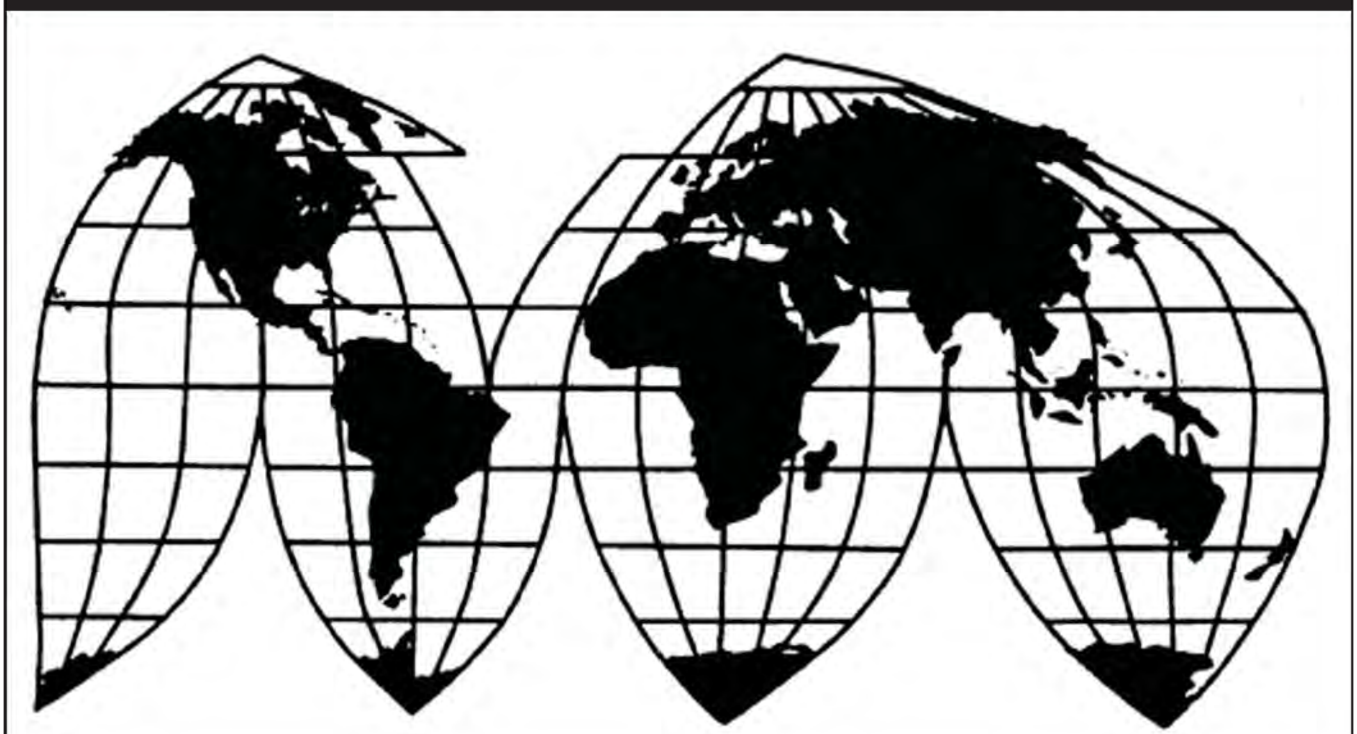
In the Matter of

CERTAIN WIRELESS CONSUMER ELECTRONICS DEVICES AND COMPONENTS THEREOF

337-TA-853

Publication 4847 **November 2018**

U.S. International Trade Commission



Washington, DC 20436

U.S. International Trade Commission

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UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

In the Matter of **CERTAIN WIRELESS CONSUMER ELECTRONICS DEVICES AND COMPONENTS THEREOF**	**Inv. No. 337-TA-853**

NOTICE OF COMMISSION DETERMINATION FINDING NO VIOLATION OF SECTION 337; TERMINATION OF INVESTIGATION

AGENCY: U.S. International Trade Commission.

ACTION: Notice.

SUMMARY: Notice is hereby given that the U.S. International Trade Commission has found no violation of Section 337 in the above-referenced investigation. The investigation is terminated.

FOR FURTHER INFORMATION CONTACT: Megan M. Valentine, Office of the General Counsel, U.S. International Trade Commission, 500 E Street, S.W., Washington, D.C. 20436, telephone (202) 708-2301. Copies of non-confidential documents filed in connection with this investigation are or will be available for inspection during official business hours (8:45 a.m. to 5:15 p.m.) in the Office of the Secretary, U.S. International Trade Commission, 500 E Street, S.W., Washington, D.C. 20436, telephone (202) 205-2000. General information concerning the Commission may also be obtained by accessing its Internet server at *http://www.usitc.gov*. The public record for this investigation may be viewed on the Commission's electronic docket (EDIS) at *http://edis.usitc.gov*. Hearing-impaired persons are advised that information on this matter can be obtained by contacting the Commission's TDD terminal on (202) 205-1810.

SUPPLEMENTARY INFORMATION: The Commission instituted this investigation on August 24, 2012, based on a complaint filed by Technology Properties Limited LLC and Phoenix Digital Solutions LLC, both of Cupertino, California; and Patriot Scientific Corporation of Carlsbad, California (collectively "Complainants"). 77 *Fed. Reg.* 51572-573 (August 24, 2012). The complaint alleges violations of section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337 ("section 337"), in the importation into the United States, the sale for importation, and the sale within the United States after importation of certain wireless consumer electronics devices and components thereof by reason of infringement of certain claims of U.S. Patent No. 5,809,336 ("the '336 patent"). The Commission's notice of investigation named the following as respondents: Acer, Inc. of Taipei, Taiwan and Acer America Corporation of San Jose, California (collectively "Acer"); Amazon.com, Inc. of Seattle, Washington ("Amazon"); Barnes and Noble, Inc. of New York, New York ("B&N"); Garmin Ltd of Schaffhausen, Switzerland, Garmin International, Inc. of Olathe, Kansas, and Garmin USA, Inc. of Olathe, Kansas (collectively

"Garmin"); HTC Corporation of Taoyuan, Taiwan and HTC America of Bellevue, Washington (collectively "HTC"); Huawei Technologies Co, Ltd. of Shenzhen, China ("Huawei Tech."); Huawei North America of Plano, Texas ("Huawei NA"); Kyocera Corporation of Kyoto, Japan and Kyocera Communications, Inc. of San Diego, California (collectively "Kyocera"); LG Electronics, Inc. of Seoul, Republic of Korea and LG Electronics U.S.A., Inc. of Englewood Cliffs, New Jersey (collectively "LG"); Nintendo Co. Ltd. of Kyoto, Japan and Nintendo of America, Inc. of Redmond, Washington (collectively "Nintendo"); Novatel Wireless, Inc. of San Diego, California ("Novatel"); Samsung Electronics Co., Ltd., of Seoul, Republic of Korea and Samsung Electronics America, Inc. of Ridgefield Park, New Jersey (collectively "Samsung"); Sierra Wireless, Inc. of British Columbia, Canada and Sierra Wireless America, Inc. of Carlsbad, California (collectively "Sierra"); and ZTE Corporation of Shenzhen, China and ZTE (USA) Inc. of Richardson, Texas (collectively "ZTE"). The Office of Unfair Import Investigations was named as a participating party.

The Commission later amended the Notice of Investigation to remove Huawei NA as a respondent and to add Huawei Device Co., Ltd. of Shenzhen, China; Huawei Device USA Inc. of Plano, Texas; and Futurewei Technologies, Inc. d/b/a Huawei Technologies (USA) of Plano, Texas ("new Huawei respondents") as respondents. 78 *Fed. Reg.* 12354 (Feb. 22, 2013). The Commission later terminated respondents Sierra and Kyocera from the investigation. Notice (Feb. 4, 2013); Notice (Sept. 20, 2013). The Commission also terminated respondents Acer and Amazon from the investigation. 78 *Fed. Reg.* 71643, 71644 (Nov. 29, 2013).

The active respondents in the investigation include: B&N, Garmin, HTC, Huawei Tech., the new Huawei respondents, LG, Nintendo, Novatel, Samsung, and ZTE. Nintendo was accused of infringing only claims 1 and 11, for which the Commission determined not to review the ALJ's findings of no infringement. *Id.*

On September 6, 2013, the ALJ issued his final initial determination ("ID"), finding no violation of Section 337 with respect to all of the named respondents. Specifically, the ALJ found that the importation requirement of Section 337 is satisfied. The ALJ also found that none of the accused products directly or indirectly infringe the asserted claims of the '336 patent. The ALJ further found that the asserted claims of the '336 patent have not been found to be invalid. The ALJ also found that respondents have not shown that the accused LG product is covered by a license to the '336 patent. The ALJ further found that Complainants have satisfied the domestic industry requirement pursuant to 19 U.S.C. § 1337(a)(3)(C) for the '336 patent because Complainants' licensing activities have a nexus to the '336 patent and because Complainants' licensing investments with respect to the '336 patent are substantial. The ALJ also found that there are no public interest issues that would preclude issuance of a remedy were the Commission to find a violation of section 337. The ALJ also issued a recommended determination, recommending that the appropriate remedy is a limited exclusion order barring entry of infringing wireless consumer electronics devices and components thereof against the active respondents. The ALJ did not recommend issuance of a cease and desist order against any respondent. The ALJ also did not recommend the imposition of a bond during the period of Presidential review. On September 12, 2013, the ALJ issued a Notice of Clarification supplementing the Final ID. Notice of Clarification Regarding Final Initial Determination (Sept.

12, 2013).

On September 23, 2013, Complainants filed a petition for review of certain aspects of the final ID concerning asserted claims 6 and 13 of the '336 patent. In particular, Complainants requested that the Commission review the ID's construction of the "entire oscillator" terms recited in claims 6 and 13 and the ID's infringement findings based on those limitations. Complainants also requested that the Commission review the ID's infringement findings concerning the limitations "varying," "independent," and "asynchronous" recited in claims 6 and 13. Also on September 23, 2013, the respondents who had not settled with Complainants filed a contingent petition for review of certain aspects of the final ID. In particular, the respondents requested review of the ID's finding that Complainants have satisfied the domestic industry requirement based on licensing activities. On October 17, 2013, the respondents filed a response to Complainants' petition for review. Also on October 17, 2013, Complainants filed a response to the respondents' contingent petition for review. Further on October 17, 2013, the IA filed a joint response to the private parties' petitions.

On October 17, 2013, Complainants filed a post-RD statement on the public interest pursuant to Commission Rule 210.50(a)(4). On October 23, 2013, the respondents also filed a submission pursuant to the rule. No responses from the public were received in response to the post-RD Commission Notice issued on September 9, 2013. *See* Notice of Request for Statements on the Public Interest (Sept. 9, 2013).

On November 25, 2013, the Commission determined to review the final ID in part with respect to the ID's findings concerning claim construction and infringement of claims 6 and 13 of the '336 patent and domestic industry. 78 *Fed. Reg.* at 71644-45. The Notice of Review included briefing questions regarding the certain issues under review. *Id.* The Commission determined not to review the remaining issues decided in the final ID. *Id.* at 71644. The Commission also extended the target date for completion of the investigation to January 29, 2014. *Id.* at 71645.

'On December 19, 2013, in reponse to a request from the parties, the Commission granted the parties an extension to file their reply submissions in response to the Commission's request for briefing to January 6, 2014, and further extended the target date for completion of the investigation to February 19, 2014. Notice (Dec. 19, 2013).

On December 23, 2013, the parties filed initial submissions responding to the Commission's request for briefing on review and concerning remedy, the public interest, and bonding. On January 6, 2014, the parties filed reply submissions. Several third parties filed submissions concerning the public interest, including: Sprint Spectrum, L.P.; CTIA—The Wireless Association®; and United States Cellular Corporation.

Having examined the record of this investigation, including the ALJ's final ID, the petitions for review and the responses thereto, and the parties' submissions on review, the Commission has determined to find no violation of section 337 with respect to the '336 patent.

Specifically, the Commission affirms the ID's claim constructions as to claims 6 and 13 of the '336 patent.

Regarding infringement, the Commission affirms with modification the ALJ's finding that the accused products do not satisfy the "entire oscillator," "varying," and "external clock" limitations of claims 6 and 13. Moreover, the Commission affirms the ALJ's finding that Complainants failed to prove indirect infringement because they failed to prove direct infringement.

With respect to the domestic industry requirement, the Commission finds that Complainants have satisfied the economic prong of the domestic industry requirement based on modified reasoning.

The investigation is terminated.

The Commission will issue an opinion reflecting its decision within seven days of this notice.

The authority for the Commission's determination is contained in section 337 of the Tariff Act of 1930, as amended (19 U.S.C. § 1337), and in Part 210 of the Commission's Rules of Practice and Procedure (19 C.F.R. Part 210).

By order of the Commission.

Lisa R. Barton
Acting Secretary to the Commission

Issued: February 19, 2014

PUBLIC CERTIFICATE OF SERVICE

I, Lisa R. Barton, hereby certify that the attached **NOTICE** has been served by hand upon, the Commission Investigative Attorney, Whitney Winston, Esq., and the following parties as indicated on **February 20, 2014.**

Lisa R. Barton, Acting Secretary
U.S. International Trade Commission
500 E Street, SW, Room 112
Washington, DC 20436

On Behalf of Complainants Technology Properties Limited LLC and Phoenix Digital Solutions LLC:

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On Behalf of Complainant Patriot Scientific Corporation:

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( ) Other:____________

On Behalf of Respondents Acer Inc., Acer America Corporation, Amazon.com Inc. and Novatel, Inc.:

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K&L GATES LLP
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( ) Other:____________

On Behalf of Respondents Garmin Ltd., Garmin International, Inc. and Garmin USA, Inc.:

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ADDUCI, MASTRIANI & SCHAUMBERG LLP
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( ) Other:____________

On Behalf of Respondent Barnes & Noble, Inc.:

Paul F. Brinkman, Esq. **Quinn Emanuel Urquhart & Sullivan, LLP** 777 6th Street, N.W., 11th Floor Washington, D.C. 20001	( ) Via Hand Delivery ( ) Via Express Delivery (x) Via First Class Mail ( ) Other:____________

On Behalf of Respondent Huawei Technologies Co., Ltd., Huawei Device Co., Ltd., Huawei Device USA Inc., and Futurewei Technologies, Inc.:

Timothy C. Bickham, Esq. **STEPTOE & JOHNSON LLP** 1330 Connecticut Avenue, NW Washington, DC 20036	( ) Via Hand Delivery ( ) Via Express Delivery (x) Via First Class Mail ( ) Other:____________

On Behalf of Respondents ZTE Corporation and ZTE (USA) Inc.:

Jay H. Reiziss, Esq. **BRINKS GILSON & LIONE** 1775 Pennsylvania Avenue, NW Suite 900 Washington, DC 20006	( ) Via Hand Delivery ( ) Via Express Delivery (x) Via First Class Mail ( ) Other:____________

On Behalf of Respondents LG Electronics, Inc. and LG Electronics U.S.A., Inc.:

Scott A. Elengold, Esq. **FISH & RICHARDSON PC** 1425 K Street, NW, Suite 1100 Washington, DC 20005	( ) Via Hand Delivery ( ) Via Express Delivery (x) Via First Class Mail ( ) Other:____________

On Behalf of Respondents Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc.:

Andrew Wainscoat, Esq. **DLA PIPER LLP (US)** 2000 University Avenue East Palo Alto, CA 94303	( ) Via Hand Delivery ( ) Via Express Delivery (x) Via First Class Mail ( ) Other:____________

On Behalf of Respondents Nintendo Co., Ltd., Nintendo of America, Inc., HTC Corporation and HTC America:

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PUBLIC VERSION

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

In the Matter of **CERTAIN WIRELESS CONSUMER ELECTRONICS DEVICES AND COMPONENTS THEREOF**	**Inv. No. 337-TA-853**

COMMISSION OPINION

On September 6, 2013, the presiding administrative law judge ("ALJ") issued his final initial determination ("ID"), finding no violation of section 337, and his recommended determination on remedy and bonding.

Having examined the record of this investigation, including the ALJ's final ID, the petitions for review and the responses thereto, and the parties' submissions on review, the Commission has determined to find no violation of section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337 ("section 337") with respect to U.S. Patent No. 5,809,336 ("the '336 patent"). Specifically, the Commission affirms the ID's claim constructions as to claims 6 and 13 of the '336 patent. Regarding infringement, the Commission affirms with modification the ALJ's finding that the accused products do not satisfy the "entire oscillator," "varying," and "external clock" limitations of claims 6 and 13. Moreover, the Commission affirms the ALJ's finding that Complainants failed to prove indirect infringement. With respect to the domestic industry requirement, the Commission finds that Complainants have satisfied the economic prong of the domestic industry requirement based on modified reasoning. The Commission has determined to adopt the ALJ's findings that are consistent with the Commission's opinion as set forth below.

I. BACKGROUND

A. Procedural History

The Commission instituted this investigation on August 24, 2012, based on a complaint filed by Technology Properties Limited LLC ("TPL") and Phoenix Digital Solutions LLC ("PDS"), both of Cupertino, California; and Patriot Scientific Corporation of Carlsbad, California (collectively "Complainants"). 77 *Fed. Reg.* 51572-573 (August 24, 2012). The complaint alleges violations of section 337 in the importation into the United States, the sale for importation, and the sale within the United States after importation of certain wireless consumer electronics devices and components thereof by reason of infringement of claims 1, 6, 7, 9-11, and 13-16 of the '336 patent. The Commission's notice of investigation named the following respondents: Acer, Inc. of Taipei, Taiwan and Acer America Corporation of San Jose, California (collectively "Acer"); Amazon.com, Inc. of Seattle, Washington ("Amazon"); Barnes and Noble, Inc. of New York, New York ("B&N"); Garmin Ltd of Schaffhausen, Switzerland, Garmin International, Inc. of Olathe, Kansas, and Garmin USA, Inc. of Olathe, Kansas (collectively "Garmin"); HTC Corporation of Taoyuan, Taiwan and HTC America of Bellevue, Washington (collectively "HTC"); Huawei Technologies Co, Ltd. of Shenzhen, China ("Huawei Tech."); Huawei North America of Plano, Texas ("Huawei NA"); Kyocera Corporation of Kyoto, Japan and Kyocera Communications, Inc. of San Diego, California (collectively "Kyocera"); LG Electronics, Inc. of Seoul, Republic of Korea and LG Electronics U.S.A., Inc. of Englewood Cliffs, New Jersey (collectively "LG"); Nintendo Co. Ltd. of Kyoto, Japan and Nintendo of America, Inc. of Redmond, Washington (collectively "Nintendo"); Novatel Wireless, Inc. of San

Diego, California ("Novatel"); Samsung Electronics Co., Ltd., of Seoul, Korea and Samsung Electronics America, Inc. of Ridgefield Park, New Jersey (collectively "Samsung"); Sierra Wireless, Inc. of British Columbia, Canada and Sierra Wireless America, Inc. of Carlsbad, California (collectively "Sierra"); and ZTE Corporation of Shenzhen, China and ZTE (USA) Inc. of Richardson, Texas (collectively "ZTE"). The Office of Unfair Import Investigations was named as a participating party. The issue of public interest was delegated to the ALJ. 77 *Fed. Reg.* at 51572.

The Commission later amended the Notice of Investigation to remove Huawei NA as a respondent and to add Huawei Device Co., Ltd. of Shenzhen, China; Huawei Device USA Inc. of Plano, Texas; and Futurewei Technologies, Inc. d/b/a Huawei Technologies (USA) of Plano, Texas ("new Huawei respondents") as respondents. 78 *Fed. Reg.* 12354 (Feb. 22, 2013). The Commission later terminated respondents Sierra, Kyocera, Amazon, and Acer from the investigation. Notice (Feb. 4, 2013); Notice (Sept. 20, 2013); 78 *Fed. Reg.* 71643-45 (Nov. 29, 2013) ("Notice of Review").[1]

On March 5, 2013, the ALJ held a Markman hearing with respect to the disputed claim language in the asserted patent. On April 18, 2013, the ALJ issued Order No. 31 ("the Markman Order") construing the disputed claim terms of the '336 patent.

On September 6, 2013, the ALJ issued his final ID, finding no violation of section 337,

[1] The remaining respondents in this investigation are as follows: B&N, Garmin, HTC, Huawei Tech. and the new Huawei respondents, LG, Novatel, Samsung, and ZTE (hereinafter "Respondents"). Respondent Nintendo was accused of infringing only claims 1 and 11, for which the Commission determined not to review the ALJ's findings of no infringement. 78 *Fed. Reg.* at 3-4.

and his recommended determination on remedy and bonding. In particular, the ALJ found that the importation requirement of section 337 is satisfied. The ALJ also found that none of the accused products directly or indirectly infringe the asserted claims of the '336 patent. In addition, the ALJ found that the asserted claims of the '336 patent have not been proven to be invalid.[2] Further, the ALJ found that respondents have not shown that the accused LG product is covered by a license to the '336 patent. With respect to the issue of domestic industry, the ALJ found that Complainants have satisfied the domestic industry requirement for the '336 patent pursuant to 19 U.S.C. ▯ 1337(a)(3)(C) for the '336 patent. The ALJ also found that no public interest issues are raised by enforcement of a remedy with respect to any of the respondents that would preclude issuance of a remedy if the Commission were to find a violation of section 337.[3]

On September 12, 2013, the ALJ issued a Notice of Clarification supplementing the final ID, explaining that the list of chips referenced on page 119 of the ID is located on page 88 of the ID. Notice of Clarification Regarding Final Initial Determination (Sept. 12, 2013) ("Notice of Clarification").

On September 23, 2013, Complainants filed a petition for review of certain aspects of the final ID, concerning only asserted claims 6 and 13 of the '336 patent. In particular, Complainants requested review of the ID's construction of the "entire oscillator" limitations recited in claims 6 and 13 and the ID's infringement findings based on those limitations.

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[2] Respondents withdrew their invalidity defenses against the '336 patent during the evidentiary hearing on June 10, 2013. Final ID at 288 (citing Tr. at 1523-1525). Pursuant to 35 U.S.C. § 282, the ALJ found that the '336 patent is, therefore, presumed to be valid. *Id.*

[3] As noted above, the Commission ordered the ALJ to take evidence and to render findings of fact concerning the public interest in the Notice of Institution. 77 *Fed. Reg.* 51572 (Aug. 24, 2012).

Complainants also requested review of the ID's infringement findings concerning the limitations "varying," "independent," and "asynchronous" recited in claims 6 and 13. Also on September 23, 2013, Respondents filed a contingent petition requesting review of the ID's finding that Complainants have satisfied the domestic industry requirement based on their licensing activities.

On November 25, 2013, the Commission determined to review the final ID in part with respect to the ID's findings concerning claim construction and infringement of claims 6 and 13 of the '336 patent. 78 *Fed. Reg.* at 71644. The Commission also determined to review the ID's finding of domestic industry to consider the question of whether the alleged industry still exists given TPL's relinquishment of its right to license the '336 patent prior to the complaint being filed and to consider whether Complainants have satisfied the economic prong of the domestic industry requirement. *Id.* at 71644-45. The Commission further determined to review the ID's statement that Complainants need not show that at least one of their licensees practices the patent-in-suit to demonstrate a license-based domestic industry. *Id.* at 71644; *see* ID at 296 (Public Ver.) (Oct. 24, 2013). The Notice of Review included briefing questions regarding the certain issues under review. *Id.* at 71644-45.

The Commission determined not to review the remaining issues decided in the final ID, including the ID's finding of no violation with respect to asserted claims 1, 7, 9, 10, 11, and 16 of the '336 patent. *Id.* at 71644. The Commission also determined not to review the ID's finding that Complainants failed to satisfy their burden of proof with respect to infringement of claims 6 and 13 as to the accused chips listed at page 88 of the ID and the products containing these chips. *Id.*[4]

On December 23, 2013, Complainants, Respondents, and the Commission investigative attorney ("IA") filed initial submissions responding to the Commission's request for briefing. On January 6, 2014, the parties filed reply submissions.

B. Patent at Issue

The '336 patent is entitled "High Performance Microprocessor Having Variable Speed System Clock," and is directed to a microprocessor system having a central processing unit ("CPU") and an oscillator, both formed on the same semiconductor die, where the CPU operates at a variable processing frequency dependent upon the clock speed of the oscillator. The patent is further directed to a microprocessor system which includes an input/output ("I/O") interface, which is independently clocked by a second clock. The '336 patent has 16 claims (following reexamination), of which claims 1, 6, 7, 9-11, and 13-16 were asserted against the respondents. Presently only claims 6 and 13 are still asserted against the active respondents.

Microprocessors must operate over: (1) variable temperature ranges, (2) voltage variations, and (3) variations in semiconductor manufacturing processing ("PVT parameters" for "process," "voltage" and "temperature"), each of which affects operating speed and transistor propagation delays. ID at 7 (citing Technology Stipulation at 2.); '336 patent at 16:44-48. Traditionally, CPUs were designed so that the circuit would function at a rated clock speed that would operate properly in the worst case conditions with respect to the PVT parameters. '336

[4] The Commission also extended the target date for completion of the investigation to January 29, 2014. *Id.* at 71645. On December 19, 2013, the Commission further extended the target date for completion of the investigation to February 19, 2014. Notice (Dec. 19, 2013).

patent at 16:48-53. As a result, prior art circuit designs were clocked a factor of two slower than their maximum theoretical performance. *Id.*

The '336 patent discloses a microprocessor system having: (1) an on-chip variable speed clock and (2) a second independent clock connected to an I/O interface. ID at 7 (citing Technology Stipulation at 2.) The '336 patent discloses a microprocessor having a clock circuit and a CPU fabricated on the same substrate. *Id.*; *see* '336 at 16:57-58. The clock circuit, thus, "tracks the parameters which similarly affect all other transistors on the same silicon die" and allows the CPU to "execute[] at the fastest speed possible[.]" '336 at 16:63-17:10, 17:19-22. The '336 patent specification discloses the following embodiment:

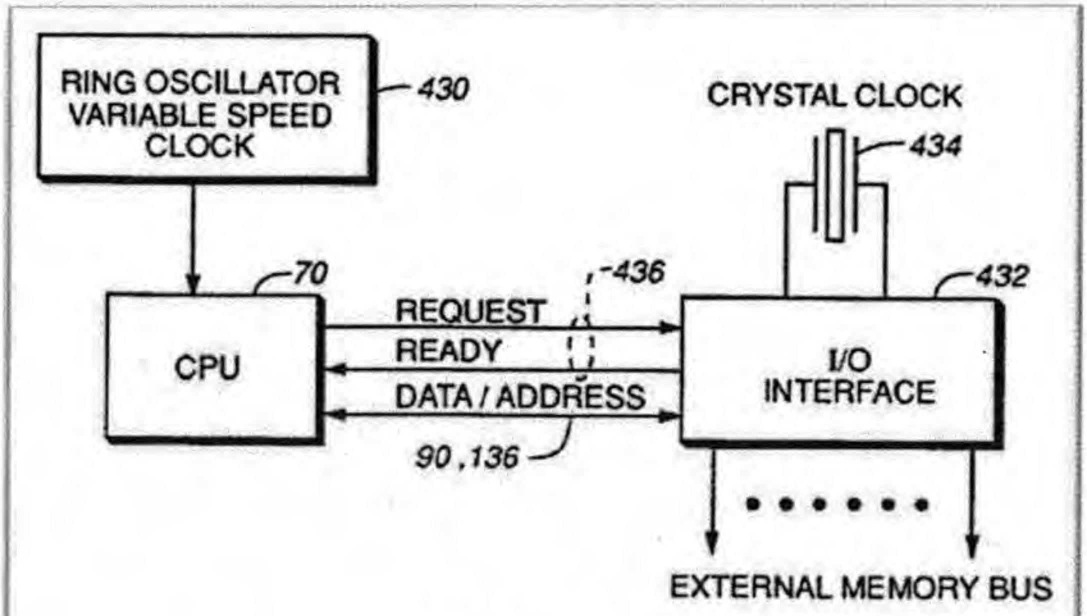

FIG._17

Id. at Fig. 17. In the illustrated embodiment, CPU **70** operates asynchronously with I/O interface **432**. ID at 7 (citing Technology Stipulation at 2.) I/O interface **432** is controlled independently by crystal clock **434**. *Id.* The on-chip ring oscillator variable speed clock **430** clocks the CPU **70**.

Id. Decoupling the variable speed of the CPU **70** from the fixed speed of the I/O interface **432** optimizes the performance of each by allowing the CPU **70** to operate at the maximum frequency dictated by the speed of the on-chip ring oscillator variable speed clock **430**. '336 patent at 17:11-37.

The asserted claims of the '336 patent recite the inventive concept of a CPU and a variable speed clock on the same chip and which vary together due to manufacturing (fabrication) and/or operational (temperature and/or voltage) parameters, where the CPU communicates with an I/O interface, which is clocked using a second clock that is independent of the variable speed clock. The claims variously recite that the first clock comprises a ring oscillator, that the operational parameters include operating temperature or operating voltage of the substrate, and that the second clock is off-chip.

C. Products at Issue

The accused products are, in general, wireless consumer electronics devices. Complainants accuse products identified in Appendix A to the final ID, including desktop personal computers, notebook personal computers, tablet computers, e-readers, navigation devices, smartphones, mobile phones, portable handheld gaming devices, mobile hotspots, USB modems, and wireless home phones (collectively, "Accused Products").[5] ID at 11. The Accused Products included microprocessor chips that are manufactured by Qualcomm, Texas Instruments

[5] The phrase "Accused Products" as used herein does not include the products listed on page 88 of the final ID. The Commission previously determined not to review the ALJ's finding that Complainants have not met their burden of proof concerning infringement for those products. 78 *Fed. Reg.* at 71644; *see* ID at 118-119;

("TI"), Samsung, and LSI. Comp. Pet. at 6. LSI's products are no longer in the investigation.[6]

The Accused Products generally use phase lock loop ("PLL") technology.[7] A PLL, using a phase checker, generally compares a signal from a reference oscillator and a signal from a second oscillator, *e.g.*, a voltage controlled oscillator ("VCO") or current controlled oscillator ("ICO"), and determines whether the two signals are in phase or out of phase. If the second signal is not in phase with the reference signal, the phase checker, using a charge pump, causes the second oscillator to speed up or slow down until the two signals are in phase. The frequency of the VCO/ICO is, therefore, set by the instruction that comes from the phase match element. The output of the VCO/ICO may be used as a clock. The output of the VCO/ICO is also fed back into the phase checker of the PLL as the second signal, thus allowing the PLL to actively adjust the frequency of the VCO/ICO based on the reference signal. Because the frequency of the VCO/ICO may be an order of magnitude higher than the frequency of the reference oscillator, the signal from the VCO/ICO is typically sent through a frequency divider, which divides the frequency such that it is in the same magnitude as the frequency of the reference signal (*e.g.*, gigahertz divided down to megahertz).

II. STANDARD ON REVIEW

Once the Commission determines to review an initial determination, its review is conducted *de novo*. *Certain Polyethylene Terephthalate Yarn and Prods. Containing Same*, Inv.

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[6] Only the Accused Products containing chips manufactured by Qualcomm, TI, and Samsung remain in the investigation. *See* Comp. Review Br. at 4 n. 2.

[7] The summary provided here of this technology is drawn from the technical tutorial given by Respondents' expert, Dr. Subramanian. Tr. at 44-53. We have avoided any discussion in his testimony that is argumentative on behalf of Respondents.

No. 337-TA-457, Comm'n Op. at 9 (June 18, 2002). Upon review, the "Commission has 'all the powers which it would have in making the initial determination,' except where the issues are limited on notice or by rule." *Certain Flash Memory Circuits and Prods. Containing Same,* Inv. No. 337-TA-382, USITC Pub. 3046, Comm'n Op. at 9-10 (July 1997) (quoting *Certain Acid-Washed Denim Garments and Accessories,* Inv. No. 337-TA-324, Comm'n Op. at 5 (Nov. 1992)). Commission practice in this regard is consistent with the Administrative Procedure Act. *Certain EPROM, EEPROM, Flash Memory, and Flash Microcontroller Semiconductor Devices and Prods. Containing Same,* Inv. No. 337-TA-395, Comm'n Op. at 6 (Dec. 11, 2000) ("*EPROM*"); *see also* 5 U.S.C. § 557(b).

Upon review, "the Commission may affirm, reverse, modify, set aside or remand for further proceedings, in whole or in part, the initial determination of the administrative law judge. The Commission may also make any findings or conclusions that in its judgment are proper based on the record in the proceeding." 19 C.F.R. § 210.45. This rule reflects the fact that the Commission is not an appellate court, but is the body responsible for making the final agency decision. On appeal, only the Commission's final decision is at issue. *See EPROM*, Comm'n Op. at 6, citing *Fischer & Porter Co. v. Int'l Trade Comm'n*, 831 F.2d 1574, 1576-77 (Fed. Cir. 1987).

III. ANALYSIS CONCERNING ISSUES THE COMMISSION HAS DETERMINED TO REVIEW

A. Claim Construction

Claim construction "begin[s] with and remain[s] centered on the language of the claims themselves." *Storage Tech. Corp. v. Cisco Sys., Inc.*, 329 F.3d 823, 830 (Fed. Cir. 2003);

Phillips v. AWH Corp., 415 F.3d 1303, 1312 (Fed. Cir. 2005) (*en banc*). The language used in a claim bears a "heavy presumption" that it has the ordinary and customary meaning that would be attributed to the words used by persons skilled in the relevant art. *Phillips*, 415 F.3d at 1312-13. To help inform the court of the ordinary meaning of the words, a court may consult the intrinsic evidence, including the claims themselves, the specification, and the prosecution history, as well as extrinsic evidence, such as dictionaries and treatises and inventor and expert testimony. *Id.* at 1314. In particular "the specification 'is always highly relevant to the claims construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.'" *Id.* at 1315 (citations omitted).

A court must "take care not to import limitations into the claims from the specification." *Abbott Labs. v. Sandoz, Inc.*, 566 F.3d 1282, 1288 (Fed. Cir. 2009). "When the specification describes a single embodiment to enable the invention, this court will not limit broader claim language to that single application 'unless the patentee has demonstrated a clear intention to limit the claim scope using "words or expressions of manifest exclusion or restriction."'" *Id.* (citations omitted). "By the same token, the claims cannot enlarge what is patented beyond what the inventor has described as the invention. Thus this court may reach a narrower construction, limited to the embodiment(s) disclosed in the specification, when the claims themselves, the specification, or the prosecution history clearly indicate that the invention encompasses no more than that confined structure or method." *Id.* (citations omitted).

"[T]he distinction between using the specification to interpret the meaning of a claim and importing limitations from the specification into the claim can be a difficult one to apply in practice … [h]owever, the line between construing terms and importing limitations can be discerned with reasonable certainty and predictability if the court's focus remains on understanding how a person of ordinary skill in the art would understand the claim terms." *Phillips*, 415 F.3d at 1323 (citations omitted). In attempting to discern whether a "patentee is setting out specific examples of the invention . . . or whether the patentee instead intends for the claims and the embodiments in the specification to be strictly coextensive . . . [t]he manner in which the patentee uses a term within the specification and claims usually will make the distinction apparent." *Id.*

"[W]here the patentee has unequivocally disavowed a certain meaning to obtain his patent, the doctrine of prosecution disclaimer attaches and narrows the ordinary meaning of the claim congruent with the scope of the surrender." *Omega Eng'g., Inc. v. Raytek Corp.*, 334 F.3d 1314, 1324 (Fed.Cir.2003). "Such a use of the prosecution history ensures that claims are not construed one way in order to obtain their allowance and in a different way against accused infringers." *Chimie v. PPG Indus., Inc.*, 402 F.3d 1371, 1384 (Fed. Cir. 2005). Disavowal of claim scope made "in the course of prosecuting [a] patent, through arguments made [by the applicant] to distinguish prior art references . . . [must] constitute clear and unmistakable surrenders of subject matter." *Cordis Corp. v. Medtronic Ave,, Inc.*, 511 F.3d 1157, 1177 (Fed. Cir. 2008).

a. Proceedings Before the ALJ

The ALJ construed the disputed claim limitation "an entire oscillator disposed upon said integrated circuit substrate" recited in claims 6 and 13 of the '336 patent to mean "an oscillator that is located entirely on the same substrate as the central processing unit and does not rely on a control signal or an external crystal/clock generator to generate a clock signal." Markman Order at 40-41; ID at 15.[8] Asserted claims 6 and 13 recite the following, with the disputed limitation highlighted:

Claim 6 of the '336 patent provides:

> 6. A microprocessor system comprising:
> a central processing unit disposed upon an integrated circuit substrate, said central processing unit operating at a processing frequency and being constructed of a first plurality of electronic devices;
> **an entire oscillator disposed upon said integrated circuit substrate** and connected to said central processing unit, said oscillator clocking said central processing unit at a clock rate and being constructed of a second plurality of electronic devices, thus varying the processing frequency of said first plurality of electronic devices and the clock rate of said second plurality of electronic devices in the same way as a function of parameter variation in one or more fabrication or operational parameters associated with said integrated circuit substrate, thereby enabling said processing frequency to track said clock rate in response to said parameter variation; an on-chip input/output interface, connected between said central processing unit and an off-chip external memory bus, for facilitating exchanging coupling control signals, addresses and data with said central processing unit; and
> an off-chip external clock, independent of said oscillator, connected to said input/output interface wherein said off-chip external clock is operative at a frequency independent of a clock frequency of said oscillator and wherein a clock signal from said off-chip external clock originates from a source other than said oscillator.

Claim 13 of the '336 patent provides:

> 13. A microprocessor system comprising: a central processing unit disposed upon an integrated circuit substrate, said central

[8] The ALJ based his construction of the limitation "an entire oscillator disposed upon said integrated circuit substrate" of claims 6 and 13 on his reasoning concerning the construction of the similar limitation "an entire ring oscillator variable speed system clock in said single integrated circuit" of claims 1 and 11. *See* Markman Order at 41. Our analysis of the ID's claim construction will, therefore, also reference his findings for the limitation in claims 1 and 11. *See id.* at 20-40.

> processing unit operating at a processing frequency and being constructed of a first plurality of electronic devices;
>
> **an entire oscillator disposed upon said integrated circuit substrate** and connected to said central processing unit, said oscillator clocking said central processing unit at a clock rate and being constructed of a second plurality of electronic devices, thus varying the processing frequency of said first plurality of electronic devices and the clock rate of said second plurality of electronic devices in the same way as a function of parameter variation in one or more fabrication or operational parameters associated with said integrated circuit substrate, thereby enabling said processing frequency to track said clock rate in response to said parameter variation;
>
> an on-chip input/output interface, connected between said central processing unit and an off-chip external memory bus, for facilitating exchanging coupling control signals, addresses and data with said central processing unit; and
>
> an off-chip external clock, independent of said oscillator, connected to said input/output interface wherein said off-chip external clock is operative at a frequency independent of a clock frequency of said oscillator and further wherein said central processing unit operates asynchronously to said input/output interface.

'336 patent C1 at 2:13-41, 3:29-4:9.

The parties' proposed constructions of the disputed limitation in claims 6 and 13 were as follows:

Claim Term	Respondents	Complainants	IA
"an entire oscillator disposed upon said integrated circuit substrate"	An oscillator that is located entirely on the same semiconductor substrate as the central processing unit and does not rely on a control signal or an external crystal/clock generator to generate a clock signal	An oscillator that is located entirely on the same semiconductor substrate as the central processing unit	An oscillator that includes all components that determine oscillator frequency located on the same semiconductor substrate as the CPU

Markman Order at 40.

Complainants argued during the Markman proceedings that the "entire oscillator" limitation merely requires "a[n] . . . oscillator with circuitry that is entirely integrated in the same semiconductor as the . . . CPU." *Id.* at 20. Complainants asserted that the claim language does not suggest that the claimed "oscillator cannot use a 'control signal' or reference an 'external crystal.'" *Id.* Respondents argued that the patent applicants clearly disavowed reliance on "any off-chip crystals, off-chip clock generators, or control signals" during the initial prosecution of the '336 patent. *Id.* at 21-22. The IA argued that, during prosecution, the patent applicants explicitly amended the claims and presented arguments distinguishing the claims from prior art systems that relied on off-chip components, *e.g.*, an external crystal, or control signals to determine clock frequency. *Id.* at 29-30.

The ALJ rejected Complainants' proposed construction because it did not account for the prosecution history. *Id.* at 38. The ALJ noted that, in distinguishing over U.S. Patent No. 4,503,500 to Magar ("Magar"), the patent applicant specifically argued that "Magar's clock generator 'is not an entire oscillator in itself' because it 'relies on an external crystal connected to terminals X1 and X2 to oscillate.'" *Id.* (citing JXM-16 at TPL853_02954559).[9] The ALJ further noted the patent applicants' assertion that the clock of Magar "is specifically distinguished from the instant case in that it is *both* fixed-frequency (being crystal based) and requires an external crystal or external frequency generator.'" *Id.* (emphasis in original) (citing JXM-16 at TPL853_02954561). The ALJ found that Respondents' proposed construction properly

[9] The citations to the prosecution history in this Opinion refer to the final admitted exhibits, updating the preliminary exhibits citations in the Markman Order.

"expresses the fact that the [oscillator] is a self-contained oscillator and clock which does not utilize external components (as is disclosed in Fig. 18 of the '336 patent)." *Id.* at 39.

The ALJ further found that Respondents' proposed construction captures the patent applicants' distinction over U.S. Patent No. 4,670,837 to Sheets ("Sheets"), where the applicants argued that "'[t]he present invention does not similarly rely upon provision of frequency control information to an external clock[;] . . . Sheets' system for providing clock control signals to an external clock is thus seen to be unrelated to the integral microprocessor/clock system of the present invention.'" *Id.* (citing JXM-17 at TPL853_02954574). The ALJ rejected the IA's proposed construction as being overly broad in requiring that "all components that determine clock frequency" be included in the construction of the limitation "entire oscillator" because "[h]ow literally the word 'determine' is to be applied in the context of the claim is a subject that invites further debate." *Id.*

b. Analysis

The Commission affirms the ALJ's claim construction of the claim limitation "an entire oscillator disposed upon said integrated circuit substrate," and provides additional reasoning in support of this construction. Specifically, while the ALJ's discussion relies exclusively on the prosecution history (*see* Markman Order at 38-41), both the language of claims 6 and 13, as well as the patent specification, further bolster his construction.

With respect to the claim language, the limitation in question cannot be fully understood by reading it in a vacuum without reference to the claim as a whole. Claims 6 and 13 both recite the following:

> **an entire oscillator disposed upon said integrated circuit substrate** and connected to said central processing unit, said oscillator clocking said central processing unit at a clock rate and being constructed of a second plurality of electronic devices, *thus varying the processing frequency* of said first plurality of electronic devices [*i.e.*, the CPU] *and the clock rate* of said second plurality of electronic devices *in the same way* **as a function of parameter variation in one or more fabrication or operational parameters associated with said integrated circuit substrate,** thereby enabling said processing frequency to track said clock rate *in response to said parameter variation*

'336 patent C1, 2:18-30, 3:34-46 (emphasis added). By the plain language of the claims, the "clock rate" of the oscillator and the CPU must "vary in the same way[10] . . . as a function of" the PVT parameters of the chip on which both the oscillator and CPU are situated such that the processing frequency of the CPU tracks the clock rate of the oscillator. Notably, the claim does not recite that the processing frequency and clock rate vary "as a function of . . . *at least* one or more fabrication or operation parameters associated with said integrated circuit substrate[.]" The addition of "at least" in the claim would indicate that the processing frequency and clock rate may vary due to other factors in addition to the fabrication and/or operation parameters. Far from simply requiring that the "entire oscillator" be disposed upon the same chip as the CPU, the plain language of the claim requires that the operating rates of the oscillator and the CPU be allowed to change in response to the chip's PVT parameters as opposed to as the result of some other influence.

The specification of the '336 patent is consistent with this interpretation. The specification explains in detail that the failure of prior art "[t]raditional CPU designs" is that the

[10] Complainants do not challenge the ALJ's construction of the limitation "varying … in the same way" as having its plain and ordinary meaning. *See* Markman Order No. 31 at 68.

chips were deliberately clocked at the slowest speed necessary to accommodate "the worst case of the [PVT] parameters." '336 patent at 16:44-54. By contrast, the microprocessor of the disclosed invention operates such that "[t]he ring oscillator frequency is determined by the [PVT] parameters[.]" *Id.* at 16:59-60. Similarly, all other components on the chip, including the CPU, are affected by the same PVT factors as the oscillator. *Id.* at 16:65-67. The specification teaches using this fact to solve the problem of prior art microprocessors by fabricating the oscillator clock "on the same silicon chip as the rest of the microprocessor **50**" so that all components, including the oscillator and the CPU, are affected by identical PVT factors. 16:57-58. The specification further explains that

> By deriving system timing from the ring oscillator **430**, ***CPU 70 will always execute at the maximum frequency possible***, but never too fast. For example, if the processing of a particular die is not good resulting in slow transistors, the latches and gates on the microprocessor **50** will operate slower than normal. Since the microprocessor **50** ring oscillator clock **430** is made from the same transistors on the same die as the latches and gates, it too will operate slower (oscillating at a lower frequency), providing compensation which allows the rest of the chip's logic to operate properly.

Id. at 16:67-17:10 (emphasis added). As with the claim language, the teaching of the specification is antithetical to allowing outside influences to affect the clock rate of the on-chip oscillator, which is how prior art microprocessors operated. Rather, the specification explicitly teaches precisely the opposite, that the use of external sources for timing was inefficient and that the solution is to allow the clock rate of the oscillator to vary solely due to the same parameters that are affecting the operational efficiency of the remainder of the on-chip components, *e.g.*, the CPU. As such, the specification of the '336 patent does not allow for the on-chip oscillator to be influenced by some outside source, *e.g.* an external crystal such as is used in a PLL, which, by definition, isolates the clock rate of the on-chip oscillator from the effects of the chip's PVT parameters.

With respect to the prosecution history, Complainants argue that the prior art references cited by the USPTO examiner—Magar and Sheets—lacked any on-chip oscillator, and that the patent applicants did not disclaim[] any use of a control signal or an external crystal/clock generator to generate a clock signal. A close reading of the prosecution history, however, shows that Complainants are mistaken.

The examiner initially rejected certain claims of the patent application as obvious over Sheets. JXM-17 ('336 prosecution history, Apr. 11, 1996 amendment). Specifically, the examiner noted that "Sheets teaches a microprocessor system having a microprocessor and a variable speed clock generator[,]" contending that, although Sheets does not teach that the "clock is implemented using a ring oscillator . . . 'a counter is a basis component of [a] clock generator.'" *Id.* at TPL853 02954573. In response, the applicants contended that Sheets teaches "the use of discrete, commercially available microprocessor chips . . . driven by a separate clock (VCO **12** of FIG. 1)" and further teaches "a technique for adjusting the frequency of VCO **12** in accordance with a desired operating frequency of the microprocessor **101**." *Id.* at TPL853 02954574. The applicants noted that "[s]pecifically, a digital word indicative of this desired operating frequency is written by microprocessor **101** to VCO **12** by way of data bus **104** as a means of adjusting the clock frequency." *Id.* The applicants contrasted the microprocessor disclosed in Sheets with the microprocessor taught by the patent application, arguing that:

> The present invention does not similarly rely upon provision of frequency control information to an external clock, but instead contemplates providing a ring oscillator clock and the microprocessor within the same integrated circuit. The placement of these elements within the same integrated circuit obviates the need for provision of the type of frequency control information described by Sheets, since *the microprocessor and clock will naturally tend to vary commensurately in speed as a function of various parameters (e.g., temperature) affecting circuit performance.* Sheets' system for providing clock control signals to an external clock is thus seen to be unrelated to the integral microprocessor/clock system of the present invention.

Id. (emphasis added). The applicants further noted the rejected claims were amended to explicitly recite that the "ring oscillator and microprocessor are provided within the same integrated circuit" and that the transistors that comprise the ring oscillator clock "have operating characteristics which *vary similarly* to operating characteristics of transistors included within the microprocessor, *thereby enabling the processing frequency of the microprocessor to track the speed of the ring oscillator clock*[.]" *Id.* (emphasis added). The applicants argued that, in contrast, the "VCO **12** [of Sheets] . . . clearly is not adapted to mimic variation in the speed of transistors within the microprocessor **101**." *Id.* at TPL853 029545745.

Although Sheets does teach "provid[ing] 'control information' – in the form of a 'digital word' – to an external clock," in traversing the rejection over Sheets, the applicants clearly argued that, unlike the invention claimed in the patent application, Sheets not only fails to disclose an on-chip clock, but also fails to disclose a clock that "is [] adapted to mimic variation in the speed of" the CPU "*as a function of various parameters (e.g., temperature) affecting circuit performance.*" Based on this amendment, the patent applicants indicated that the invention recited in the claims of the patent application requires that the CPU "track the speed" of the on-chip clock due to the operating parameters of the chip, not merely that the clock must be on the same chip as the CPU.

The patent applicants subsequently clarified the novel aspect of the invention in an amendment submitted in response to a telephone interview between the patent examiner and the applicants' counsel, during which counsel further discussed the distinction of the invention over Sheets. JXM-21 ('336 prosecution history, Jan. 13, 1997 amendment). In the amendment, the applicants noted that:

> In the interview, the fact that operating characteristics of electronic devices in an integrated circuit will track one another *depending on variations in the manufacturing process used to make the integrated circuit* was discussed. . . . This fact is utilized in the present invention to provide a variable speed clock for the microprocessor, with the clock speed varying in the same way as variations in the operating characteristics of the electronic devices making up the microprocessor. *This allows the microprocessor to operate at its fastest safe operating speed, given its manufacturing process or changes in its operating temperature or voltage. In contrast, prior art microprocessor systems are given a rated speed based on possible worst case operating conditions and an external clock is used to drive them no faster than the rated speed.* Under other than worst case operating conditions, the prior art microprocessors are actually capable of operating at a faster clock speed than their rated speed.
>
> . . .
>
> Even if the Examiner is correct that the variable clock in Sheets is in the same integrated circuit as the microprocessor of system **100**, that still does not give the claimed subject matter. In Sheets, a command input is required to change the clock speed. *In the present invention, the clock speed varies correspondingly to variations in operating parameters of the electronic devices of the microprocessor because both the variable speed clock and the microprocessor are fabricated together in the same integrated circuit. No command input is necessary to change the clock frequency.*

Id. at TPL853_00002448-49 (emphasis added). Based on this later filing, it is clear that the patent applicants explicitly disclaimed the use of command signals to adjust the clock rate of the on-chip oscillator.

The patent examiner next rejected certain claims of the patent application as obvious over Magar in view of Pelgrom. JXM-19 ('336 prosecution history, Apr. 3, 1997 office action). The examiner relied on Figure 1 of Magar as disclosing "a data processing system having a single chip microcomputer **10** and an I/O interface **12[,]**" and the examiner relied on Figure 2a of Magar to show "that the microprocessor includes [a] clock generator and a CPU[.]" *Id.* at TPL853_00002434. The examiner further relied on Pelgrom's teaching that "electronic components would exhibit [the] same characteristics if they are manufactured by the same process technology" to conclude that "it would have been obvious, from the teaching of Pelgrom, to a person of ordinary skill in the art to have the components of Magar'[s] microprocessor and clock (oscillator) [made] of the same process for ensuring processing frequency of the CPU to track [*sic*] the clock rate in response to the parameter variations." *Id.*

In overcoming the rejection, the patent applicants distinguished between the "conventional crystal clock" disclosed in Magar and the "variable speed clock" of the invention, describing the difference as "a primary point of departure from the prior art[.]" JXM-18 ('336 prosecution history, July 7, 1997 amendment) at TPL853_00002427. The applicants went on to explain that:

> Contrary to the Examiner's assertion in the rejection that "one of ordinary skill in the art should readily recognize that the speed of the CPU and the clock vary together due to manufacturing variation, operating voltage and temperature of the IC", [*sic*] *one of ordinary skill in the art should readily recognize that the speed of the CPU and the clock do not vary together due to manufacturing variation, operating voltage and temperature of the IC in the*

> *Magar microprocessor, as taught in the above quotation from the reference. This is simply because the Magar microprocessor clock is frequency controlled by a crystal which is also external to the microprocessor. Crystals are by design fixed-frequency devices whose oscillation speed is designed to be tightly controlled and to vary minimally due to variations in manufacturing, operating voltage and temperature. The Magar microprocessor in no way contemplates a variable speed clock as claimed.*
>
> ...
>
> The present invention is unique in that it applies, and can only apply, in the circumstance where the oscillator or variable speed clock is fabricated on the same substrate as the driven device. The example given is a non-crystal controlled circuit, a ring oscillator. *A ring oscillator will oscillate at a frequency determined by its fabrication and design and the operating environment.* Thus in this example, the user designs the ring oscillator (clock) to oscillate at a frequency appropriate for the driven device when both the oscillator and the device are under specified fabrication and environmental parameters. *Crucial to the present invention is that since both the oscillator or variable speed clock and [the] driven device are on the same substrate, when the fabrication and environmental parameters vary, the oscillation or clock frequency and the frequency capability of the driven device will automatically vary together.* This differs from all cited references in that the oscillator or variable speed clock and the driven device are on the same substrate, and that *the oscillator or variable speed clock varies in frequency but does not require manual or programmed inputs or external or extra components to do so.*

Id. at TPL853_00002427-28 (emphasis added). The patent applicants specifically distinguished the present invention from Magar and other similar prior art microprocessors which "operate at a frequency determined by [an] external crystal." *Id.* at TPL853_00002428.

Finally, in responding to yet another rejection over Magar and Pelgrom, the patent applicants submitted an additional response, in which the claims were amended to clarify that the claimed oscillator is on-chip. JXM-16 ('336 prosecution history, Feb. 10, 1998 amendment) at TPL853 02954559. In further distinguishing the invention over Magar, the patent applicants stated that:

> Magar's clock generator relies on an external crystal connected to terminals Xl and X2 to oscillate, as is conventional in microprocessor designs. It is not an entire oscillator in itself. *And with the crystal, the clock rate generated is also conventional in that it is at a fixed, not a variable, frequency. The Magar clock is comparable in operation to the conventional crystal clock **434** depicted in Fig. 17 of the present application for controlling the I/O interface at a fixed rate frequency, and not at all like the clock on which the claims are based*, as has been previously stated.
>
> ...
>
> The signals PHASE 0, PHASE 1, PHASE 2, and PHASE 3 in Applicant's Fig 18 are synonymous with Ql, Q2, Q3, and Q4 depicted in Magar Fig. 2a. *The essential difference* is that the frequency or rate of the PHASE 0, PHASE 1, PHASE 2, and PHASE 3 signals *is determined by the processing and/or operating parameters of the integrated circuit* containing the Fig. 18 circuit, while the frequency or rate of the Ql, Q2, Q3, and Q4 signals depicted in Magar Fig. 2a are *determined by the fixed frequency of the external crystal connected to the circuit* portion outputting the Ql, Q2, Q3, and Q4 signals shown in Magar Fig. 2a.
>
> The Magar teaching is well known in the art as a conventional crystal controlled oscillator. *It is specifically distinguished from the instant case in that it is **both** fixed-frequency (being crystal based) **and** requires an external crystal or external frequency generator.*

Id. at TPL853 02954559-61 (emphasis added). The patent applicants' statement in the final sentence quoted above, in particular, shows that the applicants intended to disclaim, not only an external crystal/frequency generator, but ***also*** a fixed-frequency, crystal controlled oscillator. Thus, the "entire oscillator" limitation requires both that the circuitry required to generate and/or determine (or adjust) the frequency of the oscillator's clock rate must be entirely on-chip.

The Commission, therefore, affirms the ALJ's construction of the limitation "entire oscillator" in claims 6 and 13 of the '336 patent to mean: "an oscillator that is located entirely on the same substrate as the central processing unit and does not rely on a control signal or an external crystal/clock generator to generate a clock signal" with the elaboration discussed above.

B. Direct Infringement

The unfair acts covered under section 337 include "all forms of infringement, including direct, contributory, and induced infringement." *Certain Home Vacuum Packaging Machines*, Inv. No. 337-TA-496, Order No. 44, 2004 ITC LEXIS 202 * 2, n.2 (Mar. 3, 2004); *see Spansion, Inc. v. Int'l Trade Comm'n,* 629 F.3d 1331, 1355 (Fed. Cir. 2010) (affirming Commission's finding of a violation of section 337 based on contributory infringement); *see also Kyocera Wireless Corp. v. Int'l Trade Comm'n,* 545 F.3d 1340 (Fed. Cir. 2008) (ruling on the merits of the Commission's finding that respondent had violated section 337 based on induced infringement).[11] To establish infringement, there must be a preponderance of evidence. *See Kao Corp. v. Unilever United States, Inc.*, 441 F.3d 963 (Fed. Cir. 2006). A determination of patent infringement encompasses a two-step analysis. *Advanced Cardiovascular Sys., Inc. v. Scimed Life Sys., Inc.*, 261 F.3d 1329, 1336 (Fed. Cir. 2001) ("*Scimed*"). First, the court determines the scope and meaning of the patent claims asserted, and then the properly construed claims are compared to the allegedly infringing device. *Id.* "Literal infringement of a claim exists when each of the claim limitations reads on, or in other words is found in, the accused device." *Allen Eng. Corp. v. Bartell Indus.*, 299 F.3d 1336, 1345 (Fed. Cir. 2002). Under the doctrine of equivalents, "a product or process that does not literally infringe upon the express terms of a

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[11] The U.S. Court of Appeals for the Federal Circuit recently addressed under what circumstances a section 337 violation may be based on induced infringement. *Suprema v. Int'l Trade Comm'n*, No. 12-1170, 2013 WL 6510929, at *5-12 (Fed. Cir. 2013).

patent claim may nonetheless be found to infringe if there is equivalence between the elements of the accused product or process and the claimed elements of the patented invention." *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 21 (1997).

Direct infringement includes the making, using, selling, offering for sale and importing into the United States an infringing product, without authority. 35 U.S.C. § 271(a). To prove direct infringement, the plaintiff must establish by a preponderance of the evidence that one or more claims of the patent read on the accused device either literally or under the doctrine of equivalents. *Scimed*, 261 F.3d at 1336.

The ID finds that the Accused Products do not directly infringe the asserted claims of the '336 patent. ID at 17-275. In particular, the ALJ found that Complainants failed to provide any evidence concerning infringement under the doctrine of equivalents. ID at 275. Complainants did not challenge this finding. In addition, the ALJ found that Complainants failed to present sufficient evidence to show that the TI audio codecs found in the accused Nintendo products include a CPU, as required by asserted claims 6 and 13. *Id.* at 270-275. Complainants did not contest this finding.

Furthermore, the ID finds that Complainants failed to present sufficient evidence to show that any of the products listed in Attachments B and C of Respondents' post-hearing brief infringes any asserted claim of the ' 336 patent. *Id.* at 284-287. Specifically, the ALJ found that "[t]o the extent those [listed] products overlap with the Accused Products as defined above, the [ALJ] finds that those products do not infringe the asserted claims of the '336 patent[.]" *Id.* at 287. Complainants did not contest this finding. The ID also finds that that there is insufficient support in the record to determine whether the accused [ ] chips listed at page 88 of the

ID contain an oscillator as required by claims 6 and 13 of the '336 patent. ID at 118-119. The Commission determined not to review this finding. 78 *Fed. Reg.* at 71644.

This Opinion, therefore, address only the following issues regarding direct infringement: (1) the ID's finding that the Accused Products do not satisfy the "entire oscillator" limitation of claims 6 and 13, focusing in particular on the use of "current-starved" technology [ ]; (2) the ID's finding that the Accused Products do not satisfy the "varying" limitations of claims 6 and 13; and (3) the ID's findings concerning the "external clock" limitations.

1. "Entire Oscillator"

a. Proceedings Before the ALJ

Based on his construction the limitation "an entire oscillator disposed upon said integrated circuit substrate" recited in claims 6 and 13 to mean "an oscillator that is located entirely on the same substrate as the central processing unit and does not rely on a control signal or an external crystal/clock generator to generate a clock signal" (Markman Order at 40-41), the ALJ found that the Accused Products do not satisfy the "entire oscillator" limitations of the asserted claims. ID at 118-132.

Specifically, the ALJ found that Respondents' expert, Dr. Subramanian, and TI's corporate witnesses, Mr. Haroun and Mr. Kekre, "all testified that the PLLs in the Accused Products require, and thus rely on, a control signal to determine the generated clock frequency signal." *Id.* at 119. The ALJ further noted that Complainants' expert, Dr. Oklobdzija, "affirm[ed] that a PLL has circuitry that is used to set the frequency of a VCO to a multiple of another oscillator frequency functioning as a reference clock." *Id.*

The ALJ also noted that, in the textbook co-authored by Dr. Oklobdzija, a section of the book concerning clock generation states that "the VCO generates the internal clock by virtue of a control voltage created in response to the external reference." *Id.* at 120 (citing RX-2283 at GARMIN 92907). The ALJ found that "this process includes more than simply delivering sufficient power to enable the oscillator to oscillate." *Id.* at 121. Rather, "[t]he clock signal that is generated is a product of a control signal provided by the PLL and the reference frequency of the external crystal/clock." *Id.* The ALJ concluded that "the processes of setting the frequency of a clock signal and generating a clock signal are inseparable, because a clock signal must have a frequency, since its sole purpose is to provide a frequency for timing the operations of devices." *Id.* The ALJ further found that "[t]he external reference signal is integral to the generation of a clock signal, and by acknowledging that the PLL sets the frequency of the VCO in reaction to a reference clock signal from an external crystal or clock generator, Dr. Oklobdzija concedes that the PLL and its components rely on an external crystal/clock to generate a clock signal." *Id.* at 121-122. The ALJ, therefore, found that none of the Accused Products satisfy the "entire oscillator" limitations of the asserted claims. *Id.* at 122.

The ALJ rejected Complainants' argument that the Accused Products infringe even though they use an external crystal/clock generator to set or adjust the frequency of a clock signal. *Id.* at 122-124. Accordingly, the ALJ found that the oscillators in the Accused Products rely on control signals from within the PLL and on an external crystal/clock generator to generate a clock signal. *Id.* at 124. In particular, Respondents argued that "for the PLLs whose structures are known, the ring oscillators used in the VCO or ICO, as the case may be, cannot operate without a control signal from other PLL circuitry" and that "*all* of the ring oscillators use [ ] and therefore require and rely on control signals from other PLL circuitry to operate." ID at 69 (emphasis added); *see also id.* at 69-73 (Respondents discussion of the so-called [ ] in the accused [ ]. The ALJ found that the so-called [ ] in the Accused Products operate only [ ] and that "[w]ithout those control signals [ ], 'oscillation unequivocally stops.'" *Id.* at 125 (citing Subramanian Tr., 1502-03).

The ALJ, however, addressed only the "current-starved" technology used in the accused [ ] chips and did not analyze the accused [ ] chips. *See* ID at 125-132. The Commission, therefore, determined to review the ID's findings concerning the "entire oscillator" limitation and posed the following question in the Notice of Review:

> With respect to the Accused Products using so-called "current-starved technology," specifically identify which accused chips are implicated, cite to the relevant evidence in the record, and discuss whether those products satisfy the "entire oscillator" limitation of claims 6 and 13 of the '336 patent.

78 *Fed. Reg.* at 71644.

b. Analysis

The parties agree that all of the [ ] chips in the Accused Products use "current-starved" technology. The parties also clarified in their submissions on review that the accused LSI chips only concerned terminated respondent Acer and are, therefore, no longer a part of the investigation. *See* 78 *Fed. Reg.* at 4 (terminating Acer). The primary dispute concerning the "entire oscillator" limitation comes down to how broadly the ALJ's construction of that limitation can be fairly read. Specifically, in responding to the Commission's request for briefing concerning the "entire oscillator" limitation, Complainants again argue (as they did before the ALJ) that the ring oscillators [ ] as long as they have a power supply, emphasizing the alleged difference between the PLLs in the Accused Products using an external crystal to set the frequency of the controlled oscillators and using an external crystal to generate the clock signal of the controlled oscillators.

We find that the ALJ's application of his construction of the "entire oscillator" limitation to the Accused Products was correct, including in particular his discussion of the intricate relationship between the generation and frequency of a clock signal. ID at 119-122. Specifically, the basis of the ALJ's finding concerning the reliance of the oscillators in the Accused Products on an "external crystal/clock generator" is that a "PLL controls the frequency of [a] VCO or ICO and adjusts it to match the reference frequency" and that "a PLL has circuitry that is used to set the frequency of a VCO to a multiple of another oscillator frequency functioning as a reference clock." ID at 119 (citing Oklobdzija Tr., 831, 824). The ALJ noted that Dr. Oklobdzija and his fellow authors concluded in a graduate-level textbook that, in a PLL, "the VCO generates the internal clock by virtue of a control voltage created in response to the external reference." *Id.* at 120. The ALJ found that "this process includes more than simply delivering sufficient power to enable the oscillator to oscillate[.]" *Id.* at 121. Furthermore, the ALJ found that "the process of setting the frequency of a clock signal and generating a clock signal are inseparable, because a clock signal must have a frequency, since it sole purpose is to provide a frequency for timing the operations of devices." *Id.* We affirm the ALJ's finding and analysis.

With respect to the use of "control signals," the ALJ found that "there are control signals within the PLLs themselves that are used to control the oscillation of the oscillators." *Id.* at 122 (citing Subramanian, Tr., 1316-32), 124.[12] The ALJ found that, in the [ ] shown in RX-621C, [ ]. *Id.* at 125.[13] In particular, he found that, even when [ ]. *Id.* at 125-127 (citing Subramanian Tr., 1502-05). He also found that, contrary to Complainants' assertions, the [ ] shown in RX-621C [ ]. ID at 128-129.

In finding that the [ ], the ALJ credited Dr. Subramanian's testimony that, according to the graph illustrated in Figure 2-11 (RX-621C at [ ]. *Id.* at 130-131 (citing Subramanian Tr., 1454-1455). The ALJ disagreed with Complainants' argument that the graph at Figure 2-11 shows that the [ ]. *Id.* Complainants' arguments provide no reasoned basis to disturb the ALJ's reliance on Dr. Subramanian's testimony.

Although the ALJ doesn't explicitly address the issue, we note that his analysis regarding the [ ] shown in RX-621C applies equally to the configuration of the same

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[12] The ID mistakenly cites Subramanian's testimony at beginning at 1306 instead of 1316.

[13] Respondents assert that [ ] use a [ ] and exhibit the same behavior as the [ ]. As such, we reject Respondents assertion in their reply submission that the [ ] is not representative of at least the [ ].

[ ] shown in Figures RDX-4.118C and 4.129C. *See* ID at 31-35. As with [ ] shown in RX-621C, the chip in RDX-4.129C provides [ ] *See* Subramanian Tr., 1448:25-1449:10 (discussing [ ]). As such, [ ] (*e.g.*, [ ] in RX-621C or [ ] in RDX-4.129C) cannot satisfy the requirements of claims 6 and 13 that the "entire oscillator" be "clocking said [CPU] at a clock rate." 336 patent at 2:18-21, 3:35-4-37. The ALJ correctly found that the Accused Products containing Qualcomm chips use a control signal to generate a clock signal and adopt the ALJ's finding of no infringement on this point.

With respect to the accused TI OMAP chips, we note that Complainants make no specific allegations regarding these chips in their review submissions, instead focusing their discussion entirely on the accused Qualcomm chips. The ALJ found that the accused TI OMAP chips also require a control signal. ID at 131. Specifically, the ALJ relied on the testimony of TI's corporate witness, Mr. Haroun, that the [ ]. Furthermore, Mr. Haroun stated that [ ].

The ALJ also relied on Mr. Haroun's testimony that [

]. The ALJ noted that Dr. Subramanian testified consistently. *Id.* at 131-132 (citing Subramanian Tr., 1186-89, 1319-20). Based on the ALJ's analysis, we agree that the ALJ correctly found that the Accused Products containing TI OMAP chips use a control signal to generate a clock signal and adopt the ALJ's finding of no infringement on this point.

With respect to the accused Samsung chips, the ID offers no analysis to support the ALJ's blanket finding that none of the oscillators in the Accused Products satisfy the "entire oscillator" limitation. *See* ID at 132. This is, however, not surprising considering Complainants made no specific arguments before the ALJ concerning the Samsung chips except to assert that they all use PLLs having VCOs that are ring oscillators. ID at 22. In their review submission, Complainants note only that the oscillators in the accused Samsung chips [ ] such that [ ]. The applied current, however, is the precise "control signal" that takes the Accused Products out of the scope of the "entire oscillator" limitation. We, therefore, affirm the ALJ's finding of no infringement with respect to the Samsung chips.

Respondents also provide specific evidence concerning the Samsung chips, which Complainants do not rebut. Specifically, Dr. Subramanian describes the accused Samsung PLLs as [

] *See* Subramanian Tr., 1198:14-1199:5, 1200:15-23; JX37C at 853Samsung 170096-97 [ ]; *see also* Oklobdzija Tr., 988:18-989:15 [ ]. Respondents further note that exhibit JX-37C shows that [ ] *Id.* (citing Subramanian Tr., 1199:6-13; JX37C at 853Samsung 170096-97). Based on this evidence, we find that the Accused Products containing Samsung chips use control signals to generate a clock signal and, therefore, do not infringe the "entire oscillator" limitation.

Based on the preceding discussion, the Commission affirms the ALJ's finding that the Qualcomm, TI OMAP, and Samsung chips in the Accused Products do not satisfy the "entire oscillator" limitation due to the fact that all of the accused chips use PLLs having [ ].

2. "Varying . . . in the Same Way"

a. Proceedings Before the ALJ

The ALJ found that the limitation "varying the processing frequency of said first plurality of electronic devices and the clock rate of said second plurality of electronic devices in the same way" of claims 6 and 13 requires no construction and would have been understood by a person of ordinary skill in the art at the time of the invention according to its plain and ordinary meaning." Markman Order No. 31 at 68; *see* ID at 16. Based on this claim construction, the ID finds that the Accused Products do not satisfy the "varying … in the same way" limitations of the asserted claims. ID at 189-213. No party petitioned for review of this construction.

With respect to infringement, the ALJ found, as an initial matter, that Complainants failed to "perform any testing and did not produce any empirical evidence of their own, despite the fact that Dr. Oklobdzija . . . thought it appropriate and desirable to do so." *Id.* at 190. While the ALJ did not find that Complainants' failure was fatal to its infringement case, he noted that "under the particular facts and circumstances of this case, the weight of the evidence is affected by the presence or absence, as the case may be, of evidence of that caliber." *Id.* at 192, n. 19. The ALJ concluded that the Accused Products, which use PLLs, do not infringe because "a PLL outputs a very stable and fixed frequency," as shown by the results of Dr. Subramanian's tests. *Id.* at 182-193.

The ALJ took particular note of Complainants' argument that the processing frequency of the CPU will always track the "entire" oscillator's clock rate because the oscillator's clock rate is what clocks the CPU. *Id.* at 193-194. The ALJ found that Complainants reasoning is flawed because "it avoids the fact that the 'entire' oscillator terms are inextricably tied to the 'varying' term of the claims." *Id.* at 194 (citing Markman Order No. 31 at 42). The ALJ found that "the evidence shows that none of the Accused Products meet any of the 'entire' limitations of the asserted claims[] because the frequencies of the oscillators in the Accused Products are fixed by external crystals/clock generators as well as internally by the PLLs." *Id.* at 194. The ALJ rejected Dr. Oklobdzija's testimony about infringement of the "varying" terms as improperly divorced from the effects of external crystals and their associated PLLs. *Id.* at 194-195. By contrast, the ALJ found that Dr. Subramanian properly "took into account the 'entire' terms, as construed, in addressing the 'varying' limitations and that the testing he described and the data obtained therefrom are reliable and support his opinion" of non-infringement. *Id.* at 196.[14] Complainants did not challenge the ALJ's findings concerning the results of Dr. Subramanian's testing in their petition for review.

Complainants further asserted that the chip manufacturing industry "engages in a common practice called 'binning'" to account for the varying performance levels of chips due to the manufacturing process, and that this procedure satisfies the "varying" limitations of claims 6 and 13. *Id.* at 143-144.. *Id.* at 143-144. The ALJ found that "while binning is a reflection that variations exist in the performance capabilities of microprocessors . . . this does not constitute evidence that any of the Accused Products meet the 'varying' limitations of the asserted claims." *Id.* at 209. Specifically, the ALJ concluded that "Dr. Subramanian's testimony and the testing it was based on empirically demonstrate that the operation frequencies of the chips, no matter their individual differences[,] are fixed." *Id.* (citing Subramanian Tr., 1265-66).

Complainants argued in their petition for review that the ALJ failed to take into account the specific language of asserted claims 6 and 13 and consider whether the CPU and clock rate of the oscillator vary in the same way due strictly to their fabrication process, as opposed to operational parameters. Complainants contended that the fact that the chips in the Accused Products are subjected to "binning" proves that processing frequency of the CPU in the Accused Products will always vary with the clock rate of the on-chip oscillator as a function of the fabrication parameters that were fixed in the chip at the factory.

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[14] The ALJ made detailed findings concerning Dr. Subramanian's testing at pages 196-204 of the final ID.

b. Analysis

Claims 6 and 13 recite two different "varying" limitations: "varying . . . as a function of" and "varying . . . in the same way."[15] Complainants' arguments concern only the former phrase. We, therefore, focus our analysis on the question of whether the Accused Products satisfy the requirement of claims 6 and 13 that the "processing frequency" of the CPU and the "clock rate" of the on-chip oscillator must "vary . . . as a function of parameter variation in one or more fabrication or operational parameters associated with [the] integrated circuit substrate[.]" *See* '366 patent at 2:22-28, 3:38-45. We also note that Complainants did not argue in their petition for review that the Accused Products infringe claims 6 and 13 due to the effects of any operational parameters, *i.e.* operating temperature and operative voltage, instead focusing solely on whether the Accuse Products infringe due to the effects of fabrication parameter variations and, as a result, the concept of "binning." We find, therefore, that Complainants have abandoned any argument concerning operational parameters. *See* 19 C.F.R. § 210.43(b)(2) ("Any issue not raised in a petition for review will be deemed to have been abandoned by the petitioning party and may be disregarded by the Commission in reviewing the initial determination (unless the Commission chooses to review the issue on its own initiative under § 210.44)).

Furthermore, we disagree with Complainants regarding the significance of the binning process. The binning process merely sorts individual chips based on the maximum processing frequency at which a chip is capable of operating and has nothing to do with the actual frequency and clock rate at which a chip operates. *See* Subramanian Tr., 1264:5-1265:10, 1264:19-1265:18;

[15] The parties requested construction only of the limitation "varying . . . in the same way." Markman Order at 57-68.

1271:21-25). Complainants' expert confirmed our understanding on this point. *See* Oklobdzija Tr., 1030:18-21; *see also id.* 300:20-21 (emphasis in original) ("So we'll sell [the chips] out according to their *ability* to run."). Claims 6 and 13, on the other hand, require variation in the chip's "processing frequency," or the frequency at which the chip operates, not variation in the chip's maximum processing frequency capability. This distinction is made evident by comparing the phrase "processing frequency" in claims 6 and 13 with the phrase "processing frequency capability" in claims 1 and 11 of the '336 patent.

The ID properly recognizes this distinction, finding that "[b]y conflating these two distinctly-claimed elements, Dr. Oklobdzija disregards an important fact about the accused chips and products: by design, a PLL compensates for any PVT-related effects in order to maintain a stable and fixed frequency." *Id.* at 210 (citing Subramanian Tr., 1273; RDX-4C.111)). The ALJ noted in particular the testimony of Respondents' expert, Dr. Subramanian, that "while PVT affects the maximum operating capability of a transistor, the PLL and its components are not running at this maximum capability, and this allows them to provide a fixed output frequency[.]" *Id.* at 210-11 (citing Subramanian Tr., 1295). The ALJ concluded that "a part's processing frequency capability may change with PVT, but its actual speed, or processing frequency, remains constant. . . .While oscillators in the PLLs of the Accused Products are capable of variable frequencies in response to PVT factors, nevertheless, they are constrained to provide fixed clocking signals to the CPU[.]" *Id.* at 211. We agree with the ALJ's conclusion that the "maximum achievable performance" (*see* Subramanian Tr., 1122:1-1123:7) which is affected by the fabrication process is different from the actual "processing frequency" at which a chip operates at a given time. The "processing frequency" of the Accused Products during operation is precisely what must "vary[] . . . as a function of parameter variation" in order to satisfy claims 6 and 13.

Dr. Subramanian's empirical tests do not directly address the issue of whether accused chips that were sorted differently according to the "binning" process do, in fact, operate differently in terms of frequency. Nevertheless, the fact that his tests showed how the PLL maintains a fixed frequency of operation regardless of variations in temperature and voltage is easily extrapolated to conclude that the PLL similarly affects chips that may be assigned different operating capabilities during "binning," *i.e.*, maintains them at a fixed operating frequency. *See* ID at 193. We further note that Complainants did not present any empirical evidence to support their position or to rebut Dr. Subramanian's test results.

We also reject Complainants' argument that the ALJ ignored the disjunctive nature of the claim limitation, which recites that the oscillator clock signal and the CPU processing frequency vary "as a function of parameter variation in one *or* more fabrication or operational parameters." '336 patent at 2:22-28, 3:38-44 (emphasis added). Rather, the ALJ correctly noted that, because the Accused Products use PLLs, there is no variation in their processing frequency due to ***any*** parameter, be it fabrication or operational-based. *See* ID at 210-211 (discussing the effect of a PLL on the processing frequency of a transistor).[16]

In addressing the Commission's question concerning "current-starved" oscillators, Complainants present an entirely new argument regarding why the [

[16] The specification of the '336 patent describes how the fabrication ("processing") of a chip can affect the operating speed of the chip if allowed and not merely affect the maximum speed capability of the chip. *See* '336 patent at 17:2-10.

] satisfy the "entire oscillator" limitation of claims 6 and 13. Specifically, Complainants now argue that the [ ] is an "operational parameter." In making this argument, Complainants necessarily implicate the "varying" limitation. We again note that Complainants did not challenge the ID's findings that the Accused Products do not satisfy the "varying" limitations with respect to "operational parameters" in their petition for review, instead focusing solely on the "fabrication parameters." As stated above, we find that Complainants have, thus, abandoned any argument that the Accused Products infringe claims 6 and 13 due to the effects of "operational parameters." Nevertheless, Complainants' arguments are also incorrect on the merits.

In arguing that the [ ] is, in fact, one of the "operational parameters" recited in the asserted claims and not a forbidden "control signal," Complainants attempt to draw a distinction based on the doctrine of claim differentiation between the term "operational parameters" in claims 6 and 13 and the specific recitation of the terms "temperature" and "voltage" as a type of operational parameter in dependent claims 7 and 14. Specifically, Complainants argue that the term "operational parameters" as used in claims 6 and 13 must be broader and encompass other operational parameters beyond temperature and voltage. In particular, Complainants advocate for extending "operational parameters" to include current as well as voltage. Complainants assert that, because the oscillator clocks the CPU, the "clock rate" of the "entire oscillator" will *always* "vary . . . in the same way" as the "processing frequency" of the CPU in the accused chips by definition. Complainants contend that, as a result, the clock rate of the oscillator and, consequently, the processing frequency of the CPU vary "as a function of parameter variation" in the [ ]. Complainants conclude that, because the [ ] is an "operational parameter," it cannot have been disclaimed despite the limitation in the claim construction of "entire oscillator" of not relying on "control signals" to "generate a clock signal."

Respondents argue that Complainants waived this novel argument by never before presenting the concept of a bias current being an "operational parameter." We agree. *See Hazani v. Int'l Trade Comm'n*, 126 F.3d 1473, 1479 (Fed. Cir. 1997) (finding argument not raised before the ALJ waived); *Broadcom Corp. v. Int'l Trade Comm'n*, 542 F.3d 894, 900-1 (Fed. Cir. 2008) (declining to address arguments not raised before the ALJ or the Commission).

Moreover, the ALJ explicitly found that the frequency of the oscillators in the Accused Products do not vary as a function of PVT parameters. *Id.* at 3 (citing ID at 192-204 (discussing Dr. Subramanian's empirical testing of the accused chips)). Rather, the ALJ found that the very function of the PLLs in the accused chips is to maintain the oscillators in those chips at a constant, un-varying frequency as a function of the frequency of an external crystal oscillator. ID at 119 (noting Dr. Oklobdzija testimony that "'the PLL controls the frequency of that VCO or ICO and adjusts it to match the reference frequency.'"); *id.* at 121-122 ("[B]y acknowledging that the PLL sets the frequency of the VCO in reaction to a reference clock signal from an external crystal or clock generator, Dr. Oklobdzija concedes that the PLL and its components rely on an external crystal/clock to generate a clock signal."). The ALJ specifically noted that "the 'entire' oscillator terms are inextricably tied to the 'varying' term of the claims." *Id.* at 194. The ALJ, thus, concluded that "[t]he relevant oscillators in the Accused Products" clock their associated [CPUs] by providing a fixed frequency, instead of varying the frequency, through the involvement of their external crystals/clock generators and the PLL circuitry in which the oscillators reside." *Id.* at 195. This finding by the ALJ is independent of his finding that the accused chips also rely on control signals, which is the only factor implicated by Complainants' new "[ ] as operational parameter" argument. Complainants' new assertion cannot, therefore, overcome the conclusion that the oscillators in the Accused Products do not satisfy the "entire oscillator" limitation or the "varying" limitation.

Complainants also fail in the context of the requirement that the claimed "varying" be independent of control signals. In particular, Complainants' current argument is at odds with the very point they made before the ALJ concerning the source of the claimed "operational parameters." Complainants' expert, Dr. Oklobdzija relied on a specific passage from a textbook concerning microprocessors in arguing that "transistors on the same chip are similarly affect by variations in process, voltage and temperature." ID at 134. The textbook states the following:

> Variation is the deviation from intended or designed values for a structure or circuit parameter of concern. The electrical performance of microprocessors or other integrated circuits are impacted by two sources of variation. *Environmental factors* arise during the operation of a circuit, and include variations in *power supply*, switching activity and *temperature of the chip or across the chip*. Physical factors during manufacture result in structural device and interconnect variations that are essentially permanent. These variations arise due to processing and masking limitations, and result in random or spatially varying deviations from designed parameters.

Id. (emphasis added) (citing CX-154 at TPL853_0297444; Oklobdzija Tr., 416-418). Complainants emphasized that "the environmental factors that cause variations in performance include changes in '*power supply*' (voltage) and 'temperature[.]'" *Id.* at 134-135 (emphasis added). Complainants further asserted that "no one disputes that *all of the transistors on the* *same chip, including ring oscillators and CPUs, will be affected by changes in PVT.*" *Id.* (emphasis added). As such, based on Complainants' own explanation, the voltage or current that may be considered an "operational parameter" as recited in claims 6 and 13 must result from an "environmental factor" that affects "all of the transistors on the same chip, including the ring oscillators and CPUs," such as the chip's "power supply."

Complainants provide no evidence or argument regarding how the [ ] used to control the frequency of the oscillators in the Accused Products can be considered the "power supply" that is available to "all of the transistors on the same chip, including the ring oscillators and CPUs." Moreover, the evidence shows that the [ ], for example, [ ]. *See* ID at 127-128. Dr. Oklobdzija confirmed that the same is true for the [ ]. Oklobdzija Tr., 968-989, 1058-1059 (explaining that the [ ].

We find that the evidence does not support extending the ALJ's finding concerning the power supply [ ] to all of the accused chips. In particular, with respect to the accused TI OMAP chips, TI's corporate witness, Mr. Haroun, testified that [ ]. However, Complainants do not present any evidence, nor could we find any from Mr. Haroun's testimony, that the CPU in the TI OMAP chips is not independently powered. It is Complainants' burden to do so given that they must show the Accused Products do not rely on control signals to generate the clock signal in the on-chip oscillators.

Based on the preceding discussion, the Commission rejects Complainants' new argument that the [ ] is an operational parameter and not a control signal as waived and, moreover, unsupported by the record. We also note that Complainants' argument has no bearing on the ALJ's finding that the oscillators in the Accused Products do not "vary . . . as a function of" PVT parameters because the PLLs in those chips control the oscillators to match their output frequency to the reference frequency of an "external crystal/clock generator." The Commission, therefore, affirms the ID's finding that the Accused Products do not satisfy the "varying" limitations of claims 6 and 13.

3. "External Clock [] Operative At A Frequency Independent" and "Asynchronously"

a. Proceedings Before the ALJ

The ALJ construed the limitation "[an] external clock is operative at a frequency *independent* of a clock frequency of said oscillator" in claims 6 and 13 of the '336 patent to mean "an external clock wherein a change in the frequency of either the external clock or oscillator does not affect the frequency of the other." Markman Order No. 31 at 11 (emphasis added); *see* ID at 14. This construction was uncontested. *Id.* The ALJ also construed the limitation "wherein said central processing unit operates *asynchronously* to said input/output interface" of claim 13 to mean "the timing control of the central processing unit operates independently of and is not derived from the timing control of the input/output interface such that there is no readily predictable phase relationship between them." *Id.* at 74 (emphasis added); *see* ID at 16. Complainants did not petition for review of the ALJ's construction of the "asynchronously" limitation. Based on these claim constructions, the ID finds that the Accused Products do not satisfy the "external clock" limitations of claims 6 and 13. ID at 245-259.

The ALJ summarized Dr. Oklobdzija's infringement testimony regarding the "external clock" limitations as follows: "'We have identified or established [the] independence [of the "first" and "second" clocks], basically, by coming from two independent PLLs or ring oscillators within those PLLs.'" *Id.* at 245 (citing Oklobdzija Tr., 702). The ALJ found "that is not sufficient proof that the frequency of either the external clock or oscillator does not affect the frequency of the other" as required by his construction of the claim limitation "independent." *Id.* The ALJ found that "[g]iven the lack of particulars and specificity in Dr. Oklobdzija's summary conclusions, Respondents' expert witness, Dr. Subramanian, responded accordingly by pointing out that the I/O interface signals that Complainants rely on are neither independent nor asynchronous, illustrating this by focusing on the two most common I/O interfaces – the USB and camera interfaces – as well as the LSI Logic B5503A chip." *Id.* at 249-50 (citing Subramanian Tr., 1351-67). In particular, the ALJ noted that:

> Dr. Subramanian testified that the clock signals for the USB interfaces in the accused [ ] are neither independent nor asynchronous. Furthermore, Dr. Subramanian went to the extent of reviewing source code to confirm some of the findings he testified about. (*id.* at 1357). Dr. Subramanian's testimony includes sufficient details showing not only that he examined relevant technical documents, as Dr. Oklobdzija testified he had, but also his reasoning for arriving at his non-infringement conclusions, which is lacking in Dr. Oklobdzija's infringement testimony.

Id. at 250. The ALJ specifically noted Dr. Subramanian's testimony with respect to the accused [ ] chips that all of the PLLs used to clock the internal oscillator and the

I/O interface "use the same [external] crystal reference signal." *Id.*

The ALJ also rejected Complainants' argument that Respondents improperly ignored "both the claim language and the adopted construction [of the 'independent' limitation, which] require[s] a comparison of the frequency of the external (second) clock to the frequency of the oscillator (first clock)" and how a change in the frequencies of those two clocks affect each other. *Id.* at 252-253. Specifically, the ALJ noted that Complainants' argument "raises the specter of Dr. Oklobdzija's and Complainants' own failure, since they did not provide evidence sufficient to demonstrate that a change in the frequency of the second (external) clock or the first clock does not affect the frequency of the other[.]" *Id.* at 253.

With respect to the "asynchronous" limitation of claim 13, Respondents argued that Complainants failed to address the requirement that the CPU clock not be "derived from the timing control of the [I/O] interface." *Id.* at 255. Respondents asserted that, in discussing the "asynchronous" limitation, Dr. Oklobdzija incorrectly "addresse[d] the phase relationship between the phase of the received external reference clock signal and the phase of the PLL's output signal[,] which is provided back to the [ ] by the PLL's feedback loop[.]" *Id.* (citing Oklobdzija Tr., 1026-27) (opining that the unpredictability of the phase relationship of the external reference signal and the output of the PLL's output signal is the entire reason the PLL is required in the first place). Respondents argued that the correct comparison is the "phase relationship[] between the CPU's timing interface and the I/O interface's timing interface].]" *Id.* (citing Markman Order No. 31 at 74). Complainants responded that "the chip documentation" clearly states that the clock relationships in the accused chips are "asynchronous." *Id.* at 257 (discussing the accused [ ] chips).

The ALJ agreed with Respondents' argument that Dr. Oklobdzija's testimony regarding "the phase relationship between the PLL and the external clock" was inapposite. *Id.* at 258. The ALJ also found that "[t]he fact that the technical documents that Complainants cite in their reply brief mention the word 'asynchronous' does not means that those documents are applying the term in the same way as expressed in the adopted construction" of that claim limitation. *Id.* Rather, the ALJ found, "Complainants [improperly] rely on a conclusory statement of Dr. Oklobdzija in which he read the word 'asynchronous' in the user manual for an accused [ ] and made the conclusory assertion that this is enough to meet the claim language." *Id.* (citing Oklobdzija Tr., 1061-62). The ALJ noted that Dr. Oklobdzija also failed to discuss how the use of the word "asynchronous" in the technical documents relates to "the other requirements in the construction of the 'asynchronous' limitations, including (1) timing controls, (2) independence, (3) no derivation, and (4) no readily predictable phase relationship." *Id.* at 259.

In their petition for review, Complainants limited their arguments concerning the "external clock" limitation to only "***external*** second clocks[,]" where the source of the external clock signal derives from peripheral devices that can be connected to the Accused Products using, for example, HDMI or USB cables. Respondents argued before the ALJ that Complainants may not rely on external USB connections for direct infringement because the Accused Products are not connected to USB peripherals as imported, relying on *Certain Elec. Devices with Image Processing Sys., Components Thereof, & Associated Software* ("*Image Processing Sys.*"), Inv. No. 337-TA-724, (U.S.I.T.C. Dec. 21, 2011). *Id.* at 236. Complainants countered that the Commission's holding in *Image Processing Systems* was limited to method claims and does not apply to apparatus claims like claims 6 and 13 of the '336 patent.[17] *Id.* (citing *Certain Video Game Systems & Wireless Controllers & Components Thereof*, Inv. No. 337-TA-770, 2012 WL [4480570], at *10 (U.S.I.T.C. Aug. 31, 2012)).[18] The ALJ did not address this issue because he found that other limitations of claims 6 and 13 are not satisfied by the Accused Products. *Id.*

b. Analysis

Complainants have not proven direct infringement with regard to the external clock limitation of claims 6 and 13 (*see* ID at 252-53 (discussing the "independent" limitation), 257-259 (discussing the "asynchronous" limitation of claim 13)), nor have Complainants proven infringement of the "entire oscillator" limitation, as discussed above. We, therefore, affirm the ID and further find that Complainants, in addition to not showing that the Accused Products practice the "external clock" limitation for the reasons discussed in the final ID, have also failed to prove that all of the required elements of the asserted claims were met. *See* 19 U.S.C. § 1337(a)(1)(B).

C. Indirect Infringement

"Whoever actively induces infringement of a patent shall be liable as an infringer." 35 U.S.C. § 271(b).[19] A patentee asserting a claim of inducement must show (i) that there has been

[17] Although Complainants cite the ID as referring to claims 6 and 13 as apparatus claims, the ID, in fact, mistakenly refers to claims 6 and 13 as method claims. *See* ID at 253. We believe this error may have led to some confusion on the ALJ's part.

[18] The citation in the ID for this case is incorrect. We have made the necessary edits.

[19] The Federal Circuit recently addressed under what circumstances a section 337 violation may be based on induced infringement. *Suprema*, 2013 WL 6510929, at *5-12.

direct infringement and (ii) that the alleged infringer "knowingly induced infringement and possessed specific intent to encourage another's infringement." *Minnesota Mining & Mfg. Co. v. Chemque, Inc.*, 303 F.3d 1294, 1304-05 (Fed. Cir. 2002). With respect to the direct infringement requirement, the patentee "must either point to specific instances of direct infringement or show that the, accused device necessarily infringes the patent in suit." *ACCO Brands, Inc. v. ABA Locks Mfrs. Co., Ltd.*, 501 F.3d 1307, 1313 (Fed. Cir. 2007) (citation omitted). This requirement may be shown by circumstantial evidence. *Vita-Mix Corp. v. Basic Holding, Inc.*, 581 F.3d 1317, 1326 (Fed. Cir. 2009). "[A] finding of infringement can rest on as little as one instance of the claimed method being performed during the pertinent time period." *Lucent Techs., Inc. v. Gateway, Inc.*, 580 F.3d 1301 , 1317 (Fed. Cir. 2009).

The specific intent requirement for inducement necessitates a showing that the alleged infringer was aware of the patent, induced direct infringement, and that he knew or should have known that his actions would induce actual direct infringement. *DSU Medical Corp. v. JMS Co., Ltd.*, 471 F.3d 1293, 1305 (Fed. Cir. 2006) (en banc in relevant part); *Global-Tech Appliances, Inc. v. SEB S A.*, 131 S. Ct. 2060, 2068-70 (2011) (holding that willful blindness may be sufficient to meet specific intent requirement). The intent to induce infringement may be proven with circumstantial or direct evidence and may be inferred from all the circumstances. *DSU*, 471 F.3d at 1306; *Broadcom Corp. v. Qualcomm Inc.*, 543 F.3d 683, 699 (Fed. Cir. 2008).

The ALJ found that there is insufficient evidence to support a finding of indirect infringement by Respondents because "there is not a preponderance of evidence showing that any of the Accused Products directly infringes any of the asserted claims of the '336 patent[.]" *Id.* at 280. In particular, the ALJ found no direct infringement because he concluded the

Accused Products do not satisfy the "entire oscillator," "varying," and "external clock" limitations of claims 6 and 13. *See* ID at 118-132, 189-213, 245-259. As discussed above, the ALJ correctly found that the Accused Products do not satisfy any of these limitations. It is undisputed that "[i]nduced infringement requires proof of direct infringement." ID at 276 (citing *Akamai Techs., Inc. v. Limelight Networks, Inc.*, 692 F.3d 1301, 1308 (Fed. Cir. 2012) (en banc)). The ALJ's conclusion on the law is, therefore, undoubtedly correct. We, therefore, affirm the ID's finding that Complainants failed to prove indirect infringement because they failed to prove direct infringement. ID at 80.

D. Domestic Industry

In order to establish a violation of Section 337 in a patent-based action, a complainant must demonstrate that a domestic industry either exists in the United States or is in the process of being established. *See* 19 U.S.C. § 1337(a)(2). Sections 337(a)(2) and (3) set forth the domestic industry requirement in its entirety:

> (2) Subparagraphs (B), (C), (D), and (E) of paragraph (1) apply only if an industry in the United States, relating to the articles protected by the patent, copyright, trademark, mask work, or design concerned, exists or is in the process of being established.
>
> (3) For purposes of paragraph (2), an industry in the United States shall be considered to exist if there is in the United States, with respect to the articles protected by the patent, copyright, trademark, mask work, or design concerned—
>
> (A) significant investment in plant and equipment;
>
> (B) significant employment of labor or capital; or
>
> (C) substantial investment in its exploitation, including engineering, research and development, or licensing.

19 U.S.C. §§ 1337(a)(2) and (3).

"To be considered 'exploitation' though licensing within the meaning of the statute, the complainant must demonstrate that a particular activity: (1) relates to the asserted patent; (2) relates to licensing; and (3) occurred in the United States." *Certain Liquid Crystal Display Devices, Including Monitors, Televisions, and Modules, and Components Thereof*, Inv. No. 337-TA-741/749 ("*Liquid Crystal Display Devices*"), Comm'n Op. at 109 (June 14, 2012); *see also Certain Multimedia Display and Navigation Devices and Systems, Components Thereof, and Products Containing Same*, Inv. No. 337-TA-694, Commission. Op. at 7-8 (August 8, 2011) ("*Navigation Devices*"). Activities meeting these requirements may be considered in an evaluation of whether the domestic industry requirement has been satisfied. *Liquid Crystal Display Devices*, Comm'n Op. at 109. However, a complainant must also show that the qualifying investments are substantial. *Id.*

1. Economic Prong

a. Proceedings Before the ALJ

Complainants argued that they have a domestic industry under section 337(a)(3)(C) based on their "substantial domestic investments relating to the exploitation of the '336 patent through their [Moore Microprocessor Patent] MMP Portfolio licensing program." *Id.* at 296. Complainants relied on the activities of Alliacense, a California-based vendor of Complainants TPL and PDS, which carries out Complainants' licensing program. *Id.*

Concerning the amount of the Complainants' investment in licensing the MMP Portfolio, the ALJ took into account TPL's investment in Alliacense. *Id.* at 308-9. The ALJ noted that "Alliacense's employees are required to account for all of their activities and provide monthly reports allocating time based on project codes . . . [and] from these reports, the percentage of time that each employee spends on the MMP Portfolio can be calculated." *Id.* at 309 (citing Leckrone Tr., 1566-67, 1605; Hannah Tr., 1745). The ALJ also took into account "summary documents showing the percentages of each employee's time spent on projects within the MMP Portfolio." *Id.* at 309-10 (citing RX-1794C; RX-1795C; RX-1796C). The ALJ noted that "[b]ased on these summaries, TPL's [Chief Financial Officer] CFO, Mr. Hannah, calculated . . . the total burden costs for these employees based on the hours worked on the MMP Portfolio, salary, benefits, and taxes paid," and concluded that "Alliacense's labor costs related to licensing the MMP Portfolio totaled over [ ]." *Id.* at 310 (citing Hannah Tr., 1742-51; CX-705C; RX-1773C). The ALJ further noted that "Mr. Hannah testified that approximately [ ] was spent on product purchases related to the MMP licensing program" and that the monthly leasing and facility costs for the shared TPL and Alliacense facility are [ ], "allocated to all of TPL's patent portfolios." *Id.* (citing Hannah Tr., 1738, 1756-57; JX-253C). The ALJ also found that "[o]verall, Alliacense's MMP Portfolio licensing activities have resulted in executed licenses with approximately 100 companies resulting in approximately [ ] in revenue." *Id.* (citing Leckrone Tr., 1538-39; Hannah Tr., 1740-41; CX-708C). The ALJ also noted that "[a]dditionally, Complainants rely on TPL's alleged investment of [ ] in PDS. *Id.* at 311.

The ALJ found that Complainants "waived their right to rely on TPL's alleged investment in PDS because Complainants failed to raise [the issue] in their pre-hearing brief." *Id.* (citing Complainants' Pre-Hearing Brief at 216-19; Ground Rule 7.2). The ALJ also found that "Complainants have not shown that PDS does not engage in ineligible activities, such as patent prosecution, or that this investment does not relate to activities that Complainants are precluded from relying on this in this Investigation, *e.g.*, attorney fees." *Id.* (citing Tr. at 1630; *see also* Order Nos. 38, 61). The ALJ, therefore, "decline[d] to consider TPL's alleged investment of [ ] in PDS[.]" *Id.*

The ALJ, however, "reject[ed] Respondents' argument that Complainants cannot establish a domestic industry because TPL rescinded its ability to license the asserted patent before the Complaint was filed." *Id.* The ALJ found "it immaterial whether it was TPL or another Complainant that had the ability to license the asserted patent at the time the Complaint was filed[,]" and that "there is no dispute that PDS [has] had the right to license the asserted patent . . . throughout this Investigation." *Id.* at 311-12. The ALJ noted that his finding was not affected by Order Nos. 28 and 61, which forbid Complainants from relying on TPL's investments in PDS. *Id.* at 312. The ALJ also disagreed with Respondents regarding the reliability of the testimony of Complainants' witness, Mr. Leckrone. *Id.* The ALJ also disregarded Respondents' argument concerning the reimbursements PDS paid to TPL. *Id.* at 312-13. Specifically, the ALJ found that "[r]egardless of whether the relied upon investments were actually reimbursed, a point that Complainants dispute at least in part . . . there is no dispute that such domestic investments were ultimately paid by a Complainant in this Investigation." *Id.* at 313. With respect to the specific investments, the ALJ found that the [ ] per month investment in the facilities shared by TPL and Alliacense "should be given little weight" because "Complainants acknowledge that that amount should be allocated to each of TPL's patent portfolios . . . [and] neither attempt to determine how much of this investment should be allocated to the MMP Portfolio . . . [or] even argue that a significant or substantial portion should be allocated to the MMP Portfolio." *Id.*

Regarding a nexus between the licensing of the MMP Portfolio and the '336 patent, the ALJ noted the testimony of Alliacense's president, Mr. Leckrone, that there are "approximately 15 patents in the portfolio, including five patents of interest and that the '336 patent is the 'lead patent' in the portfolio." *Id.* at 308 (citing Leckrone Tr., 1534-35). Mr. Leckrone also testified that a claim chart for the '336 patent is always included in product reports presented to potential licensees. *Id.* (citing Leckrone Tr., 1558-59; CX-81C; RX-1762C; CX-22; CX-731C; CX-719C; RX-1759C; CX-1126C). The ALJ found that "based on the small number of patents in the MMP and the testimony and evidence provided," Complainants showed that their activities are "sufficiently related to the asserted patent that they may fully be relied upon in the domestic industry analysis, with the exception of Complainants' alleged facilities costs[.]" *Id.* at 314. The ALJ further found that "a substantial portion of the expenses relied upon by Complainants have the necessary relationship to licensing[,]" noting the testimony of Mr. Hannah that "all of the activities under the one project code" used by Alliacense employees "were considered to be licensing related." *Id.* at 315 (citing Hannah Tr., 1770-71). The ALJ also found that "a substantial majority of the alleged MMP licensing investment" occurred in the United States, though acknowledging that some of the expenses incurred by Alliacense employees involved foreign travel, and costs relating to three employees working overseas. *Id.* (citing Hannah Tr., 1783-95; RX-1784C).

The ALJ also found that Complainants' licensing investments are substantial. The ALJ stated that "[m]ost significantly . . . the amount invested in the MMP Portfolio as a whole (approximately [   ] including labor and product acquisition costs), the small number of patents in that portfolio, and the relative importance of the '336 patent in licensing negotiations, weighs heavily in favor of finding that Complainants' investments are substantial." *Id.* at 316 (citing *Liquid Crystal Display Devices*, Comm'n Op. at 123). The ALJ also stated that his finding is supported "[t]o a lesser extent . . . [by] the fact that Complainants engaged in ancillary activities after licenses were executed including monitoring licensees' compliance, M&A activities, and transfers of relevant business divisions (*see* Tr. at 1565-66); the fact that Complainants' licensing activities are ongoing (*see* Tr. at 1565-66, 1568,69); and the fact that Complainants' licensing efforts related to the MMP Portfolio have generated over [ ] in revenue (*see* CX-708C; Tr. at 1538-39)." *Id.* at 316-17 (citing *Liquid Crystal Display Devices*, Comm'n Op. at 123-24).

The ALJ weighed these findings against the fact that "Complainants made no attempt to determine the actual value of their investments in the asserted patent, instead relying on the alleged total investment in the MMP Portfolio." *Id.* at 317. The ALJ noted in particular that "[w]hile the Commission does not require an exact allocation of investments to the asserted patents . . . Complainants' failure to set forth any allocation somewhat undermines the weight of the evidence they did provide, particularly because . . . the investments relied upon include portions unrelated to the asserted patent, licensing, or the United States." *Id.* The ALJ also found that "Complainant' licensing activities are revenue-driven and target existing production[,]" as opposed to supporting the production of products covered by the patent. *Id.* Lastly, the ALJ noted that "Complainants do not invest in other activities to exploit the '336 patent[.]" *Id.* (citing *Liquid Crystal Display Devices*, Comm'n Op. at 124).[20]

[20] The ALJ also rejected respondent Garmin's argument that TPL's investments should be rejected because they have a potential nexus only to the version of the '336 patent that was

Respondents argued in their petition for review that TPL's revenue-driven licensing activities, which seek licenses from entities that already produce and sell products that allegedly infringe the patents in the MMP Portfolio, are not the type of licensing program that Congress sought to protect when it amended section 337 to include license-based domestic industries. Respondents noted that the ALJ identified TPL's revenue-driven licensing model as a factor weighing against a finding of substantiality (ID at 317), but argue that, as a policy matter, the Commission should give this factor greater weight in the context of the substantiality analysis – particularly given the paucity of documentary evidence produced by TPL to support its claimed investments. Respondents further argued that Complainants' lack of direct investment in activities to exploit the '336 patent should also receive greater weight in the overall analysis. Respondents also asserted that Complainants' failure to allocate the actual value of their investments in the asserted patent, as opposed to relying on the alleged total investment in the MMP Portfolio, should strongly weigh against a finding of domestic industry.

Respondents also questioned the factors which the ALJ found weigh in favor of a conclusion that Complainants' investments in the MMP Portfolio are substantial. Specifically, Respondents argued that some of Complainants' license agreements include licenses to other patent portfolios, in addition to the MMP Portfolio, and that Complainants' failure to offer its licenses into evidence means that there is no record from which to determine the percentage of the approximately 100 licenses that also include other patent portfolios. Respondents also asserted that none of the ancillary activities the ALJ credited is the type of ancillary activity that

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surrendered during reexamination. *Id.* at 317-19. Respondents did not raise this argument in their contingent petition for review.

the Commission has held supports a finding of substantiality, noting that all of Complainants' ancillary, post-license activities are directed to obtaining additional revenue. *Id.* (citing Leckrone Tr., 1565:23-1566:22).

We note that Respondents do not challenge the ALJ's determination of whether each factor the ALJ weighed favored Complainants or Respondents. In particular, the ALJ specifically considered Complainants' failure to otherwise invest in exploiting the '336 patent as weighing against a finding of substantiality. ID at 317. Respondents failed to point to any particular Commission or Federal Circuit precedent which would require the Commission to afford even greater negative weight to these facts than the ALJ already applied.

Respondents also asked the Commission to give greater negative weight to Complainants' failure to allocate its investments in the asserted patent. However, we find that the "[   ]" investment the ALJ credits is exclusively directed toward the MMP Portfolio and that the '336 patent is the lead patent in this portfolio. *See* ID at 310; CX-705C, Hannah Tr., 1751-52 (testifying that the expenses listed in CX-705C are only for the MMP Portfolio); Leckrone, Tr. at 1534-35. Similarly, concerning Respondents' arguments that Complainants did not specify what portion of its expenses were accrued overseas, TPL's CFO, Mr. Hannah, testified that "for overseas patents, [licenses] are handled for the most part by outside counsel. . . we haven't included any outside counsel costs here." Hannah Tr., 1758:19-1759:25.

Respondents raised two additional issues in their contingent petition for review with respect to the economic prong that do, however, warrant further consideration. First, Respondents argued that complainant TPL cannot establish a licensed-based domestic industry because it "did not have the right to license the MMP Portfolio at the time the complaint was filed, or anytime thereafter[.]" Respondents noted that "Complainants' domestic industry assertions are properly limited only to TPL's licensing investments, and not those of [] [Patriot] or PDS[.]" In particular, Respondents noted that Order Nos. 28 and 61 preclude Complainants from relying on investments by Patriot or PDS, and argue that "the record is therefore limited to TPL's investment."

We agree with the ALJ that "it is immaterial whether it was TPL or another Complainant that had the ability to license the asserted patent at the time the Complaint was filed." ID at 311. The statute requires that "an industry in the United States, relating to the articles protected by the patent . . . concerned, exists or is in the process of being established" without reference to the necessity of segregating the investments specifically to each intellectual property right owner. 19 U.S.C. § 1337(a)(2). Only three weeks passed between the recission of TPL's right to license the '336 patent and the filing of the complaint, distinguishing this case from *Motiva, LLC. v. Int'l Trade Comm'n*, where the complainant had abandoned its industry three-and-a-half years prior to filing its section 337 complaint. 716 F.3d 596, 601, n.6 (Fed. Cir. 2013) (affirming the "Commission's use of the date of the filing of the complaint as the relevant date at which to determine if the domestic industry requirement . . . was satisfied")).

We acknowledge, however, that PDS's investments were not the basis of the ID's finding that the economic prong has been satisfied. The Commission, therefore, addresses whether the alleged industry still exists even though TPL is no longer actively involved in licensing the '336 patent. *See Certain Electronic Devices, Including Mobile Phones, Portable Music Players, and Computers*, Inv. No. 337-TA-701, Order No. 58, at 6 (Nov. 18, 2010) (unreviewed) (finding that the Commission should consider whether post-complaint activity indicates that an alleged industry is "dwindling.").

Second, Respondents argued that Complainants failed to demonstrate how their investments in litigation and in prosecution are related to licensing." TPL's CFO, Mr. Hannah testified that the project code TPL used to account for activities concerning the MMP Portfolio included "litigation, prosecution activities, reexamination activities, and other licensing activities." Hannah Tr., 1765:16-1766:18. The ALJ addressed TPL's possible investments in "litigation and prosecution" in the context of nexus. Specifically, he noted Mr. Hannah's testimony that "in his view, 'management decided to have [litigation and prosecution] categories when the activity was significant enough to include those categories[.]'" ID at 314-15 (citing Hannah Tr., 1783). The ALJ did not address, however, what Mr. Hannah meant by this. Furthermore, with respect to substantiality, the ALJ did not specifically address how Complainants' failure to account for the proportion of its asserted investments that concerned the problematic categories of "litigation and prosecution." The Commission determined to review this issue. In connection with its review, the Commission posed the following questions to the parties:

1. With respect to Complainants' alleged licensed-based domestic industry, is there a continuing revenue stream from the existing licenses and is the licensing program ongoing? If the licensing program is ongoing, which complainant(s) is/are investing in the program and what is the nature (not amounts) of those investments?

2. Please describe the claimed expenditures for patent prosecution and litigation and explain how they relate to Complainants' domestic industry in licensing the '336 patent. Please provide an estimate of the proportion of the total claimed investments in licensing the '336 patent accounted for by the claimed patent prosecution and litigation expenditures.

78 *Fed. Reg.* at 71645.

b. Analysis

i. On-Going Licensing Program

The question of whether Complainants had satisfied the economic prong of the domestic industry requirement through licensing at the time they filed the complaint is distinct from the question of whether the domestic industry licensing program has ceased to exist. We address the latter question raised by the respondents here.

Complainants argue that their licensing program is ongoing, noting that as of the date the Complaint was filed, there were roughly 100 licensees to the MMP patent portfolio, which includes the '336 patent and that they executed several licenses subsequent to the filing of the Complaint, including licenses to [ ]. *See* CX-708C; CX-1332C at 19; Leckrone Tr., 120:21-121:15. Complainants further note that revenue from these licenses have totaled over [ ]. Complainants admit, however, that most of the license agreements include a [ ], although they assert that certain licensees . . . [ ]. *See* CX-1332C at 5, 10, 14 ([ ]). Complainants further assert that they have an agreement with [ ] that provides for multiple payments continuing through [ ].

Respondents note that Complainants identify only three licensees that allegedly made [ ] in connection with their licenses, and that each of those licensees made a total of [ ] prior to the filing of the complaint. Respondents further note that Complainants failed to provide evidentiary support with respect to the alleged [ ] license, which was neither admitted nor introduced as evidence, and failed state how much is due from [ ], the number of expected payments, when those payments are due, or whether any allegedly future payment is contingent and thus may not actually be made. The IA likewise contends that the evidence does not show that there is a continuing revenue stream from Complainants existing licenses, asserting that the evidence shows that each licensee made a single lump-sum payment, with the exception of [ ]. *See* CX-708C; JX-177C; Leckrone Tr., 1538:14-25. The IA further notes, however, that Complainants do not receive any continuing revenue stream from [ ]. *See* CX-1124C at §§ 3.1 and 3.2.[21]

Complainants filed their complaint in this investigation on July 24, 2012. Complainants received payments from [ ]. CX-1332C at 19. There is no evidence concerning Complainants' licensing revenue beyond December 2012. The evidence shows that, at the time the complaint was filed, Complainants were not receiving revenue from licenses entered into before they filed the complaint. However, Complainants are clearly still involved in licensing the MMP Portfolio and have received payments for licenses entered into subsequent to the complaint being filed. This fact supports finding that Complainants domestic licensing industry was ongoing at the time of the complaint.[22]

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[21] From our review, the evidence shows that Complainants also received multiple payments from the three licensees Complainants mention – [ ]. CX-1332C at 5, 10, 14. We find no evidence that Complainants received multiple payments from [ ].

[22] Complainants offered to produce the [ ] license upon Commission request. However, the Commission declines to consider the alleged [ ] license. Complainants do not state when the license was executed, but considering that it was a proposed, yet ultimately rejected, exhibit (RX-1561C), we assume it existed prior to the evidentiary hearing. The Commission declines to second-guess the ALJ's rationale for excluding the exhibit or to give Complainants another

Complainants assert that they made significant investments in their licensing program prior to the initiation of the instant investigation, and continue to do so. Complainants rely primarily on the [ ] that TPL invested in labor costs for TPL and Alliacense personnel involved with the MMP licensing program and [ ] in product purchases made prior to the complaint being filed. *See* ID at 311, 316.[23] Complainants admit that these investments were made from June 2005 through May 2012. Without further support or explanation, Complainants have not shown this evidence of its investments prior to the complaint to be indicative as to the question raised by respondents of whether Complainants' licensing program is ongoing.

Complainants also assert that Alliacense currently provides its licensing services relating to the MMP Portfolio to PDS. *See* Leckrone Tr., 1568:25-1569:4, 1576:7-20, 1577:22-25. Complainants further contend that TPL still participates in the licensing program. *See id.* at 93:6-9, 144:16-145:1. Complainants do not, however, point to any evidence concerning PDS's payments to Alliacense subsequent to when the complaint was filed, not even in the July to December, 2012 time frame through which Complainants' licensing evidence extends.[24] Instead, Complainants note only their pre- and post-complaint expenditures related to the purchase of products for tear-down analysis. *Id.* (citing JX-253C).[25] While the IA asserts that Complainants' licensing program is ongoing, he merely points to conclusory statements by Complainant's

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opportunity to present the license as evidence.

[23] Complainants also mention expenses that the ALJ rejected. *See* ID at 311 (declining to consider "TPL's alleged investment of [ ] in PDS[.]").

[24] We note that CX-1332C shows various expenses for this time frame; however, Complainants do not rely on this evidence and do not explain how it should be interpreted.

[25] We calculate that Complainants, presumably PDS, spent [ ] on product purchases from July 25, 2012, through January 22, 2013.

witness, Mr. Leckrone, without specifying the amount of PDS's continuing investment.

The evidence does support the conclusion that Complainants' licensing program appears to be ongoing under PDS's control, with TPL's participation, although the record does not identify a way to definitively determine the amount of PDS's pre- or post-complaint investment. The Commission determines, however, that the filing of TPL's complaint in this matter is sufficiently contemporaneous with its activities with respect to the licensing of the '336 patent and that those activities should be examined for purposes of the economic prong domestic industry analysis.

Such action is supported by Commission precedent. Indeed, in *Certain Semiconductor Integrated Circuits and Products Containing the Same*, Inv. No. 337-TA-665, ID at 233 (Oct. 19, 2009) (unreviewed in relevant part) ("*Integrated Circuits*"), the ALJ found that a complainant satisfied the economic prong of the domestic industry requirement where it had "been less than one year since [the complainant's] activities [had] diminished" and "prior to entering bankruptcy, [the complainant's] activities in the United States clearly met the standard required to establish the economic prong[.]"[26] In particular, the presiding ALJ in *Integrated Circuits* noted several cases where the Commission found the economic prong satisfied based on "both the complainant's past investment and current domestic activities when the complainant has stopped manufacturing the patented product." *Id.* at 232 (citing *Certain Variable Speed Wind Turbines and Components Thereof,* Inv. No. 337-TA-376, USITC Pub. No. 3003, Comm'n Op. at 25-26 (Nov. 1996); *Certain Battery-Powered Ride-On Toy Vehicles and Components Thereof,*

[26] It is unclear whether TPL lost its rights to license the '336 patent as the result of its Chapter 11 bankruptcy filing. *See* Comp. Review Br. at 34; Leckrone Tr., 140:3-141:17.

Inv. No. 337-TA-314, Order No. 6 at 19-20 (Dec. 5, 1990) (unreviewed); *Certain Video Graphics Display Controllers and Prods. Containing the Same,* Inv. No. 337-TA-412, USITC Pub. 3224, ID at 13 (Aug. 1999) (unreviewed in relevant part)). Although this investigation involves licensing rather than manufacturing, we believe considering TPL's prior licensing investments and Complainants' post-complaint licensing activities is analogous. We, therefore, only need be concerned with the amount TPL invested prior to the complaint filing and which the ALJ found sufficiently tied to Complainants' licensing program. ID at 316.

For purposes of determining whether the economic prong of the domestic industry requirement is met, the ALJ properly limited Complainants to TPL's pre-complaint expenditures through his evidentiary findings. Specifically, in Orders 28 and 61, the ALJ rejected Complainants' belated attempt to rely on the investments of either PDS or Patriot, instead limiting Complainants to TPL's investments. *See* Order No. 28 at 3-4; Order No. 61 at 4-5. We note that PDS, not TPL, is responsible for all post-complaint investment. By considering the transfer of licensing activity from TPL to PDS as an unbroken chain of events concerning the MMP licensing program, we also rely only on TPL's pre-complaint expenditures and avoid and have not considered evidence concerning PDS's post-complaint investments in connection with that activity. *See Motiva*, 716 F.3d at 601, n.6 (affirming the "Commission's use of the date of the filing of the complaint as the relevant date at which to determine if the domestic industry requirement . . . was satisfied").

Based on the precedent discussed above, we find that the evidence concerning Complainants' licensing activity that occurred following the complaint supports finding that Complainants' licensing activities are ongoing, even though the investment in that activity was made by a different complainant than TPL. The appropriate investments to be examined for the economic prong analysis are the pre-complaint investments of TPL.

ii. Propriety and Significance of Complainants' Investments

Complainants assert that their [ ] in licensing-related expenses do not include significant costs related to patent prosecution or litigation. Specifically, Complainants note the testimony of TPL's CFO, Mr. Hannah, that the expenses listed in CX-705C do not include litigation and lawyers' costs. *See* Hannah Tr., 1759:23-25 (discussing costs for outside counsel).[27] Mr. Hannah further testified that the expenses submitted into evidence relate to licensing and that the term "litigation" in those documents "was broadly defined[.]" *See id.* at 1749:1-12 ("It's licensing, but there may be some involvement as a result [of] questions answered or dealt with as a result of litigation."). Complainants assert that none of the TPL or Alliacense employees acted as legal counsel in patent litigation on behalf of TPL or Alliacense. *See id.* at 1816:8-1817:13.

Complainants note in particular that, starting in 2008, true litigation-related expenses were specifically broken out in a separate product code [ ]. *Id.* at 1765:21-1766:14. Prior to that time, however, TPL and Alliacense employees recorded their times in a single project code [ ], which included everything involved in the process of licensing, *e.g.* expenditures for litigation and reexam proceeding. *See* Leckrone Tr., 1548:3-1550:23, 1552:7-1553:13 (testifying that "as part of the licensing process, Alliacense routinely reverse-engineered products organized the data into claim charts, and presented the information to potential licensees along with data

[27] Mr. Hannah testified that CX-705C's header entitled "Monthly Litigation Hours By Employee" is merely a mislabel. Hannah Tr.,1753:8-13, 177:19-1800:9.

compiled by the IP R&D group and other Alliacense employees"). Complainants argue that, prior to 2008, litigation expenses were not significant enough to warrant a separate category. *See* Hannah Tr., 1783:2-6. Complainants assert that Respondents failed to present any evidence that Complainants' patent prosecution or litigation-related expenses included under project code [ ] prior to 2008 were anything but *de minimis*. Rather, Complainants contend that Respondents, at most, established that Complainants' pre-2008 expenses relating to litigation or patent prosecution was uncertain. *See* Hannah Tr., 1770:12-1773:11. Complainants further note that even with respect to the few potential licensees with which TPL was in litigation, Complainants typically produced product reports well in advance of any litigation, and licensing discussions began prior to litigation and continued after litigation commenced. *See* Hannah Tr. 1776:10-13, 1787:13-1788:7.

Respondents argue that Complainants provided no evidence with which the Commission can determine which of TPL's employee expenses related to licensing as opposed to irrelevant litigation, patent prosecution, and patent re-examination activities for the first three years of expenses relied upon by TPL. Respondents allege that even after TPL ostensibly started to implement sub-codes for litigation and prosecution/re-examination costs at the end of 2008, expenses related to patent prosecution and litigation nevertheless infect the overall total claimed. *See* JX-354 (claiming expenses from 2006 to June 2012)). Respondents call out, in particular, Mr. Hannah's testimony regarding the [ ] TPL spent on personnel conducting IP research and development and IP legal work, arguing that these individuals were largely involved in ineligible patent prosecution and patent work unrelated to licensing. *See* Hannah Tr., 1771:24-1774:1. Respondents further note the [ ] TPL spent on business analysts, some of whom Respondents claim were communicating with companies involved in litigation with TPL (*id.* at 1774:10-1775:7), the [ ] expenditure for reverse-engineering specialists, who Respondents allege may have been partially involved in litigation-related activities (*id.* at 1781:17-1782:9), and the [ ] cost for operations analysts, who Respondents assert may have been involved in making claim charts for products for purposes of litigation (*id.* at 1782:10-1783:11). Respondents argue that there is no way to determine what portion of the licensing executives' employee costs related to license negotiations with companies with which TPL was in litigation. *Id.* at 1787:23-1788:14). Respondents also challenged Complainants' [ ] in expenditures relating to the acquisition of products for tear down, asserting that some of those acquired products were purchased in anticipation of litigation against various Respondents in connection with the present investigation. *Id.* at 1775:20-1776:1, 1776:24-1778:18.

The IA argues that Complainants' expenditures are significant and that any prosecution and litigation expenditures represent a relatively small portion of Complainants' total claimed investment. In particular, the IA notes that Complainants' [ ] investment in employee expenditures does not include fees paid to outside litigation counsel. *See* Leckrone Tr., 132:5-16. The IA also notes Mr. Hannah's testimony that litigation and patent prosecution expenses were not separately tracked prior to late-2008 because management did not consider those expenses sufficiently significant before that time. *See* Hannah Tr., 1783:4-6. The IA also relied on Mr. Hannah's testimony that the activities of the IP R&D /IP Legal group include preparing claim charts and product reports for potential licensees, and answering questions about non-infringement and prior art related to those claim charts and product reports. *Id.* at Hannah Tr., 1816:25-1817:13. Lastly, the IA notes that, in 2006 and 2007, Complainants were involved in litigation with only five companies, in comparison with the over [ ] Complainants have contacted and the over 100 license agreements Complainants have entered into.

The Commission's primary consideration is whether the there is sufficient evidence in the record that TPL's [ ] investment ([ ] in employee expenditures for TPL and Alliacense and [ ] for product acquisitions, *see* ID at 311, 316) that the ALJ credited as applying to Complainants' licensed-based domestic industry does not include irrelevant expenditures. In *John Mezzalingua Associates, Inc. v. International Trade Commission*, the Federal Circuit held that litigation expenses do not automatically constitute evidence of the existence of a domestic industry. 660 F.3d 1322, 1328 (Fed. Cir. 2011) ("We agree with the Commission that expenditures on patent litigation do not automatically constitute evidence of the existence of an industry in the United States established by substantial investment in the exploitation of a patent. "). In *Coaxial Cable Connectors Components Thereof and Products Containing Same*, Inv. No. 337-TA-650, Comm'n Op. at 50-51 (Apr. 14, 2010), the Commission further held that litigation costs may be considered in determining whether a domestic industry exists, but only if they are directly related to licensing. Furthermore, the Commission has never considered expenditures relating to patent prosecution to be relevant to a licensing-based domestic industry.

We cannot dismiss Respondents' concerns regarding Complainants' failure to support is contention that its claimed investments that are attributable to ineligible patent prosecution and litigation activity are *de minimis*. Complainants presented insufficient evidence that the lack of breakout was because TPL's management did not consider its litigation expenses to be sufficiently significant to warrant accounting for them separately. Complainants offer no indication of what TPL's management considered to be "significant" litigation expenses that suddenly required separate tracking beginning at the end of 2008. Exhibit RX-1795C shows the expense breakout by project code. The product code [ ], which TPL allegedly used to breakout "true litigation-related expenses," first shows an entry on January 31, 2009, where two employees recorded that they reportedly spent [ ]. *See* RX-1795C at 31. The percentages in this project category range from [ ] (RX-1795C at 36) to [ ] (RX-1795C at 39). From this, we might conclude that TPL's management didn't consider anything under [ ] of litigation-related time to be worth identifying, and such a decision may be reasonable. However, the complaint states that TPL initiated litigation with various companies in the 2005 to mid-2008 time frame. *See* Compl. at ¶¶ 149, 151, 152, 153. Complainants fail to offer any explanation as to why TPL's expenses with respect to these litigations were considered *de minimis* in comparison to later matters.

The evidence supports considering the entire time period of 2006-2012 encompassed by Complainants' exhibits, but excluding the [ ] the ALJ attributed to Complainants' "IP Legal and IP R&D" expenditures. ID at 310. Of all the categories the ALJ considered, this is the most troublesome. Mr. Hannah testified that the IP R&D and IP Legal team evaluates the patents in the MMP portfolio and analyzes the disclosed technology, as well as "continually work[ing] toward strengthening the portfolio by filing additional patent applications." JX-354C, ¶ 13. We find that Mr. Hannah's description of this activity comes uncomfortably close to the improper territory of patent prosecution, rather than licensing.

By contrast, all of the other categories of work Mr. Hannah discusses are arguably genuinely related to licensing activity. *Id.*, ¶¶ 14-22. We note in particular Respondents' argument that the Commission cannot determine what portion of TPL's licensing executives' employee costs related to license negotiations with companies with which TPL was in litigation. As the Federal Circuit held in *Mezzalingua*, "expenses associated with ordinary patent litigation should not automatically be considered a 'substantial investment in ... licensing,' even if the lawsuit happens to culminate in a license." 660 F.3d at 1328. Unlike the facts in *Mezzalingua*, however, there is no indication that Complainants merely received a license as the result of litigation and otherwise has no licensing program. *Id.* at 1329. To the contrary, there is no question that Complainants have a robust licensing program. Moreover, as Mr. Hannah testified, TPL's licensing executives engaged in negotiations prior to, as well as on the point of, litigation. Hannah Tr., 1787:23-1788:14. The Commission, therefore, rejects Respondents' argument that TPL's licensing executive employee costs should not be considered.

Excluding Complainants' expenditures for IP Legal and IP R&D, Complainants are left with an investment of [ ] in employee costs and [ ] in product acquisition expenses, for a total investment of [ ] from 2006 through 2012. While we note that the pre-2008 expenditures were not tracked using the litigation project code, given Mr. Hannah's description of the remaining employee categories, we find that this analysis sufficiently excludes any improper non-licensing activity.

In finding that TPL's [ ] investment was substantial, the ALJ gave particular weight to certain facts beyond the monetary amount, including "the small number of patents in [the MMP Portfolio] and the relative importance of the '336 patent in licensing negotiations[.]" ID at 316 (citing *Liquid Crystal Display Devices* at 122). The ALJ also found that

Complainants' "investments are substantial in relation to certain industries in light of the large number of executed licenses covering a large percentage of the market (*e.g.*, the mobile phone market (*see* Tr. at 1860-1861) and the number of companies that Complainants have engaged in licensing negotiations." *Id.* (citing *Liquid Crystal Display Devices* at 123). For the first scenario, taking a look at a smaller window of time – 2009 through 2012 instead of 2006 through 2012 – doesn't change the fact that, during that time, TPL's investment was largely focused on the MMP Portfolio and Complainants had a large number of executed licenses during that time period. *See* CX-708C (indicating 41 executed licenses between February, 2009 and June, 2012). Similarly, for the second scenario, excluding all potential expenses related to patent prosecution only bolsters the already strong nexus between TPL's expenditures and the MMP Portfolio. Nor does a more limited view of TPL's investment change the fact that Complainants' licensing program was clearly ongoing through three weeks before the complaint was filed and, as discussed above, was ongoing at the time the complaint was filed through the present.

Based on the preceding discussion, we affirm the ALJ's finding that Complainants have satisfied the economic prong of the domestic industry requirement. Specifically, we find that Complainants' licensing program was ongoing at the time the complaint was filed and that TPL's investment of either $5.5 million from 2009 through 2012 or of [ ] from 2006 through 2012 was substantial.

2. Technical Prong

In his summary of the law concerning the domestic industry requirement, the ALJ stated that "where a complainant is relying on licensing activities, the domestic industry determination does not require a separate technical prong analysis and the complainant need not show that it or one of its licensees practices the patents-in-suit." ID at 296 (citing *Certain Semiconductor Chips with Minimized Chip Package Size and Products Containing Same*, Inv. No. 337-TA-605, Initial Determination at 112 (February 9, 2009) (unreviewed in relevant part)). The Commission determined to review and requested that the parties brief the issue in light the statutory language, legislative history, the Commission's prior decisions, and relevant court decisions, including *InterDigital Communications, LLC v. ITC*, 690 F.3d 1318 (Fed. Cir. 2012), 707 F.3d 1295 (Fed. Cir. 2013) and *Microsoft Corp. v. ITC*, 731 F.3d 1354 (Fed. Cir. 2013). 78 *Fed. Reg.* at 71645.

Subsequent to the issuance of the Notice of Review in this case, the Commission issued its decision in *Computer Peripheral Devices*, Inv. No. 337-TA-841, definitively holding that there is a technical prong requirement with respect to "articles protected by the patent" for a domestic industry asserted under section 337(a)(3)(C). Comm'n Op. at 24-40, 44 (Dec. 20, 2013).

After issuance of the ID in this case, the Commission noted that, under its prior precedent, a complainant was not historically required "to demonstrate for purposes of a licensing-based domestic industry the existence of protected articles practicing the asserted patents." Comm'n Op. at 27-28. However, the Commission decided in *Computer Peripheral Devices* that a complainant must show that there are "articles protected by the patent" when asserting a licensed-based domestic industry under section 337(a)(3)(C). Due to the posture of this case, the Commission takes no position on whether the requirement is met here in light of its findings of non-infringement. *See Beloit Corp. v. Valmet Oy, TVW*, 742 F.2d 1421 (Fed. Cir. 1984).

IV. CONCLUSION

PUBLIC VERSION

For the reasons discussed above, the Commission finds no violation of section 337 with respect to the '336 patent.

By order of the Commission.

Lisa R. Barton
Acting Secretary to the Commission

Issued: March 21, 2014

CONFIDENTIAL CERTIFICATE OF SERVICE

I, Lisa R. Barton, hereby certify that the attached **OPINION** has been served by hand upon, the Commission Investigative Attorney, Whitney Winston, Esq., and the following parties as indicated on **March 21, 2014.**

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U.S. International Trade Commission
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CERTAIN WIRELESS CONSUMER ELECTRONICS DEVICES AND COMPONENTS THEREOF **Inv. No. 337-TA-853**

[CORRECTED] CERTIFICATE OF SERVICE

I, Lisa R. Barton, hereby certify that the attached **OPINION** has been served by hand upon, the Commission Investigative Attorney, Whitney Winston, Esq., and the following parties as indicated on **March 21, 2014.**

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UNITED STATES INTERNATIONAL TRADE COMMISSION

Washington, D.C.

In the Matter of **CERTAIN WIRELESS CONSUMER ELECTRONICS DEVICES AND COMPONENTS THEREOF**	**Inv. No. 337-TA-853**

INITIAL DETERMINATION ON VIOLATION OF SECTION 337 AND RECOMMENDED DETERMINATION ON REMEDY AND BOND

Administrative Law Judge E. James Gildea

(September 6, 2013)

Appearances:

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For the Commission Investigative Staff:

Anne Goalwin, Esq., Acting Director; David O. Lloyd, Esq., Supervisory Attorney; and R. Whitney Winston, Esq., Investigative Attorney, of the Office of Unfair Import Investigations, U.S. International Trade Commission of Washington, D.C.

Pursuant to the Notice of Investigation, 77 Fed. Reg. 51572-73 (August 24, 2012), this is the Initial Determination of the Investigation in the Matter of Certain Wireless Consumer Electronics Devices and Components Thereof, United States International Trade Commission Investigation No. 337-TA-853. *See* 19 C.F.R. § 210.42(a).

With respect to Respondents Acer, Inc. and Acer America Corporation, it is held that no violation of Section 337 of the Tariff Act of 1930, as amended (19 U.S.C. § 1337), has occurred in the importation into the United States, the sale for importation, or the sale within the United States after importation, of certain wireless consumer electronics devices and components thereof, by reason of infringement of one or more of claims 1, 6, 7, 9-11, and 13-16 of United States Patent No. 5,809,336.

With respect to Respondent Amazon.com, Inc., it is held that no violation of Section 337 of the Tariff Act of 1930, as amended (19 U.S.C. § 1337), has occurred in the importation into the United States, the sale for importation, or the sale within the United States after importation, of certain wireless consumer electronics devices and components thereof, by reason of infringement of one or more of claims 1, 6, 7, 9-11, and 13-16 of United States Patent No. 5,809,336.

With respect to Respondent Barnes & Noble, Inc., it is held that no violation of Section 337 of the Tariff Act of 1930, as amended (19 U.S.C. § 1337), has occurred in the importation into the United States, the sale for importation, or the sale within the United States after importation, of certain wireless consumer electronics devices and components thereof, by reason of infringement of one or more of claims 1, 6, 7, 9-11, and 13-16 of United States Patent No. 5,809,336.

With respect to Respondents Garmin Ltd.; Garmin International, Inc.; and Garmin USA, Inc., it is held that no violation of Section 337 of the Tariff Act of 1930, as amended (19 U.S.C. § 1337), has occurred in the importation into the United States, the sale for importation, or the sale within the United States after importation, of certain wireless consumer electronics devices and components thereof, by reason of infringement of one or more of claims 1, 6, 7, 9-11, and 13-16 of United States Patent No. 5,809,336.

With respect to Respondents HTC Corporation and HTC America, Inc., it is held that no violation of Section 337 of the Tariff Act of 1930, as amended (19 U.S.C. § 1337), has occurred in the importation into the United States, the sale for importation, or the sale within the United States after importation, of certain wireless consumer electronics devices and components thereof, by reason of infringement of one or more of claims 1, 6, 7, 9-11, and 13-16 of United States Patent No. 5,809,336.

With respect to Respondents Huawei Technologies Co., Ltd; Huawei Device Co., Ltd; Huawei Device USA Inc.; and Futurewei Technologies, Inc., it is held that no violation of Section 337 of the Tariff Act of 1930, as amended (19 U.S.C. § 1337), has occurred in the importation into the United States, the sale for importation, or the sale within the United States after importation, of certain wireless consumer electronics devices and components thereof, by reason of infringement of one or more of claims 1, 6, 7, 9-11, and 13-16 of United States Patent No. 5,809,336.

With respect to Respondents Kyocera Corporation and Kyocera Communications, Inc., it is held that no violation of Section 337 of the Tariff Act of 1930, as amended (19 U.S.C. § 1337), has occurred in the importation into the United States, the sale for importation, or the sale within the United States after importation, of certain wireless consumer electronics devices and components thereof, by reason of infringement of one or more of claims 1, 6, 7, 9-11, and 13-16 of United States Patent No. 5,809,336.

With respect to Respondents LG Electronics, Inc. and LG Electronics USA, Inc., it is held that no violation of Section 337 of the Tariff Act of 1930, as amended (19 U.S.C. § 1337), has occurred in the importation into the United States, the sale for importation, or the sale within the United States after importation, of certain wireless consumer electronics devices and components thereof, by reason of infringement of one or more of claims 1, 6, 7, 9-11, and 13-16 of United States Patent No. 5,809,336.

With respect to Respondents Nintendo Co., Ltd. and Nintendo of America Inc., it is held that no violation of Section 337 of the Tariff Act of 1930, as amended (19 U.S.C. § 1337), has occurred in the importation into the United States, the sale for importation, or the sale within the United States after importation, of certain wireless consumer electronics devices and components thereof, by reason of infringement of one or more of claims 1, 6, 7, 9-11, and 13-16 of United States Patent No. 5,809,336.

With respect to Respondent Novatel Wireless, Inc., it is held that no violation of Section 337 of the Tariff Act of 1930, as amended (19 U.S.C. § 1337), has occurred in the importation into the United States, the sale for importation, or the sale within the United States after importation, of certain wireless consumer electronics devices and components thereof, by reason of infringement of one or more of claims 1, 6, 7, 9-11, and 13-16 of United States Patent No. 5,809,336.

With respect to Respondents Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc., it is held that no violation of Section 337 of the Tariff Act of 1930, as amended (19 U.S.C. § 1337), has occurred in the importation into the United States, the sale for importation, or the sale within the United States after importation, of certain wireless consumer electronics devices and components thereof, by reason of infringement of one or more of claims 1, 6, 7, 9-11, and 13-16 of United States Patent No. 5,809,336.

With respect to Respondents ZTE Corporation and ZTE (USA), Inc., it is held that no violation of Section 337 of the Tariff Act of 1930, as amended (19 U.S.C. § 1337), has occurred in the importation into the United States, the sale for importation, or the sale within the United States after importation, of certain wireless consumer electronics devices and components thereof, by reason of infringement of one or more of claims 1, 6, 7, 9-11, and 13-16 of United States Patent No. 5,809,336.

It is further held that a domestic industry exists that practices U.S. Patent No. 5,809,336.

TABLE OF CONTENTS

The following abbreviations may be used in this Initial Determination:

JX	Joint exhibit
JXM	Joint Markman exhibit
CX	Complainants' exhibit
CXM	Complainants' Markman exhibit
CDX	Complainants' demonstrative exhibit
CPX	Complainants' physical exhibit
CBr.	Complainants' initial post-hearing brief
CRBr.	Complainants' reply post-hearing brief
RX	Respondents' exhibit
RXM	Respondents' Markman exhibit
RDX	Respondents' demonstrative exhibit
RPX	Respondents' physical exhibit
RBr.	Respondents' initial post-hearing brief
RRBr.	Respondents' reply post-hearing brief
SBr.	Staff's initial post-hearing brief
SRBr.	Staff's reply post-hearing brief
Tr.	Hearing transcript
MTr.	Markman Hearing transcript

I. BACKGROUND

A. Institution and Procedural History of this Investigation.

By publication of a Notice of Investigation in the Federal Register on August 24, 2012, pursuant to subsection (b) of Section 337 of the Tariff Act of 1930, as amended, the Commission instituted Investigation No. 337-TA-853 with respect to U.S. Patent No. 5,809,336 ("the '336 patent") to determine:

> whether there is a violation of subsection (a)(1)(B) of section 337 in the importation into the United States, the sale for importation, or the sale within the United States after importation of certain wireless consumer electronic devices and components thereof that infringe one or more of claims 1, 6, 7, 9-11, and 13-16 of the '336 patent and whether an industry in the United States exists as required by subsection (a)(2) of section 337[.]

77 Fed. Reg. 51572 (August 24, 2012). In addition, the Commission has asked the Administrative Law Judge to:

> take evidence or other information and hear arguments from the parties and other interested persons with respect to the public interest in this Investigation, as appropriate, and provide the Commission with findings of fact and a recommended determination on this issue, which shall be limited to the statutory public interest factors, 19 U.S.C. 1337(d)(1), (f)(1), (g)(1)[.]

(*Id.*) The Notice of Investigation names Technology Properties Limited LLC and Phoenix Digital Solutions LLC of Cupertino, California and Patriot Scientific Corporation of Carlsbad, California as complainants and Acer, Inc. of Taipei, Taiwan; Acer America Corporation of San Jose, California; Amazon.com, Inc. of Seattle, Washington; Barnes and Noble, Inc. of New York, New York; Garmin Ltd of Schaffhausen, Switzerland; Garmin International, Inc. of Olathe, Kansas; Garmin USA, Inc. of Olathe, Kansas; HTC Corporation of Taoyuan, Taiwan; HTC America of Bellevue, Washington; Huawei Technologies Co, Ltd. of Shenzhen, China; Huawei North America of Plano, Texas; Kyocera Corporation of Kyoto, Japan; Kyocera

Communications, Inc. of San Diego, California; LG Electronics, Inc. of Seoul, Korea; LG Electronics U.S.A., Inc. of Englewood Cliffs, New Jersey; Nintendo Co. Ltd. of Kyoto, Japan; Nintendo of America, Inc. of Redmond, Washington; Novatel Wireless, Inc. of San Diego, California; Samsung Electronics Co., Ltd., of Seoul, Korea; Samsung Electronics America, Inc. of Ridgefield Park, New Jersey; Sierra Wireless, Inc. of British Columbia, Canada; Sierra Wireless America, Inc. of Carlsbad, California; ZTE Corporation of Shenzhen, China; and ZTE (USA) Inc. of Richardson, Texas as respondents. (*Id.*) The Commission Investigative Staff ("Staff") of the Office of Unfair Import Investigations is also a party in this Investigation. (*Id.*)

On January 8, 2013, the Administrative Law Judge issued an initial determination granting Complainants' motion to amend the Complaint and Notice of Investigation to remove Respondent Huawei North America and add Huawei Device Co., Ltd., Huawei Device USA Inc., and Futurewei Technologies, Inc. as additional Respondents in this Investigation. (*See* Order No. 14.) The Commission did not review this initial determination. (*See* Notice of Commission Determination Concerning an Initial Determination Granting a Motion to Amend Complaint and Notice of Investigation (U.S.I.T.C., February 15, 2013).)

On January 15, 2013, the Administrative Law Judge issued an initial determination granting a motion to terminate this Investigation with respect to Respondents Sierra Wireless, Inc. and Sierra Wireless America, Inc. (*See* Order No. 17.) The Commission did not review this initial determination. (*See* Notice of Commission Determination Not to Review an Initial Determination Granting a Joint Motion to Terminate Respondents Sierra Wireless, Inc. and Sierra Wireless America, Inc. Based upon a Settlement Agreement (U.S.I.T.C., February 4, 2013).)

On March 5, 2013, the Administrative Law Judge held a Markman hearing in order to permit the parties to present their positions with respect to the interpretation of certain disputed claim language in the asserted patent. Complainants, Respondents, and Staff attended the Markman hearing.

On April 18, 2013, the Administrative Law Judge issued Order No. 31 (the "Markman Order") construing the patent claim terms at issue in this Investigation.

The evidentiary hearing on the question of violation of Section 337 began on June 3, 2013 and ended on June 12, 2013. Complainants and Respondents were represented by counsel at the hearing. Staff also attended the hearing.

B. The Parties.

1. Complainants

Technology Properties Limited LLC ("TPL") is a California limited liability company with its principal place of business in Cupertino, California. (Second Amended Complaint at ¶ 5.) Patriot Scientific Corporation ("Patriot") is a Delaware corporation with its principal place of business in Carlsbad, California. (*Id.*) Phoenix Digital Solutions LLC ("PDS") is a Delaware limited liability company with its principal place of business in Cupertino, California. (*Id.*) TPL, Patriot, and PDS (collectively, "Complainants") "each hold rights to the Moore Microprocessor Patent ("MMP") Portfolio, which includes the '336 Patent, through respective assignments and/or licenses from each of the co-inventors of the MPP Portfolio, Charles H. Moore and Russell H. Fish, III." (*Id.*) "Through a series of transactions, TPL and PTSC each licensed to Phoenix Digital Solutions, LLC ("PDS"), a company they jointly own, the exclusive right to assert and/or grant licenses under the MMP Portfolio… PDS then granted to TPL all the rights licensed to it by both TPL and PTSC, including the exclusive right to assert and/or grant licenses under the MMP Portfolio." (*Id.*) However, TPL rescinded the right to license the asserted patent, and that right reverted back to PDS prior to the filing of the Complaint. (*See* CRBr. at 76, n. 45.)

2. Respondents

Respondent Acer Inc. is a Taiwanese corporation with a principal place of business in New Taipei City, Taiwan. (RBr. at 5.) Respondent Acer America Corporation is a California corporation with a principal place of business in San Jose, California. (*Id.*) Respondents Acer Inc. and Acer America Corporation may be collectively referred to herein as "Acer."

Respondent Amazon.com, Inc. ("Amazon") is a Delaware corporation with a principal place of business in Seattle, Washington. (*Id.*)

Respondent Barnes & Noble, Inc. ("Barnes & Noble") is a Delaware corporation with a principal place of business in New York City, New York. (*Id.*)

Respondent Garmin Ltd. is a Swiss corporation with a principal place of business in Schaffhausen, Switzerland. (*Id.*) Respondent Garmin International, Inc. is a Kansas corporation with a principal place of business in Olathe, Kansas. (*Id.*) Respondent Garmin USA, Inc. is a Kansas corporation with a principal place of business in Olathe, Kansas. (*Id.*) Respondents Garmin Ltd., Garmin International, Inc., and Garmin USA, Inc. may be collectively referred to herein as "Garmin."

Respondent HTC Corporation is a Taiwanese corporation with a principal place of business in New Taipei City, Taiwan. (*Id.*) Respondent HTC America is a Washington corporation with a principal place of business in Bellevue, Washington. (*Id.*) Respondents HTC Corporation and HTC America may be collectively referred to herein as "HTC."

Respondent Huawei Technologies Co., Ltd. is a Chinese corporation with a principal place of business in Shenzhen, China. (*Id.*) Respondent Huawei Device Co., Ltd. is a Chinese corporation with a principal place of business in Shenzhen, China. (*Id.* at 5-6.) Respondent Huawei Device USA Inc. is a Texas corporation with a principal place of business in Plano, Texas. (*Id.* at 6.) Respondent Futurewei Technologies, Inc. d/b/a Huawei Technologies (USA) is a Texas corporation with a principal place of business in Plano, Texas. (*Id.*) Respondents Huawei Technologies Co., Huawei Device Co., Ltd., Huawei Device USA Inc., and Futurewei Technologies, Inc. may be collectively referred to herein as "Huawei."

Respondent Kyocera Corporation is a Japanese corporation with a principal place of business in Kyoto, Japan. (*Id.*) Respondent Kyocera Communications, Inc. is a Delaware corporation with a principal place of business in San Diego, California. (*Id.*) Respondents Kyocera Corporation and Kyocera Communications, Inc. may be collectively referred to herein as "Kyocera."

Respondent LG Electronics, Inc. is a Korean corporation with a principal place of business in Seoul, Republic of Korea. (*Id.*) Respondent LG Electronics U.S.A., Inc. is a Delaware corporation with a principal place of business in Englewood Cliffs, New Jersey. (*Id.*) Respondents LG Electronics, Inc. and LG Electronics U.S.A., Inc. may be collectively referred to herein as "LG."

Respondent Nintendo Co., Ltd. is a Japanese corporation with a principal place of business in Kyoto, Japan. (*Id.*) Respondent Nintendo of America, Inc. is a Washington corporation with a principal place of business in Redmond, Washington. (*Id.*) Respondents Nintendo Co., Ltd. and Nintendo of America, Inc. may be collectively referred to herein as "Nintendo."

Respondent Novatel Wireless, Inc. ("Novatel") is a Delaware corporation with a principal place of business in San Diego, California. (*Id.*)

Respondent Samsung Electronics Co., Ltd. is a Korean corporation with a princeipal place of business in Gyeonggi-do, Republic of Korea. (*Id.*) Respondent Samsung Electronics America, Inc. is a New York corporation with a principal place of business in Ridgefield Park, New Jersey. (*Id.*) Respondents Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. may be collectively referred to herein as "Samsung."

Respondent ZTE Corporation is a Chinese corporation with a principal place of business in Shenzhen, China. (*Id.* at 7.) Respondent ZTE (USA) Inc. is a New Jersey corporation with a principal place of business in Richardson, Texas. (*Id.*) Respondents ZTE Corporation and ZTE (USA) Inc. may be collectively referred to herein as "ZTE."

C. Overview of the Technology.

The technology at issue relates generally to wireless consumer electronic devices and the clocking of microprocessors in those devices. (RBr. at 7; CBr. at 5.) Microprocessors contain millions of electrical components whose operation must be coordinated to function properly. (CBr. at 6.) Clock signals are used to synchronize all operations of a microprocessor. (*Id.*)

D. Overview of U.S. Patent No. 5,809,336.

This Investigation concerns U.S. Patent No. 5,809,336, titled "High Performance Microprocessor Having Variable Speed System Clock," which resulted from U.S. Patent Application No. 484,918 filed on June 7, 1995. (JXM-0001.) The '336 patent is a division of Serial No. 389,334, filed on August 3, 1989 and issued as U.S. Patent No. 5,440,749. (*Id.*) The '336 patent issued on September 15, 1998 and names Charles H. Moore and Russell H. Fish, III as the inventors. (*Id.*) The patent was assigned to Patriot Scientific Corporation. (*Id.*; Complaint at ¶36; *id.*, Ex. 8.)

The '336 patent discloses a microprocessor system having (1) an on-chip variable speed clock and (2) a second independent clock connected to an input/output (I/O) interface. (Technology Stipulation at 2.) Microprocessors must operate over (1) temperature ranges, (2) voltage variations and (3) variations in semiconductor processing, each of which affects operating speed ("PVT parameters" for "process," "voltage" and "temperature"). (*Id.* (citing JXM-0001 at 16:44-53).) The '336 patent discloses a microprocessor having a clock circuit and a CPU fabricated on the same substrate. (*Id.* (citing JXM-0001 at 16:56-58).) The '336 patent presents the following embodiment in Figure 17:

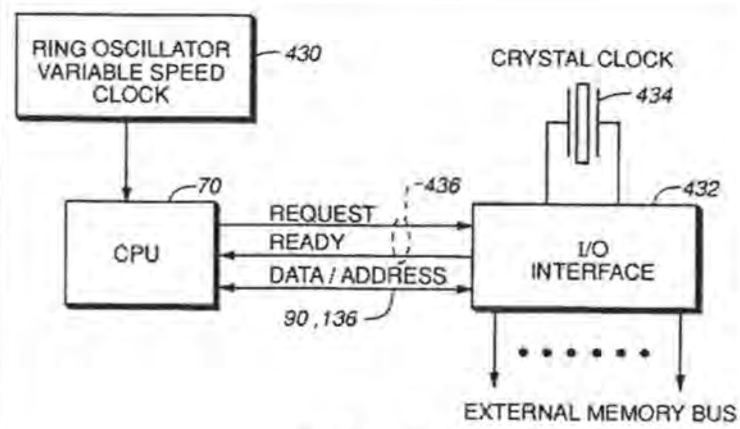


FIG._17

In the embodiment shown in Figure 17, CPU 70 operates asynchronously with I/O interface 432. (*Id.* (citing JXM-0001 at 17:14-19).) I/O interface 432 is controlled independently by crystal clock 434. (*Id.* (citing JXM-0001 at 17:17-19, 17:25-27).) The on-chip ring oscillator variable speed clock 430 clocks the CPU 70. (*Id.* (citing JXM-0001 at 16:59-60, 17:19-22, 17:32-34).)

Asserted claims 1, 6, 7, 9-11, and 13-16 of the '336 patent are shown below.

1. A microprocessor system, comprising a single integrated circuit including a central processing unit and an entire ring oscillator variable speed system clock in said single integrated circuit and connected to said central processing unit for clocking said central processing unit, said central processing unit and said ring oscillator variable speed system clock each including a plurality of electronic devices correspondingly constructed of the same process technology with corresponding manufacturing variations, a processing frequency capability of said central processing unit and a speed of said ring oscillator variable speed system clock varying together due to said manufacturing variations and due to at least operating voltage and temperature of said single integrated circuit; an on-chip input/output interface connected to exchange coupling control signals, addresses and data with said central processing unit, and a second clock independent of said ring oscillator variable speed system clock connected to said input/output interface, wherein a clock signal of said second clock originates from a source other than said ring oscillator variable speed system clock.

6. A microprocessor system comprising:

a central processing unit disposed upon an integrated circuit substrate, said central processing unit operating at a processing frequency and being constructed of a first plurality of electronic devices;

an entire oscillator disposed upon said integrated circuit substrate and connected to said central processing unit, said oscillator clocking said central processing unit at a clock rate and being constructed of a second plurality of electronic devices, thus varying the processing frequency of said first plurality of electronic devices and the clock rate of said second plurality of electronic devices in the same way as a function of parameter variation in one or more fabrication or operational parameters associated with said integrated circuit substrate, thereby enabling said processing frequency to track said clock rate in response to said parameter variation; an on-chip input/output interface, connected between said central processing unit and an off-chip external memory bus, for facilitating exchanging coupling control signals, addresses and data with said central processing unit; and

an off-chip external clock, independent of said oscillator, connected to said input/output interface wherein said off-chip external clock is operative at a frequency independent of a clock frequency of said oscillator and wherein a clock signal from said off-chip external clock originates from a source other than said oscillator.

7. The microprocessor system of claim 6 wherein said one or more operational parameters include operating temperature of said substrate or operating voltage of said substrate.

9. The microprocessor system of claim 6 wherein said oscillator comprises a ring oscillator.

10. In a microprocessor system including a central processing unit, a method for clocking said central processing unit comprising the steps of:

providing said central processing unit upon an integrated circuit substrate, said central processing unit being constructed of a first plurality of transistors and being operative at a processing frequency;

providing an entire variable speed clock disposed upon said integrated circuit substrate, said variable speed clock being constructed of a second plurality of transistors;

clocking said central processing unit at a clock rate using said variable speed clock with said central processing unit being clocked by said variable speed clock at a variable frequency dependent upon variation in one or more fabrication or operational parameters associated with said integrated circuit substrate, said processing frequency and said clock rate varying in the same way relative to said variation in said one or more fabrication or operational parameters associated with said integrated circuit substrate;

connecting an on-chip input/output interface between said central processing unit and an off-chip external memory bus, and exchanging coupling control signals, addresses and data between said input/output interface and said central processing unit; and

clocking said input/output interface using an off-chip external clock wherein said off-chip external clock is operative at a frequency independent of a clock frequency of said variable speed clock and wherein a clock signal from said off-chip external clock originates from a source other than said variable speed clock.

11. A microprocessor system, comprising a single integrated circuit including a central processing unit and an entire ring oscillator variable speed system clock in said single integrated circuit and connected to said central processing unit for clocking said central processing unit, said central processing unit and said ring oscillator variable speed system clock each including a plurality of electronic devices correspondingly constructed of the same process technology

with corresponding manufacturing variations, a processing frequency capability of said central processing unit and a speed of said ring oscillator variable speed system clock varying together due to said manufacturing variations and due to at least operating voltage and temperature of said single integrated circuit; an on-chip input/output interface connected to exchange coupling control signals, addresses and data with said central processing unit; and a second clock independent of said ring oscillator variable speed system clock connected to said input/output interface, wherein said central processing unit operates asynchronously to said input/output interface.

13. A microprocessor system comprising: a central processing unit disposed upon an integrated circuit substrate, said central processing unit operating at a processing frequency and being constructed of a first plurality of electronic devices;

an entire oscillator disposed upon said integrated circuit substrate and connected to said central processing unit, said oscillator clocking said central processing unit at a clock rate and being constructed of a second plurality of electronic devices, thus varying the processing frequency of said first plurality of electronic devices and the clock rate of said second plurality of electronic devices in the same way as a function of parameter variation in one or more fabrication or operational parameters associated with said integrated circuit substrate, thereby enabling said processing frequency to track said clock rate in response to said parameter variation;

an on-chip input/output interface, connected between said central processing unit and an off-chip external memory bus, for facilitating exchanging coupling control signals, addresses and data with said central processing unit; and

an off-chip external clock, independent of said oscillator, connected to said input/output interface wherein said off-chip external clock is operative at a frequency independent of a clock frequency of said oscillator and further wherein said central processing unit operates asynchronously to said input/output interface.

14. The microprocessor system of claim 13 wherein said one or more operational parameters include operating temperature of said substrate or operating voltage of said substrate.

15. The microprocessor system of claim 13 wherein said oscillator comprises a ring oscillator.

16. In a microprocessor system including a central processing unit, a method for clocking said central processing unit comprising the steps of:

providing said central processing unit upon an integrated circuit substrate, said central processing unit being constructed of a first plurality of transistors and being operative at a processing frequency;

providing an entire variable speed clock disposed upon said integrated circuit substrate, said variable speed clock being constructed of a second plurality of transistors;

clocking said central processing unit at a clock rate using said variable speed clock with said central processing unit being clocked by said variable speed clock at a variable frequency dependent upon variation in one or more fabrication or operational parameters associated with said integrated circuit substrate, said processing frequency and said clock rate varying in the same way relative to said variation in said one or more fabrication or operational parameters associated with said integrated circuit substrate;

connecting an on-chip input/output interface between said central processing unit and an off-chip external memory bus, and exchanging coupling control signals, addresses and data between said input/output interface and said central processing unit; and

clocking said input/output interface using an off-chip external clock wherein said off-chip external clock is operative at a frequency independent of a clock frequency of said variable speed clock, wherein said central processing unit operates asychronously to said input/output interface.

(JXM-0001 at 33:17-19, 33:23-24, Ex Parte Reexamination Certificate at 1:59-3:26, 3:29-4:46.)

E. The Products at Issue.

The products at issue in this Investigation are wireless consumer electronics devices. Complainants accuse products, identified in **Appendix A**, in a variety of categories including desktop personal computers, notebook personal computer, tablet computers, e-readers, navigation devices, smartphones, mobile phones, portable handheld gaming devices, mobile hotspots, USB modems, and wireless home phones (collectively, "Accused Products"). (RBr. at 9; CBr. at 8.)

II. JURISDICTION AND IMPORTATION.

In order to have the power to decide a case, a court or agency must have both subject matter jurisdiction and jurisdiction over either the parties or the property involved. *See Certain Steel Rod Treating Apparatus and Components Thereof*, Inv. No. 337-TA-97, Commission Memorandum Opinion, 215 U.S.P.Q. 229, 231 (U.S.I.T.C., 1981). For the reasons discussed below, the Administrative Law Judge finds the Commission has jurisdiction over this Investigation.

Respondents have each responded to the Complaint, First Amended Complaint, Second Amended Complaint, and Notice of Investigation and have fully participated in the Investigation by, among other things, participating in discovery, participating in the Markman and evidentiary hearings, and filing pre-hearing and post-hearing briefs. Accordingly, the Administrative Law Judge finds that Respondents Acer Inc.; Acer America Corporation; Amazon.com, Inc.; Barnes & Noble, Inc.; Garmin Ltd.; Garmin International, Inc.; Garmin USA, Inc.; HTC Corporation; HTC America; Huawei Technologies Co., Ltd.; Huawei Device Co., Ltd.; Huawei Device USA Inc.; Futurewei Technologies, Inc.; Kyocera Corporation; Kyocera Communications, Inc.; LG Electronics, Inc.; LG Electronics U.S.A., Inc.; Nintendo Co., Ltd.; Nintendo of America, Inc.; Novatel Wireless, Inc.; Samsung Electronics Co., Ltd.; Samsung Electronics America, Inc.; ZTE Corporation; and ZTE (USA) Inc. have submitted to the personal jurisdiction of the Commission and that the Commission has in rem jurisdiction over the Accused Products. *Certain Cloisonné Jewelry*, Inv. No. 337-TA-195, Initial Determination at 40-43 (U.S.I.T.C., March, 1985) (unreviewed).

Section 337 declares to be unlawful "[t]he importation into the United States, the sale for importation, or the sale within the United States after importation by the owner, importer, or consignee, of articles" that infringe a valid and enforceable United States patent if an industry relating to the articles protected by the patent exists or is in the process of being established in the United States. See 19 U.S.C. §§ 1337(a)(1)(B)(i) and (a)(2). Pursuant to Section 337, the Commission shall investigate alleged violations of the Section and hear and decide actions involving those alleged violations.

With respect to the asserted patents, it is undisputed that the importation or sale requirement of Section 337 establishing subject matter jurisdiction as to all Respondents has been met. (RBr. at 42.) Accordingly, the Administrative Law Judge finds that each Respondent sells for importation, imports, or sells after importation into the United States, articles that are accused in this Investigation. *See Certain Electronic Devices with Image Processing Systems, Components Thereof, and Associated Software*, Inv. No. 337-TA-724, Comm'n Op. at 9-10 (U.S.I.T.C., Dec. 21, 2011[1]) ("*Electronic Devices*").

III. CLAIM CONSTRUCTION

A. Level of Ordinary Skill in the Art

The Administrative Law Judge concluded that a person of ordinary skill in the art of the '336 patent would have at least a bachelor's degree in electrical engineering, computer engineering, or a related field and at least 5 years of experience in integrated circuit design or a related field or a graduate degree in electrical engineering, computer engineering, or a related field and at least 3 years of experience in integrated circuit design or a related field. (Order No. 31 at 10-11.)

[1] Date of public opinion.

B. Claims 1, 6, 10, 11, 13, 16—*"central processing unit"*

The parties agreed that the term "central processing unit" in claims 1, 6, 10, 11, 13, and 16 of the '336 patent should be construed to mean "electronic circuit on an integrated circuit that controls the interpretation and execution of programmed instructions." (Order No. 31 at 11.)

C. Claims 1, 11—*"second clock independent of said ring oscillator variable speed system clock"*

The parties agreed that the term "second clock independent of said ring oscillator variable speed system clock" in claims 1 and 11 of the '336 patent should be construed to mean "a second clock wherein a change in the frequency of either the second clock or ring oscillator system clock does not affect the frequency of the other." (Order No. 31 at 11.)

D. Claims 1, 6, 10, 11, 13, 16—*"on-chip input/output interface"*

The parties agreed that the term "on-chip input/output interface" in claims 1, 6, 10, 11, 13, and 16 of the '336 patent should be construed to mean "a circuit having logic for input/output communications, where that circuit is located on the same semiconductor substrate as the CPU." (Order No. 31 at 11.)

E. Claims 6, 13—*"external clock is operative at a frequency independent of a clock frequency of said oscillator"*

The parties agreed that the term "external clock is operative at a frequency independent of a clock frequency of said oscillator" in claims 6 and 13 of the '336 patent should be construed to mean "an external clock wherein a change in the frequency of either the external clock or oscillator does not affect the frequency of the other." (Order No. 31 at 11.)

F. Claims 10, 16—*"external clock is operative at a frequency independent of a clock frequency of said variable speed clock"*

The parties agreed that the term "external clock is operative at a frequency independent of a clock frequency of said variable speed clock" in claims 10 and 16 of the '336 patent should be construed to mean "an external clock wherein a change in the frequency of either the external clock or the variable speed clock does not affect the frequency of the other." (Order No. 31 at 12.)

G. Claims 1, 9, 11, 15—*"ring oscillator"*

The Administrative Law Judge concluded that the term "ring oscillator" means "an oscillator having a multiple, odd number of inversions arranged in a loop." (Order No. 31 at 20.)

H. Claims 1, 11—*"an entire ring oscillator variable speed system clock in said single integrated circuit"*

The Administrative Law Judge concluded that the term "an entire ring oscillator variable speed system clock in said single integrated circuit" as it appears in claims 1 and 11 means "a ring oscillator variable speed system clock that is located entirely on the same semiconductor substrate as the central processing unit and does not rely on a control signal or an external crystal/clock generator to generate a clock signal." (Order No. 31 at 40.)

I. Claims 6, 13—*"an entire oscillator disposed upon said integrated circuit substrate"*

The Administrative Law Judge concluded that the term "an entire oscillator disposed upon said single integrated circuit substrate" means "an oscillator that is located entirely on the same substrate as the central processing unit and does not rely on a control signal or an external crystal/clock generator to generate a clock signal." (Order No. 31 at 41.)

J. Claims 10, 16—*"an entire variable speed clock disposed upon said integrated circuit substrate"*

The Administrative Law Judge concluded that the term "an entire variable speed clock disposed upon said single integrated circuit substrate" means "a variable speed clock that is located entirely on the same semiconductor substrate as the central processing unit and does not rely on a control signal or an external crystal/clock generator to generate a clock signal." (Order No. 31 at 42.)

K. Claims 1, 6, 10, 11, 13, 16—*"clocking said central processing unit"*

The Administrative Law Judge concluded that the term "clocking said central processing unit" means "providing a timing signal to said central processing unit." (Order No. 31 at 45.)

L. Claims 6, 13—*"thereby enabling said processing frequency to track said clock rate in response to said parameter variation"*

The Administrative Law Judge found that the following construction should be adopted: "thereby allowing the processing frequency of the central processing unit to follow said clock rate in response to said parameter variation." (Order No. 31 at 56.)

M. Claims 1, 11—*"varying together;"* **Claims 10, 16**—*"varying in the same way;"* **and Claims 6, 13**—*"varying... in the same way"*

The Administrative Law Judge found that the term "varying" requires no construction and would have been understood by a person of ordinary skill in the art at the time of the invention according to its plain and ordinary meaning. (Order No. 31 at 68.)

N. Claims 11, 13, 16—*"wherein said central processing unit operates asynchronously to said input/output interface"*

The Administrative Law Judge concluded that the term "wherein said central processing unit operates asynchronously to said input/output interface" means "the timing control of the central processing unit operates independently of and is not derived from the timing control of the input/output interface such that there is no readily predictable phase relationship between them." (Order No. 31 at 74.)

IV. INFRINGEMENT DETERMINATION

A. Applicable Law

1. Direct Infringement

"Determination of infringement is a two-step process which consists of determining the scope of the asserted claim (claim construction) and then comparing the Accused Product . . . to the claim as construed." *Certain Sucralose, Sweeteners Containing Sucralose, and Related Intermediate Compounds Thereof*, Inv. No. 337-TA-604, Comm'n Op. at 36 (U.S.I.T.C., April 28, 2009) (citing *Litton Sys., Inc. v. Honeywell, Inc.*, 140 F.3d 1449, 1454 (Fed. Cir. 1998)). An accused device literally infringes a patent claim if it contains each limitation recited in the claim exactly. *Litton*, 140 F.3d at 1454. Each patent claim element or limitation is considered material and essential. *London v. Carson Pirie Scott & Co.*, 946 F.2d 1534, 1538 (Fed. Cir. 1991). In a Section 337 investigation, the complainant bears the burden of proving infringement of the asserted patent claims by a preponderance of the evidence. *Enercon GmbH v. Int'l Trade Comm'n*, 151 F.3d 1376, 1384 (Fed. Cir. 1998).

2. Induced Infringement

"Whoever actively induces infringement of a patent shall be liable as an infringer." 35 U.S.C. § 271(b). A patentee asserting a claim of inducement must show (i) that there has been direct infringement and (ii) that the alleged infringer "knowingly induced infringement and possessed specific intent to encourage another's infringement." *Minnesota Mining & Mfg. Co. v. Chemque, Inc.*, 303 F.3d 1294, 1304-05 (Fed. Cir. 2002). With respect to the direct infringement requirement, the patentee "must either point to specific instances of direct infringement or show that the accused device necessarily infringes the patent in suit." *ACCO Brands, Inc. v. ABA Locks Mfrs. Co., Ltd.*, 501 F.3d 1307, 1313 (Fed. Cir. 2007) (citation omitted). This requirement may be shown by circumstantial evidence. *Vita-Mix Corp. v. Basic Holding, Inc.*, 581 F.3d

1317, 1326 (Fed. Cir. 2009). "[A] finding of infringement can rest on as little as one instance of the claimed method being performed during the pertinent time period." *Lucent Techs., Inc. v. Gateway, Inc.*, 580 F.3d 1301, 1317 (Fed. Cir. 2009).

The specific intent requirement for inducement necessitates a showing that the alleged infringer was aware of the patent, induced direct infringement, and that he knew or should have known that his actions would induce actual direct infringement. *DSU Medical Corp. v. JMS Co., Ltd.*, 471 F.3d 1293, 1305 (Fed. Cir. 2006) (en banc in relevant part); *Global-Tech Appliances, Inc. v. SEB S.A.*, 131 S.Ct. 2060, 2068-70 (2011) (holding that willful blindness may be sufficient to meet specific intent requirement). The intent to induce infringement may be proven with circumstantial or direct evidence and may be inferred from all the circumstances. *DSU*, 471 F.3d at 1306; *Broadcom Corp. v. Qualcomm Inc.*, 543 F.3d 683, 699 (Fed. Cir. 2008).

B. Analysis of the Accused Products with Respect to the '336 Patent

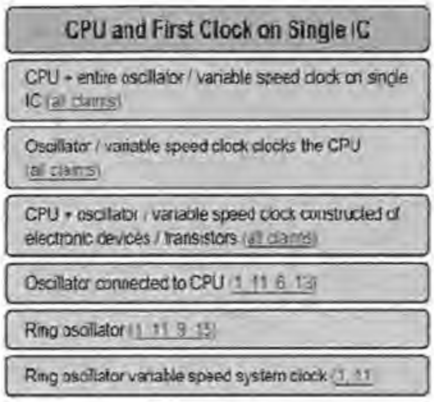
Complainants assert that the Accused Products literally infringe claims 1, 6, 7, 9-11, and 13-16 of the '336 patent.

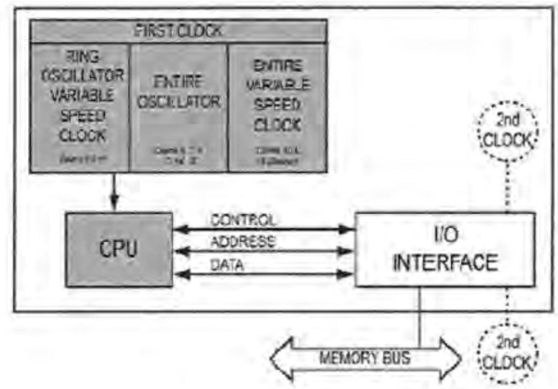
1. The "Entire" Limitations

a) Complainants' arguments

Complainants contend that all of the Accused Products satisfy what Complainants call the "first clock" or "CPU clock"[2] limitation of the asserted claims, according to what they show in their exhibit CDX-0004.03, reproduced here:

[2] "First/CPU Clock" is not a term that is mentioned in the asserted claims, as noted by Respondents in their reply brief (RRBr. at 19, n. 6). Independent Claim 1 mentions the terms "an entire ring oscillator variable speed system clock" and "central processing unit," but these individual terms in the context of the claim—"a ring oscillator variable speed system clock, wherein the ring oscillator is located entirely on the same semiconductor substrate as the central processing unit"—do not equate to Complainants' "First/CPU clock" conflation. Therefore, the fact that certain arguments are addressed herein in the manner undertaken by Complainants is not intended to be, and should not be construed as, a tacit acceptance or recognition of the accuracy, validity, or propriety of Complainants' rhetoric or any underlying legal assumptions implied therein.





(CBr. at 11.) Complainants say each of the Accused Products includes a CPU clock that is a "ring oscillator," which has construed to mean "an oscillator having a multiple, odd number of inversions arranged in a loop." (*Id.*) Complainants argue that, although a ring oscillator is specifically required in claims 1, 9, 11, and 15, the ring oscillators in the Accused Products also satisfy the corresponding "clock" elements of the other asserted claims, 6, 7, 13, and 14 ("oscillator"); 10, and 16 ("variable speed clock"). (*Id.*)

(1) *"Oscillator" and "ring oscillator" limitations*

Complainants say the evidence at the hearing indisputably shows that all of the Accused Products include on-chip ring oscillators for clocking associated CPUs. (*Id.*) Dr. Oklobdzija testified that ring oscillators generally are a basic source for the clocks in all of the microprocessor systems. (*Id.* (citing Tr. (Oklobdzija) at 262).) He says there are several reasons for this. First, modern microprocessors for mobile phones and other wireless products operate at very high frequencies. Typically, conventional quartz crystal oscillators operate at frequencies in the range of tens of megahertz, whereas high-speed products like mobile phones run in the gigahertz range. (*Id.*) High-speed performance is achieved by on-chip oscillators but cannot be met by off-chip crystals. (*Id.* (citing Tr. (Subramanian) at 1378-80).) Dr. Oklobdzija says manufacturers have to include ring oscillators on the same chip as the CPU in order to achieve the fast clock speeds demanded by industry. (*Id.* at 12-13.) Dr. Oklobdzija contends that it is not possible to multiply the frequency of a digital signal. (*Id.* at 13 (citing Tr. (Oklobdzija) at 378-379).)

Complainants say Respondents' expert, Dr. Subramanian, confirmed that { } in the Accused Products have ring oscillators. (*Id.* (citing Tr. (Subramanian) at 1410-11, 1432, 1392-95).) Although he testified that the { }. (*Id.* (citing Tr. (Subramanian) at 1390-92, 1395-96, 1423).) Thus, argue Complainants, Drs. Oklobdzija and Subramanian both testified that { }. (*Id.*) Therefore, the evidence confirms that the { }. (*Id.*)

(a) The Qualcomm processors

Complainants say that the evidence in this Investigation shows that Qualcomm { }, noting that Dr. Oklobdzija testified that { }. (*Id.*) He testified that any modern microprocessor that has a PLL must have a ring oscillator. (*Id.* at 13-14 (citing Tr. (Oklobdzija) at 439-441).) Dr. Oklobdzija further testified that { }, a fact that was confirmed by { } corporate witness, { }. (*Id.* at 14 (citing Tr. (Oklobdzija) at 445-446).)

---

[3] { }

(b) The Texas Instrument OMAP processors

Complainants divide the Texas Instruments ("TI") OMAP processors in the Accused Products into two families: (1) the OMAP4 family, which includes the 4470, 4460, and 4430 processors: and (2) the OMAP3 family, which includes the 3530, 3611, 3621, and 3630 processors. (*Id.* (citing, at n. 4, Tr. 172, 174-175, 1182-83).) Complainants say TI's corporate witness, Baher Haroun, testified that TI creates Technical Reference Manuals ("TRMs") for its OMAP3 and 4 products and distributes them to its customers, which include Respondents. (*Id.* (citing Tr. (Oklobdzija) at 176-177, 170, 210).) Dr. Haroun confirmed this, during his testimony (Tr. at 171-172, 181, 196-197), and this is also confirmed by the TRMs (CX-0318C; CX-0316C; CX-0321C; CX-0366C; CX-0353C; and CX-1142). (*Id.*) Dr. Haroun also testified that each of the identified TI chips has a "Microprocessor Unit" (MPU) containing an ARM CPU. (*Id.*) These CPUs are located on the same die as a number of digital PLLs that generate clock signals for various systems that reside on the chip. TI refers to these DPLLs[4] as "internal DPLLs for internal high-frequency clocks generation" and DPLL clock generators that synthesize high-frequency clocks for the device." (*Id.* at 14-15.)

Complainants say each of the OMAP3 and 4 chips in the Accused Products contains a DPLL that outputs a clock signal for its associated MPU. (*Id.* at 15 (citing Tr. at 181).) Within each of these DPLLs is either a { } ring oscillator that generates an oscillation that constitutes a clock signal. (*Id.* (citing Tr. at 190).) Each of these ring oscillators is able to produce an oscillation because it has an odd number of inversions arranged in a loop. (*Id.* (citing Tr. at 190).) Dr. Haroun drew representations of the ring oscillators in the OMAP3 and 4 chips, which are shown in CDX-80C, reproduced here:

[4] Digital phase locked loop(s).

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(*Id.* at 15-16.)

(c) The Samsung processors

Complainants say Samsung's corporate witness testified that { }. (*Id.* at 16 (citing CX-0913C (J. Lee Dep.) at 99-100, 104).) Dr. Subramanian agrees that { } in the accused Samsung products have the { }. (*Id.* (citing Tr. at 1200).) Dr. Oklobdzija testified that Samsung's { }. (*Id.* (citing Tr. at 519-520).)

(d) The LSI processors

Complainants say that LSI's corporate witness testified that the company's LSI B5503A microprocessor { } (*Id.* (citing CX-1454C (Casasanta Dep.) at 27).) He also testified that { } (*Id.* (citing CX-1454C at 27-28).) Dr. Oklobdzija also testified that { }. (*Id.* (citing Tr. at 663-666).)

[5] Voltage controlled oscillator(s).

(2) *Complainants assert that the oscillators do not rely on control signals or external crystal/clock generators*

Complainants say the ring oscillators in the Accused Products satisfy the "entire" limitations of the claims because the ring oscillators do not rely on a control signal or an external crystal/clock generator to generate a clock signal. (*Id.*) Complainants say that Order No. 31 states that for each of the "entire" limitations the first/CPU clock, which is a ring oscillator in each of the Accused Products, must not rely on a control signal or an external crystal/clock generator to generate a clock signal. (Order No. 31 at 40, 41, 42.) Complainants say the evidence at the hearing demonstrates that the "ring oscillator 'first clocks'" in each of the Accused Products meet this limitation because they generate clock signals without relying on a control signal or an external crystal/clock generator. (*Id.* at 17 (citing Tr. (Oklobdzija) at 414-415).) Complainants say that in each of the Accused Products the "first clock" that clocks the CPU is a ring oscillator that is entirely integrated on the same chip as the CPU. (*Id.*) Dr. Oklobdzija concluded from the evidence that the ring oscillators that generate the clock signals in the Accused Products are integrated on the same chip as the CPU, with no part of the ring oscillator being off the chip. (*Id.* (citing Tr. (Oklobdzija) at 414-415).)

According to Complainants, Dr. Oklobdzija repeatedly said that the ring oscillators generate a signal on their own, provided they are connected to a power source and ground. (*Id.* at 17-18 (citing Tr. at 389-390; CX-0648C (regarding the ring oscillator in the {

})).) Dr. Oklobdzija testified that the ability of a ring oscillator to oscillate stems from the delay that is incident to the odd number of inverters that are arranged in a loop. (*Id.* at 18.) The frequency of the clock signal is determined by the time it takes the signal to travel across all of the inverters in the ring, as was pictured by Dr. Oklobdzija, using an animation of Figure 18 from the '336 patent. (*Id.* (citing Tr. at 286-289).)

Complainants say Dr. Subramanian agreed that a ring oscillator generates a clock signal on its own because the odd number of inverters that make up the loop produces oscillation. (*Id.* (citing Tr. at 1399-1400).) That is why the "free-running" ring oscillators referred to by Dr. Subramanian are able to generate clock signals. However, what is not shown in Dr. Subramanian's demonstratives is that "free-running" and test oscillators have to be connected to a power source and ground or they will not run. (*Id.* (citing Tr. at 1401-02).)

Complainants stress that Dr. Oklobdzija said numerous times during his testimony that the ring oscillators in the Accused Products do not rely on an external crystal/clock generator to generate a clock signal, as exemplified here:

> The external reference does not produce the system clock" because "that external reference is being compared to the clock…that external reference is being compared to the clock. It's 100 to 200 times lower in frequency. There's no way to multiply it…So how can that external reference produce system clock? It's impossible.

(*Id.* (citing Tr. (Oklobdzija) at 415-416).) He repeated this point later in his testimony, but in greater detail:

> I said that many times in this court, and I explained, and we saw the demonstration, how the clock signal is generated. And we had a demo with 0's and 1's running around through the inverters, generating the clock. In that slide and in this demo we didn't see a crystal anywhere….Nor anything else, you know. It was—it was generating—it was not relying on the reference to generate the clock. It was not relying on the external clock's—external crystal to generate the clock. It was not relying on a control signal to generate the clock. It was never present.

(*Id.* at 21 (citing Tr. at 1054-55).)

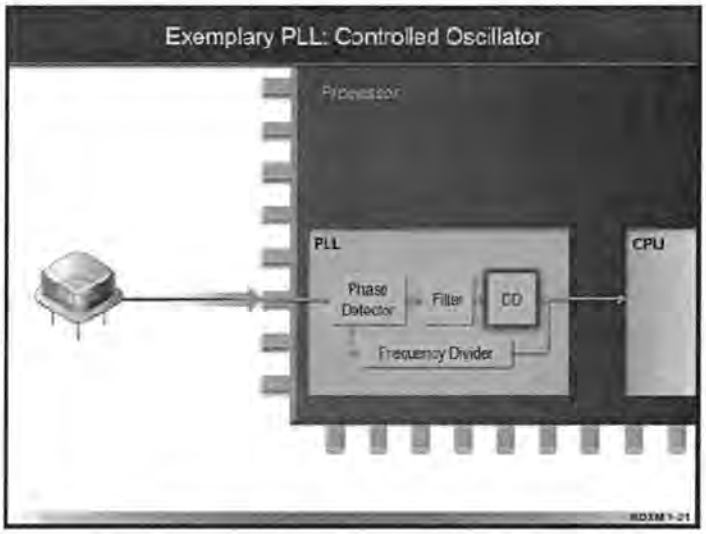
As for Dr. Subramanian's testimony, Complainants argue that, despite his slides RDX-0004.115 and RDX-0004.116, which may suggest otherwise, Dr. Subramanian agreed that an external reference crystal cannot be used to produce a high-speed system clock that operates in the gigahertz range. (*Id.* at 18.) Rather, a frequency divider in the PLL divides an output of the ring oscillator. But the PLL cannot multiply the frequency of the external reference crystal, say Complainants. (*Id.* at 18-19 (citing Tr. (Oklobdzija) at 1397-99, 1386-88, 1378-80).)[6] Not only is it impossible for an external crystal oscillator to produce the high frequencies needed for the Accused Products, external crystal/clock generators are not relied upon by these products to generate the clock signal that is used by the CPU. (*Id.* at 19.) Dr. Oklobdzija said the ring oscillator generates a clock signal on its own, without relying on external crystals. (*Id.* (citing Tr. (Oklobdzija) at 413-414, 1053).)

Complainants argue that the external reference is only used "to perform a comparison with the phase of the ring oscillator's already generated clock signal that has been steeply divided by the frequency divider." (*Id.*) Complainants say a ring oscillator generates a very high frequency clock signal on its own, which must then be divided in order to obtain a lower frequency, so that its phase can be compared to the phase of the external reference. (*Id.* (citing Tr. (Oklobdzija) at 374-381).) Thereafter, the PLL can make adjustments to the analog voltage/current sent to the ring oscillator, in order to regulate, but not to generate, its frequency. (*Id.* (citing Tr. at 384).)

According to Complainants, Dr. Subramanian supports Dr. Oklobdzija in this respect by testifying that the phase detector of a PLL compares two inputs, one representing the digital frequency of the off-chip crystal oscillator, which is in the range of megahertz, and the other representing a divided digital frequency from the frequency divider, which is also in the range of megahertz. (*Id.* (citing Tr. (Subramanian) at 1381-82, 1388-89).) The phase detector then provides correction signals, or charges, that go into a filter that smooths the digital signals before

[6] However, in the textbook Dr. Oklobdzija co-authored, it states: "PLLs are mostly used in modern processors to multiply frequency of the external system clock and reject any existing high-frequency clock noise." (RX-2283 at GARMIN92911.)

providing an analog voltage or current to a controlled oscillator, as illustrated in RDXM-0001.21 (shown below) and RDX-0004.94.



(*Id.* at 19-20 (citing Tr. at 1383-84, 1389).) The filter does not pass the digital clock signal from the external crystal to the controlled oscillator but, instead, passes a smooth, continuous analog current or voltage. (*Id.* at 20 (citing Tr. at 1384-85).) Dr. Subramanian testified that a voltage is always provided to the ring oscillator ("CO") no matter what. (*Id.* (citing Tr. (Subramanian) at 1385-86).) The digital frequency of the external crystal is never passed to the ring oscillator, and therefore the ring oscillator does not rely on the crystal to generate a clock frequency. (*Id.* (citing Tr. (Subramanian) at 1383).) Instead, the analog voltage/current provided to the ring oscillator is like a dimmer switch that is never entirely off; the ring oscillator always has power to generate a clock signal. (*Id.*)

Complainants say the experts for both parties testified that the external crystal/clock generator is used simply as a metronome, road sign, or comparator.[7] (*Id.*) Based on a comparison, the PLL can then adjust the level of the analog voltage or current to the ring

[7] In the textbook *Digital System Clocking*, Dr. Oklobdzija and his fellow authors say, "The function of the clock signal is comparable to the metronome in music." (RX-2283 at Garmin 92903.)

oscillator in order to regulate the clock signal the ring oscillator has already generated, say Complainants. (*Id.*) Dr. Oklobdzija concluded that the ring oscillator "first clocks" in the Accused Products do not rely on a control signal to generate a clock signal. (*Id.* at 21 (citing Tr. (Oklobdzija) at 1054-55).) As one example, he testified that the oscillator { } in RX-0690.6 { } to generate the clock signal that is used to clock the CPU. (*Id.* (citing Tr. at 1058-59).) This is what he said:

> To generate, no. Let me be specific about it. That's why I said it has its own power supply. There is another voltage in there. That supply enables it to run, to function. And as I explained also…that generation of the property of generating the signal is based on the delay of those inverters which are in the loop of the ring oscillator….So the control controls the frequency but not the generation.

(*Id.*) Complainants point out that Dr. Oklobdzija repeatedly testified that none of the ring oscillators in the VCO or ICO[8] of any Accused Product relies on a control signal to generate the clock signal that is used to clock the CPU. (*Id.* (citing Tr. 1059).) According to Dr. Oklobdzija, the control signal regulates; it does not generate. (*Id.* at 22 (citing Tr. (Oklobdzija) at 1059).) Thus, argue Complainants, although the PLLs in the Accused Products regulate the frequency of the ring oscillator clocks, no control signals are needed for the ring oscillators to generate a clock signal. (*Id.*)

(a) Qualcomm products

Complainants say Dr. Subramanian and Respondents presented three arguments in support of their contention that the Qualcomm chips do not include the "entire" limitations of the asserted claims, and in so doing mischaracterized their own evidence. First, Dr. Subramanian made a new argument when he pointed to a schematic for {

[8] Current controlled oscillator.

}. (*Id.* (citing Tr. (Subramanian) at 1158-61; RX-0621C.15).) Complainants say Dr. Subramanian admitted that he had not previously mentioned this argument in his expert report:

> Q. Okay. But again, in your expert report, you never discussed the fact that if you {
>
> }; right?
>
> A. As I've told you, with respect to the specific case where {
>
> }.

(*Id.*) Complainants argue that this testimony should be disregarded as a violation of Ground Rule 9.5.6. (*Id.* at 23 (citing Tr. (Subramanian) at 1427).)

What is more important, say Complainants, is the fact that the evidence contradicts Dr. Subramanian. (*Id.*) Aside from the fact that Dr. Subramanian did not point to anything that indicates the { }, the Qualcomm document on which he relied undermines his position because it shows that {

}, according to RX-0621C.10, reproduced below:

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(*Id.* (annotated by Complainants).) Complainants argue that Figure 2-2 of RX-0621C shows a

{

}. (*Id.* citing Tr. (Subramanian) at 1428, 1432.)

{

}. (*Id.* at 24 (citing Tr. (Subramanian) at 1431-34).)

At first, Dr. Subramanian said the {

}, say Complainants. (*Id.*) But later he acknowledged that {

}, as shown here:

Q. {

}

A. {

}

(*Id.* (citing Tr. (Subramanian) at 1440-41).) Therefore, according to Complainants, Figure 2-2 shows that, even though {

}. (*Id.* (citing Tr. (Subramanian) at 1442-43).)

Complainants say RX-0621C.17 includes a graph, in Figure 2-11, which shows that the { } Dr. Subramanian agreed, say Complainants. (*Id.* at 24-25 (citing Tr. (Subramanian) at 1450-53).) According to

Complainants, Figure 2-11 confirms that the {

}. (*Id.* (citing CX-0621C.10 (Fig. 2-2).) Thus, {

}. (*Id.*)

Complainants argue that the { } shown in RX-0621C is not the only {

}, say Complainants. (*Id.*) Dr. Subramanian used RDX-4.129C, shown below, to argue {

}.

REDACTED

(*Id.*) Dr. Subramanian argued that {

}. (*Id.* (citing RDX-0129C; RDX-0004.47C; Tr. (Subramanian) at 1444-45).)

According to Complainants, the basis for this argument is false because, as shown in the block diagram in RDX-4.129C, which Dr. Subramanian testified represented {

}. (*Id.* (citing Tr. (Subramanian) at 1403-05; RDX-0004.42C).) However, according to Complainants, in the configuration shown in RDX-0004.129C, {

}" which was confirmed by Dr. Subramanian during his cross examination, excerpted here:

{

}.

(*Id.* (citing Tr. (Subramanian) at 1445-46); RDX-0004.129C).) Complainants argue that, as shown in RDX-0004.129C and confirmed by Dr. Subramanian's testimony, the {

}. (*Id.*)

Complainants argue further, in respect to this point, that even though the {

}, as is shown in Dr. Subramanian's testimony here:

{

}

(*Id.* at 26-27 (citing Tr. (Subramanian) at 1447).) Therefore, argue Complainants, {

} (*Id.*)

Complainants say Dr. Subramanian misrepresented that the ring oscillators in { }, using RDX-0004.118C to support his argument that the ring oscillators { }, represented as { } shown here:

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(*Id.*) According to Complainants, Dr. Subramanian admitted on cross-examination that {

}. (*Id.* at 27-28 (citing Tr. (Subramanian) at 1447).)

Complainants argue that {

}. (*Id.* (citing Tr. (Subramanian) at 1447-48; RDX-0004.118C).) This, according to Complainants, shows that Respondents' own evidence disproves all three of their arguments as to why the { } chips supposedly do not infringe the "entire" limitations. (*Id.* at 28.)

(b) Texas Instruments products

Complainants assert that Dr. Haroun, the designated corporate witness on the subject of the Texas Instrument OMAP3 and 4 chips that are incorporated into the Accused Products, admitted that the { } to the ring oscillators in these chips is a { }. (*Id.* (citing Tr. (Haroun) at 188, 194).) According to Complainants, {

} pass a

control signal on to the ring oscillator. (*Id.* (citing Tr. (Haroun) at 189).) Complainants say Dr. Haroun admitted that { }, the ring oscillators in the OMAP chips would still output an oscillation. (*Id.* (citing Tr. (Haroun) at 196).) He confirmed this when he said that, { }. (*Id.* (citing Tr. (Haroun) at 209-210).) In other words, argue Complainants, the ring oscillator will always generate a clock signal as long as a current is applied to it. (*Id.* (citing Tr. (Haroun) at 196).)

Complainants contend that all of the Accused Products include a "first clock,"[9] in the form of a ring oscillator, for "clocking said central processing unit," a requirement of all asserted claims. (*Id.*) Complainants note that in Order No. 31 the term "clocking said central processing unit" is construed as "providing a timing signal to said central processing unit." (*Id.*) Complainants argue that it is undisputed that the ring oscillator in each of the relevant PLLs outputs the master clock signal that is sent either to the CPU or to a clock distribution network. (*Id.*) In the example illustrated by Dr. Subramanian in RDX-0004.115, it is the ring oscillator ("CO") that outputs the 2.0 gigahertz clock signal to the CPU of the processor, say Complainants. (*Id.* (citing Tr. (Subramanian) at 1396-97).) And the ring oscillator outputs the 3.0 gigahertz clock signal to the CPU, according to RDX-0004.116 and Dr. Subramanian. (*Id.*) In the "voltage-controlled oscillator" in Dr. Subramanian's exhibit RDX-0004.128, the clock frequency of the PLL is the output of the third inverter in the ring oscillator, say Complainants. (*Id.* at 28-29.) Afterwards, argue Complainants, the master clock signal is merely fed into a

[9] It is worth pointing out, once again, that this term is not found in the claims. It is not clear whether Complainants' enclosing quotation marks are intended to signify that this is an invented term or represents some rhetorical device of Complainants. The claim language that is actually of concern here is "an entire ring oscillator variable speed system clock in said single integrated circuit and connected to said central processing unit for clocking said central processing unit." (*See* JXM-0001 at 32:12-16.)

clock distribution network that includes frequency dividers, which will not work unless they receive the master clock signal, inasmuch as a frequency divider cannot generate an oscillating clock signal by itself. For example, supplying the frequency divider with just a voltage is not sufficient; there has to be a clock signal from the master clock. (*Id.* at 29 (citing Tr. (Subramanian) at 1456-57).)

Complainants say a clock distribution system is like a river delta that flows to a sea: no matter which tributary the water flows through, the river still makes its way to the sea. (*Id.*) With a clock distribution system, a branch does not produce its own current; instead, it receives it from the master branch. (*Id.* (citing Tr. (Subramanian) at 1458-59).) In the Accused Products, there would be no downstream clock signal without the master clock signal from the ring oscillator in the PLL, argue Complainants, quoting the following testimony from the hearing:

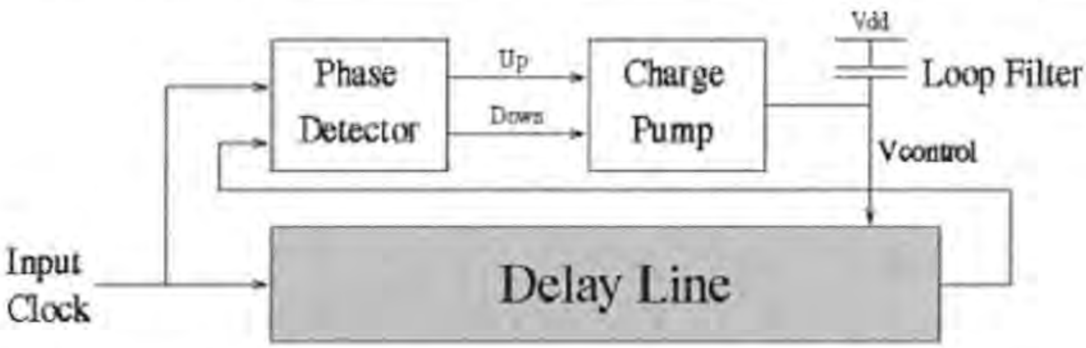
> Q. Fair enough. But by the same token, if you didn't have the master clock signal coming from the PLL into the so-called clock generator, you wouldn't get any divided clock signals going out, either, would you?
>
> A. That I agree with.

(*Id.* (citing Tr. (Subramanian) at 1461).) Thus, argue Complainants, the master clock signal from the "first clock" in the Accused Products does, in fact, "clock the CPU," and without the master clock, there would be no "clocking" of the CPU. (*Id.*)

b) Respondents' arguments

As an initial matter, Respondents argue that Complainants failed to identify PLLs in a number of the accused Qualcomm chips. Respondents say independent claims 6 and 13 require an "oscillator," while independent claims 1 and 11 call for a "ring oscillator." (RBr. at 110 (citing JXM-0001 at Claims 1, 6, 11, 13).) However, Dr. Oklobdzija only identified PLLs for some, but not all, of the Qualcomm chips, and in order to overcome this deficiency, he makes a blanket statement that all PLLs must contain ring oscillators. (*Id.* (citing Tr. (Oklobdzija) at 459-460).) Respondents say Dr. Oklobdzija is wrong. (*Id.*)

Respondents argue that a PLL does not need to include a controlled oscillator. (*Id.* (citing Tr. (Subramanian) at 1335-36).) For example, a special PLL called a delay-locked loop ("DLL") does not include an oscillator. (*Id.*) As shown below, a DLL uses a delay line to control the frequency and align the phase of the output signal with a phase of a reference signal.



(*Id.* (citing RDX-0004.145 (excerpt).) One of the textbooks on clocking authored by Dr. Oklobdzija expressly says that a DLL is a type of PLL in which a voltage-controlled delay line replaces the controlled oscillator, as quoted here:

> The other type of PLL is delay-line based or delay-locked loop (DLL). As shown in Fig. 1.12, the VCO in the PLL is replaced by the voltage-controlled delay line (VCDL), which delays the external clock, feeding the clock driver, until the internal clock becomes aligned with the external clock, at which point the control voltage of the VCDL becomes steady and the loop stays in lock.

(*Id.* (citing RX-2283 at Garmin 92907-08).) Because this passage from Dr. Oklobdzija's book shows that a PLL does not have to use a controlled oscillator, the mere presence of a PLL in a device is not sufficient evidence to satisfy claims 6 and 13, say Respondents. (*Id.* at 112.)

Second, a PLL, or a controlled oscillator inside a PLL, does not necessarily include or constitute a ring oscillator. (*Id.* (citing Tr. (Subramanian) at 1336-37; RX-0167C { } at 73).) Instead of using a ring oscillator, a chip designer can implement a controlled oscillator by using an inductor-capacitor circuit ("LC circuit") or a relaxation controlled oscillator, as exemplified in RDX-4.146. (*Id.*) Dr. Subramanian testified that an LC oscillator has advantages over a free-running ring oscillator because of the LC circuit's superior stability, especially as desired frequencies increase and chip space required for inductors decreases with those higher frequencies. (*Id.* (citing Tr. (Subramanian) at 1338-39).)

Respondents point out that Dr. Oklobdzija concurs, according to his textbook discussing clocking microprocessor systems for industry practitioners and graduate students. (*Id.* (citing Tr. (Oklobdzija) at 252-253; RX-2283).) Dr. Oklobdzija states that "VCO is built either as a ring oscillator topology, as shown in Fig. 1.14, or an inductance-capacitance (LC) tank oscillator, as shown in Fig. 1.15." (*Id.* (citing RX-2283 at Garmin 92909).) Dr. Oklobdzija even praised LC oscillators' superior performance by saying, "With the increase in clock frequency and the use of on-chip spiral inductors, both feasible with today's technology, LC tank-based VCOs are becoming increasingly popular due to superior phase-noise performance." (*Id.* at 111-112 (citing RX-2283 at Garmin 92910).) Contradictory of statements he previously made in his textbook about the use of LC oscillators in VCOs, Dr. Oklobdzija testified at the hearing that LC oscillators would not be used in microprocessors. (*Id.* at 112 (citing Tr. (Oklobdzija) at 857-858).) However, he also testified that the book from which these quotations are taken is about clocking microprocessor systems, leaving no doubt that statements made by him in his writings concern chip clocking; in fact, the title of the book is *On-Chip Clock Generation*. (*Id.* (citing Tr. (Oklobdzija) at 252); RX-2283 at Garmin 92907).)

Respondents accuse Dr. Oklobdzija of using a double standard in his search for the presence of ring oscillators in connection with different facets of this Investigation. (*Id.*) For infringement purposes, he assumes any PLL necessarily has a VCO that includes a ring oscillator. (*Id.* (citing Tr. (Oklobdzija) at 856).) He stressed that he has never seen a PLL that does not have a ring oscillator. (*Id.* (citing Tr. (Oklobdzija) at 857).) But when confronted with a prior-art reference with a VCO inside a PLL, Dr. Oklobdzija argued that the VCO disclosed in the prior art was not sufficient evidence to show the presence of a ring oscillator. (*Id.* (citing Tr. (Oklobdzija) at 861).) In due course, he admitted that the same reasoning has to apply for both infringement and invalidity, and merely having a PLL, or even a VCO, does not necessarily mean that there has to be a ring oscillator present within that circuit. (*Id.* citing Tr. (Oklobdzija) at 862-863).)

Respondents say that, in order to show infringement of the system claims of the '336 patent, Complainants must show that the accused chips have either an oscillator (claims 6 and 13) or a ring oscillator (claims 1 and 11). (*Id.*) However, Complainants have only identified a PLL in certain chips, without providing any evidence of their internal structures. (*Id.*) Because of this omission, a finding of non-infringement for the system claims of the '336 patent is called for insofar as the accused chips hereinafter enumerated:

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(*Id.* at 112-113 (citing Tr. (Subramanian) at 1339-40: RDX-0004.147).)

(1) *The PLLs in the Accused Products rely on an external crystal/clock to generate a clock signal*

Respondents note that Complainants focus on the ring oscillator and ignore the surrounding claim language in an attempt to show that the ring oscillator does not rely on an external crystal/clock generator or control signal to generate a clock signal. (RRBr. at 19 (citing CBr. at 17-22).)[10] Respondents say Complainants' isolation of the ring oscillator contravenes the evidence, noting that even Complainants' expert recognized that the "entire" limitations—what he calls the "first clock"—require more than a ring oscillator. (*Id.* (citing Tr. (Oklobdzija) at 818).) For that reason, Dr. Oklobdzija had to go beyond the ring oscillator and accuse the VCO or ICO of being what he calls the "first clock." (*Id.* at 19-20 (citing Tr. (Oklobdzija) at 341).) Thus, even under Dr. Oklobdzija's analysis, Complainants' focus on the ring oscillator is not a sufficient point of analysis. (*Id.* at 20.)

According to Respondents, the reason Complainants focus on the ring oscillator, and disregard the VCO/ICO, is that these controlled oscillators are not the concern of the '336 patent, which does not relate to controlled oscillators or PLLs, a fact that Dr. Oklobdzija concedes:

> [Q.] I'm trying to deal with what the patent discloses. The VCO is not disclosed?
>
> A. The patent is not about VCO.
>
> Q. And also we know that there's no disclosure in the patent about a PLL; isn't that right?
>
> A. The patent is not about PLL.

(*Id.* (citing Tr. (Oklobdzija) at 816).) Respondents say Complainants cannot avoid the fact that the '336 patent is inapplicable to PLLs as a basis for infringement simply by ignoring the things that are involved with the ring oscillators, including the components that control the generation

[10] The Administrative Law Judge has attempted to present the parties' arguments in the most logical order throughout this Initial Determination, and thus, the parties' briefs are not addressed in the same order in each section herein.

and maintenance of the clock signal. (*Id.*) Dr. Oklobdzija admitted that the ring oscillators in issue are part of a controlled oscillator, which in turn, is part of a PLL. (*Id.* (citing Tr. (Oklobdzija) at 957, 842-844).) When the electric circuit that includes the ring oscillator is considered, there can be no finding of infringement, because the electric circuit and the ring oscillator both rely on control signals and on the reference signal from an external crystal or clock generator to generate signals. (*Id.* (citing Tr. (Subramanian) at 1295-1316).) As in the case of the human heart which cannot continue to pump blood without signals from the nervous system, the ring oscillator cannot generate a signal without the external crystal's reference or control signals. (*Id.*)

Therefore, Respondents say a proper inquiry must give attention to the controlled oscillator that is part of the PLL. (*Id.*) The evidence demonstrates that the PLLs and their components in the accused chips rely on an external crystal/clock generator to generate a clock signal. (*Id.* at 21.) Respondents say the testimonies of Dr. Subramanian, Dr. Haroun, and Mr. Kekre establish that the PLLs in the Accused Products rely on an external/clock generator to generate a clock signal. (RRBr. at 21.) Even Dr. Oklobdzija recognizes that a PLL relies on an external reference, as evidenced by what is stated in his expert report, in his hearing testimony, and in his textbook. (*Id.*) According to Respondents, the fact that a { } governs the relationship between the frequencies input to and those output from the PLLs in the Accused Products is confirmation that the output frequency is a multiple of the input frequency, and this relationship, by itself, shows that each of these PLLs relies on an external crystal/clock generator to generate a clock signal. (*Id.*)

Despite this fact, Complainants maintain that a ring oscillator in a PLL must generate a clock signal by itself, because the external crystal cannot produce the high frequency clock signal required by the chip, and supposedly there is no existing circuit that can multiply the frequency of the signal generated by the external crystal. (*Id.*) Therefore, the ring oscillator does not rely on the external crystal to generate a clock signal. (*Id.*) Also, according to Complainants, the crystal's signal never reaches the ring oscillator because this reference signal is used as a "road sign" to compare against the output of the controlled oscillator. (*Id.*) Therefore, the ring oscillator does not rely on the reference signal to generate the clock signal. (*Id.*) Respondents reply that Complainants are wrong on all counts. (*Id.*)

Contrary to Complainants' denial, Respondents assert that the PLL circuit, in fact, does multiply the frequency signal received from the external crystal, and this is confirmed by Dr. Oklobdzija's own textbook, which is geared towards experienced practitioners and graduate students in the field of microprocessor clocking. (*Id.* at 22.) This book states that "[c]lock generation begins on a system board, where the global system clock reference is generated from a 'crystal' oscillator." (*Id.* (citing Tr. (Oklobdzija) at 251-253; RX-2283 (textbook) at Garmin 92905).) Using the clock signal of the off-chip crystal, the on-chip PLL performs frequency multiplication. (*Id.* (citing RX-2283 at Garmin 92906 ("For these reasons, the low-frequency system clock is first brought on-chip and frequency multiplication is performed to achieve the desired on-chip clock rate."), Garmin 92909 ("In addition to clock alignment PLLs can perform frequency multiplication."), Garmin 92909 ("Fig. 1.13, PLL frequency multiplication."); Tr. (Oklobdzija) at 828-829).)

Respondents say Dr. Oklobdzija's textbook leaves no doubt about the multiplicative properties of the PLL and its VCO, because it provides a mathematical equation showing that the VCO's output frequency f_{vco} is equal to the multiplication of the external crystal's frequency f_{ext} by certain integer values:

> Figure 1.13 shows a general block diagram where the VCO operates at $f_{vco} = f_{ext} \times B \times C/A$, and the frequency of the internal clock is $f_{int} = f_{vco}/B$. Typi-

(*Id.* (citing RX-2283 at Garmin 92909).) This formula shows that there is a clear relationship between the VCO's output clock signal and the crystal's reference signal, a fact which Dr. Oklobdzija acknowledges:

> Q. Now, you understand that there's a relationship between the frequency of the reference signal from the crystal and the frequency at the output of the VCO?
>
> A. Yes, there is a relationship, which is established by the divider. So if it divides by 100, the relationship is 1 to 100.

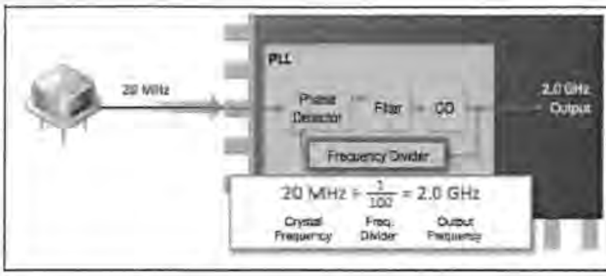
(*Id.* at 22-23 (citing Tr. (Oklobdzija) at 834).) If the frequency of the external crystal increases, the frequency of the VCO does too, by a fixed ratio. (*Id.* (citing Tr. (Oklobdzija) at 836).) If the frequency of the external crystal decreases, the frequency of the VCO also decreases, relatively. (*Id.* (citing Tr. (Oklobdzija) at 836).)

Dr. Oklobdzija recognizes that the PLLs in the Accused Products rely on an external crystal to set the frequency of the incorporated oscillator, because on several occasions he testified that the PLL "uses" the external reference to "set," "adjust," or "control" the frequency of the oscillator. (*Id.*) For example, he said the PLL "uses" the crystal reference frequency to "set" the frequency of the VCO. (*Id.* at 26 (citing Tr. (Oklobdzija) at 952-953, 1052, 1089).) Dr. Oklobdzija agreed that the controlled oscillator's output signal depends on the reference signal. (*Id.* (citing Tr. (Oklobdzija) at 838).)

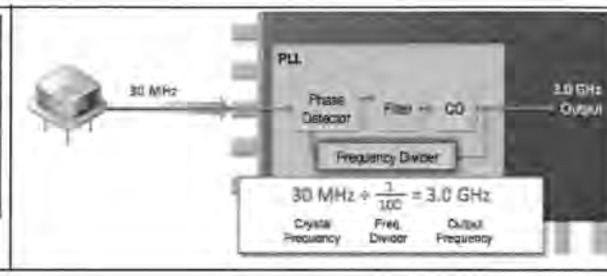
Respondents say Dr. Oklobdzija on several occasions refused to answer Complainants' attorney on whose behalf Dr. Oklobdzija had been called to testify—during both direct and re-direct examination—when he was asked whether the accused Qualcomm PLL relies on an external crystal to generate a clock signal, giving only evasive responses, such as "I don't see external crystal anywhere on this slide that shows the ring oscillators." (*Id.* (citing Tr. (Oklobdzija) at 630, 633-634, 635, 647-649).) Dr. Subramanian, on the other hand, was unequivocal, positively opining that all of the accused { }, giving detailed explanations, and reasons for his opinion. (*Id.* (citing Tr. (Subramanian) at 1304-16; RDX-0004.11—0004.126C).)

Respondents say a PLL requires an external crystal or clock generator to function, because its own frequency output is a multiple of the input frequency coming from the external crystal/clock generator. (RBr. at 69 (citing Tr. (Subramanian) at 1300).) A mathematical formula predictably governs the relationship between the PLL's output and input frequencies, and this shows that a strong dependence exists between these two frequencies. (*Id.* (citing Tr. (Subramanian) at 1300).)

Respondents say this point can be observed if the crystal's input frequency is changed, in the absence of anything else occurring. (*Id.* (citing Tr. (Subramanian) at 1301).) As shown in RDX-0004.115, on the lower left side, the PLL outputs a two gigahertz frequency by multiplying the received crystal frequency of 20 megahertz by a factor of 100, which is depicted below. (*Id.* (citing Tr. (Subramanian) at 1301; RDX-0004.115).) If a different crystal operating at 30 megahertz is substituted for the 20 megahertz crystal, even if the PLL itself is not changed, its output frequency will change. Now it will produce a frequency of three gigahertz, because of the effect of the 30-megahertz signal produced by the external crystal, as shown in RDX-0004.116, below right:



RDX-0004.115



RDX-0004.116

(*Id.* at 69-70.) These illustrations show that the PLL and its components rely on the external crystal/clock generator's reference signal to generate their clock signals. (*Id.*)

Respondents say Dr. Oklobdzija appears to agree with this position in his expert report, when he says the PLL's output is a direct function of the input reference frequency, noting that the PLL is circuitry that is used to set the frequency of the free-running ring oscillator VCO to a desired range with respect to the multiple or some other rational number of another oscillator frequency that is used as a reference frequency. (*Id.* (citing Tr. (Oklobdzija) at 951, (Subramanian) at 1302 (quoting from Dr. Oklobdzija's report).) In his report, Dr. Oklobdzija also admitted that a VCO "is set to a desired range (through the aid of the PLL) by using the second reference oscillator frequency," this second reference frequency being a signal from the external crystal/clock generator. (*Id.* (citing Tr. (Subramanian) at 1302-03, (Oklobdzija) at 952-953).)

Respondents contend that Dr. Oklobdzija's recognition of the role played by the PLL confirms the important link between the external reference signal and the generation of a clock signal. (*Id.* (citing Tr. (Oklobdzija) at 1089-90).) The processes of setting the frequency of a clock signal and generating a clock signal are inseparable, because a clock signal must have a frequency, since its sole purpose is to provide a frequency for timing the operations of devices. (*Id.* at 70-71 (citing Tr. (Oklobdzija) at 1088).) Dr. Oklobdzija testified that "a clock is a control" and exerts control through repeated, periodic "start, stop, start, stop, and…do[es] it a billion times a second." (*Id.* (citing Tr. (Oklobdzija) at 413).) This periodicity is the frequency of the clock signal. But for a clock signal to carry out its objective, it must have a frequency, which the PLL circuitry sets in reaction to a reference signal from an external crystal or clock generator. (*Id.* at 71.) The external reference signal is integral to the generation of a clock signal, and by acknowledging that the PLL sets the frequency of the VCO, in reaction to a reference clock signal from an external crystal or clock generator, Dr. Oklobdzija concedes that the PLL and its components rely on an external crystal/clock to generate a clock signal. (*Id.*)

Respondents say Dr. Oklobdzija struggled when trying to support Complainants' theory of infringement, as is demonstrated by his failure to respond to certain questions he was asked during his direct examination and by his admissions and concessions during his cross-examination. (*Id.*) For example, when he was asked several times on direct examination whether an accused Qualcomm PLL relies on an external crystal to generate a clock signal, he avoided giving an answer. (*Id.*) In order to give a truthful response to the question, while at the same time trying to avoid undermining his clients' position, he said that he did not see a crystal in the small excerpt appearing on the screen, to which his attention was being directed:

> Q. Dr. Oklobdzija, does this Qualcomm ring oscillator rely on an external crystal to generate a clock signal?
>
> A. I would answer this question by saying I don't see a crystal oscillator on that schematic produced by Qualcomm.
>
> Q. And so is that a yes or a no?
>
> A. You can qualify that yourself.
>
> Q. Does this Qualcomm ring oscillator shown in Paragraph 89 of your expert report rely on an external crystal to generate a clock signal?

JUDGE GILDEA: I think the witness has answered the question.

A. I don't [see] a crystal oscillator there.

(*Id.* at 71-72 (citing Tr. (Oklobdzija) at 413).) When he was asked the question anew the next day, Dr. Oklobdzija again refused to give a direct answer; instead, he offered the same response: "I don't see external crystal anywhere on this slide that shows the ring oscillators." (*Id.* at 72 (citing Tr. (Oklobdzija) at 630).) When the question was again put to him a few minutes later, Dr. Oklobdzija repeated that he did not see a crystal in the Qualcomm schematic that was projected on the screen to which his attention had been directed. (*Id.* (citing Tr. (Oklobdzija) at 633-635).) (The slide that was being displayed on the screen, and to which Dr. Oklobdzija was referring, was CDX-0005C.36A, which is depicted here:

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(*See* Tr. (Oklobdzija) at 630.)

Respondents say that Dr. Oklobdzija gave truthful testimony when he made this statement:

> I'll take it [the output clock frequency fx] out, and I will compare that with another clock signal, which comes from the reference. This is a reference that I rely on and a reference that [is really] stable, or it's a reference that I want to be -- I want this clock to run with respect to that reference.
>
> Now, that reference comes from outside. So this is, let's say -- this is the boundary of the chip here.

(*Id.* (citing Tr. at 375 (where Dr. Oklobdzija is discussing CDX-0082, shown below).)

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Also, according to Respondents, Dr. Oklobdzija expressly conceded that the ring oscillator that is presumptively present in the LSI chip does, in fact, rely on an external crystal to generate a clock signal:

> Q. Dr. Oklobdzija, I'm going to rephrase that question. Based on all of your scientific and technical analysis, does the ring oscillator in the LSI processor you analyzed rely on an external crystal to generate a clock signal?

> A. Let me answer the question this way: Based on my previous answer about ring oscillators, which I think I was perfectly clear, it will be yes. But I do agree with Mr. Walker, that what was shown is not the relevant material to answer that question, because based from what was shown on the screen, I would say yes, based on what I have seen before. But it has not been shown on that display.
>
> So I understand Mr. Walker's objection, and I appreciate it. So to be truthful, my "yes" is based on my general analysis of ring oscillator.

(*Id.* at 72-73 (citing Tr. at 660-661 (objection and ruling omitted)).) According to Respondents, these admissions undercut Complainants' position. (*Id.* at 73.)

On cross-examination, Dr. Oklobdzija was confronted with prior conflicting statements contained in publications he had co-authored. (*Id.*) In order to disavow the notion of any reliance on an external crystal, Dr. Oklobdzija testified that it was his contention that a PLL and its components do not "multiply" the frequency they receive from the external crystal. (*Id.* (citing Tr. (Oklobdzija) at 378-379, 826, 828).) However, in a technical book he had co-authored involving related subject matter, in 2003, before he was retained in connection with the '336 patent, Dr. Oklobdzija and his co-authors said that frequency multiplication does occur and that PLLs perform this frequency multiplication in microprocessors. (*Id.* (citing Tr. at 829; RX-2283 at Garmin 92906 ("For these reason, the low-frequency system clock is first brought on-chip and then frequency multiplication is performed to achieve the desired on-chip clock rate."), Garmin 92909 ("In addition to clock alignment PLLs can perform frequency multiplication."), Garmin 92909 ("Fig. 1.13. PLL frequency multiplication.")).) When confronted with these quotations from his book, Dr. Oklobdzija shrugged them off as "colloquialisms," which he variously attributed to either himself, his students, his co-authors, or his publisher, although he acknowledged that the book was written for experienced practitioners in the field and for use in graduate-level courses. (*Id.* at 74 (citing Tr. (Oklobdzija) at 251-253, 829-831, 962-966).)

(a) The Accused Products that use Qualcomm chips

Respondents contend that the PLLs in the accused { }. (*Id.* (citing Tr. (Subramanian) at 1304-07).) For example, the { }, says Dr. Subramanian, for three principal reasons. (*Id.*) First, the { } expressly identify { } (*Id.* at 74-75 (citing Tr. (Subramanian) at 1304-05).) Second, Respondents assert that { } says that, { } (*Id.* at 75 (citing Tr. (Subramanian) at 1305).) Third, { }. (*Id.* (citing RX-0618C at QTPL 13892; Tr. (Subramanian) at 1305).) Respondents say this formula, taken from Qualcomm's specification, shows that there is a direct, knowable, and predictable function between the { }. (*Id.*) According to Respondents, the formula in Qualcomm's specification is clear evidence that the system in which this { } is employed { }. (*Id.* (citing Tr. (Subramanian) at 1305).) Also, the evidence demonstrates that this { }, which is present in { } of { } accused

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11 { }. (*Id.* at n. 16.)

{

}. (*Id.* (citing Tr. (Subramanian) at 1148-49.)

Aside from Dr. Subramanian, Respondents say that Dr. Oklobdzija also testified that

{

}:

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(*Id.* at 76 (citing CX-0619 at QCHITCTPL 7709; Tr. (Oklobdzija) at 846).) Dr. Oklobdzija admitted that this formula { }. (*Id.* (citing Tr. (Oklobdzija) at 846-847). According to Respondents, this equation from Qualcomm's documents confirms that {

}

Based on his review of other evidence concerning the Qualcomm chips, Dr. Subramanian testified that it is his opinion that all of the following chips likewise {

}:

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(*Id.* at 76-77 (citing Tr. (Subramanian) at 1306-1307; RDX-0004.119C).)

Respondents argue that, in the face of this indisputable evidence of a {

} PLLs, Dr. Oklobdzija refused to answer questions about whether {

}. (*Id.* at 77.) When counsel for Complainants repeatedly asked Dr. Oklobdzija whether the accused {

} that were portrayed on the screen in the hearing room during his testimony. (*Id.* (citing Tr. (Oklobdzija) at 413).) He gave the same answer when asked the same question the following day, and again shortly after that, when Complainants' counsel revisited the issue. (*Id.* (citing Tr. (Oklobdzija) at 633-635).) Thus, say Respondents, Dr. Oklobdzija was either unable or unwilling to endorse Complainants' unsupported position under oath. (*Id.*)

As a result, argue Respondents, Complainants have presented no probative testimony or documentary evidence showing that the {

}. (*Id.*) On the other hand, both Dr. Subramanian's explicit testimony and { } do not satisfy the "entire" limitations. (*Id.*)

(b) The Accused Products that use Texas Instruments OMAP chips

Respondents say the DPLLs in the accused OMAP chips rely on an external crystal/clock generator to generate a clock signal. (*Id.* at 77-78 (citing Tr. (Subramanian) at 1307-10).) Dr. Subramanian used one of the OMAP4 chips to illustrate the point. (*Id.* at 78.) This chip receives a stable frequency signal from an external crystal/clock generator through the {

} the external frequency ultimately being delivered to the { } to serve as the reference signal for the PLL inside the block. (*Id.*) Just as in the case of the { }, the OMAP technical documents contain an equation showing that the {

}:

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(*Id.* (citing RX-528C at LGE800ITC 86358-59; Tr. (Subramanian) at 1308).) This mathematical formula proves that there is a knowable, predictable, and direct relationship between the clock signal of the PLL and the received signal from the external crystal/clock generator. (*Id.* (citing Tr. (Subramanian) at 1308).)

Dr. Oklobdzija agreed when he was asked about the same document and its formula. (*Id.* (citing Tr. (Oklobdzija) at 849-851).) He acknowledged that this formula shows a relationship between the input frequency from the reference source and the output frequency of the VCO in the DPLL. (*Id.* (citing Tr. (Oklobdzija) at 851).) Because the output frequency of the DPLL is dependent on the input of a reference frequency from the crystal, the output frequency from the DPLL will increase if the input frequency from the crystal does. (*Id.* (citing Tr. (Oklobdzija) at 851).) If the input frequency to the DPLL from the crystal decreases so too will the frequency that the DPLL outputs. (*Id.* (citing Tr. (Oklobdzija) at 851-852).) This dependency, which Dr. Oklobdzija acknowledges, shows that these DPLLs rely on an external crystal/clock generator to generate a clock signal, say Respondents. (*Id.*)

Dr. Haroun, Texas Instruments' corporate witness, who was subpoenaed by Complainants to testify about the accused OMAP chips, testified that all OMAP chips, along with their adjuncts at issue in this Investigation, rely on an external crystal or clock generator to generate a clock signal. (*Id.* at 78-79 (citing Tr. (Haroun) at 178-200).) Dr. Haroun testified that the PLL in the OMAP chips receives, as one of its inputs, a reference clock that is external to the chip, usually from an { }. (*Id.* at 79 (citing Tr. (Haroun) at 182-183, 196-198).) When the PLL is locked and ready to provide a clock signal, it outputs "a multiple of the input reference clock." (*Id.* (citing Tr. (Haroun) at 187).) As he put it: {

}

(*Id.* (citing Tr. (Haroun) at 187).) He further testified:

[Q.] Do the PLLs in the OMAP processors use external references?

A. Yes, they do.

Q. Is one external reference relied on by the OMAP PLLs a crystal oscillator?

A. Yes, they rely on crystal clocks, yes.

(*Id.* (citing Tr. at 202).)

Based on Dr. Haroun's testimony and the OMAP technical documents that he considered, Dr. Subramanian was able to testify that his opinion about reliance on an external crystal/clock generator to generate a clock signal applies equally to all of the accused OMAP chips enumerated here:

- **OMAP3530** [RX-1804C at GARM-N37xx-031493-95, 31407, 31499, 31503.]
- **OMAP 3611 & OMAP 3621** [RX-1817C at GARMIN068490-91, 68495, 68499, 68879.]
- **OMAP 4430** [RX-528C at LGE800ITC 85678-79, 86355, 86358-59 85690-91;RX-529C at TPL853_2988000-2988003.]
- **OMAP 4460** [RX-527C at AMZ_TPL 25318, 25321-22, 24590-91; RX-524C at AMZ_TPL 15928-31.]
- **OMAP 4470** [RX-526C at AMZ_TPL 40817, 40820-21, 40084-85; RX-525C at AMZ_TPL 32077-80.]

(*Id.* (citing Tr. (Subramanian) at 1309:3-1310:1; RDX-0004.121C).) According to Respondents, the evidence shows that the accused OMAP chips do not meet the "entire" limitations because the DPLLs and their components in these chips rely on external crystal/clock generators to generate clock signals. (*Id.* at 79-80.)

(c) The Accused Products that use LSI Logic chips

Respondents note that the accused LSI Logic B5503A chip, like the previous Qualcomm and Texas Instruments chips, relies on an external crystal/clock generator to generate a clock signal. (*Id.* at 80 (citing Tr. (Subramanian) at 1310-11.) In the accused LSI Logic chips, {

}

This evidence demonstrates that "the clock generator that is being accused by [Complainants] indeed actually does rely on an external crystal or clock generator[,]" argue Respondents. (*Id.* (citing Tr. (Subramanian) at 1311; RX-0192C; RDX-0004.122C).)

Respondents say the testimony of the LSI corporate witness corroborates Dr. Subramanian. LSI's corporate witness testified as follows: {

} And when he was asked whether the PLL in the LSI chip still generates a clock signal if the external crystal is disconnected, he said {

} According to Dr. Subramanian, this is "clear evidence that in the LSI Logic B5503A there is clear reliance on the external crystal/clock generator to generate the clock signal that is being accused by [Complainants]." (*Id.* (citing Tr. (Subramanian) at 1311-12).)

Dr. Oklobdzija agrees, argue Respondents, as demonstrated by the response he gave when asked by Complainants' counsel whether "the ring oscillator in the LSI processor you analyzed rely on an external crystal to generate a clock signal?" He responded:

> Let me answer the question this way: Based on my previous answer about ring oscillators, which I think I was perfectly clear, it will be yes. But I do agree with Mr. Walker, that what was shown is not the relevant material to answer that

> question, because based from what was shown on the screen, I would say yes, based on what I have seen before. But it has not been shown on that display.
>
> So I understand Mr. Walker's objection, and I appreciate it. So to be truthful, my "yes" is based on my general analysis of ring oscillator.

(*Id.* at 81 (citing Tr. (Oklobdzija) at 660-661).) Thus, both experts agree that the accused LSI chips do not satisfy the "entire" limitations, because they rely on an external crystal to generate their clock signals. (*Id.*)

(d) The Accused Products that use Samsung chips

Respondents note that the { } and their components that are used in the accused Samsung chips also rely on an external crystal/clock generator to generate a clock signal. (*Id.* (citing Tr. (Subramanian) at 1312-14).) Dr. Subramanian testified about the { } used in the Samsung { } chip as being a representative example. (*Id.* (citing Tr. (Subramanian) at 1312; RDX-0004.124C).) As with the previously discussed PLLs, { }. (*Id.* (citing Tr. (Subramanian) at 1312-13; 1195-97; RDX-0004.124C).) The PLL in the { }. (*Id.* (citing Tr. (Subramanian) at 1197-98, (Oklobdzija) 954-956, 960-962).) A formula in the { }:

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(*Id.* at 81-82 (citing RX-0690C at 853Samsung 167113); *id.* at 82 (citing Tr. (Subramanian) at 1313).) This establishes that the { } and its components rely on an external crystal/clock generator. (*Id.* at 82.)

Dr. Oklobdzija does not dispute that there is a clear relationship between the input and the output frequencies. He acknowledged that { } (*Id.* (citing Tr. (Oklobdzija) at 924, 927, 943).) That reference is the { } If the frequency of the external crystal changes, the PLL will change the frequency of the clock output from the VCO. (*Id.* (citing Tr. (Oklobdzija) at 953, 967).) The change in the output frequency follows the dictates of the formula recited above, { } (*Id.* (citing Tr. (Oklobdzija) at 972-973).) According to Dr. Oklobdzija, the first equation provides that { } (*Id.* (citing Tr. (Oklobdzija) at 972-973).) Accordingly, Dr. Oklobdzija agrees with Dr. Subramanian's opinion concerning the { } chip. (*Id.*)

Respondents say Dr. Subramanian's opinion for the { } chip also extends to the other two Samsung chips that are accused by Complainants since the evidence shows that these chips likewise rely on an external crystal/clock to generate a clock signal:

> { }

(*Id.* (citing Tr. (Subramanian) at 1313-14).)

In light of the mathematical relationship between the input frequency and the output signal { }, Respondents say it is not surprising that Dr. Oklobdzija again refused to answer the question about whether the accused Samsung chips' APLLs rely on an external crystal to generate a clock signal, as evidenced by his testimony here:

> Q. Thank you. Based on your scientific and technical analysis, do the ring oscillators in any of the Samsung processors you analyzed rely on an external crystal to generate a clock signal?
>
> * * * *
>
> A. Let me answer this question the following way: In my previous testimony, I believe Monday, maybe Tuesday, I showed the ring oscillator to the Court, I explained how a ring oscillator operates, I explained how a ring oscillator generates the clock signal, and nowhere there [] was a crystal. So I think that's clear to everybody who was listening to my presentation. And that applies to every single device that uses ring oscillator.
>
> So the question is does Samsung use the ring oscillator? Yes, it does. Does that apply to Samsung? Yes, it does.

(*Id.* (citing Tr. (Oklobdzija) at 647-649) (objection and ruling omitted).) Dr. Oklobdzija avoided the inquiry from Complainants' counsel by giving a non-responsive answer, as he had previously done with other chips. (*Id.* at 83.) His repeated refusal to answer this direct question demonstrates his inability to support Complainants' strained position, according to Respondents. (*Id.*)

(e) The Accused Products that use the Texas Instruments codec chips

Respondents say the PLLs in the two accused codec chips also rely on an external crystal/clock generator to generate a clock signal. (*Id.* (citing Tr. (Subramanian) at 1314-16).) The PLL in each of the accused TI Audio Codec chips receives an external reference frequency provided by an external clock generator. (*Id.* at 84 (citing Tr. (Subramanian) at 1315).) This external clock generator, as illustrated in RDX-4.126C, is a Sharp CPU chip that is not accused of being an infringing element. (*Id.* (citing Tr. (Subramanian) at 1315).) Using a crystal reference as its frequency source, the Sharp CPU { }. (*Id.* (citing Tr. (Subramanian) at 1315).) As with the previously discussed chips, the evidence shows that the PLLs and their components in the TI codec chips rely on an external clock generator to generate a clock signal. (*Id.* (citing Tr. (Subramanian) at 1315; RX-0649C at NINTPL 13007, 13016, 13035-38, & Fig. 23; RX-0647C at NINTPL 316, 325, 344-347; RX-0814C-RX-0819C; RX-0640C at NINTPL 210-214; RX-0807C at NINTPL 17631-35; RX-0648C at NINTPL 12843, 12860-864; RX-0813C; RX-832C at NINTPL 18484-18487).)

The corporate witness for Texas Instruments, Mr. Kekre, who appeared and testified in response to Complainants' subpoena, supported Dr. Subramanian's testimony. (*Id.*) He said that, as regards the accused AIC3010 coded chip, { } (*Id.* (citing Tr. (Kekre) at 229-230).) { }. (*Id.* (citing Tr. (Kekre) at 230-231).) { } (*Id.* (citing Tr. (Kekre) at 231).) { }. (*Id.* at 84-85 (citing Tr. (Kekre) at 231-232).)

As regards the accused AIC3005 chip, { }. (*Id.* (citing Tr. (Kekre) at 232-235).) { }. (*Id.* (citing Tr. (Kekre) at 235-236).) { }. (*Id.* (citing Tr. (Kekre) at 236).) { } (*Id.* (citing Tr. (Kekre) at 237).)

Mr. Kekre's testimony corroborates Dr. Subramanian's description of the codec chips and their operation, and Dr. Oklobdzija admits that Mr. Kekre has a greater understanding of the codec chips than he does. (*Id.* (citing Tr. (Oklobdzija) at 1036).) The testimonies of Mr. Kekre and Dr. Subramanian about the Texas Instruments codec chips show that the PLLs and components within the accused codec chips rely on external clock generators to generate clock signals and cannot meet the "entire" limitation of the asserted claims of the '336 patent. (*Id.*)

(2) *The controlled oscillators in the Accused Products rely on a control signal inside the PLL*

Respondents argue that the '336 patent is not directed to the invention of oscillators or ring oscillators, which are structures that were well-defined before the '336 patent. (RBr. at 85 (citing Tr. (Subramanian) at 1114; JXM-0001 at 16:56-57).) Such oscillators, unconstrained by any controls limiting their speed, will run at the maximum speed at which they are physically capable. (*Id.* (citing Tr. (Subramanian) at 1317, 1114-15).) However, because processing, voltage, and temperature ("PVT") parameters affect transistor propagation delays and thereby impact a circuit's processing capabilities, PVT factors act as inhibitors to the speed at which the oscillator would otherwise operate. (*Id.* (citing Tr. (Subramanian) at 1112).) Since its speed tracks the PVT parameters, the oscillator's speed will be affected by, and vary with, changes in PVT. (*Id.* (citing Tr. (Subramanian) at 1116).) Respondents say the '336 patent chose to embrace this variability by using an unencumbered "free-running" oscillator as an on-chip clock, so that the clock will always output the fastest timing signal that is permitted by prevailing PVT factors. (*Id.* (citing Tr. (Subramanian) at 1117-18, (Oklobdzija) at 812-813); *see also* JXM-1 at 16:59-17:2.)

In contrast to the design and goals of the '336 patent, Respondents say the PLLs in the Accused Products embrace control and reject free-running oscillators, by using fixed, rather than variable, frequencies. That is why the accused PLLs, at least the ones for which information about their internal topologies is available, use controlled oscillators to generate fixed frequency clock signals. (RBr. at 86 (citing Tr. (Subramanian) at 1213, (Oklobdzija) at 833).) Instead of running at the circuit's fastest speed allowed by PVT factors, as contemplated by the '336 patent, the PLLs in the Accused Products run at slower fixed frequencies, by using internal control signals, and fix the speeds of the oscillators they control. (*Id.* (citing Tr. (Subramanian) at 1213-16).)

Respondents say Dr. Oklobdzija agrees that a PLL controls its internal oscillator, if it has one: "[s]o the PLL controls the frequency of that VCO or ICO and adjusts it to match the reference frequency." (*Id.* at 86-87 (citing Tr. (Oklobdzija) at 834).) To set output frequency of the VCO (or ICO as the case may be), the PLL { }, [the PLL] generate[s] { } (*Id.* at 87.) In other words, argue Respondents, a PLL uses internal signals to control the frequency of its controlled oscillator, and all accused chips for which there is information about the internal topology of their PLLs use such control signals to control their controlled oscillators. (*Id.* (citing Tr. (Subramanian) at 1317).)

(a) Products using Qualcomm chips

Respondents say all of the Qualcomm controlled oscillators for which information is available are { }. (*Id.* (citing Tr. (Oklobdzija) at 841-842).) Because of this, each of these { }. (*Id.* (citing Tr. (Subramanian) at 1317).) All Qualcomm chips for which information is available { }. (*Id.*) By way of example, { }. (*Id.* at 87-88 (citing RX-0609C at QTPL1128; Tr. (Subramanian) at 1143-44, 1146-49; RX-1051C at QTPL13832-33; RX-0625C at QTPL23345, 23348-49; RX-0618C at QTPL13872; RX-0619C at QTPL14386-87, 14393, 14397-98; RX-0621C at QTPL14880-82; RX-0626C at QTPL 23687-90; Tr. (Subramanian) 1153-56,1166-67, 1170-72, 1176-77).) Each of these control signals { } (*Id.* (citing Tr. (Subramanian) at 1318).) This, say Respondents, is true for the { };

{ }

(*Id.*) For these reasons, the accused Qualcomm chips do not satisfy the "entire" limitations. (*Id.*)

(b) Products using TI OMAP chips

As with the { } for which information is available, the accused OMAP chips { } have PLLs that use internal signals to control the PLLs' internal controlled oscillators. (*Id.*) Dr. Haroun testified that the controlled oscillators inside OMAP's PLLs receive numerous signals for controlling their oscillators' output frequencies:

> { }

(*Id.* at 88-89 (citing Tr. (Haroun) at 184-185, 196-198).) The oscillators on their own cannot operate; they require the { }. (*Id.* at 89.) "{ }" (*Id.* (citing Tr. (Haroun) at 189).) The controlled oscillator needs this control information to generate an output frequency. (*Id.* (citing Tr. (Haroun) at 188).)

On the basis of the diagram drawn by Dr. Haroun in the course of his hearing testimony, Dr. Subramanian testified that the controlled oscillators of the DPLLs inside the accused OMAP chips receive signals to control their output frequencies. (*Id.* (citing Tr. (Subramanian) at 1319-20).) The control oscillators in the DPLLs of the accused OMAP chips rely on a control signal to generate a clock signal, and therefore they cannot satisfy the "entire" limitations as they have been construed. (*Id.*)

(c) Products using Samsung chips

Respondents say the { } to generate a clock signal. (*Id.* (citing Tr. (Subramanian) at 1320).) Dr. Subramanian testified that the { } in the accused Samsung APLLs { } to generate a clock signal. (*Id.* at 89-90 (citing Tr. (Subramanian) at 1320; RX-0690C at 853Samsung 167113; RX-0693C at 853Samsung 167077-81; RX-0694C at 853Samsung 167095-97; RX-0699C at 853Samsung 42502).) { }. (*Id.* at 90 (citing Tr. (Subramanian) at 1320, 1197-98, (Oklobdzija) at 961-962).) This evidence, according to Respondents, shows that { }. (*Id.* (citing Tr. (Subramanian) at 1320).)

Respondents say Dr. Oklobdzija agrees that the accused Samsung { }, by testifying that { } (*Id.* (citing Tr. (Oklobdzija) at 1089).) { }. (*Id.* (citing Tr. (Oklobdzija) at 961-962).) Thus, both experts agree that the { } accused Samsung {

}. Therefore, these products cannot meet the "entire" limitations. (*Id.*)

(d) Products using the Texas Instruments codec chips

The PLLs in the two accused codec chips rely on control signals to output a clock signal, as shown by this testimony of Mr. Kekre, Texas Instruments' corporate designee:

{

}

(*Id.* at 91 (citing Tr. (Kekre) at 222-224).) Dr. Oklobdzija did not dispute this testimony. (*Id.* (citing Tr. (Oklobdzija) at 1035-36).) On the basis of Mr. Kekre's testimony, Dr. Subramanian concluded that the PLLs in the codec chips, and their ring oscillators, rely on a control signal to generate a clock signal. (*Id.* (citing Tr. (Subramanian) at 1319-20; RDX-0004.130C; RDX-0081C).) Therefore, posit Respondents, the TI codec chips and their components do not meet the "entire" limitations. (*Id.*)

(e) Other Qualcomm and LSI Logic chips

Respondents say Complainants have not shown that the LSI Logic B5503A chip and a large number of Qualcomm chips do not rely on a control signal to generate a clock signal, as required by the asserted claims, according to the claim construction of the "entire" limitations, because Complainants never sought or obtained information about the internal structures of the PLLs in these chips. (*Id.* (citing Tr. (Subramanian) at 1321).) The chips for which no such information exists in this Investigation are these:

{

}

• **Accused LSI Logic chip:** B5503A

(*Id.* at 91-92 (citing Tr. (Subramanian) at 1321; RDX-0004.132C).) Without such information, it is possible that the PLLs in these chips do not contain an oscillator, much less a ring oscillator, according to Respondents. (*Id.* at 92.) And even if there were oscillators in the PLLs on these chips, the evidence in this Investigation about the PLLs shows that such oscillators require and rely on an internal control signal to generate a clock signal. (*Id.*) Moreover, the evidence concerning the LSI Logic B5503 chip shows that {

} On the basis of his general knowledge about PLLs, Dr. Subramanian concluded that "it's perfectly reasonable to say that we could expect there to be at least an internal control signal." (*Id.* (citing Tr. (Subramanian) at 1329; RDX-0004.140C).) If Complainants contend that the LSI Logic chip's PLL contains a variable speed clock or oscillator, "it has to be controlled." (*Id.* (citing Tr. (Subramanian) at 1329; RX-0184C (Casasanta Dep.) at 82).)

(3) *Any controlled oscillators in the Accused Products cannot oscillate without an external crystal/clock generator or control signal*

Respondents contend that, under the constructions of the "entire" limitations in this Investigation, reliance on an external crystal/clock generator or a control signal to generate a clock signal precludes infringement. (RBr. at 98.) Respondents say Complainants contend that any ring oscillator included in a controlled oscillator can perpetually oscillate so long as there is a connection to a power supply and ground. (*Id.* (citing Tr. at 71 ("If you provide a power supply to each inverter [in a ring oscillator], it will run and generate a frequency, a clock signal, all by itself.")); *Id.* at 98-99 (citing Tr. (Complainants' Opening Statement) at 69-70).) If a ring oscillator is able to run with a power supply only, then it does not, according to Complainants, rely on an external crystal/clock generator or a control signal to generate a clock signal. (*Id.* (citing Tr. at 71).) According to Complainants, all ring oscillators have the same structure that allows for perpetual oscillation if there is power supplied to it. (*Id.* (citing Tr. at 64 ("If it has power to it, it will spin and generate a clock signal. And that's how all ring oscillators work.")).)

Respondents say Complainants are wrong because they accuse a simplified hypothetical version of a ring oscillator, one that is divorced from a PLL and is unconnected to any physical device. (*Id.*) Complainants ignore the actual structures of the accused PLLs, at least for the chips for which they sought discovery, and disregard a key flaw with their argument: for the PLLs whose structures are known, the ring oscillators used in the VCO or ICO, as the case may be, cannot operate without a control signal from other PLL circuitry. (*Id.*) If Complainants and Dr. Oklobdzija had investigated the structure of the ring oscillators in the PLLs, they would have realized that all of the ring oscillators use { } and therefore require and rely on control signals from other PLL circuitry to operate. (*Id.*)

Dr. Subramanian testified about the reason why a { } cannot operate without receipt of signals from other circuitry in a PLL. (*Id.* at 99 (citing Tr. (Subramanian) at 1157-63).) In doing so he used a schematic diagram from a { } document for the { }:

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(*Id.* at 99-100 (citing RX-0621C at QTPL 14887 (annotated by coloration)).) The right side of the diagram depicts {

}. (*Id.* at 100 (citing Tr. (Subramanian) at 1157-58).) {

}

The {

}, shown on the left side of the schematic diagram above, {

}. (*Id.* at 101 (citing Tr. (Subramanian) at 1159).)

{

} the diagram, as shown by the yellow highlights on the far left. (*Id.* (citing Tr. (Subramanian) at 1159-60).) {

} are important and reveal a flaw in a key assumption underlying Dr. Oklobdzija's argument.

According to Dr. Oklobdzija, a ring oscillator oscillates on its own, while the rest of the PLL circuitry merely modulates or adjusts its oscillation. (*Id.* (citing Tr. (Subramanian) at 1161 (summarizing Dr. Oklobdzija's argument)).) But that is *not* true for the {

} (*Id.* (citing Tr. (Subramanian) at 1161:21-23).) { } would no longer work. (*Id.* (citing Tr. (Subramanian) at 1163).) If there were no {

}. (*Id.* at 101-102.) In sum, without other PLL circuitry, the ring oscillator does not work. (*Id.* at 102.)

The use of a { } under the control of PLL circuitry is not unique to {

} (*Id.* (citing Tr. at 1169).)

This { }, also appears in the accused OMAP chips. Dr. Haroun, who testified as Texas Instruments' corporate witness, testified that the { } in the accused OMAP chips use { }" (*Id.* (citing Tr. (Haroun) at 203).) As in the { } PLLs discussed above, the OMAP chips' controlled oscillator uses a { }. (*Id.* (citing Tr. (Haroun) at 203-204).) Without this { } turn off. (*Id.* (citing Tr. (Haroun) at 204-205).) And if those { }, the { }, and the ring oscillator no longer oscillates. (*Id.* (citing Tr. (Haroun) at 204).) Accordingly, the OMAP chips' ring oscillators require the whole PLL circuitry to operate. (*Id.* (citing Tr. (Subramanian) at 1186-87 (OMAP4), 1189 (OMAP3)).)

Respondents say the accused Samsung chips {

}

(4) *Regarding waiver*

Respondents deny Complainants' assertion that Respondents waived the position just discussed because it was first raised by Dr. Subramanian at the hearing. (RRBr. at 39 (citing CBr. at 22-23).) Respondents say his expert report supports the testimony that Dr. Subramanian gave at the hearing about the { } to control the frequency of the alleged ring oscillators in the Accused Products. (RRBr. at 39 (citing Tr. (Subramanian) at 1426-27).) Although Complainants' counsel objected to a single sentence in Dr. Subramanian's testimony about the { }, Dr. Subramanian's report specifically addressed the { } at issue, as pointed out in this testimony:

> If you're asking me about that specific sentence, that may not have been there. But I certainly specifically discussed the relationship of { } on the operation of the cell, and clearly that is part of { }.

(*Id.* (citing Tr. (Subramanian) at 1426-27).) The { } and thus "a specific case out of a more general case." (*Id.* at 40 (citing Tr. (Subramanian) at 1426-27).) Respondents say Dr. Subramanian extensively discussed the impact of the { } to support his opinion that clock signal generation relies on the { }. (*Id.* (citing Tr. (Subramanian) at 1427).) This is what he said:

> All the point has to establish is that these circuits rely on { }. That is one instance to illustrate how. But it's certainly not a critical instance. There are multiple ways to establish that generation relies on these signals.

(*Id.*) Respondents argue that this testimony did not come as a surprise to Complainants, as indicated by their failure to object during Dr. Subramanian's testimony on { }. (*Id.* (citing Tr. (Subramanian) at 1157-63).) There was no contemporaneous objection about any PLL's { }. (*Id.* (citing Tr. (Subramanian) at 1168-69, 1171-74, 1176, 1186-87, 1189, 1198-99).)

Furthermore, argue Respondents, Dr. Subramanian's testimony was a direct rebuttal to Complainants' previously undisclosed "perpetual oscillation" theory. (*Id.*) Complainants first raised the point about "perpetual oscillation" at the hearing, and their pre-hearing brief makes no mention of this topic, even though Ground Rule 7.2 requires the parties to set forth with particularity their contentions on each issue. (*Id.*) Similarly, Dr. Oklobdzija's expert report does not discuss the "perpetual oscillation" theory as a basis for disputing that any of the Accused Products relies on an external crystal or control signal. (*Id.*at 40.) In fact, Dr. Oklobdzija's expert report does not offer any opinions based on the construction of the "entire" limitation that was set forth in Order No. 31. (*Id.*) Respondents note that they objected to, and opposed, any testimony by Dr. Oklobdzija about the "entire" limitation because he had expressly withheld any infringement opinion based on Respondents' proposed claim construction, which was adopted in Order No. 31. (*Id.* at 41, n.10 (citing Tr. (Oklobdzija) at 644-645, 647-651, 659-663, 761-770).) Thus, if any party is guilty of waiver, it is Complainants, and Respondents say they were fully justified in retorting to the testimonial exposition provided by Dr. Oklobdzija for the first time at the hearing. (*Id.* at 41.)

Respondents note that Complainants first raised the "perpetual oscillation" argument at the hearing, during Complainants' opening statement, followed by testimony on the subject by Dr. Oklobdzija. (*Id.* at 41 (citing Tr. (Opening Statement) at 61-62, (Oklobdzija) at 286-289, 389-390, 413-414).) Dr. Subramanian relied on discussion he included in his own report about the { } in the accused chips' PLLs to demonstrate why this "perpetual oscillation" theory is wrong and is not applicable to the Accused Products. (*Id.*) This responsive testimony was proper under principles of due process and fairness, as was noted at the time Dr. Oklobdzija was permitted to give specific infringement testimony not included in his expert report, over Respondents' objections. (*Id.* (citing Tr. (Oklobdzija) at 763).)[12]

(5) *Complainants misrepresent the { }*

Respondents say Complainants incorrectly represent the evidence about the { } in order to conceal the flaw in their "perpetual oscillation" theory. First, they incorrectly argue that the { } configuration, as shown in RX-0621C, oscillate even when they are not { }. (*Id.* (citing CBr. at 23).) This, say Respondents, is incorrect because, even in the configuration shown in RX-0621C, the { }. (*Id.* at

[12] On this point, the Administrative Law Judge agrees. Dr. Subramanian's testimony was a proper response to Complainants' epiphanic revelation of "perpetual oscillation" at the hearing and, at that, was an obvious and logical refinement of what he expressed in his expert report. Complainants have no basis for crying foul or harm and no reason for having Dr. Subramanian's testimony on this point excluded.

41-42.) { }. (*Id.* at 42 (citing Tr. (Subramanian) at 1160, 1163, 1504-05; RX-621C at QTPL 14882).) In the configuration shown in RX-621C, { }. (*Id.* (citing Tr. (Subramanian) at 1503-04).) Similarly, { }. (*Id.* (citing Tr. (Subramanian) at 1504-05).)

Complainants concede that { } in this configuration; however, Respondents charge that Complainants overlook the fact that the current received is { }. (*Id.* (citing CBr. at 24).) Dr. Subramanian testified that { }, and this is why they are able to oscillate. (*Id.*)

Second, Respondents say Complainants erroneously argue that the { } still generate a clock signal, even though { }. (*Id.* (citing CBr. at 23-24).) This, argue Respondents, mistakenly assumes that the {

} is only available when the { }, and that the { }. (*Id.* at 42-43.) But there is no basis in the record for such assumption, because as just discussed, { }. (*Id.* (citing Tr. (Subramanian) at 1503).)

Third, according to the PLL configuration shown in RX-621C, the { } a clock signal to the CPU, and this dooms Complainants' position on infringement because all of the asserted claims, as they have been construed, require that the variable speed clock/oscillators covered by the "entire" limitations must "generate a clock signal" and "clock[] said CPU." (*Id.* (citing Order No. 31 at 40; JXM-0001 at claims 1, 6, 10-11, 13, 16).) Notably, Complainants explicitly state that "{ } was not being used to generate the PLL's clock signal." (*Id.* (citing CBr. at 24).) As Dr. Subramanian testified, { }. (*Id.* (citing Tr. (Subramanian) at 1434, 1436).) In sum, this configuration, upon which Complainants rely so heavily in their attempt to overcome

Respondents' proofs, is a {

}. (*Id.* at 43-44 (citing RX-0618C at QTPL 13875).) In fact, say Respondents, Complainants expressly acknowledge that the {

} in the illustrated configuration. (*Id.* at 44 (citing CBr. at 24).) The very testimony relied on by Complainants for promoting this issue concerns a {

} that cannot be a basis for an infringement finding, owing to the fact that the {

} do not clock a CPU, a requirement of the claims. (*Id.*)

Fourth, Respondents say Complainants falsely argue that the { } in RX-621C use { } as a power supply. (*Id.* (citing CBr. at 25).) Respondents argue that the evidence shows that each { } power supply is separate from { }, which is apparent from RX-621C. (*Id.* (citing Tr. (Subramanian) at 1157-58).) For example, {

}:

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(*Id.* at 44-45 (citing RX-0621C at QTPL 14891 (colors added)).) The schematic shows {

}. It also discloses the error in Complainants' position, because it confirms {

}. (*Id.* (citing Tr. (Subramanian) at 1502-05).)

(6) *{ } cannot oscillate without a { }*

According to Respondents, all of these accused PLLs implement { }. (RBr. at 103.) While the { } differs in minor degrees among the various accused chips, all of { } in these PLLs require a { } to apply a particular control signal to a { } in the

{ }, and the PLL circuitry generates and provides this particular signal to the { }. (*Id.*) Because the ring oscillators in the accused chips require this control signal to oscillate and the control signals come from PLL circuitry, the ring oscillators cannot oscillate on their own with only a power supply, as Dr. Oklobdzija proposes. (*Id.*)

According to Respondents, the testimony of Dr. Oklobdzija, supported by that of Dr. Subramanian and Dr. Haroun, undercuts Complainants'' position. (*Id.*) On cross-examination, Dr. Oklobdzija was shown a page from one of his textbooks and was asked about the circuit illustrated therein. (*Id.* at 103-104 (citing Tr. (Oklobdzija) at 905; RDX-1002).) The illustration is shown below:

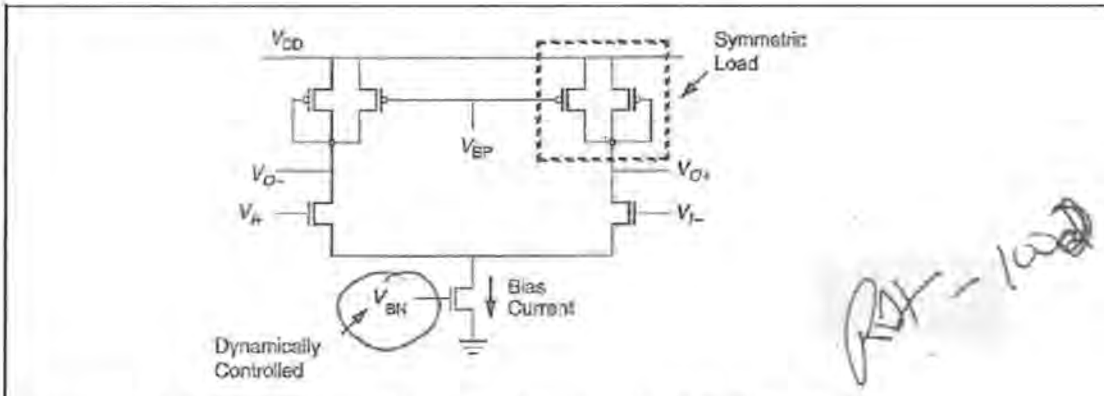


FIGURE 7.20 Differential delay element with symmetric loads for an N-well CMOS process.

(*Id.* at 104 (citing RDX-1002 (excerpt)).) Dr. Oklobdzija testified that the circuit shown in the illustration "is a differential inverter, { }." (*Id.* (citing Tr. (Oklobdzija) at 905).) He testified that each inverter in the ring oscillators, like the one he drew on CDX-81 and { }, includes a similar circuit. (*Id.* (citing Tr. (Oklobdzija) at 904-905).) He also testified that, if the current on the V_{BN} transistor is changed, the differential in the delay element shown in RDX-1002 will likewise change, with the level of current on this V_{BN} transistor setting the delay of this element:

> [Q.] Isn't it correct that if I change the current through the VBN transistor, the differential in the differential delay element will change; isn't that right?
>
> A. Yes, the current here is affected by that current bias, so by -- and that current bias comes from a different source, which is again voltage control, et cetera, which set the current of that differential inverter. And so if you are playing with a current, you are basically determining how fast the differential inverter is or how fast the ring oscillator will oscillate.
>
> Q. Okay. So depending on the level of the current, that sets the delay for the differential delay element.
>
> A. That is correct.

(*Id.* (citing Tr. (Oklobdzija) at 906-907).) In this respect, the testimony of Dr. Oklobdzija is consistent with that of Drs. Subramanian and Haroun. (*Id.*) However, Dr. Oklobdzija refused to answer this important follow-up question: "[I]f I turn that transistor off at its gate, the differential delay element stops working and won't invert. Isn't that right?" (*Id.* at 104-105 (citing Tr. (Oklobdzija) at 907-909).) But despite being asked this question at least three times, Dr. Oklobdzija evaded the question on each occasion by claiming that it is not possible to turn off the V_{BN} transistor. (*Id.* at 105.) He was then asked, "[I]f I constructed a differential ring oscillator using these same differential delay elements, the ring oscillator wouldn't oscillate if the VBN transistors are off; correct?" (*Id.* (citing Tr. (Oklobdzija) at 909-910).) Respondents say that Dr. Oklobdzija, instead of answering the specific question, offered non-responsive replies such as saying the answer is too complex, the situation described in the question is merely hypothetical, the transistor in question cannot be turned off, and the question has nothing to do with the Accused Products. (*Id.* (citing Tr. (Oklobdzija) at 909-912).) Respondents argue that the last mentioned response of Dr. Oklobdzija rings hollow because a few minutes before he readily testified that the circuit shown on RDX-1002 is a differential inverter { }. (*Id.* (citing Tr. (Oklobdzija) at 904-905).) According to

Respondents, a simple comparison of RDX-1002 with the {

}. (*Id.* (inviting comparison of RDX-1002 with RX-0621C at QTPL 14887 and citing Tr. (Subramanian) at 1161).)

Respondents argue that the repeated evasions of these two simple questions by Dr. Oklobdzija undermine Complainants' attempt to circumvent the construction of the "entire" limitations in Order No. 31. (*Id.*) Dr. Subramanian shed light on this fact when he subsequently testified, "I was in the courtroom yesterday when Dr. Oklobdzija was discussing this, and I believe he did not specifically provide an answer, but I will unequivocally say, if this transistor turns off, this does not function as an inverter." (*Id.* (citing Tr. (Subramanian) at 1161).) And in addressing Dr. Oklobdzija's statement that the V_{BN} transistor cannot turn off, Dr. Subramanian countered:

> [Dr. Oklobdzija] insisted it wouldn't turn off. But as we've seen here, the only way it doesn't turn off in these systems is with the circuitry associated with the PLL. In other words, these ring oscillators that he's saying will ring-oscillate anyway in fact will not. They need the PLL. The PLL provides the control.

(*Id.* at 105-106 (citing Tr. (Subramanian) at 1162).) Respondents say Dr. Subramanian's direct answers to the two questions that Dr. Oklobdzija evaded giving direct answers to defeat Complainants' infringement theory, which Dr. Oklobdzija's testimony vainly tries to uphold. (*Id.*) Dr. Oklobdzija's evasive testimony loudly and clearly betrays the lack of merit in Complainants argument, say Respondents. (*Id.*)

(7) *Complainants misapply precedent to create an infringement argument*

Respondents argue that Complainants misapplied precedent in the course of their opening statement when they cited *A.B. Dick Co. v. Burroughs Corp.*, 713 F.2d 700, 703 (1983), because it is well-established Federal Circuit precedent that "a device does not infringe simply because is possible to alter it in a way that would satisfy all the limitations of a patent claim." (*Id.* (citing *Accent Packaging, Inc. v. Leggett & Platt, Inc.*, 407 F. 3d 1318, 1327 (Fed. Cir. 2013)).) However, the evidence in this Investigation shows that the frequency-setting circuitries of the PLL, at least with respect to those whose structures are known, are connected to the ring oscillator/VCO and do set their frequencies. (*Id.* at 106-107.) Therefore, the Accused Products do not infringe at the time they are imported into the United States, and thus, a finding of infringement is precluded. (*Id.* at 107.)

Respondents also argue that Complainants misapply Federal Circuit case law in another way. (*Id.*) By citing *A.B. Dick*, Complainants reckon that the asserted claims do not preclude the addition of other components, such as off-chip crystal or components of a PLL, if a ring oscillator is present and is able to oscillate by itself. (*Id.* (citing Tr. (Opening Statement of Complainants) at 76-77).) Respondents counter that *A.B. Dick* simply stands for the proposition that "[i]t is fundamental that one cannot avoid infringement merely by adding elements if each element recited in the claims is found in the accused device." (*Id.* (citing *A.B. Dick*, 713 F.2d at 703).) The *A.B. Dick* case is not a license to ignore claim limitations and it does not change the fact that the Accused Products in this Investigation do not meet the "entire" limitations, as they have been construed, because each of the alleged oscillators/clocks in the Accused Products actually do rely on an external crystal/clock generator or control signals. Respondents claim that it is fundamental law that "[t]o establish literal infringement, all of the elements of the claim, as correctly construed, must be present in the accused system." (*Id.* (citing *TechSearch, LLC v. Intel Corp.*, 285 F.3d 1360, 1371 (Fed. Cir. 2002)).)

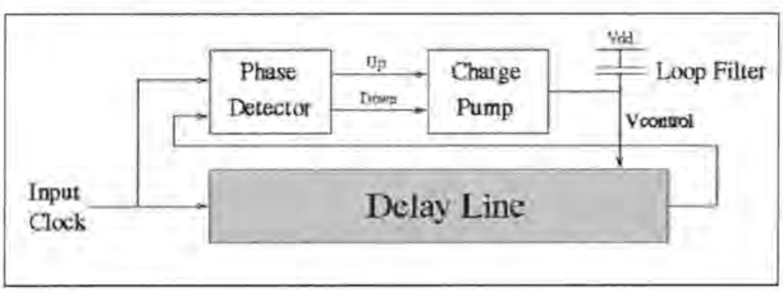
In support of this contention, Respondents point to *Dippin' Dots, Inc. v. Mosey,* 476 F.3d 1337 (Fed. Cir. 2007), in which the Federal Circuit held that the lower court properly construed method claims directed at "beads" to be limited to processes that produced only smooth beads. (*Id.* at 107-108 (citing *Dippin' Dots*, 476 F.3d at 1343).) Respondents note that in that case the Federal Circuit rejected the patentee's attempt to establish infringement by an accused process that produced smooth beads, which were a requirement of the construed claims, but also produced irregular particles, and held that "where…the patentee has narrowly defined the claim term it now seeks to have broadened," the term "comprising" does not "render every word and phrase…open ended." (*Id.* at 108 (internal citations omitted).) In this Investigation, Complainants' assertion that all of the Accused Products include a PLL and the plethora of evidence that the circuitry of these PLLs, including their components, rely on an external crystal/clock generator or a control signal to generate a clock signal, whether or not these are characterized as "additional," compel a finding that there is no infringement. (*Id.*)

(8) *Violation of the method claims cannot arise from direct infringement*

Respondents argue that a violation of Section 337 cannot arise from the direct infringement of claims 10 and 16, if any, as a matter of law, contrary to Complainants' assertions in their pre-hearing brief and at the hearing. (*Id.* (citing Complainants' Pre-hearing Brief at 21-22; Tr. (Oklobdzija) at 542-547).) Respondents also say that, as a matter of law, the showing of direct infringement of a method claim occurring in the United States cannot be the basis for a violation of Section 337. (*Id.* (citing *Electronic Devices*, Comm'n Op. (Dec. 21, 2011)).) According to Respondents, in addition to proof of infringement of an article "as imported to satisfy the requirements of Section 337," the Commission held that a method claim can only arise from proof of indirect infringement. (*Id.* at 109.) Respondents conclude, from their understanding of the cited opinion, that even if Complainants could show infringement of method claims 10 and 16, this alone is not a sufficient basis for a finding a violation of Section 337, for the reasons discussed. (*Id.*)[13]

(9) *The "Oscillator" and "ring oscillator" limitations are not met*

Respondents note that claims 6 and 13 require an "oscillator," while claims 1 and 11 call for a "ring oscillator"; however, Dr. Oklobdzija has only identified a { } in the Accused Products. (*Id.* at 110 (citing RDX-0004.147C).) In an attempt to overcome this omission, Dr. Oklobdzija makes a blanket assertion that all PLLs necessarily contain ring oscillators. (*Id.* (citing, by way of example, Tr. (Oklobdzija) at 459-460).) Dr. Oklobdzija is wrong, say Respondents. (*Id.*) A PLL does not require a controlled oscillator. (*Id.* (citing Tr. (Subramanian) at 1335-36).) A special PLL called a delay-locked loop ("DLL") does not include an oscillator. (*Id.*) As illustrated below, a DLL uses a delay line to control the frequency and align the phase of the output signal with the phase of the reference signal:



(*Id.* (citing RDX-0004.145 (excerpt).) The textbook that Dr. Oklobdzija co-authored discusses the fact that a DLL is a type of PLL in which a voltage-controlled delay line replaces the controlled oscillator:

[13] In light of the finding below that there is no infringement of claim terms that are applicable to claims 10 and 16, the Administrative Law Judge finds that it is not necessary to address this distinct issue for purposes of this Initial Determination.

> The other type of PLL is delay-line based or delay-locked loop (DLL). As shown in Fig. 1.12, the VCO in the PLL is replaced by the voltage-controlled delay line (VCDL), which delays the external clock, feeding the clock driver, until the internal clock becomes aligned with the external clock, at which point the control voltage of the VCDL become steady and the loop stays in lock. An

(*Id.* at 110-111 (citing RX-2283 at Garmin 92907-08).) Since the evidence shows that a PLL does not require the use of a controlled oscillator, Respondents argue that Complainants cannot simply rely on proof of the presence of a PLL as an element of proof that claims 6 and 13 are infringed, according to what is shown by other evidence. (*Id.*)

Respondents also argue that a PLL or a controlled oscillator within a PLL, does not necessarily include a ring oscillator. (*Id.* (citing Tr. (Subramanian) at 1336-37); RX-0167C { } at 73).) Instead of a ring oscillator, a chip designer could implement a controlled oscillator by using an inductor-capacitor circuit—what is known as an *LC* circuit—or a relaxation controlled oscillator. (*Id.* (citing Tr. (Subramanian) at 1338-39; RDX-0004.146).) Dr. Oklobdzija acknowledges this, according to statements found in the textbook he co-authored about clocking microprocessor systems for industry practitioners and graduate students. (*Id.* (citing Tr. (Oklobdzija) at 252-253; RX-2283).) The book states, "VCO is built either as a ring oscillator topology, Fig. 1.14, or an inductance-capacitance (LC) tank oscillator, Fig. 1.15." (*Id.* (citing RX-2283 at Garmin 92909).) Respondents point out the authors of the textbook lauded the superior performance of LC oscillators, saying: "With the increase in clock frequency and the use of on-chip spiral inductors, both feasible with today's technology, LC tank-based VCOs are becoming increasingly popular due to superior phase-noise performance." (*Id.* at 111-112 (citing RX-2283 at Garmin 92910).)

Respondents argue that, despite statements in the textbook Dr. Oklobdzija co-authored, about the use of LC oscillators in VCOs, he insisted in his hearing testimony that LC oscillators would not be used in microprocessors. (*Id.* (citing Tr. (Oklobdzija) at 857-858).) But only a little earlier before giving this negative testimony, Dr. Oklobdzija testified that the textbook from which the positive statement was taken was itself "about clocking microprocessor systems." (*Id.* (citing Tr. (Oklobdzija) at 252).) This, argue Respondents, leaves no doubt that Dr. Oklobdzija's written statements concern chip clocking, and the heading of the section which gives praise to the use of LC oscillators in VCOs is entitled "On-Chip Clock Generation." (*Id.* (citing RX-2283 at Garmin 92907).) Dr. Oklobdzija's published statements are inconsistent with his hearing testimony, say Respondents. (*Id.*)

Worse yet for Complainants, Dr. Oklobdzija used a double standard when seeking to discover ring oscillators in PLLs in the Accused Products. (*Id.*) When it came to the issue of infringement, Dr. Oklobdzija based his accusations on his presumption that any PLL must have a VCO, which in turn must necessarily contain a ring oscillator. (*Id.* (citing Tr. (Oklobdzija) at 856).) He testified that he "ha[s] not seen a PLL that does not have a ring oscillator inside." (*Id.* (citing Tr. (Oklobdzija) at 857).) However, when dealing with an asserted prior art reference showing a VCO inside a PLL, Dr. Oklobdzija took the opposite position that the presence of a VCO in the prior art was not sufficient to conclude that it contained a ring oscillator. (*Id.* (citing Tr. (Oklobdzija) at 861).) When confronted with this inconsistency, Dr. Oklobdzija acquiesced that the same rationale should apply for both infringement and invalidity analyses. (*Id.* (citing Tr. (Oklobdzija) at 862-863).)

Respondents say that Complainants must show that the accused chips have either an oscillator (claims 6 and 13) or a ring oscillator (claims 1 and 11). (*Id.*) And yet, Complainants have only identified a PLL in the following chips, without any further evidence of the internal structures of these PLLs:

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(*Id.* at 112-113 (citing Tr. (Subramanian) at 1339-40; RDX-0004.147).) Under Dr. Oklobdzija's acquiescence regarding consistency, Respondents argue that the Administrative Law Judge should find no infringement here. (*Id.* at 112.)

As for Complainants' argument that a crystal/clock regulates, but does not generate, a clock signal, Respondents say this amounts to a distinction without a difference. (RRBr. at 27 (citing Tr. (Oklobdzija) at 1058-59).) Controlling a clock's frequency and generating a clock signal are essentially the same thing because frequency is the gauge by which cyclical intervals representing time are established. (*Id.*) Dr. Oklobdzija explained it this way: "a clock is a control" which is exerted through repeated, periodic "start, stop, start, stop, and they do it a billion times a second." (*Id.* (citing Tr. (Oklobdzija) at 1089).) This periodic start-stop is the frequency of the clock signal. (*Id.*) In order for there to even be a clock signal there has to be a frequency. Frequencies can vary, and establishing a frequency is elemental to generating a clock signal. (*Id.* (citing Tr. (Oklobdzija) at 1089-90 ("The role of the PLL is to control the frequency of the VCO or set it in the desired range"), 1091 ("And that control signal controls the frequency or adjusts the frequency of the VCO.")).) Therefore, controlling the frequency of the controlled oscillator is the same thing as controlling the generation of the clock signal. (*Id.*)

Furthermore, according to Respondents, the controlled oscillator of a PLL relies on a reference signal of a crystal, even if that signal does not arrive directly from the crystal. (*Id.*)

{

} signal to be sent to the controlled oscillator, thus controlling the generation of a clock signal by the oscillator. (*Id.* at 28-29.)

{

}. (*Id.* at 29.) For example, in the {

}. (*Id.* (citing Tr. (Subramanian) 1305-08, 1313).)

Although Complainants argue that the crystal's reference signal is not directly received by the oscillator, this is not a requisite, say Respondents. (*Id.*) Complainants did not argue for or seek a construction of the "entire" limitation that would require that only direct reliance on off-chip sources falls outside the asserted claim term. (*Id.*) The evidence shows that the Accused Products do rely on the reference signal of an off-chip crystal to generate the clock signal, and such reliance places the Accused Products outside the scope of the "entire" limitation. (*Id.*)

Along the same lines, Respondents protest that Complainants, while acknowledging that the PLLs in the Accused Products "use" clock signals from an external crystal, nevertheless argue that "use" of the clock signal from the external crystal does not constitute reliance on an external crystal. (*Id.* at 30 (citing CBr. at 19-20).) Respondents say there is no basis for this argument in the language of the claims, the specification, the file history, or Order No. 31. (*Id.* (citing Order No. 31 at 39 ("the ring oscillator variable speed system clock is a self-contained oscillator and clock which does not utilize external components")).) Furthermore, the assertion that the crystal's reference signal is merely used to regulate the clock signal is itself an admission that the reference signal is used to generate the clock signal. (*Id.*) It is indisputable that a clock signal is not something that is generated and sent just once; instead, it is repeatedly generated and sent. (*Id.* (citing Tr. (Oklobdzija) at 1089).) While Complainants erroneously contend that the initial beat or beats of the clock do not rely on the reference signal, their admission that the subsequent beats of the clock are "regulated" by the reference signal is recognition that the reference signal is relied upon in generating those beats. (*Id.*)

Respondents contend that the PLLs' circuitry and control signals, including the one created and based on a comparison with the signal from the external crystal, do more than simply regulate. (RRBr. at 30-31.) Without them, the controlled oscillator would be unable to generate a clock signal, because the controlled oscillators in all of the Accused Products with known PLL topology use { } and therefore cannot begin oscillating until they receive a control signal, { }. (*Id.* at 31.) Because the controlled oscillators in the Accused Products never oscillate without at least a control signal, including those derived from a comparison with the external crystal, the Accused Products do not infringe, even under Complainants' theory, Respondents argue. (*Id.*)

Respondents say Dr. Subramanian, Dr. Haroun, and Mr. Kekre are in agreement in testifying that the PLLs in the Accused Products require—and thus rely on—a control signal to determine the generated clock frequency signal. (*Id.* (citing Tr. (Subramanian) at 1316-32, (Haroun) at 178-205, (Kekre) at 228-239).) Dr. Oklobdzija implicitly agrees as well, because he accepts the fact that a PLL controls its internal oscillator: "So the PLL controls the frequency of that VCO or ICO and adjusts it to match the reference frequency." (RBr. at 86-87 (citing Tr. (Oklobdzija) at 834).) Also, he affirms that a PLL has circuitry that is used to set the frequency of a VCO to a multiple of another oscillator frequency functioning as a reference clock. (*Id.* (citing Tr. (Oklobdzija) at 831).) And he acknowledges that, when setting output frequency, the PLL compares the VCO's frequency with the external reference frequency, and based on the difference, the PLL generates an appropriate voltage for controlling the frequency of the VCO. (*Id.*)

Respondents say Complainants ignore the facts in evidence when arguing that the control signals are used to control frequency generation but not signal generation, and in the process, insisting that there is no reliance on the PLL's control signals, because the ring oscillators allegedly generate a clock signal without any added control. (RRBr. at 31.) In this respect, Respondents argue that Complainants are wrong for several reasons. (*Id.* at 32.)

First, as previously discussed, setting the frequency of a clock signal is part-and-parcel of generating the clock signal. (*Id.*) Second, Respondents assert that the control signals of the PLLs do more than merely regulate frequency. (*Id.*) Without them, the controlled oscillator ultimately could not generate a clock signal, as discussed in detail above. Third, the evidence shows that all of the Accused Products use internal signals to control their controlled oscillators. (*Id.* at 32 (citing Tr. (Subramanian) at 1317).) Fourth, Complainants focus solely on control signals internal to the PLL, but the PLLs in each of the Accused Products also rely on external control signals to generate control signals. (*Id.* at 34.) The PLLs in each of the Accused Products rely on external control signals to generate control signals, because the evidence shows that each of the PLLs in the Accused Products includes at least one external control signal that is used to set the output frequency of its controlled oscillator. (*Id.*) And last, to the extent that Complainants argue that there is a distinction between "relying" on and "using" a control signal to generate a clock signal, there is no basis in the claims, specification, file history, or Order No. 31 for concluding that "using" a control signal does not constitute "relying" on the signal. (*Id.*)

Respondents say Complainants mischaracterize testimony of Dr. Subramanian concerning a graph from one of { } technical documents in an attempt to argue that the { } will always have power to generate a clock signal. (*Id.* at 46 (citing CBr. at 24-25).) Complainants argue that, according to this graph, { } during its operation. (*Id.* (citing Tr. (Subramanian) at 1453).) However, Dr. Subramanian refuted this contention. (*Id.* (citing Tr. (Subramanian) at 1453).) According to the graph, { }. (*Id.* (citing Tr. (Subramanian) at 1454).)

If Complainants' position that the { } will always oscillate regardless of any control signal were correct, {

}. (*Id.* (citing Tr. (Subramanian) at 1455).) Rather than rebutting Dr. Subramanian's testimony, the {

}. (*Id.*)

Respondents deny Complainants' statement that Dr. Subramanian testified that the { } diagram shown in RDX-0004.129C represents all { } chips with known topology. (*Id.* (citing CBr. at 25-28).) Dr. Subramanian's testimony regarding RDX-0004.129C makes no such a statement or anything resembling it. (*Id.* (citing Tr. (Subramanian) at 1317-18).) Furthermore, the first bullet point in RDX-0004.129C lists a number of { } for which Dr. Subramanian thoroughly discussed differences as compared to the { }, thereby contradicting Complainants' contention that the { } is representative of other { }. (*Id.* at 47-48 (citing Tr. (Subramanian) at 1164-78).)

As concerns the { }, Respondents say Complainants' entire argument rests on the erroneous assumption that the { }, according to what is depicted in the block diagram, represent the PLL's { } positions in operation. Actually, the PLL's {

} in the diagram. Rather, the {

}. (*Id.* at 48 (citing Tr. (Oklobdzija) at 844-845, (Subramanian) at 1435).)

Dr. Subramanian testified that the {

}. (*Id.* (citing RX-0618 at QTPL 13875-76).)

Notably, Complainants have not shown that {

}. (*Id.*)

According to Respondents, even if the specific configuration shown in RDX-4.129C,

{

}. (*Id.* at 48-49 (citing Tr. (Subramanian) at 1503-04).) Because { } in this particular configuration rely on { }, Respondents argue that the "entire" limitations are not met and there is no infringement. (*Id.* at 49.)

As regards the Texas Instruments OMAP chips, Complainants again advocate their "perpetual oscillation" theory by arguing that the PLLs in these chips can oscillate on their own with only a power supply, and again they are wrong, argue Respondents. (*Id.* (citing CBr. at 28).) First, Complainants fail to realize that there are many control signals directed at the OMAP PLL's ICO, and the ICO will not operate without these signals. (*Id.* (citing Tr. (Haroun) at 184-185).) Dr. Haroun testified that the {

}. (*Id.* (citing Tr. (Haroun) at 185).) Without this control current, the ring oscillator will not operate. (*Id.* (citing Tr. (Haroun) at 189).) Based on Dr. Haroun's testimony, Dr. Subramanian testified that the controlled oscillators inside the accused OMAP chips receive and rely on control signals to generate a clock signal. (*Id.* (citing Tr. (Subramanian) 1319-20).)

Also undermining Complainants' allegations against the OMAP chips is the use of a { } of these chips: Dr. Haroun testified that the ring oscillators in the accused OMAP chips { }" (*Id.* (citing Tr. (Haroun) at 203).) { }, the OMAP chips' controlled oscillator uses { }. (*Id.* (citing Tr. (Haroun) at 203-204).) If the { }. (*Id.* (citing Tr. (Haroun) at 204).) Consequently, the OMAP chips' ring oscillators cannot oscillate without the control current generated by the PLL. (*Id.* at 49-50 (citing Tr. (Subramanian) at 1186-87, 1189).)

As for the targeted LSI Logic, Samsung, and Texas Instruments audio codec chips, Respondents say the evidence shows that they will not oscillate in the absence of control signals. (*Id.* at 50.) Respondents say it is not surprising that Complainants did not raise the "perpetual oscillation" theory with respect to these chips, because the evidence clearly shows that the oscillators in these chips cannot oscillate without PLL control signals. (*Id.*)

In the case of the LSI chips, Respondents say the evidence clearly establishes that the oscillators in these chips will not operate without a reference frequency. (*Id.* (citing { }).) Similarly, the PLLs in the accused Texas Instruments audio codec chips will not operate, according to their specifications, without an external reference clock signal. (*Id.* (citing Tr. (Kekre) at 232-233, 236-237).) As for the ring oscillators in the APLLs in the accused Samsung chips, {

}. (*Id.* at 51 (citing Tr. (Subramanian) at 1199; JX-0037C.1-2).) For these reasons, Respondents conclude that Complainants' "perpetual oscillation" construct does not apply to these chips. (*Id.*)

Respondents claim that Complainants have not shown that particular Accused Products with Qualcomm chips satisfy the "ring oscillator" or "oscillator" limitations. (*Id.*) Complainants have advanced three grounds in support of their contention. First, they say the high frequency that is needed by contemporary chips cannot be obtained from slower off-chip crystals by means of the chips' interface pins and that "no circuitry exists to multiply a digital signal." (*Id.* (citing CBr. at 12-13).) Second, Complainants base their allegation on Dr. Oklobdzija's ninety-nine percent certainty that every PLL has to employ a ring oscillator, on Dr. Subramanian's statement that all of the Accused Products that he examined contain ring oscillators, and on various portions of depositions and documents. (*Id.*) Third, in making allegations against specific Respondents, Complainants fallaciously resort to a blanket assertion that all of accused chips have ring oscillators. To these claims, Respondents answer that Complainants are wrong on all counts. (*Id.*)

First, the '336 patent discloses and requires a clock/oscillator whose speed varies because of, and with changes in, the PVT[14], while the prior art and the present-day industry use a fixed clocking design by using a PLL to neutralize the influence of PVT. (*Id.* (citing Tr. (Subramanian) at 1212-14).) In order to avoid the import of these opposing designs,

[14] Performance, voltage, and temperature.

Complainants posit that the industry cannot operate without the '336 patent because (1) "no circuitry exists to multiply a digital signal" from an off-chip crystal and (2) the frequency needed by today's chips "is too high to be delivered from the—through the outside pins." (*Id.* at 51-52 (citing CBr. at 12-13 and Tr. (Oklobdzija) at 378-379, 414-415).) Both of these arguments are technically baseless, argue Respondents. (*Id.* at 52.)

Complainants' first point—that "no circuitry exists to multiply a digital signal"—is contradicted by prior statements that Dr. Oklobdzija has made. (*Id.*) In a 2003 book about clocking microprocessors, written for experienced practitioners and graduate-level students, and co-authored by Dr. Oklobdzija, it states: "Clock generation begins on a system board, where the global system clock reference is generated from a 'crystal' oscillator." (*Id.* (citing RX-2283 (textbook) at Garmin 92905; Tr. (Oklobdzija) at 251, 827-829).) According to this book, the crystal's "low-frequency system clock is first brought on-chip and then frequency multiplication is performed to achieve the desired on-chip clock rate." (*Id.* (citing RX-2283 at Garmin 92906; Tr. (Oklobdzija) at 828).) The book acknowledges that a PLL is a frequency multiplier by stating this: "In addition to clock alignment, PLLs can perform frequency multiplication." (*Id.* (citing RX-2283 at Garmin 92909).) In addition to that, the book includes the following caption describing a figure in the book: "Fig. 1.13. PLL frequency multiplication." (*Id.* (citing RX-2283 at Garmin 92909).) And if that were not enough, the book makes this statement: "PLLs are mostly used in modern processors to multiply the frequency of the external system clock and reject any existing high-frequency reference clock noise." (RX-2283 at Garmin 92911.)

As to Complainants' second point—that it is not possible to deliver the needed high-speed clock signal from an off-chip source through the chips' interface pins—Respondents reply that this is an attempt to resurrect a failed claim construction argument and is contradictory of the applicable technology. (*Id.* (citing CBr. at 12).) Complainants' argument here rests on the premise that the signal from the off-chip crystal is not input directly into the ring oscillator but, instead, is used as a point of comparison to regulate the controlled oscillator. (*Id.*) This argument, say Respondents, overlooks the fact that Order No. 31 considered, but did not adopt, a construction of the "entire" limitation that specifies that the entire clock/oscillator must directly rely on an external crystal. (*Id.* (citing Order No. 31 at 28-29, 40-42).) Hence, this aspect of Complainants' argument is foreclosed by what is stated in Order No. 31. (*Id.*) Besides that, there is no technological basis for Complainants' argument, as demonstrated by Dr. Subramanian's testimony regarding the ability of the well-known DDR3 memory interface to send a one gigahertz signal across a chip's input-output interface. (*Id.* at 53 (citing Tr. (Subramanian) at 1238-39).) Dr. Subramanian's empirical measurements of the frequency of the accused { }. (*Id.* (citing Tr. (Subramanian) at 1239; RX-1189C; RX-1190C; RDX-0004.101).)

With respect to Dr. Oklobdzija's testimony that any modern microprocessor with a PLL has to have a ring oscillator, an opinion about which he testified he was 99.999 percent confident, Respondents reply that the evidence, including Dr. Oklobdzija's own writings, fail to support his statement, and there are several reasons why. (*Id.* at 53.) First, Dr. Subramanian and one of the named '336 patent inventors, { }, separately stated that a PLL, or a controlled oscillator inside a PLL, does not require a ring oscillator. (*Id.* (citing Tr. (Subramanian) at 1336-37; RX-167C { } at 73).) Second, testimony given by Dr. Oklobdzija at the hearing is contradicted by other statements he made whereby he opined that the disclosure of a VCO in a particular prior art reference, which was the subject of an invalidity allegation, is not sufficient by itself to disclose the presence of a ring oscillator. (*Id.* (citing Tr. (Oklobdzija) at 861-863).) Third, Dr. Oklobdzija's textbook on microprocessor clocking reveals that a ring oscillator is not the only way to implement a controlled oscillator in a PLL. (*Id.* at 53-54.)

Dr. Oklobdzija's textbook says: "VCO is built either as a ring oscillator topology, Fig. 1.14, or an inductance-capacitance (*LC*) tank oscillator, Fig. 1.15." (*Id.* at 53-54 (citing RX-2283 at Garmin 92909; Tr. (Oklobdzija) at 252-253).) In statements in his textbook, which he made before his involvement in this Investigation, Dr. Oklobdzija and his fellow authors said that, because of their superior performance, LC oscillators were becoming increasingly popular in comparison to ring oscillators. Although at the hearing Dr. Oklobdzija tried to minimize this statement by arguing that LC oscillators are not used in microprocessors, he confirmed that the textbook in which the statement was included focuses on "clocking microprocessor systems." (*Id.* at n. 12 (citing Tr. (Oklobdzija) at 252, 857-858; RX-2283 (*Digital System Clocking, High-Performance and Low-Power Aspects* (Wiley-Interscience, 2003) at Garmin 92910 ("With the increase in clock frequency and the use of on-chip spiral inductors, both feasible with today's technology, LC tank-based VCOs are becoming increasingly popular due to superior phase-noise performance.")).)

Dr. Subramanian, in a similar vein, testified that the use of an LC circuit on a high-performance microprocessor chip is "pretty attractive," because an LC circuit exhibits superior stability at higher fixed frequencies and because the space required on the chip for the inductor decreases with higher frequencies. (*Id.* (citing Tr. (Subramanian) at 1338-39).) In addition to using an LC circuit, a PLL designer could also use a relaxation controlled oscillator to implement a VCO. (*Id.* (citing Tr. (Subramanian) at 1337; RDX-0004.146 (illustrating LC and relaxation oscillators).) Respondents say this evidence supports the conclusion that—contrary to Dr.

Oklobdzija's ninety-nine percent confident opinion otherwise—a given PLL may use a different kind of oscillator than a ring oscillator. (*Id.*)

Respondents also note that a PLL does not need an oscillator. (*Id.* (citing Tr. (Subramanian) at 1335-36).) A delay-locked loop ("DLL"), identified in Dr. Oklobdzija's book as a type of PLL, uses a voltage controlled delay line, instead of a controlled oscillator, to control the output frequency of the PLL. (*Id.* (citing RDX-0004.145; RX-2283 at Garmin 92907-08 ("The other type of PLL is delay-line based or delay-locked loop (DLL)...[where] the VCO in the PLL is replaced by the voltage controlled delay line (VCDL), which delays the external clock...")).) A DLL is, then, a PLL without a controlled oscillator or a ring oscillator. (*Id.* at 54-55.)

Respondents point out that Dr. Subramanian, rather than confirming the presence of a ring oscillator in the PLLs in the Accused Products, as Complainants assert, merely testified that certain PLLs have a "ring oscillator" in line with the construction set forth in Order No. 31. (*Id.* (citing Tr. (Subramanian) at 1410-11, 1432, 1392-93, 1394-95).) However, as concerns the numerous chips about which Complainants did not seek discovery, Dr. Subramanian was unable to confirm the internal structure of the PLL and could not determine whether a given PLL contains a voltage controlled delay line, an LC oscillator, a relaxation controlled oscillator, or a ring oscillator. (*Id.* (citing Tr. (Subramanian) at 1334-1340).) Dr. Subramanian testified that "we don't know that [an accused PLL has a controlled oscillator] for some of the Accused Products," because the level of detail in many data sheets and schematics are insufficient to make that determination. (*Id.* (citing Tr. (Subramanian) at 1389-90).) This lack of information, argue Respondents, results from the failure of Complainants to seek discovery about a large number of the Qualcomm chips that Complainants have taken aim at. (*Id.* (citing Tr. (Subramanian) at

1339-40; RDX-0004.147C).) Respondents argue that Complainants must bear the consequences of this failure. (*Id.* at 55-56.)

According to Respondents, Complainants failed to seek the necessary discovery and are left with no evidence of the PLL topologies for the following Qualcomm chips:

- **MDM9600** (CBr. at 90, 94-95 (Novatel).)
- **MSM7227** (CBr. at 64-65 { }.)
- **MSM7627A** (CBr. at 119 (Huawei); 123 (ZTE Tania/Render N859).)

{ }

- **MSM8255** (CBr. at 70-71 { }; 116 (Huawei).)
- **MSM8260A** (CBr. at 45-46 { }; { }
- **MSM8660A** (CBr. at 45-46 { }.)

{ }; 93 (Novatel).)

- **QSC6270** (CBr. at 126-127 (ZTE).)

(*Id.* at 56.) Albeit that they failed to seek and obtain discovery about these chips, Complainants presumptively claim that a ring oscillator must be present simply because of the fabrication technology that was used to make them. (*Id.*) Complainants refer to RX-545C, by way of example, to support their discussion about the MSM7227 chip, although the document reflected in this exhibit concerns a different chip, the MSM7227A. (*Id.* (citing CBr. at 64).) Similarly, Complainants assume that the QSC6085, for which they possess no structural documents from Qualcomm, and the QSC6055, which Dr. Subramanian did analyze, must have the same PLL structure simply because both "{ }" (*Id.* at 56-57 (citing CBr. at 85-86).) Likewise, Complainants claim without support the MDM9600 must have a ring oscillator, because "all of { }." (*Id.* at 57 (citing

CBr. at 95).) Respondents say that similar unfounded assertions are scattered throughout Complainants' post-hearing brief. (*Id.* (citing CBr. at 45-46 (arguing that { } must have the same PLL because { }), at 70-71 (concluding that the { } share the same PLL structure because they share the same user guide), at 81 (assuming, absent evidence from { } have the same structure), at 123 (associating different documents about the { } chip to argue that it has the same PLL as the { } chip), and at 126-127 (presuming that the { } contains a ring oscillator because it is { } and because other { } analyzed by Dr. Subramanian have { }))).)

Respondents point out that Dr. Subramanian testified that a PLL's internal structure cannot be determined from the chip's model number or its fabrication technology, because { }. (*Id.* at 57-58.) This indicates that there are PLL designs that are different from the ones Dr. Subramanian analyzed and which are unknown because Complainants failed to seek the necessary discovery about many of the accused chips. (*Id.* at 58.)

Respondents say that up to the trial Complainants and Dr. Oklobdzija accused a large number of products with chips for which they never sought discovery. (*Id.* (citing Tr. (Subramanian) at 1145-47; RDX-0004.441C).) At trial Complainants failed to present any evidence concerning these chips and the products containing them. (*Id.* (citing CBr. at 138-142).) Respondents point out that Complainants' post-hearing brief is silent about the following { } and the Accused Products that incorporate them:

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(*Id.* (noting that there is no mention of these chips or products in Complainants' post-hearing brief).) Because Complainants did not produce evidence against these products, a finding of no infringement is appropriate, say Respondents. (*Id.*)

c) Staff argues that the Accused Products do not satisfy the "entire" limitations

Staff says the evidence shows that the Accused Products do not satisfy the "entire" limitations of the asserted claims. (SBr. at 11-12.) First, argue Staff, because each of the Accused Products employs a clock that relies on an external crystal or clock generator to generate a fixed-frequency clock signal. (*Id.* at 12 (citing Tr. (Subramanian) at 1295-96).) The clock frequency is determined as a direct function of the reference frequency of the external source. (*Id.* (citing Tr. (Subramanian) at 1299-1301).) Staff says there is no dispute here, and even Dr. Oklobdzija recognizes that there is a "precise formulaic relationship" between clock frequency and reference frequency. (*Id.* (citing Tr. (Oklobdzija) at 834).) If the reference frequency increases or decreases, the clock frequency follows, proportionally. (*Id.* (citing Tr. (Oklobdzija) at 836).) Therefore, it is axiomatic that the accused clocks rely on external crystals or clock generators to generate clock signals. (*Id.*)

Staff says that it does not appear to be disputed that each alleged clock/oscillator generates a clock signal at a frequency that is regulated by phase-locked loops ("PLL") based on a reference supplied by an external crystal or clock. (SRBr. at 2.) Although the frequency of the generated clock signal is determined on the basis of an external reference, Complainants nevertheless argue that the generation of the clock signal does not rely on an external reference because the clock signal first has to be generated before it can be regulated. (*Id.* at 2-3 (citing CBr. at 19-20).) Staff says the evidence does not support Complainants' position.

According to Staff, Dr. Oklobdzija testified that the alleged ring oscillators rely on delays in order to generate clock signals:

> Q. The ring oscillator generates a clock signal, but does it rely on an external clock generator to generate a clock signal?
>
> A. As I explained in my explanation of how ring oscillators oscillate, everyone in this courtroom can conclude that it does not rely on anything else but on delay between -- delays that inverters introduce in the loop.

(*Id.* at 3 (citing Tr. (Oklobdzija) at 414:7-14.) However, these delays are controlled by PLLs based on external references, says Staff. (*Id.* (citing Tr. (Oklobdzija) at 1058).) Dr. Oklobdzija testified that the PLL functions like a water faucet: "[T]he water faucet, you are controlling how much water goes through, and that affects how fast or how slow it's going to oscillate." (*Id.* (citing Tr. (Oklobdzija) at 1058).) Put another way, the PLL controls the delay that Dr. Oklobdzija admits is relied on by the alleged oscillator/clock to generate a clock signal:

> Q. Now, changing the off-chip crystal frequency FIN in this equation will result in a change of the PLL's output frequency. Correct?
>
> A. Because the phase comparator will see the difference and will try to adjust the VCO closer so that they match.
>
> Q. So the answer to my question is yes?
>
> A. It would be changed -- the output frequency would be changed if the input frequency changes. That's what PLL does.

(*Id.* at 3-4 (citing Tr. (Oklobdzija) at 967).)

Staff says Dr. Oklobdzija admits that the PLL relies on the reference signal to adjust the frequency of the clock signal. (*Id.* at 4 (citing Tr. (Oklobdzija) at 375 ("This a reference that I rely on and a reference that I relied stable, or it's a reference that I want to be—I want this clock to run with respect to that reference.[] Now, that reference comes from outside.")).) Dr. Oklobdzija elaborated as follows:

> The system clock -- and I said it many times here, also. The system clock is supplied by the on-chip ring oscillator. In other words, the ring oscillator generates the clock, and that is the timing signal that goes and clocks the CPU.
>
> The PLL, the purpose of the PLL is to set that VCO into a desired range, as we have seen also here, through the formulas, which says, "Okay, we want it to be here; no, we want it to shift over there." And that is done. How do you do it? Because you cannot multiply. You use the second reference and say, "Okay, with respect to that reference, I want to be 20 yards away, or with respect to this reference I want to be 5 yards away from it, or with respect to this reference I want to be 100 yards away."
>
> So you need the reference in order to set it where you want to set it. This is why reference is needed. So what PLL does, it needs the reference to put it where it doesn't want to put it, because PLL doesn't know. PLL can only say, "Okay, where do you want me to put it?" "I'll put it to be double of that or twice or four-thirds or something like that," and this is where PLL will set it.

(*Id.* (citing Tr. (Oklobdzija) at 1051-1052).) Thus, the evidence shows that the alleged oscillators/clocks rely on external crystals/clocks to generate signals, says Staff, and Complainants' argument fails. (*Id.*)

d) Complainants' reply to Respondents and Staff

Complainants in their reply brief only address claims 6 and 13, although Complainants say the other asserted claims are also infringed. (CRBr. at 5.) According to Complainants, except for the TI audio codec chips, which are limited to Respondent Nintendo, there is no dispute that all of the Accused Products include a CPU on an integrated circuit substrate; nor is there any dispute that the CPU of each Accused Product is constructed of a "first plurality of electronic devices," or transistors that are built into the silicon chip. (*Id.* at 6.) And there is no dispute that the CPU in each Accused Product operates at a "processing frequency," which is simply the speed at which the CPU runs. (*Id.*)

Complainants say the Accused Products include the "entire oscillator" of claims 6 and 13. (*Id.*) With the exception of a few products that contain certain Qualcomm chips, Complainants say Respondents do not contest that each of the Accused Products has a ring oscillator; therefore, the "entire ring oscillator" element is met. (*Id.*) Furthermore, there is no dispute that, to the extent each Accused Product has an "oscillator," it is on the same silicon chip as the CPU. (*Id.*) Nor is there any dispute that the "oscillator" is constructed of a "second plurality of electronic devices," or transistors that are built on the same chip as the CPU. Finally, Complainants assert that there is no dispute that the "entire ring oscillator" in each of the Accused Products is "connected to said CPU." (*Id.* at 6-7.)

Regarding Respondents' argument that Complainants have failed to show that certain Qualcomm chips contain a ring oscillator, Complainants argue that Respondents misrepresent the evidence regarding the Qualcomm PLLs and their associated ring oscillators because all of the Qualcomm chips at issue include ring oscillators within PLLs. On this point, Dr. Oklobdzija testified as follows:

> I'm 99 percent sure that everything that has a PLL has a ring oscillator. {
>
> }.

(CRBr. at 23 (citing Tr. (Oklobdzija) at 439-440, 441-443).) Complainants note that on cross-examination Dr. Oklobdzija testified: "I cannot say in 100 percent in every case it is a ring oscillator, but I can say it's 99.999 and that 9 going to that wall, it is a ring oscillator." (*Id.* (citing Tr. (Oklobdzija) at 856).)

Complainants say Respondents' only rebuttal to Dr. Oklobdzija's testimony on this point is Dr. Subramanian's testimony and Dr. Oklobdzija's book confirming that other kinds of oscillators, such as those involving LCs, exist. (*Id.*) However, argue Complainants, Dr. Subramanian testified without qualification that (1) none of the Accused Products that he analyzed uses an LC oscillator (Tr. (Subramanian) at 1390-91); (2) he is unaware of any PLL in any of the Accused Products that uses an LC oscillator (Tr. (Subramanian) at 1391-92); and (3) all of the PLLs in the Accused Products that he analyzed are either ring oscillators or oscillators { } that meet the "ring oscillator" claim term as construed in Order No. 31 (Tr. (Subramanian) at 1392). (*Id.*)

With respect to Dr. Oklobdzija's book, Complainants contend that Dr. Oklobdzija explained in detail why it is "impossible to integrate" an LC oscillator within the same die as the CPU. (*Id.* at 23 (citing Tr. (Oklobdzija) at 857-859).) Thus, the fact that Dr. Oklobdzija's book reports the existence of other kinds of oscillators is not relevant since this does not overcome the evidence showing that the { }. (*Id.* at 24.)

And as for Respondents' charge that Dr. Oklobdzija used a double standard in testifying on this issue, Complainants argue that Respondents are wrong for two reasons. First, his infringement opinion rests on his review of technical documents for the chips at issue, and he employed his expertise to arrive at his opinion. Second, Respondents' invalidity arguments rested entirely on assumption, and Respondents made no attempt to carry their burden, as did Dr. Oklobdzija. (*Id.*) Further, Respondents fail to acknowledge that the references upon which they relied were published in the 1980s, whereas Dr. Oklobdzija recognition that today's microprocessors use ring oscillators comes more than 15 years after the parent application of the '336 patent disclosed using the "familiar ring oscillator" in a novel way by incorporating it onto the same chip in order to clock the CPU. (*Id.*)

Next, Complainants say Respondents assert that the Accused Products do not satisfy the "entire oscillator" element of claims 6 and 13 because (1) the products rely on control signals and external crystal/clock generators to set or adjust the frequency of the ring oscillators in their PLLs, which they contend means the same thing as "generate a clock signal; (2) a few of the products that contain certain Qualcomm chips do not have a "ring oscillator" or any other "oscillator"; and (3) the Accused Products do not meet the "clocking said CPU" language of this element, because the output of the PLL goes through a clock distribution system before it is provided to the CPU. (*Id.* at 7.)

Complainants reject Respondents' contention that the accused ring oscillators do not rely on a control signal or an external crystal/clock generator to generate the clock signal. According to Complainants, the ring oscillators always have a power supply that enables them to oscillate and generate a clock signal on their own. (*Id.*) Complainants say Respondents argued for a claim construction that recites "an oscillator that is located entirely on the same substrate as the central processing unit and does not rely [on] a control signal or an external crystal/clock generator to generate a clock signal," which was adopted. (*Id.* at 7-8 (citing Order No. 31 at 40-

41).) According to Complainants, Respondents, in their opening brief, make clear that they now want a different construction which reads:

> an oscillator that is located entirely on the same substrate as the central processing unit and does not rely [on] a control signal or an external crystal/clock generator to ***set or adjust the frequency*** of a clock signal

(*Id.* at 8 (emphasis in the original).) Complainants say that Respondents are rejecting the claim construction that was adopted, in favor of the one just cited, and that, on that basis, Respondents go on to argue that the Accused Products do not infringe because they use a control signal or external crystal/clock generator to set, control, or adjust the frequency of the clock signal. (*Id.* at 8-9 (citing various pages of Respondents' opening brief where the term "frequency" is mentioned in relation to an external reference).) Complainants argue that Respondents should not be allowed to rewrite the claim construction that was adopted in Order No. 31 by substituting the words "set, control or adjust the frequency" for the word "generate." (*Id.* at 9.) Complainants contend that Respondents are attempting to ignore the actual claim construction that was adopted and apply a different one. (*Id.*)

Complainants say that when Respondents argue that "the concepts of setting a clock signal's frequency and generating a clock signal are inseparable, because a clock signal *must* have a frequency – its entire purpose is to provide a frequency to be used to time device operations[,]" they are attempting to make it appear as though they are not trying to change the construction that was adopted for the "entire" term; however, equating "setting a clock's frequency" with "generating a clock signal" is fundamentally incorrect. (*Id.*) Frequency is a characteristic of a clock signal; it is not the same thing as "generating a clock signal." Complainants say this point is demonstrated by the tutorial provided by Dr. Subramanian at the Markman hearing when he said this:

> So we'll go to RDXM-1-8. And this shows a hypothetical clock signal, and as was pointed out earlier, a clock signal is a signal that is, essentially, a periodic signal, so it tends to have regularity in its period. If I were to look as a function of time, I will see these pulses coming at a regular interval spaced out over time.
>
> And it tends to oscillate between two levels, which I'll call zero and one. And zero just means a very low voltage, and one means a high voltage, and it's essentially going back and forth between them. Now, you've, therefore, seen – I've already introduced one idea of clocks, and that is clocks tend to have a certain frequency.
>
> And so we could figure out the frequency by counting how many times it oscillates between zero and one in a given second, and that would be called its frequency in hertz, and that's where the term comes from. So that's one characteristic of a clock.
>
> Now, clocks can have multiple – you can design clocks to run at different frequencies. So, for example, you can have a clock running at a low frequency, as is shown on the top of RDXM-1-9, and a lower frequency means its fewer pulses per second.
>
> Or we could design it to run at a higher frequency, such as the one shown on the bottom of RDXM-1-9, and this is oscillating more at more pulses per second. So that's the idea of frequency.

(*Id.* at 10-11 (citing (Markman Tr. at 35-36).) Complainants say that Dr. Subramanian's testimony regarding frequency makes it clear that frequency is not the same as a clock signal; rather, frequency is a characteristic of a clock signal. (*Id.* at 11.) Nor is the setting of a frequency the same as generating a clock signal. As Dr. Subramanian testified, the same clock signal can have a low frequency or a high frequency, but its frequency simply characterizes how fast the clock signal's pulses are. (*Id.*)

For these reasons, Complainants request that Respondents' application of the "entire" limitations be rejected because it differs from the construction of that term that was adopted in Order No. 31.

Complainants further argue that Respondents' accused chips do not avoid infringement because they use control voltage/currents to set or adjust the frequency of a clock signal that is generated by the ring oscillator. (CRBr. at 11.) Complainants contend that the evidence shows that the clock signal is first generated by a ring oscillator, and without a clock signal there would be no frequency for the PLL to adjust. (*Id.*) This, say Complainants, is clear from a portion of Dr. Oklobdzija's examination, quoted here:

> Q. As I understand it, there's something else that's generating the frequency to begin with.
>
> A. Right.
>
> Q. And the control signal, rather than generating that frequency, it's regulating it.
>
> A. Very correct.
>
> Q. Is that understanding correct?
>
> A. Very correct.
>
> Q. I have no further questions. Thank you.
>
> A. Let me just clarify the answer. You cannot control something that is not generated. Let's say if a ring oscillator is dead, it doesn't generate any frequency, there's no point of regulating it, because it's not generating. So you can regulate the traffic when there is traffic, but when there is no traffic, what is the point of regulating it? Basically, that's my analogy. So it has to generate first before I can regulate it.
>
> Q. But my question is, what does the – the control signal itself is not doing the generating.
>
> A. The control signal regulates. It doesn't generate. And you are very correct in the terms that you used for that.

(*Id.* (citing Tr. (Oklobdzija) at 1092-1093).) Therefore, even though the PLLs in the Accused Products regulate the frequency of the ring oscillator's clock signal, the ring oscillator does not need a control signal or external crystal to generate the clock signal. (*Id.*) According to Complainants, Dr. Oklobdzija was unequivocal in his testimony that it is the ring oscillator in each of the products that generates the clock signal. As long as a ring oscillator has a power supply, it does not rely on anything else to generate a clock signal, except the delays that inverters introduce in the loop. (*Id.* (citing Tr. (Oklobdzija) at 413-414).) Complainants say Dr. Subramanian agreed that the ring oscillator "relies on the principle that an odd number of inverters connected together in a loop will have a tendency to oscillate, which is their nature. (*Id.* (citing Tr. (Subramanian) at 1399-1400).) Complainants say Dr. Oklobdzija said several times during his testimony that the oscillator inside the VCO in RX-0690C.0006 does not rely on the { } to generate the clock signal that is used to clock the CPU, as for example here:

> To generate, no. Let me be specific about it. That's why I said it has its own power supply. There is another voltage in there. That power supply enables it to run, to function. And as I explained also . . . that generation of the property of generating the signal is based on the delay of those inverters which are in the loop of the ring oscillator. . . So the control controls the frequency but not the generation.

(*Id.* (citing Tr. (Oklobdzija) at 1058:-1059).) Complainants emphasize that Dr. Oklobdzija repeatedly said that none of the ring oscillators in the VCOs or ICOs of any of the Accused Products relies on a control signal to generate the clock signal that is used to clock the CPUs of those chips. (*Id.* (citing Tr. (Oklobdzija) at 1059, 635-636, 645, 650, 661).) Complainants say that Respondents cite testimony and other evidence to argue that the PLLs in the Accused Products use "control signals" to set, control, and/or regulate the frequency of their clock signal, but the evidence shows instead that it is the ring oscillator in each of the Accused Products that generates the clock signal, while a control voltage/current is used to set or adjust the frequency of the clock signals. (*Id.* at 13.)

Complainants say Respondents' chips infringe even though they use an external crystal/clock generator to set or adjust the frequency of a clock signal. (*Id.* at 13.) Complainants say they do not dispute that the Accused Products use an external crystal/generator to set or adjust an already generated clock signal, but there is no evidence that the ring oscillators in the

Accused Products rely on an external crystal/generator to generate a clock signal. (*Id.*) Complainants say the fact that an external crystal is used as a reference to set the frequency is quite different from saying that the external crystal "generates" the clock signal of the ring oscillator, noting that Dr. Oklobdzija testified:

> The external reference does not produce the system clock.
>
> * * *
>
> As you have seen, that external reference is being compared to the clock. It's 100 to 200 times lower in frequency. There's no way to multiply it. The output of that comparator is voltage, not the clock. That voltage goes through the filter, produces a voltage, not the clock. That voltage gets converted into the current, not the clock. So how can that external reference produce system clock? It's impossible.

(*Id.* at 13-14 (citing Tr. (Oklobdzija) at 415-416, 389, 1092-93, 378).) Complainants say Dr. Subramanian acknowledged that an external reference crystal cannot be used to produce a high-speed system clock in the gigahertz range; rather, the frequency divider in a PLL divides the already generated output of the ring oscillator, but the PLL cannot multiply the frequency of the external crystal. (*Id.* (citing Tr. (Subramanian) 1397-99; 1386-88; RDX-4.115).)

As for Respondents' criticisms of Dr. Oklobdzija's testimony, Complainants say Dr. Oklobdzija's testimony was both truthful and perfectly consistent with Complainants' positions in this case:

(1) An external crystal/clock generator is used by a PLL as a reference to set or adjust the frequency of the ring oscillator, but not to generate its clock signal. (*Id.* (citing Tr. (Oklobdzija) at 374:18-384:7; 385:17-386:22; 413:6-414:14; 1053:1-7).)

(2) There is a mathematical relationship between the external crystal reference and the frequency of the ring oscillator. (*Id.* (citing Tr. (Oklobdzija) at 415:15-416:3; 835:16-836:19).)

(3) But that mathematical relationship results from the fact that the ring oscillator's frequency is divided – not that the frequency of the crystal reference is multiplied. (*Id.* (citing Tr. (Oklobdzija) at 378:24-381:1; 415:15-416:3).)

While Dr. Oklobdzija testified that he "did not see" an external crystal involved in clock signal generation in some products, that is consistent with his testimony that a ring oscillator generates a clock signal on its own, and does not rely on an external crystal to generate a clock signal. (*Id.*) It was not relying on the external crystal to generate the clock that was the substance of Dr. Oklobdzija's testimony, say Complainants. Therefore, Respondents' attacks on Dr. Oklobdzija are uncalled for. (*Id.*)

Complainants further argue that Respondents improperly attempt to limit the "entire oscillator" by arguing that the "entire oscillator" of Claims 6 and 13 is limited to a "free-running oscillator which varies and runs at its maximum speed permitted by PVT parameters…." (CRBr. at 15 (citing RBr. at 86).) Respondents seek to distinguish the Accused Products by arguing that "[r]ather than running at the circuit's maximum speed dictated by PVT parameters as contemplated by the patent, a PLL of the Accused Products runs at a lower, fixed frequency by using internal control signals and fix the speed [i.e., frequency] of its controlled oscillators." (*Id.*) Complainants say there are multiple problems with this argument. (*Id.*)

First, Respondents attempt to import limitations from the specification into the claims, such as "free-running," "maximum speed," "400%" etc., which is improper. (*Id.* (citing *Phillips v. AWH Corp.*, 415 F.3d 1303, 1320 (Fed. Cir. 2005); *Voda v. Cordis Corp.*, 536 F.3d 1311, 1320 (Fed. Cir. 2008)).) Complainants say Respondents tried to import these limitations into the claims in the context of their proposed construction for "clocking said CPU" and were rejected. (*Id.* at 16.) Moreover, the "first clock" of claims 6 and 13 is simply an "entire oscillator." (*Id.*)

Not only is there nothing in the claims that requires the "entire oscillator" to "run at the circuit's maximum speed dictated by PVT parameters," there is also nothing in claims 6 and 13 that requires the "entire oscillator" to be "variable speed" during operation. (*Id.*) Claims 6 and 13 are satisfied solely by process ("fabrication") variations that are built into the chips at the factory and therefore there is no requirement that those chips vary during operation. (*Id.*) Claims 6 and 13 are satisfied as long as the processing frequency of the CPU and the clock rate of the "entire oscillator" vary "in the same way as a function of parameter variation in one or more fabrication or operational parameters." (*Id.*) Complainants say Respondents admit that the transistors of some chips, including the CPU and the "entire oscillator," will run faster because of process variations, and other chips will run slower. (*Id.* (citing Tr. (Subramanian) at 1263-65, 1121).) This, according to Complainants, is sufficient to satisfy claims 6 and 13. (*Id.*)

Complainants next say Dr. Subramanian confirmed on cross-examination that {

}, is shown here:

REDACTED

Complainants say on cross-examination Dr. Subramanian admitted that {

}. (*Id.* at 17-18 (citing Tr. (Subramanian) at 1445-46).) Thus he agreed that the ring oscillators would oscillate and generate clock signals even though they were not in use by the PLL. (*Id.* (citing Tr. (Subramanian) at 1447).)

Complainants say Dr. Subramanian admitted that the same was true for the {

} (*Id.* (citing Tr. (Subramanian) at 1435-36, 1438-41).)

According to Complainants, RX-621C.14 also shows that {

}. (*Id.*) This, argue Complainants, contradicts Dr. Subramanian's testimony that { }. (*Id.*)

Therefore, Complainants allege that Respondents have tried to create a new argument that the {

} (*Id.*)

Complainants argue that Respondents admit that all of the accused chips have { } that operate the same way and therefore all of them infringe because they do not rely on a control signal to generate a clock signal. (CRBr. at 19-20 (citing RBr. at 102, 87-88.) However, argue Complainants, the evidence is unequivocal that the ring oscillators in RDX-0004.129C and RX-0621C do not rely on a control signal to generate a clock signal, for reasons already discussed. (*Id.*) Complainants argue that Respondents' attempt to extend their "control signal" argument to other chips actually proves the opposite, since it is clear that the ring oscillators in all accused Qualcomm chips generate a clock signal without relying on a control signal, they all infringe. (*Id.* at 20.) For reasons already discussed, the Administrative Law Judge finds the evidence does not support Complainants' assertion in this regard.

Complainants argue that Dr. Haroun admitted that the only input to the ring oscillators in the OMAP3 and OMAP4 chips is current, and while the { } in the DPLL may receive a { }, it does not pass that control signal on to the ring oscillator. (*Id.* (citing Tr. (Haroun) at 188-189, 194).) Complainants say Dr. Haroun admitted that without the { } of the PLL, the ring oscillators in the OMAP chips would still output an oscillation. (*Id.* (citing Tr. (Haroun) at 196).) Complainants argue that Dr. Haroun conceded that the only way to change the frequency of the ring oscillator, { }. (*Id.* (citing Tr. (Haroun) at 209-210).) In other words, argue Complainants, the ring oscillator will always generate a clock signal as long as it has a current. (*Id.* (citing Tr. (Haroun) at 196).) Therefore the ring oscillators in the Texas Instruments OMAP chips do not require a control signal. (*Id.*)

e) The Administrative Law Judge's findings and conclusion

As an initial matter, the Administrative Law Judge concludes that the testimony of Dr. Oklobdzija is incomplete and inconclusive with respect to whether all of the accused chips include the claimed ring oscillators or oscillators. When he testified that he is 99 percent sure that they do, he did not provide sufficient supporting evidence for that opinion. Given the conflicting evidence, both from Dr. Subramanian and from Dr. Oklobdzija's own textbook, more was needed to be shown by Complainants besides Dr. Oklobdzija's sweeping generalization. The textbook he co-authored discusses PLLs that employ delay-line based or delay-locked loops (DLL). (RX-2283 at GARMIN 92097.) Because Complainants bear the burden of proof, in order to prove that each of the Accused Products infringes, more is required than a blanket assumption based on Dr. Oklobdzija's general knowledge of digital system clocking to warrant reliance. Therefore, the Administrative Law Judge finds that the evidence is not sufficient to establish that chips listed above meet this element of the asserted claims.

The Administrative Law Judge disagrees with Complainants' premise that Respondents' argument misapplies the term "an oscillator that is located entirely on the same substrate as the central processing unit and does not rely on a control signal or an external crystal/clock generator to generate a clock signal." Complainants concentrate their argument on a narrow application of the word "generate." Complainants reckon that as long as power is available to the ring oscillator it can and does generate the clock signal, and the external crystal/clock merely regulates that signal after it has been generated. This ignores other portions of the claim term as it was construed, such as the words "does not rely on a control signal," and runs counter to the evidence as a whole. *See* Order No. 31. First, Dr. Subramanian, Dr. Haroun, and Mr. Kekre all testified that the PLLs in the Accused Products require, and thus rely on, a control signal to determine the generated clock frequency signal. (Tr. (Subramanian) at 1316-32, (Haroun) at 178-205, (Kekre) at 228-239.)

Dr. Oklobdzija agrees, to the extent that he accepts that a PLL controls its internal oscillator: "So the PLL controls the frequency of that VCO or ICO and adjusts it to match the reference frequency." (Tr. (Oklobdzija) at 834.) He affirms that a PLL has circuitry that is used to set the frequency of a VCO to a multiple of another oscillator frequency functioning as a reference clock. (Tr. (Oklobdzija) at 831.) He testified that, to set the output frequency, the PLL compares the frequency of the VCO with the external reference frequency, and based on the difference, the PLL generates a voltage that controls the frequency of the VCO. (*Id.*) In the textbook that Dr. Oklobdzija co-authored with three other microprocessor clocking experts, the authors say the clock system is usually divided into two distinct categories: clock generation and clock distribution. (RX-2283 at Garmin 92904.) In a section of the book discussing clock generation, entitled "On-Chip Clock Generation" the authors say this:

> There are two main types of PLLs. In the first type, the PLL has its own voltage-controlled oscillator (VCO) that generates the internal clock, which is then aligned to the external reference clock by the virtue of negative feedback, as shown in Fig. 1.11. The phase difference between the external reference clock and the internal distributed clock is detected with the phase detector (PD), and low-pass filtered (LP), *to create the control voltage for the VCO, steering the oscillation frequency in order to align the external and internal clocks*, ideally, achieving a zero phase difference. At this point, a so-called *phase lock* is achieved (Gardner 1979).

(RX-2283 at Garmin 92907 (emphasis added).) Here is a copy of Figure 1.11 showing the negative feedback:

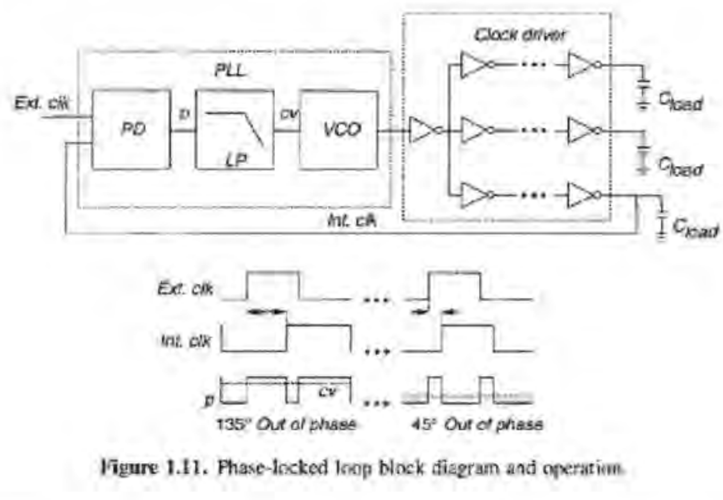

Figure 1.11. Phase-locked loop block diagram and operation.

According to what the authors say, the VCO generates the internal clock by virtue of a control voltage created in response to the external reference. The process discussed in the "On-Chip Clock Generation" section involves clock generation, according to the authors' heading and exposition thereunder, and this process includes more than simply delivering sufficient power to enable the oscillator to oscillate, as Complainants maintain.[15] The clock signal that is generated is a product of a control signal provided by the PLL and the reference frequency of the external crystal/clock. Dr. Oklobdzija and his fellow authors say a clocking system includes generation and distribution (RX-2283 at GARMIN92904), and, obviously, distribution follows generation. The distributed clocking of all of the Accused Products relies on an external crystal.

What Dr. Oklobdzija and his fellow authors said in their book coincides with Respondents' argument that the processes of setting the frequency of a clock signal and generating a clock signal are inseparable, because a clock signal must have a frequency, since its sole purpose is to provide a frequency for timing the operations of devices. (*See* RBr. at 70-71 (citing Tr. (Oklobdzija) at 1088).) Compare that with this statement from the excerpt from the book, cited above: "The phase difference between the external reference clock and the internal distributed clock is detected with the phase detector (PD), and low-pass filter (LP), to create the control voltage for the VCO, steering the oscillation frequency in order to align the external and internal clocks." Dr. Oklobdzija testified that "a clock is a control" and exerts control through repeated, periodic "start, stop, start, stop, and...do[es] it a billion times a second." (Tr. (Oklobdzija) at 413.) This periodicity is the frequency of the clock signal. In order for a clock signal to carry out its objective, it must have a frequency, which the PLL circuitry sets in reaction to a reference signal from an external crystal or clock generator. The external reference signal is integral to the generation of a clock signal, and by acknowledging that the PLL sets the

[15] The book's authors, in their Introduction, write: "The issues dealing with clock generation, frequency stability and control, and clock distribution are too numerous to be discussed in depth in this book and so they are covered only briefly." (RX-2283 at Garmin 92897.) Thus, their statements about clock generation are general, so as to provide a foundation for the principal subject of the book, but that is reason to find that their statements are fundamental to those of skill in the art in respect to clock generation, especially in light of the contrasting strictures Dr. Oklobdzija has applied to clock generation throughout this Investigation.

frequency of the VCO in reaction to a reference clock signal from an external crystal or clock generator, Dr. Oklobdzija concedes that the PLL and its components rely on an external crystal/clock to generate a clock signal.

What Dr. Oklobdzija and his fellow authors describe in their book is also consistent with Dr. Subramanian's testimony. (Tr. (Subramanian) at 1304-16.) Beyond that, Dr. Subramanian additionally testified that there are control signals within the accused PLLs themselves that are used to control the oscillation of the oscillators. (Tr. (Subramanian) at 1306-32.)

For these reasons, the Administrative Law Judge concludes that Respondents' argument is consistent with the claim construction adopted in Order No. 31, and further finds that the evidence on this point supports Respondents' contention that none of the Accused Products satisfies the "entire" limitations of claims 6 and 13. Furthermore, and for the same reasons, the Administrative Law Judge finds that none of the Accused Products satisfies any of the "entire" limitations with respect to any of the other asserted claims.

Regarding Complainants' argument that the Accused Products do not avoid infringement because they use control voltage/currents to set or adjust the frequency of a clock signal that is generated by the ring oscillator, the Administrative Law Judge finds that the evidence does not support Complainants' argument for the reasons discussed above.

Regarding Complainants' argument that the Accused Products infringe even though they use an external crystal/clock generator to set or adjust the frequency of a clock signal, the Administrative Law Judge finds that Dr. Oklobdzija's testimony with respect to the involvement the external crystals employed in Accused Products pivots on how he treats the word "generate." Dr. Oklobdzija's opinion in this Investigation is that any external crystals employed in the Accused Products do not provide power to the ring oscillators, and therefore do not generate a clock signal. His reasoning on this point is not consistent with how he and his co-authors applied the term in their textbook, as discussed above. On this point, it is worth harkening back to Order No. 31, at 20-40. What the '336 patent applicants disavowed during the course of their patent application, in order to obtain acceptance from the patent examiner, is basically what is disclosed in each of the Accused Products, with respect to their use of an external crystal. The applicants informed the patent examiner that "[t]he present invention does not…rely upon provision of *frequency control information to an external clock*, but instead contemplates providing a ring oscillator clock and microprocessor within the same integrated circuit." (Order No. 31 at 30, (emphasis added and citation omitted).) In distinguishing the *Sheets* prior art, the '336 patent applicants said, "In Sheets a command input is required to change the clock speed [but in] the present invention…[n]o command input is necessary to change the clock frequency." (Order No. 31 at 36-37 (citation omitted).) And in distinguishing the *Magar* reference, the patent applicants said:

> The essential difference [between the '336 application and *Magar*] is that the frequency or rate of the PHASE0, PHASE1, PHASE2, and PHASE3 signals is determined by the processing and/or operating parameters of the integrated circuit containing Fig. 18 circuit, while the frequency or rate of the Q1, Q2, Q3, and Q4 signals depicted in Magar Fig.2 are determined by the fixed frequency of the external crystal connected to the circuit portion outputting Q1, Q2, Q3, and Q4 signals shown in Magar Fig. 2a….The Magar teaching is well known in the art as a conventional crystal controlled oscillator. It is specifically distinguished from the instant case in that is both fixed-frequency (being crystal based) and requires an external crystal or external frequency generator.

(JXM-0016 at TPL853-02954560-61.) Nevertheless, Complainants now argue that the evidence shows that Dr. Oklobdzija testified that the Accused Products use control signals and external crystal/clock generators to regulate the frequency of clock signals, which is what they disavowed during prosecution. Frequency—and the regulation thereof, which is a form of control—are incidental to clock generation, as Dr. Oklobdzija and his co-authors describe in their textbook, as discussed above. (RX-2283 at GARMIN092903 ("The function of the clock signal is comparable to the function of the metronome in music...Therefore, the clock provides the time reference point, which determines the flow of data in the digital system.").)

There is another reason for rejecting Complainants' argument. As construed with respect to claims 6 and 13 of the '336 patent, the "entire" limitation means "an oscillator that is located entirely on the same substrate as the central processing unit and does not rely on a control signal or an external crystal/clock generator to generate a clock signal." (Order No. 31 at 41.) There are two elements to this construction: first, the oscillator does not rely on a control signal, and second, the oscillator does not rely on an external crystal/clock generator to generate a clock signal. The evidence shows that the oscillators in all of the Accused Products rely on control signals from within the PLL (Tr. (Subramanian) at 1316-32), and on an external crystal/clock generator to generate a clock signal (Tr. (Subramanian) at 1304-1316).

Next, as to Complainants' argument that Respondents improperly attempt to limit the "entire oscillator" of Claims 6 and 13, the Administrative Law Judge concludes that this portion of Complainants' argument does not overcome the fact that the "entire" limitations of claims 6 and 13, as construed, mean "an oscillator that is located entirely on the same substrate as the central processing unit and does not rely on a control signal or an external crystal/clock generator to generate a clock signal." (Order No. 31 at 41.) The fact remains, all of the "entire oscillators" in the Accused Products rely on control signals and external crystal/clock generators to generate clock signals. Therefore, as Respondents and Staff point out in their briefs, and as discussed and found above, the evidence produced by Complainants fails to show that any of the Accused Products meets the "entire limitations" of Claims 6 and 13.

The Administrative Law Judge also disagrees with Complainants' allegation that Respondents have tried to create a new argument regarding whether certain ring oscillators can be "turned off." Complainants were unable to refute Dr. Subramanian's testimony and, instead, now distort it. Complainants misstate the evidence about the { }. They argue that the

{

}

Dr. Subramanian testified that {

} (Tr. (Subramanian) at 1502.) Without those control signals, "oscillation unequivocally stops." (Tr. (Subramanian) at 1503.)

The Administrative Law Judge also rejects Complainants' argument that the {

} still generate a clock signal, even though they are not "used" by the PLL. This assumes that the { } is only available when the { } and that the control signal must { }. There is no basis in the record for this assumption, because PLL circuitry provides the { }. (Tr. (Subramanian) at 1160-63, 1504-05; RX-0621C at QTPL 14882.) There are numerous sources for the { }, as Dr. Subramanian testified:

> Q. Can you please explain how this circuit operates, with an emphasis on the parts that you and Mr. Otteson were discussing?
>
> A. Certainly. So in general —the high—level description is the following: Firstly, { }. If you do not, oscillation unequivocally stops. That's the high-level description of how this operates. { } we already discussed.
>
> Q. Great. So how does the operation of this circuit you just described support your opinion relating to the requirement of His Honor's construction regarding the "entire" limitations?
>
> A. Well, [given] that the current-controlled oscillators rely on the various control signals to generate a clock, it clearly supports the argument, because it's very clear that to generate a clock, the systems rely on these for all the reasons I've listed out.
>
> Q. You just mentioned control signals. Can you give a few examples of the control signals in this specific configuration that we are looking at in Figure 2-2?

> A. Certainly. Well, so in Figure 2-2, { } we're talking about—so one of the issues with Figure 2-2 [if] it doesn't identify specifically { }.
>
> If we were talking about { }, the control signals associated with { } would be, for example, internally { }, controlled by the digital system.
>
> Similarly, there's all the digital controls, which control basically the—I apologize. Let me finish the internal controls { } are affected by the digital control. So we have internal control and external control.
>
> And, of course, { }, have the reference frequency as an input, because both of those are using the reference frequency to determine the output of the particular blocks. And { }

(Tr. (Subramanian) at 1502-05.) All are part of the control mechanism through which the PLL controls the oscillation of { }. (Tr. (Subramanian) at 1503.)

Further, the Administrative Law Judge rejects Complainants' argument that the { } shown in RX-0621C use { }:

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(RX-0621C at QTPL 14891.) {

}

The Administrative Law Judge finds that Complainants mischaracterize testimony of Dr. Subramanian concerning a graph from one of { } technical documents when they argue that the { } will always have power to generate a clock signal. Complainants argue that, according to this graph, { }. However, Dr. Subramanian disproved this. (Tr. (Subramanian) at 1453.) According to the graph, { }[16]:

REDACTED

{ }. (RX-

[16] Because the graph is faint in the original, it is even more so as reproduced above; however, the pertinent information as discussed is evident from the original.

0621C at QTPL 14889.) {

}. To the contrary, the Administrative Law Judge finds

{

}, supports Dr. Subramanian's testimony by showing that the { }.

Regarding the Texas Instruments OMAP chips the Administrative Law Judge disagrees with Complainants' conclusion that these chips do not require a control signal. Dr. Haroun gave this testimony:

> {
>
> }.

(Tr. (Haroun) at 184-185.) The oscillator on its own cannot operate; it requires the { } in order to operate: "The oscillator by itself { }. It does not function." (Tr. (Haroun) at 189.) The controlled oscillator needs this control information to generate an output frequency. (Tr. (Haroun) at 188 (also noting that the controlled oscillator "{ }").) Based on the diagram drawn by Dr. Haroun during his testimony (CDX-0080C), Dr. Subramanian testified that the controlled oscillator of the DPLL inside the accused OMAP chips receives signals to control its output frequency. (Tr. (Subramanian) 1319-20.) The Administrative Law Judge finds that the accused controlled oscillators in the accused OMAP chips' DPLL rely on a control signal to generate a clock signal, and cannot, therefore, satisfy the construction of the "entire" limitations.

Dr. Haroun confirmed that the ring oscillators in the accused OMAP chips use { }" (Tr. (Haroun) 203.) As in the { }, the OMAP chips' controlled oscillator { }. (Tr. (Haroun) at 203-204.) Without this { }. (*Id.* 204-205.) { }, and the ring oscillator no longer oscillates. (Tr. (Haroun) at 204.) Therefore, the OMAP chips' ring oscillators cannot oscillate on their own without the PLL's generated control current. (Tr. (Subramanian) 1186-89.) Complainants' argument to the contrary is not sustained by the evidence, and is therefore rejected by the Administrative Law Judge.

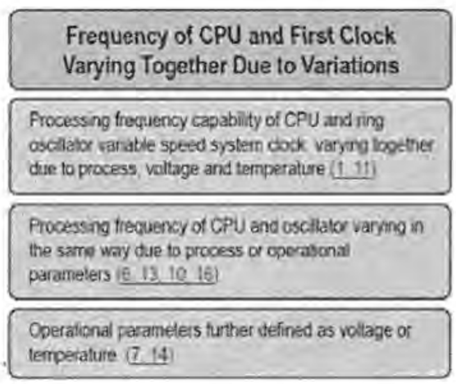
In conclusion, the Administrative Law Judge finds that the evidence is not sufficient to show that any of the Accused Products satisfies the "entire" limitations of any of the asserted claims of the '336 patent, for the reasons discussed above. For this reason alone, the Administrative Law Judge concludes there is no violation of Section 337, since none of the Accused Products meets all of the claim limitations of the asserted claims of the '336 patent.

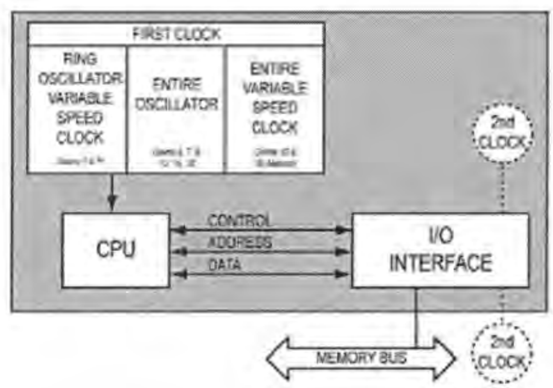
2. The "Varying Together" Limitations

a) Complainants' Opening Brief

(1) *The Accused Products have "first clocks" and CPUs on the same chip*

Complainants say that because all of the Accused Products include a CPU and a "first clock" on the same chip, these elements "vary in the same way" with changes in voltage, temperature and/or semiconductor processing. (CBr. at 29.) Complainants say the requirements for the "varying" limitations of the asserted claims are summarized in their exhibit CDX-0004.407, reproduced here:





Complainants maintain that each of the Accused Products includes a CPU and a "first clock" on the same chip, such that they vary similarly with changes in voltage, temperature and/or semiconductor processing. (*Id.* at 30.) Complainants note that Order No. 31 states that the term "varying" requires no construction because it would have been understood by a person of ordinary skill in the art according to its plain meaning at the time of the invention. (*Id.* (citing Order No. 31 at 68).)

Complainants say the claim language of the "varying" limitations is similar across the asserted claims, but there are a few important differences concerning "processing capability" and the word "and" versus the word "or." (*Id.*) Complainants say there are essentially two versions of the "varying" limitations in the six independent claims, as shown in the following table:

Independent Claims 1, 11: "**a processing frequency capability** of said central processing unit and a **speed** of said ring oscillator variable speed system clock **varying together** due to said manufacturing variations **and** due to at least operating voltage and temperature . . ."	**Key Points (unique to claims 1 and 11):** • Processing frequency **capability** of CPU varies with speed of ring oscillator • Variation due to **all three** parameters (P, V ***and*** T)
Independent claims 6, 13: "**varying the processing frequency** of [the CPU] and the **clock rate** of [the entire oscillator] **in the same way** as a function of parameter variation in **one *or* more fabrication *or*** operational **parameters** . . ."	**Key Points (same for claims 6, 13, 10, 16):** • Processing **frequency** (not capability) of CPU varies with clock rate of the oscillator; this ***always*** happens, because the entire oscillator clocks the CPU • Variation due to ***one or more*** parameters (P, V ***or*** T)
Independent claims 10, 16: "said processing **frequency** [of the CPU] and said clock rate [of the entire variable speed clock] varying in the same way relative to said variation **in said one *or* more fabrication *or* operational parameters** . . ."	**Key Points (same for claims 6, 13, 10, 16):** • Processing **frequency** (not capability) of CPU varies with clock rate of the clock; this ***always*** happens, because the clock clocks the CPU • Variation due to ***one or more*** parameters (P, V ***or*** T)

(*Id.* at 30-31.)

Complainants say the experts for both sides agree that transistors on the same chip are similarly affected by variations in process, voltage and temperature. (*Id.* at 31 (citing Tr. (Oklobdzija) at 302-303, (Subramanian) at 1272).) To support this proposition, Dr. Oklobdzija quoted the following passage from a textbook authored by two renowned experts:

> Variation is the deviation from intended or designed values for a structure or circuit parameter of concern. The electrical performance of microprocessors or other integrated circuits are impacted by two sources of variation. *Environmental factors* arise during the operation of a circuit, and include variations in power supply, switching activity and temperature of the chip or across the chip. *Physical factors* during manufacture result in structural device and interconnect variations that are essentially permanent. These variations arise due to processing and masking limitations, and result in random or spatially varying deviations from designed parameter values.

(*Id.* (citing CX-0154 at TPL853_0297444); Tr. (Oklobdzija) at 416-418).) As discussed, the environmental factors that cause variations in performance include changes in "power supply" (voltage) and "temperature," while physical factors involve variations in semiconductor processing or manufacture that are essentially permanent because they are set at the factory. (*Id.* at 31-32.) Both Dr. Oklobdzija and Dr. Subramanian are in agreement about PVT variations, say Complainants. (*Id.* at 32.) Therefore, no one disputes that all of the transistors on the same chip, including ring oscillators and CPUs, will be affected by changes in PVT. (*Id.*) However, Respondents argue that while the "maximum capability" of their CPUs and on-chip clocks may vary with PVT, the actual frequency of their on-chip clocks does not vary, because their clock frequencies are controlled by PLLs. (*Id.*) Complainants disagree. (*Id.*)

(2) *The processing frequency of the CPUs and "first clocks" vary similarly with changes in PVT*

According to Complainants, the processing frequency of the CPUs and the "first clock[s]" in the Accused Products vary similarly with changes in PVT, and the addition of PLLs does not negate infringement. (*Id.* at 33.) Complainants maintain that the Accused Products meet the "varying" elements of the '336 claims because the processing frequency of the CPUs and the clock rates of the "first clock[s]" vary together with changes in PVT because the CPUs and the "first clock[s]" are on the same dies and the "first clock[s]" are used to pace the operation of the CPUs so that the speeds of the CPUs will always "vary together" with the clock, by definition. (*Id.*) Complainants point out that Dr. Subramanian testified:

> First, the starting point is PVT – process, voltage, and temperature, can indeed vary. That is undisputed. In addition, it is undisputed that the maximum speed at which a transistor can operate does indeed depend on PVT.

(*Id.* (citing Tr. (Subramanian) at 1116).)

According to Complainants, the mere use of PLLs in their Accused Products is an acknowledgement that all of the circuits in these chips, including the CPUs and ring oscillators, vary with changes in PVT. Dr. Subramanian's testimony when he made a comparison to the cruise controls of automobiles confirms this, say Complainants:

> Q. So you said here in your expert report that, "When driving a car in cruise control, the cruise control mechanism slows down the car when the car picks up speed going downhill." Right?
>
> A. Correct.
>
> Q. And you also said, "Similarly, when the car goes uphill and slows down, the cruise control accelerates the car in order to maintain the same speed, as illustrated in Figure 19." Right?
>
> A. Correct.
>
> Q. Then you compare that to the PLL, and you say, "Like a cruise control keeping the car at a fixed speed, the PLL will maintain a fixed frequency by telling the controlled oscillator to slow down if the oscillator starts to speed up, and by instructing the oscillator to speed up if it starts to slow down." Right?
>
> A. Correct.

(*Id.* (citing Tr. (Subramanian) at 1419-20).) Thus, argue Complainants, Dr. Subramanian admits that even with a PLL, the ring oscillator does not always stay at the same speed; rather, it speeds up and slows down owing to operating conditions such as temperature and voltage, or else there would be no need for a PLL to try to maintain a given speed, within a range. (*Id.* at 33-34.)

Complainants say that, as a matter of law, the addition of a PLL to prevent the ring oscillator from experiencing greater variations is irrelevant, according to what the Federal Circuit said in *A.B. Dick*, 713 F.2d at 703:

> It is fundamental that one cannot avoid infringement merely by adding elements if each element recited in the claims is found in the accused device. *See Apco Mfg. Co.*, 275 U.S. 319, 328, 48 S.Ct. 170, 173, 72 L. Ed. 298 (1928). For example, a pencil structurally infringing a patent claim would not become noninfringing when incorporated into a complex machine that limits or controls what the pencil can write. Neither would infringement be negated simply because the patentee failed to contemplate use of the pencil in that environment.

(*Id.* at 34.) According to Complainants, *A.B. Dick* rejected a theory that is closely analogous to Respondents' non-infringement argument. The Accused Products include all of the elements of the asserted claims, and the fact that Respondents added another element, a "complex machine" in the form of the PLL, "that limits or controls" the frequency of the ring oscillator does not render the Accused Products non-infringing. (*Id.* (citing 713 F.2d at 703).)

Despite Respondents' argument that their clock frequencies do not vary at all with changes in temperature and voltage, their own data prove otherwise, as discussed below, say Complainants. Therefore, they satisfy the "varying" limitations of the asserted claims, citing the following excerpt from Judge Radar's concurring opinion in *Embrex, Inc. v. Serv. Eng'g Corp.*, 216 F.3d 1343, 1352-53 (Fed. Cir. 2000):

> Since its inception, this court has not tolerated the notion that a little infringement – de minimis infringement – is acceptable infringement or not infringement at all. The statute states directly that any unauthorized use of a patented invention is an infringement. See 35 U.S.C. § 271(a) (1994). Thus, the statute leaves no leeway to excuse infringement because the infringer only infringed a little.

(*Id.*). Even though the PLLs may prevent wide variations in frequency based on voltage and/or temperature, Respondents' data show that the PLLs do not completely eliminate variations. (*Id.*)

Complainants say that Dr. Subramanian throughout his testimony was careful to emphasize that changes in PVT affect "maximum performance capability" and "maximum speed." (*Id.* at 35.) But he argued that the PLLs prevent the Accused Products from achieving their "maximum" capability, which he contends is required by the '336 patent. (*Id.*) In this manner, he tried to add a requirement that the frequency of the oscillator and CPU vary by 200 to 400 percent. (*Id.* (citing Tr. (Subramanian) at 1211-12).) This, say Complainants, is an attempt by Respondents to re-litigate claim construction and import limitations from the specification, such as "maximum speed possible" and "200 to 400%." The claims of the '336 patent do not require such limitations, say Complainants. (*Id.* (citing Tr. (Subramanian) at 1508-09).) It is wrong to read limitations from the specification into the claims, argue Complainants. (*Id.* (citing *Phillips,* 415 F.3d at 1320).) Even when the specification describes a single embodiment, the claims of the patent will not be read restrictively unless the patentee has demonstrated a clear intention to limit the claim scope using "words or expressions of manifest exclusion or restriction. (*Id.* (citing *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 906 (Fed. Cir. 2004)).) The same principle applies to prosecution history, say Complainants. (*Id.* (citing *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)).)

Complainants argue that the evidence shows that the Accused Products meet the "varying together" limitation of claims 1 and 11, and applying the plain language of those claims, Dr. Oklobdzija testified that the processing frequency capability of the CPU "varies together" with the speed of the ring oscillator, owing to changes in semiconductor processing, voltage, and temperature. (*Id.*) And absent his improper use of "maximum," even Dr. Subramanian's testimony supports infringement under claims 1 and 11, argue Complainants. (*Id.*) For example, "[i]f conditions, PVT conditions, dictate that the maximum achievable performance has dropped, everything will drop: both the clock and therefore the operation of the CPU." (*Id.* (citing Tr. (Subramanian) at 1121, 1213).)

This same evidence satisfies the "vary in the same way" limitations of claims 6, 10, 13, and 16, say Complainants. (*Id.* at 36.) Under these claims, however, the processing frequency of the CPU—and not its processing frequency capability, as is the case with claims 1 and 11—must "vary in the same way" as the clock rate of the oscillator/clock. (*Id.*) Thus, any attempt by Respondents to argue that the CPU's "maximum processing capability" must vary by 200 to 400 percent, or any percentage for that matter, is improper for claims 6, 10, 13, and 16. (*Id.*) The very purpose of the oscillator/clock is to clock the CPU, or stated another way, to provide a timing signal to the CPU. (*Id.*) This means that the "processing frequency" of the CPU and the "clock rate" of the oscillator/clock are the same, so they will always "vary in the same way." (*Id.*) Dr. Subramanian never acknowledged this truism, say Complainants, and the fact that the Accused Products satisfy this limitation in claims 6, 10, 13, and 16 is beyond dispute, say Complainants. (*Id.*)

Claims 6, 10, 13, and 16 do not require "varying in the same way" to be based on all three parameters, say Complainants. (*Id.*) Rather, the relevant requirement in these claims is written in the disjunctive, such that the CPU and oscillator/clock need only "vary in the same way relative to said variation in said one or more fabrication or operational parameters." (*Id.*) The Accused Products indisputably satisfy this claim requirement based on Dr. Subramanian's admissions about variations based on semiconductor processing and "binning," as discussed in Section III.B.2.d. of their brief, say Complainants. (*Id.*)

(3) *Dr. Subramanian's tests confirm the "varying together" limitations are met*

Complainants say that the tests that Dr. Subramanian performed, which will be discussed later, although "fatally flawed…confirm the 'varying together' due to changes in temperature and voltage." (*Id.*) Complainants say that Respondents, in an effort to show that the Accused Products do not meet the "varying" limitations, rely on certain tests that were discussed in Dr. Subramanian's expert report and at trial. (*Id.*) Complainants say there are numerous problems with Dr. Subramanian's testing, which undermine the validity of the data. (*Id.*) Dr. Subramanian testified about temperature testing of a { } using a Samsung testing board. (*Id.* (citing RDX-0004.101).) The actual tests were performed by John Fox, not Dr. Subramanian, note Complainants. (*Id.* at 36-37 (citing Tr. (Subramanian) at 1251-

52).) For temperature testing of the { }, the tester did not measure the temperature of the actual chip but, instead, that of the chip package. (*Id.* at 37 (citing Tr. (Subramanian) at 1463-64).) Complainants say there are two problems with Dr. Subramanian's data for the { }. First, there was a ten-minute time interval between the collection of data points shown on the graph. Dr. Subramanian has no data for the interval between each point on the graph and, thus, has no idea how the frequency varied during that time. (*Id.* (citing Tr. (Subramanian) at 1465-67).) What is worse, say Complainants, Dr. Subramanian used an unreasonably large scale to present his data on the graph, which is shown in RDX-4.101, to make it look "completely flat as a function of frequency." (*Id.* (citing Tr. (Subramanian) at 1225).) Dr. Subramanian's graph uses increments of 500 megahertz, which is half a gigahertz, per line on the Y-axis, and Complainants say Dr. Subramanian agreed these were "huge frequency ranges." (*Id.* (citing Tr. (Subramanian) at 1469-70).) The graph's scale is so large that it is analogous to trying to track someone's movements within a few city blocks by watching them from outer space with a pair of binoculars, argue Complainants. (*Id.* (citing Tr. (Subramanian) at 1473).)[17]

Complainants argue that, when the data are displayed on a more reasonable scale it is clear that the frequency of the { } does, in fact decrease as temperature decreases. (CBr. at 36.) Complainants argue that even though the chip has a PLL to try to

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[17] The Administrative Law Judge notes here that what occurred in the course of Mr. Otteman's cross-examination of Dr. Subramanian, is that Mr. Otteson posed this question to Dr. Subramanian, and received the answer shown:

> Q. But if you change the scale ——I mean, that would be like me trying to keep tabs on my son in Palo Alto from a satellite with a pair of binoculars.
>
> A. I don't understand the analogy. But if your point is if you go to a scale which the patent calls flat, you can find it's not flat, fair enough, but that's true for crystals too. The patent clearly considers that fixed. This is in the very same range that the patent calls fixed.

(Tr. (Subramanian) at 1473).)

stabilize its frequency, the frequency varies 10 kilohertz, which is enough to tune an AM radio to a different station, as depicted in the graph appearing here:

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(*Id.* at 37.) Complainants say that, for the data Dr. Subramanian presented in RDX-0004.101, "we have no idea what was happening in the frequency between the [10-minute] time intervals" for which he obtained measurements. (*Id.* at 38.)[18] Based on this, Complainants argue that "even though Dr. Subramanian's test methodology was flawed and his data were presented with

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[18] Once again, to put this in context, this is how the transcript records the colloquy on which this statement is based:

> Q. Okay. Well, you yourself acknowledge the PVT does affect transistors in a silicon die; right"
>
> A. In terms of maximum performance capability, yes. But this data actually proves my point. That is, the instability we see here, whatever variability you're trying to plot on this scale is no worse than the variability of a crystal, which actually supports my point that these PLLs are incredibly stable.
>
> Q. Okay. Again, you know, we have no idea what was happening in the frequency between the time intervals that you measured; right?
>
> A. That's true.

(Tr. (Subramanian) at 1474.)

a misleading scale to make frequency appear 'completely flat,' the frequency decreased as temperature increased." (CBr. at 37.) This, argue Complainants, is consistent with Dr. Oklobdzija's opinions, which Complainants contend is confirmed by Dr. Subramanian himself, and meets the "varying" limitations of the '336 patent. (*Id.* at 38.)

Complainants say Dr. Subramanian also performed a voltage variation test for a Samsung chip shown in RDX-0004.97. (*Id.*) For the voltage test, Dr. Subramanian's technician waited 30 to 60 seconds between measurements. Dr. Subramanian admitted that 30 to 60 seconds is an eternity for microprocessors, because the PLL is "supposed to lock within 10 microseconds or so." (*Id.* (citing Tr. (Subramanian) at 1477-78).) He had no idea how the frequency of the Samsung chip varied between measurements and admitted that under these conditions there would be billions or trillions of intervening clock cycles. (*Id.* (citing Tr. (Subramanian) at 1478-79).) Complainants say Dr. Subramanian's methodology is like someone who sees a shooting star streak across the night sky and then drives to the edge of a hill to take a picture of it, but by then it is way too late to collect any meaningful data. (*Id.*)

As with his temperature tests, Dr. Subramanian chose a very large scale, with increments of 10 megahertz on the Y-axis, to present the voltage testing data for the Samsung chip shown in RDX-4.97, say Complainants. (*Id.*) The 50-megahertz value shown in RDX-4.97 was divided down from the "actual on-chip PLL frequency," which was much higher, say Complainants. (*Id.*) Thus, the 10-megahertz increments on the Y-axis of the graph in RDX-4.97 also represent much larger increments, based on the fixed ratio by which the PLL frequency was divided. (*Id.*) Complainants say Dr. Subramanian's large increments for his graph are misleading and were chosen to ensure that the frequency variation would appear to be "effectively flat." (*Id.* (citing Tr. (Subramanian) at 1216-17).) By contrast, if the data are presented on a more reasonable scale, it is clear that clock frequency increases with voltage, argue Complainants. (*Id.* (citing CDX-0087C).)

Thus, although Dr. Subramanian's testing methodology was flawed and his results were presented in a misleading way, the data still show that the frequency of the accused chips varies with temperature and voltage, as taught by the '336 patent, say Complainants. (*Id.*)

(4) *The "first clocks" and CPUs of all Accused Products "vary together" with variations in semiconductor manufacturing process*

Complainants claim that ample evidence proves that the Accused Products satisfy the "varying" limitations based on changes in voltage and temperature and that it is undisputed that they satisfy the "varying" limitations due to variations in chip "fabrication" or "process." Complainants note that Dr. Subramanian gave this testimony, which by itself is sufficient evidence that the Accused Products satisfy the "varying" limitations of claims 6, 10, 13, and 16:

> In the tutorial, and here again I will point out that it is widely accepted that process can have variability, which can affect performance. Now, what is process? I've been working in process for a large part of my career. Process is the method by which we fabricate these systems. And it turns out the fabrication is never perfectly set up. In other words, if I look at 100 different wafers and look at 100 different integrated circuits on those wafers, they won't all be exactly the same, even though they are nominally designed the same. And one of the consequences of that is, the maximum achievable performance for one integrated circuit might be 100 megahertz. . . Whereas another nominally very similar processor, just because of the variations in the process, might only be able to run at 50 megahertz.

(*Id.* at 39 (citing Tr. (Subramanian) at 1122:1-23; RDX-0004.10).) Thus, argue Complainants, in this example, Dr. Subramanian testified that variations in process could result in performance variations of 200 percent (50 megahertz versus 100 megahertz). (*Id.*) As the authors Boning and Nassif explained, these variations are "physical factors" that are "essentially permanent" because they are set at the factory. (*Id.* (citing CX-0154 at TPL853_0292744: CDX-0005C.39).) As a result of these permanent variations that are fixed in the chip at the factory, Dr. Subramanian testified that the industry engages in a common practice called "binning." (*Id.* at 39-40 (citing Tr. (Subramanian) at 1263-65).) Complainants say that Dr. Oklobdzija's explanation of binning and process variations was consistent. (*Id.* at 40 (citing Tr. (Oklobdzija) at 296-301, 494-495).) Complainants say that, according to Dr. Subramanian, if process conditions "dictate that the maximum achievable performance has dropped, everything will drop, both the clock and, therefore, the operation of the CPU. (*Id.* (citing Tr. (Subramanian) at 1121).)

According to Complainants, Drs. Oklobdzija and Subramanian, as well as Boning and Nassif, agree that there are significant variations that are permanently fixed into the microprocessor chips at the factory as a result of process variations. (*Id.*) Typically such variations can be in the order of 20 percent (1 gigahertz versus 1.5 gigahertz) or even as much as 200 percent (50 megahertz versus 100 megahertz), according to Dr. Subramanian. (*Id.*) As a result, manufacturers sell "faster" chips for a higher price and "slower" chips at a lower price. Even though all of the chips have PLLs, Dr. Subramanian has admitted that process differences occur at the factory, which permits chips "that are nominally designed the same" to be sold at different prices. (*Id.* (citing Tr. (Subramanian) at 1122-23; 1263-65).)

Thus, argue Complainants, it is undisputed that chips in the Accused Products have process variations that are fixed at the factory, and therefore CPUs and clocks of some chips are faster than others with "nominally the same design." (*Id.*) Complainants argue that there can be no dispute that this process variation, by itself, satisfies the "varying" limitations of claims 6, 10, 13, and 16. (*Id.*)

It is also undisputed, argue Complainants, that the clock rate of the entire oscillator is always used to clock the CPU, and the processing frequency of the CPU will always vary with the clock rate of the entire oscillator as a function of the fabrication parameters that were fixed in the chip in the factory, parameters that admittedly affect both the entire oscillator and the CPU. (*Id.* at 40-41.) As a result, there can be no doubt that all of the Accused Products satisfy the "varying" requirement of claims 6, 10, 13, and 16. (*Id.* at 41.)

b) Respondents' opening brief

Respondents, in their opening brief, point out that all of the asserted independent claims require that the frequency of the claimed clock or oscillator must vary due to, as a function of, or relative to variation in fabrication process, voltage, or temperature ("PVT"). (RBr. at 44-45 (citing Tr. (Oklobdzija) at 308-309, 520, 542-544, 546-547, 554-555).) For this reason, Dr. Subramanian addressed the non-infringement of these "varying" limitations together during his testimony. (*Id.* at 45 (citing Tr. (Subramanian) at 1210-79).)

(1) *A PLL's output frequency does not vary due to PVT*

In all of the Accused Products, Dr. Oklobdzija identifies a PLL, or an incorporated oscillator component, if there is any, as the alleged "first clock" whose frequency must vary because of PVT. (*Id.* (citing Tr. (Oklobdzija) at 439-440, 474-475, 499-500, 510-511, 518-519).) In making this allegation, Dr. Oklobdzija ignores an important and indisputable point, argue Respondents, which is that a PLL is the antithesis of a variable speed system clock. (*Id.*) By its very nature and design, a PLL outputs a very stable and fixed frequency. (*Id.* at 45-46 (citing Tr. (Subramanian) at 1213; RDX-0004.94).) To achieve this stability, the PLL precisely controls and fixes its components' output frequency by continuously comparing this output against an accurate and fixed reference signal provided by an external crystal or clock generator. (*Id.* at 46 (citing Tr. (Subramanian) at 1212-13; RDX-0004.94).)

Dr. Haroun of Texas Instruments confirmed this key feature of PLLs when he testified that the oscillators in the DPLLs of the OMAP chips "would have a consistent frequency" because the components of the DPLL "together are designed to have a constant value." (*Id.* (citing Tr. (Haroun) at 195).) Dr. Haroun also testified that the frequency of the DPLL, "[o]nce it's set, it's supposed to stay at the frequency until external control ask for something different…So it's always stable." (*Id.* (citing Tr. (Haroun) at 201-202).) He testified that "[t]here's always, at all times, the clock is tightly controlled to a known value." (*Id.* (citing Tr. (Haroun) at 202).) Because of this desire for a stable frequency, Texas Instruments { }. (*Id.* (citing Tr. (Haroun) at 203).)

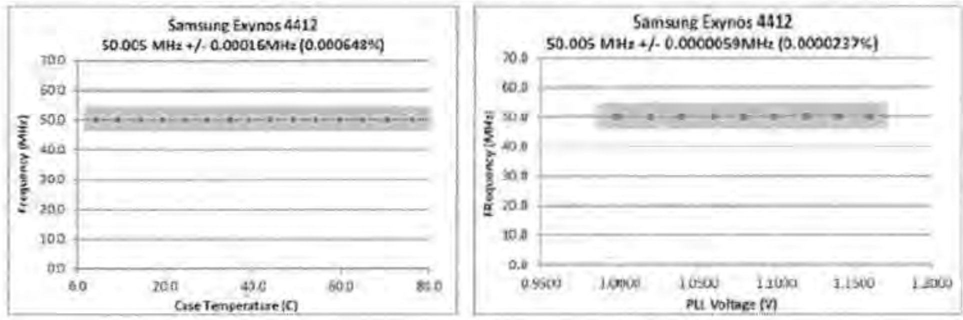
As further support, Respondents note that Dr. Subramanian testified that the ability of a PLL to provide a fixed and stable output frequency is analogous to a car's cruise control, which maintains a car's speed regardless of environmental conditions. (*Id.* (citing Tr. (Subramanian) at 1214; RDX-0004.95).) For example, a cruise control set to run at 55 miles an hour will maintain this fixed speed regardless of whether the car is going uphill, downhill, or traveling level on a flat road. (*Id.* (citing Tr. (Subramanian) at 1214).) Like a cruise control, the PLL compensates for any PVT effects on its transistors and circuitry, thereby resulting in a fixed-speed clock like the prior art discussed in the '336 patent. (*Id.* (citing Tr. (Subramanian) at 1213).)

Respondents also point out that one of the named inventors of the '336 patent, { }. (*Id.* at 46-47 (citing RX-0167C { } at 237).) Leaving no doubt, argue Respondents, that a PLL is opposite of a variable-speed clock, { } said that using a PLL-based frequency synthesizer to time a CPU "would defeat the purpose of a variable speed timing described in the '336 patent" because the purpose of the PLL-based frequency synthesizer is "to not vary." (*Id.* (citing RX-0167C at 231-232).)

(2) *Empirical evidence shows that the PLL's frequency does not vary*

Respondents say empirical evidence confirms that the PLL's frequency does not vary due to PVT. (*Id.*) To confirm the well-known fact that PLLs output a very stable frequency, Dr. Subramanian worked with an engineer at a testing facility to measure clock speed in a few of the accused chips. (*Id.* (citing Tr. (Subramanian) at 1252).) These measurements demonstrate that PLLs do not vary as a result of, due to, or as a function of parameters such as temperature, voltage, and fabrication process. (*Id.*)

With respect to the accused Samsung Exynos 4412 chip, Dr. Subramanian measured clock output frequency over a large temperature range and over a substantial voltage range. (*Id.* (citing Tr. (Subramanian) at 1215; RX-1179; RX-1181).) In doing this, Dr. Subramanian mounted chips on a development board, which are available on the open market and can implement basic phone functions. (*Id.* at 47-48, n. 7 (citing Tr. (Subramanian) at 1215).) He then used a high-precision and well-calibrated Agilent 53131A frequency counter to characterize the frequency behavior of the chips as a function of temperature or voltage. (*Id.* (citing Tr. (Subramanian) at 1219; RDX-0004.96).) In addition, the PLL's frequency output was subjected to a fixed ratio divider that provides a fixed fraction of the actual on-chip PLL frequency. (*Id.* (citing Tr. (Subramanian) at 1216-17; RDX-0004.97).) Because of this fixed division ratio, the measured frequency will vary by the same amount as the PLL. (*Id.* (citing Tr. (Subramanian) at 1217).) The results of this testing appear on RDX-4.97, where the plot on the left (see below) shows frequency as a function of temperature, while the graph on the right (also below) depicts frequency as a function of voltage. (*Id.* (citing Tr. (Subramanian) at 1216; RDX-0004.97).)

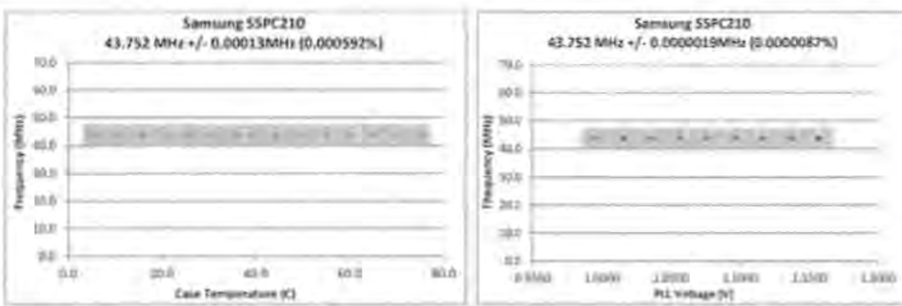


Range	Clock Frequency over Range	Tolerance During Measurement
0ºC-70ºC in five degrees increments	50.005 MHz*	+/- 0.000648%
1.0V-1.16V in 0.02V increments	50.005 MHz*	+/- 0.0000237%

Dr. Subramanian testified that "if you look at the data, you see that it is effectively flat." (*Id.* (citing Tr. (Subramanian) at 1217; RDX-0004.97).) Dr. Subramanian said: "[T]he key point is, over a large range of testing, 0 to 70° C, and an almost 20 percent change in operating voltage, which is a large change in operating voltage, because these PLLs are driven with precision power sources, we see that the clock frequency basically doesn't move very much. It's extremely flat." (*Id.* (citing Tr. (Subramanian) at 1217).) This level of stability in frequency is in the same ballpark as what a crystal, which the patent calls "fixed," would exhibit, say Respondents. (*Id.* (citing Tr. (Subramanian) at 1217-18; JXM-0001 at 17:32-34).)

For the purpose of seeking additional confirmation about the stability of the frequency of the PLL, despite changes in temperature or voltage, Dr. Subramanian also calculated the tolerance, that is, the variability associated with the measurements. (*Id.* at 48-49 (citing Tr. (Subramanian) at 1218).) The table in RDX-4.97 shows "variation is tiny," being less than 0.001 percent. (*Id.* at 49 (citing Tr. (Subramanian) at 1218; RDX-0004.97).) This shows that the PLL outputs an extremely stable frequency that is, according to the patent, fixed. (*Id.* at 49.)

In addition, Respondents assert that Dr. Subramanian measured the PLL frequency of the accused Samsung S5PC210 chip as a function of voltage or temperature by using the same procedure and set-up that were used for the Exynos chip. (*Id.* (citing Tr. (Subramanian) at 1218-21: RDX-0004.98).) As with the Exynos chip, the data for the Samsung S5PC210 chip, appearing below in a reproduction of RDX-4.99, shows no variation over a temperature range of 0 to 80 degrees Celsius and over a voltage range of 0.95V to 1.20V. (*Id.* (citing Tr. (Subramanian) at 1220-21; RX-1184C; RX-1186C; RDX-0004.99).) The tolerance for temperature measurement was a miniscule +/- 0.000087 percent. (*Id.*)



Range	Clock Frequency over Range	Tolerance During Measurement
0°C -70°C in five degrees increments	43.752 MHz*	+/- 0.000592%
1.0V-1.16V in 0.02V increments	43.752 MHz*	+/- 0.0000087%

(*Id.* (citing RDX-0004.99 (excerpt).) Dr. Subramanian testified that the data "shows that the frequency is essentially flat as a function of temperature[,]" and "similarly, the frequency is essentially flat as a function of voltage." (*Id.* (citing Tr. (Subramanian) at 1220).)

According to Respondents, the measurements obtained by Dr. Subramanian for the accused { } show the same result: the clock frequency is flat as a function of temperature. (*Id.* at 49-50 (citing Tr. (Subramanian) at 1221-24; RDX-0004.100).) Because this chip was inside an operating mobile phone, Dr. Subramanian measured the camera clock frequency as a proxy for the output of the PLL, since this { }. (*Id.* (citing Tr. (Subramanian) at 1221-22; RX-0602C at LGE800ITC 1914-16, 1918).) The measured camera clock frequency, which is a fixed fraction of the actual on-chip PLL frequency, is again "incredibly flat" over the temperature range of 0 to 50 degrees Celsius, with a tolerance of +/- 0.000015 percent. (*Id.* (citing Tr. (Subramanian) at 1222-23; RX-1187C; RX-1188C; RDX-0004.100).) This is shown in RDX-4.100, excerpted here:

REDACTED

Respondents say a different temperature range of 0 to 50 degrees Celsius was used for the { } phone, as distinguished from the tests of the other chips, in order to prevent battery damage. (*Id.* at n. 8 (citing Tr. (Subramanian) at 1223).)

Dr. Subramanian also measured the frequency output of the relevant PLL in the { } by using a development board from { }. (*Id.* (citing Tr. (Subramanian) at 1224-25; RDX-0004.101).) This { }. (*Id.* (citing Tr. (Subramanian) at 1224).) Therefore, he was able to measure the full 1.5 gigahertz frequency of the PLL over a large temperature range extending from 0 to 50 degrees Celsius with a tolerance of +/- 0.000619 percent. (*Id.* at 50-51.) A temperature range of 0 to 50 degrees Celsius was used for this { } because it was on a development board that required a larger oven than the one used for the other chips, and had a maximum temperature of 50 degrees Celsius. (*Id.* at 51, n. 9 (citing Tr. (Subramanian) at 1225).) Respondents say that, as with the other data measurements, the output frequency of this PLL is "completely flat" and "incredibly stable over the temperature range that we could do." (*Id.* (citing Tr. (Subramanian) at 1225).) The data actually shows that any possible fluctuation is "basically in the range of what the crystal can provide." (*Id.* (citing Tr. (Subramanian) at 1225; RX-0167C (Fish Dep.) at 145 (saying a crystal is "a fixed clock for all intents and purposes."")).) An excerpted reproduction of RDX-0004.101 appears below:

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Respondents say the evidence empirically demonstrates, clearly, that "the PLL does exactly what it should." (*Id.* (citing Tr. (Subramanian) at 1226).) In particular, the output frequency of the PLL "does not vary" and "is extremely stable." (*Id.* (citing Tr. (Subramanian) at 1226).)

Instead of the fixed frequency produced by a PLL, the '336 patent teaches that the variable speed of the frequency of its clock changes by as much as 400 percent because of PVT.

(*Id.* (citing JXM-0001 at 17:21-22 ("factor of four")).) In another example, the patent states that the frequency of its clock changes by 200 percent because of temperature, varying from 50 megahertz at 70 degrees Celsius to 100 megahertz at room temperature (~22°C). (*Id.* at 51-52 (citing JXM-0001 at 16:60-63; 17-21-22; RDX-0004.93).) Over the same temperature range, Dr. Subramanian's test measurements show no detectable variation. (*Id.* (citing RDX-0004.97-101).) In the face of the sharp distinction between the patent and the PLLs of the accused chips, Dr. Oklobdzija sought to distinguish the variations described in the patent by arguing that the variations described in the patent were "debatable" and by characterizing the patent specification as a mere "preamble" of no import. (*Id.* (citing Tr. (Oklobdzija) at 784-788, 804-807).) However, argue Respondents, the facts are simple and oppose Complainants' allegation—the frequencies in the accused PLLs do not vary by virtue of PVT. (*Id.*)

In contrast to the compelling data that Dr. Subramanian assembled, Dr. Oklobdzija did not offer any measurements or test results, say Respondents. Although Dr. Oklobdzija said he had told Complainants' attorneys that he wanted to perform such measurements, he did not, nor did anyone else do so for him. (*Id.* (citing Tr. (Oklobdzija) at 980-981).) In their reply brief, Respondents point out that, without any data of their own to substantiate their arguments, Complainants criticize the results of Dr. Subramanian's measurements, first because of the length of his time intervals and second because of the scales and increments used to graph the data. (RRBr. at 9.) Also, Complainants suggest that the test data shows *de minimis* variations when the scale is drastically magnified without justification. (*Id.* (citing CBr. at 34, 36-38).) None of these criticisms is valid, say Respondents. (*Id.*)

Respondents note that while criticizing Dr. Subramanian's measurements, Dr. Oklobdzija presented no empirical evidence of his own, although Complainants had ample time before filing their complaint to perform the same measurements. (*Id.*) They also had ample opportunity during discovery to run such tests. (*Id.*) They demanded and obtained samples of Accused Products from each of Respondents and could have obtained additional products on the open market if they needed more samples. (*Id.*) Dr. Oklobdzija said he expressed a desire to perform such tests. (*Id.* (citing Tr. (Oklobdzija) at 980-981).) With both the incentive and the opportunity to perform these tests, the fact remains that Complainants did not perform a single measurement. (*Id.*) Their failure to do so means that Dr. Subramanian's tests constitute the only empirical evidence in the record, and Respondents argue this evidence is fatal to Complainants' case. (*Id.*)

(3) *The criticisms of the test measurements are unjustified*

With respect to Complainants' first criticism regarding the ten-minute time intervals between temperature measurements for the {

}, Dr. Subramanian squarely addressed this issue during his testimony at the hearing, say Respondents. (*Id.*) The ten-minute interval between measurements was necessary to allow the oven in which the tests were being conducted to reach the next temperature point in order to obtain accurate temperature measurements. (*Id.* at 9-10 (citing Tr. (Subramanian) at 1250, 1477-78).) The 30- to 60-second intervals for the voltage measurements were necessary to allow the technician who operated the testing equipment under Dr. Subramanian's supervision to manually change the voltage values for the following measurements. (*Id.* at 10 (citing Tr. (Subramanian) at 1478).) These time intervals had no effect on the validity or reliability of the measurements, however, because the accused PLLs output a frequency signal when they are in a locked state, at which time the frequency is fixed and very stable. (*Id.* (citing Tr. (Subramanian) at 1250-51, (Haroun) at 187).) Therefore, there is no reason to expect any difference or variation in the frequency of the PLL, regardless of the point in time at which the measurement occurs. (*Id.* (citing Tr. (Subramanian) at 1507).) In short, the frequency should remain constant regardless of the measurement interval, and as the tests showed, the frequency did remain constant at each time interval tested. (*Id.*)

As for Complainants' second criticism, i.e. faulting the scale and increments that were used to graph the temperature measurement results for the { } and voltage test results for the Samsung Exynos 4412 chip, that criticism does not challenge the underlying data depicted in the graphs. (*Id.*) That data shows frequency stabilities that are at the measurement limits of the testing equipment, which is 0.000015 percent to 0.000648 percent. (*Id.* (citing Tr. (Subramanian) at 1243-44; RDX-0004.101).)

Although Complainants fault Dr. Subramanian's use of 500 megahertz increments in his graph on RDX-0004.101, they ignore the fact that the clock signal generated by the { } is about 1,500 megahertz (1.5 gigahertz), which is three times the increment that was used. (*Id.* at 10-11 (citing RDX-0004.101).) Seen in this light, Respondents argue that "this [scale] is absolutely the appropriate scale to use." (*Id.* at 11 (citing Tr. (Subramanian) at 1470).) The same holds for the voltage measurements in the Exynos 4412 chip, where the 10 megahertz increments are appropriate for the measured signal of about 50 megahertz, which is five times the increment that was used. (*Id.* (citing RDX-0004.97).) Respondents note that Dr. Oklobdzija had the opportunity to comment on the data, but he did not question the increments used in Dr. Subramanian's graphs, nor did Dr. Oklobdzija suggest that a different scale should have been applied. (*Id.* (citing Tr. (Oklobdzija) at 761-770, (Subramanian) at 1226-52).)

Respondents assert that use of smaller graph increments, such as 1 megahertz or even 0.01 megahertz cannot change one key fact—the PLL output frequency for each of the tested chips remained fixed and stable over wide variations in temperature and voltage. (*Id.* (citing RDX-0004.97; RX-1180C; RX-1182C (Exynos results); RDX-0004.101; RX-1189C; RX-1190C ({ })).) For example, say Respondents, the PLL output frequency of the { } chip was fixed and stable over the large temperature range of 0 degrees to 60 degrees Celsius, and the frequency measurements for the Exynos 4412 chip were similarly fixed and stable over the large power-supply range of 0.95 volts to 1.2 volts. (*Id.*) Dr. Subramanian stressed that the data "is completely flat as a function of frequency." (*Id.* (citing Tr. (Subramanian) at 1225, 1217).)

Respondents say Complainants falsely suggest that the use of their scale shows *de minimis* variations. (*Id.* at 11-12 (citing CBr. at 37-38).) However, the newly created graph in Complainants' opening brief, which Respondents contend lacks testimonial support, actually highlights a fundamental flaw in Complainants' suggested scale. (*Id.* at 12 (citing CBr. at 12).) Rather than presenting the same graph that Complainants' counsel created and used during the hearing, CDX-0086C, Complainants include in their opening brief a different, newly created graph, say Respondents. (*Id.* (advocating comparing CDX-0086C with CBr. at 37).) Instead of showing the "mean frequency" in megahertz on the Y-axis, as CDX-0086C does, the Y-axis in Complainants' brand-new graph shows the "change from initial mean frequency," using different units of measurement. (*Id.* (suggesting a comparison of the Y-axis legend and scale of CDX-0086C with Y-axis legend and scale in the graphs shown in CBr. at 37).) This belated tactic on the part of Complainants to alter their own graph is not surprising, say Respondents, because the genuine CDX-0086C reveals a critical flaw in Complainants' position: it plots the { } data points on a miniscule scale that is between 1.512028 gigahertz to 1.51238 gigahertz, and by so doing, Complainants magnify the Y-axis scale by a factor of more than 200,000 times and plot these data points over a miniscule 0.00001 gigahertz range. (*Id.*) Respondents say changing the units of the Y-axis in their newly created graph, however, fails to remedy this critical flaw in Complainants' argument, since the underlying data stays the same. (*Id.*) Complainants' position is akin to zooming in on a flat table with an electron microscope and arguing that misalignment in the atoms on the table's surface somehow prevents the table from being perceived as flat. (*Id.*)

On the other hand, Dr. Subramanian selected the Y-axis scale for his graph based on the teachings of the '336 patent. (*Id.* (citing Tr. (Subramanian) at 1507 ("the scales that I used to plot those were specifically used to be consistent with the patent terminology and patent descriptions"); JXM-0001 at 16:61-63 (discussing variation from 50 megahertz at 70 degrees Celsius to 100 megahertz at 22 degrees Celsius)).) In contrast to Dr. Subramanian's units of measurement, Complainants' grossly magnified scale of 0.00001 gigahertz for a 1.5 gigahertz signal zooms into a region that the patent itself considers "fixed," rather than variable. (*Id.*) Dr. Subramanian testified that "[t]he scale that Mr. Otteson [Complainants' counsel] used in his zoomed-in plots was in fact what—in the region in which the patent calls fixed." (*Id.* at 12-13 (citing Tr. (Subramanian) at 1506).)

Furthermore, the tiny Y-axis range that Complainants magnified "is actually below the range of what a crystal delivers, and the patent calls that amount of variation fixed; specifically, multiple times [the patent] calls it fixed." (*Id.* at 13 (citing Tr. (Subramanian) at 1482).) When the patent was effectively filed, in 1989, crystals exhibited a variance of 100 parts per million, compared to today's high-precision crystals' five or ten parts per million. (*Id.* (citing Tr. (Subramanian) at 1483).) Yet the patent views variances of 100 parts per million as insignificant by calling the crystal's frequency "fixed." (*Id.* (citing JXM-0001 at 17:29-34).) With their magnified graphing scales, Complainants are seeking possible frequency variations that are still well below the crystal's 100 parts per million variance that the patent regards as fixed. (*Id.* (citing Tr. (Subramanian) at 1484).) Respondents note that Complainants' opening brief states that the amount of variance shown in the graph (on page 37) is 10,000 hertz. (*Id.* at n. 2 (citing CBr. at 37).) This variance is measured on a 1.5 gigahertz (1,500,000,000 hertz) signal. (*Id.* (citing CDX-0086C).) Thus, the amount of variance is 10,000/1,500,000,000, or 0.000007, which is seven parts per million. (*Id.* at n.2.) This falls within the range of five to ten parts per million of today's high-precision crystals and is well below the 100 parts-per-million variance of crystals that the '336 patent characterized as fixed. (*Id.*)

In addition, say Respondents, Complainants' magnified graphing scale puts the data at the precision limit of the Agilent frequency counter. (RRBr. at 13 (citing Tr. (Subramanian) at 1482).) Dr. Subramanian testified that the scale used in Complainants' graphs is actually "below the noise floor of the measurement instrument," such that any perceived unevenness in the data points using Complainants' magnified scale relates to the measurement instrument's precision limit. (*Id.* (citing Tr. (Subramanian) at 1243-44, 1481-82).) As with a microscope, which allows a user to see only to a certain degree of magnification, the Agilent frequency measurement tool has a detection limit on how small a frequency difference it can detect. In light of the instrument's detection limit and the microscopic nature of the fluctuations, an apparent fluctuation of 0.00001 gigahertz occurring between 0 and 60 degrees Celsius for the { } chip is virtually no variation at all. (*Id.* at 13-14.) Dr. Subramanian demonstrated that there is no variation in the measured PLL output frequency—"This is statistically flat." (*Id.* at 14 (citing Tr. (Subramanian) at 1481).) Since there is no statistically significant variation in PLL output frequency, there is no infringement, *de minimis* or otherwise, and Complainants' reliance on cases relating to *de minimis* infringement is misplaced, say Respondents. (*Id.* (citing CBr. at 34).)

Respondents address other criticisms leveled by Dr. Oklobdzija at Dr. Subramanian's tests in their opening brief, at pages 52-67. Respondents point out that when Dr. Subramanian was afforded an opportunity to respond, he addressed each of the criticisms that Dr. Oklobdzija and Complainants raised, showing how their criticisms were wrong. (RBr. at 52.)

First, Respondents take up Dr. Oklobdzija's contention that Dr. Subramanian did not explain how he performed his measurements. (*Id.* (citing Tr. (Oklobdzija) at 764-770).) In response to this charge, Dr. Subramanian testified that "there is a huge amount of detail, both within the body of the expert report and in the exhibits that explained the process." (*Id.* (citing Tr. (Subramanian) at 1227-31).) The body of Dr. Subramanian's expert report and exhibits contain almost 80 pages detailing the testing procedures, providing the measured data, and discussing the implications of the data. (*Id.* (citing Tr. (Subramanian) at 1218).) If he had reviewed and considered Dr. Subramanian's full report, Dr. Oklobdzija would have found that the complicated in-chip measurements he assumed were important were actually not needed. (*Id.* (citing Tr. (Oklobdzija) at 766, (Subramanian) at 1227).) Dr. Subramanian testified "in all cases we were doing board-level measurements that did not require us to land a probe inside a chip." (*Id.* (citing Tr. (Subramanian) at 1227-28).) These development boards, which are commonly used in industry and are available from chip manufacturers and in the open market, implement standard phone functionalities that allow phone makers to obtain detailed measurements of the chip, in order to develop phone features based thereon. (*Id.* (citing Tr. (Subramanian) at 1231-35).) Because these boards have pins that allow external measurements to be made of internal signals, Dr. Subramanian did not have to probe inside the chips themselves. (*Id.* (citing Tr. (Subramanian) at 1229, 1232, 1236).)

As to Dr. Oklobdzija's professed confusion "because one set of data shows a 50 megahertz signal for a one gigahertz clock," Respondents say Dr. Oklobdzija missed a point that Dr. Subramanian's expert report made clear: for the Samsung chips which are the subject of this particular criticism, the development board's configuration employs a divide-by-32 fixed-ratio divider on the output of the clock signal. (*Id.* (citing Tr. (Subramanian) at 1229).) Put another way, the data for the Samsung chips measured a divided-down version of the clock signal. (*Id.* (citing Tr. (Subramanian) at 1237).) The use of a fixed-ratio divider, which Respondents say is a common industry practice, does not affect the validity of the results, because any variations in the one gigahertz clock signal will also appear in the divided-down signal. (*Id.* (citing Tr. (Subramanian) at 1237).)

As for Dr. Oklobdzija's statement that it is impossible to push a one gigahertz clock beyond the input-output boundary, Respondents respond that this does not apply to the tested Samsung chips and { } phone because the measured frequencies were below one gigahertz, since the clock signal passed through a fixed-ratio divider. (*Id.* at 54 (citing Tr. (Subramanian) at 1238).) Even with respect to the { } chip measurements, which operate at 1.5 gigahertz, Dr. Oklobdzija's impossibility argument is wrong as is shown, for example, by the well-known DDR3 memory interface, which Complainants have accused in this Investigation. One of the implementations of the DDR3 technology standard involves outputting a one gigahertz signal across a chip's input-output interface, thereby disproving Dr. Oklobdzija's argument. (*Id.* (citing Tr. (Subramanian) at 1238-39).) The evidence in this Investigation confirms that outputting a signal in the gigahertz frequency range through an input-output interface is possible, as shown by the 1.512 gigahertz frequency measurements output by the { }. (*Id.* (citing Tr. (Subramanian) at 1239).)

Respondents also refute Dr. Oklobdzija's testimony that a chip does not have a pin to extract the clock signal, and the PLL cannot run at 50 megahertz. (*Id.* (citing Tr. (Oklobdzija at 767-768, (Subramanian) at 1239).) Respondents say this point rehashes the prior criticisms, and furthermore with respect to the tested { } phone, Dr. Oklobdzija failed to understand that the measurements obtained reflect a divided-down fraction of the PLL's frequency that was output through the CAMIF camera interface. (*Id.* (citing Tr. (Subramanian) at 1240).) With respect to the chips on the development boards, Dr. Oklobdzija failed to realize that the boards have input-output pins that allow measurements of the clock signals. (*Id.* (citing Tr. (Subramanian) at 1240).) Depending on the configuration of the board, Dr. Subramanian either measured the clock signal's full frequency at 1.5 megahertz for the { } development board, or detected a divided-down frequency of about 50 megahertz for the Samsung development boards, which use a fixed-ratio divider at the output pin. (*Id.*) As previously noted, the use of a fixed-ratio divider does not affect the validity of the results, since any variations in the clock signal also appear in the divided-down signal. (*Id.* at 54-55 (citing Tr. (Subramanian) at 1237).)

Another criticism raised by Dr. Oklobdzija is that a probe was not inserted into the chip and that it is otherwise very difficult to measure inside a chip, in reply to which Respondents say the use of development boards for the Samsung chips and { }, as well as the use of the camera clock in the { }, made such invasive measurements unnecessary. (*Id.* at 55 (citing Tr. (Subramanian) at 1241, (Oklobdzija) at 768).)

Dr. Oklobdzija also questioned the precision of the measurements because they appeared to exceed the precision of the crystal's specification. (*Id.* (citing Tr. (Subramanian) at 1242, (Oklobdzija) at 764-765).) This argument is off target, argue Respondents, because even though the '336 patent characterizes crystal clocks as providing a fixed frequency, crystal clocks, even temperature-compensated crystal oscillators, still exhibit very small variations. (*Id.* (citing Tr. (Subramanian) at 1245; JXM-0018 at 18-34 (patentee recognizing during the original prosecution of the patent that crystal clocks exhibit small PVT-related variations)).) Because of this, a crystal's specifications provide a range for such variations. (*Id.* (citing Tr. (Subramanian) at 1245).) In high-performance devices, such as cell phones, the crystals usually vary by no more than 10 parts per million, and the crystal used on the development boards in this Investigation included either a standard crystal with a variance of ten parts per million or a high-precision crystal with a variance of five parts per million or less. (*Id.* (citing Tr. (Subramanian) at 1246).) At the nominal frequency of 50 megahertz, such as the crystals in the Samsung chips, the standard ten part per million translates to a worst-case variation of 500 megahertz over the full temperature range of -20 degrees to +70 degrees Celsius, as is shown in the crystal's specification. (*Id.* at 55-56 (citing Tr. 1246-47).) Since the measured temperature range, 0 to 70 degrees Celsius, is a fraction of the temperature range in a crystal's specification, which is minus 20 degrees to plus 70 degrees Celsius, Dr. Subramanian calculated that the crystal's frequency variation for the range that he measured would be, conservatively, about 300 hertz, which is 0.0003 megahertz. (*Id.* (citing Tr. (Subramanian) at 1247-48).) This variance of 300 hertz in the crystal's frequency is comparable to the 280 hertz variance for the PLL output frequency measured by Dr. Subramanian. (*Id.* (citing Tr. (Subramanian) at 1248; RX-1180.2).) Thus, the precision of Dr. Subramanian's variance measurements matches the precision of the crystal's variance. (*Id.* (citing Tr. (Subramanian) at 1248).) Dr. Subramanian performed the same calculations for the data related to the { }, which were measured over a smaller range of temperatures, 0 to 50 degrees Celsius, and he reached the same conclusions. (*Id.* (citing Tr. (Subramanian) at 1248-49).) Respondents conclude that Dr. Oklobdzija's purely anecdotal criticism is misguided. (*Id.* (citing Tr. (Subramanian) at 56).)

As for Dr. Oklobdzija's criticism that the testing protocol should not have used a ten-minute interval between measurements and that the testing failed to detect the frequency of the PLL in an unlocked state, Respondents reply that Dr. Oklobdzija again ignores the facts. The ten-minute wait, as previously recounted from Respondents reply brief, was necessary to allow the oven to reach the next temperature point and to thus obtain accurate temperature measurements. (*Id.* (citing Tr. (Subramanian) at 1250, 1477-78).) With respect to an unlocked state, Respondents reply that such measurements would be irrelevant because the PLLs in the accused chips output clock frequency only in a locked state. (*Id.* (citing Tr. (Subramanian) at 1250-51, (Haroun) at 187).) Because a PLL in an unlocked state does not output a clocking signal to the rest of the chip, any inquiry about the unlocked state is immaterial when it comes to analyzing claims that expressly require a clock or oscillator to clock the supposed CPU. (*Id.* at 56-57 (citing Tr. (Subramanian) at 1250; JXM-0001 at claims 1, 6, 10-11, 13, and 16).)

After Dr. Subramanian had rebutted all of Dr. Oklobdzija's criticisms, Complainants' counsel resorted to an attack on the scale that Dr. Subramanian used to graph the data that was obtained. (*Id.* (citing Tr. (Subramanian) at 1479).) In the course of that endeavor, he magnified the scale on the Y-axis to plot the Exynos 4412 chip data points from 50.005252 megahertz to 50.005266 megahertz, say Respondents. (*Id.* (citing CDX-0087C; CDX-0086C (plotting { } data points between 1.512028 gigahertz to 1.512038 megahertz)).) In so doing, Complainants magnified the Y-axis scale by a factor of more than 4.37 million times by plotting the Exynos 4412 data points over a miniscule range of 0.000014 gigahertz. (*Id.* (citing CDX-0087C; CDX-0086C (plotting the { } data over a 0.00001 gigahertz range)).)

Respondents say that, unlike Complainants, Dr. Subramanian selected the Y-axis scale for his graphs based on the teachings of the patent (which have been described above in connection with Respondents' reply brief). Respondents note that Dr. Subramanian testified that "[t]he scale that Mr. Otteson used in his zoomed-in plots was in fact what—in the region in which the patent calls it fixed." (*Id.* (citing Tr. (Subramanian) at 1506).)

Regardless, say Respondents, Complainants re-graphing of the data is scientifically unsound. (*Id.*) Dr. Subramanian testified that the tiny Y-axis range that Complainants magnified "is actually below the range of what a crystal delivers, and the patent calls that amount of variation fixed, multiple times. (*Id.* at 57-58 (citing Tr. (Subramanian) at 1482).)

Respondents say Complainants' magnified graphing scale puts the data at the precision limit of the Agilent frequency counter. (*Id.* (citing Tr. (Subramanian) at 1482.) Stated elsewise, any perceived unevenness in the data points using Complainants' magnified scale are artifacts of the measurement instrument's limits of precision. (*Id.* (citing Tr. (Subramanian) at 1482).)

In summary, Dr. Oklobdzija's criticisms of the measurement methodology lack merit. His criticisms simply spotlight the substance of Dr. Subramanian's 80 pages of testing protocol and data, but fail in any respect to impugn the results. (*Id.*)

(4) *Complainants' other theories do not satisfy the "varying together" limitations*

Next, Respondents argue that, instead of putting forth actual empirical evidence, Dr. Oklobdzija advanced seven strained and purely anecdotal reasons to buttress his opinions that the

Accused Products purportedly meet the "varying" limitations. (*Id.* at 58-59.) Respondents counter that none of these propositions withstands scrutiny.

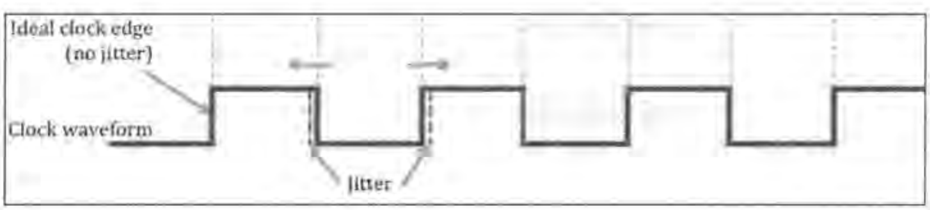
Turning first to Dr. Oklobdzija citation to and reliance on a textbook edited by Professor Chandrakasan, in support of Dr. Oklobdzija's argument that, according to the laws of physics, the frequency of a PLL will vary with PVT, Respondents point to the fact that Dr. Oklobdzija admitted on cross-examination that the cited excerpt in the textbook does not discuss a single operating product, much less any of the Accused Products or chips. (*Id.* (citing Tr. (Oklobdzija) at 871).) Nor does it mention PLLs or voltage-controlled oscillators. (*Id.* (citing Tr. (Oklobdzija) at 871; CX-0154).) This is not surprising, argue Respondents, since the 21-page chapter, from which Complainants extracted two paragraphs, discusses theoretical constraints based on statistical description of parameter variations. (*Id.* (citing CX-0154 at 2, 11; Tr. (Oklobdzija) at 870-871).)

Based on his review of the textbook excerpt, Dr. Subramanian concluded that it does not support Dr. Oklobdzija's argument. (*Id.* (citing Tr. (Subramanian) at 1254; RDX-4.104).) Dr. Subramanian explained his position this way:

> Now, the specific reasons [why Dr. Oklobdzija is] running into problems with respect to the laws-of-physics argument is, he's identifying a physical fact – in other words, these variations happen – and he's trying to tie it to a real processor and ignoring the circuits that basically prevent that variation from doing anything. In other words, he's taking this physical fact and applying it to a prior-art approach. And he's incorrect in that regard.

(*Id.* (citing Tr. (Subramanian) at 1254-55).) By focusing on a theoretical paper using statistical modeling, Dr. Oklobdzija misses a simple truth, which is that a PLL compensates for any PVT effects on transistors in order to keep the output frequency stable and fixed. (*Id.* (citing Tr. (Subramanian) at 1255).)

Second, Dr. Oklobdzija claimed that jitter is a PVT-related variation in the Accused Products. (*Id.* (citing Tr. (Oklobdzija) at 513-514).) But, again, he is wrong, say Respondents. Dr. Subramanian testified that jitter is not a change in frequency. (*Id.* at 59-60 (citing Tr. (Subramanian) at 1256-57); RDX-0004.105).) Specifically, the rising and falling edges of an idealized clock signal, as illustrated by the red lines in the excerpt from RDX-4.105 shown below, are precisely spaced and appear exactly where they ought to be. (*Id.* (citing Tr. (Subramanian) at 1256; RDX-0004.105).) In reality, however, the position of the edge of a clock signal does not follow this idealized form; sometimes an edge may surface early and sometimes late. At other times it may show up at its idealized point. (*Id.* (citing Tr. (Subramanian) at 1256).) What actually occurs is relatively random. (*Id.* (citing Tr. (Subramanian) at 1256-57).) This randomness in the occurrence of a clock's signal is called jitter, and Respondents argue that it is not a change in frequency, as Dr. Oklobdzija asserts. (*Id.* (citing Tr. (Subramanian) at 1256).))



(*Id.* (citing RDX-0004.105 (excerpt).)

Respondents say this random uncertainty with respect to a single edge is not the type of variation that occurs due to PVT, as is contemplated in the '336 patent. (*Id.*) Although the position of a particular edge may randomly shift from cycle to cycle, overall, the frequency of the clock signal does not change. (*Id.* (citing Tr. (Subramanian) at 1257).) This randomness is miniscule, while the patent focuses on large performance variations caused by PVT. (*Id.* (citing Tr. (Subramanian) at 1258, 1261).) Any residual doubt that jitter is not the sort of variation that the patent encompasses, should be dispelled by awareness of the fact that jitter is a phenomenon that has existed since long before the filing of the patent, and that crystal oscillators themselves exhibit jitter. (*Id.* (citing Tr. (Subramanian) at 1258-59; JXM-0018 (Prosecution History) at 3-4).) Yet, despite the well-known effect of jitter on crystals, the patent still characterizes crystals as fixed clocks. (*Id.* (citing JXM-0001 at 17:29-34).) Accordingly, jitter, argue Respondents, is not a variation that is due to PVT. (*Id.*)

Respondents also say that Dr. Oklobdzija points to { } mention of PVT in certain technical documents for some of the Accused Chips as evidence of the claimed "varying…due to [PVT]." (*Id.* at 61 (citing Tr. (Oklobdzija) at 463-465).) Respondents say that mere mention of the subject of PVT in a technical document falls short of Complainants' burden of proof. (*Id.*) All of the { } statements involve discussion "over worst-case process/voltage/temperature." (*Id.* (citing RDX-0004.107C; CDX-0005.40C-42C).) { } and guarantees their operation under extreme conditions, by mapping out the possible worst-case PVT conditions and then designing its chips to operate under these worst-case conditions. (*Id.* (citing Tr. (Subramanian) at 1262; RDX-0004.107C).) Dr. Oklobdzija testified on cross-examination that { } statements mean only that "whoever uses our chip, we want to guarantee that under worst conditions it will still work" and "out of this limit, don't return the product to us." (*Id.* (citing Tr. (Oklobdzija) at 875-876).) This, argue Respondents, has nothing to do with variation. (*Id.* (citing Tr. (Subramanian) at 1262).)

Respondents say these statements of { } indicate its practice squarely falls within the prior art, which the patent took pains to distinguish. (*Id.*) According to the patent, "[t]raditional CPU designs are done so that with the wors[t] case of the three parameters, the circuit will function at the rated clock speed," which means that the CPU must be clocked at a speed slower than the chip's maximum theoretical performance for it to operate properly under those worst case PVT conditions. (*Id.* (citing JXM-0001 at 16:48-53).) As with the traditional approach that the patent criticizes, { } cares about PVT and designs its circuits to operate at a rated clock speed that will allow the CPU to operate under these worst-case conditions. (*Id.* (citing Tr. (Subramanian) at 1262-63, (Oklobdzija) at 877-878).) Merely caring about PVT and designing for the possibility of worst-case scenarios, however, do not mean that the frequency of the PLL actually varies due to PVT. (*Id.* at 61-62 (citing Tr. (Subramanian) at 1263).) To the contrary, this demonstrates the use of the prior art traditional CPU design that the patent sought to avoid. (*Id.* at 62 (citing Tr. (Subramanian) at 1262).) Dr. Oklobdzija attempts to make a logical leap that has no technical or factual support when he fosters this argument, say Respondents. (*Id.*)

Respondents next address Dr. Oklobdzija's assertion that binning is evidence of variations due to manufacturing process. (*Id.* (citing Tr. (Oklobdzija) at 298-299).) Respondents reply that Dr. Oklobdzija is wrong. (*Id.*) Binning involves the grouping of chips according to operational capabilities in terms of frequency, but it has nothing to do with the actual frequency at which the chip is operating. (*Id.* (citing Tr. (Subramanian) at 1264-65).) Binning takes place at the factories where manufacturing occurs; high-precision testing machines are used to determine the maximum frequency capabilities of chips after they have been produced. (*Id.* (citing Tr. (Subramanian) at 1264-65).) On the basis of such tests, the chips are grouped according to established categories of frequencies ranging from the fastest to the slowest. (*Id.* (citing Tr. (Oklobdzija) at 879-880).) This enables chip manufacturers and suppliers to price and sell the chips according to their tested frequencies, with the faster ones commanding higher prices than the slower ones. (*Id.* (citing Tr. (Oklobdzija) at 881, (Subramanian) at 1265).)

Dr. Oklobdzija contends that this process shows that these chips satisfy the "varying...due to [PVT[limitations. (*Id.*) Respondents argue that his reasoning has at least three flaws. (*Id.*) First, the claim language for the so-called "first clock" requires that its actual "speed," not its frequency capability, vary by reason of PVT. (*Id.* (citing, by way of example, JXM-0001 at claim 1 ("a speed of said ring oscillator variable speed system clock varying together due to [PVT]")).) Second, the binning process occurs overseas and not at the time of importation or while the chips are in the United States. (*Id.* (citing Tr. (Oklobdzija) at 879).) Respondents say this forecloses a violation of Section 337, according to the Commission's decision in *Electronic Devices*, *supra*. (*Id.* at 62-63.) Third, Respondents say that, regardless of its maximum frequency capability, each chip in the Accused Products is set at a fixed speed, and when that chip is integrated into a mobile device overseas, it runs at a fixed speed. (*Id.* at 63.) When the Accused Products are imported, the chips also run at a fixed speed, not at the theoretical maximum speed identified by the binning process. (*Id.* (citing Tr. (Subramanian) at 1266).) Therefore, the practice of binning is irrelevant and does not concern the claim language. (*Id.*)

With respect to the OMAP chips solely, Dr. Oklobdzija argues that an OMAP feature called dynamic voltage frequency scaling ("DVFS") infringes this limitation. (*Id.*) Dr. Oklobdzija alternatively refers to this feature as "OPP" or "DVFS" (Tr. (Oklobdzija) at 493-496), so the term "DVFS" is used for the purpose of consistency. (*Id.* at n. 11.) Dr. Oklobdzija's contention incorrectly assumes that the appearance of the words "frequency" and "voltage" near each other necessarily satisfies the claim language, but this is wrong, argue Respondents. (*Id.*) The limitation requires a frequency variation "due to" PVT, but DVFS lacks the requisite causal relationship between voltage and frequency change because DVFS uses software to change frequency, independently of, and not due to, PVT. (*Id.*)

As a feature implemented and controlled by software, DVFS can be used to conserve power, and it saves battery life whenever the device does not require high performance, such as when a mobile phone is in a standby mode awaiting a call. (*Id.* (citing Tr. (Subramanian) at 1268-69; RDX-0004.109).) In order to save power, DVFS "software measures the load, and they will send control bits into that register, and they would initiate the switch into a different operating point based on the load." (*Id.* at 63-64 (citing Tr. (Oklobdzija) at 901; RX-0528C at LGE800ITC85813).) If the software decides that higher performance is needed, the DVFS algorithm increases voltage first and then separately increases frequency. (*Id.* at 64 (citing Tr. (Subramanian) at 1270).) However, if the software determines that power conservation is appropriate, the DVFS algorithm first reduces the frequency and then reduces the voltage. (*Id.* (citing Tr. (Subramanian) at 1270, (Oklobdzija) at 903-904).) This separate software-controlled modification of frequency followed by voltage demonstrates that the causality between voltage and frequency required by the "varying…due to [PVT]" limitation is not present in DVFS, say Respondents. (*Id.*)

Respondents argue that Dr. Oklobdzija persistently, and wrongly, equated "processing frequency capability" with "processing frequency" throughout his testimony, even though these are two distinct concepts. (*Id.*) Processing frequency capability is the maximum frequency at which a part can run, but that is not the actual frequency at which the part operates. (*Id.* (citing Tr. (Subramanian) at 1271).) The speed at which the part actually runs is its processing frequency, say Respondents. (*Id.* (citing Tr. (Subramanian) at 1271).) The claims, especially 1 and 11, distinguish between these two concepts by requiring that the CPU's "processing frequency capability" vary with PVT, while demanding that that the speed of the ring oscillator variable speed system clock (i.e., its processing frequency) vary due to PVT. (*Id.* (citing JXM-0001 at claims 1, 11).) But Dr. Oklobdzija, in his analysis, focuses on the clock's capability rather than its actual speed. (*Id.* at 65 (citing Tr. (Oklobdzija) at 301-302).) In so doing, Dr. Oklobdzija wrongly rewrites the claim language and erroneously analyzes the facts, argue Respondents. (*Id.*)

By conflating these two distinctly-claimed elements, Dr. Oklobdzija disregards an important fact about the accused chips and products: by design, a PLL compensates for any PVT-related effects in order to maintain a stable and fixed frequency. (*Id.* (citing Tr. (Subramanian) at 1273; RDX-0004.111).) Dr. Subramanian testified that, while PVT affects the maximum operating capability of a transistor, the PLL and its components are not running at this maximum capability, and this allows them to provide a fixed output frequency:

> [S]o I've already said that PVT does affect the maximum transistor operating speed. And the reason that PLLs are able to ensure that the output of the PLL, including the output of the oscillator within that PLL, is so precise is because the oscillator is not running at its maximum possible speed. The PLL ensures that it is very stable at a value below it, and in fact, when the PLL is in lock, it will be set up such that the oscillation of that oscillator will be at a speed below the maximum possible capability; in other words, the performance capability. And by doing that, the PVT variation does not affect the oscillator output, which is why we obtained the data that we did, Your Honor.

(*Id.* (citing Tr. (Subramanian) at 1295).) Succinctly put, a part's processing frequency capability may change with PVT, but its actual speed, or processing frequency, remains constant. (*Id.* (citing Tr. (Subramanian) at 1273; RDX-0004.111).)

Regardless of Dr. Oklobdzija's blending of the two concepts, Respondents say the facts show that the Accused Products do not satisfy the "varying…due to [PVT]" limitations for a separate reason: the CPU's "processing frequency capability" does not vary together with the

PLL's speed, because the CPU and the PLL are not subjected to the same temperature, voltage, and fabrication conditions. (*Id.*) The temperature across the accused chips is not uniform, partly because of a phenomenon called self-heating, in which regions with high transistor density, such as the core, heat up on their own at a faster rate than regions with lower transistor density, such as the PLL. (*Id.* at 65-66 (citing Tr. (Subramanian) at 1274-75).) In chip architectures where the core and the PLL are far apart, such as the one shown in RDX-0004.111, the two parts are not subject to the same temperature effect. (*Id.*) And with respect to voltage, the PLL and CPU do not receive the same power supply, because PLLs have their { }, while the chip and the core, which draws more power than a PLL and has different power demands, may have { } power supply inputs, say Respondents. (*Id.* (citing Tr. (Subramanian) at 1275; RX-1051C at QTPL 13831; RX-0867C at Kyocera853 21418-19; RX-0696C at 853Samsung 167298-99; RX-0648C at 4).)

As for the fabrication aspect of PVT, Respondents say the PLLs and ARM core use different transistors of varying sizes or types such that these differential transistors have different threshold voltages and their responses to environmental effects would differ from one another. (*Id.* (citing Tr. (Subramanian) at 1277).) Because these features result in the CPU's processing frequency capability not varying together with the PLL's speed, the "varying together due to [PVT]" limitation is not met in the Accused Products. (*Id.*)

Respondents, lastly, state that in a last ditch effort to prove the "varying…due to [PVT]" limitation, Dr. Oklobdzija brought up a new theory at the hearing, by saying the PLL's dead band somehow meets the "varying together" requirement of the asserted claims. (*Id.* (citing Tr. (Oklobdzija) at 1056-57).) Respondents say the PLL's dead band is an artifact of the design and sensitivity of the PLL's { }. (*Id.*) While very sensitive, the { }

has a minimum threshold below which it is unable to detect an extremely small phase difference between the loop's feedback signal and the reference signal. (*Id.* at 66-67 (citing Tr. (Subramanian) at 1278).) As a result, there is a small region where the PLL does not detect this minute phase difference, and this is called the "dead band." (*Id.*) Respondents argue that the dead band phenomenon cannot satisfy the claim limitation because the dead band itself and its size are unrelated to PVT, because the dead band is set and controlled by the {

}, and it is not set by PVT. (*Id.* at 67 (citing Tr. (Subramanian) at 1278).) Also, the dead band values are truly tiny, well below a crystal's own 0.01 percent variation and thus are within what the patent calls "fixed." (*Id.* (citing Tr. (Subramanian) at 1279).) Because PVT does not cause dead band and its value is fixed, within the meaning of the patent, it cannot be counted on to meet the "varying" limitation, say Respondents. (*Id.*)

c) Staff argues that the Accused Products do not meet these limitations

Staff says that none of the Accused Products meets any of the asserted claims with respect to the "varying…due to [PVT]" limitation. (SBr. at 9-25.) Staff says the Accused Products do not employ variable speed system clocks but, instead, use fixed-speed system clocks. (*Id.* at 12 (citing Tr. (Subramanian) at 1212-14).) Staff says the '336 patent addresses a purported deficiency in prior art microprocessor system designs, in which the central processing units "must be clocked a factor of two slower than their maximum theoretical performance, so they will operate properly in wors[t] case conditions." (*Id.* at 13 (citing JXM-0001 at 16:50-53).) According to Staff, CPU performance capability degrades as temperature rises, but by using a clock that varies in the same manner as the processing capability of the CPU, the CPU "will always execute at the maximum frequency possible, but never too fast." (*Id.* (citing JXM-0001 at 17:1-2).) Contrary to the teachings of the '336 patent, the Accused Products use fixed-speed system clocks operating at frequencies that are dependent on external crystals or clock generators, says Staff. (*Id.* (citing Tr. (Subramanian) at 1212-14).) Therefore, the Accused Products do not satisfy this limitation. (*Id.* at 13 (claim 1), 18 (claim 6), 19 (claims 7, 9), 22 (claim 10), 24 (claims 13, 14, 15), 25 (claim 16).)

d) Complainants' reply

(1) *The transistors that make up the CPUs and the "entire oscillators" are subject to the same PVT parameters*

Specifically addressing claims 6 and 13 in their reply brief, Complainants say the Accused Products meet the "varying" limitations of these claims because, to begin with, the transistors that make up the CPU and the transistors that make up the "entire oscillator" that clocks the CPU are subject to the same PVT parameters. This is because they are on the same integrated circuit chip or silicon die. (CRBr. at 28.) Complainants say there is also no dispute that the components, including the CPU and the oscillator, on the integrated circuits within each of the Accused Products are made out of transistors. (*Id.* (citing Tr. (Oklobdzija) at 300, (Subramanian) at 1275).) For each Accused Product, Complainants say they have shown that the accused CPU core and first clock oscillator are located on the same integrated circuit. Because the transistors of the CPU and oscillator are on the same integrated circuit, they are subject to the same PVT parameters, say Complainants. (*Id.* at 28-29 (citing Tr. (Oklobdzija) at 302).) Complainants say Dr. Subramanian agrees. (*Id.* at 29 (citing Tr. at 1272).)

(2) *The CPU processing frequency tracks the oscillator clock rate in response to parameter variation*

Complainants say the processing frequency of the CPU in the Accused Products tracks the "entire oscillator's clock rate because the on-chip oscillator is the source of the signal that clocks the CPU. (*Id.*) Complainants say Respondents' arguments about processing frequency capability" are misleading and irrelevant to claims 6 and 13, which do not recite "capability" at all. (*Id.*) Complainants say claims 6 and 13 concern two things that must vary together, the processing frequency of the first plurality of electronic devices that make up the CPU and the clock rate of the second plurality of electronic devices that make up the "entire oscillator" of the first clock. (*Id.* (citing JXM-0001, claims 6 and 13).) It is the rate or speed of the first clock's signal that is used to clock the CPU or set the CPU's processing frequency. (*Id.*) Complainants say the CPU's processing frequency must track the clock rate, and that the two must vary together because any variation in the clock rate will change the CPU processing frequency. (*Id.* at 29-30.)

The CPU is clocked by the "entire oscillators," identified as "first clocks" at the hearing, and in their initial brief, say Complainants. (*Id.* at 30.) Dr. Oklobdzija testified that these first clock oscillators clock the CPU core of the chip. (*Id.* (citing Tr. (Oklobdzija) at 370-371).) He testified that the CPU needs the "ticks" that correspond to the clock signal edges "to tell…when to start a new operation or when the old operation is terminating." (*Id.* (citing Tr. (Oklobdzija) at 364-365).)

Dr. Subramanian testified that "the controlled oscillator is generating a frequency that is used to drive the CPU." (*Id.* at 30-31 (citing Tr. (Subramanian) at 1388).) Complainants say it is clear that the "processing frequency…track[s] said clock rate" of the "entire oscillator," as required by claims 6 and 13, and the processing frequency of the CPU is the rate or frequency of the clock signal from the oscillator that drives the CPU. (*Id.*)

Although Respondents argue that other circuitry, such as dividers, is positioned between the first clock oscillator and the CPU core in some instances, this does not change the fact that the CPU's frequency must track the clock rate. (*Id.* at 31.) Complainants say this is acknowledged by Respondents. (*Id.* (citing RBr. at 124, 128).) Complainants say Respondents repeatedly noted that the divided-down signal would vary the same way as the signal generated by the oscillator. (*Id.* (citing RBr. at 53).) Because of this fixed division ratio, any variations in the clock signal would also appear in the divided-down signal of the Accused Products, say Complainants. (*Id.* (citing RBR. at 47-48, n.7, 55).)

Complainants say Dr. Subramanian testified that the clock signal from the PLL's oscillator is the source of the divided clock signal downstream. (*Id.* at 31-32 (citing Tr. (Subramanian) at 1461).) Complainants say the first clock oscillator generates the timing signal used to clock the CPU, and because that timing signal, or the divided-down version of it, is the CPU's clock signal, the processing frequency of the CPU tracks the clock rate of that timing signal exactly. (*Id.* at 32.)

Complainants say the CPU processing frequency in the Accused Products tracks the clock rate in response to parameter variation, as required by claims 6 and 13. (*Id.*) Complainants say the parties agree that PVT parameters affect all transistors on the integrated circuits of the Accused Products. (*Id.*) Complainants say PVT parameters affect propagation delays and thus affect the speed capabilities of the transistors on the chip. (*Id.* (citing RBr. at 86; Tr. (Subramanian) at 1112).) Thus there is no question, argue Complainants, that the CPU processing frequency tracks the clock rate in response to PVT. (*Id.* at 33.)

Complainants say Respondents' argument regarding the difference between "processing frequency capability" and "processing frequency" as those terms pertain to claims 6 and 13 is irrelevant because these claims mention nothing about capability. (*Id.*) Complainants say that claims 1 and 11 are the only claims that concern processing frequency capability. (*Id.*) Complainants dispute Respondents' claim that Dr. Oklobdzija conflated the two terms and say

Dr. Oklobdzija testified that he had prepared summary slides to illustrate the various claim elements and how they are met. (*Id.* at 34 (citing Tr. (Oklobdzija) at 303-306, 308-309; CDX-0004.07).) The slide that summarized the "varying" claim elements specifically calls out the fact that "[p]rocessing frequency capability" is only relevant to claims 1 and 11. (*Id.* (citing CDX-0004.07 (first element with red numerals "(1, 11)")).) The summary language for the remainder of the claim elements relates to "[p]rocessing frequency of CPU" and not capability." (*Id.*) Far from "conflating" these concepts, when referring to this slide, Dr. Oklobdzija specifically observed that this language does not relate to processing frequency "capability," say Complainants. (*Id.* (citing Tr. (Oklobdzija) at 309 ("It says frequency of the CPU and the first clock vary together due to variations.")).)

Complainants say that, although Respondents now attempt to inject the processing frequency capability requirement into claims where it is not present and to paint Dr. Oklobdzija as somehow confused on this point, there was no such confusion during his cross examination. (*Id.* at 34.) Both Dr. Oklobdzija and Respondents' counsel were totally clear that it is the "processing frequency" and not the "processing frequency capability" that needs to vary:

> Q. We know that all claims require that the processing frequency of the CPU and the relevant clock – you called it first clock – they vary together due to PVT.
>
> A. Yeah, that is the claim.
>
> Q. And you understand, of course, that's a limitation of the claim, that you have to actually show that to show infringement?
>
> A. That they vary together.
>
> Q. They vary together due to PVT.
>
> A. Yes.

(*Id.* (citing Tr. (Oklobdzija) at 864).) On this basis, Dr. Oklobdzija testified that all of the Accused Products meet the "varying" limitations of the claims, which Complainants say they discussed in detail in their opening brief. Dr. Oklobdzija also testified generally that PVT "variations do exist, and they affect anything across the chip" for all types of integrated circuits. (*Id.* (Tr. (Oklobdzija) at 462.) Dr. Subramanian confirmed that clock and CPU operation would be affected: "if conditions, PVT conditions, dictate that the maximum achievable performance has dropped, everything will drop: both the clock and therefore the operation of the CPU." (*Id.* (citing Tr. (Subramanian) at 1121).) Therefore, Respondents' arguments about processing frequency "capability" are irrelevant to claims 6 and 13, and to all other claims except 1 and 11, argue Complainants. (*Id.* at 35.)

(3) *CPU processing frequency and the oscillator clock rate vary in the same way as a function of parameter variation*

Complainants say the CPU processing frequency and the oscillator clock rate vary in the same way as a function of parameter variation in one or more fabrication or operational parameters. (*Id.*) The processing frequency of the CPU and the first clock oscillator in the Accused Products vary in the same way as a function of parameter variation. (*Id.*) Claims 6 and 13 only require variation of one or more parameters, and there is no dispute as to process. (*Id.*) Additionally, the evidence, including testimony from both experts and Dr. Subramanian's test results, confirms that the CPU processing frequency and the oscillator clock rate vary in the same way as a function of one or more of these parameters, say Complainants. (*Id.*)

Complainants say the claim language of claims 6 and 13 recite:

> varying the processing frequency of said first plurality of electronic devices [of which the CPU is constructed] and the clock rate of said second plurality of electronic devices [of which the "first clock" oscillator is constructed] in the same way as a function of parameter variation in one or more fabrication or operational parameters associated with said integrated circuit substrate.

(*Id.* (citing JXM-0001, claims 6 and 13).) In other words, say Complainants, the "processing frequency," and not capability, of the CPU and the clock rate of the first clock must vary together "as a function of" changes in "one or more fabrication or operational parameters." (*Id.*) By referring to the fabrication and operational parameters in the disjunctive, claims 6 and 13 only require the claimed variation to occur as a function of one of the specified parameters, as discussed in Complainants' opening brief. (*See* CBr. at 30-31; CDX-0004.07.) By lumping these parameters together as "PVT," however, Respondents' arguments frequently give the impression that variation of process, voltage, and temperature are all required, which is not the case for claims 6 and 13. (*Id.* at 35-36.) According to Complainants, the plain language of claims 6 and 13 makes it clear that variation in just "one or more fabrication or operational parameters" associated with the integrated circuits in the Accused Products is sufficient to infringe. (*Id.* at 36.)

Complainants say the CPU processing frequency of Respondents' Accused Products varies at least as a function of "fabrication" (*i.e.*, processing) parameters, as they and their expert have conceded. (*Id.*) Because the language of claims 6 and 13 expresses these parameters in the disjunctive, that process variation is sufficient by itself to show infringement. (*Id.*) Moreover, Dr. Subramanian's own tests and Dr. Oklobdzija's testimony establish that the CPU processing frequency of Respondents' Accused Products also varies as a function of operational parameters like voltage and temperature. (*Id.*)

Complainants argue that Respondents confirm, and do not dispute, that the CPU processing frequency and the clock rate in the Accused Products vary as a function of fabrication or "processing," which is sufficient to show infringement of claims 6 and 13. (*Id.*) With respect to fabrication, the '336 patent notes the following:

> [I]f the processing of a particular die is not good resulting in slow transistors, the latches and gates on the microprocessor 50 will operate slower than normal. Since the microprocessor 50 ring oscillator clock 430 is made from the same transistors on the same die as the latches and gates, it too will operate slower (oscillating at a lower frequency), providing compensation which allows the rest of the chip's logic to operate properly.

(*Id.* (citing JXM-0001 at 17).) Thus, the variations in processing from die-to-die (i.e., chip-to-chip) will affect the speed of the electrical devices on those chips, and because the entire oscillator ("first clock") and the CPU are constructed of those electronic devices, they will both be affected similarly. Also, the speed of the oscillator's transistors directly affects the frequency or clock rate of the oscillator, which directly affects the frequency at which the CPU is clocked. (*Id.*)

Complainants say Respondents and Dr. Subramanian confirmed that this is also the case in the Accused Products, when he testified that "PVT parameters affect propagation delays" and thereby affect the speed capabilities of the transistors on the chip. (*Id.* at 37 (citing RBr. at 86; Tr. (Subramanian) at 1112 ("temperature, voltage, and process can affect transistor propagation delays.")).) Dr. Subramanian also testified that these propagation delays determine the speed or frequency of oscillation of the oscillators and the operation of the CPU. (*Id.* (citing Tr. (Subramanian) at 1494-95 (speed of oscillator "dependent on the overall loop delay calculation, which is based on various parameters that affect the inverter propagation delays."), 1121 ("so if conditions, PVT conditions, dictate that the maximum achievable performance has dropped, everything will drop: both the clock and therefore the operation of the CPU.")).)

Dr. Oklobdzija testified that the fact that chip-to-chip process variations affect the clock rate and CPU processing frequency is so well recognized in the industry and that chip manufacturers engage in a standard practice of "binning" chips according to their performance characteristics based on these process parameters. (*Id.* (citing Tr. (Oklobdzija) at 296-298).) He testified that this industry practice is a recognition of the fact that the components on the chips vary based on process or fabrication and this affects the transistors on the same die the same way. (*Id.*) Dr. Subramanian agreed that the chips will not be the same because of process variation between chips. (*Id.* at 38 (citing Tr. (Subramanian) at 1122).) Complainants also say he also that binning is a standard practice in response to performance differences among different chips caused by process variations. (*Id.* (citing Tr. (Subramanian) at 1263-65).)

Based on the foregoing, Complainants contend there is no dispute that process variations happen and that differences attributable thereto affect the performance of the electrical devices on the chips, such as propagation delays, which determine the clock rate of the oscillator and therefore the processing frequency of the CPU, thereby causing them to "vary together." (*Id.* at 38-39).) Thus, argue Complainants, there can be no dispute that the CPU processing frequency and the clock rate of the "entire oscillator" vary in the same way as a result of a fabrication parameter, i.e. process. (*Id.* at 39.) Without more, Complainants say this is sufficient to show that this element is met for claims 6 and 13 because they are worded in the disjunctive and only require variation of one or more fabrication parameters. (*Id.*)

As regards Respondents' argument that evidence of binning is irrelevant because it only relates to speed capability, occurs overseas, and concerns worst-case scenarios, Complainants argue that Respondents are wrong, because, in the first place, there is no dispute that process affects both the oscillator's clock rate and the CPU's processing frequency, and not just speed capability. (*Id.*) And second, Respondents' worst-case argument does not hold up because there is undisputed varying according to fabrication parameters, and the evidence shows that there is also varying according to operational parameters like voltage and temperature. (*Id.*)

Third, the fact that binning and the corresponding process that causes process variation occurs overseas is irrelevant because claims 6 and 13 are apparatus claims and are infringed by virtue of what they are, not what they do. (*Id.*) Complainants argue that it is irrelevant where the processing frequency vary together as a function of those process parameters. (*Id.*) Complainants say Section 337(a)(1)(B) declares unlawful "[t]he importation into the United States, the sale for importation, or the sale within the United States after importation…of articles that…infringe a valid and enforceable United States patent." (*Id.* (citing 19 U.S.C. § 1337(a)(1)(B)).) According to Complainants, this means that if an article infringes a patent when it is imported, that is enough. (*Id.* at 39-40 (citing *Gemtron Corp. v. Saint-Gobain Corp.*, 572 F.3d 1371, 1380-81 (Fed. Cir. 2009)).) Complainants say it does not matter where the article was fabricated, since in most ITC cases the article is made abroad. Complainants say the case cited by Respondents, *Electronic Devices,* actually supports a finding of infringement because it says "infringement…must be based on the articles as imported." (*Id.* (citing *Electronic Devices*, 2012 WL 3246515, at *9, Comm'n Op. (Dec. 21, 2011)).) According to Complainants, the Commission's opinion in that investigation required processing of the chips to occur overseas so that the accused articles would infringe as imported. (*Id.* at 40.)

Complainants argue that while variation as a function of fabrication or process is sufficient by itself to show that the "varying" element of claims 6 and 13 are met, a preponderance of evidence also shows that the CPU's processing frequency and the clock rate of the entire oscillator vary as a function of operational parameters such as voltage and temperature. (*Id.*) The evidence showing this includes testimony of Dr. Oklobdzija and Dr. Subramanian, as well as Dr. Subramanian's testing results. (*Id.*)

Complainants note that Dr. Oklobdzija testified that temperature and voltage also affect the operation of the electronic devices on an integrated circuit. (*Id.* (citing Tr. (Oklobdzija) at 301-302).) He testified that since the CPU and the oscillator are on the same chip, they will be similarly affected by voltage and temperature variations. (*Id.* (citing Tr. (Oklobdzija) at 303).) He cited a chapter from a book by Boning and Nassif, which he said confirmed his opinion that the electrical performance of microprocessors or other integrated circuits are affected by two variation sources, environmental or operation factors such as temperature, power supply, etc.; and physical factors such as structural differences that arise due to processing. (*Id.* at 41 (citing Tr. (Oklobdzija) at 416-418; CDX-0005C.39; CX-0154 at TPL853_092744).) Dr. Oklobdzija also testified that { }, confirmed Dr. Oklobdzija's opinion that { } (*Id.* (citing Tr. (Oklobdzija) at 758-759).) Dr. Subramanian agrees that temperature, voltage, and process affect transistor propagation delay and thus the actual speed of the operation of these transistors. (*Id.* at 42 (citing Tr. (Subramanian) at 1112).) Dr. Subramanian testified that PVT conditions also affect both clock and CPU operations. (*Id.* (citing Tr. (Subramanian) at 1121).) In fact, Respondents include { }. (*Id.* (citing Tr. (Subramanian) at 1419-20 (discussing his cruise control analogy)).) Thus, argue Complainants, it is only after the oscillator speed changes because of process, voltage, or temperature that the PLL attempts to control the frequency. (*Id.*)

Also, Dr. Subramanian's tests confirm that there is variation in temperature or voltage, and his slides call that "variation" tolerance, which Respondents explain is the variability associated with the measurements. (*Id.* at 43 (citing RBr. at 48-49).) Complainants argue that tolerance is variation for the purposes of the "varying" limitations, and Dr. Subramanian shows tolerances or variation over each temperature and voltage range associated with each of his tests. (*Id.* (citing RBr. at 48-51; RDX-0004.97; RDX-0004.100; RDX-0004.101).) Although Respondents characterize the results of Dr. Subramanian's testing as "essentially flat," they actually confirm variation of the oscillator's clock rate due to PVT, argue Complainants. (*Id.*)

Complainants argue that Respondents' attempt to minimize the variation in Dr. Subramanian's test results are legally insufficient to avoid infringement. (*Id.* at 43-44 (citing *Organic Seed Growers & Trade Ass'n v. Monsanto Co.*, ___F.3d___, 2013 WL 2460949 (Fed. Cir. June 10, 2013); *Embrex, Inc. v. Serv. Eng'g Corp.*, 216 F.3d 1343, 1352-53 (Fed. Cir. 2000) (Rader, J., concurring)).) Complainants argue that the statute states that any unauthorized use of a patented invention is infringement. (*Id.* (citing 35 U.S.C. § 271(a) (1994)).)

Complainants say Respondents also try to minimize the variation Dr. Subramanian reported by arguing that it is smaller than the range the patent contemplates, pointing to two examples in the patent's specification that show ranges of variation between 100 and 400 percent, and arguing that anything else is fixed. (*Id.* at 44 (citing RBr. at 51).) But the claims do not contain any such limitation, say Complainants, and Respondents are attempting to read into the claims, limitations from the specification, which is improper. (*Id.* (citing *Phillips*, 415 F.3d at 1320; *Voda v. Cordis Corp.*, 536 F.3d 1311, 1320 (Fed. Cir. 2008)).) Because the examples in the specification pointed to by Respondents do not contain any language of disclaimer or clear intention to limit the claim scope, they should not be imported into the claims, as Respondents attempt to do. (*Id.* at 44-45 (citing *Liebel-Flarsheim*, 358 F.3d at 906).) Complainants point to Order No. 31 at 68, and argue that the term "varying' is to be accorded its plain and ordinary meaning. (*Id.* at 45.) Applying the plain and ordinary meaning of "varying" results in any variation meeting the claim term, regardless of whether it is called "tolerance," "variability," or "variation." (*Id.*)

Complainants accuse Respondents of trying to back away from Dr. Subramanian's measured variations by claiming that they are "at the precision limit of the Agilent frequency counter." (*Id.* (citing RBr. at 58).) Respondents' reasoning has two problems, say Complainants. First, the instrument used by Dr. Subramanian in his testing is the same one that Respondents elsewhere characterize as "high-precision" and "well-calibrated." (*Id.* (citing RBr. at 47, n. 7.) Second, Dr. Subramanian reported his numbers, which raises the question why he reported such precise numbers if they were beyond the precision level of the instrument. (*Id.* (citing RX-1180C—RX-1189C).) On the other hand, argue Complainants, Respondents complain in their brief about Complainants' use of numbers with precision to the fifth and sixth decimal places. (*Id.* (citing RBr. at 57).) Dr. Subramanian reports the mean frequency of his test results in the eighth and tenth decimal places, a hundred to a hundred thousand times more precise than the numbers Respondents complain about in their brief, argue Complainants. (*Id.*) All of the tolerances that Dr. Subramanian reported were percentages reported to the sixth decimal place, which is the same as non-percent numbers to the eighth decimal place. (*Id.* (citing RBr. at 41-48; RDX-0004.97; RDX-0004.99; RDX-0004.100).) If numbers to the fifth and sixth decimal place were impossible to measure using the test equipment, as Respondents argue, Complainants wonder why Dr. Subramanian was able to report measurements significantly more precise. (*Id.*) Dr. Subramanian's test results suggest the opposite of what Respondents want to be found in this Investigation, which is that the variation measured by Dr. Subramanian is real and valid, and within the scope of the ordinary meaning of "varying." (*Id.*)

(4) *Respondents' and Staff's arguments are unavailing*

Complainants say Respondents and Staff are wrong when they say a PLL's output frequency does not vary due to PVT, because as just discussed, process variations affect the propagation delay, which sets the oscillator frequency that clocks the CPU. (*Id.* at 46-47 (citing RBr. at 45, SBr. at 18).) Also, as previously discussed, Dr. Subramanian's test results and testimony confirm that the CPU processing frequency and the oscillator clock rate vary as a function of temperature and voltage as well. (*Id.* at 47.)

Complainants say Respondents' criticisms of Dr. Oklobdzija's challenges to Dr. Subramanian's testing procedure and results fail to apprehend the points Dr. Oklobdzija was making. There are important details missing from Dr. Subramanian's report, say Complainants, which left critical issues unresolved. (*Id.*) For example, Dr. Oklobdzija noted that it would be impossible to connect to a line inside the chip, and noted that Dr. Subramanian's measurements were of 50 megahertz frequencies for chips that perform in the gigahertz range. (*Id.* (citing Tr. (Oklobdzija) at 766-767).) Complainants say Dr. Subramanian provided no detail or documentation about dividers or their characteristics, so while Respondents argue that "any variation in the one gigahertz clock would also appear in the divided-down signal, they do not acknowledge the fact that variation, or "tolerance," would also be divided down by the dividers, and do not take into account the effect of any noise the divider and their connections would introduce. (*Id.*) This is apparently why "tolerance" shown for the { }, which is measured without dividers, was greater than the variation reported for other chips, say Complainants. (*Id.*) And although Dr. Subramanian claims that "there is a huge amount of detail" in his report about his testing, he provided no specifications for or characterizations of the testing equipment he used. (*Id.* at 47-48.)

As for Respondents' criticism of Dr. Oklobdzija's testimony that it is not possible to "push a gigahertz signal across the I/O boundaries," Complainants argue that Dr. Subramanian's competing testimony, that implementation of the so-called "Double Data Rate" 3, or DDR3, involves outputting a one gigahertz signal across the chip's I/O interface, does not prove, or disprove, anything. (*Id.* at 48.) Dr. Subramanian did not provide any details of the DDR memory implementation and no details or specifications about the { } he used, so it is not possible to verify Dr. Subramanian's claim that the { } used the { }. (*Id.* (citing RBr. at 54; Tr. (Subramanian) at 1238-39).)

As for Respondents' taking issue with Dr. Oklobdzija's faulting of Dr. Subramanian's measurements for lack of precision, Complainants reply that Respondents miss the point, which is that the precision that Dr. Oklobdzija finds lacking calls into question Dr. Subramanian's tests, methodology, and results generally. (*Id.* at 48-49.) In particular, Dr. Oklobdzija raises questions about how a divided-down clock signal can possibly be more stable than the reference crystal, as some of Dr. Subramanian's results suggest. (*Id.* at 49.) Dr. Oklobdzija testified, "I don't believe anything in these numbers," in part because the variation of the on-chip oscillator Dr. Subramanian reported was below the variation of the reference signal. (*Id.* (citing Tr. (Oklobdzija) at 765-766; RBr. at 56).) Complainants say it is striking that Respondents would rely on such ultra-precise measurements, such as five or ten parts per million, to support their argument, but when Complainants point to even larger variations in Dr. Subramanian's test results, such as 10 kilohertz variation, Respondents ignore the results and claim that all such variations are "scientifically unsound" (RBr. at 57) and "at the precision limit of the Agilent frequency counter" (RBr. at 58). (*Id.* at 49.)

Complainants say Dr. Subramanian's test results showed variation in the form of very precise numbers, and Complainants argue that the fact that those numbers indicate that the oscillator is more precise than the reference frequency, calls into question Dr. Subramanian's methodology and results. (*Id.*) Complainants note that Respondents claim that these variations are what the patent considers "fixed." (*Id.* (citing RBr. at 57-58).) This is wrong, say Complainants, since Respondents themselves point out that the range of variation discussed in the '336 patent is 50 megahertz (from 50 megahertz to 100 megahertz). (*Id.* (citing RBr. at 51-52).) Yet, Respondents admit a variation of 280 hertz for the divided-down clock they discuss in their brief, which would also be divided down. (*Id.* (citing RBr. at 56).) The only clock signal that Dr. Subramanian claims to have measured without interposed dividers between the oscillator and the measuring equipment, the { }, the variation is on the order of 10 kilohertz. (*Id.* (citing CDX-0086C; RX-1189C).)

As to Respondents' argument that Dr. Oklobdzija's exceptions to the ten-minute intervals between Dr. Subramanian's measurements somehow "ignore[d] the facts," Complainants say Respondents misapprehend Dr. Oklobdzija's criticism when they argue that it took ten minutes for the temperature to become steady. (*Id.* at 49-50.) However, Dr. Oklobdzija's point was that ten minutes is an eternity compared to the time scale of the oscillator, and an interval of this magnitude permits measurements that completely disregard any minor changes in voltage, for example. (*Id.* at 50 (citing Tr. (Oklobdzija) at 770 ("So within one microsecond the PLL will have the ability to make adjustments. So any drift that happened as a result of voltage dropping, any glitch on the voltage, which I'm sure the ring oscillator followed, in ten minutes' time is [a] forgotten event.")).) Dr. Subramanian admitted that billions or trillions of clock cycles elapsed between measurements, and that he had no idea what happened to the frequency in the interval. (*Id.* (citing Tr. (Subramanian) at 1479).) With no knowledge of what happened to the frequency over billions or trillions of clock cycles between "cherry-picked" results, Complainants argue that it is difficult to place much faith in the results that Dr. Subramanian claims are essentially flat. (*Id.*)

As for Respondents' argument that Dr. Oklobdzija's comments about jitter are incorrect, and that jitter does not relate to PVT variations, Complainants point to the fact that Respondents concede that jitter is a deviation in the time at which a clock edge arrives. (*Id.* (citing RBr. at 60 ("Sometimes an edge may show up early; sometimes it may show up late....")).) Because the clock edges are the frequency of the clock signal square wave, any change in their arrival times constitutes a change in frequency. (*Id.* (citing Tr. (Oklobdzija) at 364-365).) Although Respondents argue that "the overall frequency of the clock does not change," they are incorrect, say Complainants. (*Id.*) Dr. Oklobdzija testified that "we need those ticks to tell us when to start a new operation or when the old operation is terminating." (*Id.*) Thus, changes in the edge arrival time because of jitter would affect both the clock rate and CPU processing frequency operation. (*Id.* at 50-51 (citing Tr. (Subramanian) at 1121).)

With respect to Respondents' argument that Texas Instruments' DVFS feature does not have a causal relationship necessary to satisfy the claim language, Complainants respond by saying Respondents miss the point. (*Id.* at 51.) The need to adjust the operational frequency before reducing DVFS is an acknowledgement that PVT variations affect the oscillator clock rate and the CPU processing frequency, and would cause them to vary together in a way that is undesirable absent that adjustment. (*Id.*at 51 (citing Tr. (Oklobdzija) at 1068-69).)

And finally, Complainants address Respondents' argument that Dr. Oklobdzija introduced new theory at trial about the PLL's dead band. (*Id.* (citing RBr. at 66-67).) This is not true, say Complainants, because Respondents were well aware that Dr. Oklobdzija had discussed in his expert report the fact the PLL can only adjust the frequency of a ring oscillator to a desired range. (*Id.* (citing Tr. (Subramanian) at 1302).) Complainants say Respondents cross-examined Dr. Oklobdzija extensively on this very point. (*Id.* (citing Tr. (Oklobdzija) at 832, 836, 950-953).) Dr. Oklobdzija testified that the desired range, which is "a frequency range within the VCO is not affected by [the] PLL," is known as a "dead band." (*Id.* (citing Tr. (Oklobdzija) at 1056-57).) He further testified that variations as a function of PVT in the PLL's dead band is one way that the "varying" claim limitation is met. (*Id.* (citing Tr. (Oklobdzija) at 1028-31).)

e) The Administrative Law Judge's Findings and Conclusions

The Administrative Law Judge finds that the evidence does not show that any of the Accused Products meets the "varying" limitations of any of the asserted claims, and therefore concludes that this finding in itself warrants a further finding that there is, and can be, no violation of Section 337, as is alleged by Complainants.

A few preliminary remarks are in order before a more detailed discussion. Complainants have the burden of proof and must establish by a preponderance of the evidence that each of the Accused Products satisfies each and every element of an asserted claim before a violation of Section 337 can be found with respect to that asserted claim. To make their case of infringement, Complainants rely principally on testimony of Dr. Oklobdzija, their expert, and technical reference documentation of some of Respondents and the suppliers of the chips that comprise the various oscillators that Complainants allege violate the '336 patent. Respondents, for their part, also rely on many of the same technical reference documents and on the testimony of their own expert, Dr. Subramanian. But in addition, Respondents also rely on empirical evidence in the form of testing that was performed for the purpose of determining whether the operation of the oscillators in the Accused Products was variable or fixed; and those tests determined that the latter was the case. Complainants challenge the validity of the methods and results of those tests, and those challenges and the merits thereof will be discussed later on, but what stands out in this regard is that Complainants and their expert did not perform any testing and did not produce any empirical evidence of their own, despite the fact that Dr. Oklobdzija, the expert who was selected by Complainants, and upon whose opinions and, implicitly, judgment they rely on, thought it appropriate and desirable to do so. It is therefore fitting to point out that Complainants, the accusing parties upon whose shoulders lies the burden of proof, were apprised by their own expert of the utility of obtaining empirical evidence by whatever testing he deemed suitable, but rejected his recommendation and did not develop any empirical evidence of their own, not even to counter the testing results that were developed through Dr. Subramanian's efforts. This point is reflected in the following colloquy:

> Q. Let's go on to a different claim limitation. I want to talk to you about the "varying" limitations. Now, I take it from what you said yesterday and from looking at your expert report, you didn't perform any actual physical testing on the Samsung chips to determine whether the "varying" limitations are met. Correct?
>
> A. If they provide me with a Samsung phone, I would have been happy to do that, but they didn't.
>
> Q. Who is "they"?
>
> A. Samsung.
>
> Q. Well, did you ask your lawyers for one?
>
> A. I expressed a desire to have them.

Q. You expressed a desire to your lawyers to have a Samsung phone to test?

A. I believe so, in conversations, but I think there was shortage of time.

Q. And they said no?

A. I think we were short on time.

Q. But you would have found it useful to test it for the "varying" limitations?

A. It would be very difficult. To be honest with you, I'm just being facetious. I would like to open it ——but to test the variation of the chip would be extremely difficult. So even if they had given me a phone, I don't think it would be of use.

Q. But nevertheless you asked for one for that purpose; right?

A. I think in the conversations I said it would be nice to have those products.

Q. It's safe to say, Samsung phones are not exactly a rare commodity; right?

A. Yeah.

Q. Even if they said no, you could have gone out and gotten one on your own. Right?

A. That is correct. But let me correct myself: I think I was just making a joke out of it, which I shouldn't in court.

Had I had a Samsung phone to open and test this, it would be extremely difficult. As I said, you need to delayer the chip, and I don't have the facilities. I think there are a few houses in Canada actually that do those reverse-engineering, and they can delayer the chip and they can do certain things. Maybe they can perform this testing, but it is extremely difficult.

Q. Well, Respondents found one. I mean, you would have probably been able to find one. Right?

A. Excuse me?

Q. Respondents found a testing house. You could have found one. Right? You have connections, don't you sir? Aren't you the president of the IEEE?

A. I wish that presidency give me authority to order to do things for me, but it doesn't. I'm just a servant as the president, so it's just more work for me.

But as I said, it is extremely difficult. So, you know, I wish—I said I wish I had a Samsung phone to open it, to look inside. But beyond that, when you get to

> the chip, I can just marvel at their design and the beauty of their design. I must admit they are beautiful. But in order to put a probe on the clock, that's impossible as I said. I could not test it. I don't think—I think it's extremely difficult, and I'm saying sort of impossible of testing that clock exactly on the chip, how it behaves. I mentioned there was scanning electron microscope in the voltage contest mode, things which you have to do in a vacuum chamber. It is horrendously difficult.
>
> So I would love to have that phone, but it would not serve much purpose.

(Tr. (Oklobdzija) at 980-983.) This mixture of a professed desire by Dr. Oklobdzija to perform testing while expressing doubts about benefits of testing and vacillating about whether testing is even possible, then reversing himself, interspersed with his admission of facetiousness not only undermines Dr. Oklobdzija's testimony, especially when contrasted to that of Dr. Subramanian, but exposes an evidentiary gap in Complainants' case.[19] This, combined with Dr. Oklobdzija's testimony that he and his co-authors were only speaking "colloquially" when they said PLLs can perform frequency multiplication, raises genuine questions about the degree of Dr. Oklobdzija's independence and about his sincerity and veracity.

Complainants recognize that all of the asserted independent claims require that the frequency of the claimed clock or oscillator must vary due to, as a function of, or relative to variation in fabrication process, voltage, or temperature ("PVT"). (Tr. (Oklobdzija) at 308-309, 520, 542-544, 546-547, 554-555.) In all of the Accused Products, Complainants identify an oscillator, which Dr. Oklobdzija presumes is included in every PLL, as the alleged "first clock" whose frequency must vary because of PVT. (Tr. (Oklobdzija) at 439-440, 474-475, 499-500, 510-511, 518-519.) However, a PLL outputs a very stable and fixed frequency. (Tr. (Subramanian) at 1213; RDX-0004.94.) To achieve this stability, the PLL precisely controls and fixes its components' output frequency by continuously comparing this output against an

[19] This does not mean that in order to prove infringement a complainant must conduct testing or produce empirical evidence. Rather, the point here is that, under the particular facts and circumstances of this case, the weight of the evidence is affected by the presence or absence, as the case may be, of evidence of that caliber.

accurate and fixed reference signal provided by an external crystal or clock generator. (Tr. (Subramanian) at 1212-13; RDX-0004.94.)

In fact, empirical evidence that was gathered from testing under the direction of Dr. Subramanian shows that the frequency of PLLs does not vary. Dr. Subramanian worked with an engineer at a testing facility to measure the clock speeds in a sample few of the accused chips. (Tr. (Subramanian) at 1252.) These measurements demonstrate that PLLs do not vary as a result of, due to, or as a function of, parameters such as temperature, voltage, and fabrication process. (*Id.*)

The data compiled by Dr. Subramanian as a result of these several tests does show that the frequency of a PLL is fixed, and as previously noted, Complainants have offered no opposing empirical evidence. Rather, they oppose this evidence with a priori opinions of Dr. Oklobdzija and criticisms of the methodology by which Dr. Subramanian derived the data.

To begin with, for each Accused Product, Complainants say they have shown that the accused CPU core and first clock oscillator are located on the same integrated circuit. Because the transistors of the CPU and oscillator are on the same integrated circuit, they are subject to the same PVT parameters, say Complainants. Complainants say Dr. Subramanian agrees. On this point, the Administrative Law Judge agrees.

Complainants say the processing frequency of the CPU in the Accused Products tracks the "entire" oscillator's clock rate because the on-chip oscillator is the source of the signal that clocks the CPU. Complainants say claims 6 and 13 concern two things that must vary together, the processing frequency of the first plurality of electronic devices that make up the CPU, and the clock rate of the second plurality of electronic devices that make up the "entire oscillator" of the first clock. It is the rate or speed of the first clock's signal used to clock the CPU or set the

CPU's processing frequency. Complainants say the CPU's processing frequency must track the clock rate, and that the two must vary together because any variation in the clock rate will change the CPU processing frequency. As recited above, Dr. Oklobdzija testified that these first clock oscillators clock the CPU core of the chip. He testified that the CPU needs the "ticks" that correspond to the clock signal edges "to tell…when to start a new operation or when the old operation is terminating." Complainants, as reported above, say the "processing frequency…track[s] said clock rate" of the "entire oscillator," as required by claims 6 and 13, and the processing frequency of the CPU is the rate or frequency of the clock signal from the oscillator that drives the CPU.

The Administrative Law Judge finds that there is a basic flaw that permeates Complainants' and Dr. Oklobdzija's reasoning regarding infringement of the "varying" limitations: it avoids the fact the "entire" oscillator terms are inextricably tied to the "varying" term of the claims. (*See* Order No. 31 at 42.) For example, claim 6 reads, in part, "an entire oscillator…thus varying the processing frequency of said first plurality of electronic devices and the clock rate of second plurality of electronic devices in the same way as a function of parameter variation in one or more fabrication or operational parameters associated with said integrated circuit…" (JXM-0001 at claim 6.) As previously discussed and determined, the evidence shows that none of the Accused Products meet any of the "entire" limitations of the asserted claims, because the frequencies of the oscillators in the Accused Products are fixed by external crystals/clock generators as well as internally by the PLLs. Dr. Oklobdzija's testimony about infringement of the "varying" terms of claims 6 and 16—and the same can be said for the other asserted claims that involve a variation of the term—treats the oscillators of the Accused Products as though they were "entire oscillators," according to the claims as construed, when they are not—they receive a fixed-rate frequency from an external crystal or clock generator and the PLL and output a fixed frequency.

Dr. Oklobdzija focuses on the oscillators in the Accused Products, divorced from the crystals/clock generators and PLLs that are associated with them. It was Dr. Oklobdzija and his co-authors who wrote: "The function of the clock signal is comparable to the function of a metronome in music… [T] clock provides the time reference point, which determines the flow of data in the digital system." (RX-2283 at Garmin 92903.) The relevant oscillators in the Accused Products clock their associated central processing units by providing a fixed frequency, instead of varying the frequency, through the involvement of their external crystals/clock generators and the PLL circuitry in which the oscillators reside. Dr. Oklobdzija did not, and cannot, support his infringement testimony regarding the "varying" terms without either assuming that the Accused Products meet the "entire oscillator" family of terms, or disregarding the fixed reference signals they receive and output. What Dr. Oklobdzija and Complainants do is isolate the oscillators in space and time by divorcing them from the effects of external crystals and PLLs associated therewith and then observing how they function without them. However, this betrays the concept of the claimed "entire oscillator" because the accused oscillators do not perform the clocking function of the asserted claims in isolation. The fact is the oscillators or ring oscillators in the Accused Products are not designed to and do not perform the claimed clocking function hermetically. Consequently, Dr. Oklobdzija's testimony about the "varying" limitations is either hypothetical or disregards material facts. Either way, his testimony does not show infringement with respect to the "varying" limitations. Although Complainants do give lip service to the concept of the "entire oscillator" in their argument (*see* CBr. at 40-41) they leave out the actual operational aspects of the relevant oscillators in the Accused Products, which do not perform in accordance with the "varying" limitations of the asserted claims. On this account, the Administrative Law Judge finds that Complainants' evidence does not show that any of the Accused Products infringe the asserted claims of the '336 patent with respect to the "varying" limitations that are alleged by Complainants.

The Administrative Law Judge finds that Dr. Subramanian, on the other hand, took into account the "entire" terms, as construed, in addressing the "varying" limitations and that the testing he described and the data obtained therefrom are reliable and support his opinion that none of the Accused Products satisfies the "varying" limitations of the asserted claims. The Administrative Law Judge finds that Respondents' evidence, irrespective of the failure of Complainants' evidence to show otherwise, affirmatively shows that none of the Accused Products infringes any of the asserted claims with respect to the "varying" limitations.

Complainants argue that Dr. Subramanian's tests confirm that there is variation in temperature or voltage, which his slides call variation tolerance, although Respondents explain this as tolerance associated with the measurements. Complainants argue that tolerance is variation and that Dr. Subramanian shows tolerances or variation over each temperature and voltage range associated with each of his tests. Although Respondents characterize the results of Dr. Subramanian's testing as "essentially flat," Complainants say they actually confirm variation of the oscillator's clock rate due to PVT.

The Administrative Law Judge disagrees with Complainants. Dr. Subramanian testified that the scale used in Complainants' graphs is actually "below the noise floor of the measurement instrument," such that any perceived unevenness in the data points using Complainants' magnified scale relates to the measurement instrument's precision limit. (Tr. (Subramanian) at 1243-44, 1481-82.) As with a microscope, which allows a user to see only to a certain degree of magnification, the Agilent frequency measurement tool has a detection limit on how small of a frequency difference it can detect. In light of the instrument's detection limit and the microscopic nature of the fluctuations, an apparent fluctuation of 0.00001 gigahertz occurring between zero and sixty degrees Celsius for the { } chip is virtually no variation at all. Dr. Subramanian demonstrated that there is no variation in the measured PLL output frequency—"This is statistically flat." (Tr. (Subramanian) at 1481.) Complainants produced no empirical evidence to show otherwise.

With respect to Complainants' criticism regarding the 10-minute time intervals between temperature measurements for the { } and the 30- to 60-second intervals for the Exynos 4412 voltage tests, Dr. Subramanian testified the 10-minute interval between measurements was necessary to allow the oven in which the tests were being conducted to reach the next temperature point in order to obtain accurate temperature measurements. (Tr. (Subramanian) at 1250, 1477-78.) The 30- to 60-second intervals for the voltage measurements were necessary in order to allow the technician who operated the testing equipment under Dr. Subramanian's direction to manually change the voltage values for the ensuing measurements. (Tr. (Subramanian) at 1478.) There is no evidence that these time intervals had an effect on the validity or reliability of the measurements since the accused PLLs output a frequency signal when they are in a locked state, at which time the frequency is fixed and very stable. (Tr. (Subramanian) at 1250-51, (Haroun) at 187.) There is also no reason to expect any difference or variation in the frequency of the PLL regardless of the point in time at which the measurement occurs. (Tr. (Subramanian) at 1507.) The frequency should remain constant regardless of the measurement interval, and as the tests showed, the frequency did remain constant at each time interval tested. (*Id.*) There being no empirical evidence to show otherwise, the Administrative

Law Judge finds the preponderant evidence favors Dr. Subramanian and Respondents on this point.

As for Dr. Oklobdzija's criticism that the testing failed to detect the frequency of the PLL in an unlocked state, Respondents reply that such measurements would be irrelevant because the PLLs in the accused chips output clock frequency only in the locked state. (Tr. (Subramanian) at 1250-51, (Haroun) at 187.) Because a PLL in an unlocked state does not output a clocking signal to the rest of the chip, any inquiry about the unlocked state is immaterial when it comes to analyzing claims that expressly require a clock or oscillator to clock the supposed CPU. (Tr. (Subramanian) at 1250; JXM-0001 at claims 1, 6, 10-11, 13, and 16.) The Administrative Law Judge agrees and finds that Dr. Oklobdzija's criticism in this regard does not discredit or diminish Dr. Subramanian's testimony and opinions based on the testing that was done on Accused Products.

Complainants fault the increments that were used to graph the temperature measurement for the { } and voltage test results for the Samsung Exynos 4412 chip. The clock signal generated by the { } PLL is about 1,500 megahertz (1.5 gigahertz), which is three times the increment that was used. Dr. Subramanian testified that "this [scale] is absolutely the appropriate scale to use." (Tr. (Subramanian) at 1470.) The same holds for the voltage measurements in the Exynos 4412 chip, where the 10 megahertz increments are appropriate for the measured signal of about 50 megahertz, which is five times the increment that was used. Dr. Oklobdzija did not question the increments used in Dr. Subramanian's graphs, nor did he suggest that a different scale should have been applied. The Administrative Law Judge finds the methodology used by Dr. Subramanian was valid and reliable in this respect and that Complainants' criticisms are not meritorious.

The use of smaller increments on the graph, such as 1 megahertz, or even 0.01 megahertz, does not discredit the finding that the PLL output frequency for each of the tested chips remained fixed and stable over wide variations in temperature and voltage. (RDX-0004.97; RX-1180C; RX-1182C (Exynos results); RDX-0004.101; RX-1189C; RX-1190C ({ } results).) The PLL output frequency of the { } chip was fixed and stable over the temperature range of zero degrees to sixty degrees Celsius, and the frequency measurements for the Exynos 4412 chip were similarly fixed and stable over the power-supply range of 0.95 volts to 1.2 volts. Dr. Subramanian testified that the data "is completely flat as a function of frequency." (Tr. (Subramanian) at 1225, 1217.) Dr. Subramanian said he had selected the Y-axis scale for his graph based on the teachings of the '336 patent. (Tr. (Subramanian) at 1507 ("the scales that I used to plot those were specifically used to be consistent with the patent terminology and patent descriptions"); JXM-0001 at 16:61-63 (discussing variation from 50 megahertz at 70 degrees Celsius to 100 megahertz at 22 degrees Celsius.) The Administrative Law Judge finds the evidence in this respect is valid and reliable.

Although Complainants prepared a graph of their own, using some of Dr. Subramanian's testing data (Tr. (Subramanian) at 1474), and base part of their argument on it (CRBr. at 37-38; CDX-0086C), the exhibit that appears in their brief is not the one that was offered and received in evidence. Respondents say Complainants are using this altered exhibit to speciously claim that it reveals *de minimis* variations. The altered graph lacks testimonial support, and Respondents say it highlights a fundamental flaw in Complainants' contention: instead of showing the "mean frequency" in megahertz on the Y-axis, as CDX-0086C does, the Y-axis in Complainants' altered graph shows "change from initial mean frequency" and uses different units of measurement, kilohertz instead of megahertz. Respondents say these alterations highlight the fact that the original CDX-0086C that was produced and used at the hearing is ineffective for supporting Complainants' "varying" argument, since it plots the { } data points on a miniscule scale that ranges only from 1.512028 gigahertz to 1.51238 gigahertz. Therefore, Complainants changed CDX-0086C by magnifying the Y-axis scale by a factor of more than 200,000 and plotted these data points over a miniscule 0.00001 gigahertz range. As noted above, Respondents say changing the units of the Y-axis fails to remedy the flaw in Complainants' argument, because the underlying data remains the same and the argument Complainants are making is akin to zooming in on a flat table with an electron microscope to argue that misalignment in the atoms on the table's surface somehow prevents the table from being flat. The Administrative Law Judge finds that the original version of CDX-0086C is admissible but, for the reasons advanced by Respondents, as discussed above, finds that it does not discredit Dr. Subramanian's graphs or data, or the testing that they were derived from. However, the Administrative Law Judge finds that the graph that appears in Complainants' opening brief at page 37 is not substantive evidence because it was not supported by, or exposed, to testimony.

The Administrative Law Judge finds the preponderance of evidence warrants a finding that none of the Accused Products satisfies the "varying" limitations of any of the asserted claims of the '336 patent.

In making this finding, the Administrative Law Judge has also considered the other criticisms leveled by Dr. Oklobdzija and Complainants against the testing methods that were used to obtain the data and other information that Dr. Subramanian relied on for his opinions and factual testimony, which are mentioned above, and finds they do not discredit Dr. Subramanian and have been fully addressed and answered by Respondents.

The Administrative Law Judge finds Dr. Subramanian's testimony to be verifiable and reliable. Although Dr. Oklobdzija expressed disbelief in the results of Dr. Subramanian's tests, the fact is that Dr. Subramanian supported his testimony and opinions with concrete evidence; whereas Dr. Oklobdzija resorted to professions of disbelief and nay-saying. This is where the empiricism versus opinion comes into play, as well as the question of veracity previously mentioned. The fact that Dr. Oklobdzija has a reputation as and standing as an expert in the field of microprocessor clocking does not make his opinions and comments on the subject sacrosanct, nor does it relieve Complainants of their burden of proof. Dr. Subramanian telegraphed the testimony he would give at the hearing in his expert report, and Complainants had a full and fair opportunity to muster concrete evidence to disprove or discredit his testing methods and data, but they did not. Instead, what they offer in opposition are expressions of dubiety and nay-sayings. The Administrative Law Judge finds that Dr. Subramanian's testimony on this point is based on reliable evidence and has not been disproved or depreciated by Dr. Oklobdzija's criticisms.

Dr. Subramanian testified that Dr. Oklobdzija's claim that it is impossible to push a one gigahertz clock beyond the input-output boundary of the chip does not apply to the tested Samsung chips and Kyocera phone because the measured frequencies were below one gigahertz, since the clock signal passed through a fixed-ratio divider. (Tr. (Subramanian) at 1238.) Even with respect to the { } measurements, which were at 1.5 gigahertz, Dr. Oklobdzija's impossibility argument is opposed by the operation of the { }, which Complainants have accused in this Investigation. Dr. Subramanian testified that one of the implementations of the DDR3 technology standard involves outputting a one gigahertz signal across a chip's input-output interface, thereby disproving Dr. Oklobdzija's impossibility argument. (Tr. (Subramanian) at 1238-39.)

Complainants argue that Dr. Subramanian's testimony that implementation of the so-called "Double Data Rate" 3, or DDR3, involves outputting a one gigahertz signal across the chip's I/O interface does not prove, or disprove, anything. Dr. Subramanian did not provide any details of the DDR memory implementation and no details or specifications about the { } he used, so it is not possible to verify Dr. Subramanian's claim that the { } used the "very careful impedance matching" he testified would be required to push such a high signal across the chip's I/O boundary, according to Complainants. The Administrative Law Judge disagrees. It was Dr. Oklobdzija who made the assertion of impossibility. Dr. Subramanian responded by providing specific testimony to the contrary. (Tr. (Subramanian) at 1238-41.) Dr. Oklobdzija was the one who should have furnished substantiation for his contention. The evidence provided through the testimony of Dr. Subramanian was adequate to the task of refuting Dr. Oklobdzija's naked assertion. The evidence in this Investigation confirms that outputting a signal in the gigahertz frequency range through an input-output interface is possible, as shown by the 1.512 gigahertz frequency measurements output by from the { }. (Tr. (Subramanian) at 1239.)

Dr. Oklobdzija testified that a chip does not have a pin to extract the clock signal, and the PLL cannot run at 50 megahertz. (Tr. (Oklobdzija) at 767-768, (Subramanian) at 1239.) Respondents say this point rehashes the prior criticisms, but with respect to the tested { } phone, Dr. Oklobdzija failed to understand that the measurements obtained reflect a divided-down fraction of the PLL's frequency that was output through the CAMIF camera interface. (Tr. (Subramanian) at 1240.) With respect to the chips on the development boards, Dr. Oklobdzija failed to realize that the boards have input-output pins that allow measurements of the clock signals. (Tr. (Subramanian) at 1240.) Depending on the configuration of the board, Dr. Subramanian either measured the clock signal's full frequency at 1.5 megahertz for the { } or detected a divided-down frequency of about 50 megahertz for the Samsung development boards, which use a fixed-ratio divider at the output pin. (*Id.*) The use of a fixed-ratio divider does not affect the validity of the results, since any variations in the clock signal would also appear in the divided-down signal. (Tr. (Subramanian) at 1237.) The Administrative Law Judge finds that Dr. Subramanian's testimony in this respect and the data he derived from the testing that was done on Accused Products as well as methods that were employed in doing so are reliable and are not discredited or depreciated in their probity by Dr. Oklobdzija's criticisms.

Another criticism raised by Dr. Oklobdzija is that a probe was not inserted into the chip and that it is otherwise very difficult to measure inside a chip, in reply to which Respondents say the use of development boards for the Samsung chips and { }, as well as the use of the camera clock in the { }, made such invasive measurements unnecessary. The Administrative Law Judge finds that the testimony of Dr. Subramanian was sufficient to overcome Dr. Oklobdzija's criticism in this regard. (*See* Tr. (Subramanian) at 1241, (Oklobdzija) at 768.)

Dr. Oklobdzija questioned the precision of Dr. Subramanian's measurements because they appeared to exceed the precision of the crystal's specification. (Tr. (Subramanian) at 1242, (Oklobdzija) at 764-765.) This argument is off target, argue Respondents, because even though the '336 patent characterizes crystal clocks as providing a fixed frequency, crystal clocks, even temperature-compensated crystal oscillators, still exhibit very small variations. (Tr. (Subramanian) at 1245; JXM-0018 at 18-34 (patentee recognizing during the original prosecution of the patent that crystal clocks exhibit small PVT-related variations).) Because of this, a crystal's specifications provide a range for such variations. (Tr. (Subramanian) at 1245.) In high-performance devices, such as cell phones, the crystals usually vary no more than 10 parts per million, and the crystal used on the development boards in this Investigation included either a standard crystal with a variance of ten parts per million or a high-precision crystal with a variance of five parts per million, or less. (Tr. (Subramanian) at 1246.) Dr. Subramanian testified that at the nominal frequency of 50 megahertz, such as the case of the crystals in the Samsung chips, the standard ten part per million translates to a worst-case variation of 500 hertz over the full temperature range of -20 degrees to 70 degrees Celsius, as is shown in the crystal's specification. (Tr. (Subramanian) at 1246-47.) Since the measured temperature range of zero to seventy degrees Celsius is a fraction of the temperature range in a crystal's specification, which is minus 20 degrees to plus 70 degrees Celsius, Dr. Subramanian calculated that the crystal's frequency variation for the range that he measured would be, conservatively, about 300 hertz, which is 0.0003 megahertz. (Tr. (Subramanian) at 1247-48.) This variance of 300 hertz in the crystal's frequency is in line with the 280 hertz variance for the PLL output frequency measured by Dr. Subramanian. (Tr. (Subramanian) at 1248; RX-1180.2.) Therefore, the precision of Dr. Subramanian's variance measurements matches the precision of the crystal's variance. (Tr. (Subramanian) at 1248.) Dr. Subramanian performed the same calculations for the data related to the { }, which were measured over a smaller range of temperatures, zero to fifty degrees Celsius, and he reached the same conclusions. (Tr. (Subramanian) at 1248-49.) Therefore, the Administrative Law Judge finds that Dr. Oklobdzija's criticism was refuted by Dr. Subramanian. (Tr. (Subramanian) at 1249.)

As for Dr. Oklobdzija's citation to and reliance on a textbook edited by Professor Chandrakasan in support of Dr. Oklobdzija's argument that, according to the laws of physics, the frequency of a PLL will vary with PVT, Respondents point to the fact that Dr. Oklobdzija admitted on cross-examination that the cited excerpt in the textbook does not discuss a single operational product, much less any of the Accused Products or chips. (*See* Tr. (Oklobdzija) at 871.) Nor does it mention PLLs or voltage-controlled oscillators. (*See* Tr. (Oklobdzija) at 871; CX-0154.)

Based on his review of the textbook excerpt, Dr. Subramanian concluded that it does not support Dr. Oklobdzija's argument. (Tr. (Subramanian) at 1254; RDX-4.104.) Dr. Subramanian explained his position this way:

> Now, the specific reasons [why Dr. Oklobdzija is] running into problems with respect to the laws-of-physics argument is, he's identifying a physical fact – in other words, these variations happen – and he's trying to tie it to a real processor and ignoring the circuits that basically prevent that variation from doing anything. In other words, he's taking this physical fact and applying it to a prior-art approach. And he's incorrect in that regard.

(Tr. (Subramanian) at 1254-55.) By focusing on a theoretical paper using statistical modeling, Dr. Oklobdzija misses a simple truth, which is that a PLL compensates for any PVT effects on transistors in order to keep the output frequency stable and fixed. (Tr. (Subramanian) at 1255.) What Dr. Subramanian testified on this point gets back to an earlier observation: Dr. Oklobdzija and Complainants are confining their attention to the oscillator itself, isolated in time and space from the PLL and the effects of the oscillator operating within the circuitry of the PLL on the clocking mechanism. This approach by Dr. Oklobdzija and Complainants strips away the word "entire" from the term "entire oscillator" and then restricts the word "varying" to the stripped-down "oscillator," which is not how the oscillators in the Accused Products function, as Dr.

Subramanian described in his testimony. The Administrative Law Judge rejects Complainants' argument in this regard.

Dr. Oklobdzija claimed that jitter is a PVT-related variation in the Accused Products. (Tr. (Oklobdzija) at 513-514.) But Dr. Subramanian testified that jitter is not a change in frequency. (Tr. (Subramanian) at 1256-57); RDX-0004.105.) Specifically, the rising and falling edges of an idealized clock signal, as illustrated by the red lines in the excerpt from RDX-0004.105 shown above, are precisely spaced and appear exactly where they ought to be. (Tr. (Subramanian) at 1256; RDX-0004.105.) However, the position of the edge of a clock signal does not follow this idealized representation; sometimes an edge may surface early, sometimes late. At other times it may show up when it ideally should. (Tr. (Subramanian) at 1256.) There is a random aspect to the process. (Tr. (Subramanian) at 1256-57.) This is called jitter, and it is not a change in frequency, as Dr. Oklobdzija asserts. (Tr. (Subramanian) at 1256.)

Respondents say random occurrence in the arrival of a particular edge of the wave is not the type of variation that arises from PVT. Although the position of an edge may randomly shift from one cycle to the next, overall the frequency of the clock signal does not change. (Tr. (Subramanian) at 1257.) This randomness is miniscule, while the patent focuses on large performance variations caused by PVT. (Tr. (Subramanian) at 1258, 1261.) Crystal oscillators themselves exhibit jitter. (Tr. (Subramanian) at 1258-59; JXM-0018 (Prosecution History) at 3-4.) Despite the effect of jitter on crystals, the patent characterizes crystals to be fixed clocks. (JXM-0001 at 17:29-34.) Thus, jitter is a physical phenomenon the origins of which are distinct from PVT, and the evidence does not show that jitter to be a function of PVT. Therefore, the Administrative Law Judge concludes that the presence of jitter alone does not satisfy the "varying" limitations of any of the asserted claims, does not refute Dr. Subramanian's conclusions, and does not constitute a basis for a finding of infringement here.

Dr. Oklobdzija points to { } mention of PVT in certain technical documents for some of the accused chips as evidence of the claimed "varying…due to [PVT]." (Tr. (Oklobdzija) at 463-465.) Respondents say that merely mentioning PVT falls short of meeting Complainants' burden of proof. All of the { } statements involve discussion "over worst-case process/voltage/temperature." (RDX-0004.107C; CDX-0005.40C-42C.) { } and guarantees their operation under extreme conditions, by mapping out the possible worst-case PVT conditions and then designing its chips to operate under these worst-case conditions. (Tr. (Subramanian) at 1262; RDX-0004.107C.) Respondents say that { } statements mean only that "whoever uses our chip, we want to guarantee that under worst conditions it will still work" and "out of this limit, don't return the product to us." (*See* Tr. (Oklobdzija) at 875-876.) This, argue Respondents, has nothing to do with the claimed variation. (Tr. (Subramanian) at 1262.)

Respondents point out these statements of { } indicate that its practice falls squarely within the prior art, which the patent took pains to distinguish. According to the patent, "[t]raditional CPU designs are done so that with the wors[t] case of the three parameters, the circuit will function at the rated clock speed," which means that the CPU must be clocked at a speed slower than the chip's maximum theoretical performance for it to operate properly under those worst case PVT conditions. (JXM-0001 at 16:48-53.) As with the traditional approach that the patent criticizes, { } is concerned about PVT and, therefore, designs its circuits to operate at a rated clock speed that will allow the CPU to operate under these worst-case conditions. (Tr. (Subramanian) at 1262-63, (Oklobdzija) at 877-878.) Merely caring about PVT and designing for worst-case scenarios, however, does not mean that the frequency of the PLL actually varies due to PVT. (Tr. (Subramanian) at 1263.) To the contrary, it demonstrates the use of the prior art traditional CPU design that the patent sought to overcome. (Tr. (Subramanian) at 1262-63.) Dr. Subramanian testified that Dr. Oklobdzija attempts to make a logical leap that has no technical or factual support when he fosters this argument. (*Id.*)

This is what Dr. Subramanian testified:

> Now, Dr. Oklobdzija identifies, as shown in RDX-4.107, some statements in { } that say they care about PVT effects, and that is certainly true, because, as someone who has designed chips for many years, we have to design to work across all conditions.
>
> But { }. In other words, they consider the PVT to map out the envelope of possibilities, and then they design their chips so that they work even at the worst case. This has nothing to do with variation. This is fixed frequencies directly along the lines of what the prior art did.
>
> Merely the fact that there are possible variations in PVT is not sufficient to establish infringement, and we can see that from the criticism in the patent of the prior art, which we see at column 16, lines 48 through 50C, where it says, "Traditional CPU designs are done so that with the worst case of the three parameters the circuit will function at the rated clock speed."
>
> The predicate for that statement is that whoever did those traditional CPU designs cared about PVT, so they designed it to work at the worst case. So it's not correct to say that the fact that they care about PVT means that they're varying with PVT, and in fact I'm showing you that they don't.

(Tr. (Subramanian) at 1263-64.) { } documents also do not support Dr. Oklobdzija's claim that the "varying" claims are met because { } acknowledges that PVT factors are recognized, a matter of concern, and need be addressed. As Dr. Subramanian testified, this is in line with the conventional approach as opposed the approach taken by the '336 patent. The '336 patent states: "The traditional CPU designs are done so that with the wors[t] case of the three parameters, the circuit will function at the rated clock speed." (JXM-0001 at 16:48-50.) { }. The fact that { } recognizes the effects of PVT simply acknowledges and addresses this concern in the traditional way, which is what the patent rejects.

For the reasons provided by Dr. Subramanian and in light of the language of the patent, including its asserted claims, the Administrative Law Judge finds that the { } documents referenced by Dr. Oklobdzija do not support the conclusion that the { } or any of the other Accused Products meet the "varying" limitation of the asserted claims.

As for Dr. Oklobdzija's assertion that binning is evidence of variations due to manufacturing process, the Administrative Law Judge concludes that while binning is a reflection that variations exist in the performance capabilities of microprocessors (Tr. (Subramanian) at 1264), this does not constitute evidence that any of the Accused Products meet the "varying" limitations of the asserted claims. Dr. Subramanian's testimony and the testing it was based on empirically demonstrate that the operational frequencies of the chips, no matter their individual differences are fixed. (Tr. (Subramanian) at 1265-66).) Once again, Dr. Oklobdzija and Complainants apply the "varying" limitation in a hermetic fashion as though an oscillator having a power source is the claimed "entire oscillator" and it does not matter that the frequency of the oscillators in the Accused Products are fixed, both internally and externally. For the reasons previously discussed, this argument is found to be erroneous.

As regards the jurisdictional argument, the Administrative Law concludes that since the evidence does not establish that any of the Accused Products infringes the '336 patent, it follows that they do not infringe at the time of importation.

With respect to the OMAP chips, the Administrative Law Judge finds that the preponderance of evidence does not establish that the "varying" elements of the asserted claims are met by the Accused Products. In the end, Complainants' evidence is primarily theoretical or dogmatic and does not withstand the opposing empirical evidence produced by Respondents. The Administrative Law Judge notes that Respondents do raise a somewhat theoretical argument of their own, in the sense that the difference between the variation of the processing frequency of the CPU and the speed of the PLL have not been established empirically. However, conceptually the point is valid and sufficient to overcome Dr. Oklobdzija's opposing conceptual opinion, and since the Complainant bears the burden of proof, the Administrative Law Judge finds the evidence in support of the allegations of infringement of the "varying" limitations of the asserted claims is deficient for this reason as well.

Respondents argue that Dr. Oklobdzija persistently, and wrongly, equated "processing frequency capability" with "processing frequency" throughout his testimony, even though these are two distinct concepts. Processing frequency capability is the maximum frequency at which a part can run, but that is not the actual frequency at which the part operates. (Tr. (Subramanian) at 1271.) The speed at which the part actually runs is its processing frequency, say Respondents. (Tr. (Subramanian) at 1271.) The claims, especially 1 and 11, distinguish between these two concepts by requiring that the CPU's "processing frequency capability" vary with PVT, while demanding that that the speed of the ring oscillator variable speed system clock (i.e., its processing frequency) vary due to PVT. (JXM-1 at claims 1, 11.) But Dr. Oklobdzija, in his analysis, focuses on the clock's capability rather than its actual speed. (Tr. (Oklobdzija) at 301-302.) In so doing, Dr. Oklobdzija wrongly rewrites the claim language and erroneously analyzes the facts, argue Respondents.

By conflating these two distinctly-claimed elements, Dr. Oklobdzija disregards an important fact about the accused chips and products: by design, a PLL compensates for any PVT-related effects in order to maintain a stable and fixed frequency. (Tr. (Subramanian) at 1273; RDX-0004.111.) Dr. Subramanian testified that, while PVT affects the maximum operating capability of a transistor, the PLL and its components are not running at this maximum capability, and this allows them to provide a fixed output frequency:

> [S]o I've already said that PVT does affect the maximum transistor operating speed. And the reason that PLLs are able to ensure that the output of the PLL, including the output of the oscillator within that PLL, is so precise is because the oscillator is not running at its maximum possible speed. The PLL ensures that it is very stable at a value below it, and in fact, when the PLL is in lock, it will be set up such that the oscillation of that oscillator will be at a speed below the maximum possible capability; in other words, the performance capability. And by doing that, the PVT variation does not affect the oscillator output, which is why we obtained the data that we did, Your Honor.

(Tr. (Subramanian) at 1295.) Succinctly put, a part's processing frequency capability may change with PVT, but its actual speed, or processing frequency, remains constant. (Tr. (Subramanian) at 1273; RDX-0004.111).)

The Administrative Law Judge considers this argument to be another way of expressing the fact that Dr. Oklobdzija and Complainants have restricted their focus of the "varying" limitation to an oscillator, divorced from the claimed "entire oscillator." While the oscillators in the PLLs of the Accused Products are capable of variable frequencies in response to PVT factors, nevertheless, they are constrained to provide fixed clocking signals to the CPU and the claimed first and second plurality of electronic devices. Although Complainants dispute this proposition, the Administrative Law Judge finds that either way it is expressed, the result is the same: the Accused Products do not satisfy the "varying" limitations of the asserted claims of the '336 patent.

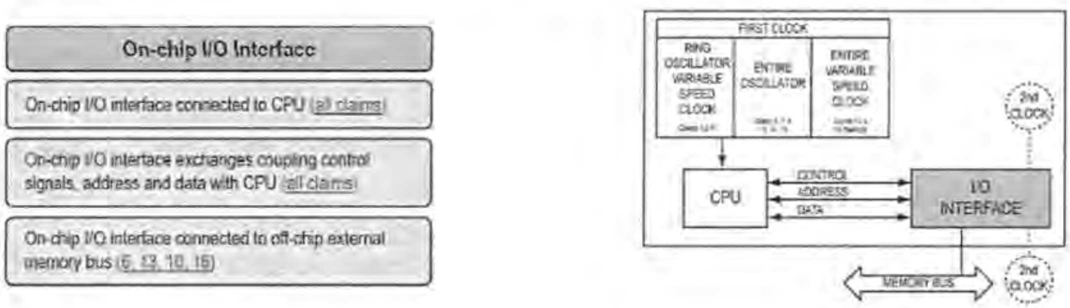
Respondents say that, in a last ditch effort to prove the "varying...due to [PVT]" limitation, Dr. Oklobdzija brought up a new theory at the hearing, by saying the PLL's dead band somehow meets the "varying together" requirement of the asserted claims. (Tr. (Oklobdzija) at 1056-57.) Respondents say the PLL's dead band is an artifact of the design and sensitivity of the PLL's { }. While very sensitive, the { } below which it is unable to detect an extremely small phase difference between the loop's feedback signal and the reference signal. (Tr. (Subramanian) at 1278.) As a result, there is a small region where the PLL does not detect this minute phase difference, and this is called the "dead band." Respondents argue that the dead band phenomenon cannot satisfy the claim limitation because the dead band itself and its size are unrelated to PVT. This is because the dead band is set and controlled by the { }, and it is not set by PVT. (Tr. (Subramanian) at 1278.) Also, the dead band values are truly tiny, well below a crystal's own 0.01 percent variation and thus are within what the patent calls "fixed." (Tr. (Subramanian) at 1279.) Because PVT does not cause dead band and its value is fixed, within the meaning of the patent, it cannot be counted on to meet the "varying" limitation, say Respondents.

The Administrative Law Judge agrees and finds that the "dead band" phenomenon is not evidence that any of the Accused Products meet the "varying" limitations of any of the asserted claims.

In conclusion, with respect to the issue of whether any of the Accused Products satisfies the "varying" limitations of any of the asserted claims, the Administrative Law Judge finds that there is not a preponderance of evidence that shows that any of the Accused Products does. The Administrative Law Judge finds that Complainants' evidence is deficient in that it is based mostly on theorized and a priori conclusions, while there is empirical evidence produced by Respondents that shows that none of the Accused Products meets the "varying" limitations of any of the asserted claims. Both the offensive and defensive evidence produced by Respondents is more rigorous and substantial than the evidence produced by Complainants, who ultimately bear the burden of proof.

3. The "On-Chip Input/Output Interface" Limitation

Complainants say that each of the Accused Products includes an "on-chip input/output interface" required by all asserted claims. Order No. 31 defined this term to mean: "a circuit having logic for input/output communications, where that circuit is located on the same semiconductor substrate as the CPU." Complainants say the claim requirements associated with the on-chip I/O interface are summarized in CDX-0004.11, shown here:



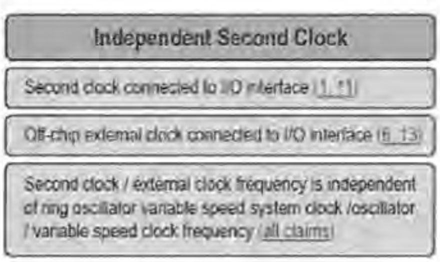
(CBr. at 41 (citing CDX-0004.11).)

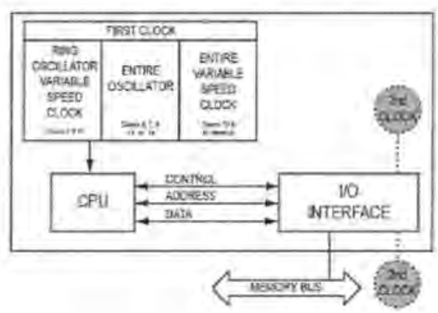
Complainants say the asserted claims require that the on-chip I/O interface be connected "to exchange coupling control signals, addresses and data" with the CPU, and that all of the Accused Products have at least one on-chip I/O interface that satisfies these requirements. (*Id.*) Complainants say Dr. Oklobdzija testified that block diagrams for the relevant processors show that they include on-chip input/output interfaces that are connected with the CPU via a bus system. (*Id.* (citing Tr. (Oklobdzija) at 495-496).) The interfaces are connected to exchange coupling control signals, addresses, and data with the central processing unit via the busses. (*Id.* (citing Tr. (Oklobdzija) at 543-545).)

Complainants say claims 6, 10, 13, and 16 require that the on-chip I/O interface be "connected between" the CPU and an off-chip external memory bus. (*Id.* at 42.) The relevant

Accused Products are connected to external memory via on-chip I/O interfaces, say Complainants, and these, in turn, are connected to the CPU via the same internal bus systems discussed above. (*Id.* (citing Tr. (Oklobdzija) at 543, 545).)

Each of the Accused Products includes an "off-chip external clock" and/or "second clock" connected to the on-chip input/output interface, according to Complainants. (*Id.*) Independent claims 6, 13, and 16 characterize this element as an "off-chip external clock," while independent claims 1 and 11 refer to it as a "second clock" that may or may not be "off-chip." (*Id.*) However, say Complainants, all of the claims require that the "off-chip"/"second clock" be "independent" of the "first/CPU clock." Complainants say the claim requirements associated with the independent off-chip/second clock are summarized in their exhibit CDX-0004.15, reproduced here:





(*Id.*)

Neither Respondents nor Staff address this issue in their briefs, and therefore Complainants contend that the evidence is not disputed that all of the Accused Products satisfy this limitation. (CRBr. at 51.)

The Administrative Law Judge concludes that the evidence is sufficient to show that the Accused Products satisfy this limitation.

4. The "Second" and "External" Clock Limitations

a) Complainants' initial arguments

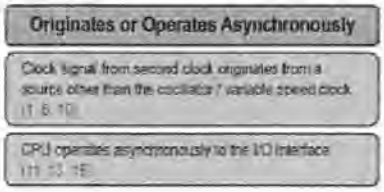
Complainants say the Accused Products include second clocks for clocking the on-chip I/O interfaces mentioned above and that some of the second clocks are internal to the processors and only apply to claims 1 and 11, and others are external and apply to all of the asserted claims. (*Id.*) In each case, the second clocks are independent of the first clock, originate from a source different from the first clock, and are asynchronous from the first clock. (*Id.*)

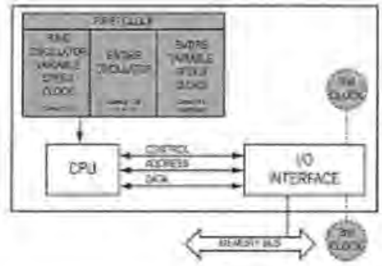
(1) *Independence*

Complainants say that regardless of whether a particular claim refers to the off-chip/second clock as an "off-chip external clock" or a "second clock," it must be "independent" of the "first/CPU clock." (*Id.* at 43 (citing Order No. 31 at 11-12).) According to Complainants, all of the Accused Products have at least one independent off-chip/second clock that satisfies the second clock limitations. Complainants say that, as regards the second clocks identified in Section III.C. of their opening brief, Dr. Oklobdzija testified that "[w]e have identified or established their independence, basically, by coming from two independent PLLs or ring oscillators within those PLLs." (*Id.* (citing Tr. (Oklobdzija) at 702).) Moreover, argue Complainants, the second clocks are independent even if they have the same reference frequency. (*Id.* (citing Tr. (Oklobdzija) at 1060-61; CX-0321C at AMZ_TPL_00059599).)

(2) *Asynchronous*

In addition to the "independence" requirement discussed above, claims 11, 13, and 16 include the following requirement: "wherein said central processing unit operates asynchronously to said input/output interface." (*Id.*) Complainants say the claim requirements associated with "asynchronous" operation are summarized in their exhibit CDX-4.19, reproduced here:





(*Id.* at 43-44.)

Complainants say the evidence established that these requirements are satisfied for all of the Accused Products. For example, Dr. Oklobdzija testified that the Texas Instruments OMAP chip in which the CPU ("MPU") was clocked by the "MPU DPLL": "Due to the MPU DPLL, the Cortex-A9 MPU subsystem is asynchronous from the rest of the device." (*Id.* at 44 (citing Tr. (Oklobdzija) at 1061-62).) Dr. Oklobdzija testified that PLLs will not work if there is a predictable phase relationship. (*Id.* (citing Tr. (Oklobdzija) at 1026-28).) He added: "the predictable phase relationship as defined…is that those two signals come edge and edge; they come exactly on or exactly off, but always the same. And that's not happening." Thus, there will never be a "predictable phase relationship" between the CPU/"first clock and the "second clock," even if they use the same reference oscillator. (*Id.*)

b) Respondents' initial arguments

Respondents say Complainants have not shown that the alleged "second clock" is either independent or asynchronous. (RBr. at 119.) Respondents report that Order No. 31 construed certain phrases related to the "second clock" limitations as set forth here:

Claim Terms	Construction Adopted by Order No. 31
"second clock independent of said ring oscillator . . . system clock" (claims 1, 11)	a second clock wherein a change in the frequency of either the second clock or ring oscillator system clock does not affect the frequency of the other
"external clock is operative at a frequency independent of a clock frequency of said oscillator" (claims 6, 13)	an external clock wherein a change in the frequency of either the external clock or oscillator does not affect the frequency of the other
"external clock is operative at a frequency independent of a clock frequency of said variable speed clock" (claims 10, 16)	an external clock wherein a change in the frequency of either the external clock or the variable speed clock does not affect the frequency of the other
"wherein said central processing unit operates asynchronously to said input/output interface" (claims 11, 13, 16)	the timing control of the central processing unit operates independently of and is not derived from the timing control of the input/output interface such that there is no readily predictable phase relationship between them

(*Id.* at 119-120.)

(1) *Complainants and Dr. Oklobdzija have not shown that these limitations are met*

Respondents argue that although the construction of the "wherein ... asynchronously" limitation of claims 11, 13, and 16 includes more words, it incorporates a concept common to the limitations in claims 1, 6, and 10 because it expressly requires that the CPU's timing control operate independently of the I/O's timing control. In other words, the concept of "independent" clocking is common to all of the asserted claims' "second clock" limitations. (*Id.* (citing Order No. 31 at 74 (construing the "wherein ...asynchronously" limitation to require, among other things, that CPU's timing control "operates *independently of* and is not derived from" the timing control of the I/O interface)).) Respondents say Dr. Oklobdzija spent many hours during his direct testimony trying to prove up these limitations, including attempting to show that the accused I/O interfaces' clocks are independent. (*Id.* (citing Tr. (Oklobdzija) 529-542, 555-610, 663-754).) He did so because, as he conceded, all of the asserted claims require that the two clocks be independent. (*Id.* (citing Tr. (Oklobdzija) at 888:21-889:3 ("Q. Now, I want to turn to discussing this idea of 'independent.' We talked about that earlier today, and then the claims require these two clocks, the first and the second clock, as you've done in your analysis, and that those clocks need to be independent. Isn't that right? A. Yes, sir."); Tr. (Oklobdzija) at 890 (similar question), 891 (same)).) But Dr. Oklobdzija's analysis fell far short, argue Respondents. (*Id.*)

One example that occurred during Dr. Oklobdzija's cross-examination illustrates the unreliability of his analysis, say Respondents. Dr. Oklobdzija testified on direct examination that the { }, satisfied the "second clock" limitations because it supposedly has an independent second clock. (*Id.* at 120-121 (citing Tr. (Oklobdzija) at 889).) The independent second clocks that he identified included signals for the camera interface CAMIF, the USB interface, and the external memory interface SD. (*Id.* at 121 (citing Tr. at 889-890; CDX-0014.18; CDX-0044.1-44.3).) Despite the many hours of testimony and the large number of slides presented, Dr. Oklobdzija did not identify the source of these "second clock" signals, say Respondents. (*Id.* (citing Tr. (Oklobdzija) 890-891).) When questioned about the inadequate proof of independence between the clock signals, he confidently volunteered to trace his supposed "second clock" signals back to their source. (*Id.* (citing Tr. (Oklobdzija) at 890-891).)

Respondents argue that had he done the necessary "tracing" as part of his report or even before testifying, he would have realized that the source for all of these signals is the same PLL that supposedly clocks the ARM core (the accused CPU). (*Id.*) Indeed, the {

}. (*Id.* (citing Tr. (Oklobdzija) at 891-892; RX-0602 at LGE800ITC 1916).) In other words, { } (*Id.*) The same document also identifies {

}

Respondents argue that because the alleged "first clock" and "second clock" in the { } are the exact same PLL, they are not mutually independent. Changing the frequency of the PLL will necessarily affect the frequency of the clock signals to both the supposed CPU and the accused I/O interfaces. (*Id.* at 122 (citing Tr. (Subramanian) 1353:1-1354:5 (confirming that "if two clock signals are derived from the same source," the frequency of the source clock affects the frequency of the downstream clock)).) And because the same PLL outputs the accused "timing controls" to both the CPU and the I/O interfaces, the frequency of these signals necessarily has a readily predictable phase relationship, *i.e.* the clocks are not "asynchronous." (*Id.* (citing Tr. (Subramanian) at 1354-55 (confirming that "if the two clock signals are derived from the same source," there is a readily predictable phase relationship between them)).)

Respondents say that while this is one example, Dr. Oklobdzija's sloppy and incomplete analysis of the { } raises serious doubts about his testimony in general and his opinions about other accused I/O interfaces in particular. Despite hours of testimony about accused I/O interfaces, Dr. Oklobdzija failed to trace back the actual source of any accused I/O interface's clock, say Respondents. For many of the accused chips, Dr. Oklobdzija's only explanation about the "second clock" limitations consisted of conclusory statements affirming that he reviewed the schematics and decided that these limitations are met. (*Id.* (citing, by way of example, Tr. (Oklobdzija) 681-684 (providing conclusory statements for eight separate products from two respondents), 686-693 (same for 21 separate products from five respondents), 702-704 (same for 17 products from Garmin), 730-732 (same for Samsung)).) Respondents say such conclusory expert testimony is legally insufficient to support a finding of infringement, citing *Kim v. ConAgra Foods, Inc.*, 465 F.3d 1312, 1319-20 (Fed. Cir. 2006). (*Id.*) Respondents say that because Dr. Oklobdzija failed to perform this important analysis to show an independent "second clock" for the accused I/O interfaces, Complainants have not carried their burden of proof with respect to the "second clock" limitations. (*Id.* at 122-123.)

(2) *Dr. Subramanian showed that the Accused Products do not have an independent or asynchronous second clock*

Respondents say that Dr. Subramanian testified that two clock signals are not "independent" if they are derived from the same source because a change in the frequency of the source clock affects the frequency of the downstream clock. (*Id.* at 123 (citing Tr. (Subramanian) 1353-55).) For example, if two separate PLLs use the same 20 megahertz crystal oscillator as a reference clock, a change in the reference's frequency (such as switching to a 30 megahertz crystal) will cause the output frequency of both PLLs to change. (*Id.*) Similarly, two clocks are not "asynchronous" if they are derived from the same source. (*Id.* (citing Tr. (Subramanian) at. 1354-55).) For example, if one PLL drives two different structures, or if two separate PLLs rely on the same reference clock/crystal, the PLLs are not asynchronous because "there is a predictable phase relationship" between the clock signals in either case. (*Id.* (citing Tr. (Subramanian) at 1354-55; Order No. 31 at 74).)

Respondents argue that despite the requirements of the claim constructions, Complainants and their expert rely solely on I/O interface signals that are neither independent nor asynchronous. To illustrate this problem, Dr. Subramanian's testimony focused on the two most common I/O interfaces covered during Dr. Oklobdzija's direct testimony (USB and camera), in addition to the particular structure of the LSI Logic B5503A chip. (*Id.* (citing Tr. (Subramanian) at 1351-67).)

With respect to the USB interfaces, Dr. Subramanian demonstrated that that the clock signals for the USB interfaces in the accused { }, OMAP, and Samsung chips are neither independent nor asynchronous. The { }. (*Id.* at 124 (citing Tr. (Subramanian) 1355-57; RX-0602C at LGE800ITC 1914, 1917; RDX-0004.159C).) The { }. (*Id.* (citing Tr. (Subramanian) 1356; RX-0602C at LGE800ITC 1916-17)).) Reinforcing the use of { } included a statement warning that { } (*Id.* (citing Tr. (Subramanian) 1356-57 (indicating that, because { }; RX-0602C at LGE800ITC 1917).)

Dr. Subramanian reviewed source code of some of Respondents, including the source code of the accused {

} were in fact used in the Accused Products. (*Id.* (citing Tr. (Subramanian) 1357).) This source code revealed that because the alleged "first clock" and "second clock" in the { } are the same PLL, they are neither independent nor asynchronous. (*Id.* (citing Tr. (Subramanian) 1353-55 (explaining why structures relying on the same reference signal do not meet these limitations)).) Dr. Subramanian also discussed another USB architecture used in some { }, including the { } chip. (*Id.* (citing Tr. (Subramanian) at 1357-58; RDX-4.160C).) In this USB architecture, {

}. (*Id.* at 124-125 (citing Tr. (Subramanian) 1357-58; RX-0795C at ZTE853TPL 756865, 756868; RX-0869C at Kyocera_853_ 29538, 29544-45; RX-0624C at QTPL 22977-78; RX-0613C at QTPL 9428, 9327; RX-0800C at LGE800ITC 309549, 309650).) Because the alleged "first clock" and "second clock" use the same crystal's reference signal, the clocks are neither independent nor asynchronous, say Respondents. (*Id.* at 125 (citing Tr. (Subramanian) 1358, 1353-55).)

Respondents say the same problem arises with respect to Dr. Oklobdzija's opinions regarding the accused Samsung chips. (*Id.* (citing Tr. (Subramanian) at 1366-67; RDX-4.167C).) In the Samsung chips, the {

}. (*Id.* (citing RX-0696C at 853Samsung 167663-76; RX-0702C at 853Samsung 20060; RX-0699C at 853Samsung 42495).) Dr. Oklobdzija conceded this fact during his cross-examination. (*Id.* (citing Tr. (Oklobdzija) at 992-993).) Because the alleged "first clock" and "second clock" in the accused Samsung chips {

}, the clocks are neither independent nor asynchronous. (*Id.* (citing Tr. (Subramanian) at 1367; 1353-55).)

Dr. Oklobdzija's opinion that the OMAP4 and OMAP3 chips satisfy his "second clock" limitations is equally deficient, say Respondents. (*Id.* (citing Tr. (Subramanian) at 1362-64; RDX-0004.163C-164C).) In the OMAP4 chips, all of the DPLLs—including the DPLL_MPU (the alleged "first clock") and the DPLL_USB (the supposed "second clock")—receive and rely on the same external crystal oscillator's reference signals. (*Id.* (citing Tr. (Subramanian) at 1362-63; RX-0528C at LGE800ITC 85678-79, 85683-84; RX-0527C at AMZ_TPL 24590-91; RX-0526C at AMZ_TPL 40084-85; RX-0529C at TPL 2987999-2988003; RX-0524C at AMZ_TPL 15927-33; RX-0525C at AMZ_TPL 32076-82).) Similarly, the same external reference signal drives the OMAP3 chips' DPLLs, including the DPLL1 (the alleged "first clock") and the DPLL_PER (the supposed "second clock"). (*Id.* (citing Tr. (Subramanian) 1363-64).) Because these accused DPLLs rely on the same external reference signals, their clock signals cannot, under the adopted claim constructions, be independent or asynchronous. (*Id.* at 125-126 (citing Tr. (Subramanian) at 1363 (OMAP4), 1364 (OMAP3), 1353:1-1355:4 (explaining why structures relying on the same reference signal do not meet these limitations); RX-1804 at GARM-N37xx-031493-95, 31498-500; RX-1817 at GARMIN 68495).) And because these OMAP DPLLs are on the same chip, they cannot meet the requirements of claims 6, 10, 13, and 16 that the "second clock" must be an "off-chip external clock." (*Id.* (citing Tr. (Oklobdzija) at 896 (stating, among other things, "I agree with you that those PLLs are on-chip"), 897 ("So for some of them [claims] it has to be the external clock clocking the I/O interface.")).)

Even when Dr. Oklobdzija can point to a USB-related PLL on a different chip, as is the case for Garmin's products, Respondents say he is still unable to meet the requirements of the "second clock" limitations. (*Id.* (citing Tr. (Subramanian) at 1364-65; RDX-4.164C).) The accused Garmin products do not use the USB-related PLL functionalities on the OMAP3 chips; these products include a separate USB3311 chip which has its own internal PLL. (*Id.* (citing Tr. (Subramanian) at 1364-65; RX-1871C at GARM-nuvi_35xx 15920-23; RX-1818C at GARMIN 75081-84; RX-1808C at GARMIN 75074, 75077; RX-1816C at GARM-N37xxR 4314, 004342).) Even though the USB3311 chip's PLL is on a different chip from the OMAP3's DPLL1, both PLLs still receive and rely on the same external crystal reference. (*Id.*) Because the supposed "first clock" and alleged "second clock" use the same crystal's reference signal, their signals cannot be independent or asynchronous, say Respondents. (*Id.* (citing Tr. (Subramanian) at 1365, 1353-554 (explaining why structures relying on the same reference signal do not meet these limitations)).)

Finally, say Respondents, Dr. Oklobdzija even reached beyond the Accused Products to find another clock on a separate device, like a desktop or laptop computer. (*Id.* (citing Tr. (Subramanian) at 1359-61, (Oklobdzija) 1085; RDX-0004.161).) Under this theory, Dr. Oklobdzija alleges that a particular encoding scheme called NRZI carries an embedded clock signal. (*Id.* at 126-127 (citing Tr. (Subramanian) 1359, (Oklobdzija) 562-564).) Dr. Subramanian testified that this theory runs contrary to the evidence because "the USB blocks in question are actually clocked using a nonindependent, nonasynchronous clock." (*Id.* at 127 (citing Tr. (Subramanian) at 1360).) Worse yet, say Respondents, this theory requires that there must be a separate device connected to the Accused Products' USB interface, with the device and the product exchanging NRZI-encoded data over a USB cable. (*Id.* (citing Tr. (Oklobdzija) at 1085-86).) The Accused Products, however, are not imported while tethered to a desktop or laptop computer as NRZI-encoded data is transmitted between the computer and the product.

(*Id.* (citing Tr. (Oklobdzija) at 1086 ("I don't see desktop or notebook in your other hand."); RPX-0037 (accused LG Lucid phone in its original small box)).) Because there is no USB connection between any Accused Product and an external computer device at the time of importation, there is no "second clock" when the Accused Products enter the United States and thus no basis for a violation of Section 337 under this theory. (*Id.* (citing *Electronic Devices*, 2012 WL 3246515 , Comm'n Op. (Dec. 21, 2011) ("We also interpret the phrase 'articles that – infringe' to reference the status of the articles at the time of importation. Thus, infringement, direct or indirect, must be based on the articles as imported to satisfy the requirements of section.")).)

Consequently, Respondents say that the evidence reveals that Dr. Oklobdzija has not shown that the alleged "second clock" driving the USB interface in the accused { }, OMAP, and Samsung chips satisfies the constructions requiring independence or asynchronicity. (*Id.*) This problem goes beyond a simple failure of proof because Dr. Oklobdzija disregarded evidence undercutting his opinion by only presenting small excerpts of ambiguous schematics without tracing back the origins of these signals. (*Id.*)..His deficient analysis should not be credited, say Respondents. (*Id.*)

Respondents say that it was shown on cross-examination that Dr. Oklobdzija's testimony regarding the exemplary { } was woefully inadequate with respect to his "second clock" analysis. (*Id.* at 128 (citing Tr. (Oklobdzija) at 889-893).) On redirect, Complainants focused on a { } that { } receive from { }. (*Id.* (citing Tr. (Oklobdzija) at 1063-66).) According to Dr. Oklobdzija, this { } signal provides an alternative clock signal that supposedly satisfies the "second clock' limitations, and this conclusion remains untainted by his cross-examination on the {

}. (*Id.*) Going beyond the { }, Dr. Oklobdzija asserted that his opinion based on this signal extends to all { }. (*Id.* (citing Tr. (Oklobdzija) at 1067).)

Respondents say that, once again, Dr. Oklobdzija failed to trace back the { } signal to its ultimate source and thus failed to ensure that this signal is truly independent or asynchronous. Dr. Subramanian explained the flaw in Dr. Oklobdzija's analysis. (*Id.* (citing Tr. (Subramanian) 1361-62).) Although the { } signal comes from the image sensor, the PLL that generates the { } signal on the image sensor chip { }. (*Id.* (citing Tr. (Subramanian) at 1361:20-25; RDX-0004.162C).) This { }, whose output is also ultimately used to clock the CPU. (*Id.* (citing Tr. (Subramanian) at 1361-62).) In addition to the clear schematic block diagram (shown on RDX-0004.162C and reproduced below), Respondents assert that { } documents confirm this fact by stating that "{ }." (*Id.* (citing RX-0790C at LGE800ITC 305078, 305081).)

REDACTED

(*Id.* at 128-129 (citing RDX-0004.162C (excerpt)).) Respondents argue that the evidence indicates that changing the frequency of the { } on the { } will necessarily affect the frequency of the { }

as its reference signal. Further, since the { } signal { }, there is a predictable phase relationship between these signals. Accordingly, the requirement of independence and asynchronicity cannot be met. (*Id.* at 129 (citing Tr. (Subramanian) 1362).)

Respondents say this example again highlights the inadequate analysis of Dr. Oklobdzija and puts in doubt the reliability of his testimony about the "second clock" limitations, and for this reason there should be a finding that Complainants have not discharged their burden of proof as to this limitation. (*Id.*)

As to the LSI Logic B5503A chip, Dr. Oklobdzija does not allege that this chip supports USB or camera functionalities; rather, he focuses on two I/O interfaces associated with the hard disc functionalities on the chip: the host interface and the read/write interface. (*Id.* (citing Tr. (Oklobdzija) at 1022).) Respondents say his failure to acknowledge the common reference clock for the PLLs associated with these interfaces and the ARM processor again undercuts his analysis. (*Id.*) As Dr. Subramanian testified, and the deposition of LSI's corporate witness confirms, {

} For this reason, the requirements of independence and asynchronicity are not met in this chip, say Respondents. On redirect and re-cross, Dr. Oklobdzija was specifically asked about the host interface, which uses a SATA protocol. Dr. Oklobdzija admitted {

}. (*Id.* at 130 (citing Tr. (Oklobdzija)1080-81,1084).) But the claims require that the second clock be connected to an "input/output" port, so that the clocking for both communication directions must meet the independent and asynchronous limitations. (*Id.* at 130.) Accordingly, { }, Dr. Oklobdzija has admitted the host SATA interface does not meet these limitations. (*Id.*)

Respondents say that because the LSI Logic chip does not satisfy the "second clock" limitation, there cannot be infringement by any Accused Product containing this chip. Beyond the non-infringement of this chip, this LSI chip, like the { }, presents yet another example where Dr. Oklobdzija did not adequately review the technical material and perform a thorough analysis under the controlling claim constructions. Once again, the evidence casts doubt on the reliability of his opinion, and for at least this reason, his testimony regarding the "second clock" limitations for other Accused Products should be rejected, say Respondents. (*Id.*)

c) Staff asserts that these limitations are not met

Staff formats its brief on the basis of the individual claims, starting with claim 1, and Staff says that the evidence does not show that the accused second clock in the Accused Products is independent of the alleged ring oscillator variable speed system clock—what Complainants refer to as the "first clock." (SBr. at 15 (citing Tr. (Subramanian) at 1209).) According to Staff, for two clocks to be independent they cannot be derived from the same source. (*Id.*) Dr. Subramanian, however, demonstrated with respect to the accused { }, Texas Instruments, Logic, and Samsung chips that the accused second clocks are derived from the same source as the ring oscillator variable speed system clock. (*Id.* (citing Tr. (Subramanian) at 1355-56 ({ }), 1362-63 (Texas Instruments), 1365-66 (LSI Logic), and 1366-67 (Samsung)).) Thus the accused clock is not independent from the ring oscillator variable speed system clock. (*Id.*) Therefore, Staff argues that the evidence establishes that the Accused Products do not satisfy the second clock limitation of claim 1 and therefore Respondents do not infringe the '336 patent. (*Id.* at 15-16.)

As concerns claim 6, Staff says Dr. Subramanian testified that the accused second clock is independent of the system clock, and therefore, the Accused Products do not infringe claim 6. (*Id.* at 18-19 (citing Tr. (Subramanian) at 1209).) Because claim 7 depends from claim 6, claim 7 is not infringed either. (*Id.* at 19.) The same holds for claim 9. (*Id.*) As for claim 10, Staff says that evidence does not show that the external clocks of the Accused Products are independent of the system clock. (*Id.* at 22 (citing Tr. (Subramanian) at 1209).) Thus, the evidence does not show that the Accused Products infringe claim 10. (*Id.*) Staff says the same conclusion holds for claim 11 as well, for the same reasons. (*Id.* at 23.)

Staff says claim 13 is similar to claim 6, and the difference between the two does not bear on this issue; and therefore, the evidence shows that the Accused Products do not infringe claim 13 for the same reasons that claim 6 does not. (*Id.* at 24.) Because claim 14 depends from and includes each of the limitations of claim 13, for the same reasons the Accused Products do not infringe claim 14. (*Id.*) The same holds for the claim 15. (*Id.*) As for claim 16, it differs from claim 10 only in in one respect: claim 16 recites "wherein a clock signal from said off-chip external clock originates from a source other than said variable speed clock," while claim 10 recites "wherein said central processing unit operates asynchronously to said input/output interface. (*Id.* at 24-25 (citing JXM-0001, Ex Parte Reexamination Certificate, U.S. 5,809,336 C1 at 3:4-6, 4:44-46).) This does not affect the second clock limitation, argues Staff, for the same reasons discussed in the case of claim 10, and therefore the evidence does not show that Respondents infringe claim 16. (*Id.* at 24-25.)

d) Complainants' reply

Complainants reply that out of literally hundreds of external and internal "second clocks" analyzed by Dr. Oklobdzija, Respondents only make an argument as to a few examples: the camera and SD clocks for the { }; USB and camera in select { }, Texas Instruments, and Samsung chips; and SATA in the LSI B5503A chip. (CRBr. at 52 (citing RBr. at 120-130).) As a threshold matter, Respondents have provided no arguments and no evidence that Dr. Oklobdzija's identification of any other specific "second clocks" in any other Accused Products is in any way deficient, argue Complainants. In contrast, Complainants' post-trial brief and Dr. Oklobdzija's claim charts present significant evidence and analysis of many other "second clocks." (*Id.* (citing CDX-1166C, CDX-1167C, CDX-1171C, and CDX-1175C).)

Faced with this evidence, Respondents attempt to broadly generalize a few alleged deficiencies in Dr. Oklobdzija's analysis. (*Id.* (citing RBr. at 122-23).) According to Complainants, this is particularly improper, because all of the "second clocks" identified by Respondents (except { }) are internal; in other words, even if Respondents were correct (which they are not), the alleged errors would not even apply to claims 6 and 13 (or claims 10 and 16), which require external clocks. Thus, Respondents' arguments cannot apply to the external "second clocks" identified by Complainants for claims 6 and 13 that reside on other chips, USB transceivers, and peripheral devices connected to the Accused Products. (*Id.*) Complainants rebut Respondents' arguments as follows.

First, Respondents argue that the "second clocks" for CAMIF and SD in the Huawei Pinnacle 2 are not independent because the second clock within { } also clocks the CPU. (*Id.*

at 52-53 (citing RBr. at 121).) But, according to Complainants, Respondents focus on the wrong CAMIF clock. (*Id.* at 53.) Dr. Oklobdzija explained this in detail on re-direct:

> Q. Do you remember yesterday Mr. McKeon asking you how it was that the clock for the CAMIF could be an independent second clock when both the ARM core and the CAMIF are shown in this table with the same corresponding default source of { }?
>
> A. Yes, I remember.
>
> Q. Let's take a look at the actual schematic for the Pinnacle 2 . . . Do you see any clock signals relevant to the CAMIF interface in this portion of the figure?
>
> A. Yes, I see a camera interface { } connected to pin AB7.
>
> Q. And what is the { }?
>
> A. It is the clock from the camera – that comes from the camera module, and it's a { }.
>
> Q. And where does that clock come from?
>
> A. It comes from the camera. It's generated on the camera module, and { }, to the device.
>
> Q. Why don't we take a look at the camera page in this same schematic, which is Page 16 of CX-375C. … [D]o you see that same signal, { }?
>
> A. Yes, I see it. It's coming from the pin 21 on that ribbon cable connector that connects the camera module to the device.

(CRBr. at 52-53 (citing Tr. (Oklobdzija) at 1063-64).) Complainants have only asserted an external CAMIF second clock, not the internal CAMIF clock upon which Respondents erroneously rely. (*Id.* (citing C.Br. at 121-22).)

Respondents next criticize Dr. Oklobdzija for his alleged failure "to trace back the actual source of any accused I/O interface's clock." (*Id.* (citing R.Br. at 122).) This is simply incorrect, say Complainants. Dr. Oklobdzija's claim charts identify multiple "second clocks" and trace them back to their respective sources. Respondents also completely ignore the significant evidence on this topic in the technical documents introduced at the hearing, as well as extensive testimony by Respondents' own corporate representatives. For example, many of the chip manuals and specifications contain a { } that proves the origin of the first and second clocks. Respondents' own technical engineers who were involved in the design of the Accused Products identified "second clocks" and traced them back to their source. These examples are just a sampling of the significant evidence cited by Complainants in their post-trial brief. (*Id.* at 54.)

Second, Complainants say that Respondents argue that "two clock signals are not 'independent' if they are derived from the same source," i.e., reference clock. (*Id.* (citing RBr. at 123; Tr. at 1353-1354).) Again, Respondents improperly generalize, even when they admit that Dr. Subramanian himself only applied this argument to second clocks for USB, camera, and the LSI Logic B5503A chip. (*Id.*) In fact, Respondents fail to show that any of the "second clocks" used for the claimed I/O interfaces ABE, SD/MMC, WiFi, IVA2.2, microSD, Bluetooth, radar, HDMI, aDSP, TSIF, I2C, SPI, GSM, and memory, among others, share a reference clock with the "first clock." (*Id.* at 55.)

In addition, Respondents improperly attempt to import a limitation into the adopted claim construction of "independent," and then argue that Complainants failed to satisfy it. (*Id.*) Both the claim language and the adopted construction require a comparison of the frequency of the external clock (second clock) to the frequency of the oscillator (first clock). (*Id.*) However, Respondents and Dr. Subramanian avoid this direct comparison. (*Id.*) Instead, they argue that "two clock signals are not 'independent' if they are derived from the same source, because a change in the frequency of the source clock affects the frequency of the downstream clock." (*Id.*)

Put another way, clock A and clock B are independent if a change in the frequency of clock A does not affect the frequency of clock B, and vice versa. (*Id.*) Instead, Respondents would import reference/source clock limitation "C" and find that a change in frequency of clock C affects the frequency of clock A, and the frequency of clock C also affects the frequency of clock B. (*Id.*) But neither the claims themselves nor the adopted construction require clock C. (*Id.*) Whether or not clock C affects both A and B says nothing about whether A and B affect each other. (*Id.*) Dr. Subramanian made no attempt to bridge this gap of logic in Respondents' argument. (*Id.*) Conversely, Dr. Oklobdzija flatly refuted the argument when he testified that two PLLs that share the same reference clock are nevertheless independent because "they are sourced by different ring oscillators" within those PLLs. (*Id.*)

Next, Respondents' specific arguments as to USB, camera, and the LSI chip are without merit. (*Id.*) Respondents repeat the same two arguments: (1) the second clock relies on the same reference or source clock as the PLL for the CPU; and (2) the alleged second clocks originate from the same PLL as the first clock. (*Id.*) Like the Pinnacle 2 example, Respondents focus on the wrong clocks—ones that were never asserted in this Investigation, say Complainants. (*Id.*) Complainants say all of the wrong USB clocks identified by Respondents are internal clocks on the chip but Complainants say they have never asserted any internal second clocks for USB for any of the Accused Products, which are inapplicable to claims 6 and 13. (*Id.* at 55-56.) Complainants' USB second clocks are all external to the chip and originate from a USB chip or transceiver, an off-chip oscillator, { }, or a clock source from a USB-compliant peripheral device like a computer. (*Id.* at 56.) Complainants put together a chart, shown below, which they say identifies the various USB chips and architecture identified in Respondents' arguments, and Complainants' rebuttal thereto:

Chip / architecture	Respondents' argument	Complainants' Rebuttal
REDACTED	REDACTED R.Br at 124.	Respondents focus on the *wrong* USB clocks. For USB, Complainants have only asserted a second clock on a USB peripheral device. (See details below under "Peripheral device generating embedded clock signal.") For USB-OTG, Complainants have only asserted an external second clock on the off-chip USB transceiver. CX-467C at KYOCERA_853_0022063 (denoted by USB xcvr outside the chip). *See also* C.Br at 89 and fn. 71 (asserting the correct *external* USB clocks for Kyocera-3 from peripheral device and USB-OTG transceiver).
REDACTED	<u>ARG #1</u>: first and second clock "use the same crystal's reference." *Id.* at 125.	Improper attempt to import reference clock limitation into the ALJ's claim construction of "independent," as described above.
Samsung chips	REDACTED	Improper attempt to import reference clock limitation into the ALJ's claim construction of "independent," as described above.
OMAP3 / OMAP4	<u>ARG #1&2</u>: DPLL_USB and DPLL_PER are the "supposed second clock" which "receive and rely on the same external crystal oscillator's reference signals." *Id.*	Improper attempt to import a reference clock limitation into the ALJ's claim construction of "independent," as described above. Respondents also focus on the *wrong* USB clocks. Respondents' identification of DPLL_USB and DPLL_PER as "supposed" second clocks is

Chip / architecture	Respondents' argument	Complainants' Rebuttal
		particularly egregious here. Dr. Oklobdzija *never* testified about either of these DPLLs at trial. Complainants have *never* asserted these DPLLs for USB for any of the Accused Products. Instead, Respondents rely entirely on Dr. Subramanian's ***false testimony*** that "TPL has associated with DPLL_USB" a second clock, along with a string cite of the OMAP chip manuals that do nothing to show that Complainants asserted these clocks (which they didn't). R.Br. at 125 (citing HT 1362:16-1363:8).[28] *See also* C.Br. at 137 (asserting the correct *external* USB clock for Garmin-1 (OMAP3) within USB3311 chip); 148 (asserting the correct *external* USB clocks for Amazon (OMAP4) within peripherals and USB PHY module); 153 & 156 (asserting the correct *external* USB clock for Barnes & Noble-1 & 2 REDACTED
USB3311 chip	ARG #1: "[B]oth PLLs still receive and rely on the same external crystal reference." *Id.* at 126.	Improper attempt to import a reference clock limitation into the ALJ's claim construction of "independent," as described above. Respondents admit that "the USB3311 chip's PLL is on a **<u>different chip</u>** from the OMAP3's DPLL1." *Id.* at 126 (emphasis added). Accordingly, the oscillators residing within each of these different PLLs *must* be independent, originating from entirely different chips.
Peripheral device generating embedded clock signal	ARG #2: "USB blocks in question are actually clocked using a nonindependent, nonasynchronous clock." *Id.* at 127.	Respondents focus on the *wrong* USB clock. Complainants allege that USB embedded clock signals are generated **<u>from a peripheral device</u>**. Respondents provide no evidence to the contrary, relying instead on a two-line conclusory statement from Dr. Subramanian. R.Br. at 127 (citing HT 1360:12-14)

Chip / architecture	Respondents' argument	Complainants' Rebuttal
		In contrast, Complainants provided evidence that this USB encoded clock is transmitted with the differential data pair from the peripheral device. HT 531:9-534:4 ("So here is the differential signal **<u>comes from the transmitter</u>**, comes from the side that is sending the signal … And it will be then passed to the processor.") (emphasis added); CX-739C at TPL853_02303458; CX-117 at GARMIN091034; *see also* CDX-9C.04 – CDX-9C.06.

(*Id.* at 56-58.)

Complainants say Respondents also contend that infringement must be based on articles as imported, and thus, Complainants' proof of infringement involving USB peripherals is inadequate because it focuses on the Accused Products after they have been put into use following importation. (*Id.* at 58 (citing RBr. at 127).) However, argue Complainants, the investigation Respondents cited, *Electronic Devices*, 2012 WL 3246515, Comm'n Op. (Dec. 21, 2011) involved method claims. Complainants say that case was distinguished in another investigation, *Image Processing Sys.*, Inv. No. 337-TA-770, 2012 WL 4480570 at *10 (Aug. 31, 2012). Accordingly, argue Complainants, as a threshold matter, *Image Processing Sys.* does not apply to any of the asserted apparatus claims, including claims 6 and 13, as well as claims 1 and 11. (*Id.*) Moreover, even as to method claims 10 and 16, *Image Processing Sys.* is distinguishable because in that investigation, the complainant failed to provide evidence of indirect infringement. (*Id.* (citing *Image Processing Sys*, 2012 WL 3246515 at *13).) Here, Complainants have provided significant evidence of indirect infringement in the form of product manuals shipped along with the Accused Products, which encourage users to hook up the Accused Products to USB peripheral devices. (*Id.* at 59.)

For the camera, Complainants note that Respondents argue that for the {

}. (*Id.* (citing RBr. at 128-129.)) Aside from its irrelevancy, say Complainants, this argument also fails because Respondents have provided no evidence that {

}. (*Id.*) Complainants say that notwithstanding Dr. Subramanian's sweeping conclusion, the Qualcomm documents do not support him. (*Id.* at 59.)

For the LSI chip, Respondents argue that {

} (*Id.*) Complainants say that again Respondents focus on the wrong clock. Complainants have only asserted the SATA clock which originates from the outside through the hard drive's SATA port. Complainants have not asserted the different SATA clock that travels in the opposite direction. (*Id.* (citing Tr. (Oklobdzija) at 1081 ({

}))).)

Complainants argue that, apparently recognizing this inconvenient truth, Respondents argue that "the claims require that the second clock be connected to an 'input/output' port, so that the clocking for both communication directions must meet the independent and asynchronous limitations." (*Id.*) Complainants say this is yet another attempt to import limitations into the claim—this time without so much as a citation in support. (*Id.*) The asserted claims merely require that a second clock be connected to the I/O interface, which is undisputed in all cases, because a clock or data line connects the second clock to the interface. (*Id.*) There is no requirement that the "second clock" must clock in both directions; in fact, this argument is nonsensical because many "second clocks" are only capable of clocking in one direction. (*Id.* at 60.)

Complainants say that claim 6 recites: "and wherein a clock signal from said off-chip external clock originates from a source other than said oscillator." (*Id.*) According to Complainants, Respondents do not address this limitation at all in their post-hearing brief. (*Id.*) In contrast, argue Complainants, their brief shows significant evidence that each of the external second clocks in the Accused Products originates from a source other than the first clock. (*Id.*)

Complainants say claim 13 recites: "and further wherein said central processing unit operates asynchronously to said input/output interface. (*Id.*) Complainants say Respondents and Staff contest this claim element, but as previously discussed, the CPU in each of Respondents' Accused Products operates asynchronously to the on-chip I/O interface. Complainants say Respondents attempt to import a limitation into the construction of "asynchronous" and then argue that Complainants failed to satisfy it. (*Id.*) According to Complainants, both the claim language and claim construction involve a comparison of the timing control of the CPU (first clock) to the timing control of the I/O interface (second clock). (*Id.* at 60-61.) Of course, say Complainants, the adopted construction says nothing about a reference, or comparing the phase relationship of a reference clock to the first or second clocks, as Respondents argue. (*Id.* at 61 (citing Tr. (Subramanian) at 1354-55).) According to Complainants, Respondents' argument relies on the faulty assumption that there is a predictable phase relationship between the reference and the first/second clock to argue that the first and second clocks must also have such a relationship. (*Id.*) Dr. Oklobdzija explained why this is not true: "if there is a predictable phase relationship [between the reference and the first/second clock], there is no error signal, and you don't need PLL; the PLL has no purpose any more." (*Id.* (citing Tr. at 1026-1028).)

The chip documentation clearly contradicts Respondents' argument, and also establishes that the CPU operates asynchronously from the various claimed I/O interfaces. (*Id.* at 61.) For the Accused Products using TI OMAP4430, 4460, and 4470 chips, the TI chip manuals unequivocally state: "Because of the MPU DPLL, the Cortex-A9 MPU subsystem is asynchronous from the rest of the device."). (*Id.*) Similarly, in the OMAP3530 and 3611, the MPU Subsystem, which contains the ARM Cortex-A8 core, includes an "asynchronous interface with core logic." The {   } likewise support the "asynchronous" limitation. (*Id.*)

For example, {

} (*Id.* at 61-62.) Complainants say that Samsung's documents {

} (*Id.* at 62.)

e) Respondents' reply

In reply to Complainants' argument that all of the Accused Products have at least one independent off-chip/second clock as the "second clock" terms have been construed, Respondents say Complainants are wrong for two reasons. (RRBr. at 64.)

First, Complainants erroneously rely on conclusory testimony of Dr. Oklobdzija, who, when referring to what he considered "second clocks" testified that "[w]e have identified or established their independence, basically, by coming from two independent PLLs or ring oscillators within these PLLs." (*Id.* (citing Tr. (Oklobdzija) at 702).) But Dr. Oklobdzija said nothing about the governing claim construction and failed to address whether "a change in the frequency of either the second clock or [first clock] does not affect the frequency of the other," as the parties' agreed construction requires. (*Id.* (citing Order No. 31 at 11-12).) Because Dr. Oklobdzija did not apply the governing claim construction, Complainants' reliance on his testimony is insufficient to meet their burden of proof, say Respondents. (*Id.* (citing *Kim v. Con-Agra Foods*, 465 F.3d at 1319-20).)

Nor do Complainants' citations to Dr. Oklobdzija's other testimony support their argument on this issue, argue Respondents. As a general matter, the Respondent-specific sections of Complainants' brief barely rely on Dr. Oklobdzija's testimony on the "independent" limitations, despite hours of testimony on the accused I/O interfaces. (*Id.* (citing CBr. at 48-56, 59-64, 65-70, 72-78 (HTC); 79-81, 82-85, 87-90 (Kyocera); 91-93, 93-94, 96-99 (Novatel); 100-104, 105-107, 108-109, 157-160 (LG); 110-113, 114-115, 175-179 (Samsung); 117-120, 121-122 (Huawei); 124-125, 125-126, 127-129 (ZTE); 133-138, 139-140 (Garmin); 143-149 (Amazon); 150-154, 154-155 (B&N); 163-167 (Nintendo); 169-172 (Acer)).) Complainants' arguments concerning the "independent" limitations are largely attorney arguments, say Respondents, and it is improper for Complainants to circumvent their expert's deficient testimony in this way. (*Id.* (citing *Johnston v. IVAC Corp.*, 885 F.2d 1574, 1581 (Fed. Cir. 1989) ("Attorneys' argument is no substitute for evidence.")).)

Even where Complainants occasionally do cite Dr. Oklobdzija's testimony, those citations are insufficient to meet their burden of proof, say Respondents. For example, in their section titled "ZTE Group 3 products meet the 'Second Clock' element," Complainants include two citations to Dr. Oklobdzija's testimony. (*Id.* at 65 (citing CBr. 128-129, referencing Tr. (Oklobdzija) at 1063-67:20, 693).) However, that testimony does not address the "independent" limitations, say Respondents. (*Id.*) Other party-specific sections have similar deficiencies, according to Respondents. (*Id.*)

By contrast, Dr. Subramanian's analysis did apply the governing claim construction, showing that many accused interfaces do not have an independent "second clock." (*Id.* (citing RBr. at 123-30).) Dr. Subramanian testified that two clock signals are not "independent" if they are derived from the same source, because a change in the frequency of the source clock affects the frequency of the downstream clocks. (*Id.* (citing RBr. at 123, referencing Tr. (Subramanian) 1353-54).) For example, if two separate PLLs use the same 20 megahertz crystal oscillator as a reference clock, a change in the reference's frequency (such as switching to a 30 megahertz crystal) will similarly cause the output frequency of both PLLs to change. (*Id.*)

Respondents argue that Complainants' brief repeats and relies on Dr. Oklobdzija's incomplete and incorrect analysis. For example, their brief asserts that "the second clocks are independent from the first clock," when discussing the { } interfaces, including USB, CAMIF, and SD memory. (*Id.* (citing CBr. at 121).) But that assertion just parrots Dr. Oklobdzija's incorrect testimony, which Respondents disproved during Dr. Oklobdzija's cross-examination. (*Id.*)

Respondents point to the fact that, during his direct testimony, Dr. Oklobdzija testified that the {

:

} (*Id.*)

The same document also {

}. (*Id.* (citing Tr. (Oklobdzija) 892; RX-0602C at LGE800ITC 1917).) Confronted with this document, Dr. Oklobdzija agreed that {

}

{

}, argue Respondents. Changing the frequency of the PLL will necessarily affect the frequency of the clock signals to both the supposed CPU and the accused I/O interfaces. (*Id.* at 67 (citing Tr. (Subramanian) 1353:1-1354:5 (confirming that "if two clock signals are derived from the same source," the frequency of the source clock affects the frequency of the downstream clock)).) Respondents say this example demonstrates that Complainants' reliance on Dr. Oklobdzija's sloppy and incomplete analysis of this claim limitation is unwarranted. (*Id.*)

For these reasons, Respondents contend that Complainants have failed to show that any Accused Product meets the "independent" limitations. By contrast, Respondents and Dr. Subramanian demonstrated that these limitations are not met. (*Id.*)

Respondents maintain that Complainants' argument that the Accused Products meet the "asynchronous" limitation of claims 11, 13, and 16 fails for at least four reasons. First, Complainants do not address the "asynchronous" limitation's "derived from" language, which requires that the CPU's timing control not be derived from the I/O interface's timing control. (*Id.* (citing Order No. 31 at 74).) Respondents say Complainants' brief is devoid of analysis on that requirement. (*Id.*) Also, argue Respondents, Dr. Oklobdzija did not testify about that requirement. (*Id.* (citing Tr. (Oklobdzija) at 567-570 (precluding Dr. Oklobdzija from testifying "as to the ultimate issue" of infringement with respect to the "asynchronous" limitation)).) Because Complainants have not presented any evidence on the "derived from" requirement of the "asynchronous" limitation, they have not shown that any of the Accused Products meets the "asynchronous" limitation. (*Id.*)

Second, argue Respondents, Complainants miss the mark with their argument about the "no readily predictable phase relationship" requirement in the "asynchronous" limitation. (*Id.* at 68 (citing CBr. at 44; Order No. 31 at 74 (adopting construction)).) Complainants argue that "PLLs will not work at all if there is a predictable phase relationship," relying solely on Dr. Oklobdzija's testimony. (*Id.* (citing CBr. at 44).) Dr. Oklobdzija was addressing the wrong relationship, argue Respondents. His testimony relates to the phase relationship between the phase of the received external reference clock signal and the phase of the PLL's output signal which is provided back to the PFD block by the PLL's feedback loop:

> The phase relationship is how those edges of the clock fall together; okay? And that difference produces that error signal that drives PLL, because if there is a predictable phase relationship, there is no error signal, and you don't need PLL; the PLL has no purpose any more. The PLL is based on error, as those phases don't come together. That's why PLL works. If there is no error, the signal out of PLL is zero, and there is no purpose for the PLL.

(*Id.* (citing Tr. (Oklobdzija) at 1026-27).) In contrast, the "asynchronous" limitations require a different phase relationship, say Respondents, because, as construed, these limitations prohibit readily predictable phase relationships between the CPU's timing interface and the I/O interface's timing interface, that is, between the CPU and the I/O interface. (*Id.* (citing Order No. 31 at 74).) Dr. Oklobdzija addressed a different, irrelevant relationship between a PLL's input and its output. Confirming this fact is the testimony that came just before the excerpt quoted in

Complainants' brief, where Dr. Oklobdzija testified which relationship he was addressing: "Yes, what Mr. Casasanta is talking about is a formula, the formula that establishes the relationship of the output of the PLL with respect to reference." (*Id.* (citing Tr. (Oklobdzija) at 1026).) Respondents say Dr. Oklobdzija's testimony and Complainants' arguments about this particular relationship are irrelevant to the "asynchronous" limitations. (*Id.* at 68-69.)

Third, argue Respondents, Complainants rely on a conclusory statement made by Dr. Oklobdzija. (*Id.* at 69 (citing CBr. at 44 (quoting Tr. (Oklobdzija) 1061-62)).) In this portion of his testimony, he read the word "asynchronous" in the user manual for an accused { } and then made the conclusory assertion that this is enough to meet the claim language. (*Id.* (citing Tr. (Oklobdzija) at 1062).) Not only does he fail to establish that the manual from which he was reading uses the term "asynchronous" in the same way as the asserted claims do, but his testimony says nothing about the other requirements in the construction of the "asynchronous" limitations, including (1) timing controls, (2) independence, (3) no derivation, and (4) no readily predictable phase relationship. (*Id.* (referencing Order No. 31 at 74 for comparison).) All that Dr. Oklobdzija does is mention the word "asynchronous" and declare that there is no phase relationship. That testimony is unpersuasive and legally insufficient, say Respondents. (*Id.* (citing *ConAgra Foods, Inc.*, 465 F.3d at 1319-20).)

Fourth, Respondents say Complainants rely on insufficient documentary excerpts. For instance, Complainants rely five times on an excerpt from a {

}. (*Id.* (citing CBr. at 50, 53, 60, 101, 111 (all quoting CX-0663C at QTPL 47334)).) As with Dr. Oklobdzija's testimony, that excerpt merely parrots the word "asynchronous," but sheds no light on whether the { }

document used the term in the same way as the patent. Nor is there any evidence addressing how these excerpts satisfy the other four requirements of the asynchronous limitation. (*Id.* (referencing Order No. 31 at 74, for comparison).) The other documentary excerpts that Complainants cite face the same flaw, because they are quoted out of context and without any testimonial explication. (*Id.*)

For these reasons, Respondents say Complainants have failed to show that any Accused Product meets the asynchronous limitation. By contrast, Respondents and Dr. Subramanian demonstrated that this limitation is not met. (*Id.* at 69-70.)

f) The Administrative Law Judge's findings and conclusions

The Administrative Law Judge finds that Complainants' evidence is not sufficient to establish that any of the Accused Products meet the "second clock" or "external clock" limitations of the asserted claims. As Respondents point out in their reply brief, Dr. Oklobdzija failed to address the parties' agreed claim construction, which was adopted in Order No. 31: "a second clock wherein a change in the frequency of either the second clock or ring oscillator system clock does affect the frequency of the other" (claims 1, 11); and "an external clock wherein a change in frequency of either the external clock or oscillator does not affect the frequency of the other (claims 6, 13). (Order No. 31 at 11-12.) Dr. Oklobdzija summed up his infringement testimony on this topic this way: "We have identified or established their independence, basically, by coming from two independent PLLs or ring oscillators within those PLLs." (Tr. (Oklobdzija) at 702.) Yet that is not sufficient proof that the frequency of either the external clock or oscillator does not affect the frequency of the other. For example, Complainants cite to Dr. Oklobdzija's redirect examination where he says a clock signal from an { }. (Tr.

(Oklobdzija) at 1063-64.) But whether, in doing that, the frequency of either of those devices is affected by the frequency of the other was not covered by Dr. Oklobdzija's testimony; and whether or not they do cannot simply be inferred on the basis of the existing evidence. In addition, the fact that Dr. Oklobdzija did not perform any testing on any of the Accused Products supports the conclusion that the most he could have offered by way of expert testimony would have been conclusory, anyway.[20] Also, we do not know whether, even if he had tested the items, countervailing testimony specifically addressed to his opinions based on the results of such testing would have been forthcoming from Respondents and Dr. Subramanian. Thus, there is a hole in the evidence, and the Administrative Law Judge concludes that Complainants' proof here is not sufficient to show that any of the Accused Products satisfies any of the "second clock" or "external clock" limitations.

The Administrative Law Judge further finds that Dr. Oklobdzija's testimony on infringement of the "second/external clock" limitations is in other respects inadequate because it was essentially conclusory. *See Kim v. ConAgra Foods, Inc.*, 465 F.3d at 1319-20. Complainants' technique was to elicit conclusory opinions from Dr. Oklobdzija and leave it to Respondents to try to ferret out his underlying reasoning. Take, for example, this representative excerpt from Dr. Oklobdzija's direct testimony:

> Q. And after considering those schematics and the other documents you reviewed as well as your own expertise, did you form an opinion about whether the products in CDX-20C.1 meet the second-clock limitation of the '336 patent's claims?
>
> A. Yes, I did.
>
> Q. And what is that opinion, sir?

[20] Insofar as Complainants cite or would rely on demonstrative exhibits (*see, for example,* CRBr. at 52), such exhibits are not substantive evidence.

A. My opinion is that they do meet the limitation. And I should add, I would be very happy to elaborate on that during cross-examination.

Q. Thank you, I think you may get your wish.
Let's go to the next slide please. What's shown in this slide?

A. It shows the products that are using the OMAP 4470

Q. Next slide, please. Looking now at CDX-30C.2. What is shown in this slide?

(Tr. (Oklobdzija) at 704-705.) That testimony overlooks the fact that the time to "elaborate," as Dr. Oklobdzija tauntingly put it, was during his direct examination, not cross, because it is Complainants who bear the burden of proving that the Accused Products infringe—Respondents do not bear the burden of proving that their products do not infringe. For Complainants to base their proof of infringement on dogmatic tidbit statements of an expert, in the guise of an informed opinion based on a litany of documents without explaining the thought process by which, or reasons why, he arrived at his conclusion is not sufficient to sustain that burden. The burden of proof does not shift to the responding party if the complaining party has not at least made out a *prima facie* case, even in administrative proceedings. *See* 19 CFR § 210.37(a).[21]

Other examples of Dr. Oklobdzija's failure to provide facts to support his opinions can be found at pages 681-684 (eight products of two respondents), 686-693 (21 products of five respondents), 702-704 (17 products from one respondent) and 730-732 of the hearing transcript. While Complainants say Dr. Oklobdzija analyzed hundreds of external and internal clocks (apparently meaning technical documents) that does not alleviate Complainants and their expert witness of their responsibility to provide information sufficient to carry Complainants' burden of proof by connecting the dots, i.e, showing how the documents support his conclusions.

[21] The Administrative Law Judge is mindful of Rule 705 of the Federal Rules of Evidence; however, that is a rule of evidence and does not lessen the burden of proof; nor does it govern beyond federal jurisprudence.

In an attempt to buttress part of Dr. Oklobdzija's testimony, Complainants fault Respondents for their argument that the "second clocks" for CAMIF and SD in the Huawei Pinnacle 2 are not independent because the second clock { } also clocks the CPU. (CRBr. at 52 (citing RBr.at 121).) Complainants say Respondents focused on the wrong CAMIF clock, and then quote the following testimony of Dr. Oklobdzija, which he explained in detail on re-direct:

> Q. Do you remember yesterday Mr. McKeon asking you how it was that the clock for the CAMIF could be an independent second clock when both the ARM core and the CAMIF are shown in this table with the same corresponding default source of { }?
>
> A. Yes, I remember.
>
> Q. Let's take a look at the actual schematic for the Pinnacle 2 . . . Do you see any clock signals relevant to the CAMIF interface in this portion of the figure?
>
> A. Yes, I see a camera interface { } connected to pin AB7.
>
> Q. And what is the{ }?
>
> A. It is the clock from the camera – that comes from the camera module, and it's a { }.
>
> Q. And where does that clock come from?
>
> A. It comes from the camera. It's generated on the camera module, and it is used { }, to the device.
>
> Q. Why don't we take a look at the camera page in this same schematic, which is Page 16 of CX-375C. … [D]o you see that same signal, { }?
>
> A. Yes, I see it. It's coming from the pin 21 on that ribbon cable connector that connects the camera module to the device.

(CRBr. at 53 (citing Tr. (Oklobdzija) at 1063-64).) Complainants argue that they only asserted an external CAMIF second clock, not the internal CAMIF clock upon which Respondents erroneously rely. However, Dr. Subramanian refuted this, when he gave this testimony:

> Specifically, Dr. Oklobdzija addressed this in his report; I believe he focused on the { }. But in his testimony, he also said you should consider HSYNC and VSYNC to be clocks. So I'll group those together, because my reasoning will be the same for all three.
>
> And he says that the { } signal comes from the image sensor, and that part is true to that extent.
>
> However, what he doesn't say was in fact the PLL that is used on the image sensor that has an oscillator in it is { }, which in turn is used to -- which has been accused by TPL of providing the timing signal for the CPU.
>
> So, now, what does that mean? I've now said—I've now said—I have just pointed out, Your Honor, that the signals—and this would be true for { }, HSYNC, and VSYNC. I have now hopefully established for you, Your Honor, that all of these signals are derived from a PLL, which { }, which means they are not independent and they are not asynchronous. And support for this comes from RX-790.

(Tr. (Subramanian) at 1361-62.)

One of Complainants' answers to Respondents' criticism of Dr. Oklobdzija's failure to provide testimony tracing the "second clocks" to their sources in order to show that they are independent is to say many of the technical manuals that Dr. Oklobdzija relied on contain this information. (*See* CRBr. at 54.) This is not an adequate response. It is incumbent upon Complainants and their expert witness to explain in sufficient detail the reasons why he formed his infringement conclusion as respects a particular limitation. Instead, as Respondents note, much of what Complainants rely on in their post-hearing briefs consists of attorney argument, which is not a substitute for absent testimony needed to explain whatever inferences Complainants are suggesting be drawn from the myriad of technical documents Complainants say are in evidence.

Given the lack of particulars and specificity in Dr. Oklobdzija's summary conclusions, Respondents' expert witness, Dr. Subramanian, responded accordingly by pointing out that the I/O interface signals that Complainants rely on are neither independent nor asynchronous, illustrating this by focusing on the two most common I/O interfaces discussed during Dr. Oklobdzija's direct testimony—the USB and camera interfaces—as well as the LSI Logic B5503A chip. (Tr. (Subramanian) at 1351-67.)

Dr. Subramanian testified that the clock signals for the USB interfaces in the accused { } (Tr. at 1355-64), OMAP (*id.* at 1364-66), and Samsung chips (*id.* at 1366-67) are neither independent nor asynchronous. Furthermore, Dr. Subramanian went to the extent of reviewing source code to confirm some of the findings he testified about. (Tr. at 1357.) Dr. Subramanian's testimony includes sufficient details showing not only that he examined relevant technical documents, as Dr. Oklobdzija testified he had, but also his reasoning for arriving at his non-infringement conclusions, which is lacking in Dr. Oklobdzija's infringement testimony.

In the case of the accused Samsung chips, Dr. Subramanian observed that { }, Dr. Subramanian concluded that the clocks are neither independent nor asynchronous. (*Id.* at 1367, 1353-55.)

Respondents argue that Dr. Oklobdzija's opinion that the OMAP4 and OMAP3 chips satisfy the "second clock" limitations is betrayed by the technical documents Dr. Oklobdzija testified he relied on. (Tr. at 1362-64.) In the OMAP4 chips, all of the DPLLs receive and rely on the same external crystal's reference signals. (*Id.*) Likewise, the same external reference signal drives the OMAP3 chip's DPLLs, according to Dr. Subramanian. (Tr. at 1363-64.) Since the accused DPLLs rely on the same external reference signals, their clock signals cannot, under controlling constructions, be independent or asynchronous, according to Dr. Subramanian. (Tr.

at 1363-64.) Also, because these OMAP DPLLs are on the same chip, they cannot meet the requirements of claims 6, 10, 13, and 16 that the "second clock" must be an "off-chip external clock." The fact that Dr. Subramanian's conclusions on the issue of the second or external clock limitations are based on his analysis of technical documents unaccompanied by testing is not fatal to Respondents countervailing evidence, since the burden of proof remains with Complainants. All Respondents need do is demonstrate that the preponderance of evidence is not met by the evidence of record. In this respect, Dr. Subramanian's opinions have been shown to be more persuasive than Dr. Oklobdzija's since Dr. Subramanian provided detailed explanations for his conclusions, which logically follow from his rational interpretation of the documents, in contrast to Dr. Oklobdzija's cursory conclusions.

Complainants, in their reply brief, say that Dr. Subramanian focused on the wrong clocks because Dr. Oklobdzija never testified about either of these DPLLs for USB for any of the Accused Products. According to Complainants, Respondents rely on the false testimony of Dr. Subramanian that "TPL has associated with DPLL_USB" a second clock, along with a string cite of OMAP chip manuals that do nothing to show that Complainants asserted these clocks (which they didn't)." (CRBr. at 56-57 (citing RBr. at 125).) On the other hand, in Complainants' opening brief, in their argument in support of what they call the "Independence" limitation, after quoting Dr. Oklobdzija statement, "We have identified or established their independence, basically, by coming from two independent PLLs or ring oscillators within those PLLs," go on to say, "[m]overover, the second clocks are independent even if they have the same reference frequency." They then cite the following excerpt from Dr. Oklobdzija's redirect examination:

> Q. How is it that the ring oscillator in the DPLL_MPU can be…the claimed first clock element and ring oscillator in one of the other DPLLs can be the claimed second clock when they both receive the same frequency signal?

> A. Because they are sourced by different ring oscillators within the DPLL. So, in other words, DPLL_MPU has a ring oscillator which generates the clock signal. It's generated by a ring oscillator….Those are independent.

(CBr. at 43 (citing Tr. (Oklobdzija) at 1060-61).) Dr. Subramanian testified that all of the PLLs that are listed in the source document are derived from the same reference clock, which is the one based on a crystal oscillator that had been discussed throughout the hearing. (Tr. (Subramanian) at 1363.) He also testified that the PLL that is used on the image sensor, which has an oscillator in it, { }, which is also used for timing the main PLL that has been accused by Complainants of providing the timing signal for the CPU. (Tr. (Subramanian) at 1361-62.) The Administrative Law Judge concludes, therefore, that Complainants' criticisms of Dr. Subramanian's analysis and his conclusions, do not show that his reasoning is wrong or that his opinion is invalid. The Administrative Law Judge further finds that, vis-à-vis Dr. Oklobdzija's testimony, Dr. Subramanian's is more demonstrable by independent evidence. Dr. Subramanian's testimony is at least sufficient to cast doubt on Dr. Oklobdzija's infringement conclusions regarding the "second" and "external" clock limitations, rendering them suspect, and therefore unreliable.

Complainants also argue that Respondents improperly attempt to import limitations into the adopted claim construction, and Complainants contend that both the claim language and the adopted construction require a comparison of the frequency of the external (second) clock to the frequency of the oscillator (first) clock. (CRBr. at 55.) According to Complainants, Dr. Subramanian and Respondents avoid this direct comparison and instead merely assume that the two clock signal are not independent if they are derived from the same source, because a change in the frequency of their common source affects the frequency of the downstream clocks. (*Id.*

(citing RBr. at 123; Tr. at 1353-1354).) Complainants argue that, put another way, clock A and clock B are independent if a change in the frequency of clock A does not affect the frequency of clock B, and vice versa. (*Id.*) However, argue Complainants, Respondents would, under their reasoning, require importation of a reference/source clock limitation ("C") and a finding that a change in frequency of clock C affects the frequency of clock A and also the frequency of clock B. (*Id.*) But, argue Complainants, whether or not clock C affects both A and B says nothing about whether clocks A and B affect each other, and Dr. Subramanian made no attempt to bridge this gap of logic in Respondents' argument. (*Id.*)

The Administrative Law Judge finds that one of the problems with this argument is that it raises the specter of Dr. Oklobdzija's and Complainants' own failure, since they did not provide evidence sufficient to demonstrate that a change in the frequency of the second (external) clock or the first clock does not affect the frequency of the other, given the construction adopted based on the parties' agreed claim constructions. (Order No. 31 at 11-12.) Complainants' argument on this point serves as a reminder of an important principle that pervades this Investigation, which is that Complainants have the burden of proof—in terms of production and persuasion—and the criticism Complainants level at Respondents here applies to them as well. According to Complainants' own critical standards, they have not discharged their burden of proof.

Complainants oppose Respondents' resort to *Certain Electronic Devices*, involving method claims, as precedent foreclosing a finding of no violation of Section 337, by citing *Image Processing Sys.*, Inv. No. 337-TA-770, 2012 WL 3246515 at *10 (Aug. 31, 2012) with respect to apparatus claims 1, 6, 11, and 13. Inasmuch as it has been found that there is no infringement by any of the Accused Products, there is no need to address this issue. The same determination holds for method claims 6 and 13.

Respondents point out that Complainants' rely on Dr. Oklobdzija's testimony as an essential basis for their infringement allegation concerning the "second" and "external" clock limitations, contending that "the second clocks are independent of the first clocks" regarding the { } interfaces, including USB, CAMIF, and SD memory. (RRBr. at 65 (citing CBr. at 121.).) Complainants point to Dr. Oklobdzija's testimony that the accused { } has a second clock that includes signals for a camera interface, CAMIF, a USB interface, and an external memory interface, SD. Respondents say Dr. Oklobdzija did not identify the source of these "second clock" signals. (*See* Tr. (Oklobdzija) at 890-892.) Respondents argue that if Dr. Oklobdzija had done the necessary tracing to the source, he would have learned that the source for all of those signals is the same PLL that supposedly clocks the ARM core, which is the accused CPU. (RRBr. at 66.) Respondents say the technical document for the { } shows that { }. (*Id.* (citing RX-0602C at LGE800ITC 1916).) Thus, argue Respondents, { } is the alleged "first clock."

The same document also identifies the { }, say Respondents, citing RX-0602C at LGE800ITC 1917. Furthermore, { }. (*See* RX-0602C at LGE800ITC 1917.)

Respondents argue that because the alleged { }, they are not independent: changing the frequency of the PLL will necessarily affect the frequency of the clock signals to both the supposed CPU and the accused I/O interfaces. (RRBr. at 67 (citing Tr. (Subramanian) at 1353-54).) This example demonstrates that Complainants' reliance on Dr. Oklobdzija's incomplete analysis is insufficient, say

Respondents. (*Id.*) Complainants oppose this claim by arguing that Respondents have provided no evidence that { }, and notwithstanding Dr. Subramanian's testimony, the Qualcomm documents do not support him. (CRBr. at 59.)

What the private parties' competing arguments reveal on this point is that technical documents themselves are not always or necessarily definitive with respect to operational characteristics, and the only way to resolve certain disputes is through testing, which neither party has done in this regard. However Complainants have the ultimate burden of proof, and any unresolved questions on material issues redound to their detriment. Dr. Subramanian's opinion (*see* Tr. 1351-54) finds a rational basis in the same documents for which Dr. Oklobdzija bases his opinion. Dr. Subramanian concluded that because the alleged "first" and "second" clocks in the { } are the same PLL, they are not independent. There are no inherent infirmities in Dr. Subramanian's testimony explaining how he arrived at his conclusion opposing Dr. Oklobdzija's opinion, and Complainants' contrary evidence is not found to be persuasive. On the whole, with respect to whether any of the Accused Products satisfies the "independent" aspect of the "second" and "external" clock limitations, the Administrative Law Judge finds that Dr. Oklobdzija's testimony was refuted by Dr. Subramanian.

With regard to Complainants' argument that the evidence demonstrates that all of the Accused Products meet the "asynchronous" requirement of claims 11, 13, and 16 (CBr. at 43-44), Respondents say Complainants did not address the "derived from" language of the "asynchronous" limitation which requires that the CPU's timing control not be derived from the I/O interface's timing control. (RRBr. at 67 (citing Order No. 31 at 74).) Respondents argue that Complainants' opening brief is devoid of any analysis of that aspect of the construed claim term. (*Id.*) Nor did Dr. Oklobdzija opine on this requirement. (*Id.* (citing Tr. (Oklobdzija) at

567-570.)[22] Because Complainants presented no evidence on the "derived from" requirement of the "asynchronous" limitation, Respondents say Complainants have not shown that any of the Accused Products meets this limitation. (*Id.*)

Respondents say Complainants' argument that there is "no readily predictable phase relationship" requirement in the "asynchronous" limitation, based on Dr. Oklobdzija's testimony, is erroneous, because Dr. Oklobdzija was addressing the wrong relationship. (*Id.* at 68.) His testimony addresses the phase relationship between the phase of the received external reference clock signal and the phase of the PLL's output signal which is provided back to the { } by the PLL's feedback loop:

> The phase relationship is how those edges of the clock fall together; okay? And that difference produces that error signal that drives PLL, because if there is a predictable phase relationship, there is no error signal, and you don't need PLL; the PLL has no purpose any more. The PLL is based on error, as those phases don't come together. That's why PLL works. If there is no error, the signal out of PLL is zero, and there is no purpose for the PLL.

(*Id.* (citing Tr. (Oklobdzija) at 1026-27).) However, the "asynchronous" limitations require a different phase relationship, argue Respondents. As construed, these limitations prohibit readily predictable phase relationships between the CPU's timing interface and the I/O interface's timing interface—that is, between the CPU and the I/O interface. (*Id.* (citing Order No. 31 at 74).) Instead of addressing the phase relationship between the CPU and I/O interface, Dr. Oklobdzija addressed something else, the relationship between the output and input of the PLL, a fact which is confirmed by this testimony of Dr. Oklobdzija:

> Yes, what Mr. Casasanta is talking about is a formula, the formula that establishes the relationship of the output of the PLL with respect to reference.

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[22] Because Dr. Oklobdzija's expert report did not opine on Respondents' and Staff's proposed claim construction for the "wherein" clause, which includes the "derived from" language, and was adopted, Dr. Oklobdzija was precluded from rendering an opinion regarding the ultimate issue of infringement, although he was permitted to discuss the technical features of the Accused Products that he relied on as they relate to the adopted construction. (*See* Tr. (Oklobdzija) at 567-570.)

(*Id.* (citing Tr. (Oklobdzija) at 1026).) Therefore, both Dr. Oklobdzija's testimony and Complainants' argument about this particular phase relationship are irrelevant to the "asynchronous" limitation, say Respondents. (*Id.* at 68-69.)

Complainants argue that Dr. Oklobdzija testified that "if there is a predictable phase relationship, there is no error signal, and you don't need PLL; the PLL has no purpose any more." (CRBr. at 61 (citing Tr. at 1026-1028).) According to Complainants, the chip documentation clearly contradicts Respondents' argument, and also establishes that the CPU operates asynchronously from the various claimed I/O interfaces. For the Accused Products using TI OMAP4430, 4460, and 4470 chips, the TI chip manuals unequivocally state: "Because of the MPU DPLL, the Cortex-A9 MPU subsystem is asynchronous from the rest of the device." (*Id.*) Similarly, in the OMAP3530 and 3611, the MPU Subsystem, which contains the ARM Cortex-A8 core, includes an "asynchronous interface with core logic." (*Id.* (citing CX-0318C; CX-0321C; CX-0316C; CX-0366C; CX-0353C).) The { } likewise support the "asynchronous" limitation. For example, the { } (*Id.* at 61-62. (citing CX-0663C; CX-0653C).) Samsung's documents confirm that, for the { } (*Id.* at 62 (citing RX-0696C.0440; RX-0702C.0308).)

The Administrative Law Judge finds that the evidence does not support a finding that any of the Accused Products meet the "asynchronous" requirement of claims 11, 13, and 16. Complainants have not demonstrated how Dr. Oklobdzija's testimony shows that the timing control signals of the accused CPUs are not derived from the timing controls of input/output interface such that there is no readily predicable phase relationship between them. It does appear, as Respondents argue, that Dr. Oklobdzija was testifying about something else, the phase relationship between the PLL and the external clock. Insofar as Complainants contend that Dr. Oklobdzija was testifying about the phase relationship between the CPU and the input/output interface, they have not provided a sufficient explanation as to how they derive that conclusion from the testimony of Dr. Oklobdzija. It is certainly not from the portion of his testimony they cite in their brief, quoted above.

As for the technical documentation Complainants cite in their reply brief, noted above, this is not sufficient to demonstrate that the Accused Products meet the limitation either. The term "asynchronous" is part of the claim term that was construed to mean "the timing control of the central processing unit operates independently of and is not derived from the timing control of the input/output interface such that there is no readily predictable relationship between them." (Order No. 31 at 74.) The fact that the technical documents that Complainants cite in their reply brief mention the word "asynchronous" does not mean that those documents are applying the term in the same way as expressed in the adopted construction. Therefore, the Administrative Law Judge finds that, in themselves, the documents are not sufficient to show that any of the Accused Products satisfy the "derived from" language of the "asynchronous" limitation.

The Administrative Law Judge is further persuaded by Respondents' argument that Complainants rely on a conclusory statement of Dr. Oklobdzija in which he read the word "asynchronous" in the user manual for an accused { } and made the conclusory assertion that this is enough to meet the claim language. (RRBr. at 69 (citing CBr. at 44; Tr. (Oklobdzija) at 1061-62).) Respondents argue that not only does he fail to establish that the manual from which he was reading uses the term "asynchronous" in the same way as the asserted claims, his testimony says nothing about the other requirements in the construction of the "asynchronous" limitations, including (1) timing controls, (2) independence, (3) no derivation, and (4) no readily predictable phase relationship. (*Id.* (citing Order No. 31 at 74).) Respondents argue that all Dr. Oklobdzija did was mention the word "asynchronous" and declare that there is no phase relationship. (*Id.*) Respondents say this testimony is legally insufficient. (*Id.* (citing *ConAgra Foods, Inc.*, 465 F.3d at 1319-20).)

The Administrative Law Judge agrees, for the same reasons discussed in the preceding paragraph. Since Complainants have not connected Dr. Oklobdzija's testimony about PLLs to these documents, so as to explain how they, alone or in conjunction with other evidence, meet the "derived from" aspect of the "asynchronous" limitation, proof of infringement of claims 11, 13, and 16 is lacking with respect to this element.

For all of the foregoing reasons, the Administrative Law Judge concludes that the evidence is not sufficient to show that any of the Accused Products meet the limitations of any of the asserted claims with respect to the "second" or "external" clocks.

5. The "Clocking Said CPU" Limitation

a) Respondents' arguments

Respondents maintain that the "clocking said CPU" limitation is not met. (RBr. at 113). Each asserted independent claim requires that the claimed variable speed clock or entire oscillator has to clock the central processing unit." (*Id.*) The affected claims and their clocking terms are particularized here:

> • Claims 1 & 11: "entire ring oscillator variable speed system clock in said single integrated circuit and connected to said central processing unit for clocking said central processing unit";

- Claims 6 & 13: "an entire oscillator disposed upon said integrated circuit substrate and connected to said central processing unit, said oscillator clocking said central processing unit at a clock rate";

- Claims 10 & 16: "clocking said central processing unit at a clock rate using said variable speed clock"

(*Id.* (citing JXM-0001 at claims 1, 6, 10, 11, 13, 16).) Respondents note that Order No. 31 construed the term "clocking said central processing unit" to mean "providing a timing signal to said central processing unit." (*Id.* (citing Order No. 31 at 45).) According to Respondents, the evidence shows that the Accused Products cannot satisfy this limitation because "the PLL or the oscillator within it does not provide the timing signal to the alleged CPU." (*Id.* (citing Tr. (Subramanian) at 1340-41).)

(1) *Products with { }*

Respondents say the PLLs and their components in the accused { } do not provide a timing signal to the ARM core, say Respondents. (*Id.* (citing Tr. (Subramanian) at 1307).) To demonstrate why the { } do not satisfy this limitation, Dr. Subramanian used the { } and one of its schematics as an example. The schematic block diagram for the { }, which appears below, shows that { }. (*Id.* at 114 (citing Tr. (Subramanian) at 1342-43; RX-0602C at LGE800ITC 1915).)

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{

}. (*Id.* (citing Tr. (Subramanian) at 1343; RX-0602C at LGE800ITC

1918).) In this chip, the { }. (*Id.* (citing Tr. (Subramanian) 1344:15-24; RX-0602C at LGE800ITC 1918).) The structure that provides the timing signal for the ARM core is { }. (*Id.* (citing Tr. (Subramanian) at 1342-43; RX-0602C at LGE800ITC 1914-15).) Hence, Complainants cannot show that the alleged "first clock" provides any timing signal to the supposed CPU (the ARM core). (*Id.*)

Respondents say that when presented with the same evidence, Dr. Oklobdzija agreed with Dr. Subramanian on a number of points. Dr. Oklobdzija concurred that the ARM core does { }, while the accused PLL { }. (*Id.* at 115 (citing Tr. (Oklobdzija) at 886).) He also agreed that the { }. (*Id.* (citing Tr. (Oklobdzija) at 886-887).) The two experts, however, disagree on whether the signal coming out of the { } is the same clock signal output by the PLL. Respondents argue that Dr. Oklobdzija would re-label the { }. (*Id.* (citing Tr. (Oklobdzija) at 887-888 (noting, among other things, that "they mislabeled that block, { }. That's not true.")).) By Dr. Oklobdzija's logic, a person walking at a leisurely pace of 192 feet per minute is moving at the same speed as an athlete jogging at 384 feet per minute. The speeds are just completely different. Respondents, conclude that the accused PLL cannot therefore provide the ARM core's required timing signals. (*Id.*)

Respondents argue that in order to rehabilitate Dr. Oklobdzija, Complainants' counsel tried to draw an analogy between the { } circuitry and the Nile River in Africa to suggest that, like the water flowing from Lake Victoria to the Nile's delta, the electrons reaching the ARM core originated from the PLL. (*Id.* (citing (Tr. (Subramanian) at 1457-1459).) However, Dr. Subramanian pointed out that "[t]his is not analogous to the system we're talking about." (*Id.* (citing Tr. (Subramanian) at 1458).) To highlight the difference between the river and the { }, he explained that, if he could tag a water molecule in the Nile, this molecule would end up in one of the river's tributaries. (*Id.* at 116 (citing Tr. (Subramanian) at 1459).) But "[i]f, on the other hand, I were to tag an electron on the PLL output, it would never show up on the output of that { } block." (*Id.* (citing Tr. (Subramanian) at 1459).) He testified: "If you look at the signal coming into the { }, that signal never has any electrons which actually show up on the other side. And it's not a quantum mechanical argument. This is sort of a fundamental wiring argument." (*Id.* (citing Tr. (Subramanian) at 1460).) Because it ignores the fundamental principles underlying the accused circuits, Complainants' analogy falls apart, argue Respondents. In contrast, they say Dr. Subramanian's analysis, which rests on a deep understanding of the technology and the accused circuits, is the only supportable explanation. (*Id.*)

Based on his review of similar evidence in the record, Dr. Subramanian testified that his opinion regarding this limitation "would also apply to {

}," including:

REDACTED

(*Id.* at 116 (citing Tr. (Subramanian) at 1345-46).) These { }, do not satisfy the "clocking said CPU" limitations of the asserted claims, say Respondents. (*Id.* at 116-117).)

(2) *Products with TI OMAP Chips*

As with the { }, the DPLLs (and their components) in the accused OMAP chips do not provide a timing signal to the MPU core. (*Id.* at 117 (citing Tr. (Subramanian) 1346-48).) Dr. Subramanian testified that there are multiple dividers at the output of the PLL circuits in the accused OMAP chips. (*Id.* (citing Tr. (Subramanian) at 1346-47; RDX-0004.152C).) Because these dividers modify the frequency generated by the PLL before the MPU receives the signal, Respondents say the accused DPLLs (and its components) do not provide the timing signal to the supposed CPU. (*Id.* (citing Tr. (Subramanian) at 1347; RX-0528 at LGE800ITC 85690).) As with the { }, it is the "clock generator block" that provides the correct frequency to the MPU for use as a timing signal. (*Id.* (citing Tr.

(Subramanian) at 134716; RX-0528 at LGE800ITC 86358; RDX-0004.152C).) Therefore, Dr. Subramanian concluded that his opinion would also apply to all of the accused OMAP chips:

- **OMAP3530** [RX-1804C at GARM-N37xx-031407, 31503];
- **OMAP3611** and **OMAP 3621** [RX-1804C at GARM-N37xx-31407];
- **OMAP4430** [RX-528C at LGE800ITC 86358, 85690];
- **OMAP4460** [RX-527C at AMZ_TPL 24602, 25320-22]; and
- **OMAP4470** [RX-526C at AMZ_TPL 40096, 40819-21].

(*Id.* at 117 (citing Tr. (Subramanian) at 1347-48).)

(3) *Products with LSI Logic Chips*

The accused PLL (and its components) in the accused LSI Logic B5503A chip does not provide a timing signal to the alleged CPU core, argue Respondents. (*Id.* (citing [Tr. (Subramanian) at 1348).) The LSI Logic chip's accused PLL, { } (*Id.* (citing Tr. (Subramanian) at 1348; RDX-0004.152C; RX-0192C; RX-0184C (Casasanta Depo.) at 72:4-23, 73:2-14).) { }. (*Id.* at 117-118 (citing Tr. (Subramanian) at 1348; RX-0184C (Casasanta Depo.) at 72-73).) Dr. Subramanian concluded that the evidence "make[s] clear that the frequency of the timing signal for the CPU is actually very different from the PLL output frequency." (*Id.* at 118 (citing Tr. (Subramanian) at 1348).)

(4) *Products with Samsung Chips*

The accused APLLs (and their components) in the accused Samsung chips { }, say Respondents. (*Id.* (citing Tr. (Subramanian) at

1349).) In these APLLs, {

}

(5) *Products with TI Codec Chips*

Respondents say Dr. Oklobdzija did not offer any testimony that this limitation is met by Nintendo's Accused Products. As an initial matter, as discussed at pp. 130-133 of Respondents' opening brief, the accused audio codecs do not contain a CPU and for that reason alone, cannot satisfy this limitation. (*Id.* (citing Tr. (Subramanian) at 1349-50).) Even setting aside the lack of a CPU in the accused audio codecs, Dr. Subramanian established that the oscillators in the PLLs of the accused codecs do not provide a timing signal to the codec audio-signal processing blocks. (*Id.* (citing Tr. (Subramanian) at 1350; RDX-0004.156C).) Instead, Respondents say the evidence shows that {

}. (*Id.* at 118-119 (citing RX-0647C at NINPTL 316, 325, 344-347: RX-0649 C at NINTPL 13007, 13016, 13035-38; RX-0648C at NINTPL 12843, 12860-862; RX-0813C; RX-0832C; Tr. (Kekre) at 231-232, 235-236; RDX-1000C; RDX-1001C).)

b) Complainants' response

Complainants say Respondents offer a single argument for why the ring oscillators in the Accused Products supposedly do not meet the "clocking said central processing unit" limitation from all asserted claims: after the ring oscillator produces the clock signal, it passes through dividers before reaching the CPU. (CRBr. at 24 (citing RBr. at § III.F).) In other words, a direct connection between the CPU and first clock is not present. (*Id.* at 24-25.) Complainants argue that, as an initial matter, this argument is an attempt to import a limitation into the claims. Nothing in any of the asserted claims requires a direct connection between the first clock and the CPU, only that the first clock be used for "clocking said central processing unit," argue Complainants. (*Id.* at 25.) All evidence shows that this is the case. Complainants also contend that Respondents' argument fails for other reasons as well. (*Id.*) First, Dr. Subramanian admits that running the first clock's signal through a divider does not change its point of origin. (*Id.*) Second, outside of Section III.F of their brief, Respondents readily and repeatedly admit that it is the "first clock" that clocks the CPU. (*Id.*) Third, there is no dispute that a divider—the structure Respondents now identify as clocking the CPU—cannot generate an oscillation (i.e., clock signal). (*Id.*) Accordingly, a divider cannot clock anything. Finally, the documents themselves demonstrate that the "first clocks" (the "entire oscillator" of claims 6 and 13) in the Accused Products clock the CPU. (*Id.*)

First, when Dr. Subramanian conducted his temperature and voltage testing, he measured clock signals that had been divided down after they were output from the ring oscillator. For example, in the case of the Samsung chips, the signal Dr. Subramanian measured had passed through "a divide-by-32 fixed-ratio divider on the output of the clock signal." (*Id.* (citing RBr. at 53).) Dr. Subramanian defended his measurement of a signal that had been divided 32 times, stating that the division did not affect the validity of the results with respect to "the 1-gigahertz clock," i.e., the claimed "first clock." (*Id.* (citing Tr. (Subramanian) at 1237).) This testimony is diametrically opposed to Respondents' current position, argue Complainants. (*Id.*) Under Respondents' "first clock" argument, it would be the divider, not the "1-gigahertz clock" that "clocks the CPU." (*Id.*) Accordingly, pursuant to this argument, Dr. Subramanian measured the temperature and voltage variations of the divider, not the clock source Dr. Oklobdzija identified as the first clock. Respondents obviously do not believe this. (*Id.*) The truth is, argue Complainants, both Dr. Subramanian and Respondents recognize that it is the output of the ring oscillator—regardless of whether it is divided down—that clocks the CPU. Otherwise, Dr. Subramanian would not have relied on divided down signals for his testing. (*Id.* at 25-26.)

Second, except when they argue regarding the "clocking said CPU" limitation, Respondents readily confirm what Dr. Subramanian has already admitted—that the first clock clocks the CPU. (*Id.* at 26.) For example, when discussing "second clocks," Respondents attack any reliance by second clock signals that supposedly rely on the same PLL that outputs the signal that clocks the CPU, i.e., the claimed "first clock." With respect to the Accused Products' camera interface, Respondents admit: "This {

}." (*Id.* (citing RBr. at 128).) As this quote from Respondents' brief suggests, it is only when an additional "direct connection" limitation is imposed that it can be argued that something other than the clock signal output by the PLL clocks the CPU. (*Id.*) Complainants say Respondents make the same admission when discussing the USB second clock: "{ } chip provides a clear example of an accused chip in which the exact same PLL ultimately drives both the ARM core (the accused

CPU) and the USB interface (the accused I/O interface)." (*Id.* (citing RBr. at 124).) Thus, Complainants and Respondents agree that it is the clock signal generated by the ring oscillator in the PLL—not an intermediate divider—that "drives . . . the accused CPU." (*Id.*)

Third, the above discussion confirms what Complainants contend should be obvious: division of an existing clock signal is not signal generation. In other words, as Dr. Subramanian admitted, "a frequency divider receives a clock signal and divides it." (*Id.* (citing Tr. (Subramanian) at 1456).) Dr. Subramanian further confirmed that such a divider can only apply division to a signal that already has an oscillation; it cannot "generate an oscillating clock signal" with just a voltage or current input like a ring oscillator can. (*Id.* (citing Tr. (Subramanian) at 1457).) Complainants say this is why—as Respondents admit—it is the chip's main PLL whose output is also ultimately used to clock the CPU," not the divider. (*Id.* at 26-27 (citing RBr. at 128).)

Finally, the documents on which Respondents rely confirm that it is the "first clock," not intermediate dividers, that clock the CPU, argue Complainants. (*Id.* at 27.) For example, the very figure Respondents cite in support of their divider argument with respect to {

}; RX-0696C at 853SAMSUNG00167663 (confirming for Samsung Exynos 4412 that the

"Cortex-A9 MPCore . . . uses APLL"); CX-0546C at NINTPL00012832 ("An on-chip PLL provides the high-speed clock needed by the digital signal-processing block"); Tr. (Haroun) at 181:8-18 (admitting that MPU_DPLL "generates a clock signal that's sent to the MPU")).) The Texas Instruments chip manuals, in particular, make clear that division and gating are something different than clock "generation:" {

} (*Id.* (citing CX-0321C at AMZ_TPL_00059599. See also CX-0318C at AMZ_TPL_00040084; CX-0316C at AMZ_TPL_00024590; CX-0366C at GARM-N37xx-031493; CX-0353C at GARMIN068490).) For these reasons, Respondents' argument that it is a divider – rather than the "first clock" – that clocks the CPU should be rejected. (*Id.*)

c) The Administrative Law Judge's findings and conclusion

The Administrative Law Judge rejects Respondents' argument that the "clocking said central processing unit" limitation is not met for the reasons they advance and concludes that this limitation does not require that the clocking signal pass directly to the CPU without passing through intermediary circuitry, such as dividers.

6. Respondents' Additional Bases For Non-Infringement

a) The Texas Instruments audio codec chip

(1) *The parties' arguments*

Respondents agree with the position taken by Staff in its opening brief that Complainants' adduced no evidence at the hearing to establish that the accused Texas Instruments' audio codecs include a CPU. (RRBr. at 70 (citing SBr. at 13.) Reflecting this lack of evidence, Complainants barely address the disputed CPU limitation in their post-hearing brief and offer no expert testimony on this disputed issue, say Respondents. (*Id.* (citing CBr. at 160-67).) Respondents say Complainants' inability to cite to any expert testimony is not surprising, because Dr. Oklobdzija never offered any opinion during the hearing regarding the presence of a CPU in the accused Texas Instruments' audio codecs. In contrast, Dr. Subramanian and Mr. Kekre, the design manager for the accused Texas Instruments' audio codec chips, provided evidence that the audio codec chips do not have any structure or any capability to control the interpretation and execution of programmed instructions. (*Id.* (citing RBr. at 130-133 (discussing evidence)).)

Complainants never disputed or even addressed the testimony of Dr. Subramanian or Mr. Kekre on the CPU limitation, say Respondents, noting that the Federal Circuit has held, "in a case involving complex technology, where the accused infringer offers expert testimony negating infringement, the patentee cannot satisfy its burden of proof by relying only on testimony from those who are admittedly not expert in the field." (*Id.* (citing *Centricut, LLC v. Esab Group, Inc.*, 390 F.3d 1361, 1370 (Fed. Cir. 2004)).) Here, Complainants offered no testimony, let alone expert testimony, to satisfy their burden to prove that the accused codecs include an "electronic circuit on an integrated circuit that controls the interpretation and execution of programmed instructions." (*Id.* at 70-71 (citing Order No. 31 at 11).) Complainants' opening brief only references (1) documents that Dr. Oklobdzija did not substantively testify about at the hearing and (2) misconstrued deposition testimony from a Nintendo witness that Dr. Oklobdzija did not mention at the hearing. (*Id.* (citing CBr. at 160-67).) Given Complainants' failure to meet their burden, there should be a finding that the accused Texas Instruments codecs do not infringe claims 1 and 11, argue Respondents. (*Id.* at 71.)

Staff says that with respect specifically to the Texas Instruments' audio codecs found in the Nintendo products at issue, these products do not include a CPU. (SBr. at 13 (citing Tr. (Subramanian) 1209-10).) The term "central processing unit" has been construed to mean an "electronic circuit on an integrated circuit that controls the interpretation and execution of programmed instructions." (*Id.* (citing Order No. 31 at 11).) In this regard, no evidence that the Texas Instruments codecs include a CPU was adduced at the evidentiary hearing. To the contrary, Mr. Kekre testified on behalf of Texas Instruments that the accused Texas Instruments audio codecs { }. (*Id.* (citing Tr. (Kekre) at 237-238).). The evidence thus does not establish that the accused Texas Instruments' audio codecs include a CPU. Staff says the accused Nintendo products that contain these audio codecs have thus not been shown to satisfy this limitation. Accordingly, the evidence establishes that the Accused Products do not satisfy the first limitation of claim 1 of the '336 patent, argues Staff. (*Id.*)

Complainants say that, as an initial matter, Respondents' argument is wrong because Mr. Kekre never gave the testimony mentioned, and no such quote exists in the hearing transcript. The citations quoted above at 211 and 213-214 merely establish Mr. Kekre's background as a Texas Instruments engineer. (CRBr. at 65.) While Mr. Kekre never testified that the codec chips could not be programmed, Respondents nevertheless rely on his testimony that { } (*Id.* (citing RBr. at 132).) However, this has no bearing on the CPU limitation of the Asserted claims, say Complainants. (*Id.*) The agreed-upon construction for CPU simply does not require user-programmed instructions as opposed to hardcoded instructions. All it requires is "programmed instructions." (*Id.* (citing Order 31 at 11).) Respondents improperly attempt to import a limitation into this construction.

Second, Complainants argue that even if user-programmed instructions were required, Mr. Kekre's testimony in fact establishes that they are present. (*Id.* (citing Tr. (Kekre) at 237

({

})).) Likewise, Dr. Subramanian admits that the audio codecs all have { } (*Id.* (citing Tr. (Subramanian) at 1369).)

Third, Respondents ignore the chip manuals for the Texas Instruments' audio codec chips, which clearly demonstrate that these chips include {

} (*Id.*)

Complainants say that, contrary to Respondents' argument, Dr. Oklobdzija did offer his opinion that the audio codec chips contain a CPU. For example, he testified that the block diagram for the TI 3005 shows a PLL "supplying clock for the digital audio processing block." (*Id.* at 66 (citing Tr. (Oklobdzija) at 498).) He likewise testified that Figure 23 from the TI 3010 chip manual shows a "signal processing block" on the right hand side, and "that PLL is where the source of the clock is or the ring oscillator is that clocks that [signal processing] block." (*Id.* (citing Tr. (Oklobdzija) at 499-500).) Complainants say the claimed CPU for the TI 3005 and 3010 chips are the programmable digital signal processor and digital audio processor, respectively. (*Id.* (citing CBr. at 161).)

(2) *The Administrative Law Judge's findings and conclusion*

The Administrative Law Judge agrees with Respondents and Staff—Dr. Oklobdzija's testimony does not disclose that the Texas Instruments' codec chip includes a CPU that is an "electronic circuit on an integrated circuit that controls the interpretation and execution of programmed instructions." (*See* Order No. 31 at 11.) This is what Dr. Oklobdzija testified:

> Q. What's shown here from RX-673C in Slide 40?
>
> A. This is a block diagram of the Audio Codec chips, a chip that is produced by Texas Instruments, referred to as 3005.
>
> Q. I want to blow up a portion here on the right-hand side. What's shown here in the box on the middle of the right-hand side?
>
> A. What we have is a PLL, and this PLL is supplying clock for the digital Audio processing block, which is this one.
>
> Q. I see it says "digital audio processing." What does it say right below that? Can you make that out?
>
> A. Can you make it less blurry?
>
> JUDGE GILDEA: It looks like "serial interface."
>
> A. "Serial interface " Right.
>
> Q. That's what it looks like to me. I didn't want to put any words in your mouth.
>
> A. Sorry. Take it back. Can you zoom back on the entire picture. I had a little trouble with it. That's fine; I don't need it. So the Audio Codec is over there. This is the interface. This is the PLL.
>
> Q. And if we could zoom on this box here above the PLL. What is that box?
>
> A. Can you zoom in? Can you zoom out, actually?
>
> Q. Why don't we skip this.
>
> A. If I have a paper copy in front of me —I know I had to really put an effort on my eyes and imagination to read those numbers.
>
> Q. It's no problem.
>
> A. We could go back and read them.
>
> Q. Let's come back to this, because we have, I'm sure it's a higher-resolution copy than this. What's shown here in Slide 41 of CDX-6C?

> A. What we have is, to the right we have a signal processing block.
>
> Q. Are you referring to the block with the blue rectangle?
>
> A. Yes. And it contains a PLL, and that PLL is where the source of the clock is or the ring oscillator is that clocks that block.

(Tr. (Oklobdzija) at 498-500.) Dr. Oklobdzija does not mention a CPU during this colloquy, yet this is what Complainants cite in opposition to Respondents' and Staffs arguments. Thus, the Administrative Law Judge finds that it does not overcome their arguments. Furthermore, Dr. Subramanian persuasively testified that there was no proof that the Audio Codec chips contain a CPU. (Tr. (Subramanian) at 1209.) The Administrative Law Judge concludes that, for the reasons just discussed with respect to the Texas Instruments' audio codecs found in the Nintendo products at issue, the evidence is not sufficient to show that these products contain a CPU, and in that respect, they do not infringe any of the asserted claims of the '336 patent.

b) The Doctrine of Equivalents

Respondents and Staff point out that Complainants produced no evidence that any of the Accused Products infringe under the doctrine of equivalents. (RBr. at 133-135; SBr. at 25.) The Administrative Law Judge concludes that there is insufficient evidence to support a finding of infringement by any of the Accused Products with respect to any of the asserted claims under the doctrine of equivalents and that any claims in that regard were waived by omission in Complainants' post-hearing briefs.

c) Indirect Infringement

(1) *The parties' arguments*

Respondents say Complainants have asserted indirect infringement based on induced infringement only, without any allegation of contributory infringement. (RBr. at 135 (citing

Complainants' Pre-hearing Brief at 147-151).) Respondents argue that even on this sole basis for indirect infringement, Complainants' allegations and evidence fall far short.

First, Respondents say there is no direct infringement. (*Id.* (citing Tr. (Subramanian) at 1372).) Induced infringement requires proof of direct infringement. (*Id.* (citing *Akamai Techs., Inc. v. Limelight Networks, Inc.*, 692 F.3d 1301, 1308 (Fed. Cir. 2012) (en banc)).) For all of the reasons discussed at pages 44-133 of its opening brief, Respondents contend that the Accused Products do not directly infringe any of the asserted claims. (*Id.*) Without direct infringement, there cannot be induced infringement. (*Id.*)

Second, Complainants have not identified any third party person, other than their expert, whom they allege practices the method claims or who uses the Accused Products. (*Id.* (citing Tr. (Subramanian) at 1373-74).) That is insufficient to support induced infringement, argue Respondents. (*Id.* at 135-136 (citing *ACCO Brands*, 501 F.3d at 1313 ("The record further shows that ACCO failed to point to specific instances of direct infringement. The sole witness at trial who testified to having used the lock in an infringing manner was ACCO's expert, Dr. Dornfeld. However, the record contains no evidence of actual users having operated the lock in an infringing manner.")).) Without an actual direct infringer, there is no induced infringement. (*Id.* at 136.)

Third, Respondents say Complainants have not met their burden of showing that Respondents' actions induced an infringing act. (*Id.* (citing *DSU Med.*, 471 F.3d at 1304 ("The plaintiff has the burden of showing that the alleged infringer's actions induced infringing acts and that he knew or should have known his actions would induce actual infringements.")).) Dr. Oklobdzija testified about statements in user guides explaining how to connect a phone to a computer using a USB cable, and reasoned that this connection necessarily results in the transmission of data containing an embedded clock signal over the USB cable. (*Id.* (citing Tr. (Oklobdzija) 564-566, 576, 738-739 (HTC); 770-771 (Amazon); 771-772 (Novatel); 772-773(Garmin); 773-774 ({ })).) But none of these excerpts teaches a customer how to practice each and every limitation of the asserted claims. At best, the manuals may relate to the "second clock" limitations, without suggesting any other limitation. (*Id.*) That is insufficient to establish inducement, say Respondents. (*Id.* (citing *Mirror Worlds, LLC v. Apple Inc.*, 692 F.3d 1351, 1360 (Fed. Cir. 2012) ("It is well settled that excerpts from user manuals as evidence of underlying direct infringement by third parties of products that can be used in a non-infringing manner are by themselves insufficient to show the predicate acts necessary for inducement of infringement.")).)

Moreover, instructing users to connect a USB cable to an Accused Product is not evidence that such Respondent intended for the act of infringement to occur. Indeed, connecting a USB cable to an Accused Product can serve a purpose other than transferring data, such as charging the product. (*Id.* at 136-137 (citing Tr. (Subramanian) at 1373, (Oklobdzija) at 917 - 918, 1074; RX-0605 at LGE800ITC 429644, 429669; RX-0705 at 853Samsung 15869; RX-0543 at BN853-686).) In fact, argue Respondents, "a major function of USB is to provide charging functionality." (*Id.* at 137 (citing Tr. (Subramanian) at 1372-73).) Many of the Accused Products can operate in a "Charge Only" mode, which does not involve data transfer and which uses the USB port solely to charge the device. (*Id.* (citing Tr. (Subramanian) at 1372-73).) For example, a USB cable can connect an Accused Product to a wall plug in order to charge the Accused Product. (*Id.* (citing Tr. (Subramanian) at 1373).) Even Dr. Oklobdzija, admitted that it is common to use USB for charging alone:

> Q. Well, Dr. O [Oklobdzija], you will agree with me that it's very common for people not to use the USB to transfer data and to use it for charging? You agree

with that, don't you?

A. I do it myself.

(*Id.* (citing Tr. (Oklobdzija) at 917-918).) Then during Dr. Oklobdzija's redirect examination, when the witness was asked about several pages of an Accused Product's user guide, he admitted that a user would use the USB cable and socket for the sole purpose of charging the product:

> Q. You don't need to read them [those portions of the user guide], but just tell me what significance do they have, if any?
>
> A. They're mentioning the PC in the 3, so they show how to connect the USB to the PC, and they also mention – Okay. "Choose from the following options: charge only, mass storage, or Internet connection." So when they connect, I think what will pop up on the screen, they'll have the option either to use it only as a charger or to store the data from the phone to the PC or to tether."

(*Id.* (citing Tr. (Oklobdzija) 1074).) Therefore, argue Respondents, Complainants cannot show intent to induce based on a user manual because charging a USB is a substantial use that does not involve data transfer, and Complainants do not allege that infringement occurs in the absence of data transfer. (*Id.* at 137-138 (citing *Warner-Lambert Co. v. Apotex Corp.*, 316 F.3d 1348, 1365 (Fed. Cir. 2003) ("[W]here a product has substantial noninfringing uses, intent to induce infringement cannot be inferred even when the defendant has actual knowledge that some users of its product may be infringing the patent.")).)

As to Acer, there is not even an allegation that the LSI B5503A uses a USB interface so no inducement as to the Acer Accused Products has been shown. (*Id.* at 138 (citing Tr. (Oklobdzija) at 1022).)

For these reasons, Respondents contend that Complainants have not shown induced infringement. (*Id.*)

Complainants, on the other hand, claim there is ample evidence of indirect infringement. (CRBr. at 69.) First, Complainants argue that their opening brief made clear that Respondents are guilty of direct infringement. (*Id.*) Complainants say the Federal Circuit has made it clear that direct, as opposed to circumstantial, evidence of end users' using the Accused Products in an infringing manner is not required to prove direct or induced infringement. (*Id.* (citing *Moleculon Research Corp. v. CBS, In.*, 793 F.2d 1261, 1272 (Fed. Cir. 1986).) To prove direct infringement, Complainants need only show that "more likely than one person somewhere in the United States [has] performed the claimed method." (*Id.* (citing *Lucent,* 580 F.3d at 1318).)

Additionally, argue Complainants, "[w]here an alleged infringer designs a product for use in an infringing way and instructs users to use the product in an infringing way, there is sufficient evidence for a jury to find direct infringement." (*Id.* at 69-70 (citing *Toshiba Corp. v. Imation Corp.*, 681 F.3d 1358, 1365 (Fed. Cir. 2012); *Lucent,* 580 F.3d at 1318; *Moleculon*, 793 F.2d at 1272; *Certain Semiconductor Chips Having Synchronous Dynamic Random Access Memory Controllers*, Inv. No. 337-TA-661, Initial Determination, 2010 WL 1695162, at *26 (U.S.I.T.C. Jan. 22, 2010) ("[E]vidence of extensive sales in the United States has been found sufficient to show direct infringement by end users that perform a claimed method when operating an Accused Product as the manufacturer intended.")).)

Here, argue Complainants, there is evidence to show the likelihood that at least one end user has used each of the Accused Products covered by the asserted apparatus claims and performed the methods claimed by the '336 patent. (*Id.* at 70.) First, Respondents have imported and sold a huge volume of infringing Accused Products. (*Id.* (citing Complainants' Pre-Hearing Brief Exhibits. 5-14).) Second, argue Complainants, Respondents distribute user manuals to their customers instructing them how to use the Accused Products in an infringing manner (*e.g.*, how to connect the Accused Product to a computer via USB to transfer data, to tether, to sync, etc.). (*Id.*) Third, Respondents provide websites and other publicly available information instructing users to transfer data between the Accused Products and devices connected via USB. (*Id.*) Forth, Respondents designed the Accused Products according to customer preferences that necessarily invoke infringement of the '336 patent, such as the ability to transfer files or tether between a computer and the Accused Product. (*Id.*) Further, Complainants elicited direct evidence of direct infringement by Respondents' customers. For example, Barnes & Noble's corporate representative admitted that end users have transferred files from their computers to the Accused Products via USB. (*Id.*)

Lastly, Respondents' discussion of the knowledge requirement of inducement is a red herring, say Complainants. Respondents have had knowledge that their instructions to customers amount to infringement of the Asserted claims since they received the Complaint and the detailed infringement charts attached thereto. Accordingly, there is more than ample evidence of infringement based on inducement. (*Id.* at 71.)

(2) *The Administrative Law Judge's findings and conclusion*

The Administrative Law Judge concludes that the evidence is not sufficient to show that Respondents are guilty of indirect infringement. Inasmuch as the Administrative Law Judge has found that there is not a preponderance of evidence showing that any of the Accused Products directly infringes any of the asserted claims of the '336 patent, there can be no induced infringement; nor is there a preponderance of evidence showing contributory infringement.

d) Lack of evidence of infringement with respect to previously Accused Products

(1) *The parties' arguments*

Respondents contend that Complainants have not provided any evidence of infringement with respect to a number of Accused Products of ZTE, LG, Huawei, Samsung, and Garmin listed in Exhibit D of Dr. Oklobdzija's expert report on infringement, which are listed hereafter:

• ZTE: Complainants accused 16 ZTE products of allegedly infringing the '336patent. (RBr. at 138-139 (citing Tr. (Subramanian) at 1136; RDX-4-26C; RDX-1033C.2).) Complainants offered evidence of alleged infringement for only 7 of the 16 accused ZTE products, and failed to offer any evidence with respect to the other 9 products. (*Id.* (citing Tr. (Oklobdzija) 623, 624, 628, 668, 672-674, 675-679, 688-6893, 693, 743-746; CDX-12C.1, CDX-15C.1; CDX-17C.1).) The 9 ZTE Accused Products that Complainants failed to offer any evidence of alleged infringement are: MF61 (4G Hotspot), V768/ P253A20 (Pascal/Concord/ Origin), EuFi891 (Unite), MF683 (Rocket 3.0), D930 (Chorus), V8000 (Engage), N859 (Tania/ Render), N910 (Anthem (LTE)), and AC30 (Fivespot).

• LG: Complainants identified 11 accused LG products but only offered evidence of alleged infringement for 9 of the accused LG products. (*Id.* at 139 (citing Tr. (Subramanian) at 113; RDX-4C.23; RDX-1029C.2; Tr. (Oklobdzija) at 600, 623-18, 640, 641, 668, 682-684, 727-72823; CDX-12C.1, CDX-16C.1;CDX-22C.1).) The 2 LG products that Complainants failed to offer any evidence of alleged infringement are the LG VN271 and LG UN272 mobile phones.

• Huawei: Complainants identified 23 accused Huawei products but only offered evidence of alleged infringement for 12 of the accused Huawei products. (*Id.* (citing Tr. (Subramanian) at 1133-34; RDX-4C.21; RDX-1027C.2; Tr. (Oklobdzija) at 623-627, 667-672, 686-687, 690-691; 739-743, 1062-67; CDX-12C.1; CDX-14C.1; CDX-15C.1; CDX-44C.3).) The 11 Huawei products that Complainants failed to offer any evidence of alleged infringement are: U8500, Summit, Prism, Fusion, Ascend Y (TF), Ascend Y (USCC), Ascend Q, Activa 4G, Springboard (Mediapad), Mercury (Honor), and Ascend P1.

• Samsung: Complainants identified 40 accused Samsung products but only offered evidence of alleged infringement for 31 of the accused Samsung products. (*Id.* (citing Tr. (Subramanian) at 1135-36; RDX-4C.25; RDX-1032C; Tr. (Oklobdzija) at 547; 577; 730; CDX-16C.1; CDX-27C.1; CDX-59C.1).) The 9 Samsung products that Complainants failed to offer any evidence of alleged infringement are: Focus II (SGH-I667); Galaxy Appeal (SGH-I827); Galaxy Discover (SGH-S730G); Galaxy Rugby Smart (SGH-I847); Galaxy S Blaze 4G (SGH-T769); Galaxy Exhibit II 4G (SGH-T679); Galaxy Rush (SPH-M830); Transform Ultra (SPH-M930); and Galaxy Reverb (SPH-M950).

• Garmin: Complainants identified 19 accused Garmin products but only offered evidence of alleged infringement for 16 of the accused Garmin products. (*Id.* at 140 (citing Tr. (Subramanian) at 1137-38; RDX-4C.32; RDX-1027C.2; Tr. (Oklobdzija) at 637-638, 638-639, 694-704; CDX-19C.1, CDX-20C.1).) The 3 Garmin products that Complainants failed to offer any evidence of alleged infringement are the GRSMAP 7012, GRSMAP 7015, and GRSMAP 7215.

Respondents argue that, because Complainants could have, but did not, provide any evidence of alleged infringement for 9 of the accused ZTE products, 2 of the accused LG products, 11 of the accused Huawei products, 9 of the accused Samsung products, and 3 of the accused Garmin products, Complainants have not met their burden of proof and a finding of non-infringement for those products is warranted. (*Id.* (citing *Certain Audiovisual Components and Products Containing the Same,* Inv. No. 337-TA-837, Order No. 67, at 3-5 (U.S.I.T.C. Feb. 27, 2013) (granting summary determination of noninfringement for ten products where complainant provided no evidence of infringement)).)

Respondents argue that Complainants also failed to introduce evidence as to any but two of the Acer Accused Products. (*Id.* (citing Tr. (Subramanian) at 1131-32; RX-1022C; RDX-4.17C).) Dr. Oklobdzija presented specific evidence only as to the Acer Aspire V3-551 and Acer Aspire V3 551G. (*Id.* (citing CDX-1166.3C at n.1).) Complainants contend, without supporting evidence, that these two products are representative of some 129 other Acer Accused Products. (*Id.*) Both counsel for Complainants and Dr. Oklobdzija admitted that Dr. Oklobdzija was asked by counsel to assume that all the Acer Accused Products "used a Seagate hard drive," even while admitting that other hard disk drives are used. (*Id.* at Tr. (Mr. Marsh) at 652-653; Tr. (Oklobdzija) at 656-657).) Dr. Oklobdzija testified that an unknown proportion of the other products used "Seagate hard disk drives," and no evidence was presented that the B5503A is even used in all Seagate hard disk drives. (*Id.* (citing Tr. (Oklobdzija) at 657-658).) On its face, the testimony was speculative, say Respondents. (*Id.*. (citing Tr. (Oklobdzija) at 657 ("it wouldn't be fair to say all of them use Seagate drive.")).) The assumption and speculation of Dr. Oklobdzija is insufficient to prove that the 129 remaining Acer Accused Products are fairly represented by the Acer Aspire V3-551 and 551G. (*Id.* at 140-141.) Respondents say

Attachment B to their opening brief is a table that identifies the products accused of infringement in Appendix D of Dr. Oklobdzija's report, and includes an indication of those Accused Products for which Complainants offered at least some evidence of alleged infringement and those Accused Products for which Complainants failed to offer any evidence of alleged infringement. (*Id.*)

Respondents say Complainants failed to provide any evidence as to Accused Products that were identified during discovery but not mentioned in Dr. Oklobdzija's expert report. (*Id.*) According to Respondents, Complainants failed to provide any evidence of infringement for the following products:

- 100 Acer Accused Products (*Id.* at 141 (citing Tr. (Subramanian) at 1131-32; RDX-4.18C, RDX-1022C)
- 63 HTC Accused Products (*Id.* citing Tr. (Subramanian) at 1133; RDX-4.20C, RDX-1026C)
- 3 Kyocera Accused Products (*Id.* (citing Tr. (Subramanian) at 1134-35; CDX-4.22C)
- 60 LG Accused Products (*Id.* (citing Tr. (Subramanian) at 1135; CDX-4.24C, RDX-1029C)
- 15 ZTE Accused Products (*Id.* (citing Tr. (Subramanian) at 1136; CDX-4.27C, RDX-1033C)
- 4 Barnes & Noble Accused Products (*Id.* (citing Tr. (Subramanian) at 1137; CDX-4.31C, RDX-1024C)
- 76 Garmin Accused Products (*Id.* (citing Tr. (Subramanian) at 1137-38; CDX-4.33C, RDX-1025C)
- 1 Nintendo product (*Id.* (citing Tr. (Subramanian) at 1138-39; CDX-4.35C, RDX-1030C)

Respondents say Complainants' failure to provide any evidence of alleged infringement at the hearing as to these Accused Products warrants a finding of noninfringement. (*Id.* (citing *Certain*

Audiovisual Components and Prods. Containing the Same, Inv. No. 337-TA-837, Order No. 67, at 3-5 (U.S.I.T.C. Feb. 27, 2013)).) Respondents say Attachment C to their opening brief is a table that identifies the products that were accused of infringing during discovery but were not included in Dr. Oklobdzija's expert report, and for which Complainants failed to offer any evidence of infringement during the hearing. (*Id.* at 141-142.)

Complainants reply that they did adduce evidence for all of the Accused Products. (CRBr. at 66-67 (citing CBr. § III, Ex. A).) Complainants say Respondents' second group comprises products not included in Complainants' list of Accused Products (*Id.* at 67 (comparing RBr. Attachment C to Complainants' Pre-Hearing Brief, Ex. 4).[23]) Complainants say therefore they do not know why Respondents even raised these products. (*Id.*)

Respondents, in their reply brief, say Complainants' post-hearing brief is silent about and still fails to offer any evidence that those products infringe. (RRBr. at 73 (citing CBr. (no evidence for any of the products identified in RBr. Attachments B and C)).)

Moreover, according to Respondents, Complainants expressly represent that the only products for which they seek a remedy in this Investigation are listed in Exhibit A of their post-hearing brief. (*Id.* (citing CBr. at 8).) Given Complainants' failure of proof, Respondents say a finding of noninfringement is appropriate for the products listed in Attachments B and C of Respondents' opening post-hearing brief. (*Id.* (citing *Certain Audiovisual Components,* Inv. No. 337-TA-837, Order No. 67, at 3-5 (Feb. 27, 2013)).)

(2) *The Administrative Law Judge's findings and conclusion*

The Administrative Law Judge agrees and finds that, insofar as the products listed in Attachments B and C of Respondents' opening brief, the evidence in this Investigation is not

[23] Complainants Pre-Hearing Brief has two exhibits, but the second exhibit includes Appendix D, which is a list of the Accused Products. It is assumed that this is what Complainants mean by "Ex. 4."

sufficient to show that any of them infringes any of the asserted claims of the '336 patent. For Complainants to respond to Respondents' specific identification of products for which there was no evidence produced with a general statement that their initial brief adduced evidence of infringement by Accused Products listed in Exhibit A of their brief, which is simply a listing of the Accused Products, is not sufficient. Complainants, who retain the burden of proof, must identify evidence that specifically proves, preponderately, that an Accused Product satisfies all the limitations of at least one asserted claim before there can be a finding of infringement, or provide such proof by way of clearly supported representative products. Complainants, by way of a footnote, do address the Acer products cited by Respondents for lack of evidence, but even here Complainants' argument is insufficient. (*See* CRBr. at 66, n. 36 (citing Tr. (Oklobdzija) at 658, 1000-02).) On cross-examination Dr. Oklobdzija testified:

> Q. And what did you mean by the last sentence here, where you say, "In light of these facts, I have been asked by Counsel to assume that at least some copies of each Acer Accused Product that has a spinning hard drive are sold with Seagate hard drives"?
>
> A. Well, out of that list—and I'm going to some of the specs, actually, the product specifications, they do list Seagate drives. So let's say it will be fair to say –it wouldn't be fair to say all of them use Seagate drive. Maybe it wouldn't be fair to say that 60 percent of them use Seagate drives. But there is a certain number of them, or perhaps a majority, that uses Seagate drives. And that is, again, as it was discussed here and stated here—it is subject to market fluctuation.
>
> Now, I would say the products that do have the Seagate drives in and they were sold, they do have Seagate drives. You cannot go and recall them and replace the drive. The products that are manufactured currently, maybe under the same brand, may have a substitute. But as of the time of the analysis, the large majority of them, to my knowledge, or to my analysis, did contain Seagate drives.

(Tr. (Oklobdzija) at 656-657).) Later he testified in response to questions from Acer's counsel as follows:

Q. In your testimony yesterday about the B5503A and about the Acer Accused Products, you'll agree with me that with respect to the Acer Accused Products, you analyzed only the LSI Logic B5503A. Correct?

A. Yes, only LSI chip was analyzed.

Q. And you only specifically identify that chip as being used in the Aspire V351 - I'm sorry, Aspire V3551 and Aspire V35S1G models. Is that correct?

A. That may not be correct, Mr. Walker, because I think there is a whole list of products, and what they list is, they list the use of the Seagate drive, and that Seagate drive uses the LSI Logic chip. So there is an evidence that there is an LSI Logic chip used in the larger number of products

Q. I believe you said yesterday that you didn't know-- that you understood from – that you had been told, that you didn't know any other —specifically know whether or not those hard disk drives using that chip were being used in any other Acer products. You don't have any—you haven't seen that in any other Acer products, have you, for this Investigation?

A. I don't need to see that, because there are 120 Acer products, and what is sufficient is to look at their specs of each one and what do they list that they have. { }.

Q. And it's your testimony that you have seen specifications for all of the Accused Products that { }, every single one of them?

A. To the best of my recollection, you know, with this number, I cannot -- I have seen—I went through a lot of them, and I believe that should be exhausting the list of what I have seen. But it is a large number, and, you know, I don't have it in my memory. But I went through those four Acer products that { }.

Q. Turn back to your Appendix 1. It's again CX-1166C. Turn your binder to it. Footnote 1, on Page 1. And in this footnote you are identifying or listing the Accused Products that you believe the Acer V3 is representative of. Do you see that word "representative"?

A. Yes, I do.

Q. And you're using that word because you don't know what the rest of these products contain; correct?

A. Well, according to the specs, those products { }.

> Q. And where did you cite the specs in this footnote?
>
> A. It's not cited.

(Tr. (Oklobdzija) at 1001-03.) Against this testimony, Dr. Subramanian testified as shown here:

> Q. Let's start with the first group of Accused Products, and those are computers. Let me direct your attention to RDX-4.17and 4.18. What do you show on these slides?
>
> A. RDX-4.17 and 4.18 address products from Acer. And in particular, RDX-4.17 lists products that were identified by Dr. Oklobdzija in his report.
>
> Now, I should point out that there's a large number of products here, and they are listed on RDX-4.17. The listing is derived from information from RDX-1022C.
>
> I would also point out that in particular in his analysis, Dr. Oklobdzija used a chip from LSI, a manufacturer, among other things, of chips such as these. And the chip was the B5503A.
>
> Now, for his analysis, Dr. Oklobdzija identified a particular—well, in fact, two particular notebook computers; that's the V3551 and the V355lG—that used this LSI B5503A chip. And specifically, he identified these two notebooks, found particular instances of those notebooks that had a Seagate hard drive, opened up the Seagate hard drive, and found that that particular hard drive had this LSI chip.
>
> Now, for all the other chips, of course, he did not perform such a reverse engineering. In other words, he did not open up the other notebooks and, A, verify that they used a Seagate hard drive; and B, verify that that Seagate hard drive actually had this LSI chip. But these were in general the products that Dr. Oklobdzija addressed.
>
> Now, on RDX-4.18, these were other products that were initially, I understand, identified by TPL, but Dr. Oklobdzija did not address them in his report. And this information also comes from RX-1022.

(Tr. (Subramanian) at 1131-32.) In view of the evidence that has been cited, the Administrative Law Judge finds that Respondents have raised valid arguments based on both existing and non-existing evidence to demonstrate that there is insufficient evidence to prove that the products listed in Attachments B and C of their opening brief infringe the '336 patent. To the extent those products overlap with the Accused Products as defined above, the Administrative Law Judge finds that those products do not infringe the asserted claims of the '336 patent for the reasons discussed above.

C. Conclusion

In addition to the points addressed above, Complainants present arguments and evidence regarding the alleged infringement of each Respondent's Accused Products. (See CBr. at 44-179.) Complainants analyze the Accused Products in light of their general infringement arguments, which the Administrative Law Judge previously found to be unpersuasive, and with respect to the microprocessors discussed above. The Administrative Law Judge has considered these arguments and the evidence cited by Complainants, and the Administrative Law Judge concludes that these arguments and evidence related to individual products do not overcome the faults in Complainants' infringement case that were addressed previously.

Based on the foregoing, the Administrative Law Judge concludes that Complainants have failed to show, by a preponderance of the evidence, that any of the Accused Products infringe any of the asserted claims of the '336 patent, either directly or indirectly.

V. VALIDITY

The '336 patent is presumed to be valid. *See* 35 U.S.C. § 282. Respondents withdrew their invalidity defenses during the evidentiary hearing on June 10, 2013. (Tr. at 1523-1525.) Accordingly, the Administrative Law Judge finds that the asserted claims of the '336 patent have not been shown to be invalid.

VI. LICENSE DEFENSE

In 2004 and 2005, Intel Corporation ("Intel") entered into patent license agreements with Complainants. (Tr. at 121-122; CX-1124C; Motion Docket No. 853-016, Ex. F.) Respondents rely on the agreement between TPL and Intel (the "Agreement") executed in 2004 to argue that one of LG's Accused Products, the LG P769 or Optimus L9, is covered by a license to the asserted patent either through a covenant not sue or a release. (RBr. at 142-152.)

Respondents assert that Complainants do not dispute certain issues related to the Agreement. (*Id.* at 144.) According to Respondents, Complainants do not dispute that the Agreement { }; that Intel and { } under the Agreement; and that LG is a customer under the Agreement. (*Id.* at 144-145 (citing CX-1124C at 1, § 1.1, Article 5; Complainants' Pre-Hearing Brief at 213-215; Opp. to Motion Docket No. 853-016 at 4-9; Order No. 29).) Further, Respondents say that Complainants do not dispute that the LG Optimus L9 contains { }. (*Id.* at 145 (citing Opp. to Motion Docket No. 853-016 at 5; Complainants' Pre-Hearing Brief at 213-215; Order No. 29 at 2).) Respondents also assert that Complainants do not dispute that this Investigation qualifies as { } under the Agreement in which Complainants have raised direct and indirect infringement against an Intel customer. (*Id.* (citing CX-1124 at § 5.2; Opp. to Motion Docket No. 853-016 at 5; Complainants' Pre-Hearing Brief at 213-215).)

According to Respondents, the only disagreement between the parties is whether the LG Optimus L9 qualifies as { } under the Agreement. (*Id.* at 146.) Respondents say it does because, based on their interpretation of the definition of { } in the Agreement, any LG product containing Intel hardware or software is an { } (*Id.*) Respondents present the definition of { } in the following manner:

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(*Id.* at 146 (citing CX-1124C at 2).) According to Respondents, any product, including the LG Optimus L9, containing any Intel circuit element for processing or utilizing data is an {

}. (*Id.* (citing CX-1124C at 2; Opp. to Motion Docket No. 853-016 at 5; Order No. 29 at 2; CX-512C).) Respondents further argue that, because the LG phone is itself an { }, the infringement allegations in this Investigation are { }, as required by the Agreement. (*Id.* at 147 (citing CX-1124C at 2 ({ })).)

Respondents assert that Complainants incorrectly argue that the LG phone does not qualify as an { } because it is not sold on behalf of Intel as an Intel product. (*Id.* (citing Opp. to Motion Docket No. 853-016 at 4-7; Complainants' Pre-Hearing Brief at 213-214).) Respondents say that Complainants rely on a strained interpretation of the definition for { } (*Id.*) Respondents argue that the restriction, { } refers only to the last clause (c) of the definition. (*Id.*) Respondents argue that this interpretation gives operative meaning to all parts of the definition. (*Id.* at 148.) Alternatively, Respondents argue that even if that restriction qualifies the phrase { } in the definition, the restriction does not apply here because the LG phone is not sold or distributed by Intel. (*Id.*) Respondents also fault Complainants for not providing extrinsic evidence at the hearing regarding the interpretation of this definition in the Agreement, and Respondents argue that without extrinsic evidence, the only source of interpretation is the Agreement itself, which dictates the construction advanced by Respondents. (*Id.* at 148-149.)

Complainants assert that Respondents have adduced no further evidence regarding the meaning of the term { } in the Agreement since LG filed its motion for summary determination on this issue. (CBr. at 180.) Complainants assert that the license defense should be rejected based on Respondents' failure of proof. (*Id.*)

Staff acknowledges Respondents' interpretation of the term { } and Staff argues that this term may also be interpreted to mean that the clause { } applies to the { } itself and not the { } or software contained within it. (SBr. at 27.) According to Staff, under this alternate interpretation, the LG phone at issue is not an { } because it is not sold or distributed by Intel. (*Id.*) Staff asserts that there appears to be a fundamental ambiguity in the contract and under Delaware law extrinsic evidence should be considered in interpreting the meaning of this term. (*Id.* at 27-28.) Because there is a lack of extrinsic evidence regarding the ambiguity, Staff argues that Respondents have failed to meet their burden of establishing that the LG phone is covered by the license. (*Id.* at 28.)

In reply, Respondents assert that they do not need extrinsic evidence to prove this defense because the only evidence needed is the Agreement itself. (RRBr. at 74.) Respondents also claim that the lack of extrinsic evidence is Complainants' fault because they were the only parties capable of presenting relevant extrinsic evidence at the hearing. (*Id.*) Regarding Staff's position, Respondents reply that this position is incorrect because, under Delaware law, the ambiguity must be resolved against Complainants under the principle of *contra proferentem*. *Id.* at 74-75 (citing *Kaiser Aluminum Corp. v. Matheson*, 681 A.2d 392, 398-99 (Del. 1996)).)

In their reply, Complainants argue that Respondents cannot meet their burden of proof by adopting their earlier unsuccessful motion for summary determination and failing to present additional evidence to support the defense. (CRBr. at 72.) Complainants also argue that Respondents' defense fails because the LG phone is not an { } under the

Agreement. (*Id.* at 73-76.) Complainants argue that Respondents provide a "tortured interpretation" of the contract language, placing a premium on punctuation, even though the words of the Agreement and the intention of the parties should control. (*Id.* at 73.) According to Complainants, the Agreement makes clear {

} (*Id.* at 74 (citing CX-1124 at § 9.19).) Complainants argue that the Accused Product is an LG phone that is assembled, branded, marketed, and sold by and on behalf of LG as LG's own product and not by Intel or as { } (*Id.*) Complainants say that while the phone may contain { }, the phone itself is not an { }. (*Id.*)

Under Delaware law, contract terms are given the meaning that would typically be ascribed to them by a reasonable third person. *See Eagle Industries, Inc. v. DeVilbiss Health Care, Inc.*, 702 A.2d 1228, 1232 (Del. Supr. 1997). However, "when there is uncertainty in the meaning and application of contract language, the reviewing court must consider the evidence offered in order to arrive at a proper interpretation of contractual terms." *Id.* When construing an ambiguous term, a court should consider "any admissible extrinsic evidence that may shed light on the expectations of the parties at the time they entered into the Agreement." *Id.* at 1233; *see also Matria Healthcare, Inc. v. Coral SR LLC*, 2007 WL 763303, at *6 (Del. Ch. Mar. 1, 2007) (If "a contract's language is ambiguous, then the Court will look beyond the 'four corners' of the agreement to extrinsic evidence."). Finally, "[i]f there are issues of material fact, the trial court must resolve those issues as the trier of fact." *Eagle Industries, Inc.*, 702 A.2d at 1233.

As an initial matter, the Administrative Law Judge notes that none of the parties discuss the separate agreement between Intel and Patriot beyond a reference to testimony acknowledging that such an agreement exists. (*See* RBr. at 142 (citing Tr. at 120-124); *see also* CBr. at 179-180;

CRBr. at 72-76; RRBr. at 74-75; SBr. at 72-76.) However, the agreement between Intel and Patriot incorporates all of the provisions in Article 4 through Article 9 of the Intel and TPL Agreement. (Motion Docket No. 853-016, Ex. F at § 4.1.) Thus, the Administrative Law Judge finds that the analysis with respect to the Intel and TPL Agreement below applies equally to the agreement between Intel and Patriot.

In Order No. 29, the Administrative Law Judge denied LG's motion for summary determination that LG products containing Intel hardware and/or software are licensed to the asserted patent. The Administrative Law Judge stated:

> The Administrative Law Judge finds that a material dispute exists with respect to certain terms included in these license agreements such that summary determination is inappropriate and a trial on the merits is warranted to determine whether any LG products are covered by the licenses. Specifically, the Administrative Law Judge finds that the term { } is amenable to multiple interpretations, rendering the intended scope of the contracts ambiguous. As propounded by LG, the term may be interpreted to include any product that contains an { }, Intel software, or any combination thereof. As propounded by Complainants, the term may be interpreted to include only Intel products that contain an { }, software, or any combination thereof. Under Delaware law, as identified above, the Administrative Law Judge finds that such an ambiguity creates a genuine issue of material fact regarding the licensing parties' intent with respect to the scope of this term.

(Order No. 29 at 6.)

Despite Order No. 29 finding an issue of material fact regarding this defense, the parties did not introduce any extrinsic evidence regarding the Agreement at the hearing, and thus, a determination regarding the merits of Respondents' license defense must be based solely on the Agreement itself. Regarding the contested language in the Agreement, the Administrative Law Judge finds that the interpretation proposed by Complainants most likely represents the intent of the parties. In contrast to Respondents' presentation of the language at issue, the language in the Agreement appears as follows:

{

}

(CX-1124C at 2.) While the grammar in this sentence creates some ambiguity as to what the final clause of the definition applies to, the Administrative Law Judge finds that the more likely intent of the parties was that the clause { } applies to each of (a), (b), or (c) in this definition. In particular, this interpretation is bolstered by § 9.19 of the Agreement that reads, in part, { } (CX-1124C at § 9.19.) Based on this interpretation, the LG Optimus L9 is not an { } because it was not { } i.e. it is not a product of Intel.

Further, the Administrative Law Judge rejects Respondents' argument that the ambiguity must be resolved against Complainants under the principle of *contra proferentum*. (*See* RRBr. at 75.) The Delaware Supreme Court has clarified that this rule of contract construction only applies where it would be unhelpful to rely upon extrinsic evidence to determine the parties' intent in drafting the contract. *Bank of New York Mellon v. Commerzbank Capital Funding Trust II*, 65 A. 3d 539, 551 (Del. 2013). Respondents have not shown that extrinsic evidence would not be helpful in determining the drafting parties' intent, and, to the contrary, the Administrative Law Judge finds that such evidence likely would have been helpful. Further, the Administrative Law Judge disagrees that the absence of relevant extrinsic evidence is Complainants' fault because "TPL was the only party capable of presenting relevant extrinsic evidence." (RRBr. at 74.) Respondents could have taken testimony from TPL on this issue, or Respondents could have sought to introduce evidence and testimony from Intel regarding the Agreement. Ultimately, it appears that Respondents are attempting to inappropriately shift the burden of proof for their defense.

Based on the foregoing, the Administrative Law Judge finds that Respondents have not shown that the LG Optimus L9 product is covered by a license to the '336 patent.

VII. DOMESTIC INDUSTRY

As stated in the Notice of Investigation, a determination must be made as to whether an industry in the United States exists as required by subsection (a)(2) of Section 337. Section 337 declares unlawful the importation, the sale for importation or the sale in the United States after importation of articles that infringe a valid and enforceable U.S. patent "only if an industry in the United States, relating to articles protected by the patent . . . concerned, exists or is in the process of being established." 19 U.S.C. § 1337(a)(2); *Certain Ammonium Octamolybdate Isomers*, Inv. No. 337-TA-477, Comm'n Op. at 55 (U.S.I.T.C., Jan. 2004) ("*Certain Isomers*"). The domestic industry requirement consists of both an economic prong (*i.e.*, the activities of, or investment in, a domestic industry) and a technical prong (*i.e.*, whether complainant practices its own patents). *Certain Isomers*, at 55. The complainant bears the burden of proving the existence of a domestic industry. *Certain Methods of Making Carbonated Candy Products,* Inv. No. 337-TA-292, Comm'n Op. at 34-35, Pub. No. 2390 (U.S.I.T.C., June 1991).

"To be considered 'exploitation' though licensing within the meaning of the statute, the complainant must demonstrate that a particular activity: (1) relates to the asserted patent; (2) relates to licensing; and (3) occurred in the United States." *Certain Liquid Crystal Display Devices, Including Monitors, Televisions, and Modules, and Components Thereof* ("*Liquid Crystal Display Devices*"), Inv. No. 337-TA-749, Comm'n Op. at 109 (U.S.I.T.C. June 14, 2012); *see also Certain Multimedia Display and Navigation Devices and Systems, Components Thereof, and Products Containing Same*, Inv. No. 337-TA-694, Commission. Op. at 7-8 (August 8, 2011) ("*Navigation Devices*"). Activities meeting these requirements may be considered in an evaluation of whether the domestic industry requirement has been satisfied. *Liquid Crystal Display Devices*, Comm'n Op. at 109. However, a complainant must also show that the qualifying investments are substantial. *Id.* Further, where a complainant is relying on licensing activities, the domestic industry determination does not require a separate technical prong analysis and the complainant need not show that it or one of its licensees practices the patents-in-suit. *See Certain Semiconductor Chips with Minimized Chip Package Size and Products Containing Same*, Inv. No. 337-TA-605, Initial Determination at 112 (February 9, 2009) (unreviewed in relevant part).

A. Analysis under § 337 (a)(3)(C)

1. The Parties' Arguments

Complainants argue that they have made substantial domestic investments relating to the exploitation of the '336 patent through their MMP portfolio licensing program. (CBr. at 181.) According to Complainants, they have contacted over { } companies regarding licensing the MMP portfolio, resulting in over { } licenses and approximately { } in licensing revenue from 2006 to June 2012. (*Id.* at 181-182 (citing CX-081C; CX-082C; CX-0708C; CX-1124C; Tr. at 93-94, 119-121, 125, 1534-1536, 1538, 1541, 1740).)

Complainants rely on the activities of Alliacense, who is a vendor of TPL and PDS and carries out Complainants' licensing program. (*Id.* at 182, 189 (citing Tr. at 124-125, 133, 1531).) Alliacense is located in Cupertino, California and shares a facility with TPL that has monthly leasing and facilities costs of { } per month. (*Id.* (citing Tr. at 157, 1531, 1738).)

Complainants assert that Alliacense engages in reverse engineering and engineering analysis, intellectual property services, sales and marketing, licensing, deal negotiation, and closure through two divisions: operations and licensing. (*Id.* at 182-184 (citing Tr. at 125-126, 133, 1533, 1536-1537, 1542-1566; CX-022; JX-253C; RX-1762C).) Complainants also assert that Alliacense performs work after a license agreement has been reached, including monitoring the activities of licensees for M&A activities and transfers of relevant business divisions. (*Id.* at 184 (citing Tr. at 1565-1566).)

Regarding the work performed by Alliacense employees, Complainants represent that {

}.

(*Id.* (citing Tr. at 1566-1568, 1605; RX-1794C, RX-1795C; RX-1796C).) Salary expenditures and the total hours of work related to the MMP portfolio can be calculated from these allocations. (*Id.* at 184-185 (citing Tr. at 1743-1744, 1746).) Further, the "burdened cost" can be calculated from the hours of employee time spent on the MMP portfolio, the employee's base salary, and an amount related to benefits and taxes. (*Id.* at 185 (citing Tr. at 1742, 1750-1751; CX-705C; RX-1773).)

Next, Complainants argue that there is a strong nexus between Complainants' licensing activity and the '336 patent. (CBr. at 185.) In support, Complainants say there are only a handful of U.S. patents in the MMP portfolio and the '336 patent is the most important patent in the portfolio because licensees have the most interest in it. (*Id.* (citing Tr. at 119, 1534-1536, 1558-1559; RX-1762C).) In contrast, Complainants say that prospective licensees have placed little value on the foreign patents in the portfolio. (*Id.* (citing Tr. at 1559).) Complainants also claim that the strong nexus is shown by the fact that the products of several licensees practice the asserted patent. (*Id.* at 185-186 (citing Tr. at 733-736; CDX-1163C).) Further, Complainants assert that the '336 patent is often specifically mentioned and analyzed during licensing negotiations. (*Id.* at 186 (citing Tr. at 1560).) Finally with respect to nexus, Complainants assert that the '336 patent is closely related to the other patents in the MMP portfolio and covers fundamental microprocessor technology. (*Id.* (citing Tr. at 110).)

Complainants assert that TPL's investment in the '336 patent is substantial based on the magnitude of TPL's expenses, the work performed by Alliacense after a license agreement is executed, and the fact that the licensing program is ongoing. (CBr. at 186, 188 (citing Tr. at 1565-1566, 1568-1569).) Complainants allege that TPL spent over { } on direct investments in the MMP portfolio from early 2006 to June 2012 including the following amounts:

{

}

(*Id.* at 186-187 (citing CX-705C; Tr. at 1550-1552, 1752).) Complainants acknowledge that some of the IP Legal and IP R&D amount may include patent prosecution, reexamination and litigation. (*Id.* at 186, n. 173 (citing Tr. at 1771-1773).) Additionally, Complainants rely on over { } spent in purchasing prospective licensees' products prior to July 2012, and Complainants assert that these products were purchased for the MMP portfolio, though they may have also been used for other portfolios. (*Id.* at 187, n. 174 (citing JX-253C, Tr. at 1756-1757, 1778-1779).) Further, while Complainants acknowledge that these expenditures cover the entire portfolio, Complainants assert that the majority of these investments are related to the '336 patent because it is the most important patent. (*Id.* (citing Tr. at 119, 1534-1536).)

Additionally, Complainants argue that another way to determine TPL's investment in the MMP portfolio is to examine the records of PDS. (*Id.*) Complainants say that PDS' only intellectual property asset is the MMP portfolio and 100 percent of its expenses are attributable to the MMP licensing effort. (*Id.* (citing Tr. at 1630).) Based on PDS' profit and loss statements, Complainants assert that TPL has invested { } in PDS, which does not include legal fees or the { } salary expenditure described above. (*Id.* at 187-188 (citing CX-1332C; Tr. at 1617, 1623-1627).) Thus, Complainants allege that TPL's total investment in the MMP portfolio is over { }. (*Id.* at 188.)

Respondents first assert that Complainants are limited to relying solely on TPL's licensing activity to support their alleged domestic industry, based on findings in Order Nos. 28 and 61. (RBr. at 152-153.) Next, Respondents argue that because TPL lost its rights to license the '336 patent before the Complaint was filed; and TPL did not have a domestic industry at the time the Complaint was filed or anytime thereafter. (*Id.* at 153, 155 (citing Tr. at 145).) Respondents assert that the existence of a domestic industry is determined as of the date the Complaint is filed, which applies here to prevent Complainants from proving that TPL's claimed domestic industry existed or was in the process of being established on the day the Complaint was filed. (*Id.* at 155-156.) Respondents argue that to hold otherwise would be contrary to the plain meaning of the statute and would reward Complainants for their repeated misrepresentations to the Commission that TPL had the exclusive right to license the '336 patent when they filed the Complaint. (*Id.* at 156.) Regarding these alleged misrepresentations, Respondents assert that TPL rescinded its contractual right to license the asserted patent on July

6, 2012 and Complainants later attempted to hide this fact. (*Id.* at 156-158 (citing Tr. at 141-145; First Amended Complaint at ¶ 5; Second Amended Complaint at ¶ 5).)

Next, Respondents argue that Complainants' evidence regarding domestic industry fails to meet their burden of proof because it is "unreliable, incomplete, impermissible, and riddled with miscalculations and undisclosed assumptions." (*Id.* at 159.) Respondents take issue with the fact that, of the alleged approximately { } licenses covering the MMP portfolio, Complainants have only introduced one and the fact that only a handful of correspondence sent to prospective licensees has been entered into the record. (*Id.* at 160 (citing CX-1124C; RX-0098C; CX-1126C; RX-1759C; RX-1762C; Tr. at 1596-1599).) Respondents also raise concerns about the work performed by TPL and Alliacense employees, claiming that there is no reliable way to verify the accuracy of the information relied upon by Complainants because the only evidence provided consists of summaries of calculations of hours and costs without the underlying information on which those summaries rely. (*Id.* at 160.)

Regarding the amount of Complainants' investments, Respondents first argue that TPL's alleged domestic industry expenses are unaudited and unreliable. (*Id.* at 161.) Respondents assert that while Respondents did not have access to Complainants' underlying financial documents, Complainants' own witness, Ms. Felcyn, did review them and found them unreliable. (*Id.* at 162-163 (citing Tr. at 1633-1638, 1642-1642, 1646-1647, 1649-1650, 1652-1656).) Respondents also claim that the alleged domestic industry expenses are unreliable because Alliacense never provided invoices to TPL for its work on any patent portfolio and Alliacense spent a majority of its time working on a non-MMP portfolio in 2011 and 2012. (*Id.* at 163 (citing Tr. at 1574-1575, 1587-1588, 1591-1592).) Respondents conclude that there is no reliable evidence to use in determining whether TPL's licensing activities relate to the MMP portfolio and whether they are substantial. (*Id.* at 164.)

Next, Respondents argue that TPL's alleged domestic industry investment is overstated and includes ineligible expenses including expenses unrelated to the '336 patent, licensing, or the United States. (*Id.*) Respondents argue that TPL's activities relate to the entire MMP portfolio, but there is no way to identify what portion of the claimed investment should be apportioned to the '336 patent or what portion of the investment relates to foreign licenses and patents. (*Id.* at 165 (citing Tr. at 1759-1760).) First, regarding the labor costs relied upon by Complainants, Respondents say that neither the { } nor the documents on which the burden costs were calculated are in the record. (*Id.* (citing Tr. at 1805-1807).) Regarding the allocation of employee time to the MMP portfolio, Respondents assert that employees allocated their time to a { } for the MMP portfolio until 2008, and thus, there is no accurate way to determine what portion of that time was spent on eligible licensing activities as opposed to ineligible litigation and prosecution activities. (*Id.* at 166 (citing Tr. at 1765-1771).) Second, Respondents take issue with Complainants' inclusion of nearly { } in IP research and development and IP legal work, arguing that there is no way to determine what portion of that amount relates to ineligible activities unrelated to licensing. (*Id.* at 167 (citing Tr. at 1771-1774).) Third, Respondents assert that the same issue arises with respect to the { } spent for business analysts. (*Id.* (citing Tr. at 1774-1775).) Fourth, regarding the acquisition of products, Respondents assert that some of these products appear to have been purchased in anticipation of litigation or after litigation or were purchased for use in other portfolios without appropriate allocation. (*Id.* at 168 (citing Tr. at 1776-1779).) Fifth, with respect to TPL's reverse-engineering specialists and operations analysts employee costs, Complainants have not identified what portion of those expenses relates to litigation. (*Id.* (citing Tr. at 1781-1783).) Finally, regarding TPL's claimed employee costs for licensing executives, Respondents assert that Complainants have not identified what portion of those costs took place outside of the United States. (*Id.* at 169 (citing Tr. at 1783-1785, 1792, 1794-1795, 1800; RX-1784C); RRBr. at 85 (citing CX-0022; CX-1126C; RX-1759C.0004).) Respondents also argue that there is evidence that licensing executives inappropriately allocated their time to the MMP portfolio and that some of the costs related to licensing negotiations may relate to litigation. (RBr. at 170 (citing Tr. at 1787-1788, 1796-1797; CX-719C).)

Respondents also claim that TPL's investments are overstated because TPL was { } in calculating its claimed domestic industry investment. (*Id.*) Respondents assert that TPL's costs were reimbursed or otherwise covered under the terms of its { }. (*Id.* at 171 (citing Tr. at 147); RRBr. at 81-82 (citing CX-0019C at ¶¶ 4.2-4.3; Tr. at 149, 1618, 1754, 1756-1757, 1779-1780; JX-0253C).) Respondents say that Daniel E. Leckrone admitted that once a { }. (RBr. at 171. (citing Tr. at 147-148).) Respondents claim that all of the labor costs attributed to Alliacense were { }. (*Id.* (citing Tr. at 154, 1618, 1753).) { }. (*Id.*) Respondents assert the same is true for TPL's alleged product acquisition costs. (*Id.* at 172 (citing Tr. at 151, 1618).)

Regarding whether TPL's investments are substantial, Respondents argue that Complainants have failed to meet their burden on this issue based on the factors previously considered by the Commission. (*Id.* at 172-173 (citing *Certain Kinesiotherapy Devices and Components Thereof*, Inv. No. 337-TA-823, Comm'n Notice at 2 (March 25, 2013); *Navigation Devices* at 15).) First, Respondents assert that Complainants did not introduce any evidence from which it can be determined whether the alleged investment is substantial when measured against the relevant business, industry, or market. (*Id.* at 173.) Further, Respondents assert that TPL's { } ownership structure should not receive favorable treatment under Section 337 at the expense of legitimate manufacturing companies. (*Id.* (citing Tr. at 137-138).) Respondents also assert that Complainants failed to submit evidence showing how the licensing of the '336 patent fit within the overall business of TPL, and Respondents say it is now, at best, a minority part of the business, and shrinking. (*Id.* at 174 (citing Tr. at 1575, 1588, 1663-1665).) Next, Respondents assert that TPL's activities do not comport with those that are favorably referenced in the legislative history of Section 337. (*Id.* at 174-175 (citing Tr. at 1542-1543, 1739-1740; Omnibus Trade and Competitiveness Act of 1988, Pub. L. No. 100-418, § 1342, 102 Stat. 1107, 1213; *Mezzalingua Assoc. Inc. v. Int'l Trade Comm'n*, 660 F.3d at 1327 (Fed. Cir. 2011); S. Rep. No. 100-71, at 129 (1987); H.R. Rep. No. 100-40, at 157 (1987); 132 cong. R. H1782 (Apr. 10, 1986)).) Respondents argue that TPL's revenue-focused approach for its licensing program, which stifles production and sales and does not result in goods practicing the patent, cannot support a determination that its alleged licensing investments are substantial. (*Id.* at 175-176 (citing *Coaxial Cable*, Inv. No. 337-TA-650, Comm'n Op. at 47; *Motiva, LLC v. International Trade Comm'n*, 716 F.3d 596, 601 (Fed. Cir. 2013)).)

Staff argues that the evidence shows that Complainants satisfy the domestic industry requirement with respect to the '336 patent through their licensing program. (SBr. at 32.) According to Staff, the evidence shows that Complainants spent over { } in employee labor costs and that these employees were engaged in activities in support of the MMP licensing program. (*Id.* (citing Tr. at 1542-1544, 1546-1549, 1551-1555, 1564-1566, 1751-1752; CX-0705C).) Staff asserts that the nexus between this investment and the '336 patent is strong given that the MMP portfolio includes only a small number of related patents and that the '336 patent factors prominently in licensing discussions, negotiations, and license agreements. (*Id.* at 33 (citing Tr. at 126).) Finally, Staff asserts that this investment is substantial because Complainants engage in a variety of ancillary licensing activities, including post-licensing work. (*Id.* (citing Tr. at 1565-1566).)

Regarding Respondents' arguments related to TPL's rescission of its right to license the asserted patents, Complainants respond that whether TPL or PDS had the right to license the patent at the time the Complaint was filed is irrelevant to whether TPL's investments were made in support of domestic industry. (CRBr. at 76.) Complainants acknowledge that the right to license the '336 patent had reverted from TPL to PDS. (*Id.* at n. 45 (citing Tr. at 143-144).) However, Complainants assert that TPL established its domestic industry long before the Complaint was filed and the Administrative Law Judge's orders do not prevent reliance on TPL's domestic industry investments. (*Id.* at 77.)

Complainants also respond to Respondents' arguments regarding the completeness of the domestic industry information provided. (*Id.* at 77-78.) Complainants argue that providing all of the relevant licenses and relevant licensing correspondence would unnecessarily crowd the record. (*Id.* at 78.) Complainants assert that the evidence offered at the hearing establishes the magnitude of Complainants' licensing program. (*Id.* (citing CX-0082C; CX-0708C).) Regarding the underlying documents related to employee work time allocation, Complainants say Respondents' argument is a rehash of a failed argument presented in a motion to compel. (*Id.* (citing Order No. 27 at 6-8).)

With respect to the reliability of TPL's alleged expenditures, Complainants say that none of Respondents' arguments have merit. (*Id.*) Regarding TPL's facility costs, Complainants assert that they are not allocating this entire investment to the MMP portfolio. (*Id.* at 78-79 (citing Tr. at 1738).) Regarding the time allocations, Complainants argue that TPL's program for recording and computing time is sufficiently detailed to establish a domestic industry here. (*Id.* at 79 (citing RX-1794C; RX-1795C; RX-1796C).) Regarding Ms. Felcyn's testimony, Complainants assert that upon review of a private company's unaudited financial records it is common to have some questions about those records, but Ms. Felcyn was eventually satisfied with TPL's books and stated that PDS's payments to TPL represented MMP expenses. (*Id.* at 79-80 (citing Tr. at 1655, 1660).) Further, Complainants argue that there is no question regarding PDS's financial records and TPL's total investment in PDS of approximately { } is only related to the MMP portfolio. (*Id.* at 80 (citing Tr. at 1623-1629, 1665-1666).)

Next, Complainants take issue with Respondents' claim that TPL failed to exclude ineligible expenses. (*Id.*) Complainants argue that all of the MPP expenses can be attributed to the '336 patent because of the size of the portfolio and the strong nexus between the '336 patent and the domestic investments. (*Id.* at 80-81 (citing CX-0081C; Tr. at 119, 1534-1536, 1560).) Complainants also argue that because TPL's sole purpose is related to licensing, all of its MMP-related activities inure to the benefit of the licensing program. (*Id.* at 81.) Complainants also rebut Respondents' claim that TPL was { }. (*Id.*) Complainants assert that Respondents are confusing alleged {

}. (*Id.* at 82 (citing Tr. at 128, 1617, 1626-1627).) Finally, Complainants address Respondents' arguments regarding the substantiality of TPL's investment. Complainants assert that TPL's ownership structure has no bearing on the domestic industry inquiry. (*Id.*) Further, Complainants assert that they have provided evidence of TPL's investment in MMP compared to its other assets by showing that the MMP portfolio has brought in approximately { } in revenue compared to { } for the next highest portfolio. (*Id.* at 83 (citing Tr. at 1741).)

In their reply, Respondents first argue that Complainants presented new domestic industry theories in the opening brief that are barred by the Administrative Law Judge's previous orders. (RRBr. at 77.) Specifically, Respondents say that Complainants advance new theories based on the alleged activities of PDS, Patriot, and non-party Alliacense. (*Id.*) Respondents argue that these theories are barred by Order No. 61, which found that Complainants had foregone reliance on investments by PDS and Patriot. (*Id.* at 78 (citing Order No. 61 at 5).) Respondents also argue that these arguments and other arguments have been waived because they were not raised in the pre-hearing brief. (*Id.* at 78-79 (citing Ground Rule 7.2; Complainants' Pre-Hearing Brief at 215-223).) Further, Respondents argue that Complainants cannot rely on the activities of Alliacense because Alliacense is not a party to this Investigation and is a separate entity from TPL. (*Id.* at 79 (citing Tr. at 157, 1568-1569, 1576-1577, 1595, 1760; *Navigation Systems* at 16).) Respondents also claim that Complainants cannot rely on the new theory that TPL maintains {

}. (*Id.* (citing Tr. at 140; Order No. 61 at 5).)

Regarding { }, Respondents claim that Complainants are attempting to shift the burden of proof on this issue by arguing that Respondents cannot prove that the claimed investments { }. (*Id.* at 80 (citing CBr. at 190).) Respondents also argue that there is no reliable evidence that any of TPL's claimed investments in PDS were spent on the MMP licensing program, and Respondents allege that Ms. Felcyn concluded that TPL was co-mingling funds for the MMP program with other licensing efforts. (*Id.* at 82 (citing Tr. at 1651-1655).) Furthermore, Respondents argue that Complainants cannot rely on the alleged { } TPL investment in PDS because they did not raise this theory in their pre-hearing brief and this amount includes ineligible expenses including the { }. (*Id.* at 83 (citing Ground Rule 7.2; Tr. at 1626; *Certain Liquid Crystal Display Devices*, Comm'n Op. at 110-11 (July 6, 2012)).)

Finally, regarding whether TPL's investment is substantial, Respondents reply that the only arguments and evidence provided by Complainants on this issue are insufficient. (*Id.* at 87-88.) First, Respondents argue that Complainants make no attempt to show that the amount of the investment was indeed of a large magnitude when compared with the relevant industry or market realities. (*Id.* at 87.) Second, Respondents argue that the amount of revenue related to the MMP portfolio is at best only circumstantial evidence that an investment was made and Complainants provided no meaningful way to assess the significance of the amount of revenue. (*Id.* at 88.) Finally, Respondents argue that Complainants cannot rely on the continuing activities of Alliacense after licenses are executed because Complainants did not raise this issue in their pre-hearing brief and because alleged activities are not the type of activities that support a finding of substantiality. (*Id.* at 88-89 (citing Tr. at 1566; *Navigation Devices*, Comm'n Op. at 15-16, 24).)

In its reply, Staff argues that it is immaterial whether TPL or another complainant had the ability to license the '336 patent at the time the Complaint was filed. (SRBr. at 7.) Staff says that so long as a complainant's investments are related to the asserted patent, related to licensing, and related to the United States, those investments may satisfy the domestic industry requirement even if a different complainant holds the right to actually license the asserted patent. (*Id.* at 7-8.) Staff also asserts that while Complainants' evidence of domestic industry may not be 100 percent accurate, Complainants adduced evidence that appears to sufficiently substantiate most of their claimed investments. (*Id.* at 8 (citing Tr. at 1542-1544, 1546-1549, 1551-1555, 1564-1566, 1751-1752; CX-0705C).)

2. The Administrative Law Judge's findings and conclusion

As noted, a complainant who seeks to satisfy the domestic industry requirement by its investments in patent licensing must first establish that there is a nexus between relied upon investment activities and the asserted patents, that the investment relates to licensing, and that the investment occurred in the United States. *Navigation Devices*, Commission. Op. at 7-8. Section 337(a)(3)(C) then requires the complainant to show that the qualifying investments are substantial. *Id.* at 8.

Regarding the MMP portfolio, the president of Alliacense, Mr. Daniel McNary Leckrone, testified that there are approximately 15 patents in the portfolio, including five patents of interest and that the '336 patent is the "lead patent" in the portfolio. (Tr. at 1534-1535.) Additionally, Mr. Leckrone testified that when only one claim chart is included in a product report presented to a potential licensee, it will be for the '336 patent. (*Id.* at 1558-1559.) The evidence of record supports this testimony and persuasively shows the importance of the '336 patent in certain licensing negotiations conducted by Alliacense. (*See* CX-0081C; RX-1762C; CX-0022; CX-0731C; CX-0719C; RX-1759C; CX-1126C.)

The MMP portfolio licensing-related activities relied upon by Complainants are performed by Complainants' vendor, Alliacense, which carries out all of TPL's licensing programs. Alliacense's services include performing reverse engineering, engineering analysis, intellectual property services, sales, marketing, licensing, deal negotiation, and closure. (Tr. at 1533.) Alliacense is divided into an operations division and a licensing division. (*Id.* at 1537.) The operations division includes reverse engineering, research and development, and intellectual property; and the licensing division includes a communications group, business analysis group, executive group, and sales and marketing group. (*Id.* at 1537-1538.) Alliacense's licensing process begins with business analysts studying the electronic field at large and identifying companies selling systems that are microprocessor-based. (*Id.* at 1542.) Once identified, the target company's financial statements and products are evaluated. (*Id.* at 1542-1543.) Relevant products from the target company are purchased and analyzed by reverse engineering specialists. (*Id.* at 1544, 1546-1547.) A Reverse Engineering Report is created and sent to an engineering analysis group, which constructs claim charts for the MMP portfolio patents. (*Id.* at 1548-1552.) The communications group uses the claim charts to create binders, which are sent to prospective licensees. (*Id.* at 1552-1554.) The Sales and Marketing Group is responsible for communicating with and meeting with prospective licensees and negotiating licenses. (*Id.* at 1564-1565.) After a license is executed, Alliacense performs compliance work and monitoring licensees for mergers and acquisitions or transfers of business divisions. (*Id.* at 1566.)

{ }. (Tr. at 1566-1567.) From these reports, the percentage of time that each employee spends on the MMP portfolio can be calculated. (*Id.* at 1605, 1745.) Complainants produced summary documents showing the percentages of each employee's time spent on projects within the MMP portfolio.[24] (*See* RX-1794C; RX-1795C;

[24] Respondents raise concerns about the reliability of these summaries because the underlying monthly reports have

RX-1796C.) Based on these summaries, TPL's CFO, Mr. Hannah, calculated the corresponding hours worked on the MMP portfolio based on a 40-hour work week and calculated the total burden costs for these employees based on the hours worked on the MMP portfolio, salary, benefits, and taxes paid. (Tr. at 1742-1751; CX-705C; RX-1773C.) From these calculations, Mr. Hannah testified that Alliacense's labor costs related to licensing the MMP portfolio totaled over { }. (Tr. at 1751-1752; CX-705C.) Additionally, Mr. Hannah testified that approximately { } was spent on product purchases related to the MMP licensing program. (Tr. at 1756-1757; JX-0253C). Mr. Hannah also testified that TPL and Alliacense share a facility with monthly leasing and facilities costs of { }, allocated to all of TPL's patent portfolios. (Tr. at 1738.)

Overall, Alliacense's MMP portfolio licensing activities have resulted in executed licenses with approximately { } companies resulting in approximately { } in revenue. (Tr. at 1538-1539, 1740-1741; CX-708C.)

Based on these facts, Complainants rely on the following expenditures to support their domestic industry claim:

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not been produced. (RBr. at 165-166.) These concerns were previously addressed and dismissed by the Administrative Law Judge. *See* Order No. 27 at 6-8.

Additionally, Complainants rely on TPL's alleged investment of { } in PDS. (CBr. at 188.) In total, Complainants seek to rely on { } in labor costs, TPL's alleged { } investment in PDS, { } spent on product purchases, and leasing and facilities costs of { } per month. (*Id.* at 182, 186-188.)

a) Nexus to the Asserted Patent, licensing and the United States

Regarding TPL's investment in PDS, Respondents contend that Complainants waived their right to rely on TPL's alleged investment in PDS because Complainants failed to raise this in their pre-hearing brief. (RRBr. at 78-79.) The Administrative Law Judge agrees. In their pre-hearing brief, Complainants did not attempt to rely on TPL's investments in PDS. (*See* Complainants' Pre-Hearing Brief at 216-219; Ground Rule 7.2) Furthermore, the Administrative Law Judge disagrees with Complainants' argument (CRBr. at 80, n. 48) that all of TPL's investments in PDS would be eligible licensing expenses because Complainants have not shown that PDS does not engage in ineligible activities, such as patent prosecution, or that this investment does not relate to activities that Complainants are precluded from relying on in this Investigation, e.g. attorney fees. (*See* Tr. at 1630; *see also* Order Nos. 38, 61.) Accordingly, the Administrative Law Judge declines to consider TPL's alleged investment of { } in PDS in the domestic industry analysis.

However, the Administrative Law Judge rejects Respondents' argument that Complainants cannot establish a domestic industry because TPL rescinded its ability to license the asserted patent before the Complaint was filed. (*See* RBr. at 155-158.) The Administrative Law Judge finds it immaterial whether it was TPL or another Complainant that had the ability to license the asserted patent at the time the Complaint was filed. The Administrative Law Judge finds that there is no dispute that PDS had the right to license the asserted patent at the time the

Complaint was filed and throughout this Investigation. The Administrative Law Judge finds that Order Nos. 28 and 61 do not preclude Complainants from showing that TPL's investments established a domestic industry and that the domestic industry was ongoing at the time the Complaint was filed based on the continuing licensing activities of another Complainant.

Further, the Administrative Law Judge disagrees with the conclusion drawn by Respondents that based on the testimony of Mr. Daniel M. Leckrone and Ms. Felcyn the record is without "reliable evidence to use in determining whether TPL's licensing activities relate to the MMP Portfolio and whether they are substantial." (RBr. at 161-164.) Regarding Ms. Felcyn, Respondents claim that her testimony shows that the TPL's underlying financial statements are "tainted, untrustworthy, and include doubling up of expenses and expenses from portfolios unrelated to the MMP." (*Id.* at 161.) While Ms. Felcyn testified that there was some concern that TPL was overstating its MMP-related expenses to PDS, Ms. Felcyn also testified that she ultimately concluded that any amounts actually paid by PDS were paid for MMP expenses. (*See* Tr. at 1653-1657; 1660.) More importantly, there is no indication that Ms. Felcyn's testimony relates to the labor, facilities, and product purchasing investments Complainants seek to rely on here, which were incurred by TPL's vendor, Alliacense. Regarding Alliacense, Respondents note that Alliacense did not provide invoices to TPL and that Mr. Daniel M. Leckrone testified that Alliacense spent the majority of its time on a different portfolio in 2011 and 2012. (RBr. at 163.) Contrary to the assertions made by Respondents, the Administrative Law Judge does not find that this evidence raises questions about the reliability of the investments Complainants seek to rely on here.

The Administrative Law Judge also finds that Respondents' argument regarding { } is unavailing. Respondents appear to rely on Order Nos. 28 and 61 to say that

Complainants cannot rely on any of TPL's alleged investments that were { }. (*See* RBr. at 170-172.) Regardless of whether the relied upon investments were actually { }, a point that Complainants dispute at least in part, the Administrative Law Judge finds that there is no dispute that such domestic investments were ultimately paid by a Complainant in this Investigation. The Administrative Law Judge finds that Order Nos. 28 and 61 do not go so far as to preclude Complainants from relying on TPL's investments that may have been { }.

Beyond arguing generally that the relied upon investments in the MMP portfolio are not sufficiently tied to the '336 patent, Respondents also argue that certain investments are related to other patent portfolios. (*See* RBr. at 168, RRBr. at 84.) Specifically, Respondents take issue with Complainants' product acquisition costs and facilities costs. Regarding Complainants' product acquisition costs, Mr. Hannah testified that the products in question, which include those products listed on JX-0155C, were purchased for the MMP portfolio, but he did not know whether they were also used for analysis with respect to other portfolios. (Tr. at 1778-1779.) Based on this testimony, the Administrative Law Judge disagrees with Respondents' argument that this investment should be entirely disregarded in the domestic industry analysis. However, regarding Complainants' alleged facilities costs of { } per month, Complainants acknowledge that that amount should be allocated to each of TPL's patent portfolios. (*See* CBr. at 182, n. 172; Tr. at 1738.) Complainants neither attempt to determine how much of this investment should be allocated to the MMP portfolio nor do they even argue that a significant or substantial portion should be allocated to the MMP portfolio. As such, the Administrative Law Judge finds that this investment should be given little weight in the domestic industry analysis.

Further, to the extent Respondents argue that Complainants cannot rely on any of these expenditures because they are precluded by Order Nos. 38 and 61, the Administrative Law Judge declines to extend those Orders to cover these expenditures. The relevant subject matter of Order No. 38 related to litigation fees and other legal fees paid to law firms, and the Administrative Law Judge found that Complainants had unequivocally stated that they would not be relying on such expenses to support their domestic industry claim. Order No. 38 at 2-4. That is not the case with the expenses relied upon here, which were first identified in Mr. Hannah's declaration attached to the Complaint. (*See* Complaint, Ex. 39 at ¶¶ 13-19.)

Regarding the required nexus to the asserted patent, the Administrative Law Judge concludes that, based on the small number of patents in the MMP portfolio and the testimony and evidence provided, the activities relied upon by Complainants are sufficiently related to the asserted patent that they may fully be relied upon in the domestic industry analysis, with the exception of Complainants' alleged facilities costs, which have minimal weight here. *See Liquid Crystal Display Devices*, Comm'n Op. at 110, 115-121 (first establishing that the relied upon activities sufficiently relate to the asserted patents in order to be considered in the domestic industry analysis and later assessing the strength of the nexus to determine the extent that investments can be attributed to the asserted patents).

Regarding whether TPL's investments relate to licensing, Respondents assert that these investments include unknown amounts related to litigation and prosecution, rendering the evidence too speculative to be the basis for a domestic industry. Mr. Hannah acknowledged that before 2008, employees only allocated their time to work on the MMP portfolio to { }. (*See* Tr. at 1765-1775.) However, Mr. Hannah explained that in his view, "management decided to have { } when the activity was significant enough to include those { }." (*Id.* at 1783.) Mr. Hannah also repeatedly testified that all of the activities under the { } were considered to be licensing related. (*See e.g., Id.* at 1770, 1771.) The Administrative Law Judge finds that overall, Mr. Hannah's testimony does not have the effect asserted by Respondents, *i.e.* it does not render the evidence provided "too speculative and incomplete to support a finding of domestic industry." (RBr. at 166.) Accordingly, the Administrative Law Judge finds that a substantial portion of the expenses relied upon by Complainants have the necessary relationship to licensing in order to be considered in the domestic industry analysis.

Regarding whether these investments occurred in the United States, Respondents assert that the relied upon investments include licensing executives' costs for trips outside the United States, costs related to two licensing employees working in France, and costs related to Mr. Daniel E. Leckrone's personal assistant, working in England. (RBr. at 169.) Mr. Hannah testified that the relied upon investment in licensing executives, does include costs for trips outside the United States. (*See* Tr. at 1783-1787.) Further, the document titled "MMP Trips Report" does reference a number of meetings occurring outside of the United States in addition to a large number of meetings in the United States and a large number of telephone conferences. (RX-1784C.) Mr. Hannah also testified that these MMP-related investments include costs associated with three employees working outside of the United States. (Tr. at 1788-1795.) While it is clear from this evidence that Complainants have included some expenses incurred outside of the United States, the Administrative Law Judge finds that based on the evidence, a substantial majority of the alleged MMP licensing investment did occur in the United States.

Accordingly, the Administrative Law Judge concludes that Complainants have shown that the activities and investments relied upon, minus the exceptions discussed above, can be substantially attributed to the asserted patent, are sufficiently related to licensing, and are sufficiently tied to the United States to be considered in the Administrative Law Judge's evaluation of whether Complainants satisfy the domestic industry requirement. *See Liquid Crystal Display Devices*, Comm'n Op. at 109 ("Activities that meet these three requirements can be considered in our evaluation of whether a complainant has satisfied the domestic industry requirement"); *see also id.* at 117.

b) Whether Complainants' investments in licensing the Asserted Patent are substantial

In light of the facts and findings presented above, the Administrative Law Judge finds that certain factors weigh in favor of finding Complainants' investments substantial, while others weigh against such a finding. Most significantly, the Administrative Law Judge finds that the amount invested in the MMP portfolio as a whole (approximately { } including labor and product acquisition costs), the small number of patents in that portfolio, and the relative importance of the '336 patent in licensing negotiations, weighs heavily in favor of finding that Complainants' investments are substantial. *See Liquid Crystal Display Devices*, Comm'n Op. at 122. Further, the Administrative Law Judge finds that Complainants have shown that these investments are substantial in relation to certain industries in light of the large number of executed licenses covering a large percentage of the market (e.g., the mobile phone market (*see* Tr. at 1860-1861)) and the number of companies that Complainants have engaged in licensing negotiations. *See Liquid Crystal Display Devices*, Comm'n Op. at 123. To a lesser extent, the substantiality of these investments is also supported by the fact that Complainants engaged in ancillary activities after licenses were executed including monitoring licensees' compliance, M&A activities, and transfers of relevant business divisions (*see* Tr. at 1565-1566); the fact that Complainants' licensing activities are ongoing (*see* Tr. at 1565-1566, 1568-1569); and the fact that Complainants' licensing efforts related to the MMP portfolio have generated over {

} in revenue (*see* CX-708C; Tr. at 1538-1539). *See Liquid Crystal Display Devices*, Comm'n Op. at 123-124.

In contrast, the Administrative Law Judge finds that a few factors weigh against finding that Complainants' investments are substantial. First, the Administrative Law Judge notes that Complainants made no attempt to determine the actual value of their investments in the asserted patent, instead relying on the alleged total investment in the MMP portfolio. While the Commission does not require an exact allocation of investments to the asserted patents in an investigation, the Administrative Law Judge finds that Complainants' failure to set forth any allocation somewhat undermines the weight of the evidence they did provide, particularly because, as discussed above, the investments relied upon include portions unrelated to the asserted patent, licensing, or the United States. Second, the fact that Complainants' licensing activities are revenue driven and target existing production weighs against a finding that these investments are substantial. *See Liquid Crystal Display Devices*, Comm'n Op. at 124. Finally, the fact that Complainants do not invest in other activities to exploit the '336 patent weighs against a finding of substantiality. *See id.*

On balance, the Administrative Law Judge finds that Complainants' domestic investments in licensing the asserted patent are substantial. Accordingly, the Administrative Law Judge finds that Complainants have established a domestic industry under Section 337(a)(3)(C).

B. Garmin's Domestic Industry Defense

Garmin argues that Complainants' domestic industry investments are overstated because they include investments related to TPL's activities before the '336 patent emerged from reexamination. (RBr. at 195.) Garmin says that a significant portion of TPL's investments can only have a nexus to the prior version of the '336 patent that was surrendered during examination. (*Id.*) Garmin says that all of the claims that emerged from reexamination were amended, creating an irrebuttable presumption that the original claims were material flawed. (*Id.* at 196-197 (citing *Bloom Engineering Co., Inc. v. North American Mfg. Co.*, 129 F.3d 1247, 1249 (Fed. Cir. 1997)).) Garmin also says that the reexamined patent should be treated as a new patent and Complainants do not have rights to enforce the patent before it emerged from reexamination. (*Id.* at 197-198 (citing *Kaufman Co., Inc. v. Lantech, Inc.*, 807 F.2d 970, 976-977 (Fed. Cir. 1986); 35 U.S.C. §§ 252, 307(b); *Bloom Engineering*, 129 F.3d at 1250).) Thus, Garmin argues that Complainants cannot rely on investments made before December 15, 2009, when the reexamination certificate issued. (*Id.* at 198.) Further, Garmin asserts that Complainants have not attempted to apportion their investments based on when the reexamination certificate issued, and there is no way to reliably and accurately determine whether a licensing-based domestic industry existed at the time the Complaint was filed. (*Id.* at 199.)

Complainants first argue that Garmin failed to provide any details about this defense until the pre-hearing brief and it should be rejected as untimely. (CBr. at 188.) Regarding the merits, Complainants assert that Garmin's argument is specious because Complainants' domestic industry is based on substantial investments in a licensing program and the licensees had a license at all times regardless of the status of the reexam. (*Id.* at 189.) Complainants say that their investments in the licensing program relate directly to the '336 patent, regardless of whether the claims were modified, and there is no dispute that the pre-existing licenses were not affected by the reexamination. (*Id.*; CRBr. at 84.)

Garmin replies that whether or not TPL made a substantial investment in a licensing program is not sufficient to establish a domestic industry, and Complainants must show that TPL made a substantial investment in exploiting the asserted patent. (RRBr. at 96.) Because the asserted version of the '336 patent did not exist until December 15, 2009, Garmin argues that investments made prior to that date were not directed to exploiting the asserted patent. (*Id.* at 97.)

The Administrative Law Judge finds that Garmin's domestic industry arguments here are unavailing. Significantly, while Garmin argues that the investments made prior to the issuance of the reexamination certificate were not directed to exploiting the asserted patent, Garmin has not shown that Complainants' pre-existing licenses were affected by the reexamination. The Administrative Law Judge also notes that Garmin has not cited to any Commission Rule or Commission precedent supporting its position here. As such, the Administrative Law Judge finds that Complainants should not be precluded from relying on their pre-reexamination licensing investments.

VIII. PUBLIC INTEREST

As noted in Section I *supra*, the Commission ordered the Administrative Law Judge to take evidence and provide findings of fact with respect to the public interest in this Investigation. 77 Fed. Reg. 51572 (August 24, 2012). Public interest considerations in Section 337 Investigations include the effect of any remedy on "the public health and welfare, competitive conditions in the United States economy, the production of like or directly competitive articles in the United States, and United States consumers." 19 U.S.C. § 1337(d)(1).

Complainants argue that there is no evidence that exclusion of the allegedly infringing devices would negatively impact any public interest factor, and Respondents' continued infringement would continue to harm Complainants' intellectual property rights. (CBr. at 193.) Complainants address each of the public interest factors listed above. First, Complainants assert that there are no public health, safety, or welfare concerns in the U.S. relating to the potential remedial orders covering Respondents' products, and Respondents failed to present any evidence relating to this factor. (*Id.*)

Second, Complainants say that granting the requested remedy will not have any negative impact on competitive conditions in the U.S. (*Id.*) To the contrary, Complainants argue that without the requested remedy, Complainants and their licensees will be negatively impacted. (*Id.*) Complainants also suggest that any negative impact from the proposed remedy can be mitigated by other manufacturers purchasing a license to the patent. (*Id.*) Complainants refute Respondents' and their expert Dr. Vander Veen's claims that an exclusion order would decrease supply and raise prices. (*Id.* at 193-194 (citing Tr. at 1846, 1848-1849, 1860-1868).) Complainants say Dr. Vander Veen did not provide an opinion regarding whether Complainants' licensees could fulfill existing demand. (*Id.* (citing Tr. at 1860-1864).) Complainants also take issue with Dr. Vander Veen's testimony regarding Garmin's market share, saying it is grossly inflated, does not account for the use of navigation services on mobile phones and other wireless devices, and provides no evidence that Complainants' licensees cannot meet market demand. (*Id.* at 194 (citing Tr. at 1849, 1865-1868).)

Third, Complainants assert that there is no evidence that the requested remedy would adversely affect U.S. consumers, and Complainants' licensees are capable of supplying consumers with devices with the same or similar functionality as those offered by Respondents. (*Id.*) Complainants acknowledge Dr. Vander Veen's opinion that Respondents' customers will be harmed because Respondents will be unable to fulfill warranty obligations, but Complainants argue that he conducted no quantitative analysis to measure the effect of an exclusion order on this point. (*Id.* at 195 (citing Tr. at 1844-1845, 1868).)

Respondents argue that exclusion and cease and desist orders would negatively impact competitive conditions in the U.S. economy and adversely affect U.S. consumers in two ways: 1) substantially reducing product availability in the market and 2) preventing consumers from receiving repair or replacement devices under warranty and/or insurance contract claims. (RBr. at 192 (citing Tr. at 1844).) Regarding product availability, Respondents argue that because of their significant market share, excluding Respondents' products would result in a reduction in supply in the U.S., resulting in less choice and higher prices for consumers. (*Id.* (citing Tr. at 1846; RDX-006C at 6-7; RX-1634C; RX-2188C).) Respondents assert that they account for approximately 50 percent of smartphone sales in the U.S. and Garmin's market share for personal navigation devices ranged from { } from December 2010 to December 2012 with a { } share in December 2012. (*Id.* (citing Tr. at 1840, 1848-1849, 1866-1867; RX-1636; RX-1637; RX-0936C; RDX-006C at 7; RX-2188C).) Respondents argue that such a large market share has been found to raise concerns regarding competitive conditions. (*Id.* at 192-193 (citing *Certain Personal Data & Mobile Commc'ns Devices & Related Software* ("*Mobile Commc'ns*"), Inv. No. 337-TA-710, Comm'n Op. at 79-83 (Dec. 29, 2011)).) Respondents also argue that Complainants have not identified any licensees that could replace the excluded products. (*Id.* at 193.) Further, Respondents also assert that the loss of sales as a result of an exclusion order may limit Respondents' future participation in the market. (*Id.* at 193 (citing Tr. at 1846).) Finally, Respondents argue that competitive conditions would be negatively affected because an exclusion order would provide Complainants with significant asymmetric bargaining power over Respondents. (*Id.* at 194-195 (citing Tr. at 92-93, 134, 139, 1739-1741).) Respondents say that Complainants are in a stronger bargaining position because, as patent assertion entities, they have no product sales at risk. (*Id.*) Respondents also assert that because Complainants are non-practicing entities and because Complainants provided no evidence that their licensees produce directly competitive products in the U.S., there is no evidence that the requested remedy would increase domestic production of competitive articles. (*Id.* at 195.) Finally, regarding consumer impact, Respondents argue that a remedial order would adversely affect existing U.S. costumers by precluding Respondents from importing products or components in order to comply with product repair or replacement warranties. (*Id.* at 193-194 (citing Tr. at 1844-1846; RX-0926; RX-0959C; RX-0960C; RX-0996-0999; RX-1218; RX-1219).)

Staff argues that while Respondents primarily rely on evidence regarding market shares to support their public interest contentions, Respondents failed to adduce evidence showing that remedial orders would result in supply shortages or otherwise affect competitive conditions or U.S. consumers. (SBr. at 37.) Staff notes that Complainants have licensed the asserted patent to many large manufactures, and Staff believes that the evidence adduced at trial is insufficient to preclude the requested remedy. (*Id.* (citing CX-0706).)

Complainants reply that their licensees are capable of supplying U.S. consumers with devices with the same or similar functionality as Respondents' accused devices. (CRBr. at 95.) Complainants say that even Dr. Vander Veen conceded that consumers could purchase non-infringing alternatives from one of Complainants' licensees. (*Id.* (citing Tr. at 1863-1865).) Complainants assert that Respondents provided no evidence to support the argument that fewer products would be available and prices would rise. (*Id.* at 96.) Further, Complainants assert that

Respondents' argument regarding its warranty obligations are wrong because Respondents can fulfill their obligations by issuing a refund, as those warranties expressly offer. (*Id.*)

Respondents reply that Complainants have failed to show how their licensees would be impacted if remedial orders were not granted. (RRBr. at 93.) Respondents also assert that it defies logic for Complainants to argue that their licensees would have the capacity to replace nearly 50 percent of the smartphone market and { } of the personal navigation market if remedial orders issue. (*Id.* (citing Tr. at 1861-1864).) Respondents say Complainants presented no evidence to support this claim. (*Id.* at 93-94.) Further, Respondents assert that there is no serious dispute regarding Respondents' market share evidence and Complainants' arguments regarding personal navigation devices are incorrect. (*Id.* at 94.) Next, Respondents argue that the potential for patent hold-up is a near certainty if a remedial order issues here. (*Id.* at 95-96.) Finally, Respondents argue that there is no dispute that there should be an exception in any remedial order to permit Respondents from carrying out their warranty obligations. (*Id.* at 96.)

The Commission has previously determined in rare situations that public interest considerations outweighed the interest in protecting intellectual property rights. *See In the Matter of Certain Fluidized Supporting Apparatus and Components*, Inv. No. 337 –TA–182/188, USITC Pub. 1667 (U.S.I.T.C., Oct. 1984); *In the Matter of Inclined–Field Acceleration Tubes and Components*, Inv. No. 337–TA–67, USITC Pub. 1119 (U.S.I.T.C., Dec. 1980); *In the Matter of Certain Automatic Crankpin Grinders*, Inv. No. 337–TA–60, USITC Pub. 1022 (U.S.I.T.C., Dec. 1979). The Federal Circuit has explained, "in those three cases, the exclusion order was denied because inadequate supply within the United States—by both the patentee and domestic licensees—meant that an exclusion order would deprive the public of products necessary for some important health or welfare need: energy efficient automobiles, basic scientific research, or hospital equipment." *Spansion, Inc. v. International Trade Comm'n.*, 629 F.3d 1331, 1360 (Fed. Cir. 2010). The Court in *Spansion* also noted that each of those cases was decided before a 1988 amendment to Section 337, which removed a requirement of proof of injury to the domestic industry. *Id.* at 1358-1360.

More recently, the Commission has reiterated that in balancing the patent holder's rights versus any adverse impact a remedy may have on the public interest, the Commission "must take into account the strong public interest in enforcing intellectual property" and must avoid improperly imposing an injury requirement. *Certain Baseband Processor Chips and Chipsets, Transmitter, and Receiver (Radio) Chips, Power Control Chips, and Products Containing Same, Including Cellular Telephone Handsets*, Inv. No. 337-TA-543, Comm'n Op. at 136-137 (U.S.I.T.C., June 19, 2007). In weighing the public interest factors, the Commission looks to evidence showing how enforcement of a remedy is likely to affect each factor and has consistently found that the public interest factors have not precluded issuance of a remedy. For example, the Commission has found that an increase in prices for retailers and consumers does not outweigh the interest in protecting intellectual property rights where the general health and welfare is not implicated and where there is no evidence that unaffected suppliers could not meet the demand for products. *Certain Ink Jet Print Cartridges and Components Thereof*, Inv. No. 337-TA-446, Comm'n Op. at 14 (U.S.I.T.C., May 8, 2002); *see also Certain EPROM, EEPROM, Flash Memory and Flash Microcontroller Semiconductor Devices and Products Containing Same*, Inv. No. 337-TA-395, Comm'n Op. at 132-133 (U.S.I.T.C., Oct. 16, 2000) ("*EPROMs*") (finding that no public interest considerations preclude issuance of a limited exclusion order considering the numerous designs of non-infringing products and the presence of many domestic manufacturers assuring continued competition and adequate supply of products);

Certain Cigarettes and Packaging Thereof, Inv. No. 337-TA-424, Comm'n Op. at 20 (U.S.I.T.C., Nov. 7, 2000) (finding that while eliminating competition from lower-priced re-imported cigarettes would cause consumers to have fewer choices and pay higher prices and may put some distributors out of business, those effects did not warrant denying a remedy); *Certain Chemiluminescent Compositions, Components Thereof and Methods of Using, and Products Incorporating Same*, Inv. No. 337-TA-285, U.S.I.T.C. Pub. No. 2370 at 29-30 (U.S.I.T.C., March 1991) (rejecting argument for denial of remedy based solely on the fact that a supplier would be shut out of the market by an exclusion order where there was no evidence that complainant could not supply the entire U.S. market); *Certain Digital Television Products and Certain Products Containing Same and Methods of Using Same*, Inv. No. 337-TA-617, Comm'n Op. at 16 (U.S.I.T.C., Apr. 23, 2009) ("the Commission has consistently held that the benefit of lower prices to consumers does not outweigh the benefit of providing complainants with an effective remedy for an intellectual property-based section 337 violation").

Respondents' expert, Dr. Vander Veen, testified that if the requested relief is granted, there will be an adverse impact on consumers and competitive conditions based on the "inability of consumers to receive repair or replacement devices under warranty claim, and the… reduction in product availability and reduced supply to market as a result of the significant market share accounted for by Respondents…" (Tr. at 1844.) Further, regarding product warranties, Dr. Vander Veen testified:

> If there's an exclusion order issued in this case, Respondents will be unable to import products or components and would be limited in their ability to comply with these warranties. That would have an adverse effect on consumers because they would not be able to receive a repair or replacement device for a product they've already purchased.

(*Id.* at 1845.) Additionally, the record includes documents describing certain Respondents' warranty obligations with respect to a number of the Accused Products. (*See* RX-926 at 226; RX-998 at 93; RX-999 at 54; RX-1219 at 44; RX-959C; RX-960C; RX-996C; and RX-997C at 21.)

Regarding Respondents' market share, Dr. Vander Veen testified that Respondents account for approximately 50 percent of the sales of smartphones in the United States and Garmin accounted for approximately { } of the sales of personal navigation devices in December 2012. (Tr. at 1849.) The record documentary evidence supports Dr. Vander Veen's testimony. (*See* RX-936C; RX-1634C; RX-1636; RX-1637; RX-2188C.)

Given the evidence provided, the Administrative Law Judge concludes that the interest in protecting Complainants' intellectual property rights through remedial orders outweighs any potential adverse public interest impact that would occur if an exclusion order is entered in this Investigation. First, the Administrative Law Judge finds that Respondents have not identified any adverse public health or safety consequences that would arise if the requested relief is granted. Second, with respect to Respondents' arguments regarding product warranties, the Administrative Law Judge notes that Respondents have not provided any quantitative analysis regarding the potential adverse impact exclusion orders would have on consumers in this regard. Further, the evidence of record shows that any impact can be mitigated to the extent Respondents' warranties allow for Respondents to provide refunds in lieu of repair or replacement of damaged products. (*See e.g.* RX-926 at 226; RX-959C; RX-960C; RX-996C; RX-997C at 21.) Finally, with respect to competitive conditions, the Administrative Law Judge finds that based on the market share of Respondents with respect to smartphones and personal navigation devices, some adverse impact is likely to result from the issuance of exclusion orders.

However, this impact is mitigated by the fact that Complainants' licensees would likely provide significant numbers of non-infringing alternative devices and functionality. (*See* Tr. at 1860-1868.) Accordingly, the Administrative Law Judge recommends that the Commission find that analysis of the public interest factors does not warrant preclusion of any remedy in this Investigation.

IX. WAIVER OR WITHDRAWAL OF RESPONDENTS' OTHER DEFENSES

Respondents responses to the Second Amended Complaint and Notice of Investigation contain a number of defenses and arguments that were not raised in Respondents' pre-hearing briefing, discussed at the hearing, or raised in post-hearing briefing ("non-asserted defenses"). The non-asserted defenses include, *inter alia*, invalidity pursuant to 35 U.S.C. §§ 101, 102, 103, and 112. (*See e.g.* Barnes & Noble, Inc.'s Response to the Amended Notice of Investigation and the Second Amended Complaint of Technology Properties Limited LLC Under Section 337 of the Tariff Act of 1930, as Amended, dated March 14, 2013.) These non-asserted defenses and arguments are deemed abandoned or withdrawn. (*See* Ground Rules 7.2, 10.1.)

X. CONCLUSIONS

1. The Commission has personal jurisdiction over the parties, subject-matter jurisdiction, and in rem jurisdiction over the Accused Products.
2. The importation or sale requirement of Section 337 is satisfied.
3. None of the Accused Products identified in Section I.E. above directly or indirectly infringe claims 1, 6, 7, 9-11, and 13-16 of the '336 patent.
4. Asserted claims 1, 6, 7, 9-11, and 13-16 of the '336 patent have not been found to be invalid.

5. A domestic industry exists with respect to the '336 patent, as required by Section 337.
6. Any public interest issues raised by enforcement of a remedy with respect to any Respondent do not overcome the public interest in protecting Complainants' property rights with respect to the '336 patent.
7. With respect to Respondents Acer, Inc. and Acer America Corporation, it has been established that no violation of Section 337 exists for claims 1, 6, 7, 9-11, and 13-16 of the '336 patent.
8. With respect to Respondent Amazon.com, Inc., it has been established that no violation of Section 337 exists for claims 1, 6, 7, 9-11, and 13-16 of the '336 patent.
9. With respect to Respondent Barnes & Noble, Inc., it has been established that no violation of Section 337 exists for claims 1, 6, 7, 9-11, and 13-16 of the '336 patent.
10. With respect to Respondents Garmin Ltd.; Garmin International, Inc.; and Garmin USA, Inc., it has been established that no violation of Section 337 exists for claims 1, 6, 7, 9-11, and 13-16 of the '336 patent.
11. With respect to Respondents HTC Corporation and HTC America, Inc., it has been established that no violation of Section 337 exists for claims 1, 6, 7, 9-11, and 13-16 of the '336 patent.
12. With respect to Respondents Huawei Technologies Co., Ltd; Huawei Device Co., Ltd; Huawei Device USA Inc.; and Futurewei Technologies, Inc., it has been

established that no violation of Section 337 exists for claims 1, 6, 7, 9-11, and 13-16 of the '336 patent.

13. With respect to Respondents Kyocera Corporation and Kyocera Communications, Inc., it has been established that no violation of Section 337 exists for claims 1, 6, 7, 9-11, and 13-16 of the '336 patent.
14. With respect to Respondents LG Electronics, Inc. and LG Electronics USA, Inc., it has been established that no violation of Section 337 exists for claims 1, 6, 7, 9-11, and 13-16 of the '336 patent.
15. With respect to Respondents Nintendo Co., Ltd. and Nintendo of America Inc., it has been established that no violation of Section 337 exists for claims 1, 6, 7, 9-11, and 13-16 of the '336 patent.
16. With respect to Respondent Novatel Wireless, Inc., it has been established that no violation of Section 337 exists for claims 1, 6, 7, 9-11, and 13-16 of the '336 patent.
17. With respect to Respondents Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc., it has been established that no violation of Section 337 exists for claims 1, 6, 7, 9-11, and 13-16 of the '336 patent.
18. With respect to Respondents ZTE Corporation and ZTE (USA), Inc., it has been established that no violation of Section 337 exists for claims 1, 6, 7, 9-11, and 13-16 of the '336 patent.

This Initial Determination's failure to discuss any matter raised by the parties, or any portion of the record, does not indicate that it has not been considered. Rather, any such matter(s) or portion(s) of the record has/have been determined to be irrelevant, immaterial or meritless. Arguments made on brief which were otherwise unsupported by record evidence or legal precedent have been accorded no weight.

XI. INITIAL DETERMINATION AND ORDER

Based on the foregoing, it is the INITIAL DETERMINATION ("ID") of this Administrative Law Judge that with respect to Respondents Acer Inc.; Acer America Corporation; Amazon.com, Inc.; Barnes & Noble, Inc.; Garmin Ltd.; Garmin International, Inc.; Garmin USA, Inc.; HTC Corporation; HTC America; Huawei Technologies Co., Ltd.; Huawei Device Co., Ltd.; Huawei Device USA Inc.; Futurewei Technologies, Inc.; Kyocera Corporation; Kyocera Communications, Inc.; LG Electronics, Inc.; LG Electronics U.S.A., Inc.; Nintendo Co., Ltd.; Nintendo of America, Inc.; Novatel Wireless, Inc.; Samsung Electronics Co., Ltd.; Samsung Electronics America, Inc.; ZTE Corporation; and ZTE (USA) Inc., no violation of Section 337 of the Tariff Act of 1930, as amended, has occurred in the importation into the United States, the sale for importation, or the sale within the United States after importation of certain wireless consumer electronics devices and components thereof, by reason of infringement of one or more of claims 1, 6, 7, 9-11, and 13-16 of United States Patent No. 5,809,336.

Further, this ID, together with the record of the hearings in this Investigation consisting of:

(1) the transcripts of the Markman and evidentiary hearings, with appropriate corrections as may hereafter be ordered, and

(2) the exhibits received into evidence in this Investigation, as listed in the attached exhibit lists in **Appendix B**,

are CERTIFIED to the Commission. In accordance with 19 C.F.R. § 210.39(c), all material found to be confidential by the undersigned under 19 C.F.R. § 210.5 is to be given in camera treatment.

The Secretary shall serve a public version of this ID upon all parties of record and the confidential version upon counsel who are signatories to the Protective Order (Order No. 1) issued in this Investigation, and upon the Commission Investigative Attorney.

RECOMMENDED DETERMINATION ON REMEDY AND BOND

I. REMEDY AND BONDING

The Commission's Rules provide that subsequent to an initial determination on the question of violation of Section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337, the Administrative Law Judge shall issue a recommended determination containing findings of fact and recommendations concerning: (1) the appropriate remedy in the event that the Commission finds a violation of Section 337, and (2) the amount of bond to be posted by respondents during Presidential review of Commission action under Section 337(j). See 19 C.F.R. § 210.42(a)(1)(ii).

A. Applicable Law

The Commission may issue a remedial order excluding the goods of respondents found in violation of Section 337 (a limited exclusion order) or, if certain criteria are met, excluding all infringing goods regardless of the source (a general exclusion order). 19 U.S.C. § 1337(d); *Certain Hydraulic Excavators and Components Thereof*, Inv. No. 337-TA-582, Comm'n Op., at 15 (U.S.I.T.C., February 3, 2009) ("Certain Excavators"). Here, Complainants request a limited exclusion order if they prevail in the Investigation. A limited exclusion order instructs the U.S. Customs and Border Protection ("CBP") to exclude from entry all articles that are covered by the patents at issue and that originate from a named respondent in the investigation. See 19 U.S.C. § 1337(d).

B. Remedy with Respect to the '336 Patent

Complainants request the issuance of a limited exclusion order prohibiting the importation of Respondents' wireless consumer electronic devices and components thereof that infringe one or more of the asserted claims of the '336 patent. (CBr. at 190-191.) Further, in order to avoid circumvention of an exclusion order, Complainants request that the limited exclusion order apply both to Respondents and to their affiliated companies, parents, subsidiaries, related business entities, or their successors or assigns. (*Id.* at 191 (citing *Certain Erasable Programmable Read-Only Memories, Components Thereof, Products Containing Such Memories & Processes for Making Such Memories*, Inv. No. 337-TA-276, Notice of Issuance of Limited Exclusion Order & Cease & Desist Orders, U.S.I.T.C., Pub. 2196, 1989 WL 1716252 (May 1989)).)

Respondents argue that Complainants limited their infringement allegations at the hearing to the following product categories:

Respondent	Accused Product Categories	Exemplary Record Citations
Acer	Desktop personal computers, notebook personal computers and tablet computers	RDX-4.17C; RDX-4.18C; RX-1022C; Tr. (Subramanian) 1129:23-1132:12
Amazon	Tablet computers	RDX-4.29C; RX-1023C; Tr. (Subramanian) 1137:2-1137:9
Barnes & Noble	E-readers and tablet computers	RDX-4.30C; RDX-4.31C; RDX-1024C; Tr. (Subramanian) 1137:10-24
Garmin	Navigation Devices	RDX-4.32C; RDX-4.33C; RX-1025C; Tr. (Subramanian) 1137:25-1138:15
HTC	Smartphones and tablet computers	RDX-4.19C; RDX-4.20C; RX-1026C; Tr. (Subramanian) 1132:23-1133:23
Huawei	Smartphones and tablet computers	RDX-4.21C; RX-1027C; Tr. (Subramanian) 1133:24-1134:12
Kyocera	Smartphones and mobile phones	RDX-4.22C; RX-1028C; Tr. (Subramanian) 1134:13-1135:6
LG	Smartphones and mobile phones	RDX-4.23C; RDX-4.24C; RX-1029C; Tr. (Subramanian) 1135:7-1135:21
Nintendo	Portable handheld gaming devices	RDX-4.34C; RDX-4.35C; RX-1030C; Tr. (Subramanian) 1138:16-1139:4
Novatel Wireless	Wireless mobile hotspots	RDX-4.28C; RX-1031C; Tr. (Subramanian) 1136:20- 1137:1
Samsung	Smartphones	RDX-4.25C; RX-1032C; Tr. (Subramanian) 1135:22-1136:2
ZTE	Smartphones, mobile phones, mobile hotspots, USB modems, and wireless home phones	RDX-4.26C; RDX-4.27C; RX-1033C; Tr. (Subramanian) 1136:3-1136:19

(RBr. at 176-177.) Respondents assert that no evidence was presented regarding any other product categories, and thus, Respondents argue that any other types of products are beyond the scope of this Investigation and any remedy should be limited to those specific categories listed above. (*Id.* at 177.) Additionally, Respondents say that Complainants limited their infringement case to the use of selected semiconductor chips from LSI, Qualcomm, Samsung, and Texas Instruments, and Respondents argue that any remedy should be limited only to products containing semiconductor chips for which Complainants offered infringement evidence. (*Id.* at 177-178 (citing RDX-0004C at 37; RX-1022C-RX-1033C' Tr. at 1139-1140).) Similarly, Respondents argue that ZTE and Huawei products that were withdrawn pursuant to Order No. 35 should be carved out of any exclusion order. (*Id.* at 178-179.[25]) The withdrawn products include the ZTE N9500 (Flash), N9120 (Avid4G), N9100, F555/P671A91 (Aspect), and X501 (Groove) and the Huawei Verge (M570) and Pillar (M615/C6070). (*Id.* at 179.)

Further, Respondents assert that Complainants failed to present evidence with respect to many Accused Products. (*Id.*) Respondents say that Complainants did not withdraw their allegations with respect to these other products while Respondents' expert affirmatively addressed these products in his testimony. (*Id.* at 180.) Respondents argue that Complainants have failed to meet their burden regarding these products and any remedial order should specifically enumerate and exempt these products. (*Id.* at 180-181.)

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[25] Citing Order No. 54 at 4; *Certain NOR and NAND Flash Memory Devices and Products Containing Same*, Inv. No. 337-TA-560, Order No. 38 at 7 (U.S.I.T.C., Nov. 17, 2006) ("*Flash Memory Devices*"); *Certain Rubber Antidegradents, Components Thereof, and Products Containing Same* ("*Rubber Antidegradants*"), Inv. No. 337-TA-533, Final Initial Detemination and Recommended Determination at 96-97, n. 32 (U.S.I.T.C., Apr. 25, 2006); *Certain Power Supply Controllers and Products Containing Same*, Inv. No. 337-TA-541; Order No. 13 (U.S.I.T.C., Dec. 22, 2005); *Certain Baseband Processors*, Inv. No. 337-TA-543, Comm'n Op., 2007 ITC LEXIS 621, at *286 (U.S.I.T.C., June 19, 2007); *Certain Power Supply Controllers*, Inv. No. 337-TA-541, Limited Exclusion Order at 3 (U.S.I.T.C., Aug. 11, 2006).

Respondents also argue that the *EPROMs* factors weigh heavily against ordering exclusion of Respondents' downstream products. (*Id.* at 181.) First, Respondents say that they demonstrated that the value of the patented technology is insignificant compared to the value of the downstream products. (*Id.* at 181-182 (citing *EPROMs*, Comm'n Op. at 125-126; *Flash Memory Devices*, Initial Determination at 149-150).) Quantitatively, Respondents argue that the value of the patent technology compared to the value of the Accused Products is apparent from the amounts third parties have agreed to pay in MMP portfolio license agreements. (*Id.* at 182 (citing CX-708C; Tr. at 1596-1600).) Qualitatively, Respondents argue that the '336 patent has a low qualitative value because Complainants failed to present any evidence that consumers demand or value the functionality provided by the patent. (*Id.*)

Regarding the second *EPROMs* factor, Respondents assert that while they are manufacturers of the accused downstream products, this does not render the *EPROMs* analysis moot because the potential harm to the manufacturers and consumers is significant while the benefit to Complainants is non-existent because they do not produce anything for sale in the market. (*Id.* at 183 (citing *Certain Liquid Crystal Display Modules, Products Containing Same, & Methods Using the Same*, Inv. No. 337-TA-634, Comm'n Op. at 4 (U.S.I.T.C. Nov. 24, 2009); *Certain Microprocessors, Components Thereof, & Products Containing Same*, Inv. No. 337-TA-781; Initial Determination at 174-178 (U.S.I.T.C. Dec. 14, 2012)).) Similarly regarding the third factor, Respondents argue that Complainants will not receive any incremental benefit if the downstream products are excluded because Complainants do not manufacture or sell any products in the United States. (*Id.* at 183-184 (citing Tr. at 92-93, 134, 139, 1739-1740, 1869).)

Regarding the fourth *EPROMs* factor, Respondents argue that excluding downstream products will harm Respondents' non-infringing activities such as sales of non-infringing accessories and components. (*Id.* at 184 (citing RDX-0004C at 17-18; RX-1022C; Tr. at 1129-1132).) Next, Respondents argue that excluding downstream products would harm consumers and third parties and Complainants have offered no evidence of an alternative supply of non-infringing products. (*Id.* at 184-186 (citing RDX-0006C at 6-7; RX-0936C; RX-1634C; RX-1636; RX-1637; RX-2188C; Tr. at 1844, 1846, 1848-1849, 1861-1864, 1866-1867).) Regarding factor 7, Respondents say that products containing non-infringing chips will be improperly excluded because U.S. Customs has no readily ascertainable method for determining whether Respondents' products contain chips accused by Complainants. (*Id.* at 186 (citing RDX-0004C at 69-71, 80; RX-0617C at QTPL 13714; Tr. at 1178-1182, 1191-1193).) Regarding *EPROMs* factor 8, Respondents say there is no evidence that Respondents will attempt to evade an order that does not cover downstream products. (*Id.* at 186-187 (citing CX-1457 at 47-48).) Finally, Respondents say that excluding downstream products would burden Customs. (*Id.* at 187.)

Next, Respondents argue that any exclusion order should contain an exemption for repair, replacement, warranty and service contracts. (*Id.* at 187-188.) Respondents assert that it was uncontested that without such an exemption, consumers would be unable to receive repair or replacement devices under a warranty claim. (*Id.* at 187 (citing Tr. at 1844-1846).) Finally, Respondents request that any exclusion order include a certification provision with Customs and a reasonable adjustment period. (*Id.* at 188-189.) Regarding a certification provision, Respondents argue that they should be able to certify that certain imported products do not infringe the asserted claims, which Customs would be "unable to easily determine by inspection whether an imported product violates a particular exclusion order." (*Id.* at 188 (citing *Certain Semiconductor Chips with Minimized Package Size & Products Containing Same*, Inv. No. 337-TA-605, Comm'n Op. at 72 (U.S.I.T.C. June 3, 2009)).) Respondents also say an adjustment period is appropriate to alleviate the harm to U.S. consumers and legitimate commerce caused by the disruption to the supply of Respondents' products. (*Id.* at 188-189 (citing *Mobile Commc'ns* at 78-83).)

Staff asserts that an *EPROMs* analysis is not appropriate here because the accused devices are Respondents' products themselves and not the semiconductor components used therein. (SBr. at 34.) As such, there are no downstream products at issue here. (*Id.*) Staff also argues that a limited exclusion order should issue that does not deviate from the Commission's standard practice with respect to an adjustment period and a certification provision. (*Id.*)

In their reply, Complainants argue that generally the Commission's remedial orders encompass all articles within the scope of the notice of investigation that infringe the asserted patent claims, regardless of whether the particular models were specifically addressed in the Commission's infringement analysis. (CRBr. at 85.) Complainants assert that Respondents have not provided any justification for departing from Commission precedent. (*Id.* at 85, 88-89.) Thus, Complainants assert that any exclusion order that issues should include all infringing products within the scope of the investigation and should not be limited to specific categories or instrumentalities. (*Id.* at 85-86.) Further, Complainants argue that a "carve-out" regarding LSI, Huawei, and ZTE products is not appropriate based on Commission precedent and Order No. 54. (*Id.* at 86-87 (citing *Certain MEMs Devices & Products Containing the Same*, Inv. No. 337-TA-700, Comm'n Op., 2011 WL 1867927, at *15 (U.S.I.T.C. May 13, 2011); *Certain Mobile Devices, Associated Software, & Components Thereof* ("*Mobile Devices*"), Inv. No. 337-TA-744, Limited Exclusion Order at 1, 2 (U.S.I.T.C. 2012)).) Next, Complainants argue that the Accused Products are not downstream products because they are finished goods and *EPROMs* does not apply. (*Id.* at 89-90.) Regarding Respondents' request for a warranty exemption, Complainants argue that Respondents did not provide any evidence to justify an exemption beyond the bare existence of warranties covering certain Accused Products. (*Id.* at 90.) Finally, Complainants address Respondents' requests for an adjustment period and certification provision. (*Id.* at 91.) Complainants say that Respondents provided no evidence to support either request. (*Id.*)

Having reviewed the evidence and arguments presented by the parties, the Administrative Law Judge finds that there is no justification for the deviations proposed by Respondents from the Commission's standard practice with respect to the issuance of a limited exclusion order. Further, the Administrative Law Judge finds that the Accused Products are not "downstream" products in the sense contemplated by the Commission in *EPROMs*, and thus, Respondents' analysis of the *EPROMs* factors is moot. Accordingly, should the Commission find a violation, the Administrative Law Judge recommends that the Commission issue a limited exclusion applying to each Respondent and all of its affiliated companies, parents, subsidiaries, or other related business entities, or its successors or assigns and prohibiting the unlicensed entry of all of Respondents' accused wireless consumer electronics devices and components thereof that infringe the claims of the asserted patent for which a Section 337 violation is found.

II. Cease and Desist Order

Section 337 provides that in addition to, or in lieu of, the issuance of an exclusion order, the Commission may issue a cease and desist order as a remedy for violation of Section 337. *See* 19 U.S.C. § 1337(f)(1). The Commission generally issues a cease and desist order directed to a domestic respondent when there is a "commercially significant" amount of infringing, imported product in the United States that could be sold so as to undercut the remedy provided by an exclusion order. *See Certain Crystalline Cefadroxil Monohydrate*, Inv. No. 337-TA-293, Comm'n Op. on the Issue Under Review, and on Remedy, the Public Interest and Bonding at 37-42, Pub. No. 2391 (U.S.I.T.C., June 1991). Cease and desist orders have been declined when the record contains no evidence concerning infringing inventories in the United States. *Certain Condensers, Parts Thereof and Products Containing Same, Including Air Conditioners for Automobiles*, Inv. No. 337-TA-334, Comm'n Op. at 28 (U.S.I.T.C., Aug. 27, 1997).

Complainants assert that the following Respondents maintain commercially significant inventories of Accused Products in the United States: Acer, Amazon, Barnes & Noble, Garmin, HTC, Kyocera, Nintendo, Novatel, and Samsung. (CBr. at 191. CRBr. at 92 (citing RBr. at 189-190; *Certain Electronic Digital Media Devices & Components Thereof*, Inv. No. 337-TA-796, Recommended Determination (U.S.I.T.C. Nov. 7, 2012) (finding that Samsung maintains commercially significant inventory of wireless consumer electronic devices)).) However, Complainants request cease and desist orders direct to all Respondents to prevent the sale, distribution, and use of products imported into the U.S. prior to the entry of an exclusion order. (CBr. at 191 (citing *Certain Curable Fluoroelastomer Compositions*, Inv. No. 337-TA-364, Notice of Limited Exclusion Order and Cease & Desist Order, 1995 WL 1049682 (Mar. 16, 1995)).)

Respondents argue that Complainants are not entitled to cease and desist orders. (RBr. at 189.) In support, Respondents say that Complainants have not met their burden of proving that each Respondent has a commercially significant inventory in the United States to justify such orders. (*Id.* (citing *Mobile Devices,* Comm'n Op. at 25-26 (June 5, 2012)).) Specifically, Respondents say that Complainants did not introduce any evidence that { }. (*Id.* at 189-190 (citing Respondents Pre-Hearing Statement, Exs. R, K; Complainants' Pre-Hearing Brief at 224-225).)

Regarding cease and desist orders, Staff asserts that Respondents Amazon, Barnes & Noble, HTC, Garmin, and { } stipulated to the existence of inventories in the United States and these inventories are commercially significant. (SBr. at 35 (citing Complainants Pre-Hearing Brief, Exs. 7-10, 14).) Staff argues that cease and desist orders would be appropriate for those five Respondents. (*Id.*)

Respondents reply that Complainants have not identified any evidence to prove that each Respondent has a commercially significant inventory in the United States. (*Id.* at 90.) Regarding the evidence cited by Staff related to Garmin, Respondents argue that neither Complainants nor Staff have attempted to explain why the cited inventory snapshot is commercially significant. (*Id.*) Further, Respondents represent that { }. (*Id.* at 90-91.)

The Administrative Law Judge finds that Complainants have failed to meet their burden to justify the issuance of cease and desist orders with respect to any Respondent. Significantly, Complainants cite to no evidence in the record to support their position in this regard. (*See* CBr. at 191.) Regarding the stipulations cited by Staff, while those stipulations may include facts regarding amounts of inventories for certain Respondents, Complainants have failed to provide any explanation or to adduce any facts to show that the listed inventories are commercially significant. Notably, the stipulations themselves only list an amount of the Accused Products in inventory, without acknowledging that such inventory is commercially significant. Accordingly, the Administrative Law Judge does not recommend that cease and desist orders issue.

III. Bond During the Presidential Review Period

The Administrative Law Judge and the Commission must determine the amount of bond to be required of a respondent, pursuant to Section 337(j)(3), during the 60-day Presidential review period following the issuance of permanent relief, in the event that the Commission determines to issue a remedy. 19 C.F.R. § 210.42(a)(1)(ii). The purpose of the bond is to protect the complainant from any injury. 19 C.F.R. § 210.50(a)(3).

When reliable price information is available, the Commission has often set the bond by eliminating the differential between the domestic product and the imported, infringing product. *See Certain Microsphere Adhesives, Process for Making Same, and Products Containing Same, Including Self-Stick Repositionable Notes*, Inv. No. 337-TA-366, Comm'n Op., at 24 (U.S.I.T.C., December 15, 1995). In circumstances where pricing information is unclear, or where variations in pricing make price comparisons complicated and difficult, the Commission typically has set a 100 percent bond. *Id.*, at 24-25; *Certain Digital Multimeters and Products with Multimeter Functionality*, Inv. No. 337-TA-588, Comm'n Op., at 12-13 (U.S.I.T.C., June 3, 2008) (finding 100 percent bond where each respondent set its price differently, preventing clear differentials between complainant's products and the infringing imports). When a pricing comparison is impossible, it is also appropriate to set the bond based on a reasonable royalty. *Certain Digital Televisions and Certain Products Containing Same and Methods of Using Same*, Inv. No. 337-TA-617, Commission Opinion at 18 (U.S.I.T.C., April 23, 2009).

Complainants request that Respondents be required to post a bond equal to 100 percent of the entered value of the accused devices during the Presidential review period. (CBr. at 192.) Complainants acknowledge that the Commission sets the bond to eliminate any differential in sales price between the patented domestic product and the infringing imported product, but

Complainants argue that that process is inappropriate here because this Investigation concerns a wide variety of products, pricing variations, and distribution methods. (*Id.*) Under these circumstances, Complainants assert that a 100 percent bond is appropriate. (*Id.* (citing *Certain Microsphere Adhesives, Process for Making Same, and Products Containing Same, Including Self-Stick Repositionable Notes*, Inv. No. 337-TA-366, Comm'n Op. at 24.; *Certain Digital Multimeters & Prods. with Multimeter Functionality*, Inv. No. 337-TA-588, Comm'n Op., at 12-13 (U.S.I.T.C., June 3, 2008)).)

Respondents argue that no bond is necessary during the Presidential Review period. (RBr. at 190-191.) Respondents say that Complainants failed to present any evidence regarding the need for a bond, and thus, no bond should be required. (*Id.* (citing *Certain Portable Electronic Devices & Related Software*, Inv. No. 337-TA-721, Init. Determination at 110-112 (U.S.I.T.C., Oct. 17, 2011); *Certain Integrated Circuits*, Inv. No. 337-TA-786, Init. Determination at 182-183 (U.S.I.T.C., July 12, 2012)).) Respondents also assert that Complainants do not produce anything and there is no evidence of price difference between any patented domestic product and the accused imported articles. (*Id.* at 191.)

Staff argues that a reasonable royalty can be established based on the effective royalty rates paid by Complainants' licensees. (SBr. at 36.) Staff asserts that the evidence shows that licensees have paid an average effective royalty rate of approximately { }, and Staff submits that this would be an appropriate bond rate. (*Id.* (citing JX-0177C; Tr. at 1798).)

Respondents reply that zero bond is warranted because Complainants provided no evidence regarding the difficulty of determining a price differential, how each Respondent sets prices, or the differences in sales prices between the patented domestic product and the alleged infringing imported product. (RRBr. at 91.) According to Respondents, recent Commission precedent dictates a zero bond when a complainant fails to present evidence justifying a 100 percent bond. (*Id.* at 92 (citing *Rubber Antidegradants*, Comm'n Op. at 40; *Certain Dimmable Compact Fluorescent Lamps*, 337-TA-830, Initial Determination, 2013 WL 1278074, at *5 (U.S.I.T.C. March 1, 2013)).)

The Administrative Law Judge finds that Complainants have failed to meet their burden to justify the imposition of any bond. *See Rubber Antidegradants*, Comm'n Op. at 40-41. Significantly, Complainants do not cite to any evidence in the record to support their contention that the usual process for determining the bond amount should be set aside here because this Investigation concerns a wide variety of products, pricing variations, and distribution methods. (*See* CBr. at 192.) Regarding Staff's proposed royalty rate, the Administrative Law Judge finds the evidence insufficient to justify imposing a bond based on the alleged effective royalty rate Staff proposes. Accordingly, the Administrative Law Judge does not recommend the imposition of a bond during the 60-day Presidential review period.

IV. Conclusion

In accordance with the discussion of the issues contained herein, it is the RECOMMENDED DETERMINATION of the Administrative Law Judge that in the event the Commission finds a violation of Section 337, the Commission should issue a limited exclusion order against each Respondent and all of its affiliated companies, parents, subsidiaries, or other related business entities, or its successors or assigns and prohibiting the unlicensed entry of all of Respondents' accused wireless consumer electronics devices and components thereof that infringe the claims of the asserted patent for which a Section 337 violation is found. It is not recommended that the Commission issue cease and desist orders or a bond for the Accused Products.

Within seven days of the date of this document, each party shall submit to the office of the Administrative Law Judge a statement as to whether or not it seeks to have any portion of this document deleted from the public version. The parties' submissions must be made by hard copy by the aforementioned date.

Any party seeking to have any portion of this document deleted from the public version thereof must submit to this office a copy of this document with red brackets clearly indicating any portion asserted to contain confidential business information by the aforementioned date. The parties' submission concerning the public version of this document need not be filed with the Commission Secretary.

SO ORDERED.

E James Gildea

E. James Gildea
Administrative Law Judge

APPENDIX A

Accused Products

Acer

A5600U
A7600U
AG3610
AM3970
AM3970G
AOD257
AS4560
AS5349
AS5749
AS5749Z
AS5750
AS5750G
AS5750Z
AS5755
AS5755G
AS7250
AS7739G
AS7739Z
AS7750
AS7750G
AZ3170
AZ3171
E1-421
E1-431
E1-471
E1-521
E1-531
E1-571
V5-471
V5-471P
VZ2610G
VZ2611G
VZ2620G
VZ2621G
VZ2650G
ZX4250
ZX4250G
AO725
AOD270
AS4250
AS4349
AS4739
AS4739Z
AS4749
AS4752
AS4752G
AS4752Z
AS4755G
AS5733
AS5733Z
AS5742
AS5742Z
AS7560
AS7560G
DOTS-C
DX4860
ID47H
LT40
M3-581PTG
M3-581T
M3-581TG
M5-481PT
M5-481T
M5-481TG
M5-581T
NE51B
NE56R
NE71B
NV52L
NV77H
TM5760
TM5760Z
TM6595TG
TM8473T
TM8481T
TM8481TG
TM8573T
TM8573TG
TMB113-E
TMB113-M
TMP243-M
TMP453-M
TMP633-M
TMP633-V
TMP643-M
TMP643-V
TMP653-M
TMP653-V
V3-471
V3-471G
V3-571
V3-571G
V3-771
V3-771G
V5-551
ZX4451
AO722
AO756
AS4830T
AS4830TG
AS5250
AS5560
AS5560G
AS5830T
AS5830TG
AS8951G
C710
FX6860
M5-581TG
NV51B
NV55S
NV75S
S3-391
S3-951
S5-391
S7-191
S7-391
TM4750
TM5744
TM5744Z
TM6495T
TM6595T
TM7750G
V3-551
V3-551G
V3-731
V5-171
V5-431
V5-531
V5-571
V5-571P

Accused Products

Amazon

Kindle Fire HD 8.9" (Jem)
Kindle Fire HD 8.9" 4G (Jem)
Kindle Fire Second Generation (Otter 2)
Kindle Fire HD 7" (Tate)

Barnes & Noble

Nook HD (Hummingbird)
Nook HD+ (Ovation)
Nook Simple Touch (Gossamer)
Nook Simple Touch with GlowLight (Owl)

Garmin

nuvi 3450
nuvi 3450LM
GMR xHD 404
GMR xHD 406
GMR xHD 604
GMR xHD 606
GMR xHD 1204
GMR xHD 1206
nuvi 3450
nuvi 3450LM
nuvi 3550LM
nuvi 3590LMT
GPSMAP 720
GPSMAP 720s
GPSMAP 740
GPSMAP 740s

Accused Products

HTC

EVO 4G LTE (Jewel)
One VX (Totem)
One X (Evita)
Windows Phone 8X (Accord)
One S (Ville)
myTouch 4G Slide (Doubleshot)
Sensation 4G (Pyramid)
Rezound (Vigor)
Status (ChaCha)
Evo Design 4G (Kingdom)
Hero S (Kingdom)
Radar 4G (Omega)
One V (PrimoC)
myTouch 4G (Glacier)

Huawei

Unite / myTouch (U8680)
Unite Q / myTouch Q (U8730)
Mercury (Honor) (M886)
Sprint Express (M650)
Ascend II (M865)
Ascend II (M865C)
Ascend II (M865-USCC)
Ascend Q (M660)
Activa 4G (M920)
Pinnacle (M635/C6071)
Pinnacle 2 (M636)
Blue (M735)

Accused Products

REDACTED

LG

Escape (P870)
Motion (MS770)
Intuition (LGVS950)
Lucid (LGVS840)
Viper (LGS840)
Elite (LGLS696)
Splendor (US730)
Venice (LG730)
Optimus L9 (P769)

Nintendo

DSi
3DS
3DS XL

Accused Products

Novatel

MiFi 4082 (Indian)
MiFi 2200 (Pacific)
MiFi 4510 (Hudson)
MiFi 4510PP (Hudson)
MiFi 4620 (Fonseca)

Samsung

Galaxy S III (SGH-I747/M16)
Galaxy S III (SCH-I535)
Galaxy S III (SCH-L710)
Galaxy S III (SCH-R530M)
Galaxy S III (SCH-R530M/M16)
Galaxy S III (SPH-L710)
Galaxy S III (SGH-T999)
Galaxy Axiom (SCH-R830)
Galaxy Express (SGH-I437)
Galaxy Rugby Pro (SGH-I547)
Galaxy Stellar (SCH-I200)
Galaxy Stratosphere 2 (SCH-I415)
Galaxy Exhilarate (SGH-I577)
Galaxy Note (SGH-I717)
Galaxy S Blaze 4G (SGH-T769)
Galaxy S II (SGH-T989)
GSII Skyrocket (SGH-I727)
Galaxy Note II (SCH-1605/M16)
Galaxy Note II (SCH-R950/M16)
Galaxy Note II (SGH-I317/M16)
Galaxy Note II (SGH-T889/M16)
Galaxy Note II (SPH-L900/M16)
Galaxy Proclaim (SCH-S720C)
Galaxy Admire 4g (SCH-R820)
Galaxy Metrix 4G (SCH-1405U)
Illusion (SCH-I110/P)
Galaxy S II (SCH-R760X)
Galaxy S II (SGH-S959G)
Galaxy S II (SPH-D710)

Accused Products

ZTE

Chorus (D930)
Score/Score M (X500)
Tania/Render (N859)
Warp II/Warp Sequent (N861)
Fury (N850)
Warp (N860)
Engage (V8000)
Spider (Z431/P671A90)
WF720 (WF720)
Z221/Michael (P671B40)

APPENDIX B

AGILITY IP LAW
IP LITIGATION EXPERTS

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June 28, 2013

The Honorable E. James Gildea
Administrative Law Judge
U. S. International Trade Commission
500 E Street, S.W.
Washington, DC 20436

Re: ***Certain Wireless Consumer Devices and Components Thereof, Inv. No. 337-TA-853***

Dear Judge Gildea:

Enclosed please find COMPLAINANTS' [CORRECTED] FINAL EXHIBIT LIST for filing in the above referenced investigation.

Pursuant to the Administrative Law Judge's June 25, 2013 Order (Order No. 64) and the agreements between Complainants and Respondents, the following changes have been made with regard to Complainants' Final Exhibit List and Final Exhibits (CX and CDX).

1. The following exhibits were admitted pursuant Order No. 64 and have been added to Complainants' enclosed Corrected Final Exhibit List:

   CX-0158, CX-0181, CX-0182, CX-0189, CX-0199, CX-0220, CX-0221, CX-0222, CX-0223, CX-0224, CX-0225, CX-0285C, CX-0286C, CX-0297C, CX-0308C, CX-0313C, CX-0331, CX-0349, CX-0363C, CX-0368C, CX-0460C, CX-0487C, CX-0488C, CX-0509C, CX-0512C, CX-0568C, CX-0569C, CX-0570C, CX-0571C, CX-0586C, CX-0587C, CX-0588C, CX-0589C, CX-0590C, CX-0591C, CX-0668, CX-0871C, CX-0872C, CX-0914C, CX-0916C, CX-0917C, CX-0933, CX-0935C, CX-0936, CX-0956, CX-0959, CX-0961C, CX-0962C, CX-0964C, CX-0965C, CX-0973, CX-0981C, CX-0983C, CX-1002, CX-1004C, CX-1006, CX-1234, CX-1235, CX-1236, CX-1259, CX-1265C, and CX-1268C.

2. The following exhibits were formerly proposed as CX but are being received as demonstratives pursuant to the agreements between Complainants and Respondents:

   CDX-0158 (formerly CX-0158), CDX-0420C (formerly CX-0420C), CDX-0441C (formerly CX-0441C), CDX-0443 (formerly CX-0443), CDX-0444C (formerly CX-0444C), CDX-0448C (formerly CX-0448C), CDX-0449C (formerly CX-0449C), CDX-0450C (formerly CX-0450C), CDX-0451C (formerly CX-0451C), CDX-0475C (formerly CX-0475C), CDX-0482C (formerly CX-0482C), CDX-0484C (formerly CX-0484C), CDX-0704C (formerly CX-0704C), CDX-0935C (formerly CX-0935C), CDX-0936 (formerly CX-0936), and CDX-1269C (formerly CX-1269C).

3. The following exhibits, which were initially part of Complainants' Motion for Leave, are not being offered pursuant to the agreements between Complainants and Respondents:

   CX-0199, CX-0310C, CX-0393C, CX-0412C, CX-0413C, CX-0414C, CX-0506C, CX-0520C, CX-0542C, CX-0555C, CX-0557C, CX-0559C, CX-0564C, CX-0565C, CX-0566C, CX-0567C, CX-0890C, CX-1005, and CX-1238.

The list is annotated to clearly indicate the status of each document and to reflect the above points.

Respectfully submitted,

James C. Otteson

James C. Otteson

Enclosure

UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON, D.C.

Before the Honorable E. James Gildea
Administrative Law Judge

In the Matter of **CERTAIN WIRELESS CONSUMER ELECTRONICS DEVICES AND COMPONENTS THEREOF**	**Investigation No. 337-TA-853**

COMPLAINANTS' [CORRECTED] FINAL EXHIBIT LIST

Pursuant to the Administrative Law Judge's Order Setting Procedural Schedule issued on January 9, 2013 (Order No. 15) and Ground Rule 10.1, Complainants Technology Properties Limited LLC, Phoenix Digital Solutions LLC, and Patriot Scientific Corporation hereby submit the following final exhibit list.

Dated: June 28, 2013

Respectfully submitted,

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Counsel for Complainant
Patriot Scientific Corporation

Complainants' [Corrected] Final CX Exhibit List

Exhibit No.		Description	Purpose	Sponsoring Witness	Status	Date
CX-0019	C	TPL Complaint Conf. Exh. 2-Q: Commercialization Agreement by and among P-NewCo and Technology Properties Limited and Patriot Scientific Corp. [TPL853_00001523-TPL853_00001549]	DI; VALIDITY	DANIEL E. LECKRONE; DANIEL M. LECKRONE; DWAYNE HANNAH; GLORIA FELCYN	Admitted	6/4/2013
CX-0022		TPL Complaint Exh. 5: Notice letter from M. Leckrone to Lanci of Acer regarding MMP Portfolio (07/15/2005) [TPL853_00000269-TPL853_00000272]	DI; INFRINGEMENT	DANIEL M. LECKRONE	Admitted	6/11/2013
CX-0072	C	TPL Complaint Conf. Exh. 39-A: Standard License Program Letter [TPL853_00001562-TPL853_00001565]	DI	DANIEL M. LECKRONE	Admitted	6/11/2013
CX-0081		TPL Complaint Exh. 39-J: List of MMP patents issued and patent applications filed since MMP program launch [TPL853_00001481-TPL853_00001483]	DI	DANIEL E. LECKRONE; DANIEL M. LECKRONE; DWAYNE HANNAH; GLORIA FELCYN	Admitted	6/4/2013
CX-0082	C	TPL Complaint Conf. Exh. 39-K: List of Entities Offered Licenses to Asserted Patent [TPL853_00001801-TPL853_00001817]	DI	DANIEL M. LECKRONE	Admitted	6/11/2013
CX-0109	C	S5PC210 RISC Microprocessor User Manual (09/2011); Jaegon Lee Depo Exh. 08 [853SAMSUNG00044735 - 853SAMSUNG00047107]	INFRINGEMENT; VALIDITY; REMEDY & BOND; IMPORTATION	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0117		USB Specification document (3.0) (06/06/20110 [GARMIN090989 - GARMIN091519]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0126		HTC User Guide: Droid Incredible 4G LTE [HTCTPL_100660861 - HTCTPL_100661136]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0127		HTC EVO 4G LTE User Guide - Sprint [HTCTPL_100661437 - HTCTPL_100661667]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0130		HTC User Guide - myTouch 4G Slide [HTCTPL_100663488 - HTCTPL_100663663]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0131		HTC User Guide - HTC One [HTCTPL_100663664 - HTCTPL_100663842]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0133		HTC User Guide - One VX [HTCTPL_100663998 - HTCTPL_100664172]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0136		HTC User Guide - Rezound [HTCTPL_100664770 - HTCTPL_00665040]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0137		HTC User Guide - Sensation 4G [HTCTPL_100665558 - HTCTPL_00665717]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0138		HTC User Guide [HTCTPL_100665718 - HTCTPL_00665896]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0139		HTC User Guide - Windows Phone 8X [HTCTPL_100667107 - HTCTPL_100667203]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0152		Photo of: LSI B5503A microprocessor [TPL853_02927280]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0154		Design of High-Performance Microprocessor Circuits p. 98 ; (Anatha Chandrakasan et al. eds., IEEE Press, 2001) [Models of Process Variations in Device and Interconnect (Duane Boning and Sani Nassif) [TPL853_02927444 - TPL853_02927464]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0155		Garmin nuvi 3400 series - owner's manual (02/2012) [TPL853_02938297 - TPL853_02938384]	INFRINGEMENT; DI	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0160		"25 Microchips That Shook the World," available at http://spectrum.ieee.org/semiconductors/processors/25-microchips-that- shook-the-world/5 [Markman Hearing Exhibit CXM-0006] [TPL853_02954298 - TPL853_02954308]	VALIDITY	DANIEL M. LECKRONE	Admitted	6/11/2013
CX-0167		Acer AZ3170/AZ3171 Service Guide [TPL853_02986130 - TPL853_02986337]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0172		Camera Interface Specifications - MIPI Alliacense [TPL853_02994925 - TPL853_02994932]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013

Complainants' [Corrected] Final CX Exhibit List

Exhibit No.		Description	Purpose	Sponsoring Witness	Status	Date
CX-0181		Defendants Technology Properties Limited and Alliance Limited's Notice of Deposition Pursuant to Rule 30(b)(6) of the Federal Rules of Civil Procedure To: Acer, Inc., Acer America Corporation and Gateway, Inc. (01/03/2013); Chen Depo Exh. 01 [TPL853_03006035 - TPL853_03006047]	INFRINGEMENT	JONAS CHEN	Admitted Pursuant to Order No. 64	6/25/2013
CX-0182		Notice of Deposition to Respondents Acer Inc. and Acer America Corporation re ITC Investigation No. 337-TA-853 (11/28/2012); [Chen Depo Exh. 02; TPL853_03006048 - TPL853_03006061]	INFRINGEMENT	JONAS CHEN	Admitted Pursuant to Order No. 64	6/25/2013
CX-0189		Notice of Deposition to Samsung Electronics Company LTD and Samsung Electronics America Inc. (11/28/2012); Jaegon Lee Depo Exh. 01 [TPL853_03009600 - TPL853_03009620]	INFRINGEMENT	JAEGON LEE	Admitted Pursuant to Order No. 64	6/25/2013
CX-0197	C	Complainants' Designations for the Deposition of Edward Liang – Volume II (01/31/2013) [CX-0197C.0001 - CX-0197C.0132]	INFRINGEMENT	EDWARD LIANG (VOL. 2)	Admitted	6/11/2013
CX-0220		Document entitled "Novatel Products" (Undated); Novatel Depo Exh. 03; Clancy Depo Exh. 03; Dhona Depo Exh. 3 [TPL853_03013150]	INFRINGEMENT	DAVID DOHNA	Admitted Pursuant to Order No. 64	6/25/2013
CX-0221		Novatel web page of the MiFi 5510L (02/19/2013); Novatel Depo Exh. 04; Clancy Depo Exh. 04; Dhona Depo Exh. 4 [TPL853_03013151 - TPL853_03013154]	INFRINGEMENT	ROBERT MICHAEL HADLEY	Admitted Pursuant to Order No. 64	6/25/2013
CX-0222		Novatel web page of the Ovation MC551 LTE USB Modem (02/20/2013); Novatel Depo Exh. 05; Clancy Depo Exh. 05; Dhona Depo Exh. 5 [TPL853_03013155 - TPL853_03013156]	INFRINGEMENT	KEVIN CLANCY	Admitted Pursuant to Order No. 64	6/25/2013
CX-0223		Novatel web page of Novatel Wireless' acquisition of Enfora (12/2010) (02/20/2013); Novatel Depo Exh. 06; Clancy Depo Exh. 06, Dhona Depo Exh. 6 [TPL853_03013157 - TPL853_03013159]	INFRINGEMENT	KEVIN CLANCY	Admitted Pursuant to Order No. 64	6/25/2013
CX-0224		Novatel Manufacturers; Novatel Depo Exh. 07; Clancy Depo Exh. 07, Dhona Depo Exh. 7 [TPL853_03013160]	INFRINGEMENT; IMPORTATION	DAVID DOHNA	Admitted Pursuant to Order No. 64	6/25/2013
CX-0225		Novatel customers; Novatel Depo Exh. 22; Dhona Depo Exh. 22, Hadley Depo Exh. 22 [TPL853_03013161]	INFRINGEMENT; REMEDY & BOND	ROBERT MICHAEL HADLEY	Admitted Pursuant to Order No. 64	6/25/2013
CX-0238		Qualcomm Snapdragon MSM8X60/APQ8060 Product Brief [TPL853_03020723 - TPL853_03020724]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0258	C	S5PC210 RISC Microprocessor User Manual (09/2011); [853SAMSUNG00044735 - 853SAMSUNG00047107]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0262	C	Qualcomm CDMA Technologies MSM8960™ Clock Plan Application Note. 80-N6794-1 B (11/23/2011); Chang Depo Exh. 07 [853SAMSUNG00065616 - 853SAMSUNG00065635]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0264	C	Samsung Electronics, Application Processor: SC54412BHB-AO30 - Exynos 4412 RISC; Microprocessor [853SAMSUNG00073699 - 853SAMSUNG00076941]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0278	C	Samsung Schematic SCH-I110 (08-00-2011) [853SAMSUNG00089593 - 853SAMSUNG00089606]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0285	C	Samsung Datasheet PLL3500X LN32LPM 1400MHz FSPLL October 13, 2011 REV 1.24 (10/13/2011); Jaegon Lee Depo Exh. 06 [853SAMSUNG00167109 - 853SAMSUNG00167127]	INFRINGEMENT	JAEGON LEE	Admitted Pursuant to Order No. 64	6/25/2013
CX-0286	C	Datasheet PLL3600X LN32LPM 1.0V 1400MHz Fractional/Dithered PLL, December 5, 2012 REV 1.05 (12/05/2012); Jaegon Lee Depo Exh. 07 [853SAMSUNG00167128 - 853SAMSUNG00167145]	INFRINGEMENT	JAEGON LEE	Admitted Pursuant to Order No. 64	6/25/2013

Complainants' [Corrected] Final CX Exhibit List

Exhibit No.		Description	Purpose	Sponsoring Witness	Status	Date
CX-0297	C	Invoicing or Shipment Report - Spreadsheet Tab Name: ACER853ITC_036582 (Undated); Worthington Depo Exh. 12 [ACER853ITC_036582 - ACER853ITC_036582.643]	INFRINGEMENT; IMPORTATION; REMEDY & BOND	CLARENCE WORTHINGTON	Admitted Pursuant to Order No. 64	6/25/2013
CX-0308	C	File Name: Acert853ITC_036588 (Undated); Worthington Depo Exh. 07 [ACER853ITC_036588]	INFRINGEMENT; IMPORTATION	CLARENCE WORTHINGTON	Admitted Pursuant to Order No. 64	6/25/2013
CX-0312	C	SMSC USB3316 HI-Speed USB Transceiver with 1.8V ULP Interface - 19.2MHz Reference Clock (06/10/2010); [AMZ_TPL_00000499 - AMZ_TPL_00000579]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0313	C	SMSC USB3316 HI-Speed USB Transceiver with 1.8V ULP Interface - 19.2MHz Reference Clock (06/10/2010); Yoshikawa Depo Exh. 11 [AMZ_TPL_00000499 - AMZ_TPL_00000579]	INFRINGEMENT	CLAU YOSHIKAWA	Admitted Pursuant to Order No. 64	6/25/2013
CX-0314	C	Texas Instruments: OMAP4430 Multimedia Device Silicon Revision 2.x -; Technical Reference Manual (06/2010-Revised 11/2010) [AMZ_TPL_00002393 - AMZ_TPL_00007805]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0316	C	Texas Instruments, Technical Reference Manual of OMAP4460, Multimedia Device, Silicon Revision 1.x, Texas Instruments OMAP Family of Products (01/2011 - Revised 7/2012) [AMZ_TPL_00024152 – AMZ_TPL_00031270]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0318	C	Texas Instruments, OMAP4470 Multimedia Device Silicon Revision 1.0 Technical Reference Manual Revised (09/2011 - 2/2012); Yoshikawa Depo Exh. 07 [AMZ_TPL_00039646 - AMZ_TPL_00046783]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0321	C	Texas Instruments, OMAP4430 Multimedia Device Silicon Revision 2.x Technical Reference Manual Revised (08/2012); Yoshikawa Depo Exh. 06 [AMZ_TPL_00059162 - AMZ_TPL_00066229]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0322	C	Texas Instruments, Data Manual of OMAP4430, Multimedia Device, Engineering Samples ES2.0 ES2.1 ES2.2 ES2.3, Version R (07/2010 - Revised 07/2012) [AMZ_TPL_00074506 - AMZ_TPL_00074973]	INFRINGEMENT	DR. SUBRAMANIAN	Admitted	6/10/2013
CX-0331		Nook by Barnes & Noble User Guide (Undated); Mulchandani Depo Exh. 13 [BN853-0000134 - BN853-0000259]	INFRINGEMENT	DEEPAK MULCHANDANI	Admitted Pursuant to Order No. 64	6/25/2013
CX-0338	C	"Gossamer Mainboard" Schematic (03/21/2011); Mulchandani Depo Exh. 06 [BN853-0453913 - BN853-0453936]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0339	C	Schematic Number Rev A. Ovation Main Board PVT. PDM Doc No: 260-00036-20 (09/13/2012); Mulchandani Depo Exh. 09 [BN853-0945084 - BN853-0945112]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0340	C	Schematic Number TBD. Hummingbird Main Board PVT. PDM Doc No: 260-00054-20 (10/07/2012); Mulchandani Depo Exh. 11 [BN853-0945138 - BN853-0945162]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0349		United States SEC 10-K form (02/29/2012); Seymour Depo Exh. 03 [GARMIN058509 - GARMIN058623]	IMPORTATION; INFRINGEMENT; REMEDY & BOND	JARROD SEYMOUR	Admitted Pursuant to Order No. 64	6/25/2013
CX-0353	C	OMAP36xx Multimedia Device Silicon Revision 1.x Technical Reference Manual [GARMIN068198 - GARMIN071968]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0357	C	Texas Instruments document for OMAP3530/25 Applications Processor (February 2008 - Revised October 2009; Seymour Depo Exh. 04 [GARMIN072984 - GARMIN073247]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0358	C	Schematic for GPSMap 7x0: 740, 740S, 720, and 720S (06/12/2009); Seymour Depo Exh. 11 [GARMIN075036 - GARMIN075046]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0359	C	Schematic for the Nuvi 3450 and 3450LM that uses the OMAP3530 chip (06/15/2009); Seymour Depo Exh. 09 [GARMIN075072 - GARMIN075080]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013

Complainants' [Corrected] Final CX Exhibit List

Exhibit No.		Description	Purpose	Sponsoring Witness	Status	Date
CX-0361	C	Schematic for the GMR xHD series (01/10/2008); Seymour Depo Exh. 08 [GARMIN077816 - GARMIN077824]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0363	C	OMAP35x Applications Processor Texas Instruments technical reference manual (10/01/2009); Seymour Depo Exh. 06 [GARMIN082526 - GARMIN086564]	INFRINGEMENT	JARROD SEYMOUR	Admitted Pursuant to Order No. 64	6/25/2013
CX-0364	C	Datasheet for an SMSC part, a hi-speed USB transceiver with 1.8-volt ULPI interface, 26 megahertz reference clock (11/02/2007); Seymour Depo Exh. 16 [GARMIN086565 - GARMIN086635]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0366	C	OMAP3500 series, Texas Instruments technical reference manual (February 2008 - Revised October 2009; [GARM-N37xx-031184 - GARM-N37xx-035222]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0368	C	Up Datasheet for an SMSC part, a hi-speed USB transceiver with 1.8-volt ULPI interface, 26 megahertz reference clock (06/11/2009); Seymour Depo Exh. 17 [GARMN37XXR-004307 - GARMN37XXR-004384]	INFRINGEMENT	JARROD SEYMOUR	Admitted Pursuant to Order No. 64	6/25/2013
CX-0373	C	Schematic, HC1C6070M Xu Depo Exh. 20; [H853F0000224795 - H853F0000224822]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0375	C	Huawei schematic, identifier HC1C6076M Xu Depo Exh. 25; [H853F0000224935 - H853F0000224956]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0390	C	BB Schematics, Xu Depo Exh. 3; [H853f0000226243 - H853f0000226282]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0395	C	HTC Corp., Schematic of History, Top Doc. Evita#UL_MB, Doc No. CS-51H40765-XXM (02/13/2012) [HTCTPL_I00078809 - HTCTPL_I00078870]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0396	C	HTC Corporation, OMA MB Block Diagram Smart Device (8/22/2011) (HTCTPL_I00090906 - HTCTPL_I00090927)	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0397	C	HTC Corporation, System Block Diagram (12/15/2010) [HTCTPL_I00093773 - HTCTPL_I00093825]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0398	C	HTC Corporation, Doubleshot MBA02 Block Diagram (7/25/2011) [HTCTPL_I00100995 - HTCTPL_I00101034] Document	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0399	C	HTC Corp., Block Diagram of VILLE#U_B1245, Top Doc. VILLE@U, VILLE#U_B1245, Doc No. C851H407 (02/22/2012) [HTCTPL_I00111247 - HTCTPL_I00111306]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0400	C	HTC Corporation, Schematic of MB A01 (7/14/2011) [HTCTPL_I00140644- HTCTPL_I00140697]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0401	C	HTC Corporation, Schematic of History - Vigor MB XA01 (2/22/2011 [HTCTPL_I00191507 - HTCTPL_I00191574]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0402	C	Jewel #CL MB A01 HTC Schematic [HTCTPL_I00206508 - HTCTPL_I00206569]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0404	C	HTC Corporation, Function_Block - PM23100 (07/30/2012) [HTCTPL_I00335702 - HTCTPL_I00335759]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0409	C	HTC Corporation, Schmatic of History - Totem#UL, One VX Main Board (02/12/2012) [HTCTPL_I00414632 - HTCTPL_I00414693]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0416	C	Qualcomm CDMA Technologies, MSM7227/MSM7227-1 Mobile Station Modem - Device Specification - 80-VM299-1 Rev. J (10/22/2010) [HTCTPL_00530930 Native Document]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0418	C	Qualcomm CDMA Technologies. MSM7500™ Mobile Station Model IC, User Guide 80-V9038-3 Rev. D (12/14/2006); Dena Depo Exh. 05 [QCHTCTPL0012054 - QCHTCTPL0012386]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013

Complainants' [Corrected] Final CX Exhibit List

Exhibit No.		Description	Purpose	Sponsoring Witness	Status	Date
CX-0419	C	Qualcomm CDMA Technologies. Cm_pl_gp3: General Purpose PLL for TSMCn45 Mobile Station Modems. Analog Core Data Sheet. 80-VE123-4 Rev. C (02/17/2010); Dena Depo Exh. 08 [QCHTCPTL0024009 - QCHTCPTL0024057]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0423	C	Parts List with Descriptive Information; Including Reference Number, Function, and Part Number (Undated); Yamashita Depo Exh. 40 [KYOCERA_853_0000579 - KYOCERA_853_0000582]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0424	C	C5120_MainBoard_Schematic (Undated); Kobayashi Depo Exh. 18 [KYOCERA_853_0000585 - KYOCERA_853_0000605]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0425	C	F15_MainBoard_Schematic (Undated); Kobayashi Depo Exh. 17 [KYOCERA_853_0000608 - KYOCERA_853_0000628]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0446	C	Kyocera DuraPlus 5DSDF58-FN-B1 Schematic [KYOCERA_853_0012951 - KYOCERA_853_0012959]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0452	C	C5155A1 RF Block Parts List (Undated); Kobayashi Depo Exh. 11 [KYOCERA_853_0013443]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0453	C	Kyocera Schematic of G-01 Bloom (Rev1.002) - Main_RF (05/25/12) Kobayashi Depo Exh. 12 [KYOCERA_853_0013447 - KYOCERA_853_0013461]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0456	C	Kyocera Rise - User Guide (Sprint) (2012); Kobayashi Depo Exh. 13 [KYOCERA_853_0014508 - KYOCERA_853_0014704]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0460	C	Kyocera ECHO Technical Specifications (2011); Yamashita Depo Exh. 54 [KYOCERA_853_0016306 - KYOCERA_853_0016309]	INFRINGEMENT	HIROMASA YAMASHITA	Admitted Pursuant to Order No. 64	6/25/2013
CX-0461	C	Kyocera Milano C5121 User Guide (Undated); Yamashita Depo Exh. 34 [KYOCERA_853_0016712 - KYOCERA_853_0016805]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0466	C	Qualcomm CDMA Technologies, QSC6055, QSC6065, QSC6075, and QSC6085 Qualcomm Single Chip - Device Specification - 80-VC881-1 Rev. Y (02/25/2011) [KYOCERA_853_0021336 - KYOCERA_853_0021584]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0467	C	Qualcomm CDMA Technologies, QSC6055, QSC6065, QSC6075, and QSC6085 Qualcomm Single Chip (QSC) - User Guide – 80-VC881-3 Rev. F (08/07/2009); Kobayashi Depo Exh. 04 [KYOCERA_853_0022041 - KYOCERA_853_0022345]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0470	C	Qualcomm CDMA Technologies. MSM7627/MSM7627-1/MSM7627-2/MSM7627 Turbo/MSM7627-1 Turbo/ MSM7627-2 Turbo Mobile Station Modem. Device Specification. 80-VM151-1 Rev. M (04/22/2011); Yamashita Depo Exh. 33 [KYOCERA_853_0022937 - KYOCERA_853_0023091]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0472	C	Qualcomm CDMA Technologies. MSM7627 and MSM7627-Turbo Chipset Training. Baseband Topics. 80-VM151-25 Rev. B (2009-2010); Yamashita Depo Exh. 41 [KYOCERA_853_0024492 - KYOCERA_853_0024691]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0479	C	Qualcomm CDMA Technologies. Application Note. Camera Interfaces on MSM™ Devices. 80-V5557-1 Rev. D 6/02/2008 (06/02/2008); Dena Depo Exh. 13 [KYOCERA_853_0030120 - KYOCERA_853_0030142]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0485	C	Inventec Applicances (Jiangning) Corporation, F04 MB Change List, Circuit Diagram of S2100/Luno/Clip Schematic (08/05/2011); Katayama Depo Exh. 24 [KYOCERA_853_0047489 - KYOCERA_853_0047502]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0486	C	Inventec Applicances (Jiangning) Corporation, F04 MB Change List, Circuit Diagram of S2100/Luno/Clip Schematic (08/05/2012); Katayama Depo Exh. 25 [KYOCERA_853_0047503 - KYOCERA_853_0047517]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013

Complainants' [Corrected] Final CX Exhibit List

Exhibit No.		Description	Purpose	Sponsoring Witness	Status	Date
CX-0487	C	Qualcomm CDMA Technologies. WCN2243 System-on-Chip (SoC). Device Specifications. 80-WL024-1 Rev. E (03/13/2012); Yamashita Depo Exh. 56 [KYOCERA_853_0068013 - KYOCERA_853_0068077]	INFRINGEMENT	HIROMASA YAMASHITA	Admitted Pursuant to Order No. 64	6/25/2013
CX-0488	C	Qualcomm CDMA Technologies. WCN1314 System-on-Chip (SoC) WLAN Solution. Device Specification. 80-WL114-1 Rev. E (10/20/2011); Yamashita Depo Exh. 57 [KYOCERA_853_0068078 - KYOCERA_853_0068127]	INFRINGEMENT	HIROMASA YAMASHITA	Admitted Pursuant to Order No. 64	6/25/2013
CX-0503	C	Qualcomm CDMA Technologies, QSC6240/QSC6270 Qualcomm Single-Chip - ; Device Specification - 80-VF846-1 Rev. D (10/10/2008) [LGE800ITC0005893 - LGE800ITC0006112]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0505	C	Qualcomm CDMA Technologies, MDM9600 Mobile Data Modem IC - Device Specification - 80-VP146-1 Rev. E (07/09/2010) [LGE800ITC0016506 - LGE800ITC0016600]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0509	C	LG Service Manual LG-VS950. Internal Use 9/2012 Issue 1.0 (09/2012); Ki-Hyun Lee Depo Exh 04 [LGE800ITC0114066 - LGE800ITC0114600]	INFRINGEMENT	KI-HYUN LEE	Admitted Pursuant to Order No. 64	6/25/2013
CX-0510	C	Qualcomm CDMA Technologies, MDM9600 Mobile Data Modem IC - User Guide - 80-VP146-3 Rev. E (05/10/2010) [LGE800ITC0309342 - LGE800ITC0309485]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0512	C	LG Service Manual LG-P769 9/2012 Issue 0.90 (09/12) [Ki-Hyun Lee Depo Exh. 08; LGE800ITC0375385 - LGE800ITC0375604]	INFRINGEMENT	KI-HYUN LEE	Admitted Pursuant to Order No. 64	6/25/2013
CX-0513	C	LG Electronics, Schematic of S3504 [LGE800ITC0428491 - LGE800ITC0428492]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0515	C	LG Electronics, Block Diagram of MS770 BT&WLAN [LGE800ITC0428545 - LGE800ITC0428546]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0517	C	LG Electronics, CDMA Mobile Subscriber Unit MS770 – Operation Description: Tri-band CDMA w/GPS [PCS Cellular/AWS CDMA/GPS] CDMA 3G Mobile Phone [LGE800ITC0428547 - LGE800ITC0428557]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0519	C	LG Electronics, Schematic of MAIN RF, P769_main_REV_10 [LGE800ITC0428783 - LGE800ITC0428795]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0521	C	Schematic of CDMA Main [LGE800ITC0429469 - LGE800ITC0429476]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0522	C	LG Electronics, Schematic of VS840_Main_Rev 10; ANT1: ANT1: 1X VOICE [LGE800ITC0429582 - LGE800ITC0429599]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0524	C	Schematic re MSM8660 DATA, and VS840_Main_Rev10 (Undated); Ki-Hyun Lee Depo Exh. 05 [LGE800ITC0429588]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0525	C	LG Electronics, Schematic of LGVS950; ANT1: BC0/BC1 1X VOICE, GSM QUAD, UMTS B/B8 [LGE800ITC0429966 - LGE800ITC0429984]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0527	C	Complainants' Designations for the Deposition of Edward Liang – Volume III (01/30/2013) [CX-0527C.0001 - CX-0527C.0161]	INFRINGEMENT	EDWARD LIANG (VOL. 3)	Admitted	6/11/2013
CX-0529	C	Complainants' Designations for the Deposition of Edward Liang – Volume No. I (02/01/2013) [CX-0529C.0001 - CX-0529C.0092]	INFRINGEMENT	EDWARD LIANG (VOL. 1)	Admitted	6/11/2013
CX-0530	C	Seagate - Vendor Requirements Specifiction - ; TetonST Requirements Specification (07/01/2005) [LSI_TPL/ITC_00000050- LSI_TPL/ITC_00000063]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0541	C	Deposition Transcript of Deepak Mulchandani (02/15/2013) [TPL853_03012112 - TPL853_03012312]	INFRINGEMENT	DEEPAK MULCHANDANI	Admitted	6/11/2013
CX-0544	C	Texas Instruments CODEC for the 3DS and 3DS XL (12/14/2010); Nintendo Depo Exh. 29 [NINTPL00000305 - NINTPL00000549]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013

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Exhibit No.		Description	Purpose	Sponsoring Witness	Status	Date
CX-0546	C	Texas Instruments CODEC sheet for the Dsi TLV320AIC3005 (09/17/2010); Nintendo Depo Exh. 30 [NINTPL00012828 - NINTPL00012996]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0548	C	Texas Instruments Inc., TLV320AIC3010DZQZR Audio Codec with Integrated Signal Processing, Headphone, Speaker Amplifier,, and Smart Touch-Screen Controller, Data Sheet # SLAS688A (2010-2012) [NINTPL00012997-NINTPL00013246]	INFRINGEMENT	NINTENDO WITNESS; TEXAS INSTRUMENTS WITNESS; DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0552	C	Schematic for the Nintendo 3DS version CTR-CPU-20 (Undated); Nintendo Depo Exh. 04 [NINTPL00017631 - NINTPL00017635]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0554	C	Schematic - Circuit design for the Nintendo 3DS XL sold in the US (03/16/2012); Nintendo Depo Exh. 17 [NINTPL00017670 - NINTPL00017674]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0562	C	Schematic for Nintendo DSi CPU-10 (04/23/2012); Nintendo Depo Exh. 23 [NINTPL00018484 - NINTPL00018487]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0568	C	Device Evaluation Team Rules (Undated); Novatel Depo Exh. 08; Clancy Depo Exh. 08 [NVTL_TPL853_0000425 - NVTL_TPL853_0000427]	INFRINGEMENT	KEVIN CLANCY	Admitted Pursuant to Order No. 64	6/25/2013
CX-0569	C	Mobilink Document (Undated); Novatel Depo Exh. 14; Clancy Depo Exh. 14 [NVTL_TPL853_0000468]	INFRINGEMENT	KEVIN CLANCY	Admitted Pursuant to Order No. 64	6/25/2013
CX-0570	C	Running MS-Assisted and MS-Based LBS tests on Novatel Wireless Data Modules (Undated); Novatel Depo Exh. 13; Clancy Depo Exh. 13, Hadley Depo Exh. 13 [NVTL_TPL853_0003716 - NVTL_TPL853_003720]	INFRINGEMENT	KEVIN CLANCY	Admitted Pursuant to Order No. 64	6/25/2013
CX-0571	C	Schematic Diagram Arctic HSPA Personal Hotspot (07/24/2009); Novatel Depo Exh. 17; Clancy Depo Exh. 17 [NVTL_TPL853_0005206 - NVTL_TPL853_0005231]	INFRINGEMENT	KEVIN CLANCY	Admitted Pursuant to Order No. 64	6/25/2013
CX-0577	C	Indian Board Schematic (04/14/2010); Novatel Depo Exh. 18; Clancy Depo Exh. 18 [NVTL_TPL853_0006666 - NVTL_TPL853_0006686]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0580	C	Fonseca Schematic (09/13/2011); Novatel Depo Exh. 20; Clancy Depo Exh. 20 [NVTL_TPL853_0032038 - NVTL_TPL853_0032056]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0583	C	Novatel Wireless, Hudson 1 Schematic (12/29/2010); Novatel Depo Exh. 19; Clancy Depo Exh. 19 [NVTL_TPL853_0046224 - NVTL_TPL853_0046241]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0586	C	Spirent Communications Test Drive II Performance Report (06/03/2009); Novatel Depo Exh. 09; Clancy Depo Exh. 09 [NVTL_TPL853_0049710 - NVTL_TPL853_0049875]	INFRINGEMENT	KEVIN CLANCY	Admitted Pursuant to Order No. 64	6/25/2013
CX-0587	C	Product Tested (05/22/2009); Novatel Depo Exh. 10; Clancy Depo Exh. 10 [NVTL_TPL853_0050172 - NVTL_TPL853_0050187]	INFRINGEMENT	KEVIN CLANCY	Admitted Pursuant to Order No. 64	6/25/2013
CX-0588	C	Test Results Template (06/03/2009); Novatel Depo Exh. 11; Clancy Depo Exh. 11 [NVTL_TPL853_0050200 - NVTL_TPL853_0050227]	INFRINGEMENT	KEVIN CLANCY	Admitted Pursuant to Order No. 64	6/25/2013
CX-0589	C	ERI Test Results (based on Sept. 2007 test plan, version 6.0) (06/2009; Novatel Depo Exh. 12; Clancy Depo Exh. 12 [NVTL_TPL853_0050250 - NVTL_TPL853_0050256]	INFRINGEMENT	KEVIN CLANCY	Admitted Pursuant to Order No. 64	6/25/2013
CX-0590	C	MiFi2200 Document (Undated); Novatel Depo Exh. 15; Clancy Depo Exh. 15, Hadley Depo Exh. 15 [NVTL_TPL853_0057875]	INFRINGEMENT	KEVIN CLANCY	Admitted Pursuant to Order No. 64	6/25/2013
CX-0591	C	Novatel Wireless Inc., Schematic of Pacific QSC (Undated); Novatel Depo Exh. 16; Clancy Depo Exh. 16 (08/22/2008) [NVTL_TPL853_0079979 - NVTL_TPL853_0079991]	INFRINGEMENT	KEVIN CLANCY	Admitted Pursuant to Order No. 64	6/25/2013
CX-0618	C	Cougar3 IBM8sf General Purpose PLL Low Level Design Review - 80-V5522-17 Rev. B (09/29/2005) [QCHTCTPL0007355 - QCHTCTPL0007697]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013

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Exhibit No.		Description	Purpose	Sponsoring Witness	Status	Date
CX-0619	C	Qualcomm CDMA Technologies, cm_pll_gp2/cm_pll_gp2/p: TSMCn65 - General Purpose PLL Core - Analog Core Data Sheet/ LLDR Part 1 - 80-V6698-15 Rev. D (11/15/2010) [QCHTCTPL0007698 - QCHTCTPL0007747]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0640	C	cm_pll_gp2-cm_pll_gp2lp-TSMCn65- General Purpose PLL Core- Analog Core Data Sheet-LLDR Part 1 80-V6698-15 Rev. D (11/15/2010) [QCHTCTPL0017216 - QCHTCTPL0017265]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0648	C	Qualcomm CDMA Technologies, 28 nm lp HF _PLL for Waverider V3 - Design Change Review - 80-N3998-5 Rev. A (09/20/2011) [QTPL-0001060 - QTPL-0001078]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0649	C	Qualcomm CDMA Technologies, QSC6055, QSC6065, QSC6075, and QSC6085 Qualcomm Single Chip (QSC) - User Guide- 80-VC881-3 Rev. F (08/07/2009) [QTPL-0005026 - QTPL-0005331]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0652	C	Qualcomm CDMA Technologies, User Guide of MSM7627 Mobile Station Modem, User Guide 80-VM151-3 Rev. C (07/28/2009) [QTPL-0009262 - QTPL-0009495]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0653	C	Qualcomm CDMA Technologies, MSM8260/MSM8660 Mobile Station Modem User Guide - 80-VU872-3 Rev. C (11/02/2011) [QTPL-0010346 - QTPL-0010547]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0655	C	Qualcomm CDMA Technologies, cm_pll_sr: Low-power PLL for 28 nm Mobile Station Modems - Data Sheet - 80-N1087-4 Rev. E (05/21/2012) [QTPL-0013575-QTPL-0013596]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0657	C	Qualcomm CDMA Technologies, cm_pll_gp3: General Purpose PLL for TSMCn45 MSMs- LLDR 80-VE123-5 Rev A (09/09/2007) [QTPL-0022398 - QTPL-0022644]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0658	C	Qualcomm CDMA Technologies, MSM8x55 Mobile Station Modem. User Guide. 80N0370-3 Rev. C (04/05/2011); Dena Depo Exh. 07 [QTPL-0022809 - QTPL-0023027]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0659	C	Qualcomm CDMA Technologies, Device Specifications of MSM8x55 Mobile Station Modem Device Specification (03/24/2011) [QTPL-0023454 - QTPL-0023677]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0662	C	Qualcomm CDMA Technologies, MSM8960/MSM8960A/MSM8260A - Device Specification - 80-N1622-1 Rev. M (12/10/2012) [QTPL-0043256 - QTPL-0043399]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0663	C	Qualcomm CDMA Technologies, MSM8960/MSM8960 Pro Chipset; (RTR860x, WTR1605x, PM8921, WCD9310, WCN36x0) Design Guidelines - 80-N1622-5 Rev. J [QTPL-0047230 - QTPL-0047842]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0668		Notice of Deposition to Jonas Chen (01/09/2013); Chen Depo Exh. 04 [TPL853_03006065 - TPL853_03006070]	INFRINGEMENT	JONAS CHEN	Admitted Pursuant to Order No. 64	6/25/2013
CX-0705	C	TPL, MMP - Licensing and Legal Support Spreadsheet (06/30/2012); Hannah Depo Exh. 29 [TPL853_01709415 - TPL853_01709420]	DI; VALIDITY	DWAYNE HANNAH	Admitted	6/11/2013
CX-0719	C	Letter Re Apple-TPL-MMP/Fast Logic/CoreFlash/Chip Scale Portfolios Licensing Opportunities [TPL853_01869279 – TPL853_01869404]	DI	DWAYNE HANNAH	Admitted	6/11/2013
CX-0731	C	Portfolio License Opportunities Between Ford and TPL MMP (2008-06-25) [TPL853_02119365 - TPL853_02119369]	DI	DANIEL M. LECKRONE	Admitted	6/11/2013
CX-0739	C	USB Specification document (Revision 1.1) [TPL853_02303426 – TPL853_02303751]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0768		HTC One X User Guide [TPL853_02998095 – TPL853_02998261]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0770		Mifi User Guide [TPL853_02998833 – TPL853_02998940]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0771		Mifi 2200 Intelligent Mobile Hotspot Product User Guide [TPL853_02998941 – TPL853_02999020]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-0848		Specifications for Acer Product - Gateway [TPL853_03004322 - TPL853_03004323]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013

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Exhibit No.		Description	Purpose	Sponsoring Witness	Status	Date
CX-0864	C	Complainants' Designations for the Deposition of Edward Liang – Volume No. III (02/21/2013) [CX-0864C.0001 – CX-0864C.0101]	INFRINGEMENT	EDWARD LIANG (VOL. 3)	Admitted	6/11/2013
CX-0869	C	Complaints' Designations for the Deposition of Jonas Chen (02/04/2013) [CX-0869C.0001 - CX-0869C.0163]	INFRINGEMENT	JONAS CHEN	Admitted	6/11/2013
CX-0871	C	List of Product Type, Model and Project Name; Chen Depo Exh. 05 [TPL853_03006071 - TPL853_03006076]	INFRINGEMENT	JONAS CHEN	Admitted Pursuant to Order No. 64	6/25/2013
CX-0872	C	List of Accused Product, Product Type, and Project Name / Nickname; Chen Depo Exh. 06 [TPL853_03006077 - TPL853_03006078]	INFRINGEMENT	JONAS CHEN	Admitted Pursuant to Order No. 64	6/25/2013
CX-0874	C	Complainants' Designations for the Deposition of Jong Kwon Choi (02/05/2013) [CX-0874C.0001 - CX-0874C.0046]	INFRINGEMENT	JONG KWON CHOI	Admitted	6/11/2013
CX-0893		Patriot Scientific Corporation, Form 10-K, Annual Report for fiscal year ended May 31, 2010. (8/16/2010); Felcyn Depo Exh. 02 [TPL853_03008560 - TPL853_03008691]	DI	GLORIA FELCYN	Admitted	6/11/2013
CX-0894		Patriot Scientific Corporation, Form 10-K, Annual Report for fiscal year ended May 31, 2012. (8/29/2012); Felcyn Depo Exh. 06 [TPL853_03008692 - TPL853_03008771]	DI	GLORIA FELCYN	Admitted	6/11/2013
CX-0913	C	Deposition Transcript of Jaegon Lee Including signature page and errata sheet (02/07/2013) [TPL853_03009443 - TPL853_03009599]	INFRINGEMENT	JAEGON LEE	Admitted	6/11/2013
CX-0914	C	Respondent Samsung Electronics Company LTD's Second Supplemental Responses to Complainant Technology Properties Limited LLC's Second Set of Interrogatories (Nos. 49-53) (01/17/2013); Jaegon Lee Depo Exh. 02 [TPL853_03009621 - TPL853_03009643]	INFRINGEMENT; VALIDITY	JAEGON LEE	Admitted Pursuant to Order No. 64	6/25/2013
CX-0916	C	Datasheet PLL3500X LN32LPM-1400MHz FSPLL, October 13, 2011 REV 1.24 (10/13/2011); Jaegon Lee Depo Exh. 05 [TPL853_03009650 - TPL853_03009668]	INFRINGEMENT	JAEGON LEE	Admitted Pursuant to Order No. 64	6/25/2013
CX-0917	C	Complainants' Designations for the Deposition of Yasuhiro Katayama (01/17/2013) [CX-0917C.0001 - CX-0917C.0117]	INFRINGEMENT	YASUHIRO KATAYAMA	Admitted Pursuant to Order No. 64	6/25/2013
CX-0919	C	Complainants' Designations for the Deposition of Ki-Hyun Lee (02/04/2013) [CX-0919C.0001 - CX-0919C.0146]	INFRINGEMENT	KI-HYUN LEE	Admitted	6/11/2013
CX-0920	C	Complainants' Designations for the Deposition of Inyoung Chang [CX-0920C.0001 - CX-0920C.0137]	INFRINGEMENT	INYOUNG CHANG	Admitted	6/11/2013
CX-0923	C	Complainants' Designation for the Deposition of Nobuaki Kobayashi (01/16/2013) [CX-0923C.0001 - CX-0923C.0105]	INFRINGEMENT	NOBUAKI KOBAYASHI	Admitted	6/11/2013
CX-0933		Notice of Deposition of Edward Liang int the U.S.D.C. Norther District of CA, San Jose Case No. 3:08-cv-00882 PSG; Liang Depo Exh. 04 (1/8/2013) [TPL853_03010976-TPL853_03010978]	INFRINGEMENT	EDWARD LIANG	Admitted Pursuant to Order No. 64	6/25/2013
CX-0956		Notice of Deposition to Respondent Barnes & Noble, Inc. (11/28/2012); Mulchandani Depo Exh. 02 [TPL853_03012319 - TPL853_03012331]	INFRINGEMENT	DEEPAK MULCHANDANI	Admitted Pursuant to Order No. 64	6/25/2013
CX-0959		NOOK Simple Touch™ - Software Updates - Barnes & Noble Web Printout from www.barnesandnoble.com (02/12/2013); Mulchandani Depo Exh. 16 [TPL853_03012339 - TPL853_03012340]	INFRINGEMENT	DEEPAK MULCHANDANI	Admitted Pursuant to Order No. 64	6/25/2013
CX-0960	C	Complainants' Designations for the Deposition of Nobuya Minowa (02/20/2013) [CX-0960C.0001 - CX-0960C.0111]	INFRINGEMENT	NOBUYA MINOWA	Admitted	6/11/2013
CX-0961	C	Complainants' Designations for the Deposition of SHUICHI TSUGAWA, Volume No. 1 (02/19/2013) [CX-0961C.0001 - CX-0961C.0120]	INFRINGEMENT	SHUICHI TSUGAWA (VOL. 1)	Admitted Pursuant to Order No. 64	6/25/2013
CX-0962	C	Complainants' Designations for the Deposition of Schuchi Tsugawa, Volume No. 2 (02/2013) [CX 0962C.0001 - CX-0962C.0028]	INFRINGEMENT	SHUICHI TSUGAWA (VOL. 1)	Admitted Pursuant to Order No. 64	6/25/2013

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Exhibit No.		Description	Purpose	Sponsoring Witness	Status	Date
CX-0964	C	Respondents Nintendo Co., Ltd. and Nintendo of America Inc.'s First Supplemental Responses to Complainant Technology Properties Limited LLC's Fourth Set of Interrogatories (Nos. 77-82) (02/08/2013); Nintendo Depo Exh. 02 [TPL853_03012615 - TPL853_03012632]	INFRINGEMENT; VALIDITY; IMPORTATION; REMEDY & BOND	SHUICHI TSUGAWA (VOL. 1)	Admitted Pursuant to Order No. 64	6/25/2013
CX-0965	C	Respondents Nintendo Co., Ltd. and Nintendo of America Inc.'s First Supplemental Responses to Complainant Technology Properties Limited LLC's Fourth Set of Interrogatories (Nos. 59-76) (02/08/2013); Nintendo Depo Exh. 03 [TPL853_03012633 - TPL853_03012664]	INFRINGEMENT; VALIDITY; IMPORTATION; REMEDY & BOND	SHUICHI TSUGAWA (VOL. 1)	Admitted Pursuant to Order No. 64	6/25/2013
CX-0970	C	Deposition Transcript of Kevin Clancy (02/21/2013) [TPL853_03012694 - TPL853_03012941]	MANUFACTURING; IMPORTATION; INVENTORY; SALES	KEVIN CLANCY	Admitted	6/11/2013
CX-0971	C	Complainants' Designation for the Deposition of David Dohna (02/22/2013) [CX-0971C.0001 - CX-0971C.0105]	MANUFACTURING; IMPORTATION; INVENTORY; SALES	DAVID DOHNA	Admitted	6/11/2013
CX-0972	C	Complainants' Designations for the Deposition of Robert Michael Hadley (02/22/2013) [CX-0972C.0001 - CX-0972C.0073]	IMPORTATION; MANUFACTURING; INFRINGEMENT	ROBERT MICHAEL HADLEY	Admitted	6/11/2013
CX-0973		Notice of Deposition to Novatel Wireless, Inc. (11/28/2012); Novatel Depo Exh. 01; Clancy Depo Exh. 01; Dohna Depo Exh. 01; Hadley Depo Exh. 01 [TPL853_03013118 - TPL853_03013131]	INFRINGEMENT	DAVID DOHNA	Admitted Pursuant to Order No. 64	6/25/2013
CX-0980	C	Deposition Transcript of Jarrod Seymour (02/12/2013) [TPL853_03013520 - TPL853_03013844]	INFRINGEMENT	JARROD SEYMOUR	Admitted	6/11/2013
CX-0981	C	Third Supplemental Response of Respondents Garmin Ltd., Garmin International Inc., and Garmin USA Inc. To Complainant Technology Properties Limited LLCs First Set of Interrogatories Nos. 4, 48 to Garmin (02/08/2013); Seymour Depo Exh. 02 [TPL853_03013861 - TPL853_03013886]	VALIDITY; INFRINGEMENT; MANUFACTURING; IMPORTATION; REMEDY & BOND	JARROD SEYMOUR	Admitted Pursuant to Order No. 64	6/25/2013
CX-0983	C	Hand-drawn diagram by Jarrod Seymour, 2/12/13, diagram of how the SDRAM connects to the circuit board or its relation to the circuit board (Undated); Seymour Depo Exh. 10 [TPL853_03013888]	INFRINGEMENT	JARROD SEYMOUR	Admitted Pursuant to Order No. 64	6/25/2013
CX-0998	C	Deposition Transcript of Hiromasa Yamashita (01/18/2013) [TPL853_03014647 - TPL853_03014759]	INFRINGEMENT	HIROMASA YAMASHITA	Admitted	6/11/2013
CX-1002		Notice of Deposition to Respondent Amazon.com, Inc (11/28/2012); Yoshikawa Depo Exh. 02 [TPL853_00304957 - TPL853_00304969]	INFRINGEMENT	CLAU YOSHIKAWA	Admitted Pursuant to Order No. 64	6/25/2013
CX-1004	C	Clau Yoshikawa Depo Exh. 04; Amazon Accused Products U.S.I.T.C. Inv. 337-TA-853 [TPL853_00304972]	INFRINGEMENT	CLAU YOSHIKAWA	Admitted Pursuant to Order No. 64	6/25/2013
CX-1006		Amazon.com Help: Transferring & Downloading Content to Your Kindle Fire HD 8.9" Web printout from www.amazon.com (05/12/2013); Yoshikawa Depo Exh. 14 [TPL853_00304994 - TPL853_00304997]	INFRINGEMENT	CLAU YOSHIKAWA	Admitted Pursuant to Order No. 64	6/25/2013

Complainants' [Corrected] Final CX Exhibit List

Exhibit No.		Description	Purpose	Sponsoring Witness	Status	Date
CX-1007		Amazon.com Help: Kindle Fire HD 8.9" Software Updates; Web Printout from www.amazon.com (02/12/2013); Yoshikawa Depo Exh. 15 [TPL853_00304998 - TPL853_00305000]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-1042		Response of Respondent Novatel Wireless, Inc. to Complainant Technology Properties Limited LLC's Third Set of Interrogatories (Nos. 59-76) (1/4/2013) [TPL853_03017197 - TPL853_03017214]	INFRINGEMENT; VALIDITY; REMEDY & BOND; IMPORTATION	KEVIN CLANCY	Admitted	6/11/2013
CX-1124	C	Patent License Agreement between TPL, Charles H. Moore, and Intel Corporation (06/28/2004) [Daniel E Leckrone Depo Exh. 14; TPL0090401 - TPL0090417]	DI; VALIDITY; LG DEFENSE	DANIEL E. LECKRONE	Admitted	6/4/2013
CX-1126	C	Letter from Mike Davis to Thomas A. Sexton re RIM - TPL: MMP Portfolio Licensing Opportunity with News Release Seiko Epson Agrees to Purchase Moore Microprocessor Patent™Portfolio License (07/07/2006); Mac Leckrone Depo Exh. 07 [TPL-NDH1007538 - TPL-NDH1007543]	DI; VALIDITY	DANIEL M. LECKRONE	Admitted	6/11/2013
CX-1131	C	Commercialization Agreement between Technology Properties Limited and Charles H. Moore (10/21/2002); Daniel E Leckrone Depo Exh. 11 [TPL1144802 - TPL1144828]	DI	DANIEL E. LECKRONE	Admitted	6/4/2013
CX-1142	C	Complainants' Designation for the Deposition of Clau Yoshikawa (02/19/2013) [CX-1142C.0001 - CX-1142C.0191]	INFRINGEMENT	CLAU YOSHIKAWA	Admitted	6/11/2013
CX-1148	C	ZTE Corporation, Schematic of WF720 RFMB (07/29/2011) [ZTE853TPL00244994 - ZTE853TPL00245014]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-1153	C	Schematic for N860MB (MSM8655) [ZTE853TPL00756927 - ZTE853TPL00756956]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-1154	C	Schematic for N861MB (MSM8655) [ZTE853TPL00757353 - ZTE853TPL00757386]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-1155	C	ZTE Corporation, Schematic of X500MB_A1, Version A1 [ZTE853TPL00757414 - ZTE853TPL00757439]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-1161		Appendix A to Dr. Oklobdzija's Opening Report ; Curriculum Vitae of Vojin G. Dr. Oklobdzija's, Ph.D. (03/27/2013) [CX-1161.001 - CX-1161.052]	INFRINGEMENT; DI	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-1186	C	TI - OMAP4470 Multimedia Device - Engineering Sample ES1.0 - Version 0 - Data Manual (12/2011 - Revised 05/2012) [AMZ_TPL_00031892 - AMZ_TPL_00032345]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-1188	C	Texas Instruments - OMAP36xx Multimedia Device Silicon Revision 1.1 Texas Instruments OMAP™ Family of Products Version E. Technical Reference Manual. Literature Number: SWPU176E (07/2009 -Revised C2043/2010); Mulchandani Depo Exh. 07 [BN853-0146433 - BN853-0147118]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-1207	C	cm_pll_hf: High Frequency PLL for 45nm Mobile CPUs Data Sheet [QTPL-0013863 - QTPL-0013924]	INFRINGEMENT	DR. SUBRAMANIAN	Admitted	6/10/2013
CX-1208	C	cm_pll_hf: High Frequency PLL for 45nm Mobile CPUs: HLDR [QTPL-0014873 - QTPL-0014906]	INFRINGEMENT	DR. SUBRAMANIAN	Admitted	6/10/2013
CX-1210	C	cmpll_gp2lp: TSMCn65 General Purpose PLL Core—LLDR Part 2 [QTPL-0022059 - QTPL-0022113]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-1211	C	Harrier (TSMCN65): NT_PLL—LLDR [QTPL-0001118 - QTPL-0001370]	INFRINGEMENT	DR. SUBRAMANIAN	Admitted	6/10/2013
CX-1212	C	45 nm NT PLL Analog Core—Data Sheet [QTPL-0013823 - QTPL-0013862]	INFRINGEMENT	DR. SUBRAMANIAN	Admitted	6/10/2013
CX-1214	C	Halcyon PLL_NT_LIB Schematics [QTPL-0001786 - QTPL-0001907]	INFRINGEMENT	DR. SUBRAMANIAN	Admitted	6/10/2013
CX-1216	C	PLL_HF for 28 nm Waverider—LLDR [QTPL-0014375 - QTPL-0014499]	INFRINGEMENT	DR. SUBRAMANIAN	Admitted	6/10/2013
CX-1217	C	28nm lp HF_PLL for Waverider—Design Change Review [QTPL-0014513 - QTPL-0014532]	INFRINGEMENT	DR. SUBRAMANIAN	Admitted	6/10/2013

Complainants' [Corrected] Final CX Exhibit List

Exhibit No.		Description	Purpose	Sponsoring Witness	Status	Date
CX-1219	C	APQ8060 Qualcomm Application Processor - User Guide [LGE800ITC0305378 - LGE800ITC0305567]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-1220	C	MSM7227 Mobile Station Modem - User Guide [LGE800ITC0309486 - LGE800ITC0309713]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-1223	C	MSM7225IMSM7225-1 Mobile Station Modem - User Guide [QTPL-0005638 - QTPL-0005919]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-1225	C	APQ8064 14 x 14 PoP - Device Specification [HTCTPL_I00530919 - HTCTPL_I00530919]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-1234		NOOK® HD User Guide (Undated); Mulchandani Depo Exh. 14 [BN853-0000888 - BN853-0000997]	INFRINGEMENT	DEEPAK MULCHANDANI	Admitted Pursuant to Order No. 64	6/25/2013
CX-1235		NOOK® HD User Guide (Undated); Mulchandani Depo Exh. 15 [BN853-0000780 - BN853-0000887]	INFRINGEMENT	DEEPAK MULCHANDANI	Admitted Pursuant to Order No. 64	6/25/2013
CX-1236		Software Update for NOOK® HD+ - Version 2.0.6 Web Printout from www.barnesandnoble.com (02/12/2013); Mulchandani Depo Exh. 18 [TPL853_03012343 - TPL853_03012344]	INFRINGEMENT	DEEPAK MULCHANDANI	Admitted Pursuant to Order No. 64	6/25/2013
CX-1256	C	Glacier Upper Board Function Block A01 [CX-1256C.001 - CX-1256C.015]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-1259		Software Update for NOOK® HD - Version 2.0.6 Web Printout from www.barnesand noble.com (02/12/2013); Mulchandani Depo Exh. 17 [CX-1259.001 - CX-1259.002]	INFRINGEMENT	DEEPAK MULCHANDANI	Admitted Pursuant to Order No. 64	6/25/2013
CX-1264	C	cm-pll_gp3: General Purpose PLL for TSMCn45 Mobile Station Modems Analog Core Data Sheet BO-VE123-4 Rev. C February 17, 2010 [QCHTCTPL0024009-QCHTCTPL00024057]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-1265	C	Notice of Deposition to respondents LG Electronics, Inc. and LG Electronics U.S.A., Inc. re ITC Investigation No. 337-TA-853 (11/28/2012); Choi Depo Exh. 01 [CX-1265C.001 - CX-1265C.016]	INFRINGEMENT	JONG KWON CHOI	Admitted Pursuant to Order No. 64	6/25/2013
CX-1268	C	Chart Containing Internal Name, Project Code, Product Number, and Market Names; Yamashita Depo Exh. 32 [CX-1268C.0001]	INFRINGEMENT	HIROMASA YAMASHITA	Admitted Pursuant to Order No. 64	6/25/2013
CX-1302	C	BB Schematic - HC1M865M (MSM7627) [H853f0000225164 - H853f0000225199]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-1305	C	Qualcomm CDMA Technologies, MSM7627/MSM7627-1/MSM7627-2 - ; Mobile Station Modem - Device Specification - 80-VM151-1 Rev. K (03/03/2011) [KYOCERA_853_0022782 - KYOCERA_853_0022936]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-1323		HTC One S Overview from HTC webpage [CX-1323.001 – CX-1323.003]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-1325	C	Schematic of ChaCha MB - Function_Block (05/09/2011) [HTCTPL_I00096189 - HTCTPL_I00096229]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-1326	C	USB 2.0 Specification [GARMIN089373 - GARMIN089725, Formerly Proposed JX-0004]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-1330	C	MSM8260/MSM8660 Mobile Station Modem Device Specification; Xu Depo Exh. 18 [H853f0000211517-H853f0000211652, Formerly Proposed JX-0068C]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-1332	C	PDS Profit and Loss Sheet [PAT853_00543972-PAT853_00543991, Formerly Proposed JX-0127C]	DI	GLORIA FELCYN	Admitted	6/11/2013
CX-1333	C	Picture of Computer Boards; Moore Depo Exh. 14 [TPL853_01326573-TPL853_01326583, Formerly Proposed JX-0148C]	INFRINGEMENT; DI	DANIEL E. LECKRONE	Admitted	6/4/2013
CX-1454	C	Complainants' Designation for the Deposition of Joseph Casasanta (02/20/2013) [CX-1454C.0001 CX-1454C.0145, Formerly proposed JX-0352C]	INFRINGEMENT	DR. OKLOBDZIJA	Admitted	6/10/2013
CX-1457	C	Complainants' Designations for the Deposition of Clearence Worthington	INFRINGEMENT	CLARENCE WORTHINGTON	Admitted	6/11/2013

Complainants' [Corrected] Final CDX Exhibit List

Exhibit No.		Description	Purpose	Sponsoring Witness	Status	Date
CDX-0002		Complainants' Demonstrative Exhibit Pages 1-3	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0004		Complainants' Demonstrative Exhibit Pages 1-3, 5-7, 9-11, 13-15, 17-19	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0005	C	Complainants' Demonstrative Exhibit Pages 1-6, 8, 13, 15-24, 26, 27, 34, 35, 36A, 37A, 38-51	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0006	C	Complainants' Demonstrative Exhibit Pages 1-2, 10, 11, 12-14, 15, 18, 20-25, 28, 30, 32, 34-36, 39-41	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0007	C	Complainants' Demonstrative Exhibit Pages 1, 3, 6, 8, 9, 11, 13	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0008	C	Complainants' Demonstrative Exhibit Pages 1-20	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0009	C	Complainants' Demonstrative Exhibit Pages 1-6, 8-10	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0012	C	Complainants' Demonstrative Exhibit Page 1	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0014	C	Complainants' Demonstrative Exhibit Page 1	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0015	C	Complainants' Demonstrative Exhibit Page 1	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0016	C	Complainants' Demonstrative Exhibit Pages 1-8A, 9, 11-22	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0017	C	Complainants' Demonstrative Exhibit Page 1	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0018	C	Complainants' Demonstrative Exhibit Page 1	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0019	C	Complainants' Demonstrative Exhibit Page 1	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0020	C	Complainants' Demonstrative Exhibit Page 1	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0021	C	Complainants' Demonstrative Exhibit Page 1	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0022	C	Complainants' Demonstrative Exhibit Pages 1, 9	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0023	C	Complainants' Demonstrative Exhibit Page 1	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0024	C	Complainants' Demonstrative Exhibit Page 1	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0025	C	Complainants' Demonstrative Exhibit Pages 1-2	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0027	C	Complainants' Demonstrative Exhibit Page 1	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013

Complainants' [Corrected] Final CDX Exhibit List

Exhibit No.		Description	Purpose	Sponsoring Witness	Status	Date
CDX-0028	C	Complainants' Demonstrative Exhibit Page 1	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0029	C	Complainants' Demonstrative Exhibit Pages 2-4	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0030	C	Complainants' Demonstrative Exhibit Pages 2-7	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0034	C	Complainants' Demonstrative Exhibit Pages 2-7	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0035	C	Complainants' Demonstrative Exhibit Pages 2-6	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0038	C	Complainants' Demonstrative Exhibit Pages 1-3, 5-13	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0039	C	Complainants' Demonstrative Exhibit Pages 1-9	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0041	C	Complainants' Demonstrative Exhibit	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0043	C	Complainants' Demonstrative Exhibit Pages 2-5	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0044	C	Complainants' Demonstrative Exhibit Page 3	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0045	C	Complainants' Demonstrative Exhibit Pages 2-4	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0049	C	Complainants' Demonstrative Exhibit	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0050	C	Complainants' Demonstrative Exhibit Pages 2-5	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0051	C	Complainants' Demonstrative Exhibit Pages 1-5, 7	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0055	C	Complainants' Demonstrative Exhibit Pages 2-3	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0056	C	Complainants' Demonstrative Exhibit Pages 3-4	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0059	C	Complainants' Demonstrative Exhibit Pages 1-3, 6-9, 11	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0062	C	Complainants' Demonstrative Exhibit Page 2	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0063		Complainants' Demonstrative Exhibit Pages 2, 3, 5, 6	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0064	C	Complainants' Demonstrative Exhibit Pages 2-4	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0079	C	Complainants' Demonstrative Exhibit	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013

Complainants' [Corrected] Final CDX Exhibit List

Exhibit No.		Description	Purpose	Sponsoring Witness	Status	Date
CDX-0080	C	Complainants' Demonstrative Exhibit	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0081	C	Complainants' Demonstrative Exhibit	INFRINGEMENT	NITESH KEKRE	Received as demonstrative	6/10/2013
CDX-0081-Oklobdzija		Complainants' Demonstrative Exhibit	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0082		Complainants' Demonstrative Exhibit	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-0085		Complainants' Demonstrative Exhibit	INFRINGEMENT	DR. SUBRAMANIAN	Received as demonstrative	6/10/2013
CDX-0086	C	Complainants' Demonstrative Exhibit	INFRINGEMENT	DR. SUBRAMANIAN	Received as demonstrative	6/10/2013
CDX-0087	C	Complainants' Demonstrative Exhibit	INFRINGEMENT	DR. SUBRAMANIAN	Received as demonstrative	6/10/2013
CDX-0158		Your HTC Rezound™ with Beats Audio™ User Guide; [Liang Depo Exh. 18; TPL853_02938965 - TPL853_02939179] (formerly CX-0158)	INFRINGEMENT	EDWARD LIANG	Received as demonstrative	6/11/2013
CDX-0420	C	C5120 BB Block Diagram (Undated); Kobayashi Depo Exh. 16 [KYOCERA_853_0000325] (formerly CX-0420C)	INFRINGEMENT	NOBUAKI KOBAYASHI	Received as demonstrative	6/11/2013
CDX-0441	C	E4233 (F-58) BB Block Diagram (Undated); Kobayashi Depo Exh. 03 [KYOCERA_853_0010890] (formerly CX-0441C)	INFRINGEMENT	NOBUAKI KOBAYASHI	Received as demonstrative	6/11/2013
CDX-0443	C	E4233 BB Block Parts List (Undated); Kobayashi Depo Exh. 02 [KYOCERA_853_0012947 - KYOCERA_853_0012948] (formerly CX-0443)	INFRINGEMENT	NOBUAKI KOBAYASHI	Received as demonstrative	6/11/2013
CDX-0444	C	E4233 RF Block Parts List (Undated); Kobayashi Depo Exh. 01 [KYOCERA_853_0012949] (formerly CX-0444C)	INFRINGEMENT	NOBUAKI KOBAYASHI	Received as demonstrative	6/11/2013
CDX-0448	C	C5155A1 (G-01) - BB Block Diagram (Undated); Kobayashi Depo Exh. 07 [KYOGERA_853_0013143] (formerly CX-0448C)	INFRINGEMENT	NOBUAKI KOBAYASHI	Received as demonstrative	6/11/2013
CDX-0449	C	C5155 BB Block Parts List (Undated); Kobayashi Depo Exh. 09 [KYOCERA_853_0013436 - KYOCERA_853_0013437] (formerly CX-0449C)	INFRINGEMENT	NOBUAKI KOBAYASHI	Received as demonstrative	6/11/2013
CDX-0450	C	C5155 RF Block Parts List (Undated); Kobayashi Depo Exh. 10 [KYOCERA_853_0013438] (formerly CX-0450C)	INFRINGEMENT	NOBUAKI KOBAYASHI	Received as demonstrative	6/11/2013
CDX-0451	C	C515541 BB Block Parts List (Undated); Kobayashi Depo Exh. 08 [KYOGERA_853_0013441 - KYOGERA_853_0013442] (formerly CX-0451C)	INFRINGEMENT	NOBUAKI KOBAYASHI	Received as demonstrative	6/11/2013
CDX-0475	C	Qualcomm CDMA Technologies, MSM8x55 Mobile Station Modem- User Guide -; 80-N0370-3 Rev. C (04/05/2011) [Dena Depo Exh. 14; KYOCERA_853_0028005 – KYOCERA_853_0028223] (same document as the previously-admitted RX-0624C; formerly CX-0475C)	INFRINGEMENT	DR. SUBRAMANIAN	Received as demonstrative	6/11/2013
CDX-0482	C	Inventec Appliances (Jiangning) Corportation, F15 MainBoard Schematic (06/16/2011); Kobayashi Depo Exh. 19 [KYOCERA_853_0040751 - KYOCERA_853_0040771] (formerly CX-0482C)	INFRINGEMENT; DI	NOBUAKI KOBAYASHI	Received as demonstrative	6/11/2013
CDX-0484	C	Inventec Applicances (Jiangning) Corportation, F04 MB Change List, Schematic (08/05/2010); Katayama Depo Exh. 23 [KYOCERA_853_0047475 - KYOCERA_853-0047488] (formerly CX-0484C)	INFRINGEMENT; DI	YASUHIRO KATAYAMA	Received as demonstrative	6/11/2013

Complainants' [Corrected] Final CDX Exhibit List

Exhibit No.		Description	Purpose	Sponsoring Witness	Status	Date
CDX-0704	C	Kyocera Product List Spreadsheet; Katayama Depo Exh. 21 [TPL853_03009785] (formerly CX-0704C)	INFRINGEMENT	YASUHIRO KATAYAMA	Received as demonstrative	6/11/2013
CDX-0935	C	I/O Interfaces (Undated); Liang Depo Exh. 08 [TPL853_03010982]	INFRINGEMENT	EDWARD LIANG	Received as demonstrative	6/11/2013
CDX-0936		HTC EVO™ 4G LTE User Guide Sprint (2012); Liang Depo Exh. 11 [TPL853_03010983 - TPL853_03011228]	INFRINGEMENT	EDWARD LIANG	Received as demonstrative	6/11/2013
CDX-1161		Appendix A to Dr. Oklobdzija's Opening Report ; Curriculum Vitae of Vojin G. Dr. Oklobdzija's, Ph.D. (03/27/2013) [CX-1161.001 - CX-1161.052] (formerly CX-1151)	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-1162		Appendix B to Dr. Oklobdzija's Opening Report ; List of Materials Considered (03/27/2013) [CX-1162.001 - CX-1162.006] (formerly CX-1162)	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-1163	C	Appendix C to Dr. Oklobdzija's Opening Report ; Licensed Products Charts (03/27/2013) [TPL853_00001821 - TPL853_00002257] (formerly CX-1163C)	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-1166	C	Appendix F to Dr. Oklobdzija's Opening Report ; Claim Chart for Infringement by Acer Accused Product (03/27/2013) [CX-1166C.001 - CX-1166C.038] (formerly CX-1166C)	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-1167	C	Appendix G to Dr. Oklobdzija's Opening Report ; Claim Chart for Infringement by Amazon Accused Product (03/27/2013) [CX-1167C.001 - CX-1167C.196] (formerly CX-1167C	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-1171	C	Appendix K to Dr. Oklobdzija's Opening Report ; Claim Chart for Infringement by HTC Accused Product (03/27/2013) [CX-1171C.001 - CX-1171C.598] (formerly CX-1171C)	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-1175	C	Appendix O to Dr. Oklobdzija's Opening Report ; Claim Chart for Infringement by Novatel Accused Product (03/27/2013) [CX-1175C.001 - CX-1175C.275] (formerly CX-1175C)	INFRINGEMENT	DR. OKLOBDZIJA	Received as demonstrative	6/10/2013
CDX-1269	C	Japanese Version of Table; Katayama Depo Exh. 21 [CX-1268C.0001] (formerly CX-1269C)	INFRINGEMENT; DI	YASUHIRO KATAYAMA	Received as demonstrative	6/11/2013

UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON, D.C.

Before the Honorable E. James Gildea
Administrative Law Judge

In the Matter of **CERTAIN WIRELESS CONSUMER ELECTRONICS DEVICES AND COMPONENTS THEREOF**	**Investigation No. 337-TA-853**

CERTIFICATE OF SERVICE

I, Sherri Mills, hereby certify that on June 28, 2013, a copy of the foregoing document was served upon the following parties or their counsel in the manner indicated:

COMPLAINANTS' [CORRECTED] FINAL EXHIBIT LIST

Acting Secretary	
The Honorable Lisa R. Barton Acting Secretary U.S. International Trade Commission 500 E Street, S.W., Room 112A Washington, D.C. 20436	☒ Via EDIS ☒ Via Overnight Courier *Two Copies*
Administrative Law Judge	
The Honorable E. James Gildea U.S. International Trade Commission 500 E Street, S.W., Room 317 Washington, D.C. 20436	☒ Via Hand Delivery ☒ Via Overnight Courier *Two Copies*
Administrative Law Judge Attorney Advisors	
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/s/ Sherri Mills
Sherri Mills

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March 26, 2013

Lisa R. Barton
Acting Secretary
U.S. International Trade Commission
500 E Street, S.W.
Washington, DC 20436

Re: ***Certain Wireless Consumer Electronics Devices and Components Thereof*, Inv. No. 337-TA-853**

Dear Secretary Barton:

Enclosed for filing please find **Final Joint *Markman* Exhibit List** in the above-referenced investigation.

Respectfully submitted,

James C. Otteson

Enclosure

Final Joint *Markman* Exhibit List

Exhibit No.	Title / Description of Exhibit	Purpose	Sponsoring Witness	Received
JXM-0001	U.S. Patent No. 5,809,336 Patent	Claim Construction	Parties' Presentations	**Admitted**
JXM-0002	Excerpts from the File History of U.S. Patent No. 5,809,336 *2/10/98 amendment - **Renumbered as JXM-0016** *4/11/96 amendment - **Renumbered as JXM-0017** *7/07/97 amendment - **Renumbered as JXM-0018** *4/03/97 office action - **Renumbered as JXM-0019** *1/13/97 amendment - **Renumbered as JXM-0021**	Claim Construction		**Renumbered as JXM-0016 to JXM-0019, and JXM-0021**
JXM-0003	**Withdrawn** (Re-Exam File History of U.S. Patent No. 5,809,336 – 90/008,306)	Claim Construction		**Withdrawn**
JXM-0004	**Withdrawn** (Re-Exam File History of U.S. Patent No. 5,809,336 – 90/008,237)	Claim Construction		**Withdrawn**
JXM-0005	Excerpts from the Re-Exam File History of U.S. Patent No. 5,809,336 – 90/008,474 *2/12/08 Interview Summary - **Renumbered as JXM-0014** *5/12/09 Amendment - **Renumbered as JXM-0022** *9/02/08 Amendment - **Renumbered as JXM-0023** *3/17/09 Office Action - **Renumbered as JXM-0024** *9/2/09 Remarks - **Renumbered as JXM-0025**	Claim Construction		**Renumbered as JXM-0014, and JXM-0022 to JXM-0025**
JXM-0006	**Withdrawn** (Re-Exam File History of U.S. Patent No. 5,809,336 – 90/009,457)	Claim Construction		**Withdrawn**
JXM-0007	June 15, 2007 Markman Order: TPL v. Matsushita, 54 F. Supp. 2d 916, 926 (E.D. Tex.) (formerly CXM-0001, RXM-0002 and SXM-0001)	Claim Construction	Parties' Presentations	**Admitted**

Final Joint *Markman* Exhibit List

Exhibit No.	Title / Description of Exhibit	Purpose	Sponsoring Witness	Received
JXM-0008	June 12, 2012 Markman Order: Acer, Inc. v. Technology Properties Ltd., 2010 U.S. Dist. LEXIS 81322 (N.D. Cal.) (formerly CXM-0002, RXM-0005 and SXM-0002)	Claim Construction	Parties' Presentations	**Admitted**
JXM-0009	December 4, 2012 Markman Order: Acer v. Technology Properties Ltd., Case No. 5:08-cv-877-PSG (N.D. Cal.) (formerly CXM-0003 and SXM-0003)	Claim Construction	Parties' Presentations	**Admitted**
JXM-0010	February 26, 2008 Amendment/Response from the File History of U.S. Patent No. 6,598,148 (formerly CXM-0008 and SXM-0007)	Claim Construction	Parties' Presentations	**Admitted**
JXM-0011	October 29, 2010 Joint Claim Construction Statement: Acer v. Technology Properties Ltd., Case No. 5:08-cv-877-PSG (N.D. Cal.) (formerly RXM-0003 and SXM-0004)	Claim Construction	Parties' Presentations	**Admitted**
JXM-0012	September 14, 2012 Supplemental Declaration of Dr. Vojin Oklobdzija, and Exhibit A thereto: HTC Corp. v. Technology Properties Ltd., Case No. 5:08-cv-882-JF (N.D. Cal.) (formerly CXM-0004 and RXM-0018)	Claim Construction	Parties' Presentations	**Withdrawn**
JXM-0013	U.S. Patent No. 4,689,581 ("Talbot") (formerly CXM-0005 and RXM-0016)	Claim Construction	Parties' Presentations	**Admitted**
JXM-0014	February 12, 2008 Interview Summary from the File History of U.S. Patent No. 6,598,148 (formerly CXM-0007 and JXM-0005)	Claim Construction	Parties' Presentations	**Admitted**
JXM-0015	U.S. Patent No. 4,503,500 ("Magar") (formerly CXM-0010 and RXM-0008)	Claim Construction	Parties' Presentations	**Admitted**

Final Joint *Markman* Exhibit List

Exhibit No.	Title / Description of Exhibit	Purpose	Sponsoring Witness	Received
JXM-0016	2/10/98 Amendment from the File History of U.S. Patent No. 5,809,336 (formerly CMX-0011 and JXM-0002 excerpt)	Claim Construction	Parties' Presentations	**Admitted**
JXM-0017	4/15/96 Amendment from the File History of U.S. Patent No. 5,809,336 (formerly CXM-0012 and JXM-0002 excerpt)	Claim Construction	Parties' Presentations	**Admitted**
JXM-0018	7/07/97 Amendment from the File History of U.S. Patent No. 5,809,336 (formerly CXM-0013 and JXM-0002 excerpt)	Claim Construction	Parties' Presentations	**Admitted**
JXM-0019	4/03/97 Amendment from the File History of U.S. Patent No. 5,809,336 (formerly CXM-0015 and JXM-0002 excerpt)	Claim Construction	Parties' Presentations	**Admitted**
JXM-0020	**Withdrawn** (2/08/98 Amendment from the File History of U.S. Patent No. 5,809,336 (formerly CXM-0016 and JXM-0002 excerpt))	Claim Construction		**Withdrawn**
JXM-0021	1/13/97 Amendment from the File History of U.S. Patent No. 5,809,336 (formerly CXM-0017 and JXM-0002 excerpt)	Claim Construction	Parties' Presentations	**Admitted**
JXM-0022	5/12/09 Amendment from the File History of U.S. Patent No. 5,809,336 (formerly CXM-0018 and JXM-0002 excerpt)	Claim Construction	Parties' Presentations	**Admitted**
JXM-0023	9/02/08 Amendment from the File History of U.S. Patent No. 5,809,336 (formerly CXM-0019 and JXM-0002 excerpt)	Claim Construction	Parties' Presentations	**Admitted**

Final Joint *Markman* Exhibit List

Exhibit No.	Title / Description of Exhibit	Purpose	Sponsoring Witness	Received
JXM-0024	3/17/09 Office Action from the Re-Exam File History of U.S. Patent No. 5,809,336 - 90/008,474 (formerly JXM-0005 excerpt)	Claim Construction	Parties' Presentations	**Admitted**

UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON, D.C.

Before the Honorable E. James Gildea
Administrative Law Judge

In the Matter of **CERTAIN WIRELESS CONSUMER ELECTRONICS DEVICES AND COMPONENTS THEREOF**	**Investigation No. 337-TA-853**

CERTIFICATE OF SERVICE

I, Sherri Mills, hereby certify that on March 8, 2013, copies of the foregoing documents were served upon the following parties or their counsel in the manner indicated:

1. **FINAL JOINT *MARKMAN* EXHIBIT LIST**
2. **FINAL COMPLAINANTS' *MARKMAN* EXHIBIT LIST**

Administrative Law Judge	
The Honorable E. James Gildea U.S. International Trade Commission 500 E Street, S.W., Room 317 Washington, D.C. 20436	☐ Via Overnight Courier ☒ Via Hand Delivery on March 7, 2013
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/s/ Sherri Mills

Sherri Mills

UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON, D.C.

Before The Honorable E. James Gildea
Administrative Law Judge

In the Matter of **CERTAIN WIRELESS CONSUMER ELECTRONICS DEVICES AND COMPONENTS THEREOF**	**Investigation No. 337-TA-853**

RESPONDENTS' FINAL EXHIBIT LIST

Pursuant to Ground Rule 10.1 and Order Nos. 7 and 15 (setting procedural schedule), Respondents Acer Inc. and Acer America Corporation (collectively, "Acer"); Amazon.com, Inc. ("Amazon"); Barnes & Noble, Inc. ("Barnes & Noble"); Garmin Ltd., Garmin International, Inc. and Garmin USA, Inc. (collectively, "Garmin"); HTC Corporation & HTC America, Inc. (collectively, "HTC"); Huawei Technologies Co., Ltd., Huawei Device Co., Ltd., Huawei Device USA Inc., and Futurewei Technologies, Inc. (collectively, "Huawei"); Kyocera Corporation & Kyocera Communications, Inc. (collectively, "Kyocera"); LG Electronics, Inc. and LG Electronics U.S.A., Inc. (collectively, "LG"); Nintendo Co., Ltd., and Nintendo of America Inc. (collectively, "Nintendo"); Novatel Wireless, Inc. ("Novatel Wireless"); Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. (collectively, "Samsung") and ZTE Corporation & ZTE (USA) Inc. (collectively, "ZTE"), (collectively, "Respondents") hereby hereby submit their final trial exhibit list.

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
RX-0007		RXM-007 - Defendants' Brief Regarding Construction of Disputed Claim Terms (E.D. Tex.)	N/A	N/A	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0098	C	Teardown Report, Ford Motor Co., Ford -- 500 (2006), November 2006	TPL853_01703860	TPL853_01703865	Domestic Industry	Dan Leckrone, Mac Leckrone, Hannah, Vander Veen	Admitted 06/11/2013
RX-0167	C	January 28, 2013 Deposition Transcript of Russell H. Fish	N/A	N/A	Non-infringement	Subramanian	Admitted 06/11/2013
RX-0176	C	Letter Fish to Higgins, dated September 11, 1991			Non-infringement	Subramanian	Admitted 06/10/2013
RX-0177		United States Patent No. 4,931,986			Non-infringement	Subramanian	Admitted 06/10/2013
RX-0179	C	Patent Defense: Fish to Higgins, dated May 12, 1992			Non-infringement	Subramanian	Admitted 06/10/2013
RX-0180		United States Patent No. 4,037,090			Non-infringement	Subramanian	Admitted 06/10/2013
RX-0181	C	Document entitled "The PSC1000 Microprocessor"			Non-infringement	Subramanian	Admitted 06/10/2013
RX-0184	C	February 20, 2013 Deposition Transcript of Joseph A. Casasanta (duplicate to CX-1454C)			Non-infringement	Subramanian	Admitted 06/10/2013 also referenced as CX 1454C
RX-0192	C	Seagate Vendor Requirements Specifications (duplicate to CX-530C)			Non-infringement	Subramanian	Admitted 06/10/2013
RX-0310		Excerpt from Mostek 3870 Single Chip Micro Family	337_853_RESPONDENTS_0006489	337_853_RESPONDENTS_0006519	Invalidity	Friedman	Admitted 06/10/2013
RX-0422	C	Tate Schematic (Kindle Fire HD 7")	AMZ_TPL_00084799	AMZ_TPL_00084815	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0472	C	Z221/Michael (P671B40) Schematics	ZTE853TPL00757230	ZTE853TPL00757253	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0483	C	Spider (P671A90/Z431) Schematics	ZTE853TPL00757070	ZTE853TPL00757096	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0525	C	TI OMAP 4470 Confidential Data Manual, Eng'g Sample ES1.0, Version D	AMZ_TPL_00031892	AMZ_TPL_00032345	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0526	C	OMAP 4470 Technical Reference Manual, Version F	AMZ_TPL_00039646	AMZ_TPL_00046783	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0527	C	OMAP 4460 Technical Reference Manual, Version T	AMZ_TPL_00024152	AMZ_TPL_00031270	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0528	C	OMAP 4430 Technical Reference Manual, Version J	LGE800ITC0085248	LGE800ITC0091885	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0529	C	OMAP 4430 Data Manual, Version C	TPL853_02987820	TPL853_02988262	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0532	C	JEM Schematic (Kindle Fire HD 8.9")	AMZ_TPL_00000033	AMZ_TPL_00000046	Non-infringement	Subramanian	Admitted 06/10/2013

RX-0543	C	Barnes & Noble NOOK HD+ User Guide	BN853-0000672	BN853-0000779	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0544	C	USB 2.0 Specification	GARMIN089373	GARMIN090022	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0545	C	MSM7627A-0/MSM7627A-1/MSM7627A-2 and MSM7227A-0/MSM7227A-1 Mobile Station Modem Device Specification	HD853F0000002987	HD853F0000003121	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0558	C	Unite / myTouch - U8680 - Schematic	H853f0000226171	H853f0000226209	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0560	C	Unite Q / myTouch Q - U8730 - Schematic	H853f0000226243	H853f0000226282	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0566	C	Sprint Express - M650 - Schematic	H853f0000225000	H853f0000225036	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0568	C	Ascend II - M865/M865C/M865-USCC - Schematic	H853f0000225164	H853f0000225199	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0582	C	Pinnacle 2 - M636 - Schematic	H853f0000224935	H853f0000224956	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0584	C	Blue - M735 - Schematic	H853f0000225117	H853f0000225143	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0591	C	LG-LS696 Service Manual	LGE800ITC0100010	LGE800ITC0100280	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0598	C	LG730 Service Manual	LGE800ITC0372693	LGE800ITC0372971	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0601	C	APQ8060 Qualcomm Application Processor - User Guide	LG800ITC0305378	LG800ITC0305567	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0602	C	QSC6055, QSC6065, QSC6075, and QSC6085 Qualcomm Single Chip (QSC) - User Guide	LG800ITC00017283	LG800ITC0002032	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0604	C	Pictures of VS840	LGE800ITC0393018	LGE800ITC0393027	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0605	C	User Manual VS840	LGE800ITC0429625	LGE800ITC0429643	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0606	C	Harrier HLD Review	QTPL-0002572	QTPL-0002824	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0607	C	cm_pll_sr: Low Power PLL for 28nm Mobile Station Modems - LLDR for MSM8960 (Waverider)	QTPL-0000749	QTPL-0000923	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0609	C	Harrier (TSMCN65): NT_PLL - LLDR	QTPL-0001118	QTPL-0001370	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0611	C	MSM8660 Device Debugging for Third-party Vendors - User Guide	QTPL-0003434	QTPL-0003446	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0612	C	MSM7225/MSM7225-1 Mobile Station Modem - User Guide	QTPL-0005638	QTPL-0005919	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0613	C	MSM7627 Mobile Station Modem - User Guide	QTPL-0009262	QTPL-0009495	Non-infringement	Subramanian	Admitted 06/10/2013

RX-0614	C	MSM8260/MSM8660 Mobile Station Modem - User Guide	QTPL-0010346	QTPL-0010547	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0615	C	Conditional Document for MDM8220, MDM9200, MDM9600 - User Guide	QTPL-0012310	QTPL-0012466	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0616	C	cm_pll_hf: High-frequency PLL for 28 nm mobile CPUs - Data Sheet	QTPL-0013597	QTPL-0013645	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0617	C	cm_pll_sr: Low Power PLL for 28nm-hpm Mobile Station Modems - Data Sheet	QTPL-0013707	QTPL-0013740	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0618	C	cm_pll_hf: High Frequency PLL for 45nm Mobile CPUs - Data Sheet	QTPL-0013863	QTPL-0013924	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0619	C	PLL_HF for 28 nm Waverider - LLDR	QTPL-0014375	QTPL-0014499	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0620	C	28 nm lp HF_PLL for Waverider V3 - Design Change Review	QTPL-0014513	QTPL-0014532	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0621	C	cm_pll_hf: High Frequency PLL for 45nm Mobile CPU's - HLDR	QTPL-0014873	QTPL-0014906	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0622	C	Karura (MSM7627™) - HDD	QTPL-0019212	QTPL-0021673	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0624	C	MSM8x55 Mobile Station Modem - User Guide	QTPL-0022809	QTPL-0023027	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0625	C	PLL C5 (TSMCN45): NT_PLL - Low Level Design Report	QTPL-0023316	QTPL-0023453	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0626	C	cm_pll_gp2/cm_pll_gp2lp: TSMCn65 General Purpose PLL Core - Analog Core Data Sheet / LLDR Part 1	QTPL-0023678	QTPL-0023727	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0627	C	sROC (MSM7625™) - Software Interface	QTPL-0026691	QTPL-0027717	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0628	C	Chetak (MDM8200A™) - HDD	QTPL-0036668	QTPL-0037728	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0640	C	CTR (3DS) CPU Schematic	NINTPL00000210	NINTPL00000214	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0647	C	AIC3010 Datasheet dated Dec. 14, 2010	NINTPL00000305	NINTPL00000549	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0648	C	AIC3005 Datasheet dated Sept. 17, 2010	NINTPL00012828	NINTPL00012996	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0649	C	AIC3010 Datasheet (duplicate to JX-103C)	NINTPL00012997	NINTPL00013246	Non-infringement	Subramanian	Admitted 06/10/2013 also admitted as JX-103C
RX-0669	C	TLV320AIC3000 Datasheet	NINTPL00015841	NINTPL00015841	Non-infringement	Dr. Oklobdzija	Admitted 06/10/2013
RX-0689	C	11/30/2011 Qualcomm MSM8960/MSM8x60A Mobile Device Station Modem Device Specification, 80-N1622-1 Rev. G	853SAMSUNG00060163	853SAMSUNG00060297	Non-infringement	Subramanian	Admitted 06/10/2013

RX-0690	C	10/13/2011 Samsung PLL3500X LN32LPM 1400MHz FSPLL Datasheet, Rev. 1.25	853SAMSUNG00167109	853SAMSUNG00167127	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0693	C	02/28/2010 Samsung PLL4508A L4LP 1030MHz FSPLL Datasheet, Rev. 1.01	853SAMSUNG00167073	853SAMSUNG00167089	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0694	C	02/2010 Samsung PLL4508C L4LP 2060MHz FSPLL Datasheet, Rev. 1.00	853SAMSUNG00167090	853SAMSUNG00167108	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0696	C	09/2012 Samsung Exynos 4412 RISC Microprocessor, Rev. 1.30	853SAMSUNG00167220	853SAMSUNG00170084	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0699	C	07/2011 Samsung S5PC111 RISC Microprocessor User's Manual, Rev. 1.30	853SAMSUNG00042131	853SAMSUNG00044673	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0702	C	09/2011 Samsung S5PC210 RISC Microprocessor User's Manual, Rev. 1.40	853SAMSUNG00019749	853SAMSUNG00022121	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0705	C	Samsung Galaxy SIII User Guide	853SAMSUNG00015855	853SAMSUNG00016092	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0720	C	Samsung Schematic SGH-I317, Rev 1.2A (Galaxy Note II)	853SAMSUNG00088997	853SAMSUNG00089009	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0723	C	Samsung Schematic SGH-I577, Rev 0.7 (Galaxy Exhilarate)	853SAMSUNG00089034	853SAMSUNG00089044	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0725	C	Samsung Schematic SGH-I717, Rev 1.2 (Galaxy Note)	853SAMSUNG00089062	853SAMSUNG00089076	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0726	C	Samsung Schematic SGH-I727, Rev 1.4 (GSII Skyrocket)	853SAMSUNG00089077	853SAMSUNG00089093	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0727	C	Samsung Schematic SGH-I747, Rev 1.2 (Galaxy S III)	853SAMSUNG00089094	853SAMSUNG00089106	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0737	C	Samsung Schematic SGH-T989, Rev 1.1 (Galaxy S II)	853SAMSUNG00089207	853SAMSUNG00089222	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0749	C	Samsung Schematic SCH-I200, Rev 08 (Galaxy Stellar)	853SAMSUNG00030125	853SAMSUNG00030137	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0751	C	Samsung Schematic SCH-I415, Rev 1.7 (Galaxy Stratosphere2)	853SAMSUNG00030153	853SAMSUNG00030168	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0756	C	Samsung Schematic SCH-R530, Rev 05 (Galaxy S III)	853SAMSUNG00030232	853SAMSUNG00030248	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0760	C	Samsung Schematic SCH-R830, Rev 10 (Galaxy Axiom)	853SAMSUNG00030287	853SAMSUNG00030300	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0763	C	Samsung Schematic SGH-I437, Rev 07 (Galaxy Express)	853SAMSUNG00030329	853SAMSUNG0000339	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0764	C	Samsung Schematic SGH-I547 (Galaxy Rugby Pro)	853SAMSUNG00030340	853SAMSUNG00030352	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0774	C	Samsung Schematic SGH-S959G (Galaxy S II)	853SAMSUNG00030465	853SAMSUNG00030474	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0784	C	Samsung Schematic SPH-L710, Rev 13 (Galaxy S III)	853SAMSUNG00030604	853SAMSUNG00030621	Non-infringement	Subramanian	Admitted 06/10/2013

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RX-0789	C	No Date, VCO Architecture for: PLL4502C & PLL4508A/C (See JX-0037C)	853SAMSUNG00170096	853SAMSUNG00170097	Non-infringement	Subramanian	Admitted as JX-0037C
RX-0790	C	MSM8X55 Mobile Station Modem User Guide	LGE800ITC0304941	LGE800ITC0305081	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0791	C	MSM8960 Clock Plan	853SAMSUNG00065616	853SAMSUNG00065635	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0794	C	Pascal/Concord/Origin (V768/P253A20) Schematics	ZTE853TPL00756681	ZTE853TPL00756695	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0795	C	N850 Schematic	ZTE853TPL00756845	ZTE853TPL00756875	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0796	C	MDM8200A Mobile Data Modem - User Guide	ZTE853TPL00763322	ZTE853TPL00763454	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0797	C	DIAM 130/DIAM 140/DIAM 210/DIAM 110 Block Diagram and Schematics	HTCTP0075909	HTCTP0075943	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0798	C	MSM7200A Mobile Station Modem User Guide	HTCTP0496547	HTCTP0496856	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0799	C	APQ8064 Device Specification	HTCTPL_I00530919	HTCTPL_I00530919	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0800	C	MSM7227 Mobile Station Modem User Guide	LGE800ITC0309486	LGE800ITC0309605	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0801	C	MSM7x30-0/MSM7x30-1 Mobile Station Modem User Guide	HTCTPL_I00602179	HTCTPL_I00602397	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0807	C	CTR (3DS) CPU Schematic	NINTPL00017631	NINTPL00017635	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0813	C	TWL (DSi) CPU Schematic	NINTPL00017718	NINTPL00017721	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0814	C	CTR (3DS) CPU Schematic	NINTPL00017722-00017726	NINTPL00017722-00017726	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0815	C	CTR (3DS) CPU Schematic	NINTPL00017727	NINTPL00017727	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0816	C	CTR (3DS) CPU Schematic	NINTPL00017728	NINTPL00017728	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0817	C	CTR (3DS) CPU Schematic	NINTPL00017729	NINTPL00017729	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0818	C	CTR (3DS) CPU Schematic	NINTPL00017730	NINTPL00017730	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0819	C	CTR (3DS) CPU Schematic	NINTPL00017731	NINTPL00017731	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0832	C	TWL-CPU-10 Schematic	NINTPL00018484	NINTPL00018487	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0849	C	Kyocera Presto Schematic	KYOCERA_853_0009758-775	KYOCERA_853_0009758-775	Non-infringement	Subramanian	Admitted 06/10/2013

RX-0852	C	Kyocera S2100/Luno/Clip Schematic	KYOCERA_853_0047503-517	KYOCERA_853_0047503-517	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0854	C	Kyocera Duracore Schematic	KYOCERA_853_0010552-559	KYOCERA_853_0010552-559	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0855	C	Kyocera Hydro Schematic	KYOCERA_853_0014168-183	KYOCERA_853_0014168-183	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0856	C	Kyocera DuraXT Schematic	KYOCERA_853_0010269-278	KYOCERA_853_0010269-278	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0857	C	Kyocera DuraPlus Schematic	KYOCERA_853_0012951-959	KYOCERA_853_0012951-959	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0858	C	Kyocera Domino Schematic	KYOCERA_853_0049088-109	KYOCERA_853_0049088-109	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0861	C	QSC6055, QSC6065, QSC6075 and QSC6085 User Guide	KYOCERA_853_0022041	KYOCERA_853_0022345	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0863	C	MSM7627/MSM7627-1/MSM7627-2/MSM7627 Turbo/MSM7627-1 Turbo/MSM7627-2 Turbo Mobile Station Modem Device Specification	KYOCERA_853_0022937	KYOCERA_853_0023091	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0867	C	QSC6055, QSC6065, QSC6075, QSC6085 Device Specification	KYOCERA_853_0021336	KYOCERA_853_0021584	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0869	C	PM8058 User Guide	KYOCERA_853_0029469	KYOCERA_853_0029604	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0871	C	20110530_NBoption_Acer_Internal_Husk_Petra.xlsx	Acer853ITC_022021	Acer853ITC_022021	Non-infringement	Subramanian	Admitted 06/10/2013
RX-0926		User Guide for LG Lucid (VS840)	LGE800ITC0370270.pdf		Public Interest	Vander Veen	Admitted 06/11/2013
RX-0936	C	StrategyAnalytics Report "North America Smartphone Vendor & OS Market Share by Country: Q3 2012" (Oct. 2012)	LGE800ITC0445481.pdf		Public Interest	Vander Veen	Admitted 06/11/2013
RX-0959	C	One Year Limited Warranty for Kindle Fire HD	AMZ_TPL_00084818	AMZ_TPL_00084820	Public Interest	Vander Veen	Admitted 06/11/2013
RX-0960	C	One Year Limited Warranty for Kindle fire	AMZ_TPL_00084821	AMZ_TPL_00084822	Public Interest	Vander Veen	Admitted 06/11/2013
RX-0996	C	Verizon Wireless Fivespot TM 3G Mobile Hotspot Product Safety and Warranty Information User Manual	ZTE853TPL00298933	ZTE853TPL00298948	Public Interest	Vander Veen	Admitted 06/11/2013
RX-0997	C	ZTE Chorus User Guide cricket	ZTE853TPL00757498	ZTE853TPL00757530	Public Interest	Vander Veen	Admitted 06/11/2013
RX-0998		Mifi User Guide	NVTL TPL853 0005338	NVTL TPL853 0005436	Public Interest	Vander Veen	Admitted 06/11/2013
RX-0999		MiFi 2200 User Guide	NVTL TPL853 0079776	NVTL TPL853 0079834	Public Interest	Vander Veen	Admitted 06/11/2013
RX-1001		Curriculum Vitae of Vivek Subramanian, Ph.D	N/A	N/A	Non-infringement	Subramanian	Admitted 06/06/2013
RX-1007	C	MSM8960 Chipset Training: Baseband Architecture Topics (excerpts)	LGE800ITC0306935	LGE800ITC0307020	Non-infringement	Subramanian	Admitted 06/10/2013

RX-1022	C	List of Accused Acer Products (see RDX-1022)	N/A	N/A	Non-infringement	Subramanian	Received for demonstrative purposes
RX-1023	C	List of Accused Amazon Products (see RDX-1023)	N/A	N/A	Non-infringement	Subramanian	Received for demonstrative purposes
RX-1024	C	List of Accused Barnes & Noble Products (see RDX-1024)	N/A	N/A	Non-infringement	Subramanian	Received for demonstrative purposes
RX-1025	C	List of Accused Garmin Products (see RDX-1025)	N/A	N/A	Non-infringement	Subramanian	Received for demonstrative purposes
RX-1026	C	List of Accused HTC Products (see RDX-1026)	N/A	N/A	Non-infringement	Subramanian	Received for demonstrative purposes
RX-1027	C	List of Accused Huawei Products (see RDX-1027)	N/A	N/A	Non-infringement	Subramanian	Received for demonstrative purposes
RX-1029	C	List of Accused LG Products (see RDX-1029)	N/A	N/A	Non-infringement	Subramanian	Received for demonstrative purposes
RX-1030	C	List of Accused Nintendo Products (see RDX-1030)	N/A	N/A	Non-infringement	Subramanian	Received for demonstrative purposes
RX-1031	C	List of Accused Novatel Products(see RDX-1031)	N/A	N/A	Non-infringement	Subramanian	Received for demonstrative purposes
RX-1032	C	List of Accused Samsung Products (see RDX-1032)	N/A	N/A	Non-infringement	Subramanian	Received for demonstrative purposes
RX-1033	C	List of Accused ZTE Products (see RDX-1033)	N/A	N/A	Non-infringement	Subramanian	Received for demonstrative purposes
RX-1043	C	APQ8060 Application Processor User Guide	LG800ITC0003487	LG800ITC0003556	Non-infringement	Subramanian	Admitted 06/10/2013
RX-1051	C	45 nm NT PLL Analog Core—Data Sheet	QTPL-0013823	QTPL-0013845	Non-infringement	Subramanian	Admitted 06/10/2013
RX-1089		File History for U.S. Patent No. 5,809,336 – July 7, 2007 Amendment (See JXM-18 (Markman))	LGE800ITC0287132	LGE800ITC0287305	Non-infringement	Subramanian	Admitted as JXM-18 (Markman)
RX-1093	C	MSM7627 Processor User Guide	LGE800ITC0092175	LGE800ITC0092245	Non-infringement	Subramanian	Admitted 06/10/2013
RX-1096	C	QSC6240/QSC6270 User Guide	LGE800ITC0308132	LGE800ITC0308411	Non-infringement	Subramanian	Admitted 06/10/2013

RX-1097	C	QSC6055, QSC6065, QSC6075 and QSC6085 User Guide	KYOCERA_853_0022041	KYOCERA_853_0022345	Non-infringement	Subramanian	Admitted 06/10/2013
RX-1098	C	MSM8X55 Mobile Station Modem User Guide	853SAMSUNG00053169	853SAMSUNG00053254	Non-infringement	Subramanian	Admitted 06/10/2013
RX-1099	C	MDM9600 Mobile Data Modem IC User Guide	LGE800ITC0309342	LGE800ITC0309426	Non-infringement	Subramanian	Admitted 06/10/2013
RX-1101	C	QSC61x5, QSC6295, QSC6695 Qualcomm Single-Chip User Guide	LGE800ITC0310316	LGE800ITC0310451	Non-infringement	Subramanian	Admitted 06/10/2013
RX-1112	C	QSD8250/QSD8650 Snapdragon User Guide	LGE800ITC0308602	LGE800ITC0308884	Non-infringement	Subramanian	Admitted 06/10/2013
RX-1131	C	Otter2 Schematics	AMZ_TPL_0082947	AMZ_TPL_0082959	Non-infringement	Subramanian	Admitted 06/10/2013
RX-1142	C	nuvi 3450/3450LM Series OMAP3611 Version Schematic	GARMIN075081	GARMIN075088	Non-infringement	Jarrod Seymour	Admitted through deposition designations submitted 06/12/2013
RX-1149	C	SC54412BHB Schematic for Galaxy Note II (SCH-I605/M16)	853SAMSUNG00030201	853SAMSUNG00030214	Non-infringement	Subramanian	Admitted 06/10/2013
RX-1167	C	ZX4451 Product	Acer853ITC_005927	Acer853ITC_005954	Non-infringement	Subramanian	Admitted 06/10/2013
RX-1174	C	MSM7227 Mobile Station Modem User Guide	HTCTPL_I00581312	HTCTPL_I00581538	Non-infringement	Subramanian	Admitted 06/10/2013
RX-1179	C	Test Documentation - S5E4412_pll_test	N/A	N/A	Non-infringement	Subramanian	Admitted 06/10/2013
RX-1180	C	Test Documentation - E4412 Temperature Results	N/A	N/A	Non-infringement	Subramanian	Admitted 06/10/2013
RX-1181	C	Test Documentation - Photos and Schematics for E4412	N/A	N/A	Non-infringement	Subramanian	Admitted 06/10/2013
RX-1182	C	Test Documentation - 4412 Voltage Results	N/A	N/A	Non-infringement	Subramanian	Admitted 06/10/2013
RX-1183	C	Test Documentation - S5PC210_pll_test	N/A	N/A	Non-infringement	Subramanian	Admitted 06/10/2013
RX-1184	C	Test Documentation – S5PC210 Measurement Results	N/A	N/A	Non-infringement	Subramanian	Admitted 06/10/2013
RX-1185	C	Test Documentation - Photos and Schematics for S5PC210	N/A	N/A	Non-infringement	Subramanian	Admitted 06/10/2013
RX-1186	C	Test Documentation – S5PC210 Voltage Results	N/A	N/A	Non-infringement	Subramanian	Admitted 06/10/2013
RX-1187	C	Test Documentation - Kyocera S2100 Measurement Results	N/A	N/A	Non-infringement	Subramanian	Admitted 06/10/2013
RX-1188	C	Test Documentation - Schematics and Photographs for Kyocera S2100	N/A	N/A	Non-infringement	Subramanian	Admitted 06/10/2013

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RX-1189	C	Test Documentation - MSM8960 Results	N/A	N/A	Non-infringement	Subramanian	Admitted 06/10/2013
RX-1190	C	Test Documentation - Photographs for Qualcomm MSM8960	N/A	N/A	Non-infringement	Subramanian	Admitted 06/10/2013
RX-1218		Aspire Notebook Series Quick Guide	Acer853ITC 0001008	Acer853ITC 0001447	Public Interest	Vander Veen	Admitted 06/11/2013
RX-1219		Samsung Galaxy Note box packaging and guides	853SAMSUNG-DEV001.1 - 853SAMSUNGDEV001.4	853SAMSUNG-DEV001.1 - 853SAMSUNGDEV001.4	Public Interest	Vander Veen	Admitted 06/11/2013
RX-1634	C	Market Share: Mobile Phones by Region and Country, 3Q12, Gartner Market Statistics	VV00001	VV00040	Public Interest	Vander Veen	Admitted 06/11/2013
RX-1636		comScore Reports November 2012 U.S.	VV00051	VV00053	Public Interest	Vander Veen	Admitted 06/11/2013
RX-1637		comScore Reports December 2012 U.S.	VV00054	VV00055	Public Interest	Vander Veen	Admitted 06/11/2013
RX-1759	C	Samples of identical licensing communications - initial letter (6 companies)	Acco:TPL853_01789285-287; Altobridge:TPL853_01853616-618; Caterpillar:TPL853_01991045-047; Goodrich:TPL853_02167046-048; Masimo:TPL853_02334350-352; Plantronics:TPL853_02606587-589	Acco:TPL853_01789285-287; Altobridge:TPL853_01853616-618; Caterpillar:TPL853_01991045-047; Goodrich:TPL853_02167046-048; Masimo:TPL853_02334350-352; Plantronics:TPL853_02606587-589	Domestic Industry; Remedy	Vander Veen, Dan Leckrone, Mac Leckrone, Hannah	Admitted 06/11/2013
RX-1762	C	Samples of Product Reports	TPL853_00219009	TPL853_00219023	Domestic Industry; Remedy	Vander Veen, Dan Leckrone, Mac Leckrone, Hannah	Admitted 06/11/2013
RX-1773	C	Two-column chart showing individual employees and their "burdened hourly rates."	TPL853_02956377	TPL853_02956378	Domestic Industry; Remedy	Vander Veen, Dan Leckrone, Mac Leckrone, Hannah	Admitted 06/11/2013
RX-1784	C	Alliacense trip reports (includes telecons; no expenses given; portfolio(s) not indicated)	TPL853_02992806	TPL853_02993060	Domestic Industry; Remedy	Vander Veen, Dan Leckrone, Mac Leckrone, Hannah	Admitted 06/11/2013
RX-1794	C	Alliacense Timesheet 2012 (unredacted)	TPL853_03005432	TPL853_03005443	Domestic Industry; Remedy	Vander Veen, Dan Leckrone, Mac	Admitted 06/11/2013
RX-1795	C	Project Labor Allocations –Multiple Periods (Alliacense/TPL)	TPL853_03005444	TPL853_03005487	Domestic Industry; Remedy	Vander Veen, Dan Leckrone, Mac	Admitted 06/11/2013
RX-1796	C	Alliacense Timesheet 2011 (unredacted)	TPL853_03005488	TPL853_03005517	Domestic Industry; Remedy	Vander Veen, Dan Leckrone, Mac Leckrone, Hannah	Admitted 06/11/2013

RX-1804	C	Texas Instruments OMAP35x technical reference manual	GARM-N37xx-031184	GARM-N37xx-035222	Non-infringement	Seymour	Admitted 06/10/2013
RX-1808	C	Seymour Deposition Ex. 9: nuvi 37xx Main Board schematic	GARMIN075072	GARMIN075080	Non-infringement	Seymour	Admitted 06/10/2013
RX-1816	C	Seymour Deposition Ex. 17: USB3311 Hi-Speed USB Transceiver with 1.8V ULPI Interface - 26MHz Reference Clock (Revision 2.0) (datasheet)	GARM-N37xxR-004307	GARM-N37xxR-004384	Non-infringement	Seymour	Admitted 06/10/2013
RX-1817	C	Texas Instruments OMAP36xx Technical Reference Manual	GARMIN068198	GARMIN071968	Non-infringement	Seymour	Admitted 06/10/2013
RX-1818	C	Seymour Deposition Ex. 19: nuvi 37xx All-In Main Board schematic	GARMIN075081	GARMIN075088	Non-infringement	Seymour	Admitted 06/10/2013
RX-1871	C	nuvi 35XX Schematic, OMAP 3611 (later version)	GARM-nuvi_35XX (Formerly 38xx)-0015920	GARM-nuvi_35XX (Formerly 38xx)-0015927	Non-infringement	Seymour	Admitted 06/10/2013
RX-2188	C	2012 Mobile Navigation Device Market Share	GARMIN082508	GARMIN082512	Remedy, Public Interest	Vander Veen	Admitted 06/11/2013
RX-2283		Textbook: Digital System Clocking, High-Performance and Low-Power Aspects by Vojin G. Oklobdzija, Vladimir M. Stojanovic, Dejan M. Markovic, and Nikola Nedovic (Wiley-IEEE Press).	GARMIN092883	GARMIN093134	Non-infringement	Subramanian; Oklobdzija	Admitted 06/10/2013

Respondents' Demonstrative Exhibit List

RDX-0004C.1 - RDX-0004C.174	C	Respondents demonstratives used with Dr. Subramanian	N/A	N/A	Non-infringement	Subramanian	Received for demonstrative purposes
RDX-0006C.3 - RDX-0006C.7	C	Respondents demonstratives used with VanderVeen	N/A	N/A	Domestic Industry/Remedy	Vander Veen	Received for demonstrative purposes
RDX-1000	C	TI Demonstrative	N/A	N/A		Kekre	Received for demonstrative purposes
RDX-1001	C	TI Demonstrative	N/A	N/A		Kekre	Received for demonstrative purposes
RDX-1002		Timing and clocking exceprt used with Dr. Oklobdzija	N/A	N/A	Non-infringement	Oklobdzija	Received for demonstrative purposes
RDX-1022	C	List of Accused Acer Products	N/A	N/A	Non-infringement	Subramanian	Received for demonstrative purposes
RDX-1023	C	List of Accused Amazon Products	N/A	N/A	Non-infringement	Subramanian	Received for demonstrative purposes
RDX-1024	C	List of Accused Barnes & Noble Products	N/A	N/A	Non-infringement	Subramanian	Received for demonstrative purposes
RDX-1025	C	List of Accused Garmin Products	N/A	N/A	Non-infringement	Subramanian	Received for demonstrative purposes
RDX-1026	C	List of Accused HTC Products	N/A	N/A	Non-infringement	Subramanian	Received for demonstrative purposes
RDX-1027	C	List of Accused Huawei Products	N/A	N/A	Non-infringement	Subramanian	Received for demonstrative purposes
RDX-1029	C	List of Accused LG Products	N/A	N/A	Non-infringement	Subramanian	Received for demonstrative purposes
RDX-1030	C	List of Accused Nintendo Products	N/A	N/A	Non-infringement	Subramanian	Received for demonstrative purposes
RDX-1031	C	List of Accused Novatel Products	N/A	N/A	Non-infringement	Subramanian	Received for demonstrative purposes
RDX-1032	C	List of Accused Samsung Products	N/A	N/A	Non-infringement	Subramanian	Received for demonstrative purposes
RDX-1033	C	List of Accused ZTE Products	N/A	N/A	Non-infringement	Subramanian	Received for demonstrative purposes

In the Matter of CERTAIN WIRELESS CONSUMER ELECTRONICS DEVICES AND COMPONENETS THEREOF
Investigation No. 337-TA-853

Respondents' Direct Physical Exhibit List

RPX-37		LG Lucid™ VS840 Device			Non-infringement	Subramanian	Admitted 06/10/2013

Dated: June 28, 2013

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<u>**CERTIFICATE OF SERVICE**</u>

I hereby certify that true and correct copies of the foregoing document,

RESPONDENTS' FINAL EXHIBIT LIST

have been served on this 1st day of July, 2013, on the following:

Lisa R. Barton Acting Secretary U.S. International Trade Commission 500 E Street, S.W. Washington, D.C. 20436	☐ **Via First Class Mail** ☐ **Via Hand Delivery** ☐ **Via Federal Express** ☒ **Via Electronic Filing**
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UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON, D.C.

Before The Honorable E. James Gildea
Administrative Law Judge

In the Matter of **CERTAIN WIRELESS CONSUMER ELECTRONICS DEVICES AND COMPONENTS THEREOF**	**Investigation No. 337-TA-853**

JOINT FINAL EXHIBIT LIST

Pursuant to Ground Rule 10.1 and Order Nos. 7 and 15 (setting procedural schedule), Complainants Technology Properties Limited LLC ("TPL"), Phoenix Digital Solutions LLC ("PDS"), and Patriot Scientific Corporation ("PTSC") and Respondents Acer Inc. and Acer America Corporation (collectively, "Acer"); Amazon.com, Inc. ("Amazon"); Barnes & Noble, Inc. ("Barnes & Noble"); Garmin Ltd., Garmin International, Inc. and Garmin USA, Inc. (collectively, "Garmin"); HTC Corporation & HTC America, Inc. (collectively, "HTC"); Huawei Technologies Co., Ltd., Huawei Device Co., Ltd., Huawei Device USA Inc., and Futurewei Technologies, Inc. (collectively, "Huawei"); Kyocera Corporation & Kyocera Communications, Inc. (collectively, "Kyocera"); LG Electronics, Inc. and LG Electronics U.S.A., Inc. (collectively, "LG"); Nintendo Co., Ltd., and Nintendo of America Inc. (collectively, "Nintendo"); Novatel Wireless, Inc. ("Novatel Wireless"); Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. (collectively, "Samsung") and ZTE Corporation & ZTE (USA) Inc. (collectively, "ZTE"), (collectively, "Respondents") hereby submit their final joint trial exhibit list.

337-TA-853, Certain Wireless Consumer Electronic Devices and Components Thereof
Final Joint Exhibit List – June 28, 2013

[illegible]	[illegible]	Description	Beg Bates	End Bates	Purpose	Sponsoring Witness(es)	Status of Receipt
JX-0001		Barnes & Noble NOOK SimpleTouch User Guide	BN853-0000260	BN853-0000379	Infringement/non-infringement	Deepak Mulchandani	Admitted through deposition designations submitted on 06/12/2013
JX-0018	C	Samsung Schematic SCH-I405U, Rev 05 (Galaxy Metrix 4G)	853SAMSUNG00088819	853SAMSUNG00088833	Infringement/non-infringement	Dr. Oklobdzija	Admitted 06/10/2013
JX-0021	C	Samsung Schematic SCH-R760 (Galaxy S II)	853SAMSUNG00088938	853SAMSUNG00088953	Infringement/non-infringement	Dr. Oklobdzija	Admitted 06/10/2013
JX-0022	C	Samsung Schematic SCH-R820, Rev 08 (Galaxy Admire 4G)	853SAMSUNG00088954	853SAMSUNG00088967	Infringement/non-infringement	Dr. Oklobdzija	Admitted 06/10/2013
JX-0024	C	Samsung Schematic SCH-R950, Rev 1.1 (Galaxy Note II)	853SAMSUNG00088982	853SAMSUNG00088996	Infringement/non-infringement	Dr. Oklobdzija	Admitted 06/10/2013
JX-0029	C	Samsung Schematic SGH-T889, Rev 1.2A (Galaxy Note II)	853SAMSUNG00089194	853SAMSUNG00089206	Infringement/non-infringement	Dr. Oklobdzija	Admitted 06/10/2013
JX-0031	C	Samsung Schematic SPH-D710, Rev 09 (Galaxy S II)	853SAMSUNG00089236	853SAMSUNG00089253	Infringement/non-infringement	Dr. Oklobdzija	Admitted 06/10/2013
JX-0032	C	Samsung Schematic SPH-L300, Rev 07 (Galaxy Victory)	853SAMSUNG00089254	853SAMSUNG00089267	Infringement/non-infringement	Dr. Oklobdzija	Admitted 06/10/2013
JX-0034	C	Samsung Schematic SPH-L900, Rev 09 (Galaxy Note II)	853SAMSUNG00089303	853SAMSUNG00089317	Infringement/non-infringement	Dr. Oklobdzija	Admitted 06/10/2013
JX-0037	C	No Date, VCO Architecture for: PLL4502C & PLL4508A/C	853SAMSUNG00170096	853SAMSUNG00170097	Infringement/non-infringement	Dr. Oklobdzija	Admitted 06/10/2013; Also referenced as RX-789
JX-0038	C	JEM Schematic (Kindle Fire HD 8.9")	AMZ_TPL_00000033	AMZ_TPL_00000046	Infringement/non-infringement	Dr. Oklobdzija	Admitted 06/10/2013
JX-0044	C	Otter 2 Schematic (Kindle Fire 7")	AMZ_TPL_00082947	AMZ_TPL_00082959	Infringement/non-infringement	Dr. Oklobdzija	Admitted 06/10/2013
JX-0045	C	Tate Schematic (Kindle Fire HD 7")	AMZ_TPL_00084799	AMZ_TPL_00084815	Infringement/non-infringement	Dr. Oklobdzija	Admitted 06/10/2013
JX-0057	C	nuvi 3450/3450LM Series OMAP3611 Version Schematic	GARMIN075081	GARMIN075088	Infringement/non-infringement	Dr. Oklobdzija	Admitted 06/10/2013
JX-0073	C	Pinnacle 2 - M636 - Schematic	H853f0000224935	H853f0000224956	Infringement/non-infringement	Dr. Oklobdzija	Admitted 06/10/2013

		Description	Beg Bates	End Bates	Purpose	Sponsoring Witness		Status of Exhibit
JX-0074	C	Sprint Express - M650 - Schematic	H853f0000225000	H853f0000225036	Infringement/non-infringement	Dr. Oklobdzija		Admitted 06/10/2013
JX-0077	C	Blue - M735 - Schematic	H853f0000225117	H853f0000225143	Infringement/non-infringement	Dr. Oklobdzija		Admitted 06/10/2013
JX-0078	C	Ascend II - M865/M865C/M865-USCC - Schematic	H853f0000225164	H853f0000225199	Infringement/non-infringement	Dr. Oklobdzija		Admitted 06/10/2013
JX-0083	C	Unite / myTouch - U8680 - Schematic	H853f0000226171	H853f0000226209	Infringement/non-infringement	Dr. Oklobdzija		Admitted 06/10/2013
JX-0084	C	Unite Q / myTouch Q - U8730 - Schematic	H853f0000226243	H853f0000226282	Infringement/non-infringement	Dr. Oklobdzija		Admitted 06/10/2013
JX-0103	C	AIC3010 Datasheet	NINTPL00012997	NINTPL00013246	Infringement/non-infringement	Dr. Oklobdzija		Admitted 06/10/2013; Also referenced as RX-0649C
JX-0112	C	TI CODEC Schematic	NINTPL00016068	NINTPL00016068	Infringement/non-infringement	Dr. Oklobdzija		Admitted 06/10/2013
JX-0133	C	Master Agreement By and Among Patriot Scientific Corporation and Technology Properties Limited Inc. and Charles H. Moore, dated June 7, 2005	TPL0074899	TPL0074934	Domestic Industry/lack of domestic industry	Daniel E. Leckrone		Admitted June 4, 2011
JX-0154	C	TriNet Payroll Headcount by Location as of August 31, 2012; Hannah Depo Exh. 19	TPL853_01709097	TPL853_01709374	Domestic Industry/lack of domestic industry	Dwayne Hannah		Admitted 06/11/2013
JX-0155	C	Product List Spreadsheet (Undated); Hannah Depo Exh. 32 [TPL853_01709392 - TPL853_01709414]	TPL853_01709392	TPL853_01709414	Domestic Industry/lack of domestic industry	Dwayne Hannah		Admitted 06/11/2013
JX-0156	C	TPL, MMP - Licensing and Legal Support Spreadsheet (06/30/2012); Hannah Depo Exh. 29 [TPL853_01709415 - TPL853_01709420]	TPL853_01709415	TPL853_01709420	Domestic Industry/lack of domestic industry	Dwayne Hannah		Admitted 06/11/2013; Also referenced as CX-0705C
JX-0177	C	Spreadsheet for Industry Segment – MMP Tiered Pricing; D. Leckrone Depo Exh. 30	TPL853_02942330	TPL853_02942334	Domestic Industry/lack of domestic industry	Dwayne Hannah		Admitted 06/11/2013
JX-0183	C	Alliacense Time Sheet for 2012 (01/30/2012); Hannah Depo Exh. 28 [TPLSS3_02955284 - TPLSS3_02955295]	TPL853_02955284	TPL853_02955295	Domestic Industry/lack of domestic industry	Dwayne Hannah		Admitted 06/11/2013

JX-0185	C	Alliacense Time Sheet for 2011 (12/31/2011); Hannah Depo Exh. 26 [TPL853_02955340 - TPL853_02955369]	TPL853_02955340	TPL853_02955369	Domestic Industry/lack of domestic industry	Dwayne Hannah	Admitted 06/11/2013
JX-0252	C	5-page memorandum dated May 18, 2011, re "Portfolio Project Cost Policy"	TPL853_02956379	TPL853_02956383	Domestic Industry/lack of domestic Industry	Dwayne Hannah	Admitted 06/11/2013
JX-0253	C	TdReportId Spreadsheet	TPL853_02987285	TPL853_02987305	Domestic Industry/lack of domestic industry	Daniel M. Leckrone; Dwayne Hannah	Admitted 06/11/2013
JX-0331	C	Spider (P671A90/Z431) Schematics	ZTE853TPL00757070	ZTE853TPL00757096	Infringement/non-infringement	Dr. Oklobdzija	Admitted 06/10/2013
JX-0332	C	Z221/Michael (P671B40) Schematics	ZTE853TPL00757230	ZTE853TPL00757253	Infringement/non-infringement	Dr. Oklobdzija	Admitted 06/10/2013
JX-0354	C	Declaration of Dwayne Hannah (07/23/2012); Complaint Exh. 39, Daniel E Leckrone Depo Exh. 32; Hannah Depo Exh. 18; Mac Leckrone Depo Exh. 17	TPL853_03006765	TPL853_03006773	Domestic Industry/lack of domestic industry	Dwayne Hannah	Admitted 06/11/2013

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Attorneys for Respondents ZTE Corporation and ZTE (USA) Inc.

CERTIFICATE OF SERVICE

I hereby certify that true and correct copies of the foregoing document,

JOINT FINAL EXHIBIT LIST

have been served on this 28th day of June, 2013, on the following:

Lisa R. Barton Acting Secretary U.S. International Trade Commission 500 E Street, S.W. Washington, D.C. 20436	☐ **Via First Class Mail** ☐ **Via Hand Delivery** ☐ **Via Federal Express** ☒ **Via Electronic Filing**
The Honorable James E. Gildea Administrative Law Judge U.S. International Trade Commission 500 E Street, S.W., Room 317 Washington, D.C. 20436 kenneth.schopfer@usitc.gov	☐ **Via First Class Mail** ☒ **Via Hand Delivery** ☐ **Via Federal Express** ☒ **Via Electronic Mail**
R. Whitney Winston, Esq. Office of Unfair Import Investigations U.S. International Trade Commission 500 E Street, S.W., Suite 401 Washington, D.C. 20436 whitney.winston@usitc.gov	☐ **Via First Class Mail** ☐ **Via Hand Delivery** ☐ **Via Federal Express** ☒ **Via Electronic Mail**
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Steptoe
STEPTOE & JOHNSON LLP

March 8, 2013

VIA HAND DELIVERY

The Honorable E. James Gildea
Administrative Law Judge
U.S. International Trade Commission
500 E Street, SW
Washington, DC 20436

Re: ***Certain Wireless Consumer Electronics Devices and Components Thereof, Investigation No. 337-TA-853***

Dear Honorable Judge Gildea:

Please find enclosed for submission in the above-referenced investigation Respondents' Final Markman Hearing Exhibit List and 4 discs containing Respondents' Final Markman Hearing Exhibits pursuant to Ground Rule 8.7.

Please do not hesitate to contact us should you have any questions.

Sincerely,

/s/ Timothy C. Bickham

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Counsel for Huawei Technologies Co., Ltd.

CC: Counsel of Record; OUII

CONTAINS CONFIDENTIAL BUSINESS INFORMATION SUBJECT TO PROTECTIVE ORDER

CERTIFICATE OF SERVICE

The undersigned certifies that, on March 8, 2013, he caused **Respondents' Final Markman Exhibit List and Final Markman Exhibits** to be served upon the following parties as indicated below:

The Honorable E. James Gildea Administrative Law Judge U.S. International Trade Commission 500 E Street, SW Washington, DC 20436	☐ Via First Class Mail ☑ Via Hand Delivery ☐ Via Overnight Courier ☐ Via Facsimile ☑ Via E-mail *(PDF) (letter only)* Kenneth.schopfer@usitc.gov Sarah.zimmerman@usitc.gov
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Jay H. Reiziss Brinks, Hofer, Gilson & Lione 1850 K Street, N.W. Washington, D.C. 20006-2219 *Counsel for Respondents ZTE Corporation and ZTE (USA) Inc.*	☐ Via First Class Mail ☐ Via Hand Delivery ☐ Via Overnight Courier ☐ Via Facsimile ☑ Via E-mail (PDF) *(letter only)* Brinks-853-ZTE@brinkshofer.com
M. Andrew Woodmansee Morrison & Foerster LLP 12532 High Bluff Drive San Diego, CA *Counsel for Respondents Kyocera Corporation and Kyocera Communications, Inc.*	☐ Via First Class Mail ☐ Via Hand Delivery ☐ Via Overnight Courier ☐ Via Facsimile ☑ Via E-mail (PDF) *(letter only)* Kyocera-TPL-ITC@mofo.com
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Chris Geissler
Paralegal

Certain Wireless Consumer Electronic Devices and Components Thereof

INV. NO. 337-TA-853

RESPONDENTS' FINAL MARKMAN EXHIBIT LIST

March 8, 2013

EXH	NO.	CBI	DESCRIPTION	PURPOSE	SPONSORING WITNESS	STATUS OF RECEIPT
			Joint *Markman* Exhibits			
JXM-	0001		U.S. Patent No. 5,809,336 Patent	Claim Construction	Parties' Presentations	ADMITTED
JXM-	0002		Excerpts from File History of U.S. Patent No. 5,809,336 *2/10/98 amendment - Re-numbered as JXM-16 *4/11/96 amendment - Re-numbered as JXM-17 *7/07/97 amendment - Re-numbered as JXM-18 *4/03/97 office action - Re-numbered as JXM-19 *1/13/97 amendment - Re-numbered as JXM-21	Claim Construction		Renumbered To: JXM-16 JXM-17 JXM-18 JXM-19 JXM-21
JXM-	0003		Re-Exam File History of U.S. Patent No. 5,809,336 – 90/008,306	Claim Construction		WITHDRAWN
JXM-	0004		Re-Exam File History of U.S. Patent No. 5,809,336 – 90/008,237	Claim Construction		WITHDRAWN
JXM-	0005		Excerpts from Re-Exam File History of U.S. Patent No. 5,809,336 – 90/008,474 *2/12/08 Interview Summary - Re-numbered as JXM-14 *5/12/09 amendment - Re-numbered as JXM-22 *9/02/08 amendment - Re-numbered as JXM-23 *3/17/09 Office Action - Re-numbered as JXM-24	Claim Construction		Renumbered To: JXM-14 JXM-22 JXM-23 JXM-24
JXM-	0006		Re-Exam File History of U.S. Patent No. 5,809,336 – 90/009,457	Claim Construction		WITHDRAWN
JXM-	0007		June 15, 2007 Markman Order: TPL v. Matsushita, 54 F. Supp. 2d 916, 926 (E.D. Tex. June 15, 2007) (formerly CXM-1, RXM-2 and SXM-1)	Claim Construction	Parties' Presentations	ADMITTED
JXM-	0008		June 12, 2012 Markman Order: Acer, Inc. v. TPL, 2010 U.S. Dist. LEXIS 81322 (N.D. Cal. June 12, 2012) (formerly CXM-2, RXM-5 and SXM-2)	Claim Construction	Parties' Presentations	ADMITTED
JXM-	0009		December 4, 2012 Markman Order: Acer v. Technology Properties Ltd., Case No. 5:08-cv-877 (N.D. Cal. December 4, 2012) (formerly CXM-3 and SXM-3)	Claim Construction	Parties' Presentations	ADMITTED
JXM-	0010		2/26/08 Amendment/Response (formerly CXM-8 and SXM-7)	Claim Construction	Parties' Presentations	ADMITTED
JXM-	0011		October 29, 2010 Joint Claim Construction Statement (N.D. Cal.) (formerly RXM-3 and SXM-4)	Claim Construction	Parties' Presentations	ADMITTED
JXM-	0012		Supplemental Declaration of Dr. Vojin Oklobdzija, dated September 14, 2012 and Exhibit A filed in Case No. 5:08-cv-00882 JW (N.D. Cal.) (formerly CXM-4 and RXM-18)	Claim Construction	Parties' Presentations	WITHDRAWN
JXM-	0013		U.S. Patent No. 4,689,581 ("Talbot") (formerly CXM-5 and RXM-16)	Claim Construction	Parties' Presentations	ADMITTED
JXM-	0014		2/12/08 Interview Summary (formerly CXM-7 and JXM-5)	Claim Construction	Parties' Presentations	ADMITTED
JXM-	0015		U.S. Patent No. 4,503,500 ("Magar") (formerly CXM-10 and RXM-8)	Claim Construction	Parties' Presentations	ADMITTED
JXM-	0016		2/10/98 amendment from prosecution of the '336 patent (formerly CMX-11 and JXM-2 excerpt)	Claim Construction	Parties' Presentations	ADMITTED
JXM-	0017		4/15/96 amendment from prosecution of the '336 patent (formerly CXM-12 and JXM-2 excerpt)	Claim Construction	Parties' Presentations	ADMITTED

Certain Wireless Consumer Electronic Devices and Components Thereof

INV. NO. 337-TA-853

RESPONDENTS' FINAL MARKMAN EXHIBIT LIST

March 8, 2013

EXH	NO.	CBI	DESCRIPTION	PURPOSE	SPONSORING WITNESS	STATUS OF RECEIPT
JXM-	0018		7/07/97 amendment from prosecution of the '336 patent **(formerly CXM-13 and JXM-2 excerpt)**	Claim Construction	Parties' Presentations	**ADMITTED**
JXM-	0019		4/03/97 office action from prosecution of the '336 patent **(formerly CXM-15 and JXM-2 excerpt)**	Claim Construction	Parties' Presentations	**ADMITTED**
JXM-	0020		2/08/98 amendment from prosecution of the '336 patent **(formerly CXM-16 and JXM-2 excerpt)**	Claim Construction	Parties' Presentations	**ADMITTED**
JXM-	0021		1/13/97 amendment from prosecution of the '336 patent **(formerly CXM-17 and JXM-2 excerpt)**	Claim Construction	Parties' Presentations	**ADMITTED**
JXM-	0022		5/12/08 amendment from the reexamination prosecution of the '336 patent **(formerly CXM-18 and JXM-2 excerpt)**	Claim Construction	Parties' Presentations	**ADMITTED**
JXM-	0023		9/02/08 amendment from the reexamination prosecution of the '336 patent **(formerly CXM-19 and JXM-2 excerpt)**	Claim Construction	Parties' Presentations	**ADMITTED**
JXM-	0024		3/17/09 Office Action **(formerly JXM-5 excerpt)**	Claim Construction	Parties' Presentations	**ADMITTED**
			Respondents' *Markman* Exhibits			
RXM-	0001	C	Excerpts from Deposition Transcript of Russell Fish (1/28/13)	Claim Construction	Parties' Presentations	**ADMITTED**
RXM-	0002		June 15, 2007 *Markman* Order	Claim Construction		**Renumbered to JXM-7**
RXM-	0003		October 29, 2010 Joint Claim Construction Statement	Claim Construction		**Renumbered to JXM-11**
RXM-	0004		Declaration of Dr. Vivek Subramanian in Support of Respondents' Initial Markman Brief	Claim Construction	Parties' Presentations	**WITHDRAWN**
RXM-	0005		June 12, 2012 *Markman* Order	Claim Construction		**Renumbered to JXM-8**
RXM-	0006		U.S. Patent No. 4,766,567 ("Kato")	Claim Construction	Parties' Presentations	**ADMITTED**
RXM-	0007		April 2, 2007 Defendants' Brief Regarding Construction of Disputed Claim Terms (E.D. Tex.)	Claim Construction	Parties' Presentations	**ADMITTED**
RXM-	0008		U.S. Patent No. 4,503,500 ("Magar")	Claim Construction		**Renumbered to JXM-15**
RXM-	0009	C	Excerpts from Deposition Transcript of Charles Moore Vol. 1 (1/24/13)	Claim Construction	Parties' Presentations	**ADMITTED**
RXM-	0010	C	Excerpts from Deposition Transcript of Charles Moore Vol. 2 (1/25/13)	Claim Construction	Parties' Presentations	**ADMITTED**
RXM-	0011		TPL's Motion to Correct Preliminary Infringement Contentions - March 25, 2011 (N.D. Cal.)	Claim Construction	Parties' Presentations	**ADMITTED**
RXM-	0012		TPL's Claim Construction Reply Brief - April 9, 2007 (E.D. Tex.)	Claim Construction	Parties' Presentations	**ADMITTED**
RXM-	0013	C	Excerpts from Deposition Transcript of Charles Moore - (7/11/07 - E.D. Tex.)	Claim Construction	Parties' Presentations	**ADMITTED**
RXM-	0014		U.S. Patent No. 4,580,216 ("Bellay")	Claim Construction	Parties' Presentations	**ADMITTED**
RXM-	0015		U.S. Patent No. 4,691,124 ("Ledzius")	Claim Construction	Parties' Presentations	**ADMITTED**
RXM-	0016		U.S. Patent No. 4,689,581 ("Talbot")	Claim Construction		**Renumbered to JXM-13**
RXM-	0017		U.S. Patent No. 3,967,104 ("Brantingham")	Claim Construction	Parties' Presentations	**ADMITTED**

Certain Wireless Consumer Electronic Devices and Components Thereof

INV. NO. 337-TA-853

RESPONDENTS' FINAL MARKMAN EXHIBIT LIST

March 8, 2013

EXH	NO.	CBI	DESCRIPTION	PURPOSE	SPONSORING WITNESS	STATUS OF RECEIPT
RXM-	0018		Supplemental Declaration of Dr. Vojin Oklobdzija, dated September 14, 2012 and Exhibit A filed in Case No. 5:08-cv-00882 JW (N.D. Cal.)	Claim Construction		Renumbered to JXM-12
RXM-	0019		Excerpts from Deposition Transcript of Vojin Oklobdzija (10/12/12)	Claim Construction	Parties' Presentations	WITHDRAWN
RXM-	0020		Supplemental Declaration of Andrew Wolfe in Support of Plaintiffs' Supplemental Claim Construction Brief, dated September 14, 2012, without exhibits, filed in *HTC Corporation v. Technology Properties Limited*, Case No. 5:08-cv-00882 JW (N.D. Cal.)	Claim Construction	Parties' Presentations	WITHDRAWN
RXM-	0021		U.S. Patent No. 4,670,837 to Sheets ("Sheets")	Claim Construction	Parties' Presentations	ADMITTED
RXM-	0022	C	Excerpts from Deposition Transcript of Charles Moore (11/4/2010)	Claim Construction	Parties' Presentations	ADMITTED
RXM-	0023	C	Excerpts from Deposition Transcript of Russell Fish (12/17/2010)	Claim Construction	Parties' Presentations	ADMITTED
			Respondents' *Markman* Demsonstrative Exhibits			
RDXM-	1		Respondents' *Markam* Tutorial Presentation	Claim Construction	Parties' Presentations	ADMITTED
RDXM-	2	C	Respondents' Demonstrative PowerPoint Presentation	Claim Construction	Parties' Presentations	ADMITTED
RDXM-	3		Respondents' Demonstrative Slide	Claim Construction	Parties' Presentations	ADMITTED

CERTAIN WIRELESS CONSUMER ELECTRONICS DEVICES AND COMPONENTS THEREOF

Inv. No. 337-TA-853

PUBLIC CERTIFICATE OF SERVICE

I, Lisa R. Barton, hereby certify that the attached **ORDER** has been served by hand upon, the Commission Investigative Attorney, Whitney Winston, Esq., and the following parties as indicated on OCT 24 2013

Lisa R. Barton, Acting Secretary
U.S. International Trade Commission
500 E Street, SW, Room 112
Washington, DC 20436

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