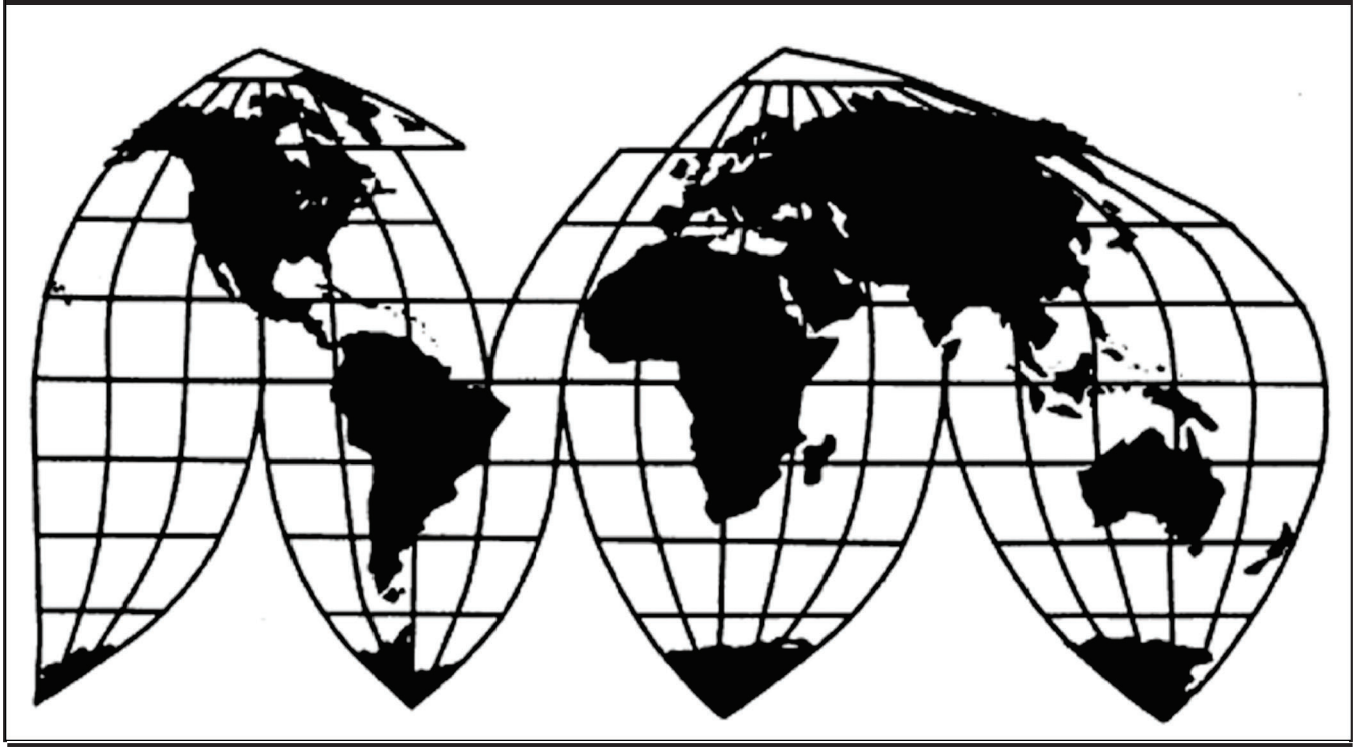
In the Matter of

CERTAIN SUBSEA TELECOMMUNICATION SYSTEMS AND COMPONENTS THEREOF

337-TA-1098

Publication 5022 **February 2020**

U.S. International Trade Commission



Washington, DC 20436

U.S. International Trade Commission

COMMISSIONERS

David S. Johanson, Chairman
Rhonda K. Schmidtlein, Commissioner
Jason E. Kearns, Commissioner
Amy A. Karpel, Commissioner

Address all communications to
Secretary to the Commission
United States International Trade Commission
Washington, DC 20436

U.S. International Trade Commission

Washington, DC 20436
www.usitc.gov

In the Matter of

CERTAIN SUBSEA TELECOMMUNICATION SYSTEMS AND COMPONENTS THEREOF

337-TA-1098

Publication 5022

February 2020

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

In the Matter of	
CERTAIN SUBSEA TELECOMMUNICATION SYSTEMS AND COMPONENTS THEREOF	**Investigation No. 337-TA-1098**

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

AGENCY: U.S. International Trade Commission.

ACTION: Notice.

SUMMARY: Notice is hereby given that the U.S. International Trade Commission has determined to find no violation of section 337 of the Tariff Act of 1930, as amended, in the above-referenced investigation. The investigation is terminated in its entirety.

FOR FURTHER INFORMATION CONTACT: Cathy Chen, Esq., Office of the General Counsel, U.S. International Trade Commission, 500 E Street SW, Washington, DC 20436, telephone (202) 205-2392. 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 SW, Washington, DC 20436, telephone (202) 205-2000. General information concerning the Commission may also be obtained by accessing its Internet server at *https://www.usitc.gov*. The public record for this investigation may be viewed on the Commission's electronic docket (EDIS) at *https://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 January 26, 2018, based on a complaint, as supplemented, filed on behalf of Neptune Subsea Acquisitions Ltd. of the United Kingdom; Neptune Subsea IP Ltd. of the United Kingdom; and Xtera, Inc. of Allen, Texas (collectively, "Xtera"). 83 FR 3770 (Jan. 26, 2018). The complaint, as supplemented, alleges violations of section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. 1337, based upon the importation into the United States, the sale for importation, and the sale within the United States after importation of certain subsea telecommunication systems and components thereof by reason of infringement of one or more claims of U.S. Patent Nos.: 8,380,068 ("the '068 patent"); 7,860,403 ("the '403 patent"); 8,971,171 ("the '171 patent"); 8,351,798 ("the '798 patent"); and 8,406,637 ("the '637 patent"). The complaint further alleges

that an industry in the United States exists as required by section 337. The notice of investigation, as originally issued, named as respondents Nokia Corporation of Espoo, Finland; Nokia Solutions and Networks B.V. of Hoofddorp, The Netherlands; Nokia Solutions and Networks Oy of Espoo, Finland; Alcatel-Lucent Submarine Networks SAS of Boulogne-Billancourt, France; Nokia Solutions and Networks US LLC of Phoenix, Arizona; NEC Corporation of Tokyo, Japan; NEC Networks & System Integration Corporation of Tokyo, Japan; and NEC Corporation of America of Irving, Texas. The Office of Unfair Import Investigations was also named as a party in this investigation.

On March 19, 2018, the ALJ issued Order No. 9 to (1) correct the corporate name of Alcatel-Lucent Submarine Networks SAS to Alcatel Submarine Networks; and (2) partially terminate the investigation based on withdrawal of the complaint with respect to Respondents Nokia Solutions and Networks B.V.; Nokia Solutions and Networks Oy; and Nokia Solutions and Networks US LLC. 83 FR 17677-678 (Apr. 23, 2018). On July 10, 2018, the ALJ issued Order No. 21 to change the corporate name of Neptune Subsea Acquisitions Ltd. to Xtera Topco Ltd. 83 FR 37516-517 (Aug. 1, 2018). On August 27, 2018, the ALJ issued Order No. 30 to amend the complaint and notice of investigation to add Nokia of America Corporation of New Providence, New Jersey as a respondent in the investigation. 83 FR 47938 (Sep. 21, 2018).

On November 19, 2018, the ALJ issued Order No. 46 granting in part Respondents' motion for summary determination of no violation with respect to the '068 patent based on Xtera's failure to establish the domestic industry requirement with respect to that patent. *See* Order No. 46 (Nov. 19, 2018), *aff'd with modification*, Comm'n Op. (Feb. 14, 2019). The ALJ also granted Xtera's motions to withdraw from the investigation all asserted claims of the '171 and '637 patents and certain asserted claims of the other asserted patents. *See* Order No. 22 (Aug. 8, 2018) (unreviewed); Order No. 47 (Nov. 20, 2018) (unreviewed); Order No. 52 (Dec. 6, 2018) (unreviewed).

An evidentiary hearing was held in this investigation from December 10-14, 2018.

On April 26, 2019, the ALJ issued his final initial determination ("ID") finding no violation of section 337 with respect to asserted claims 13, 15, and 19 of the '798 patent and claims 8, 9, and 12 of the '403 patent by Respondents Nokia Corporation; Alcatel Submarine Networks; and Nokia of America Corporation (collectively "Nokia"); and NEC Corporation; NEC Networks & System Integration Corporation; and NEC Corporation of America (collectively "NEC"). Specifically, with respect to the '798 patent, the ID found that Xtera produced no evidence at the evidentiary hearing to show a violation of section 337 based on infringement of claims 13, 15, and 19. Accordingly, the ID found that Xtera has not established a violation of section 337 based on infringement of the '798 patent. With respect to the '403 patent, the ID found that Respondents do not infringe and Xtera's domestic industry products do not practice claims 8, 9, and 12 of the '403 patent. The ID also found that claims 8, 9, and 12 of the '403 patent are invalid as anticipated by U.S. Patent No. 6,430,336 ("Frankel"). The ID further found that Xtera had not established that its investments and activities satisfied the domestic industry requirement with respect to the articles protected by the '403 patent.

On May 13, 2019, Xtera filed a petition for review of the final ID. On the same day, Respondents filed a contingent petition for review of the final ID. Thereafter, the parties filed responses to the petitions for review and public interest comments pursuant to Commission Rule 210.50(a)(4).

On July 24, 2019, the Commission determined to review in part the final ID and to extend the target date in this investigation to September 30, 2019. 84 FR 36935-937 (Jul. 30, 2019). Specifically, the Commission determined to review the ID's findings with respect to the '403 patent in their entirety, including domestic industry. *Id.* at 36936. The Commission also determined that Xtera had effectively withdrawn its allegations with respect to claim 13 of the '403 patent and the '798 patent. *Id.* The Commission asked the parties to brief certain issues under review. *Id.* The parties filed their respective initial submissions on August 7, 2019, and their respective reply submissions on August 14, 2019.

Of the patent claims that formed the basis for institution of this investigation, only claims 8, 9 and 12 of the '403 patent remain in dispute.

Having reviewed the parties' submissions and the record evidence, the Commission has determined to affirm with modifications the ID's finding of no violation of section 337 with respect to the '403 patent. Specifically, the Commission has determined to modify the ID's construction of the "means for producing" limitation in claim 8 of the '403 patent. In particular, the Commission adopts the ID's claimed function for the "means for producing" limitation and clarifies that the claimed function does not require the production of "narrow" optical pulses, *i.e.*, pulses of a particular bit rate. The Commission finds the specification clearly links or associates pulsed laser light sources (*e.g.*, active mode locked laser 20 in Figure 2), CW lasers modulated to create a periodic series of optical pulses (*e.g.*, CW laser 10 and first modulator 11 in Figure 1), and equivalents thereof to the claimed function. Applying that construction, the Commission affirms with modifications the ID's findings that (i) the accused products do not infringe claims 8, 9 and 12; (ii) the asserted claims are invalid as anticipated by Frankel; and (ii) Xtera has not established the existence of a domestic industry with respect to the '403 patent. The Commission's reasoning in support of its determinations is set forth in its concurrently issued opinion.

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 CFR Part 210).

By order of the Commission.

Lisa R. Barton
Secretary to the Commission

Issued: October 3, 2019

CERTAIN SUBSEA TELECOMMUNICATION SYSTEMS AND COMPONENTS THEREOF **Inv. No. 337-TA-1098**

PUBLIC CERTIFICATE OF SERVICE

I, Lisa R. Barton, hereby certify that the attached **NOTICE** has been served by hand upon the Commission Investigative Attorney, **Cortney Hoercherl, Esq.**, and the following parties as indicated, on **October 3, 2019**.

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

On Behalf of Complainants Neptune Subsea Acquisitions Ltd., Xtera Topco Ltd., and Xtera, Inc.:

Yar Chaikovsky, Esq.
PAUL HASTINGS LLP
1117 S. California Avenue
Palo Alto, CA 94304

☐ Via Hand Delivery
☐ Via Express Delivery
☒ Via First Class Mail
☐ Other:_____

On Behalf of Respondents NEC Corporation, NEC Networks & System Integration Corporation, and NEC Corporation of America:

Timothy W. Riffe, Esq.
FISH & RICHARDSON PC
1000 Maine Avenue, SW, Suite 1000
Washington, DC 20024

☐ Via Hand Delivery
☐ Via Express Delivery
☒ Via First Class Mail
☐ Other:_____

On Behalf of Respondents Nokia Corporation, Alcatel Submarine Networks, and Nokia of America Corporation:

Adam D. Swain, Esq.
ALSTON & BIRD LLP
950 F Street NW
Washington, DC 20004

☐ Via Hand Delivery
☐ Via Express Delivery
☒ Via First Class Mail
☐ Other:_____

PUBLIC VERSION

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

In the Matter of **CERTAIN SUBSEA TELECOMMUNICATION SYSTEMS AND COMPONENTS THEREOF**	**Investigation No. 337-TA-1098**

COMMISSION OPINION

The Commission has determined that there has been no violation of section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337, with respect to U.S. Patent No. 7,860,403 ("the '403 patent") on review of the presiding administrative law judge's ("ALJ") final initial determination ("ID"). This Opinion sets forth the Commission's reasoning in support of that determination.

I. BACKGROUND

A. Procedural History

The Commission instituted this investigation on January 26, 2018, based on a complaint filed on behalf of Neptune Subsea Acquisitions Ltd. of the United Kingdom; Neptune Subsea IP Ltd. of the United Kingdom; and Xtera, Inc. of Allen, Texas (collectively "Xtera"). 83 *Fed. Reg.* 3770 (Jan. 26, 2018). The complaint, as supplemented, alleges violations of section 337 based upon the importation into the United States, the sale for importation, and the sale within the United States after importation of certain subsea telecommunication systems and components thereof by reason of infringement of one or more of claims 1-14 of the '403 patent; claims 13-20 of U.S. Patent No. 8,351,798 ("the '798 patent"); claims 1-15 of U.S. Patent No. 8,380,068 ("the '068 patent"); claims 1-10 of U.S. Patent No. 8,971,171 ("the '171 patent"); and claims 1-6 of

U.S. Patent No. 8,406,637 ("the '637 patent"). The complaint further alleges that an industry in the United States exists as required by section 337. The notice of investigation, as originally filed, named as respondents Nokia Corporation of Espoo, Finland; Nokia Solutions and Networks B.V. of Hoofddorp, The Netherlands; Nokia Solutions and Networks Oy of Espoo, Finland; Alcatel-Lucent Submarine Networks SAS of Boulogne-Billancourt, France; Nokia Solutions and Networks US LLC of Phoenix, Arizona; NEC Corporation of Tokyo, Japan; NEC Networks & System Integration Corporation of Tokyo, Japan; and NEC Corporation of America of Irving, Texas. The Office of Unfair Import Investigations ("OUII") was also named as a party in this investigation.

On March 19, 2018, the ALJ issued Order No. 9 to amend the complaint and notice of investigation to (1) correct the corporate name of Alcatel-Lucent Submarine Networks SAS to Alcatel Submarine Networks; and (2) partially terminate the investigation based on withdrawal of the complaint with respect to Respondents Nokia Solutions and Networks B.V.; Nokia Solutions and Networks Oy; and Nokia Solutions and Networks US LLC. 83 *Fed. Reg.* 17677-678 (Apr. 23, 2018). On July 10, 2018, the ALJ issued Order No. 21 to change the corporate name of Neptune Subsea Acquisitions Ltd. to Xtera Topco Ltd. 83 *Fed. Reg.* 37516-517 (Aug. 1, 2018). On August 27, 2018, the ALJ issued Order No. 30 to amend the complaint and notice of investigation to add Nokia of America Corporation of New Providence, New Jersey as a respondent in the investigation. 83 *Fed. Reg.* 47938 (Sep. 21, 2018). The Commission determined not to review these initial determinations.

On November 19, 2018, the ALJ issued Order No. 46 granting in part Respondents' motion for summary determination of no violation with respect to the '068 patent based on Xtera's failure to establish that a domestic industry exists with respect to that patent. *See* Order

No. 46 (Nov. 19, 2018), *aff'd with modification*, Comm'n Op. (Feb. 14, 2019). The ALJ also granted Xtera's motions to withdraw from the investigation all asserted claims of the '171 and '637 patents and certain asserted claims of the other asserted patents. *See* Order No. 22 (Aug. 8, 2018), *not rev'd by* Comm'n Notice (Aug. 22, 2018); Order No. 47 (Nov. 20, 2018), *not rev'd by* Comm'n Notice (Dec. 11, 2018); Order No. 52 (Dec. 6, 2018), *not rev'd by* Comm'n Notice (Dec. 21, 2018). Other claims were abandoned at trial as discussed below.

The ALJ held an evidentiary hearing from December 10 to 14, 2018. Of the patent claims that formed the basis for institution of this investigation, only claims 8, 9, 12, and 13 of the '403 patent and claims 13, 15, and 19 of the '798 patent were in dispute going into the evidentiary hearing.

On April 26, 2019, the ALJ issued his final ID and recommended determination ("RD") on remedy and bonding in this investigation. The ID found no violation of section 337 with respect to claims 13, 15, and 19 of the '798 patent and claims 8, 9, and 12 of the '403 patent by Respondents Nokia Corporation; Alcatel Submarine Networks; and Nokia of America Corporation (collectively "Nokia"); NEC Corporation; NEC Networks & System Integration Corporation; and NEC Corporation of America (collectively "NEC"). ID at 1, 88. With respect to the '798 patent, the ID found that Xtera produced no evidence at the evidentiary hearing to show a violation of section 337 based on infringement of the asserted claims. *Id.* at 7. Accordingly, the ID found that Xtera had not established a violation of section 337 based on infringement of the '798 patent. *Id.* With respect to the '403 patent, the ID found that Respondents' accused products do not infringe the asserted claims and Xtera's domestic industry products do not practice the '403 patent. *Id.* at 88. The ID also found that the asserted claims of the '403 patent are invalid as anticipated by U.S. Patent No. 6,430,336 ("Frankel"). *Id.* The ID

further found that Xtera failed to establish the existence of a domestic industry with respect to the '403 patent. *Id.*

On May 13, 2019, Xtera filed a petition for review seeking review of most of the ID's findings with respect to the '403 patent.[1] Xtera's petition did not address the ID's finding of no violation with respect to the '798 patent and claim 13 of the '403 patent. Also on May 13, 2019, Respondents filed a contingent petition for review of the ID.[2] On May 21, 2019, the private parties and the Commission Investigative Attorney ("IA") each filed a response to the petitions.[3]

On July 24, 2019, the Commission determined to review in part the final ID. 84 *Fed. Reg.* 36935-937 (Jul. 30, 2019). Specifically, the Commission determined to review the ID's findings with respect to the '403 patent in its entirety, and determined not to review the remainder of the ID. *Id.* at 36936. The Commission also determined that Xtera had effectively withdrawn its allegations with respect to the '798 patent and claim 13 of the '403 patent. *Id.* The Commission asked the parties to brief certain issues under review. *Id.* The parties filed

[1] *See* Complainants' Petition for Review of the Initial Determination of No Violation of Section 337 of the Tariff Act of 1930 Regarding U.S. Patents 8,351,798 and 7,860,403, EDIS Doc ID 675760 (May 13, 2019) ("CPet").

[2] *See* Respondents' Contingent Petition for Review of the Initial Determination on Violation, EDIS Doc ID 675758 (May 13, 2019) ("RPet").

[3] *See* Response of the Office of Unfair Import Investigations to the Private Parties' Petitions for Review of the Initial Determination on Violation of Section 337, EDIS Doc ID 676578 (May 21, 2019) ("IAResp"); Complainants' Opposition to Respondents' Contingent Petition for Review of the Initial Determination on Violation, EDIS Doc ID 676605 (May 21, 2019) ("CResp"); Respondents' Response to Complainants' Petition for Review of the Initial Determination on Violation, EDIS Doc ID 676611 (May 21, 2019) ("RResp").

their respective initial submissions on August 7, 2019,[4] and their respective reply submissions on August 14, 2019.[5]

B. U.S. Patent No. 7,860,403

The '403 patent, titled "Data Format for High Bit Rate WDM Transmission," relates to a transmitter that can produce optical data pulses having a particular profile in a wavelength division multiplexed ("WDM") network. *See* JX-3 at Title, Abstract. "WDM schemes increase fibre capacity by transmitting multiple channels, each [transmitting a separate signal] at different wavelengths, over a single fibre." *Id.* at 1:20-22.

Fig. 1.
(Prior Art)

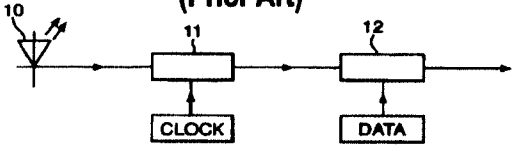


Figure **1** (reproduced above) illustrates a prior art optical transmitter which includes a coherent light source **10**, such as a continuous wave (CW) laser. *Id.* at 2:43-45. The CW laser "produces an optical beam which is first modulated with an electrical clock signal using a first

[4] Complainants' Response to the Commission's Request for Additional Briefing, EDIS Doc ID 684671 (Aug. 7, 2019) ("CSub"); Respondents' Written Submission on the Issues Identified in the Notice of Commission Determination to Review In Part the Final Initial Determination Finding No Violation of Section 337, EDIS Doc ID 684669 (Aug. 7, 2019) ("RSub"); Response of the Office of Unfair Import Investigations to the Commission's Request for Written Submissions on the Issues Under Review, EDIS Doc ID 684663 (Aug. 7, 2019) ("IASub").

[5] Complainants' Reply to Respondents' Written Submission on the Issues Identified in the Notice of Commission Determination to Review In Part the Final Initial Determination Finding No Violation of Section 337, EDIS Doc ID 685338 (Aug. 14, 2019) ("CReply"); Respondents' Response to Xtera's Written Submission on the Issues Identified in the Notice of Commission Determination to Review In Part the Final Initial Determination Finding No Violation of Section 337, EDIS Doc ID 685325 (Aug. 14, 2019) ("RReply"); Reply Submission of the Office of Unfair Import Investigations in Response to the Private Parties' Written Submissions Regarding the Issues Under Review, EDIS Doc ID 685299 (Aug. 14, 2019) ("IAReply").

modulator **11**." *Id.* at 2:45-47. "The first modulator **11** provides a series of pulses at a particular bit rate in accordance with the clock signal." *Id.* at 2:51-52. "The second modulator **12** puts data onto the series of pulses by modulating [] it with [non-return-to-zero] NRZ electrical data" and outputting "data encoded as [a return-to-zero] RZ optical signal."[6] *Id.* at 2:53-55.

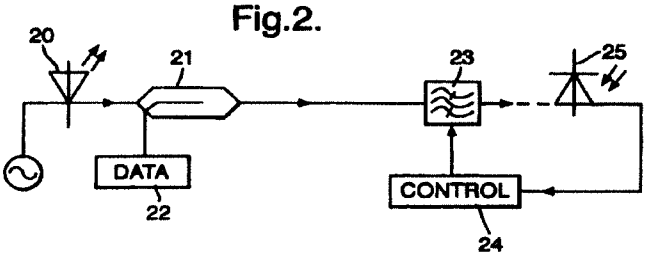
The '403 patent teaches that transmitting pulses at "a higher bit rate increases the bandwidth of each channel and therefore reduces the number of channels which can be used." *Id.* at 1:22-25. This is because WDM systems must avoid "inter-channel crosstalk," which requires spacing each channel from adjacent channels within the system's limited bandwidth. *Id.* at 2:59-62. The patent explains, for example, that "[e]ach RZ pulse in the data stream of a channel has an associated spectral width." *Id.* at 2:62-63. Specifically, an RZ pulse at "10 Gb/s will have a spectral width of about 40 GHz whilst an RZ pulse at 40 Gb/s will have a spectral width of about 160 GHz." *Id.* at 1:16-19. Thus, the patent states that the "shorter the pulse, i.e., the higher the bit rate, the broader the frequency of the pulse." *Id.* at 2:63-64. "Conversely, the narrower the spectrum of each pulse the broader the pulse in the time domain, which could potentially lead to overlapping between neighboring pulses resulting in patterning effects." *Id.* at 2:65-3:1.

The '403 patent provides a data format and a transmitter which provides improved spectral efficiency over the prior art. *Id.* at 1:34-37. In particular, the patent teaches that the embodiment of Figure **2** (reproduced below) "illustrates a transmitter in accordance with the present invention which provides a means for generating optical signals with a narrow spectral

[6] In the telecommunication industry, RZ and NRZ are two different electrical data formats. *See* Tr. (Ralph) at 388:14-24. While "RZ electrical data will start at zero and return to zero in every time slot or, in our case, for each pulse," *id.* at 398:2-5, "NRZ electrical data would not return to zero," *id.* at 389:6-8. Therefore, an RZ signal is self-clocking whereas a NRZ signal is not.

width at a particular bit rate whilst avoiding the strong patterning effects that would be experienced using conventional RZ data of the same spectral width and bit rate." *Id.* at 3:3-8.

Fig.2.



The transmitter in Figure **2** uses a "pulsed laser light source" such as "an active mode locked laser **20**" to "produce a series of narrow pulses at a particular bit rate." *Id.* at 3:9-12. The series of pulses is modulated with "an electrical NRZ data source **22** operating at the same bit rate as the light source **20**" by a modulator **21**. *Id.* at 3:17-21. The patent explains that "[i]n order to allow as many channels to be packed into the available bandwidth, the spectral width of the pulses must be reduced and preferably has a sharp cut-off, i.e. a substantially flat top spectral profile with sharp decay outside the desired frequency band." *Id.* at 3:25-30. The patent teaches that the embodiment of Figure **2** includes a filter **23**, which alters the spectral profile of the pulses. *Id.* at 3:24-25. The "optical filter shown in FIG. 2" is "a super-Gaussian 6^{th} order bandpass filter" as depicted in Figure **3***b* that "gives rise to a sinc shaped temporal profile for the carrier pulses having minima in adjacent time slots." *Id.* at 3:35-38, 3:59-61.

The patent also teaches that Figures **4***a* and **4***b* (reproduced below) show the temporal profiles of a pulse **40** prior to filtering and the pulse **41** after filtering, respectively. *Id.* at 3:47-50. As shown in Fig. 4*b*, "the filtered pulse extends over several time slots" and "the minima **43** of the filtered pulse fall in the centre of the time slots adjacent to the time slot the pulse is centred on." *Id.* at 3:53-56.

Fig.4a.

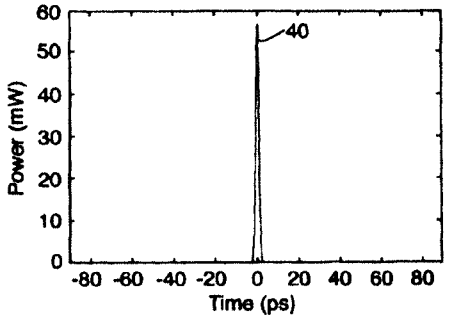
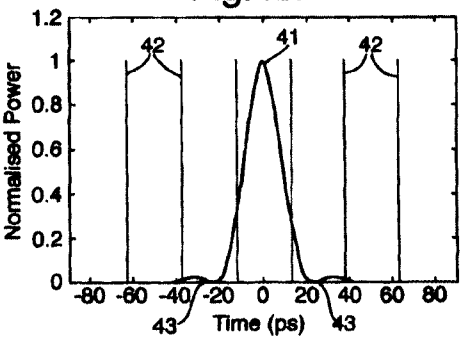
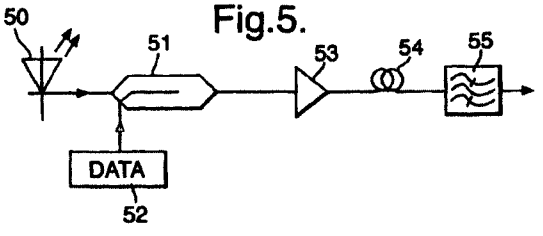


Fig.4b.



An "alternative transmitter design in accordance with the present invention" is shown in Figure **5** (reproduced below). *Id.* at 4:20-21. This embodiment includes a "coherent light source **50**," *e.g.* CW laser, that provides an optical beam that is "modulated using an MZ modulator **51** driven with RZ electrical data [**52**] at the required bit rate." *Id.* at 4:21-24. "The data pulses are then amplified by amplifier **53**" and compressed by dispersive fiber **54**." *Id.* at 4:24-26. "The compressed, i.e., narrowed pulses are then filtered using a super-Gaussian type filter **55** as in the transmitter of FIG. **2**." *Id.* at 4:26-28.

Fig.5.



Finally, the '403 patent notes that "the system shown in FIG. 1 might be suitable for producing narrow pulses which could be subsequently filtered in accordance with the present invention." *Id.* at 4:32-34. However, "[i]n order to produce the required narrow pulses the modulator **11** would have to be able to switch on and off very quickly." *Id.* at 4:34-36. The patent teaches that "[s]uitable modulators may be available in the near future." *Id.* at 4:37.

Xtera alleges infringement of claims 8, 9 and 12 of the '403 patent. These claims recite:

> **8. [Element 8PRE]** A transmitter for producing an optical data signal for transmission over a wavelength division multiplexer optical communication system comprising:
>
> **[Element 8A]** means for producing a periodic series of optical pulses defining a series of time slots, wherein one pulse appears in each time slot;
>
> **[Element 8B]** a filter having a spectral profile giving rise to carrier pulses,
>
> **[Element 8C]** each carrier pulse having a temporal profile extending over more than one time slot, the temporal profile having a minimum substantially in the center of each of the time slots adjacent to the time slot for that corresponding carrier pulse, the temporal profile of the corresponding carrier pulse further having an oscillating tail that extends from the minimum into at least one time slot that is even further from the time slot for the corresponding cg pulse; and
>
> **[Element 8D]** modulating means for modulating the pulses with data for transmission.
>
> **9**. A transmitter according to claim **8**, wherein the filter has a substantially flat top spectral profile.
>
> **12**. A transmitter according to claim **8**, wherein the modulating means a Mach Zehnder modulator.

Id. at 5:16-6:2 (alphanumeric designations added in accordance with the ID's discussion of the claim limitations).

C. Products at Issue

The products at issue are used for subsea fiber optic communication. Xtera accuses the Nokia 1830 product line, the ASN 1620 product line, and the NEC T740SW product line (collectively, "the Accused Products") of infringing the asserted claims of the '403 patent. Xtera alleges that its NuWave Optima products ("the DI Products") practice the '403 patent.

The parties agree for asserted independent claim 8 of the '403 patent that all of the Accused and DI Products operate in a manner similar to Figure **5** of the '403 patent using the same three components: (1) a CW laser, (2) a Mach-Zehnder (MZ) modulator, and (3) a digital

signal processor (DSP), which includes a finite impulse response (FIR) filter that performs Nyquist pulse shaping, and a digital-to-analog converter (DAC). ID at 40 (citing CIB[7] at 78-79; RRB[8] at 8-9; SIB[9] at 14-15; Tr. at 59:4-15; RDX-0105.30); *see also* CIB at 1, 96-120.

II. ANALYSIS

Subject to the analysis below, the Commission affirms with modifications the ID's finding of no violation of section 337 with respect to the '403 patent. The Commission adopts those portions of the ID that are not inconsistent with this opinion. In particular, with respect to the "means for producing" limitation in claim 8 of the '403 patent (**Element 8A**), the Commission adopts the parties' stipulated function for that limitation, *i.e.*, "producing a periodic series of optical pulses defining a series of time slots, wherein one pulse appears in each time slot." The Commission clarifies that the claimed function does not require the production of "narrow" optical pulses, *i.e.*, pulses of a particular bit rate. With regard to the structure corresponding to that function, the Commission adopts the ID's finding that the '403 patent specification clearly links or associates pulsed laser light sources (*e.g.*, active mode locked laser **20** in Figure **2**), and equivalents thereof, to the claimed function. The Commission, however, finds that the '403 patent specification also clearly links or associates CW lasers modulated to create a periodic series of optical pulses (*e.g.*, CW laser **10** and first modulator **11** in Figure **1**), and equivalents thereof, to the claimed function.

---

[7] Complainants' Initial Post-Hearing Briefing, EDIS Doc ID 667776 (Feb. 21, 2019).

[8] Respondents' Responsive Post-Hearing Brief, EDIS Doc ID 668737 (Feb. 28, 2019).

[9] Commission Investigative Staff's Post-Hearing Brief, EDIS Doc ID 667751 (Feb. 21, 2019).

Applying the Commission's construction for the "means for producing" limitation, the Commission affirms with modifications the ID's findings that (i) Xtera has not established that the Accused Products infringe the asserted claims of the '403 patent; (ii) Xtera has not established that its articles practice the asserted claims; and (iii) Respondents have established that the asserted claims are invalid as anticipated by Frankel. The Commission also affirms the ID's conclusion that Xtera has not satisfied the domestic industry requirement in this investigation. In particular, Xtera failed to establish that its domestic investments and activities were with respect to "articles protected by the patent" consistent with section 337's domestic industry requirement. These multiple independent bases support the Commission's conclusion of no violation of section 337.

A. Claim Construction

i. The Parties' Stipulated Function for the "Means for Producing" Limitation Does Not Require the Production of "Narrow" Pulses

The ID adopted the parties' stipulated function for the "means for producing" limitation in claim 8 of the '403 patent (**Element 8A**). ID at 26 ("The parties [] agree that the function of the means is 'producing a periodic series of optical pulses defining a series of time slots, wherein one pulse appears in each time slot.'"). There is no dispute that this function does not require the production of a periodic series of "narrow" optical pulses, *i.e.*, pulses of a particular bit rate, and that no party proposed interpreting the function in that way. *See* CSub at 3; RSub at 1, 4, 7; IASub at 6.

While the ID did not expressly construe the claimed function to require "narrow pulses," Xtera argues that the ID effectively imported a "narrow pulses" limitation into the claimed function when it limited the corresponding structure to the single embodiment of Figure **2**. *See* CSub at 3; CReply at 7-8. Respondents and the IA, however, contend that the ID only references

"narrow" pulses when paraphrasing a statement from the specification that Xtera relies on to support its position that the modulator in Figure **1** would need to be modified in order to perform the claimed function. *See* RSub at 5, 6; IASub at 6. Respondents and the IA assert that Xtera did not argue before the ALJ that the modulator in Figure **1** was capable of performing the claimed function *without* modification. *See* RSub at 5, 6; IASub at 6. Xtera claims that Respondents and the IA mischaracterize the record and that it consistently argued that "narrow pulses" and "suitably fast" modulators are not required by or part of the claimed function. *See* CReply at 10-11.

The Commission finds that, before the evidentiary hearing, Xtera's position as to whether the Figure **1** structure is clearly linked to the claimed function was ambiguous and unclear. For example, when addressing the "means for producing" limitation in its *Markman* brief, Xtera argued that the '403 patent's specification clearly links two structures for performing the recited function: first, "pulsed light sources, including active mode locked lasers," and second, "CW lasers with amplitude modulation to create a pulse stream." COCCB at 33. Xtera relied on the testimony of its expert, Dr. Willner, who testified that "the specification discloses everything needed to perform the claimed function—a CW laser and a modulator." *Id.* at 37 (citation omitted). Dr. Willner also testified that "such modulators existed by 2004, but were not in wide commercial circulation." *Id.* at 38 (citation omitted). On the other hand, Xtera also argued that "the '403 patent's specification describes two ways of generating pulses: using a pulsed laser light source such as an active mode locked laser and using a system *similar* to that employed in the prior art: a CW laser with a sufficiently powerful modulator." *See id.* at 37 (emphasis added). Xtera explained that "to produce the *required narrow pulses* [of the recited function] the

modulator **11** would have to be able to switch on and off very quickly." *See id.* at 36 (brackets in original; emphasis added).

Xtera made similarly ambiguous arguments in its pre-hearing brief. Specifically, Xtera argued that the "specification also links performance of the claimed function to a coherent light source that is modulated, such as a modulated continuous wave (CW) laser." CPHB[10] at 24. Xtera stated that "[a]though modulators capable of suitably performing this function for the system described in Figure **1** may not have been readily available at the '403 patent's priority date, the specification assures that '[s]uitable modulators may be available in the near future.'" *Id.* at 25 (citing JX-3 at 4:37). Xtera noted that "[w]hether a linked structure is readily available or is sufficiently 'suitable' to achieve a particular level of efficiency is irrelevant to its status as corresponding structure." *Id.* "The appropriate standard is whether a skilled artisan would understand the specification to disclose structure sufficient to perform the claimed function (even if inefficiently)." *Id.* On the other hand, Xtera again emphasized that the Figure **1** modulator "would have to be able to switch on and off very quickly." *Id.* at 25-26. Xtera asserted that the "'403 patent clearly links a CW laser and modulator to the required function both in the system described in Figure **5** and the system described in Figure **1** *as modified*." *Id.* at 26 (emphasis added).

The Commission finds that it was not until the evidentiary hearing and in its post-hearing briefs that Xtera made clear that "narrow pulses" and "suitably fast" modulators are not required by or part of the claimed function. In particular, at the hearing, Xtera's expert testified that

[10] Complainant's Corrected Pre-Hearing Brief, EDIS Doc ID 661772 (Nov. 13, 2018).

Figure **1** "conforms to a means for producing a periodic series of optical pulses."[11] Tr. (Ralph) at 291:15-17; *see* Tr. (Willner) at 527:20-528:4, 532:8-22. While Dr. Ralph testified that the specification at column 4, lines 32 to 38 discloses that the modulator in Figure **1** may not be capable of turning on and off fast enough to produce the *narrow* pulses required by the invention (*see* Tr. (Ralph) at 366:11-367:15, 405:19-406:14), he explained that the claimed function is performed "strictly from the clock modulating the CW source, [and] that by itself is sufficient to meet" the claimed function, Tr. at 291:17-20; *see also* Tr. at 313:1-10, 362:16-363:15. Xtera reiterated in its post-hearing brief that "[t]his embodiment [shown in Figure **1**] 'might be suitable for producing *narrow* pulses which could be subsequently filtered in accordance with the present invention' based on the availability of 'suitable modulators.'" CIB at 22-23. But Xtera made clear that "[w]hether the optical pulses produced by Figure **1** modulator are 'narrow enough' is not relevant to the claimed function," and that "[a]s to the *claimed* function, the specification clearly links the CW laser and modulator." *Id.* at 24-25.

Before the Commission, the parties do not dispute that the claimed function does not require the production of "narrow" pulses. Although the parties' earlier arguments appeared ambiguous, the Commission finds the parties' interpretation in their submissions in response to the Commission's notice is consistent with the specification and the plain language of claim 8. Accordingly, the Commission adopts the ID's claimed function and clarifies that the function does not require producing "narrow" optical pulses, *i.e.*, pulses of a particular bit rate.

[11] During cross-examination of Xtera's experts, counsel for Xtera argued that the claimed function does not call for "narrow" pulses and the specification at column 4, lines 32 to 38 was not relevant to the claimed function. *See* Tr. at 369:23-370:24, 528:23-530:20.

ii. The Structure Corresponding to the Claimed Function Includes CW Lasers Modulated to Create a Periodic Series of Optical Pulses and Their Equivalents Thereof

After adopting the parties' stipulated function for the "means for producing" limitation, the ID looked to the specification and the prosecution history to identify all structure corresponding to that function. The parties did not dispute, and the ID agreed, that pulsed laser light sources (*e.g.*, active mode locked laser **20** in Figure **2**) or equivalents thereof are corresponding structures. ID at 26-27. The ID also found that the CW laser and MZ modulator in Figures **1** and **5** of the '403 patent are not corresponding structures. *Id.* at 28-32. As explained below, when the claimed function is properly applied in the corresponding structure analysis, the Commission finds that the '403 patent specification clearly links not only pulsed laser light sources, but also CW lasers modulated to create a periodic series of optical pulses (*e.g.*, CW laser **10** and first modulator **11** in Figure **1**), and their equivalents thereof to the claimed function.

A means-plus-function element encompasses all structure in the specification corresponding to that element's function and equivalent structures.[12] *See Micro Chem., Inc. v. Great Plains Chem. Co.*, 194 F.3d 1250, 1258-59 (Fed. Cir. 1999) (citing *Serrano v. Telular Corp.*, 111 F.3d 1578, 1583 (Fed. Cir. 1997)) ("When multiple embodiments in the specification correspond to the claimed function, proper application of § 112, ¶ 6 generally reads the claim element to embrace each of those embodiments."). Structure disclosed in the specification is "corresponding" structure "only if the specification or the prosecution history clearly links or

[12] Because the issue date of the '403 patent is December 28, 2010, the pre-AIA version of 35 U.S.C. § 112 governs. *See* Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284, 296, § 4(c) (2011).

associates that structure to the function recited in the claim." *B. Braun Med., Inc. v. Abbott Labs.*, 124 F.3d 1419, 1424 (Fed. Cir. 1997).

Moreover, the "interpretation of what is disclosed in the specification must be made in light of the knowledge of one skilled in the art." *Biomedino, LLC v. Waters Techs. Corp.*, 490 F.3d 946, 950 (Fed. Cir. 2007) (citing *Atmel Corp. v. Info. Storage Devices, Inc.*, 198 F.3d 1374, 1380 (Fed. Cir. 1999)). In other words, the corresponding structure of the limitation "must be disclosed in the written description in such a manner that one skilled in the art will know and understand what structure corresponds to the means limitation." *Id.* (quoting *Atmel*, 198 F.3d at 1382). However, "the testimony of one of ordinary skill in the art cannot supplant the total absence of structure from the specification." *Id.* (quoting *Default Proof Credit Card Sys., Inc. v. Home Depot U.S.A., Inc.*, 412 F.3d 1291, 1302 (Fed. Cir. 2005)).

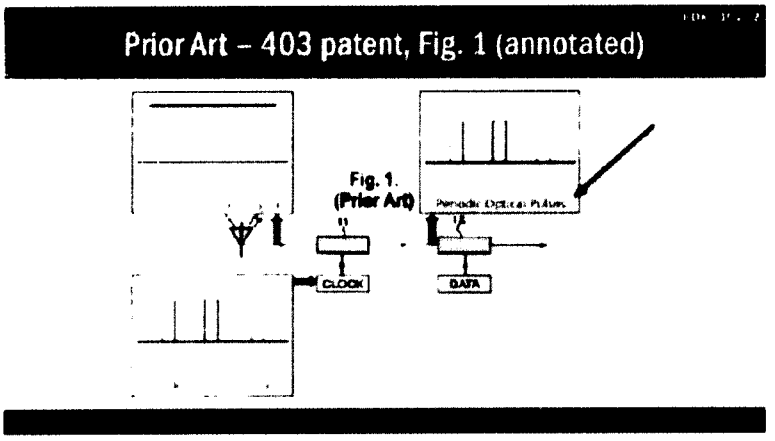
The Commission finds that the record evidence supports finding that one of ordinary skill in the art would understand from the '403 patent specification that the CW laser **10** and the first modulator **11** in Figure **1** are clearly linked to the claimed function. In describing the optical transmitter shown in Figure **1**, the '403 patent specification teaches that "[a] coherent light source **10**, such as a CW laser, produces an optical beam which is first modulated with an electrical clock signal using a first modulator **11**." JX-3 at 2:44-47. The specification provides that the modulators of Figure **1** "could be Mach Zehnder (MZ) modulators or another type of electro-optic modulator." *Id.* at 2:48-50. The specification also discloses that "[t]he first modulator **11** provides a series of pulses at a particular bit rate in accordance with the clock signal." *Id.* at 2:51-52.

The testimonies of both parties' experts confirm that one of ordinary skill in the art would understand from the specification that the CW laser **10** and the first modulator **11** in Figure **1** are

clearly linked to the claimed function. *See* Tr. (Ralph) at 291:14-292:18, 313:1-10, 362:16-20; 398:2-17; Tr. (Willner) at 527:20-528:4, 532:8-22. For example, during the evidentiary hearing, Xtera's expert, Dr. Ralph, testified as follows:

> Q Okay. Let's look at figure 1. Now, in figure 1, ***you believe that figure 1, the prior art figure, shows a structure for producing a periodic series of optical pulses; is that right?***
> A ***Yes.***
> Q And that's prior art; right? Everything in figure 1 was well known in the art before '403 patent; right?
> A Yes.
> Q And what we see here, we have got a continuous wave laser on the left, 10; right?
> A Yes, 10 is a continuous wave laser.
> Q And no dispute that that continuous wave laser does not generate optical pulses, right, by itself? What comes out of that laser, no optical pulses?
> A Correct.
> Q Okay. What goes into -- box 11 there is a modulator; is that right?
> A Yes, the element identified as 11 is a modulator.
> Q ***And what that modulator is doing there in -- that's labeled 11, is it has a clock signal, and it is essentially turning on and off the modulator to allow a series of optical pulses to come out; is that right?***
> A ***Yes.***

Tr. at 362:16-363:15 (emphasis added). Similarly, Respondents' expert, Dr. Brandt-Pearce, demonstrated how Figure **1** uses a CW laser and modulator to generate a periodic series of optical pulses defining a series of time slots, wherein one pulse appears in each time slot. *See* CReply at 15-16 (citing RDX-0105.12 (annotated)).



As shown in the demonstrative above, there is one pulse in each time slot, *i.e.*, one pulse at t = 1, one pulse at t = 2, and one pulse at t = 3. *Id.* at 16. Indeed, Dr. Brandt-Pearce testified multiple times during the hearing that the specification describes Figure **1** as producing the claimed periodic series of optical pulses:

> A Okay. So what a clock signal is, it's a – it's a periodic series of electrical pulses here. And as shown just to the left of the clock, that's what an electrical clock signal might look like.
>
> So what a modulator effectively does, one good way of thinking about it is it takes the electrical signal and, say, multiplies it, so it embeds it onto the optical signal.
>
> ***So what you get at the output is an optical signal that in this case, since I took a constant and multiplied it by a periodic series of pulses, I get a periodic series of optical pulses***, as shown with a blue arrow just to the left of unit 12, right.
>
> . . . .
>
> Q ***You have labeled the output of modulator 11 as periodic optical pulses. Is it important that those optical pulses be periodic?***
>
> A ***It is very important that those pulses be periodic***, because when -- so recall, we're matching those pulses with data. They have to be synchronized so that you have one pulse for every bit of data, and they have to line up.

Tr. at 802:8-20, 803:15-22 (emphasis added). Respondents' submission to the Commission states that Dr. Brandt-Pearce's testimony supports finding one of ordinary skill in the art would

recognize the clear link between the CW laser **10** and modulator **11** in Figure **1** and the claimed function.[13] *See* RReply at 27 n.13 ("[I]n the cited testimony she explained that when a CW laser is modulated with an electrical *clock* signal—which has a regularly repeating pattern—then the output optical signal is considered 'periodic' because it, too, has a regularly repeating pattern.").

Respondents argue that the specification and the expert testimony are insufficient to establish a clear link between the structures of Figure **1** and the claimed function because the specification does not expressly state that those structures generate pulses wherein each pulse defines a time slot. *See* RReply at 9-10. Respondents' argument is directly contradicted by the specification and its own expert testimony as discussed above. To the contrary, the specification and expert testimony support the conclusion of a clear link because by providing a clock signal to a modulator, the CW laser and the first modulator of Figure **1** produce a periodic series of optical pulses defining a series of time slots, wherein one pulse appears in each time slot as discussed below.

Respondents also argue that *Medtronic* is analogous to the facts here because "[e]ven if Figure 1's CW laser-MZ modulator combination *could* be configured to perform the function recited in Element [8A], . . . the intrinsic record does not *clearly link or associate* this structure with the claimed function." RSub at 11 (citing *Medtronic, Inc. v. Advanced Cardiovascular Sys., Inc.*, 248 F.3d 1303, 1312 (Fed. Cir. 2001)). Respondents' argument is unpersuasive. In *Medtronic*, the parties agreed that "helical windings" were a corresponding structure to the

[13] The Commission gives no weight to Xtera's argument that the Bulow reference cited by the examiner during prosecution supports finding Figure **1** is clearly linked to the claimed position. CSub at 14-15. Xtera did not raise its Bulow argument before the ALJ or in its petition for Commission review. Xtera, therefore, has waived this argument. *See, e.g., Finnigan Corp. v. Int'l Trade Comm'n*, 180 F.3d 1354, 1362-63 (Fed. Cir. 1999) (waiver for failure to raise the issue in a party's petition for Commission review).

function of "connecting adjacent elements together," but disagreed as to whether "straight wire and hooks" were also a corresponding structure. Although the court found that the straight wire and hooks were *capable* of performing the function, the court found that the specification did not sufficiently link the straight wire and hooks with the claimed function. 248 F.3d at 1312. Rather, the specification linked the straight wire and hooks to an entirely different function. *See id.* at 1313.

In contrast, the specification in this case clearly links the CW laser and first modulator in Figure **1** with "producing a periodic series of optical pulses defining a series of time slots, wherein one pulse appears in each time slot." *See* JX-3 at 2:44-47 (disclosing the CW laser "produces an optical beam which is first modulated with an electrical clock signal using a first modulator **11**"), 2:51-52 (disclosing that "[t]he first modulator **11** provides a series of pulses at a particular bit rate in accordance with the clock signal"). Moreover, both parties' experts testified that the disclosed structures of Figure **1** and the corresponding description of Figure **1** in the specification would convey to one skilled in the art the link to the claimed function. *See* Tr. (Ralph) at 291:14-292:18, 313:1-10, 362:16-363:15; 398:2-17; Tr. (Willner) at 527:20-528:4, 532:8-22; Tr. (Brandt-Pearce) at 802:8-803:22. Thus, the evidence demonstrates that the CW laser and the first modulator of Figure **1** actually perform the claimed function—not simply that a skilled artisan would know that those structures *can* be configured to perform the claimed function. Indeed, other than evidence demonstrating that the Figure **1** system may not be able to produce sufficiently "narrow pulses," which is not required by the claimed function, there is no evidence in the record contradicting the fact that the CW laser and the first modulator of Figure **1** perform the claimed function.

Respondents further argue that *Signtech USA, Ltd. v. Vutek, Inc.*, 174 F.3d 1352 (Fed. Cir. 1999), is instructive because the '403 patent specification at column 4, lines 32-37 purportedly describes Figure **1** as incapable of performing the claimed function. RSub at 13. The Court in *Signtech* construed a means-plus-function limitation to exclude a prior art structure because the specification taught away from the prior art. 174 F.3d at 1354, 1357-58. The specific prior art structure in *Signtech* was described in the written description as "incapable" of performing the function of the means-plus-function element. *Id.* Thus, the claim was construed so that it did not cover that specific prior art structure. *Id.* at 1357. However, the Court in *Signtech* noted that the claim could indeed cover alternative embodiments described in the written description, just not the particular prior art structure that was "incapable" of performing the appropriate function. *See id.*

First, we find that Respondents' reliance on the specification at column 4, lines 32-37 stems from a misreading of two phrases: (1) "in accordance with the present invention," and (2) "the required narrow pulses." The relevant portion of the specification states as follows:

> It should be noted that the system shown in FIG. 1 might be suitable for producing narrow pulses which could be subsequently filtered ***in accordance with the present invention***. In order to produce ***the required narrow pulses*** the modulator **11** would have to be able to switch on and off very quickly. Suitable modulators may be available in the near future.

JX-3 at 4:32-37 (emphasis added). When this portion of the specification is read in context, it is directed to the Figure **1** system as a whole for not being suitable to produce "narrow pulses" that can be filtered in accordance with the invention unlike the "narrow pulses" directly produced by the "pulsed laser light source" of Figure **2** and the "compressed [] pulses" processed by the filter in the system of Figure **5**. *Id.* at 3:3-6, 4:35, 4:26-27. Respondents mistake the phrase "in accordance with the present invention" as pertaining to the "means for producing" limitation

rather than the WDM transmission system with the claimed filter. Immediately following the specification at column 4, lines 32-37, the specification clarifies what it means by "the present invention" when it teaches that "[t]he present invention provides a data format that is tolerant to overlap between neighbouring bits, allowing greater spectral efficiency in a WDM transmission scheme." *Id.* at 4:38-40. Notably, the patentee's description of "the present invention" does not mention the production of narrow pulses.

Second, Respondents conflate the pulses produced by the "means for producing" limitation with the pulses that are filtered in accordance with the invention, which leads to their misunderstanding of "the required narrow pulses." Even though the specification points out certain disadvantages and inadequacies of the prior art Figure **1** system, it does not state that only the pulsed laser light source, but not the Figure **1** components, could be used to perform the claimed function. To the contrary, the specification specifically included this prior art in the Detailed Description section of the specification and expressly stated that the "modulator **11** provides a series of pulses at a particular bit rate in accordance with the clock signal." *Id.* at 2:41-52. As discussed above, both parties' experts testified that the CW laser and the first modulator of Figure **1** perform the claimed function even if the experts disputed whether the produced pulses were sufficiently "narrow" to be filtered in accordance with the invention.[14] For these reasons, *Signtech* is inapplicable.

[14] Although the parties agree that **Element 8A** does not require "narrow" pulses, to the extent that the claimed filter processes "narrow" pulses, the specification teaches in an alternative embodiment that an amplifier and a length of "nonlinear highly dispersive fib[er]" can be used to "compress[]" and "narrow" the optical pulses that are produced by the CW laser and modulator. *See* JX-3 at 4:20-28; Tr. (Ralph) at 403:7-9; CPet at 22 n.1; RResp at 5-6; RIB at 64.

Thus, in view of the parties' arguments and the record evidence, the Commission adopts the ID's claimed function for the "means for producing" limitation and clarifies that the claimed function does not require producing "narrow" optical pulses, *i.e.*, pulses of a particular bit rate. When this claimed function is properly applied in the corresponding structure analysis, the record evidence supports finding that one of ordinary skill in the art would recognize from the specification a clear link between the CW laser **10** and the first modulator **11** of Figure **1** and the claimed function.[15] Accordingly, we find the structures that correspond to the claimed function for **Element 8A** include pulsed laser light sources (*e.g.*, active mode locked laser **20** in Figure **2**), CW lasers modulated to create a periodic series of optical pulses (*e.g.*, CW laser **10** and first modulator **11** in Figure **1**), and their equivalents.

B. Infringement

i. Under the Commission's Construction, Xtera Has Not Shown Literal Infringement of the Asserted Patent Claims

Under the Commission's construction for **Element 8A**, which is broader than the ID's construction, Xtera has not shown that the Accused Products literally infringe claims 8, 9, and 12 of the '403 patent because the accused CW laser-MZ modulator structure does not satisfy any element of claim 8.[16]

---

[15] The Commission adopts the ID's analysis regarding Figure **5** of the patent specification and the ID's finding that neither the light source **50** nor the MZ modulator **51** nor their combination are clearly linked to the claimed function. *See* ID at 29-32. In contrast to the first modulator **11** in Figure **1**, the modulator **51** in Figure **5** produces optical *data* pulses, which is not a *periodic* series of pulses because "data is not periodic." *See* ID at 29-30 (citations omitted). Moreover, the specification does not describe Dr. Ralph's theory that the modulator **51** in Figure 5 "simultaneously" creates a pulse and modulates that pulse with data. *Id.* at 31.

[16] The Commission adopts the ID's finding that Xtera withdrew its indirect infringement arguments because it did not raise them in its post-hearing briefs. ID at 55. Xtera did not petition for review of this finding.

An infringement analysis of a claim with limitations drafted pursuant to 35 U.S.C. § 112, ¶ 6, involves the same two steps: claim construction and a comparison of the accused device or method with the properly construed claims. *IMS Tech., Inc. v. Haas Automation, Inc.*, 206 F.3d 1422, 1429 (Fed. Cir. 2000). For literal infringement of a means-plus-function claim limitation, the second step of an infringement analysis begins with determining whether the relevant structure in the accused device performs the identical function recited in the claim. *Id.* at 1430. If the finder of fact determines that the accused device or method does not perform a function identical to the one recited in the claim, there is no literal infringement. *See id.*

In this case, the ID found that the CW laser-MZ modulator combination in the Accused Products do not perform the claimed function of "producing a periodic series of optical pulses, defining a series of time slots, wherein one pulse appears in each time slot." *See* ID at 41-45. This finding is unaffected by the Commission's modification of the corresponding structure for **Element 8A** to include the CW laser **10** and the first modulator **11** in Figure **1**. That is because Xtera implicitly concedes that, in order to reach a different outcome on infringement, the Commission would have to reverse the ID's findings on a number of issues that do not depend on whether the optical pulses are "narrow" or not, including: (1) the ID's interpretation of "periodic"; (2) the ID's interpretation of "one pulse appears in each time slot"; (3) the ID's finding regarding the claimed filter in **Elements 8B** and **8C**; (4) the ID's finding regarding the "modulating means" in **Element 8D**; and (5) the ID's finding that Figure **5** is not clearly linked to the claimed function for **Element 8A**. *See* CSub at 25-37.

With respect to **Element 8A**, the ID first assessed whether the optical beam output from the accused CW laser met the requirements of the agreed function. ID at 42. The ID properly found that it did not because the optical beam has a relatively constant amplitude that does not

include any pulses. *Id.*; *see* RDX-0105.31; Tr. (Pelouch) at 138:12-139:13; Tr. (Ralph) at 249:2-9, 363:3-6, 376:21-377:2, 382:23-383:4, Tr. (Willner) at 466:22-467:23, Tr. (Brandt-Pearce) at 816:15-817:3, Tr. (Blumenthal) at 974:16-23.

In addition, the ID properly found that the output signal of the accused CW laser-MZ modulator combination also did not meet the requirements of the claimed function because it could not: (*i*) produce a "series of optical pulses;" (*ii*) produce pulses such that one pulse appears in each time slot; or (*iii*) produce a "periodic" series of optical pulses as required by the claimed function of **Element 8A**. ID at 41-44; *see* RDX-0105.34. The ID found that the output of the CW laser-MZ modulator combination in the Accused and DI Products is a non-periodic signal without any pulses. *Id.*; CDX-0103C.33; Tr. (Brandt-Pearce) at 814:17-819:10, 824:25-826:16, 827:8-828:21; Tr. (Blumenthal) at 970:6-14; RDX-0105C.49-51.

Xtera argues for the first time that "[i]t would make no sense for a periodic series of pulses whose purpose is to carry data to suddenly no longer be periodic when data is put on the pulses ***at the same bit rate*** that the pulses are produced." CSub at 26. Xtera's argument is not supported by the specification. The pulses produced by CW laser **10** and modulator **11** in Figure **1** have not yet been modulated with data and would still have a regular, repeating pattern. RReply at 27 (citing Tr. (Brandt-Pearce) at 803:15-22). By contrast, the ID found that the accused CW laser-MZ modulator combination does not produce *any* pulses, periodic or not. ID at 43-45.

According to Xtera, "[e]ven NEC's expert Dr. Blumenthal agreed that a 'periodic series of optical pulses' are pulses 'that are periodic at the required bit time slot interval,' *i.e.*, a rate and not a repeating pattern." CSub at 26 (citing Tr. at 1002:20-1004:6). We agree with Respondents that "[w]hile a periodic signal can have a bit rate (*i.e.*, because it has a repeating pattern at fixed

intervals), a signal with a bit rate is *not* necessarily periodic." RReply at 27 n.13 (citing Tr. (Brandt-Pearce) at 826:3-5 (opining that "a series of pulses that are at irregular or sporadic intervals" would not be periodic). Thus, the Blumenthal testimony—which relates to bit rates of periodic signals—does not support Xtera's "periodic" argument.

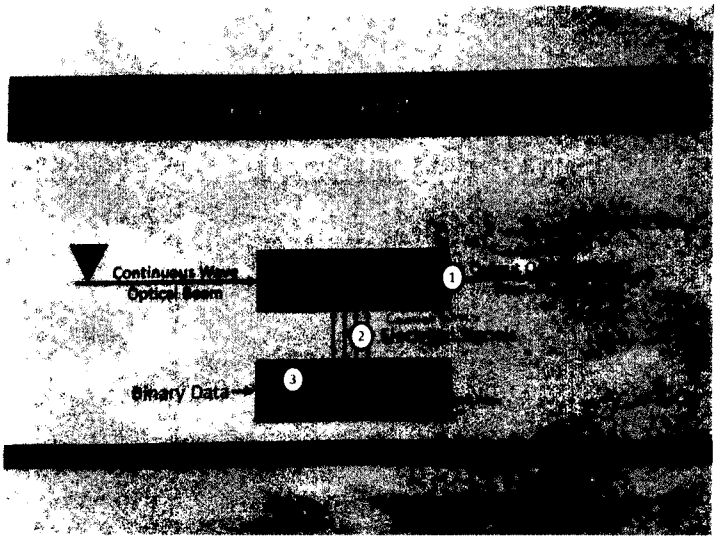
Xtera asserts that "the ID acknowledge[d], the produced optical pulses may also satisfy the definition of the claimed carrier pulses." CSub at 28 (citing ID at 37-38). To the contrary, the ID construed "carrier pulses" to be "optical pulses that have been filtered," which are different from the "optical pulses" produced by the "means for producing" limitation. ID at 50. Xtera's failure to petition for review of the ID's constructions of "carrier pulses" to be "optical pulses that have been filtered," and "the pulses" as used in the "modulating means" limitation to be "optical pulses" filtered or unfiltered, is fatal to Xtera's infringement position. *See id.* at 33-39, 50. The ID's interpretation of "the pulses" and "carrier pulses" necessarily requires the production of "a periodic series of optical pulses" *before* those "optical pulses" can be filtered and/or modulated. *See id.* at 51 n.7. Having waived any challenge to these constructions, Xtera's theory that the asserted claims are infringed by products that allegedly simultaneously produce a series of pulses and modulate those pulses with data necessarily fails. *See id.* at 51.

Xtera misunderstands the record when it states that "Respondents concede, requiring 'visible' pulses would limit even the Figure **2** embodiment to transmitting only specific binary data sequences of 'a 1, [which is] a nonzero value, and then a bunch of zeros,' excluding any sequence that has consecutive '1' values." CSub at 29 (citing Tr. at 824:12-15). The cited portion of the transcript relates to a journal article "Schmogrow" (CX-2609) that Xtera's expert relied on to support its position that optical and electrical filters are both capable of producing the claimed carrier pulses and are therefore equivalent. *See* Tr. (Ralph) at 337:13-339:10. In

response to Dr. Ralph's testimony, Respondents' expert testified that unlike the optical and electrical filters illustrated in Schmogrow, the Accused and DI Products are not capable of outputting an impulse response. *See* Tr. (Brandt-Pearce) at 824:8-15. It is unclear what the relevance of this article and the expert testimony is, as Xtera did not cite this evidence before the ALJ with respect to the construction of **Element 8A**. Thus, Xtera's argument is waived.

With respect to **Elements 8B** and **8C**, as mentioned above, Xtera did not petition for review of the ID's construction of "carrier pulses," which was "optical pulses that have been filtered." ID at 50. The ID correctly applied this construction to find that the digital FIR filter in the Accused Products gave rise only to electrical signals, not carrier pulses, and thus the Accused Products do not include the claimed filter. *Id.* at 49-50. Accordingly, the ID properly concluded that the Accused Products lack the "filter and carrier pulses required by claim elements 8B and 8C." *Id.* at 50.

The ID also found Xtera's expert not credible on this issue because his testimony is "unclear" regarding the location of "carrier pulses" in the Accused Products and is "undermin[ed]" by "difficulty remembering which one of the three possible locations he was relying on for the purposes of his infringement analysis." *Id.* at 50 (citing Tr. at 554:3-555:6). Before the ALJ, Xtera accused a digital FIR filter in the Accused and DI Products of giving rise to carrier pulses in three different locations: (1) the output of the MZ modulator; (2) in between the DAC and MZ modulator; and (3) inside the DSP. *See id.* (citing Tr. (Willner) at 550:8-555:9, 587:9-589:16; RDX-130). These three locations are depicted in RDX-130, which follows:



See RDX-130 (annotation added). Xtera's petition does not dispute the ID's finding "that signals coming out of the DSP and digital-to-analog convertor (DAC) and going into the MZ modulator are electrical signals, not optical signals." *Id.* (citing Tr. at 347:10-17 (describing "carrier pulses" between DAC and MZ modulator as "electrical analog signals"), 850:17-22 (output of FIR filter is "a stream of digital samples")). Moreover, the ID found "that those electrical signals do not include any pulses." *Id.* (citing Tr. (Brandt-Pearce) at 822:21-823:11, 855:2-7, 970:6-23). Because Xtera does not dispute the ID's finding that there are no pulses in the electrical signals coming out of the DSP and DAC and going into the modulator, then there can be no pulses at the output of the MZ modulator. ID at 50, 52; Tr. (Brandt-Pearce) at 818:4-819:10. Moreover, because Xtera fails to demonstrate that the MZ modulator in the Accused and DI Products produces optical pulses as required by **Element 8A**, that same MZ modulator likewise fails to give rise to optical pulses that have been filtered. *See* ID at 49-50.

With respect to **Element 8D**, the ID properly rejected Xtera's argument that the same structure, *i.e.*, the MZ modulator in the Accused Products, can simultaneously produce optical pulses and modulate those pulses with data because the "plain language of claim element 8D requires a structure (the 'modulating means') to perform an action ('modulating') on what is

grammatically the object of the phrase ('the pulses')." *Id.* at 51. The ID found that the MZ modulator in the Accused Products is identical to the MZ modulator described as performing the claimed function in the asserted patent. *Id.* at 52. However, the ID also found that the MZ modulator in the Accused Products does not perform the recited function of "modulating optical pulses with data for transmission" because the modulator receives a continuous light beam from the CW laser and there are no pulses in such a beam. *Id.*

Xtera has raised no clear error with the ID's finding that the MZ modulator in the Accused Products does not satisfy **Element 8D**. Xtera never proposed a different function for **Element 8D** before the ALJ or in its petition for review, and it does not petition for review of the ID's finding that "the pulses" in this element refers to "optical pulses." *See* CPet at 52-53; CIB at 66 ("The antecedent basis for 'the pulses' in claim 8 is 'the optical pulses.'"). Accordingly, there is no dispute over the proper claim construction for **Element 8D**, and the ID's finding that the MZ modulator in the Accused Products does not perform the identical function of **Element 8D** is appropriate. It is undisputed that (i) a CW laser does not output optical pulses (Tr. (Ralph) at 362:25-363:6; *id.* (Willner) at 527:5-12); and (ii) each Accused and DI Product includes a CW laser that is input into the MZ modulator. Optical pulses are therefore not input to the MZ modulator in the Accused or DI Products and, thus, cannot be modulated by the MZ modulator as required by the claims.

For the reasons discussed above, the Commission affirms the ID's finding that the Accused Products do not literally infringe claims 8, 9, and 12 with the additional analysis provided above. Accordingly, the Commission declines to adopt the ID's literal infringement analysis based on its narrower claim construction for **Element 8A**, including the sentence that

begins with "Additionally" on page 41 of the ID, as well as the analyses at subsections (b) and (c) on pages 45-49 of the ID.

ii. Xtera's Doctrine of Equivalents Argument Is Waived and Is Not Supported by the Record Evidence

In addition to literal infringement, Xtera argued before the ALJ that the Accused Products also infringe claims 8, 9, and 12 under the doctrine of equivalents. "Although an equivalence analysis under § 112, ¶ 6, and the doctrine of equivalents are not coextensive (for example, § 112, ¶ 6, requires identical, not equivalent function) and have different origins and purposes, their tests for equivalence are closely related." *Chiuminatta Concrete Concepts, Inc. v. Cardinal Indus., Inc.*, 145 F.3d 1303, 1310 (Fed. Cir. 1998) (citations omitted). "Both § 112, ¶ 6, and the doctrine of equivalents protect the substance of a patentee's right to exclude by preventing mere colorable differences or slight improvements from escaping infringement, the former, by incorporating equivalents of disclosed structures into the literal scope of a functional claim limitation, and the latter, by holding as infringements equivalents that are beyond the literal scope of the claim." *Id.* "They do so by applying similar analyses of insubstantiality of the differences." *Id.*

As an initial matter, Xtera has waived its doctrine of equivalents argument before the Commission by not raising it in its petition for review and in response to the Commission's notice. *See* 19 C.F.R. § 210.43(b)(2); *see, e.g.*, *Finnigan Corp. v. Int'l Trade Comm'n*, 180 F.3d 1354, 1362-63 (Fed. Cir. 1999) (waiver for failure to raise the issue in a party's petition for Commission review).

Even if the doctrine of equivalents issue was not waived, Xtera's doctrine of equivalents argument with respect to **Element 8A** was limited to whether the accused CW laser-MZ modulator combination performs "the same function in substantially the same way to achieve

substantially the same result as a pulsed light source such as an active mode-locked laser." *See* CIB at 85-87. In other words, even though Xtera urged the ALJ to construe **Element 8A** broadly to include the structures in Figures **1** and **5**, Xtera failed to set forth its doctrine of equivalents position under its proposed construction. *See id.* at 19-25, 85-87. For that reason, the ID's analysis with regard to the doctrine of equivalents was limited to a comparison of the accused structure with a pulsed light source. ID at 53-54. Accordingly, the Commission declines to adopt the ID's doctrine of equivalents analysis at section IV(C)(2) on pages 53-54.

Notwithstanding waiver, in this case there can be no doctrine of equivalents infringement because even though both the accused structure and the corresponding structure in Figure **1** are structurally identical (both structures include a CW laser and a MZ modulator), the inputs to the respective modulators are different and, therefore, the functions performed by the modulators are not substantially the same. In particular, as we have explained above, the first modulator **11** in Figure **1** takes an electrical *clock* signal as its input and outputs a periodic series of pulses at a particular bit rate in accordance with the clock signal. JX-3 at 2:44-47, 2:51-52. By contrast, the ID found that the accused CW laser-MZ modulator takes an electrical *data* signal as its input and outputs a non-periodic signal without a series of pulses, wherein one pulse appears in each time slot. ID at 42-45. Xtera's position that the accused MZ modulator *simultaneously* produces a series of pulses and modulates the pulses with a data signal effectively reads out the "means for producing" limitation from claim 8 because the claim language requires the "means for producing" to produce the series of pulses and the "modulating means" to modulate the *already-produced* pulses with data for transmission. ID at 51, 51 n.7; *see Duncan Parking Techs., Inc. v. IPS Grp., Inc.*, 914 F.3d 1347, 1362 (Fed. Cir. 2019) ("[T]he doctrine of equivalents cannot be used to effectively read out a claim limitation . . . because the public has a right to rely on the

language of patent claims." (citing *Primos, Inc. v. Hunter's Specialties, Inc.*, 451 F.3d 841, 850 (Fed. Cir. 2006))). Because the CW laser-MZ modulator combination in the Accused Products and the corresponding structure do not perform substantially the same function of **Element 8A**, the Accused Products do not infringe the asserted claims of the '403 patent under the doctrine of equivalents.

Moreover, there can be no doctrine of equivalents infringement because the record evidence does not support finding that the structure in the Accused Products produces substantially the same result compared with the corresponding structure in Figure **1**. As the ID explained in the context of literal infringement, the accused "MZ modulator uses encoded electrical signals from a digital signal processor to modulate the incoming continuous laser beam with data at predetermined intervals." ID at 42. The ID found as a factual matter that the resulting output optical signal from the MZ modulator "has no regularly repeating pattern and is not periodic." *Id.* (citing CDX-0103C.33). By contrast, as discussed above, there is no factual dispute that the output of the first modulator in Figure **1** is a periodic series of optical pulses. Thus, notwithstanding Xtera's waiver of its doctrine of equivalents argument, the Accused Products also do not infringe claims 8, 9, and 12 of the '403 patent under the doctrine of equivalents.

C. Invalidity

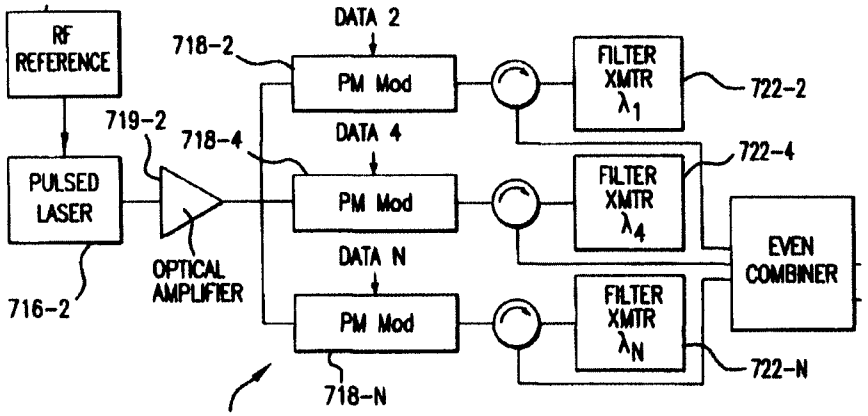
i. Xtera Has Failed to Establish Clear Error in the ID's Finding That Frankel Anticipates the Asserted Patent Claims[17]

Subject to the additional analysis provided *infra*, the Commission affirms and adopts the ID's analysis and conclusion that Frankel anticipates the asserted claims of the '403 patent.[18] The ID found that Frankel describes "a device and method for minimizing optical channel drift in a wavelength division multiplexed communication system" and "provid[ing] high channel density, i.e., spectral efficiency, and excellent signal transmission performance in multiwavelength optical communication systems." ID at 60 (citing RIB[19] at 15 (quoting RX-0651 at 1:5-8, 2:16-22)). As shown in Figure **7** of Frankel (partially reproduced below), the ID noted that Xtera does not dispute that Frankel discloses "a pulsed laser light source," "a modulator for modulating data onto a pulsed laser light source," and "a filter having a spectral profile giving rise to carrier pulses." *Id.* at 60-61 (citations omitted).

[17] There is no dispute that the Commission's broader construction of **Element 8A** does not impact the ID's findings and the parties' positions on invalidity. *See* CSub at 37; CReply at 34; RSub at 24; IASub at 24.

[18] Respondents' contingent petition requests the Commission to review two invalidity issues if the Commission reviews the ID's claim constructions and non-infringement findings: (1) whether the asserted claims of the '403 patent are rendered obvious both by Frankel alone and by Frankel in combination with the textbook by Proakis (RX-0790); and (2) whether McCarty (U.S. Patent No. 6,628,728 (RX-0786)), alone and/or in combination with the textbook by Kaminow (RX-0787), renders obvious the asserted claims. Because the Commission affirms the ID's finding that Frankel anticipates the asserted claims, the Commission does not address Respondents' additional invalidity arguments raised in its contingent petition.

[19] Respondents' Initial Post-Hearing Brief, EDIS Doc ID 667754 (Feb. 21, 2019).



RX-0651 at Figure **7** (partial reproduction). The ID stated that "Xtera only contends that Respondents failed to show, for claim 8, that the filter disclosed in Frankel produces the required 'temporal shape.'" *Id.* at 61 (citing Tr. (Willner) at 1103:7-21; *see* CRB[20] at 29-48; SIB at 60).

With respect to the limitation that the filter gives rise to carrier pulses having a "temporal profile having a minimum substantially in the center of each of the time slots adjacent to the time slot for that corresponding carrier pulse," (**Element 8C**), the ID found that Respondents' expert "testified that this limitation is met by the nature of super-Gaussian filters and a person of ordinary skill in the art would know how to 'pick the right parameters for your super-Gaussian filter' to satisfy the claim 8 requirements." *Id.* at 63 (citing Tr. (Brandt-Pearce) at 887:19-23, 890:15-17); *see* Tr. (Brandt-Pearce) at 886:19-888:12. The ID also discussed Dr. Brandt-Pearce's testimony that the "eye diagram" in Figure **6** of Frankel shows the required minimum substantially in the center of each of the time slots. ID at 63-66.

The ID properly found that "Xtera's evidence to the contrary is weak." *Id.* at 64. Specifically, the ID found that although Xtera's expert, Dr. Willner, testified that he does not "believe that necessarily all [super-Gaussian filters] would have a minimum substantially in the

[20] Complainant's Responsive Post-Hearing Briefing, EDIS Doc ID 668763 (Feb. 28, 2019).

center of a neighboring time slot," he said "nothing about whether the super-Gaussian filters relied on by Respondents [*e.g.*, the 2.3 order super-Gaussian filter expressly disclosed in Frankel] would or would not have minimums substantially in the center of a neighboring time slot[]." *Id.*; *see also* CRB at 31; Tr. (Willner) at 1127:22-1128:4.

Further, the ID correctly rejected Xtera's argument that the "eye diagram" is irrelevant because it is formed at the receiver and represents the contribution of multiple components. ID at 65-66. The ID found that "Frankel discloses that the receiver and transmitter filters may be substantially identical." *Id.* at 66 (citing RX-651 at 5:17-27; Tr. (Brandt-Pearce) at 892:19-893:24). The ID also found that Xtera admits Frankel teaches "that the 'limited uses' of an eye diagram include the crossing points, useable eye width, and usable eye height which is consistent with Respondents' use of the eye diagram to show pulse minimums." *Id.* at 65 (citing CRB at 39 (citing RX-651 at 6:1-8)). Xtera's citation to Dr. Willner's testimony and attorney argument do not establish clear error in the ID's factual finding about what is disclosed by the "eye diagram" and the ID's conclusion that the "eye diagram" provides additional evidence that Frankel's 2.3-order super-Gaussian filter gives rise to pulses with a minimum substantially in the center of each of the time slots adjacent to the time slot for that corresponding carrier pulse.

With respect to the limitation that the "temporal profile of the corresponding carrier pulse further [has] an oscillating tail," the ID properly found that "Frankel discloses to a person of ordinary skill in the art [this] limitation either through the 2.3 super-Gaussian filter embodiment of Frankel or a higher-order super-Gaussian filter, such as a sixth-order super-Gaussian filter." *Id.* at 63. The ID credited Dr. Brandt-Pearce's testimony that a person of ordinary skill in the art ("POSITA") would know that "the impulse response of a super-Gaussian filter of really any order higher than 2 . . . would have one or more visible bumps, oscillating tails." Tr. at 887:6-23,

890:6-17; *see also* ID at 62. Xtera's expert, Dr. Willner, agreed that higher-order super-Gaussian filters can have oscillating tails, but equivocated that "not necessarily all" super-Gaussian filters have oscillating tails. ID at 62 (citing Tr. (Willner) at 1103:22-1104:8). We find that Dr. Willner's testimony is consistent with Dr. Brandt-Pearce's testimony that a super-Gaussian filter with any order higher than 2 would have oscillating tails, since Dr. Brandt-Pearce's testimony presumably indicates that a super-Gaussian filter with an order lower than 2 may not necessarily have oscillating tails.

Xtera argues that Dr. Brandt-Pearce did not provide the "additional information [that] would be needed to determine whether the oscillations are 'substantially in the middle of neighboring time slots,' as required by the asserted claims." CPet at 68 (citing Tr. at 887:13-23). But Dr. Brandt-Pearce's testimony just before the testimony Xtera cites in its petition states that she is referring to the "2.3 super-Gaussian filter" as an example of a super-Gaussian filter with "the right parameters so that the main lobe hits a zero at the right times on the adjacent pulses," as required by **Element 8C**. Her testimony is reproduced below:

> Q Does the teaching of the formula shown in column 4, lines 24 to 35 inform your opinion as to whether or not the output pulses of the Frankel filter would have that temporal profile?
>
> A Yeah. So when -- what is shown in Frankel is this super-Gaussian filter with the specified spectral properties. And **this would be a 2.3 super-Gaussian filter**.
>
> And when you look at the impulse response of a super-Gaussian filter of really any order higher than 2, you would see an impulse response that has a main -- a main lobe. It would then, if you look at the intensity, would go to zero, and then it would have one or more visible bumps, oscillating tails.
>
> So I know that's what super-Gaussian filters look like, and so if you pick **the right parameters** for your super-Gaussian filter so that that main lobe hits a zero at the right times on the adjacent pulses, then you satisfy claim 8C.

Tr. (Brandt-Pearce) at 887:6-23 (emphasis added). It is evident from Dr. Brandt-Pearce's testimony that her reference to "the right parameters" is referring to the right *order*. In fact, Xtera admitted as much. CPet at 67 (stating that Dr. Brandt-Pearce "testified that super-Gaussian filters with 'the right parameters' (i.e., the correct order filter) would satisfy the claimed temporal profile").

Equally unpersuasive are Xtera's genus/species arguments and its argument that the ID impermissibly relies on a POSITA's hindsight or knowledge of the '403 patent. *Id.* at 64-66 (arguing, *inter alia*, that the ID used the '403 patent "as a map" for anticipation), 69-71 (arguing, *inter alia*, that the ID's anticipation analysis used "hindsight knowledge"). The ID credited Dr. Brandt-Pearce's testimony that the claimed temporal profile is met by the nature of super-Gaussian filters and that any super-Gaussian filter over order 2 would necessarily have the required temporal profile. ID at 62-63; Tr. (Brandt-Pearce) at 887:6-23; *see also* Tr. (Willner) at 1119:6-11. The ID also found that Frankel expressly discloses higher-order super-Gaussian filters, including the 2.3-order super-Gaussian filter specifically, and that Frankel teaches that the 2.3-order super-Gaussian filter outputs pulses with the claimed temporal profile, which is much more than a theoretical possibility as Xtera argues. *See* ID at 63-66; Tr. at 887:6-23; RX-0651 at Fig. 6. The ID further relied on Dr. Brandt-Pearce's testimony that claim 7 of Frankel tells a POSITA to "pick the order that suits your needs" and there is no dispute that a sixth-order super-Gaussian filter would produce pulses with the claimed temporal profile. ID at 62-63 (citing Tr. (Brandt-Pearce) at 890:15-17, 896:3-10; Tr. (Willner) at 1079:4-22, 1103:15-1107:25). Thus, contrary to Xtera's assertion, the ID did not impermissibly refer to the asserted patent as a roadmap in finding that Frankel anticipates the asserted claims.

Finally, Xtera argues for the first time that the ID improperly relied on disclosures from multiple embodiments in Frankel because Frankel's dependent claims 7 and 8 require a "phase modulator" but, according to Respondents, asserted claim 8 requires an amplitude modulator. CPet at 72-73. As Respondents and the IA point out, Xtera never raised this argument and did not contest the fact that Frankel discloses **Elements 8A** and **8D** before the ALJ. IAResp at 26; RResp at 81. Because Xtera did not raise this argument in its pre-hearing and post-hearing briefs, the Commission finds this argument waived. *See* CPHB at 1322-28; CRB at 27-48; *Broadcom Corp. v. Int'l Trade Comm'n*, 542 F.3d 894, 901 (Fed. Cir. 2008) (party "waived that argument by failing to preserve it in the proceedings before the administrative law judge").

Notwithstanding waiver, we find Respondents' position that "claims 7 and/or 8 of Frankel are applicable to transmitters that can employ *both* phase *and* amplitude modulation" is more persuasive. RResp at 80-81 (citing RX-0651 at claim 6 (which depends from claim 2, claiming a filter "configured to amplitude modulate"); Tr. at 883:5-12 (explaining that Frankel at 1:26-34 discloses "on/off keying," which is the "same as the modulation scheme disclosed in the asserted patent"). Just because claims 7 and 8 depend from a claim requiring a phase modulator does not mean that those claims must refer to an embodiment without amplitude modulation. RResp at 82.

Accordingly, subject to the additional analysis provided above, the Commission affirms and adopts the ID's finding that Frankel anticipates the asserted claims of the '403 patent.

D. Domestic Industry

Subject to the analysis below, the Commission affirms and adopts in part the ID's finding that Xtera failed to demonstrate that a domestic industry exists with respect to the '403 patent. In particular, the Commission affirms and adopts the ID's findings that (1) Xtera did not demonstrate that its DI Products practice the '403 patent, ID at 55; (2) even if its DI Products

practice the '403 patent, Xtera's alleged domestic industry showing improperly included investments and activities in articles not protected by the asserted patent, *id.* at 67-75; and (3) Xtera's belated allocation of its investments and activities has been waived and lacks the support of substantial evidence, *id.* at 76-77.

i. Xtera Did Not Show Practice of the Asserted Patent Claims to Demonstrate the Existence of a Domestic Industry

Both Federal Circuit law and Commission precedent require the existence of actual "articles protected by the patent" in order to find that a domestic industry exists. *See, e.g.*, *Microsoft Corp. v. Int'l Trade Comm'n*, 731 F.3d 1354, 1361-62 (Fed. Cir. 2013); *Certain Computers and Computer Peripheral Devices, and Components Thereof and Products Containing Same*, Inv. No. 337-TA-841, Comm'n Op. at 32 (Jan. 9, 2014). In this investigation, Xtera has not shown the existence of an article protected by the '403 patent. Here, the parties have not disputed, and the Commission affirms and adopts, the ID's finding that Xtera's arguments with respect to whether its articles practice the '403 patent are "coextensive" with its infringement arguments. *See* ID at 55; *see also* CIB at 78-79 ("The parties agree for claim 8, the DI and accused products operate in a similar manner using the same three components . . . . "). As such, Xtera has not established that a domestic industry exists relating to the articles protected by the '403 patent for the same reasons discussed above with respect to infringement.

ii. The ID Properly Concluded That Xtera's Alleged Domestic Industry Showing Improperly Included Investments and Activities in Articles Not Protected by the Asserted Patent

Independent of the foregoing discussion, the Commission finds that even if Xtera had demonstrated that its articles practice the asserted patent, Xtera's investments and activities are insufficient to meet the domestic industry requirement of section 337(a)(3). Specifically, Xtera alleges the existence of a domestic industry under subparagraphs (A) and (B), and not (C). ID at

67. Xtera relied on both (i) its own investments in the United States in its Line Terminal Equipment of its NuWave Optima product line, and (ii) indirect investments made through payments to Xtera's manufacturing partner, MC Assembly, related to manufacturing, repair, and maintenance of its NuWave Optima product line in the United States. *See* CIB at 128-138.

The ID found that "Xtera has included investments in an indisputably unprotected version of the NuWave Optima system [*e.g.*, NuWave Optima systems with the AC100 module] along with an allegedly protected version of the product [*i.e.*, NuWave Optima systems with the AC400 module] for the purposes of establishing a domestic industry" contrary to section 337(a)(3). *Id.* at 70. In particular, the ID found the record evidence does not support Xtera's contention that an allocation is unnecessary because its NuWave Optima systems with the AC400 module were its only product from 2015 to 2017. *Id.* at 69. According to the ID, the hearing testimony established that "[r]ather than an abrupt transition from NuWave Optima systems with AC100 modules to NuWave Optima systems with AC400 modules in 2015, Xtera's own timeline shows a gradual transition, over a period of years [from 2014 to 2017], from NuWave Optima systems utilizing AC100 modules to systems utilizing AC400 modules." *Id.* In addition, from 2017 to 2018, Xtera admits that at least four system upgrades did not include the AC400 module and that its deals during this period included systems that utilize AC400 modules as well as other modules. *Id.* Thus, the ID found that "Xtera's reliance on 100% of its investments in NuWave Optima systems is inconsistent with section 337's requirement that a domestic industry exist with respect to 'articles protected by the patent.'" *Id.* at 75 (citing 19 U.S.C. § 1337(a)(2)).

The ID also found that Xtera has not "established facts sufficient to show that the realities of the marketplace require the inclusion of investments in NuWave Optima systems that utilize

AC100 modules along with investments in NuWave Optima systems utilizing AC400 modules." *Id.* at 71. The ID rejected Xtera's attempt to analogize its DI Products to those at issue in *Certain Magnetic Tape Cartridges*, Inv. No. 337-TA-1058. *Id.* In that investigation, the ID explained that it was appropriate to consider investments in tape drives, even though it was undisputed that the tape drives did not practice the asserted patent, because the evidence showed that a tape cartridge that practiced the asserted patent could only be used with the corresponding tape drive. *Id.* at 71-72. In this case, the ID found that "[t]here is no dispute that the whole NuWave Optima system is necessary to exploit the patented technology of the '403 patent, and, on that basis, Xtera is not limited only to their investments in the AC400 module." *Id.* at 73. However, the ID explained "given that the NuWave Optima system is also used with AC100 modules that are not protected by the '403 patent, Xtera is not entitled to count all of its investments in all versions of the NuWave Optima system." *Id.*

The Commission affirms and adopts the ID's findings and analyses at subsections V(A) through (C) on pages 67-77, supplemented by the discussion below. As the ID correctly finds, the language of the statute mandates that the domestic industry must be "with respect to" articles protected by the asserted patent. ID at 72 (citing 19 U.S.C. § 1337(a)(3)). The Commission has found that complainants have not satisfied the domestic industry requirement where the complainant failed to allocate expenses to account for non-domestic industry products that do not practice the patent. *Id.* at 75; *see, e.g.*, *Certain Forensic Devices,* Inv. No. 337-TA-799, Initial Determination at 10 (Nov. 27, 2012) (finding complainant's domestic industry "estimates are necessarily improper because they include expenses of non-domestic industry products," contrary to Commission precedent, which "requires that expenses be allocated to each of the products covered by the asserted patents"), *unrev'd by* Comm'n Notice (Dec. 21, 2012)).

The Commission has also held that "in certain circumstances, the realities of the marketplace required a modification of the principle that the domestic industry is defined by the patented article." *Certain Video Game Systems and Wireless Controllers and Components Thereof*, Inv. No. 337-TA-770, Comm'n Op. at 66 (Oct. 28, 2013). Factors to consider regarding the realities of the marketplace analysis include whether the patented technology is sold as a separate entity or article of commerce; whether it is an essential component of the downstream product; and whether the domestic industry activities "have a direct relationship to exploitation of the patented technology." *Id.* at 66-67.

Within the NuWave Optima system, Xtera contends that its Flex-Rate Line Cards, which include the Acacia AC400 module, practice claim 8 of the '403 patent. *See* ID at 9. Recognizing the realities of the marketplace, there is no dispute that the alleged articles in commerce here are Xtera's NuWave Optima systems that include the AC400 module. There is also no dispute that NuWave Optima systems that do not include the AC400 module (and include other modules such as AC100, or even older 10G systems) do not practice the '403 patent. As such, the ID appropriately found that Xtera has lumped together investments in an indisputably unprotected version of the NuWave Optima system with the AC100 module and even investments in the older unprotected 10G system with investments in the NuWave Optima system with the AC400 module for purposes of establishing a domestic industry. *See* ID at 70.

Xtera argues that the ID committed various legal errors by requiring an allocation. CPet at 76-97. Specifically, Xtera argues that the ID's "interpretation of the plain language of the statute 'with respect to articles protected by the patent' is overly narrow" and inconsistent with Commission precedent in *Certain Marine Sonar Imaging Devices, Including Downscan and Sidescan Devices, Products Containing the Same, and Components Thereof*, Inv. No. 337-TA-

921 ("*Sonar Imaging*") and *Certain Kinesiotherapy Devices and Components Thereof*, Inv. No. 337-TA-823 ("*Kinesiotherapy Devices*"). *Id.* at 78-85. However, both the statute and Commission precedent clearly require such an allocation. *See* ID at 70-75 (citing statute and relevant Commission precedent). Moreover, both *Sonar Imaging* and *Kinesiotherapy Devices* are distinguishable from this investigation.

In *Sonar Imaging*, the complainant alleged a domestic industry based on its investments in its LSS-1 products. Comm'n Op. at 54 (Jan. 6, 2016). Specifically, the record in that investigation showed that complainant had "discontinued sales of the LSS-1 product in February 2012," and replaced it with the LSS-2 product, a product that undisputedly does not practice the patent. *Id.* at 55, 60. Nevertheless, complainant "asserts that its investment in the LSS-1 product continued well after 2012 in the form of technical customer support, warranty and repair work, research and development of software updates, and the sale and support of components for replacing damaged or defective parts of the LSS-1 product." *Id.* at 54. The ALJ in that investigation found, however, that complainant had "stopped investing in the LSS-1 products . . . in 2012 when it discontinued the products." *Id.* The Commission reversed the ALJ, finding that "[t]he ID erred to the extent that it held that [complainant's] 2009-2012 investments in protected articles cannot be credited toward its domestic industry on the sole ground that [it had] discontinued sales of the domestic industry product in 2012 and replaced it with a product that does not practice the claims of the [asserted] patent." *Id.* at 55. The ALJ in that investigation also rejected complainant's post-2012 research and development expenditures "based on evidence that the [relevant] software updates can be used with the LSS-1 and other products," and "conclud[ed] that '[i]nvestment in general that is not directly attributable to the LSS-1 . . . cannot be used to satisfy the economic prong of the domestic industry requirement." *Id.* at 59.

The Commission, however, found "that [complainant] ha[d] made the necessary showing that its post-2012 labor and capital costs are related to the LSS-1 products." *Id.* at 60.

Like *Sonar Imaging*, the investments at issue here relate to products alleged to practice the asserted patent and other products that undisputedly do not practice the asserted patent. But unlike in *Sonar Imaging*, Xtera has not shown that investments related to the other products also relate to the NuWave Optima systems that use the AC400 module. ID at 69; CIB at 125. Xtera admits that "systems that currently only use the non-practicing AC100 card still exist . . . and that during the 2015-2017 time period, Xtera has upgraded Nu-Wave Optima systems to add *both AC100* and AC400 cards." CPet at 82 (emphasis added); *see also id.* at 90 (Xtera stating that it was still supporting customers with AC100 cards through late 2017). Xtera also admits that its domestic investments "related to ***all*** Nu-Wave Optima systems." *Id.* at 82. Thus, by Xtera's own admission, the ID appropriately found that Xtera "included investments in an indisputably unprotected version of the NuWave Optima system [*e.g.*, NuWave Optima systems with the AC100 module] . . . for the purposes of establishing a domestic industry." ID at 70. We therefore agree with Respondents that "Xtera . . . padd[ed] its domestic industry numbers by counting investments in articles that are not protected by the '403 patent." *Id.* at 67.

Kinesiotherapy Devices is also distinguishable from this investigation in two important aspects. First, in *Kinesiotherapy Devices*, the Commission addressed "the extent to which a domestic industry can be based on expenditures in components produced by a domestic subcontractor." Comm'n. Op. at 26 (Jul. 12, 2013), *rev'd on other grounds, Lelo Inc. v. U.S. Int'l Trade Comm'n* 786 F.3d 879 (Fed. Cir. 2015). Complainant's product in that investigation was assembled in China, but the ALJ found that complainant had made "investments in four crucial components that are manufactured in the United States and used in the production of the

[DI product]." *Id.* at 22. Nonetheless, the ALJ rejected complainant's reliance on such components because complainant had "fail[ed] to demonstrate that the components were specifically designed or customized for the [DI product]." *Id.* at 27. The Commission reversed the ALJ's finding, determining that "there is no requirement that the components must be developed or produced specifically for the domestic industry products." *Id.* By contrast, the ID here did not dispute that Xtera is entitled to count its investments in components that are used in the production of the version of the NuWave Optima system that allegedly practices the '403 patent. Rather, the ID found that Xtera had "included investments in an indisputably unprotected version of the NuWave Optima system [*i.e.*, in components that are not used in the production of the allegedly patent-practicing system]," and that Xtera failed to provide a timely allocation supported by substantial evidence. ID at 70, 75.

Second, in *Kinesiotherapy Devices*, the Commission considered expenditures related to the original domestic industry product even though they occurred more than two years prior to the filing of the complaint along with expenditures related to later developed and refined versions of the product because the record showed "that while the product updates . . . added new features, the fundamental product did not change in any way relevant to the patented features." Comm'n Op. at 30. In the present investigation, Xtera argues that it is entitled to count its investments made in the NuWave Optima, starting in 2011 (in versions of the NuWave Optima system that undisputedly do not have the capability of practicing the '403 patent), because the NuWave Optima system "did not require any additional components to utilize the AC400 card." CPet at 85. But Xtera's argument is not supported by the evidence in this investigation. Dr. Pelouch, Xtera's corporate witness, testified that the AC400 "required a whole new shelf system" and the help of multiple engineers.

> Did Xtera perform any research and development activities relating to the flex rate line card using the AC400?
> A Yes.
> Q What sort of research and development activities did they conduct?
> A So the flex rate line card was developed specifically to accommodate the AC400 module. So there was a -- and it required a whole new shelf system. So it required the work of mechanical engineers, electrical engineers, software engineers, to design it, to research and design it, and also required the work of the optical engineers, like Sergey, to test the performance of the module.

Tr. (Pelouch) at 136:11-24. Furthermore, as stated above, there is no dispute that the NuWave Optima systems using the AC100 (or even older technology, such as 10G) do not practice the '403 patent. Thus, unlike the multiple versions of the domestic industry product in *Kinesiotherapy Devices*, Xtera's NuWave Optima system fundamentally changed relevant to the patented features with the release of the version using the AC400 module.

Xtera also argues that the ID made factual errors by: (i) discounting evidence that, as of 2015, the NuWave Optima system with the AC400 was Xtera's only product; and (ii) failing to consider material facts regarding Xtera's investments from 2017 onward (which Xtera alleges is a time period in which it should be undisputed that all of Xtera's investments were directed at production of articles protected by the patent). *See* CPet at 81-82, 99-100. But there is no dispute that NuWave Optima systems that use the AC100 module does not practice the alleged inventions of the '403 patent. *See, e.g.*, Tr. (Pelouch) at 131:20-23, 142:19-143:11. In addition, it is undisputed that starting in 2011, up until the introduction of the next-generation AC400 module, Xtera deployed several NuWave Optima systems with only the AC100 module. CPet at 95. And "by their own admission, Xtera made at least four system capacity upgrades in the 2017-2018 time period that did not include the AC400 module" as shown in CDX-106.0007. ID

at 69 (citing CIB at 125 ("Of the thirteen Optima system capacity upgrades in 2017-2018, nine included AC400 or AC400 single-carrier cards.")); *see* Tr. at 626:6-8 (testifying that "most [but, not all, Optima] systems have already been upgraded to currently utilize both [AC100 and AC400]"). Based on this record evidence, the ID appropriately found that "Xtera's reliance on 100% of its investments in NuWave Optima systems is inconsistent with section 337's requirement that a domestic industry exist with respect to 'articles protected by the patent.'" ID at 75.

iii. The ID Appropriately Determined That Xtera's Belated Allocation of Its Investments and Activities Has Been Waived and Lacks the Support of Substantial Evidence

Following the evidentiary hearing, Xtera includes for the first time a section in its post-hearing brief that presents an allocation of its investments in plant and equipment and labor or capital between NuWave Optima systems using the AC400 module and those not using that module. ID at 76. As explained above, the Commission finds that the domestic industry requirement is not satisfied in this case because none of Xtera's DI Products practice the claims of the '403 patent and as such, none of the claimed investments are made "with respect to articles protected by the patent" under section 337(a)(3).

However, even if Xtera's DI Products were to practice the '403 patent, the Commission finds the ID properly rejected Xtera's belated allocation in its post-hearing brief and appropriately determined that Xtera abandoned such allocation based on the ALJ's Ground Rule 11.2. *Id.* ("I will not credit an argument made for the first time after the close of the evidentiary hearing, when Respondents have no ability to seek expert economic analysis of that argument, or any ability to test the veracity of that argument through cross-examination of Xtera's economic expert."). Because we have found Xtera abandoned its allocation argument, the Commission does not adopt the ID's analysis of Xtera's evidence in support of a domestic industry based on

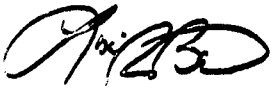
investments in plant and equipment and labor or capital in subsections V(D) and (E) on pages 77-86 of the ID. The Commission notes, however, that even if Xtera's last minute allocation argument had not been waived, Xtera has not demonstrated clear error in the ID's finding that Xtera's proffered allocation lacked the support of substantial evidence as it consists solely of attorney argument. *Id.* at 76-77.

For the foregoing reasons, subject to the additional analysis provided *supra*, the Commission affirms and adopts the ID's findings that Xtera has not satisfied the domestic industry requirement of section 337, 19 U.S.C. § 1337(a)(3), with respect to the '403 patent.

III. CONCLUSION

For the reasons set forth above, the Commission modifies the ID's construction of the "means for producing" limitation in claim 8 of the '403 patent. Applying the Commission's construction, the Commission affirms with modifications the ID's findings that (i) the Accused Products do not infringe the asserted claims of the '403 patent; (ii) the asserted claims are invalid as anticipated by Frankel; and (iii) Xtera has not established that a domestic industry exists with respect to the '403 patent. Accordingly, the investigation is terminated with a finding of no violation of section 337.

By order of the Commission.



Lisa R. Barton
Secretary to the Commission

Issued: October 21, 2019

CERTAIN SUBSEA TELECOMMUNICATION SYSTEMS AND COMPONENTS THEREOF **Inv. No. 337-TA-1098**

PUBLIC CERTIFICATE OF SERVICE

I, Lisa R. Barton, hereby certify that the attached **OPINION** has been served by hand upon the Commission Investigative Attorney, **Cortney Hoercherl, Esq.**, and the following parties as indicated, on **October 21, 2019**.

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

On Behalf of Complainants Neptune Subsea Acquisitions Ltd., Xtera Topco Ltd., and Xtera, Inc.:

Yar Chaikovsky, Esq.
PAUL HASTINGS LLP
1117 S. California Avenue
Palo Alto, CA 94304

☐ Via Hand Delivery
☐ Via Express Delivery
☒ Via First Class Mail
☐ Other:_____

On Behalf of Respondents NEC Corporation, NEC Networks & System Integration Corporation, and NEC Corporation of America:

Timothy W. Riffe, Esq.
FISH & RICHARDSON PC
1000 Maine Avenue, SW, Suite 1000
Washington, DC 20024

☐ Via Hand Delivery
☐ Via Express Delivery
☒ Via First Class Mail
☐ Other:_____

On Behalf of Respondents Nokia Corporation, Alcatel Submarine Networks, and Nokia of America Corporation:

Adam D. Swain, Esq.
ALSTON & BIRD LLP
950 F Street NW
Washington, DC 20004

☐ Via Hand Delivery
☐ Via Express Delivery
☒ Via First Class Mail
☐ Other:_____

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

In the Matter of	
CERTAIN SUBSEA TELECOMMUNICATION SYSTEMS AND COMPONENTS THEREOF	**Investigation No. 337-TA-1098**

NOTICE OF A COMMISSION DETERMINATION TO REVIEW IN PART A FINAL INITIAL DETERMINATION FINDING NO VIOLATION OF SECTION 337 AND TO EXTEND THE TARGET DATE; SCHEDULE FOR FILING WRITTEN SUBMISSIONS

AGENCY: U.S. International Trade Commission.

ACTION: Notice.

SUMMARY: Notice is hereby given that the U.S. International Trade Commission has determined to review in part the Administrative Law Judge's ("ALJ") final initial determination ("ID"), issued on April 26, 2019, finding no violation of section 337 in the above-referenced investigation and to extend the target date for completion of the above-referenced investigation to September 30, 2019. The Commission requests briefing from the parties on certain issues under review, as indicated in this notice.

FOR FURTHER INFORMATION CONTACT: Cathy Chen, Esq., Office of the General Counsel, U.S. International Trade Commission, 500 E Street SW, Washington, DC 20436, telephone (202) 205-2392. 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 SW, Washington, DC 20436, telephone (202) 205-2000. General information concerning the Commission may also be obtained by accessing its Internet server at *https://www.usitc.gov*. The public record for this investigation may be viewed on the Commission's electronic docket (EDIS) at *https://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 January 26, 2018, based on a complaint, as supplemented, filed on behalf of Neptune Subsea Acquisitions Ltd. of the United Kingdom; Neptune Subsea IP Ltd. of the United Kingdom; and Xtera, Inc. of Allen, Texas (collectively, "Xtera"). 83 FR 3770 (Jan. 26, 2018). The complaint, as supplemented, alleges violations of Section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. 1337 ("section 337"), based upon the importation into the United States, the sale for

importation, and the sale within the United States after importation of certain subsea telecommunication systems and components thereof by reason of infringement of one or more claims of U.S. Patent Nos. 8,380,068; 7,860,403 ("the '403 patent"); 8,971,171; 8,351,798 ("the '798 patent"); and 8,406,637. The complaint further alleges that an industry in the United States exists as required by section 337. The notice of investigation, as originally issued, named as respondents Nokia Corporation of Espoo, Finland; Nokia Solutions and Networks B.V. of Hoofddorp, The Netherlands; Nokia Solutions and Networks Oy of Espoo, Finland; Alcatel-Lucent Submarine Networks SAS of Boulogne-Billancourt, France; Nokia Solutions and Networks US LLC of Phoenix, Arizona; NEC Corporation of Tokyo, Japan; NEC Networks & System Integration Corporation of Tokyo, Japan; and NEC Corporation of America of Irving, Texas. The Office of Unfair Import Investigations was named as a party in this investigation.

The corporate name of Neptune Subsea Acquisitions Ltd. was changed to Xtera Topco Ltd. ID at 3. Respondents Nokia Solutions and Networks B.V.; Nokia Solutions and Networks Oy; and Nokia Solutions and Networks US LLC were terminated from the investigation based on withdrawal of the complaint. *Id.* The corporate name of Alcatel-Lucent Submarine Networks SAS was corrected to Alcatel Submarine Networks. *Id.* Respondent Nokia of America Corporation of New Providence, New Jersey was later added to the investigation. *Id.*

Of the patents that formed the basis for institution of this investigation, only the '798 patent and the '403 patent remain in dispute. ID at 3-4, 6.

On April 26, 2019, the ALJ issued his final ID and his recommended determination. The ID found no violation of section 337 with respect to asserted claims 13, 15, and 19 of the '798 patent and claims 8, 9, and 12 of the '403 patent by Respondents Nokia Corporation; Alcatel Submarine Networks; and Nokia of America Corporation (collectively "Nokia"); and NEC Corporation; NEC Networks & System Integration Corporation; and NEC Corporation of America (collectively "NEC"). Specifically, with respect to the '798 patent, the ID found that Xtera produced no evidence at the evidentiary hearing to show a violation of section 337 based on infringement of claims 13, 15, and 19. Accordingly, the ID found that Xtera has not established a violation of section 337 based on infringement of the '798 patent. With respect to the '403 patent, the ID found that Respondents do not infringe and Xtera's domestic industry products do not practice claims 8, 9, and 12 of the '403 patent. The ID also found that claims 8, 9, and 12 of the '403 patent are invalid as anticipated by U.S. Patent No. 6,430,336. The ID further found that complainants had not established that complainants' investments and activities satisfied the domestic industry requirement with respect to articles protected by the '403 patent.

On May 13, 2019, Xtera filed a petition for review of the final ID. On the same day, Respondents filed a contingent petition for review of the final ID. Thereafter, the parties filed responses to the petitions for review and public interest comments pursuant to Commission Rule 210.50(a)(4).

Having examined the record of this investigation, including the ID, the petitions for review, and the responses thereto, the Commission has determined to review the ID's findings with respect to the '403 patent in their entirety, including domestic industry. The Commission does not review the remainder of the ID.

The Commission has determined to extend the target date in this investigation to September 30, 2019.

Xtera originally asserted infringement of claims 8, 9, 12, and 13 of the '403 patent. *See* ID at 6. Xtera, however, presented no evidence or argument regarding claim 13 at the hearing or in post-hearing briefing. The ID makes no findings with respect to claim 13 and Xtera's petition for review does not address that claim. Further, Xtera's petition for review does not address the '798 patent. The Commission hereby determines that Xtera has thus effectively withdrawn its allegations with respect to claim 13 of the '403 patent and the '798 patent.

The parties are requested to brief their positions on only the following issues under review with reference to the applicable law and the evidentiary record.

1. The ID adopts the parties' agreed-upon function for Element 8A to be "producing a periodic series of optical pulses defining a series of time slots, wherein one pulse appears in each time slot." Does the ID's interpretation of the claimed function for Element 8A require the production of a periodic series of "narrow" optical pulses? Did the parties provide argument before the ALJ as to whether or not the claimed function requires the production of a periodic series of "narrow" optical pulses?

2. In view of your response to the first question, please discuss whether the specification or prosecution history clearly links or associates the combination of the light source and the first modulator in the prior art transmitter shown in Figure 1 of the '403 patent to the claimed function for Element 8A.

3. If your positions on the above issues are adopted by the Commission, please explain the effect, if any, on the ID's infringement, invalidity, and technical prong findings.

The parties are not to brief other issues on review, which are adequately presented in the parties' existing filings. At this time, the Commission does not request written submissions on remedy, public interest, or bonding.

WRITTEN SUBMISSIONS: Each party's written submission responding to the above questions and any response to the initial submissions should be no more than 50 pages. The written submissions must be filed no later than close of business on Wednesday, August 7, 2019. Reply submissions of no more than 35 pages must be filed no later than the close of business on Wednesday, August 14, 2019. No further submissions will be permitted unless otherwise ordered by the Commission.

Persons filing written submissions must file the original document electronically on or before the deadlines stated above and submit 8 true paper copies to the Office of the Secretary by noon the next day pursuant to Commission Rule 210.4(f), 19 C.F.R. 210.4(f). Submissions should refer to the investigation number ("Inv. No. 1098") in a prominent place on the cover page and/or the first page. (*See* Handbook for Electronic Filing Procedures, https://www.usitc.gov/secretary/documents/handbook_on_filing_procedures.pdf). Persons with questions regarding filing should contact the Secretary, (202) 205-2000.

Any person desiring to submit a document to the Commission in confidence must request confidential treatment. All such requests should be directed to the Secretary to the Commission and must include a full statement of the reasons why the Commission should grant such treatment. *See* 19 CFR 201.6. Documents for which confidential treatment by the Commission is properly sought will be treated accordingly. All information, including confidential business information and documents for which confidential treatment is properly sought, submitted to the Commission for purposes of this Investigation may be disclosed to and used: (i) by the Commission, its employees and Offices, and contract personnel (a) for developing or maintaining the records of this or a related proceeding, or (b) in internal investigations, audits, reviews, and evaluations relating to the programs, personnel, and operations of the Commission including under 5 U.S.C. Appendix 3; or (ii) by U.S. government employees and contract personnel, solely for cybersecurity purposes. All contract personnel will sign appropriate nondisclosure agreements. All nonconfidential written submissions will be available for public inspection at the Office of the Secretary and on EDIS.

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
Secretary to the Commission

Issued: July 24, 2019

CERTAIN SUBSEA TELECOMMUNICATION SYSTEMS AND COMPONENTS THEREOF **Inv. No. 337-TA-1098**

PUBLIC CERTIFICATE OF SERVICE

I, Lisa R. Barton, hereby certify that the attached **NOTICE** has been served by hand upon the Commission Investigative Attorney, **Cortney Hoercherl, Esq.**, and the following parties as indicated, on **July 24, 2019**.

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

On Behalf of Complainants Neptune Subsea Acquisitions Ltd., Xtera Topco Ltd., and Xtera, Inc.:

Yar Chaikovsky, Esq.
PAUL HASTINGS LLP
1117 S. California Avenue
Palo Alto, CA 94304

☐ Via Hand Delivery
☐ Via Express Delivery
☒ Via First Class Mail
☐ Other:_____

On Behalf of Respondents NEC Corporation, NEC Networks & System Integration Corporation, and NEC Corporation of America:

Timothy W. Riffe, Esq.
FISH & RICHARDSON PC
1000 Maine Avenue, SW, Suite 1000
Washington, DC 20024

☐ Via Hand Delivery
☐ Via Express Delivery
☒ Via First Class Mail
☐ Other:_____

On Behalf of Respondents Nokia Corporation, Alcatel Submarine Networks, and Nokia of America Corporation:

Adam D. Swain, Esq.
ALSTON & BIRD LLP
950 F Street NW
Washington, DC 20004

☐ Via Hand Delivery
☐ Via Express Delivery
☒ Via First Class Mail
☐ Other:_____

UNITED STATES INTERNATIONAL TRADE COMMISSION

Washington, D.C.

In the Matter of	
CERTAIN SUBSEA TELECOMMUNICATIONS SYSTEMS AND COMPONENTS THEREOF	**Inv. No. 337-TA-1098**

NOTICE REGARDING ERRATA TO FINAL INITIAL DETERMINATION

(May 6, 2019)

The Final Initial Determination ("ID") on the question of violation of section 337 was issued on April 26, 2019. After the ID was issued, it was discovered that the following inadvertent errors were included in the ID:

Page No(s).	Original Text	Corrected Text
99	"but NEC contends"	"but NAC contends"
99	"NEC concedes"	"NAC concedes"

These modifications do not affect the analyses or findings set forth in the text of the ID, and will be included in the public version of the ID.

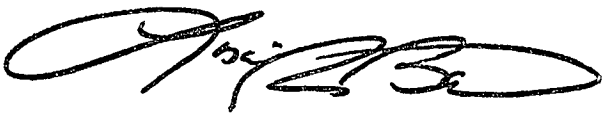
Clark S. Cheney
Administrative Law Judge

CERTAIN SUBSEA TELECOMMUNICATIONS SYSTEMS AND COMPONENTS THEREOF

Inv. No. 337-TA-1098

PUBLIC CERTIFICATE OF SERVICE

I, Lisa R. Barton, hereby certify that the attached **NOTICE** has been served by hand upon the Commission Investigative Attorney, Cortney Hoecherl, Esq., and the following parties as indicated on **May 6, 2019.**



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

On Behalf of Complainants: Xtera Topco Ltd. and Xtera, Inc.:

Yar R. Chaikovsky, Esq.
PAUL HASTINGS LLP
1117 S. California Avenue
Palo Alto, CA 94304

☐ Via Hand Delivery
☐ Via Express Delivery
☒ Via First Class Mail
☐ Other:_____

On Behalf of Respondents: Nokia Corporation, Nokia Solutions and Networks B.V., Nokia Solutions and Networks Oy, Nokia Solutions and Networks US LLC, Alcatel Submarine Networks, and Nokia of America Corporation

Adam D. Swain, Esq.
ALSTON & BIRD LLP
950 F Street NW
Washington, DC 20004

☐ Via Hand Delivery
☐ Via Express Delivery
☒ Via First Class Mail
☐ Other:_____

On Behalf of Respondents: NEC Corporation, NEC Networks & System Integration Corporation and NEC Corporation of America

Timothy W. Riffe, Esq.
FISH & RICHARDSON P.C.
1000 Maine Avenue, SW
Suite 1000
Washington, DC 20024

☐ Via Hand Delivery
☐ Via Express Delivery
☒ Via First Class Mail
☐ Other:_____

PUBLIC VERSION

UNITED STATES INTERNATIONAL TRADE COMMISSION

Washington, D.C.

In the Matter of **CERTAIN SUBSEA TELECOMMUNICATIONS SYSTEMS AND COMPONENTS THEREOF**	**INV. NO. 337-TA-1098**

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

Administrative Law Judge Clark S. Cheney

(April 26, 2019)

Appearances:

For the complainants Xtera Inc., Xtera Topco Ltd. and Neptune Subsea IP Ltd.:

Yar R. Chaikovsky, Esq., David M. Beckwith, Esq., Philip Ou, Esq., David T. Okano, Esq., Alexander H. Lee, Esq., Marc Child, Esq., Stephen Tang, Esq., and Radhesh Devendran, Esq. of Paul Hastings LLP of Palo Alto, CA.

Blair M. Jacobs, Esq. and Christina A. Ondrick, Esq. of Paul Hastings LLP of Washington, DC.

Hiroyuki Hagiwara, Esq. and Kyotaro Ozawa, Esq. of Paul Hastings LLP of Tokyo, Japan.

For the respondents NEC Corporation, NEC Networks & System Integration Corporation, and NEC Corporation of America:

Michael J. McKeon, Esq., Timothy W. Riffe, Esq., Richard A. Sterba, Esq., Thomas L. Halkowski, Esq., R. Andrew Schwentker, Esq., Daniel A. Tishman, Esq., Thomas S. Fusco, Esq., Min Woo Park, Esq., Yao Wang, Esq., Jared M. Hartzman, Esq., andTaylor L. Caldwell, Esq. of Fish & Richardson P.C. of Washington, DC.

Bryan K. Basso, Esq. of Fish & Richardson P.C. of Redwood City, CA.

John-Paul R. Fryckman, Esq. of Fish & Richardson P.C. of San Diego, CA.

For the respondents Nokia Corporation, Nokia of America Corporation and Alcatel Submarine Networks

John D. Haynes, Esq., Patrick J. Flinn, Esq., Wesley C. Achey, Esq., and David S. Frist, Esq. of Alston & Bird LLP of Atlanta, GA.

Adam D. Swain, Esq. of Alston & Bird of Washington DC.

For the Commission Investigative Staff:

Margaret D. Macdonald, Esq., Director; David O. Lloyd, Esq., Supervisory Attorney; Cortney C. Hoecherl, Esq., Investigative Attorney of the Office of Unfair Import Investigations, U.S. International Trade Commission.

Table of Contents

TABLE OF ABBREVIATIONS

CDX	Complainant's demonstrative exhibit
CIB	Complainant's initial post-hearing brief
CPB	Complainant's pre-hearing brief
CPX	Complainant's physical exhibit
CRB	Complainant's reply post-hearing brief
CX	Complainant's exhibit
Dep.	Deposition
JX	Joint Exhibit
RDX	Respondent's demonstrative exhibit
RIB	Respondent's initial post-hearing brief
RPX	Respondent's physical exhibit
RPB	Respondent's Pre-hearing brief
RRB	Respondent's reply post-hearing brief
RRX	Respondent's rebuttal exhibit
RX	Respondent's exhibit
SIB	Staff's initial post-hearing brief
SPB	Staff's Pre-hearing brief
SRB	Staff's reply post-hearing brief
Tr.	Transcript

PUBLIC VERSION

UNITED STATES INTERNATIONAL TRADE COMMISSION

Washington, D.C.

In the Matter of **CERTAIN SUBSEA TELECOMMUNICATIONS SYSTEMS AND COMPONENTS THEREOF**	**INV. NO. 337-TA-1098**

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

Administrative Law Judge Clark S. Cheney

(April 26, 2019)

Pursuant to the Notice of Investigation, 83 Fed. Reg. 3770 (Jan. 26, 2018), this is the final Initial Determination in the matter of *Certain Subsea Telecommunications Systems and Components Thereof*, Investigation No. 337-TA-1098. 19 C.F.R. §§ 210.10(b), 210.42(a)(1)(i).

For the reasons stated herein, I have determined that no violation of section 337 of the Tariff Act of 1930, as amended (19 U.S.C. § 1330), has occurred in the importation into the United States, the sale for importation, or the sale within the United States after importation of certain subsea telecommunication systems and components thereof alleged to infringe U.S. Patent No. 8,351,798 ("the '798 Patent") and U.S. Patent No. 7,860,403 ("the '403 Patent").

I. INTRODUCTION

A. Procedural History

On December 22, 2017, complainants Neptune Subsea Acquisitions Ltd. of the United Kingdom; Neptune Subsea IP Ltd. of the United Kingdom; and Xtera, Inc. of Allen, Texas ("Xtera") filed a complaint alleging violations of section 337 based upon the importation into the United States, the sale for importation, and the sale within the United States after importation of certain subsea telecommunication systems and components thereof by reason of infringement of one or more of U.S. Patent No. 8,380,068 (''the '068 Patent''); U.S. Patent No. 7,860,403 (''the '403 Patent''); U.S. Patent No. 8,971,171 (''the '171 Patent''); U.S. Patent No. 8,351,798 (''the '798 Patent''); and U.S. Patent No. 8,406,637 (''the '637 Patent''). 83 Fed. Reg. 3770 (Jan. 26, 2018).

On December 20, 2017, the Commission instituted this investigation 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 subsea telecommunication systems and components thereof by reason of infringement of one or more of claims 1–15 of the '068 Patent; claims 1–14 of the '403 Patent; claims 1–10 of the '171 Patent; claims 13–20 of the '798 Patent; and claims 1–6 of the '637 Patent; and whether an industry in the United States exists as required by subsection (a)(2) of section 337.

Id.

The named respondents were Nokia Corporation of Espoo, Finland; Nokia Solutions and Networks B.V. of Hoofddorp, The Netherlands; Nokia Solutions and Networks Oy of Espoo, Finland; Alcatel-Lucent Submarine Networks SAS of Boulogne Billancourt, France; Nokia Solutions and Networks US LLC of Phoenix, AZ; NEC Corporation of Tokyo, Japan; NEC Networks & System Integration Corporation of Tokyo, Japan; and NEC Corporation of America of Irving, TX. *Id.* The notice of investigation also named the Office of Unfair Import Investigations ("Staff") as a party to this investigation. *Id.*

On February 12, 2018, the presiding administrative law judge set an 18-month target date of July 26, 2019. Order No. 6 (unreviewed). On March 19, 2018, I issued an initial determination granting Xtera's unopposed motion to (1) amend the Verified Complaint, Public Exhibits 17, 19, and 21, and Notice of Institution of Investigation to correct the name of respondent Alcatel-Lucent Submarine Networks SAS to Alcatel Submarine Networks, and (2) withdraw the complaint and thus terminate the investigation against respondents Nokia Solutions and Networks B.V.; Nokia Solutions and Networks Oy; and Nokia Solutions and Networks US LLC. Order No. 9 (unreviewed). On July 10, 2018, I issued an initial determination granting Xtera's unopposed motion to amend the Complaint and Notice of Investigation to reflect a corporate name change from Neptune Subsea Acquisitions Ltd. to Xtera Topco Ltd. Order No. 21 (unreviewed). On August 8, 2018, I issued an initial determination granting Xtera's unopposed motion for termination of the investigation with respect to the '637 patent. Order No. 22 (unreviewed). On August 27, 2018, I issued an initial determination amending the complaint and notice of investigation to add Nokia of America Corporation as a respondent. Order No. 30 (unreviewed).

On November 19, 2018, I issued an initial determination granting-in-part Respondents' motion for summary determination. *See* Order No. 46, *affirmed with modification*, Comm'n Opinion (Feb. 14, 2019) (public version). Particularly, I granted summary determination of no violation with respect to the '068 patent based on Xtera's failure to satisfy the domestic industry requirement with respect to that patent. *See* Order No. 46 at 15.

On November 20, 2018, I issued an initial determination granting-in-part Xtera's unopposed motion for termination of the investigation with respect to claims 3-5, 7, 10-11, and 14 of the '403 patent; claims 2-4 and 6-10 of the '171 patent; and claims 14, 16-18, and 20 of the '798. Order No. 47 (unreviewed). On December 6, 2018, I issued an initial determination granting

Xtera's unopposed motion for termination of the investigation with respect to claims 1 and 5 of the '171 patent and claims 1, 2, and 6 of the '403 patent. Order No. 52 (unreviewed).

An evidentiary hearing was held in this investigation from December 10 through December 14, 2018. The remaining disputed issues in this investigation are now ripe for determination.

B. The Parties

1. Complainants (collectively "Xtera")

a) Xtera, Inc.

Xtera, Inc., is a corporation located at 500 West Bethany Drive, Allen, TX 75013. CPBr. at 5-6. Xtera, Inc. is a wholly-owned subsidiary of Xtera Holdings Ltd., which in turn is a wholly-owned subsidiary of complainant Xtera Topco Ltd. *See, e.g., id.* Xtera, Inc., is the successor to Xtera Communications, Inc., and is "the primary operating arm for Xtera's optical networking solutions." *Id.*

b) Xtera Topco Ltd. (formerly Neptune Subsea Acquisitions Ltd.)

Complainant Xtera Topco Ltd. is located at Bates House, Church Road, Harold Wood, Essex, RM3 0SD, UK. *Id.* Complainant Xtera Topco Ltd. is the parent of complainant Xtera, Inc., and complainant Neptune Subsea IP Ltd. *Id.*

c) Neptune Subsea IP Ltd.

Complainant Neptune Subsea IP Ltd. is located at Bates House, Church Road, Harold Wood, Essex, RM3 0SD, UK. *Id.* Neptune Subsea IP Ltd. is a wholly-owned subsidiary of Xtera Holdings Ltd., which in turn is a wholly-owned subsidiary of complainant Xtera Topco Ltd. *Id.* Complainant Neptune Subsea IP Ltd. is a holding company for intellectual property assets owned by Xtera Holdings Ltd. *Id.*

2. The NEC Respondents (collectively "NEC")[1]

a) NEC Corporation ("NEC Corp.")

Respondent NEC Corporation is a Japanese corporation with its headquarters at 7-1, Shiba 5-chome, Minato-ku, Tokyo 108-8001, Japan. *See* NEC Resp. to Compl. at ¶ 16 (EDIS Doc. ID 644640).

b) NEC Networks & System Integration Corporation ("NESIC")

Respondent NESIC is a Japanese corporation with its headquarters at Iidabashi First Tower, 2-6-1 Koraku, Bunkyo-ku, Tokyo 112-8560, Japan. *Id.* at ¶ 17.

c) NEC Corporation of America ("NECAM")

Respondent NECAM is a wholly-owned subsidiary of NEC Corporation. NECAM is a Nevada corporation with its principal place of business at 3929 W. John Carpenter Freeway, Irving, TX 75063-2909. *Id.* at ¶ 18.

3. The Nokia Respondents (collectively "Nokia")

a) Nokia Corporation ("Nokia Corp.")

Respondent Nokia Corp. is a company organized under the laws of Finland, with its principal place of business at Karaportti 3, 02610 Espoo, Finland. Nokia Resp. to Compl. at ¶ 20 (EDIS Doc. ID 640300).

[1] This initial determination uses "Respondents" to refer collectively to all NEC and Nokia respondents.

b) Alcatel Submarine Networks ("ASN")

Respondent ASN is an indirect wholly owned subsidiary of Nokia Corp. and is a company organized under the laws of the French Republic. *Id.* at ¶ 20. ASN manufactures and sells the 1620LM SLTE products. *Id.* at ¶ 21.

c) Nokia of America Corporation ("NAC")

Respondent NAC is located at 600 Mountain Avenue New Providence, NJ 07974. *See* NAC Resp. to Compl. at 1 (EDIS Doc. ID 658815). NAC offers the 1830 product line for sale. *See, e.g.,* RPB. at 14.

C. The Asserted Patents

Of the patents that formed the basis for institution of this investigation, only two remain in dispute: U.S. Patent No. 7,860,403 ("the '403 patent") and U.S. Patent No. 8,351,798 ("the '798 Patent").

1. U.S. Patent No. 7,860,403

United States Patent Number 7,860,403, entitled "Data Format for High Bit Rate WDM Transmission," issued to Turitsyn et al. on December 28, 2010. '403 Patent at cover page. The patent issued from Application Number 10/553,338, which is a national stage application arising from PCT No. PCT/GB2004/095752. *Id.* The '403 patent claims priority to GB 03089951.3, which was filed on April 17, 2003. The patent, on its face, is assigned to Xtera Communications Ltd. *Id.* Xtera asserts infringement of independent claim 8 and dependent claims 9, 12, and 13 of the '403 patent.

2. U.S. Patent No. 8,351,798

United States Patent Number 8,351,798, entitled "Phase Shift Keyed High Speed Signaling," issued to Edirisinghe et al. on January 8, 2013. JX-0007 at cover page. The patent issued from Application Number 12/252,962, which was filed on October 16, 2008. The '798 patent claims priority to GB 0720227.8, filed on October 16, 2007, and GB 0806826.4, filed on April 15, 2008. *Id.* The patent, on its face, is assigned to Xtera Communications Ltd. *Id.* Going into the evidentiary hearing, Xtera asserted infringement of independent claim 13 and dependent claims 15 and 19 of the '798 patent. But Xtera produced no evidence to show a violation of section 337 based on infringement of those claims. *See generally* CIB; CRB (addressing only the '403 patent). Accordingly, I find Xtera has not established a violation of section 337 based on infringement of the '798 patent. The remainder of this determination is limited to the parties' disputes in connection with the '403 patent.

D. The Technology at Issue

The technology at issue relates to optical data transmission in a wavelength division multiplex (WDM) scheme. '403 Patent at 1:6-8. In a WDM scheme, the capacity of a single transmitting fiber is increased by transmitting multiple channels, each at a different wavelength, over that fiber. *Id.* at 1:20-22. At the time the application giving rise to the '403 patent was filed, the art recognized that because the bandwidth of such an optically amplified system is limited, the maximum rate at which information could be transferred over an optical fiber link would be roughly the same regardless of the bit rate. *See id.* at 1:25-29. This because as bit rate increases, so too does the bandwidth of each channel, and thus the total bandwidth of the system becomes a limiting factor on the number of useable channels. *See id.* Given that background, the object of the '403 patent is to provide means to improve spectral efficiency over traditional data formats. *See id.* at 1:34-37.

Generally speaking, the '403 patent describes three steps to achieve greater spectral efficiency in a WDM system as compared to conventional return-to-zero or non-return-to-zero data formats. *See id.* at Abstract. First, a periodic series of optical pulses is generated, which defines a series of time slots with one pulse in each time slot. *See id.* Second, the pulses are filtered to produce carrier pulses that extend over more than one time slot. *See id.* Third, the pulses are modulated with data for transmission. *See id.* In the context of the '403 patent, both methods of performing these steps, and transmitter for performing these steps, are described.

E. The Accused Products

There exists some tension between the parties as to what exactly the accused products in this investigation are. Xtera's initial post-hearing brief never clearly identifies the accused products but instead relies on a table of abbreviations to define "Accused Products" as "Nokia 1830, ASN 1620, NEC T740SW." CIB at Table of Abbreviations and Defined Terms; *see also* CIB at 78 ("Xtera's Optima practices claim 8, establishing technical DI. Nokia's 1830 and 1620 products and NEC's T740SW product infringe claims 8, 9, and 12."). Respondents complain that Xtera's definition of accused products is overbroad. In Respondents' view, the accused NEC product is NEC's T740SW terminal with the XF200 line card and a [redacted], and the accused Nokia products are (1) ASN's 1620 series products with an XWAV line card containing an Acacia AC400 module and a [redacted] transponder containing an ADD2 chip; and (2) NAC's 1830 series products with PSI-2T or D5X500 transponders and [redacted] cards containing ADD3 chips, and also [redacted] cards containing ADD2 chips. *See* RRB at 7.

From Staff's perspective, the NEC and Nokia accused products are NEC's NS Series product line, Nokia's 1620 product line, which Staff notes is manufactured by ASN, and Nokia's 1830 product line, which Staff notes is manufactured by NAC. *See* SIB at 13. Similar to

Respondents' position, Staff notes that each of the product lines it identifies includes, among other things, the components identified in Respondents' description of the accused products. *See id.* at 13-14. Staff's brief does not, however, suggest limiting the scope of the accused products to the specific components identified by Respondents. *See id.*

To the extent there is a disagreement between the parties about the proper characterization of the accused products in this investigation, it is ultimately Xtera's burden to show articles that infringe the '403 patent. As will be seen in my analysis of infringement, Xtera has failed to show any Nokia or NEC product infringes, largely rendering moot any dispute about which products are accused. For the background purposes of this section, it is sufficient to acknowledge that Xtera accused the Nokia 1830 product line, the ASN 1620 product line, and the NEC T740SW product line of infringing the asserted claims of the '403 patent.

F. The Domestic Industry Products

The parties also share some dispute over the identification of the alleged domestic industry products. Xtera defines the domestic product as the "Nu-Wave Optima," and Staff similarly characterizes that domestic industry product as Xtera's "New Wave Optima product line." CIB at Table of Abbreviations and Defined Terms; SIB at 14. Respondents characterize the domestic products as Nu-Wave Optima products that include a Flex-Rate line card containing the Acacia AC400 module, pointing to the evidence Xtera presented at the evidentiary hearing. As with infringement, it is Xtera's burden to establish a domestic industry for all of the domestic industry products it relies on. That issue is addressed *infra.* For the purpose of giving context to the disputes addressed in this determination, it is sufficient to acknowledge that Xtera relies on the Nu-Wave Optima to establish domestic industry.

II. JURISDICTION & IMPORTATION

A. Subject Matter Jurisdiction

Section 337 confers subject matter jurisdiction on the Commission to investigate, and if appropriate, to provide a remedy for, unfair acts and unfair methods of competition in the importation, the sale for importation, or the sale after importation of articles into the United States. *See* 19 U.S.C. §§ 1337(a)(1)(B) and (a)(2). Xtera filed a complaint alleging a violation of section 337(a). Accordingly, the Commission has subject matter jurisdiction over this investigation under section 337 of the Tariff Act of 1930. *See Amgen, Inc. v. Int'l. Trade Comm'n*, 902 F.2d 1532, 1536 (Fed. Cir. 1990).

B. Personal Jurisdiction

Respondents have appeared and participated in this investigation. The Commission therefore has personal jurisdiction over Respondents. *See, e.g.*, *Certain Optical Disk Controller Chips & Chipsets & Prods. Containing Same, Including DVD Players & PC Optical Storage Devices*, Inv. No. 337-TA-506, ID at 4-5 (May 16, 2005) (unreviewed in relevant part).

C. In Rem Jurisdiction

There is no dispute here that the Commission has *in rem* jurisdiction over the accused products that have been imported into the United States. Xtera has presented evidence in the form of a stipulation and discovery responses showing that the accused products have been imported into the United States. *See* Joint Stipulation Regarding Importation of NEC Corporation, NEC Networks & System Integration Corporation, and NEC Corporation of America (Nov. 14, 2018) (EDIS Doc. 662043); CX-2063C at 0508-21 (ASN responses to requests for admission); CX-2052C at 0020-0044 (ASN supplemental responses to interrogatories); CX-2064C at 0487 (NAC responses to requests for admission); CX-2057C at 0018-20 (NAC responses to interrogatories). Accordingly, I find that the Commission has *in rem* jurisdiction over the accused products in this

investigation. *See Sealed Air Corp. v. Int'l Trade Comm'n*, 645 F.2d 976, 985-86 (C.C.P.A. 1981) (noting that the Commission has jurisdiction over imported goods); *Certain Crawler Cranes and Components Thereof*, Inv. No. 337-TA-887, Comm'n Op. at 17 (May 6, 2015) (an article "sold for importation" can confer jurisdiction on the Commission for that article).

D. Importation

The parties' dispute over satisfaction of the importation requirement of section 337 is narrow. The parties agree that the importation requirement is satisfied as to all Respondents except Nokia Corporation. Relying on *Certain Rubber Resins*, Inv. No. 337-TA-849 (Feb. 26, 2014), Nokia agues that Nokia Corporation, the parent entity of the other Nokia respondents, "does not sell for importation, import, or sell after importation any accused products . . . ." RRB at 13 (quoting Comm'n Op. at 74-75 ("mere ownership is not enough to hold a parent corporation liable for the acts of its subsidiaries absent further showing.")). Elaborating on that assertion, Nokia argues that "[a] parent entity does not itself meet the importation requirement based entirely on importations or sales of accused products by its subsidiaries;" that "mere ownership is not enough to hold a parent corporation liable for the acts of its subsidiaries absent further showing;" and that "[t]he mere fact that Nokia's subsidiaries market the product under the Nokia brand cannot be sufficient to overturn this clear case law [(*Certain Rubber Resins*)] because most complex corporations use similar branding across subsidiaries." *Id.* Other than the Commission's opinion in *Certain Rubber Resins*, Respondents cite no other precedent or evidence in support of their position.

The Nokia respondents' position concerning Nokia Corporation is reminiscent of Nokia's misguided tactics addressed in Order No. 30 and is contrary to longstanding interpretation and application of the importation requirement of section 337. To determine whether the importation requirement is satisfied as to a particular respondent, the Commission does not blindly apply a set

of context-agnostic rules. Rather, the Commission applies a fact-intensive inquiry as to the extent of a respondent's conduct in causing infringing articles to enter the United States. *See Certain Apparatus for the Continuous Prod. of Copper Rod*, Inv. No. 337-TA-52, Initial Determination, 1979 WL 61155, at *13-14 (Aug. 13, 1979) (concluding that a respondent was an importer where it purchased equipment that it was aware was produced in Germany and the evidence on balance established that the respondent "put in motion the importation" of those articles), *not reviewed*, Comm'n Determination & Order (Nov. 23, 1979); *Certain Large Video Matrix Display Sys. & Components Thereof*, Inv. No. 337-TA-75, Order No. 14, 1980 WL 140805, at *1-2 (June 30, 1980) (considering the "degree" of involvement in causing a scoreboard to enter the country, and concluding that the "direct nature of the involvement of the Brewers and the magnitude of their purchase" showed that the team was an "importer"), *not reviewed*, Comm'n Op. (June 19, 1981); *Certain Plastic-Capped Decorative Emblems*, Inv. No. 337-TA-121 (Oct. 1, 1982), Order No. 11, 1982 WL 213041, at *1-2 (finding a respondent to be an importer where it purchased articles from a Canadian corporation "f.o.b. Buffalo"), *not reviewed*, Comm'n Action & Order (Dec. 1, 1982); *Certain Salinomycin Biomass & Preparations Containing Same*, Inv. No. 337-TA-370, Order No. 19, 1995 WL 945787, at *1-3 (Sept. 18, 1995) (concluding, based on the evidence presented, that respondent Merck was not an importer because of the lack of its involvement in causing the goods to enter the country), *not reviewed*, Notice (Feb. 9, 1996); *Certain Cigarettes & Packaging Thereof*, Inv. No. 337-TA-643, Comm'n Op., 2009 WL 6751505, at *4-6 (Oct. 1, 2009) (concluding, based on the evidence adduced at trial, that the respondent was an importer where its acts were "integral to the importation"); *Certain Digital Set-Top Boxes & Components Thereof*, Inv. No. 337-TA-712, Initial Determination, 2011 WL 2567284, at *10-12 (May 20, 2011) (concluding, based on the record evidence, that "Cablevision was sufficiently involved in the

manufacture and importation of the Cisco STBs to meet the importation requirement"), *not reviewed*, Notice (July 21, 2011).

In contrast to the fact-intensive approach to importation that the Commission has consistently applied for decades, the Nokia respondents misinterpret the guidance in *Certain Rubber Resins* to suggest that, because certain of its subsidiaries are responsible for the importation of the allegedly infringing articles, the importation requirement cannot be satisfied as to Nokia Corp. *Rubber Resins* does not support that conclusion. At best, the portion of *Rubber Resins* that Respondents rely on only indicates there is no bright-line rule as to when a subsidiary's importation also evidences importation by the subsidiary's corporate parent. *See* Comm'n Op. at 74-75 ("mere ownership is not enough to hold a parent corporation liable for the acts of its subsidiaries *absent further showing*." (emphasis added)). In that respect, *Rubber Resins* is entirely consistent with the Commission's longstanding fact-intensive approach to the importation requirement. Just as the Commission will not absolve an entity of its roll in importing allegedly infringing articles into the United States based solely on a corporate relationship, the Commission will also not find importation based solely on those grounds.

Following the Commission's fact-intensive approach to determining importation, I find that the evidence presented by Xtera and Staff demonstrates that the importation requirement is satisfied as to Nokia Corporation. First, I find that Nokia Corporation, in its role as a common corporate parent to NAC and Bell Labs, was involved in causing NAC and Bell Labs to work together to test the Nokia 1830 products in the United States. *See* Tr. at 726:2-728:11. Particularly, Dr. Szilard Zsigmond, a product line manager of submarine products for Nokia, testified that Nokia Corporation was involved in the decision to have Bell Labs and NAC work together to test D5X500 transponders. *See id.* at 727:19-22. I also find that at least [redacted]

transponders—which are components of the Nokia 1830 products—were imported for the Bell Labs and NAC test. *See* JX-0038C at 30:8-12; *see also* Tr. at 705:3-25.

Second, I find that Nokia's approach to marketing subsea telecommunications systems demonstrates a coordinated effort by Nokia Corporation and NAC that weighs against the conclusion that NAC is solely responsible for causing the allegedly infringing articles to be imported into the United States. Particularly, Nokia Corporation's marketing materials tout its status as an industry leader in the field of submarine networks based on the deployment of "more than 200 submarine systems." CX-2068 at 0001; *see also* JX-0020C at 148:11-149:4. To support that statement, Nokia combined submarine system deployments throughout all of Nokia with those of ASN. *See* JX-0020C at 148:14-149:4. The fact that Nokia presents its submarine network business as a single cohesive unit for marketing purposes, despite the contributions of disparate subsidiaries, weighs against finding that Nokia Corporation's involvement in the importation of the Nokia 1830 should can be severed from the involvement of NAC for the purposes of considering the importation requirement. Put another way, Nokia and NAC do not appear to operate with the clear separation that Respondents rely on to argue that Nokia Corp. has not satisfied the importation requirement. The facts simply do not support the narrative that Nokia Corp. had no part in the importation of the allegedly infringing articles at issue in this investigation.

Additional marketing evidence supports the conclusion that Nokia Corp. and NAC operated in conjunction to cause the importation of the Nokia 1830 products into the United States. For example, the [redacted] Subsea Deployment statement of work by Alcatel-Lucent USA Inc.—NAC's predecessor—bears Nokia Corporation's logo on every page. *See* CX-1688C. Similarly, Nokia's response to a request for information on open line system transponders makes none of the distinctions between its subsidiary companies that Respondents attempt to rely on to distinguish

Nokia Corporation in the context of importation. *See* CX-1694C. Rather, Nokia's response touts its work with Bell Labs and its global reach as desirable traits in its pitch. *See id.* at .0006-.0007.

Considering the evidence of record in this investigation, I find that Nokia Corporation engaged in coordinated action with NAC to test and market the Nokia 1830 products, including coordinating the domestic testing of the D5X500 transponders by NAC and Bell Labs. On that basis, I find that Nokia Corporation is sufficiently responsible for causing the Nokia 1830 products to be imported into the United States that the importation requirement of section 337 is satisfied as to Nokia Corporation. Accordingly, I find that the importation requirement of section 337 is satisfied as to all respondents.

III. LEGAL PRINCIPLES

A. Claim Construction

"An infringement analysis entails two steps. The first step is determining the meaning and scope of the patent claims asserted to be infringed. The second step is comparing the properly construed claims to the device accused of infringing." *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 976 (Fed. Cir. 1995) (*en banc*) (internal citations omitted), *aff'd*, 517 U.S. 370 (1996). Claim construction resolves legal disputes between the parties regarding claim scope. *See Eon Corp. IP Holdings v. Silver Spring Networks*, 815 F.3d at 1314, 1319 (Fed. Cir. 2016).

Evidence intrinsic to the application, prosecution, and issuance of a patent is the most significant source of the legally operative meaning of disputed claim language. *See Bell Atl. Network Servs., Inc. v. Covad Commc'ns Grp., Inc.*, 262 F.3d 1258, 1267 (Fed. Cir. 2001). The intrinsic evidence includes the claims themselves, the specification, and the prosecution history. *See Phillips v. AWH Corp*, 415 F.3d 1303, 1314 (Fed. Cir. 2005) (*en banc*); *see also Markman*, 52 F.3d at 979. As the Federal Circuit explained in *Phillips*, courts must analyze each of these

components to determine the "ordinary and customary meaning of a claim term" as understood by a person of ordinary skill in the art at the time of the invention. 415 F.3d at 1313.

"It is a 'bedrock principle' of patent law that 'the claims of a patent define the invention to which the patentee is entitled the right to exclude." *Phillips*, 415 F.3d at 1312 (quoting *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004)). The patent claims themselves "provide substantial guidance as to the meaning of particular claim terms." *Id.* at 1314; *see Interactive Gift Express, Inc. v. Compuserve Inc.*, 256 F.3d 1323, 1331 (Fed. Cir. 2001) ("In construing claims, the analytical focus must begin and remain centered on the language of the claims themselves, for it is that language that the patentee chose to use to 'particularly point[ ] out and distinctly claim[ ] the subject matter which the patentee regards as his invention.'"). The context in which a term is used in an asserted claim can be "highly instructive." *Phillips*, 415 F.3d at 1314. Additionally, other claims in the same patent, asserted or unasserted, may also provide guidance as to the meaning of a claim term. *Id.*

The specification "is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term." *Id.* at 1315 (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)). "[T]he specification may reveal a special definition given to a claim term by the patentee that differs from the meaning it would otherwise possess. In such cases, the inventor's lexicography governs." *Id.* at 1316. "In other cases, the specification may reveal an intentional disclaimer, or disavowal, of claim scope by the inventor." *Id.* As a general rule, however, the particular examples or embodiments discussed in the specification are not to be read into the claims as limitations. *Id.* at 1323. In the end, "[t]he construction that stays true to the claim language and most naturally aligns with the

patent's description of the invention will be . . . the correct construction." *Id.* at 1316 (quoting *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1250 (Fed. Cir. 1998)).

When the intrinsic evidence does not establish the meaning of a claim, then extrinsic evidence (*i.e.*, all evidence external to the patent and the prosecution history, including dictionaries, inventor testimony, expert testimony, and learned treatises) may be considered. *Id.* at 1317. Extrinsic evidence is generally viewed as less reliable than the patent itself and its prosecution history in determining how to define claim terms. *Id.* "The court may receive extrinsic evidence to educate itself about the invention and the relevant technology, but the court may not use extrinsic evidence to arrive at a claim construction that is clearly at odds with the construction mandated by the intrinsic evidence." *Elkay Mfg. Co. v. Ebco Mfg. Co.*, 192 F.3d 973, 977 (Fed. Cir. 1999).

B. Infringement

In a section 337 investigation, the complainant bears the burden of proving infringement of the asserted patent claims by a preponderance of the evidence. *See Spansion*, 629 F.3d at 1349. This standard "requires proving that infringement was more likely than not to have occurred." *Warner-Lambert Co. v. Teva Pharm. USA, Inc.*, 418 F.3d 1326, 1341 n.15 (Fed. Cir. 2005).

1. Literal Infringement

Literal infringement is a question of fact. *Finisar Corp. v. DirecTV Grp., Inc.*, 523 F.3d 1323, 1332 (Fed. Cir. 2008). "Literal infringement requires the patentee to prove that the accused device contains each limitation of the asserted claim(s). If any claim limitation is absent, there is no literal infringement as a matter of law." *Bayer AG v. Elan Pharm. Research Corp.*, 212 F.3d 1241, 1247 (Fed. Cir. 2000).

2. Doctrine of Equivalents

Where literal infringement is not found, infringement nevertheless can be found under the doctrine of equivalents. Determining infringement under the doctrine of equivalents "requires an intensely factual inquiry." *Vehicular Tech. Corp. v. Titan Wheel Int'l, Inc.*, 212 F.3d 1377, 1381 (Fed. Cir. 2000). The Supreme Court has described the essential inquiry of the doctrine of equivalents analysis in terms of whether the accused product or process contains elements identical or equivalent to each claimed element of the patented invention. *Warner-Jenkinson Co., Inc. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 40 (1997).

The Federal Circuit applies two articulations of the test for equivalents, as one phrasing may be more suitable for particular fact patterns or technologies. Under the insubstantial differences test, "[a]n element in the accused device is equivalent to a claim limitation if the only differences between the two are insubstantial." Alternatively, under the function-way-result test, an element in the accused device is equivalent to a claim limitation if it "performs substantially the same function in substantially the same way to obtain substantially the same result." *Voda v. Cordis Corp.,* 536 F.3d 1311, 1326 (Fed. Cir. 2008) (citations omitted).

In *Warner-Jenkinson*, the Supreme Court noted that the doctrine of equivalents is subject to several limitations. *Warner-Jenkinson,* 520 U.S. at 29. The doctrine must be applied to individual elements of a claim and not to the invention as a whole. *Id.*

C. Validity

A patent is presumed valid. *See* 35 U.S.C. § 282; *Microsoft Corp. v. i4i Ltd. P'ship*, 564 U.S. 91, 95 (2011). A respondent who has raised patent invalidity as an affirmative defense has the burden of overcoming this presumption by clear and convincing evidence. *See Microsoft,* 564 U.S. at 95.

1. Anticipation

Under 35 U.S.C. § 102, a claim is anticipated, and therefore invalid, when "the four comers of a single, prior art document describe every element of the claimed invention, either expressly or inherently, such that a person of ordinary skill in the art could practice the invention without undue experimentation." *Advanced Display Sys., Inc. v. Kent State Univ.*, 212 F.3d 1272, 1282 (Fed. Cir. 2000). To be considered anticipatory, the prior art reference must be enabling and describe the applicant's claimed invention sufficiently to have placed it in possession of a person of ordinary skill in the field of the invention. *See Helifix Ltd. v. Blok-Lok, Ltd.*, 208 F.3d 1339, 1346 (Fed. Cir. 2000).

2. Obviousness

Under 35 U.S.C. § 103, a patent may be found invalid as obvious if "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." 35 U.S.C. § 103(a). Because obviousness is determined at the time of invention, rather than the date of litigation, "[t]he great challenge of the obviousness judgment is proceeding without any hint of hindsight." *Star Scientific, Inc. v. R.J. Reynolds Tobacco Co.*, 655 F.3d 1364, 1375 (Fed. Cir. 2011).

When a patent is challenged as obvious, the critical inquiry in determining the differences between the claimed invention and the prior art is whether there is an apparent reason to combine the known elements in the fashion claimed by the patent at issue. *See KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 417-418 (2007). Thus, based on a combination of several prior art references, "the burden falls on the patent challenger to show by clear and convincing evidence that a person of ordinary skill in the art would have had reason to attempt to make the composition or device, or

carry out the claimed process, and would have had a reasonable expectation of success in doing so." *PharmaStem Therapeutics, Inc. v. ViaCell, Inc.*, 491 F.3d 1342, 1360 (Fed. Cir. 2007) (citations omitted).

Obviousness is a determination of law based on underlying determinations of fact. *Star Scientific*, 655 F.3d at 1374. The factual determinations behind a finding of obviousness include: (1) the scope and content of the prior art, (2) the level and content of the prior art, (3) the differences between the claimed invention and the prior art, and (4) secondary considerations of non-obviousness. *KSR,* 550 U.S. at 399 (citing *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966)). These factual determinations are referred to collectively as the "*Graham* factors." Secondary considerations of non-obviousness include commercial success, long felt but unresolved need, and the failure of others. *Id.* When present, secondary considerations "give light to the circumstances surrounding the origin of the subject matter sought to be patented," but they are not dispositive on the issue of obviousness. *Geo. M. Martin Co. v. Alliance Mach. Sys. Int'l.*, 618 F.3d 1294, 1304-06 (Fed. Cir. 2010). For evidence of secondary considerations to be given substantial weight in the obviousness determination, its proponent must establish a nexus between the evidence and the merits of the claimed invention. *See W. Union Co. v. MoneyGram Payment Sys. Inc.*, 626 F.3d 1361, 1372-73 (Fed. Cir. 2010) (citing *In re GPAC Inc.,* 57 F.3d 1573, 1580 (Fed. Cir. 1995)).

3. Written Description and Enablement

The hallmark of the written description requirement is the disclosure of the invention. *See Ariad Pharm., Inc. v. Eli Lilly and Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (*en banc*). The test for determining the sufficiency of the written description in a patent requires "an objective inquiry into the four corners of the specification from the perspective of a person of ordinary skill in the art. Based on that inquiry, the specification must describe an invention understandable to that

skilled artisan and show that the inventor actually invented the invention claimed." *Id.* Compliance with the written description requirement is a question of fact and "the level of detail required to satisfy the written description requirement varies depending on the nature and scope of the claims and on the complexity and predictability of the relevant technology." *Id.*

To satisfy the enablement requirement a patent specification must "contain a written description of the invention . . . to enable any person skilled in the art . . . to make and use the same." 35 U.S.C. §112, ¶ 1. The specification must enable a person of ordinary skill in the art to practice the claimed invention without undue experimentation. *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Contractors USA, Inc.*, 617 F.3d 1296, 1305 (Fed. Cir. 2010). Although a specification need not disclose minor details that are well known in the art, this "rule" is "merely a rule of supplementation, not a substitute for a basic enabling disclosure." *Auto. Tech. Int'l Inc., v. BMW of N. Am.*, 501 F.3d 1274, 1283 (Fed. Cir. 2007) (*quoting Genentech, Inc. v. Novo Nordisk, A/S*, 108 F.3d 1361, 1366 (Fed. Cir. 1997)). "It is the specification, not the knowledge of one skilled in the art, that must supply the novel aspects of an invention in order to constitute adequate enablement." *Auto. Tech.*, 501 F.3d at 1283.

Enablement is a question of law with underlying questions of fact regarding undue experimentation. *Transocean*, 617 F.3d at 1305. The factors weighed by a court in determining whether a disclosure requires undue experimentation include: (1) the quantity of experimentation necessary, (2) the amount of direction provided, (3) the presence of working examples, (4) the nature of the invention, (5) the state of the prior art, (6) the relative skill of those in the art, (7) the predictability of the art, and (8) the breadth of the claims. *In re Wands*, 858 F.2d 731, 737 (Fed. Cir. 1988).

4. Indefiniteness

A claim must also be definite. Pursuant to 35 U.S.C. § 112, ¶ 2, a patent specification "shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention." 35 U.S.C. § 112, ¶ 2. Section 112, ¶ 2 requires "that a patent's claims, viewed in light of the specification and prosecution history inform those skilled in the art about the scope of the invention with reasonable certainty." *Nautilus, Inc.* v. *Biosig Instruments, Inc.,* 134 S. Ct. 2120, 2129 (2014). A patent claim that is indefinite is invalid. 35 U.S.C. § 282(b)(3)(A).

D. Domestic Industry

For a patent-based complaint, a violation of section 337 can be found "only if an industry in the United States, relating to the articles protected by the patent . . . concerned, exists or is in the process of being established." 19 U.S.C. § 1337(a)(2). This domestic industry requirement of section 337 is often described as having an economic prong and a technical prong. *InterDigital Commc'ns, LLC v. Int'l Trade Comm'n*, 707 F.3d 1295, 1298 (Fed. Cir. 2013); *Certain Stringed Musical Instruments and Components Thereof*, Inv. No. 337-TA-586, Comm'n Op. at 12-14, USITC Pub. No. 4120, 2009 WL 5134139 (Dec. 2009). The complainant bears the burden of establishing that the domestic industry requirement is satisfied. *See Certain Set-Top Boxes and Components Thereof*, Inv. No. 337-TA-454, ID at 294, 2002 WL 31556392 (June 21, 2002) (unreviewed by Commission in relevant part).

1. Economic Prong

Section 337(a)(3) sets forth the following economic criteria for determining the existence of a domestic industry in such investigations:

> (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.

Given that the statutory criteria are listed in the disjunctive, satisfaction of any one of them will be sufficient to meet the economic prong of the domestic industry requirement. *See Certain Variable Speed Wind Turbines and Components Thereof*, Inv. No. 337-TA-376, Comm'n Op. at 15, USITC Pub. 3003 (Nov. 1996).

2. Technical Prong

The technical prong of the domestic industry requirement is satisfied when the complainant in a patent-based section 337 investigation establishes that it is practicing or exploiting the patents at issue. *See* 19 U.S.C. § 1337(a)(2) and (3); *Certain Microsphere Adhesives, Process for Making Same and Prods. Containing Same, Including Self-Stick Repositionable Notes,* Inv. No. 337-TA-366, Comm'n Op. at 8, 1996 WL 1056095 (Jan. 16, 1996). "The test for satisfying the 'technical prong' of the industry requirement is essentially [the] same as that for infringement, *i.e.*, a comparison of domestic products to the asserted claims." *Alloc, Inc. v. Int'l Trade Comm'n*, 342 F.3d 1361, 1375 (Fed. Cir. 2003). To prevail, the patentee must establish by a preponderance of the evidence that the domestic product practices one or more claims of the patent. It is sufficient to show that the products practice any claim of that patent, not necessarily an asserted claim of that patent. *See Certain Male Prophylactic Devices*, Inv. No. 337-TA-546, Comm'n Op. at 38 (Aug. 1, 2007).

IV. U.S. PATENT NO. 7,860,403

A. Level of Ordinary Skill in the Art

Xtera submits that a person of ordinary skill in the art "would have . . . an undergraduate degree in electrical engineering or equivalent, and they would have approximately two years of professional experience in optical data transmission systems or graduate work in optical data transmission systems." CRB at 4. Respondents and Staff contend that a person of ordinary skill in the art "would have had either a Bachelor of Science in electrical engineering or a field related to fiber-optic communications and three to five years of experience in the design of fiber-optic communications systems." RRB at 14; SIB at 37. While the parties propose different levels of ordinary skill in the art, the differences are not material and the parties agree that no issue I must decide turns on the level of ordinary skill. *See* RRB at 14-15; CRB at 4; SIB at 37; Tr. at 790:8-14, 979:9-19. Therefore, I need not resolve which of the two proposals is more correct to resolve the remaining disputes in this Investigation. I find that both proposals are suitably indicative of the level of ordinary skill in the relevant art.

B. Claim Construction Disputes[2]

1. "A transmitter for producing"

The phrase "[a] transmitter for producing" appears in the preamble of claim 8. Xtera, for the first time at the evidentiary hearing, argued that the preamble of claim 8 is limiting. Tr. at 274:19-275:1; CIB at 11-12; CRB at 8-9. Even if I were to excuse the untimeliness of Xtera's argument, the argument is not persuasive. Generally, "a preamble limits the invention if it recites

[2] While Xtera includes a section on the term "a filter having a spectral profile giving rise to carrier pulses" in the claim construction portion of its initial post-hearing brief, none of the parties actually propose any construction for this term. Thus, I address Xtera's arguments about the filter when I compare the claims to the accused devices.

essential structure or steps, or if it is 'necessary to give life, meaning, and vitality' to the claim." *Catalina Mktg. Int'l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 808 (Fed. Cir. 2002) (quoting *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1305 (Fed. Cir. 1999)). Furthermore, "a preamble is not limiting 'where a patentee defines a structurally complete invention in the claim body and uses the preamble only to state a purpose or intended use for the invention.'" *Id.* (quoting *Rowe v. Dror*, 112 F.3d 473, 478 (Fed. Cir. 1997)). Here, the preamble is non-limiting because it does not impart structure into the claims. Rather, the preamble merely describes the intended use (*i.e.*, "producing an optical data signal for transmission over a wavelength division multiplexer optical communication system") for an otherwise structurally complete invention. *See* '403 Patent at cl. 8; Tr. at 865:22-867:19.

I do not agree with Xtera's contention that the preamble must be limiting because it provides antecedent basis for the terms "signal" and "transmitter" in dependent claims 10 and 11. First, as to the term "signal," claim 10 recites "a signal path of the transmitter," which provides the necessary antecedent basis for "the signal path of the transmitter" in claim 11. *See id.* at cl. 10, 11. Second, as to "a transmitter" in claim 8, which Xtera alleges provides antecedent basis for claim 10, the phrase merely gives a descriptive name to the set of limitations in the claim, but does not add limitations to the claim. *See IMS Tech., Inc. v. Haas Automation, Inc.*, 206 F.3d 1422, 1434 (Fed. Cir. 2000). And contrary to Xtera's assertion, it is not apparent that there was "clear reliance" on the preamble during prosecution to distinguish the claimed invention over the prior art. *See Catalina*, 289 F.3d at 808-09. Therefore, I decline to treat the preamble as a limitation of claim 8.

2. "means for producing"

Claim 8 recites a "means for producing a periodic series of optical pulses defining a series of time slots, wherein one pulse appears in each time slot." The parties agree that the "means for producing" term invokes the application of 35 U.S.C. § 112, sixth paragraph. The parties also agree that the function of the means is "producing a periodic series of optical pulses defining a series of time slots, wherein one pulse appears in each time slot."[3] CIB at 12; SIB at 39; RIB at 62. The parties dispute, however, the structure corresponding to that function. Xtera submits that the corresponding structure is "pulsed light sources, including active mode locked lasers, or CW lasers modulated to create a pulse stream, and equivalents thereof," while Respondents and Staff submit that the corresponding structure is "pulsed laser light sources (e.g. an active mode locked laser) or equivalents thereof." *Id.*

The parties appear to agree that the '403 patent clearly links the light source in Figure 2 to the function of the "means for producing a periodic series of optical pulses" recited in claim 8. *See* CIB at 25; RIB at 62; SIB at 39. The parties' dispute centers on whether the specification of the '403 patent additionally clearly links or associates structures in Figure 1 and Figure 5 with the claimed function. *See Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1352 (Fed. Cir. 2015) (citing *B. Braun Med., Inc. v. Abbott Labs.*, 124 F.3d 1419, 1424 (Fed. Cir. 1997)) ("Structure disclosed in the specification qualifies as 'corresponding structure' if the intrinsic evidence clearly links or associates that structure to the function recited in the claim."). Xtera wants to rely on both Figure 1 and Figure 5 to broaden the classes of corresponding structures beyond those shown in

[3] While Xtera contends there is a dispute about the function of the "means for producing a series of pulses," the parties all provided the same language for the claimed function in their briefing. Xtera's arguments are therefore addressed when I compare the claims to the accused devices.

Figure 2; Respondents and Staff say the structures in Figure 1 and Figure 5 are not clearly linked to the relevant function. CIB at 19-25; RIB at 62-69; SIB at 40-42.

I begin my analysis with the undisputed point—that Figure 2 shows structure clearly linked to the function of "producing a periodic series of optical pulses." I begin there because the applicant's disclosures in connection with Figure 2 are so clearly linked to the function in question that they create a sharp contrast with the debated disclosures surrounding Figures 1 and 5.

The written description states, "FIG. 2 illustrates a transmitter in accordance with the present invention which provides a means for generating [an] optical signal with a narrow spectral width at a particular bit rate . . . " '403 Patent at 3:2-6. There is no dispute that the "means for generating [an] optical signal" identified in Figure 2 is the same as the "means for producing a periodic series of optical pulses" at issue in the claim 8.[4]

The written description goes on to explain that the pulsed laser light source 20 shown in Figure 2 is an "active mode locked laser" that can be made "to produce a series of narrow pulses at a particular bit rate." *Id.* at 3:10-16. That language further links the active mode locked laser in Figure 2 to the function of producing a periodic series of optical pulses. The patent then identifies by manufacturer and model a specific active mode locked laser that is suited for use in the system shown in Figure 2. *Id.* at 3:12-16.

The prosecution history also clearly links structure in Figure 2 to the function of producing a periodic series of optical pulses. There the applicant stated that the "means for producing" limitation was illustrated by the "active mode lock laser" in Figure 2, which "generates such a

[4] It is interesting to note that in the written description portion of the specification, the term "means" is not used in connection with any other structure in any other figure.

series of narrow pulses at a particular bit rate." *See* JX-0010 at JX-0010.0275 (discussion regarding Figure 2 and claim 6, which eventually became issued claim 8).

I find a sharp contrast between the clear language linking the structure in Figure 2 to the function at issue and the debatable disclosures surrounding Figure 1 and Figure 5 of the '403 patent. For example, with respect to Figure 1, the '403 patent states that figure depicts a "coherent light source 10, such as a CW laser, [that] produces an optical beam which is first modulated with an electrical clock signal using a first modulator 11." '403 Patent at 2:44-47. The specification explains that the "first modulator 11 provides a series of pulses at a particular bit rate in accordance with the clock signal." *Id.* at 2:51-52. At first blush, it might seem that because "modulator 11 provides a series of pulses at a particular bit rate," it could be a structure that performs the agreed function of "producing a periodic series of optical pulses defining a series of time slots, wherein one pulse appears in each time slot." The problem is that the '403 patent includes additional teachings that cast doubt about whether the structures illustrated by Figure 1 are capable of performing the function in question consistently with the claimed invention.

Specifically, the '403 patent states multiple times that Figure 1 is prior art. *See* '403 Patent at Fig. 1; 2:29-30, 43-44. The '403 patent acknowledges that prior art structures illustrated by modulator 11 in Figure 1 have limitations when it comes to implementing the claimed invention. The specification states that although the system shown in Figure 1 "*might* be suitable for producing narrow pulses," in order to produce the "required" narrow pulses, "the modulator 11 would have to be able to switch on and off very quickly." '403 Patent at 4:32-37 (emphasis added). The patentee then admits that such rapidly switching modulators were unavailable at the time of the invention by adding, "Suitable modulators may be available in the near future." *Id.* These statements are the opposite of a clear link between a structure and a claimed function of the

invention; they are expressions of doubt by the patentee that the structure of Figure 1 could perform the function of "producing a periodic series of optical pulses defining a series of time slots" in the manner required by the claimed invention. I therefore conclude that Figure 1 does not disclose structure clearly linked to the function of "producing a periodic series of optical pulses" as required by claim 8.

Turning to Figure 5, the specification states that "[a] coherent light source 50 provides an optical beam" that is "modulated using an MZ modulator 51 driven with RZ electrical data 51 [sic] at the required bit rate." '403 patent at 4:21-24. The patent then implies that this modulation results in "data pulses." *Id.* at 4:24-26 (emphasis added). Xtera contends that this disclosure clearly links structures in Figure 5 to the claimed function of "producing a periodic series of optical pulses." Xtera's argument is not a model of clarity, but there appear to be three possible structures in Figure 5 for performing the function: (1) coherent light source 50, (2) MZ modulator 51, and (3) the combination of coherent light source 50 with MZ modulator 51. I will examine each in turn.

First, it is undisputed that coherent light source 50 produces an "optical beam" ('403 patent at 4:21-24) but does not produce optical pulses. As Xtera's expert Dr. Ralph testified, light source 50 is a continuous wave source. Tr. at 285:22-286:24. Respondents' expert Dr. Brandt-Pearce agreed. *Id.* at 921:7-12. It is undisputed that a continuous wave laser does not produce optical pulses. Tr. at 816:20-817:3 (Brandt-Pearce); 974:19-25 and 987:11-20 (Blumenthal), 362:25-363:6 (Ralph), 527:5-527:19 and 556:13-18 (Willner), 138:19-22 (Pelouch). I therefore find that the light source 50 in Figure 5 does not perform the function of "producing a periodic series of optical pulses."

Next, the record demonstrates that modulator 51 produces data pulses ('403 patent at 4:22-26), but not a *periodic* series of pulses. Respondents' expert Dr. Brandt-Pearce testified that "the output of 51 is optical data pulses," but the series of data pulses would not be periodic because "data is not periodic." Tr. at 809:14-19; *see also* 814:17-815:1, 839:16-23; 940:11-941:14. Xtera's expert Dr. Ralph did not dispute that data is not periodic. This evidence undermines a conclusion that modulator 51 is linked to the function of producing a periodic series of optical pulses. But even without the aid of expert testimony, I find nothing in the specification of the '403 patent itself that clearly links the modulator 51 in Figure 5 to the function of "producing a *periodic* series of optical pulses," which is the claimed function.

The final possibility is that coherent light source 50 in combination with modulator 51 performs the function of "producing a periodic series of optical pulses." Xtera appears to rely on this combination because the modulator 51 alone does not produce light and the coherent light source 50 alone does not produce pulses. But pointing to both structures together does not solve the fundamental problem: the '403 patent does not clearly link the structures, alone or in combination, to the claimed function.

To overcome the deficient disclosures surrounding Figure 5, Xtera points to testimony from its expert Dr. Ralph. *See* CIB at 20. Dr. Ralph testified that "one *can* modulate light" and "*perhaps* with a Mach-Zehnder modulator driven with *appropriate* electrical signaling" one could "produce a series of optical pulses." Tr. at 283:7-18 (emphasis added). But what one *could* do "is not the correct inquiry." *Med. Instrumentation & Diagnostics Corp. v. Elekta AB*, 344 F.3d 1205, 1212 (Fed. Cir. 2003). The correct inquiry focuses on what the patentee actually said in the disclosure of the patent. *Id.* Expert testimony cannot "rewrite the patent's specification" to provide a link

between a structure and a claimed function where the patentee did not clearly provide one. *See Omega Eng'g, Inc, v. Raytek Corp.*, 334 F.3d 1314, 1332 (Fed. Cir. 2003).

Even with respect to what *could* be a "means for producing a periodic series of optical pulses," Dr. Ralph's testimony raised more questions than it answered. When asked on cross-examination whether the modulator shown in Figure 5 is capable of producing optical pulses in the manner required by claim 8, Dr. Ralph testified that he was "not sure if there's a conclusive answer" to the question. *See* Tr. at 371:3-11. Dr. Ralph also admitted that his theory that the modulator in Figure 5 "simultaneously" creates a pulse and modulates that pulse with data was "not described" in the '403 patent. *See id.* at 374:12-375:3. I give little weight to Dr. Ralph's understanding of this term.

Xtera also argues that because claim 11, which depends on claim 8, recites an amplifier and Figure 5 is the only figure that depicts an amplifier, then claim 8 must cover structure in Figure 5. Xtera's argument appears to rely on the unremarkable practice of genus-species claiming to supply linking disclosure between Figure 5 and the claimed function of producing a periodic series of optical pulses. The attempt is misguided. Even if claim 8 were construed as a genus that encompasses species of transmitters having an amplifier, so as to include the embodiment described in dependent claim 11, it does not follow that all structures that happen to be shown in the same figure as an amplifier are clearly linked to the "means for producing a periodic series of optical pulses." The patentee still has a duty to clearly link structure with a claimed function in the written description. *Med. Instrumentation & Diagnostics Corp.*, 344 F.3d at 1211.

Xtera's logic also ignores multiple alternative understandings of claim 11. For example, Xtera disregards the fact that "the claims of the patent need not encompass all disclosed embodiments." *TIP Sys., LLC v. Phillips & Brooks/Gladwin, Inc.*, 529 F.3d 1364, 1373 (Fed. Cir.

2008). There is no requirement that claim 11 must encompass what the '403 patent calls the "alternative transmitter design" of Figure 5 ('403 Patent at 4:30). Xtera's argument overlooks the possibility that claim 11 best corresponds to Figure 2 because (a) the patentee clearly linked structure in Figure 2 to the function of the "means for producing a periodic series of optical pulses," which is included by reference in claim 11 and (b) a person of ordinary skill in the art would know how to implement the amplifier of claim 11 within the circuit shown in Figure 2. Alternatively, there may be no disclosed embodiment of the invention that corresponds with claim 11 and it is invalid. I need not resolve which of these various theories accounts for claim 11 because that claim is not asserted here (perhaps with good reason). It suffices for the present purpose to note that nothing in the specification clearly links any structure shown in Figure 5 to the function of the "means for producing a periodic series of optical pulses."

A patentee is free to use the convenience of means-plus-function claiming allowed under the sixth paragraph of § 112, but the price that must be paid for use of that convenience is that a tribunal will carefully limit the claim to only the means specified in the written description and equivalents thereof. *See O.I. Corp. v. Tekmar Co.*, 115 F.3d 1576, 1583 (Fed. Cir. 1997). It is the duty of a patentee to clearly link or associate structure with the claimed function in the written description. *Med. Instrumentation & Diagnostics Corp.*, 344 F.3d at 1211. Here, the patentee clearly linked the function of "producing a periodic series of optical pulses defining a series of time slots, wherein one pulse appears in each time slot" the structure shown in Figure 2. Accordingly, I construe the corresponding structure for the "means for producing" to be pulsed laser light sources (e.g., an active mode locked laser) or equivalents thereof.

3. "the pulses"

a) Indefiniteness

The term "the pulses" appears in independent claim 8 of the '403 patent, and all other asserted claims depend from claim 8. Respondents argue that all asserted claims of the '403 patent are invalid as indefinite because the meaning of the claim limitation "the pulses" is ambiguous. RIB at 3-8. Respondents assert that a person of ordinary skill in the art would not understand, with reasonable certainty, whether the antecedent of "the pulses" is "optical pulses" or "carrier pulses," both of which appear earlier in claim 8. *Id.*

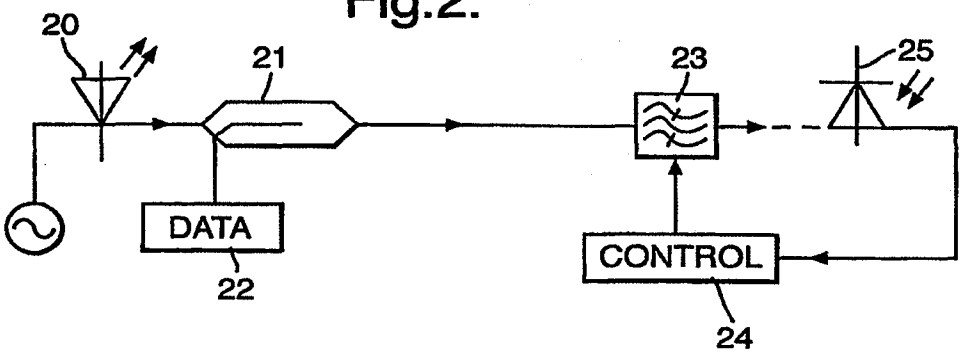
Under 35 U.S.C. § 112, ¶ 2, a patent must conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as the invention. A patent claim fails to satisfy this statutory requirement and, as a result, is invalid for indefiniteness if its language fails to inform, with reasonable certainty, those skilled in the art about the scope of the invention. *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901 (2014). "[T]he definiteness inquiry trains on the understanding of a skilled artisan at the time of the patent application, not that of a court viewing matters *post hoc*." *Id.* at 911. Indefiniteness is a question of law with factual underpinnings, and Respondents have the burden to establish indefiniteness by clear and convincing evidence. *Berkheimer v. HP Inc.*, 881 F.3d 1360, 1363 (Fed. Cir. 2018); *Enzo Biochem, Inc. v. Applera Corp.*, 599 F.3d 1325, 1332 (Fed. Cir. 2010).

The relevant portions of claim 8 are as follows: "A transmitter . . . comprising means for producing a periodic series of optical pulses . . . ; a filter having a spectral profile giving rise to carrier pulses . . . and; modulating means for modulating the pulses with data for transmission." '403 patent, cl. 8 (emphasis added).

The specification teaches a person of ordinary skill in the art where the "optical pulses" and "carrier pulses" exist within the transmitter system. As shown below in Figure 2 of the '403

patent, a laser light source 20 produces a series of optical pulses that are "modulated with data using an electro-optic modulator 21" and then passed through filter 23, "which alters the spectral profile of the pulses" to "produce carrier pulses extending over more than one time slot." '403 patent, 1:49-50, 3:3-30. In other words, the "modulating means for modulating the pulses" (modulator 21) in the Figure 2 embodiment acts upon optical pulses produced by the laser 20, and the "carrier pulse" label is assigned to the optical pulses after they are filtered by filter 23.

Fig.2.



The specification of the '403 patent, however, contemplates another configuration of the modulator and the filter that is not illustrated in Figure 2. The patent teaches, "The step of modulating the pulses with data can be performed either before or after the filtering step, but is preferably performed before the filtering step." *Id.*, 1:65-67. Thus, in this alternative embodiment, the modulator can act on pulses coming out of the filter.

The '403 patent contains claims that are in accord with these two alternative embodiments. As has been noted, claim 8 describes a transmitter comprising a "*means for producing* a periodic series of optical pulses . . . ; *a filter* having a spectral profile giving rise to carrier pulses . . . and; *[a] modulating means* for modulating the pulses with data for transmission." '403 patent, cl. 8 (emphasis added). On its face, claim 8 does not limit where along the signal path the modulating means is placed; it could come before or after the filter. In contrast, claim 10, which depends from claim 8, does impose such a limitation. In claim 10, the "modulating means is placed before the

filter in the signal path of the transmitter." '403 patent, cl. 10. Placing the modulating means before the filter is the only limitation that distinguishes claim 10 from claim 8. There is an especially strong presumption, therefore, that claim 8 covers both an arrangement with the modulating means before the filter and an arrangement with the modulating means after the filter in the signal path. *See SunRace Roots Enter. Co. v. SRAM Corp.*, 336 F.3d 1298, 1303 (Fed. Cir. 2003). Nothing in the '403 patent specification or prosecution history rebuts the presumption established by the doctrine of claim differentiation. *See Hill-Rom Servs., Inc. v. Stryker Corp.*, 755 F.3d 1367, 1374 (Fed. Cir. 2014). Therefore, a person of ordinary skill in the art would understand that the modulating means in claim 8 (*e.g.*, modulator 21 shown in Figure 2) can be positioned either before or after filter 23 in the signal path of the transmitter shown in Figure 2. In the later positional arrangement, the modulator 21 will act upon the so-called carrier pulses that exit filter 23. Accordingly, the claims in view of the specification confirm that the "the pulses" appearing near the end of claim 8 can refer to either "optical pulses" without a carrier spectral profile as they leave the laser light source 20 as shown in Figure 2 or "carrier pulses" leaving filter 23 with a spectral profile.

Staff agrees with the analysis above and contends that "the pulses" term appearing at the end of claim 8 is not indefinite. According to Staff, the evidence shows that a person of ordinary skill in the art would understand with reasonable certainty that "the pulses" of claim 8 refers to "optical pulses" in the embodiment shown in Figure 2 and to "carrier pulses" in the inverse positional arrangement where modulator 21 is placed after filter 23. SIB at 69. Staff finds support for this position in the testimony of Respondents' expert, Dr. Maité Brandt-Pearce, who admitted that the specification "teach[es] that you could modulate either the optical pulses or the carrier pulses." *Id.* (quoting Tr. at 929:7-18 and citing *id.* at 290:16-24 (Complainant's expert, Dr.

Stephen Ralph), 310:16-311:10 (same), 547:20-548:5 (Complainant's expert, Dr. Alan Willner), 944:6-11 (Dr. Brandt-Pearce)).

Respondents disagree with Staff. Respondents argue that a limitation with a "different meaning depending on the arrangement of the system purportedly infringing the alleged invention . . . is the essence of indefiniteness." RIB at 6 (emphasis removed) (quoting *Halliburton Energy Servs. Inc. v. M-ILLC*, 514 F.3d 1244, 1255 (Fed. Cir. 2008)). Respondents' citation to *Halliburton*, however, does not support its assertion. The patent claim in *Halliburton* recited a "fragile gel" used as lubrication in drilling oil wells. The patentee argued that a fragile gel was one that could easily transition between a gel state while at rest and a liquid state while drilling and, when in the gel state, suspend drill cuttings and weighting materials. The court determined an artisan would not know whether a certain drilling fluid was within the scope of the claims because a wide variety of oil well characteristics would influence how the gel would perform (*e.g.*, geology, wellbore size, depth, angle, etc.). "In other words, a given fluid might be adequate to suspend drill cuttings in some formations and/or well configurations, whereas in others it would not be." *Id.* at 1255. The court therefore found the claim to be indefinite. Here, unlike the many oil well characteristics influencing performance in *Halliburton*, there is only one factor at play—the location of the modulator in relation to the filter—and this factor by itself does not determine whether a transmission system is infringing or not. A circuit can infringe no matter whether the modulator comes before or after the filter.

And despite Respondents' suggestion otherwise, the lack of an antecedent basis for a claim limitation does not automatically render a claim invalid as indefinite. In *Energizer Holdings, Inc. v. International Trade Commission*, for example, the "said zinc anode" limitation did not have an explicit antecedent basis, but the Federal Circuit held that the "anode gel" was "by implication the

antecedent basis." 435 F.3d 1366, 1370-71 (Fed. Cir. 2006). Likewise, in *Microprocessor Enhancement Corp. v. Texas Instruments Inc.*, the Federal Circuit held that the "condition code" limitation need not have a single antecedent basis in order to be definite because "the appropriate meaning of 'condition code' is readily apparent from each occurrence in context . . . the [asserted] patent used condition code to refer to a value or a storage location based on its context within the claims." 520 F.3d 1367, 1376 (Fed. Cir. 2008) (also noting "the well-settled rule that claims are not necessarily invalid for a lack of antecedent basis").

Xtera offers a different perspective than Staff in arguing that "the pulses" limitation is definite. According to Xtera, Respondents' argument "is based on a false distinction—that 'optical pulses' and 'carrier pulses' are separate and distinct physical phenomena, rather than describing aspects of the same optical data signal." CRB at 15. The essence of Xtera's argument is that optical pulses can include carrier signals added by the filter, in which case they are labeled "carrier pulses," but the optical pulses with carrier signals are still optical pulses. Xtera concludes, therefore, that "optical pulses" is always the antecedent of "the pulses" limitation such that the "modulating means for modulating the pulses with data for transmission" will always act upon optical pulses regardless of whether the modulator is placed before the filter or after the filter. CRB at 16.

Respondents argue that Xtera's experts contradicted themselves and Xtera's position, which highlights the ambiguity of the limitation. RIB at 7-8. For example, Dr. Ralph agreed that "the pulses can be either the optical pulses from the means for producing or the carrier pulses from the filter." Tr. at 358:15-19. But Dr. Ralph clarified that "one can think of the ['the pulses' limitation] as . . . the optical pulses that are eventually created," and there would be no "misunderstanding or confusion" if "the pulses" also referred to carrier pulses because "the optical

pulses and the carrier pulses can be the same thing." Tr. at 310:16-311:10, 357:2-9. Respondents also point out that Dr. Willner similarly testified that the "the pulses" limitation "can refer to either the optical pulses or the carrier pulses." RIB at 8 (citing Tr. at 545:25-546:2). However, he also clarified that "[o]ne could view ['the pulses' limitation] as optical pulses or as carrier pulses" and that it is "fairly straightforward to have ['the pulses' limitation] be the optical pulses." Tr. at 545:3-546:98; *see id.* at 550:3-7 (agreeing with Respondents' counsel that "one of ordinary skill in the art wouldn't be confused and they would read the ['the pulses' limitation] to refer to the optical pulses").

The testimony of the expert witnesses is precise to a fault, and this precision may have led to Respondents' confusion. The experts' references to "carrier pulses" is not to the exclusion of "optical pulses," as the testimony may indicate, because carrier pulses are simply optical pulses that have been filtered. Referring to the filtered optical pulses as carrier pulses is accurate and the experts were justified in using this terminology as it mimics the language of the '403 patent, but the experts could have also referred to the carrier pulses as optical pulses for the purposes of explaining the "the pulses" limitation.

Accordingly, despite the lack of an antecedent basis, Respondents have not shown by clear and convincing evidence that a person of ordinary skill in the art would not understand, with reasonable certainty, that the "the pulses" limitation refers to optical pulses irrespective of whether those optical pulses are adorned with carrier signals. The claims and specification of the '403 patent informs the ordinary artisan that claim 8 is agnostic as to the position of the modulating means in relation to the filter such that "the pulses" being modulated are always optical pulses, with or without carrier signals. The asserted claims are therefore not indefinite.

b) **Construction**

As has been explained above, claim 8 convers a configuration in which the modulating means modulates optical signals that have not yet been filtered as well as a configuration in which the modulating means modulates optical signals that have been filtered. Optical signals that have been filtered are "carrier pulses" that have passed through the filter. *See id.* at cl. 8. Those carrier pulses, however, are still optical pulses – they are optical pulses that have the claimed temporal profile. *See id.*; CIB at 67; RIB at 69. Therefore, regardless of the placement of the modulator with respect to the filter, the modulator will always be modulating optical pulses – either unfiltered optical pulses or filtered optical pulses (i.e., carrier pulses). *See, e.g.*, Tr. at 310:16-311:10, 356:24-357:9, 358:15-19, 544:23-546:19, 550:3-7, 812:2-4, 942:3-18, 946:18-948:4. I construe the term "the pulses" to mean optical pulses with the understanding that those pulses may or may not have been filtered.

C. Infringement

1. Literal Infringement

Xtera asserts that the Accused Products infringe claims 8, 9, and 12 of the '403 patent. CIB at 78. Claim 8 is an independent claim and claims 9 and 12 depend from claim 8. '403 Patent at Cl. 8, 9, 12.

a) Claim 8 is not literally infringed

Claim 8 of the '403 patent provides as follows:

> [Preamble] 8. A transmitter for producing an optical data signal for transmission over a wavelength division multiplexer optical communication system comprising:
>
> [8A] means for producing a periodic series of optical pulses defining a series of time slots, wherein one pulse appears in each time slot;

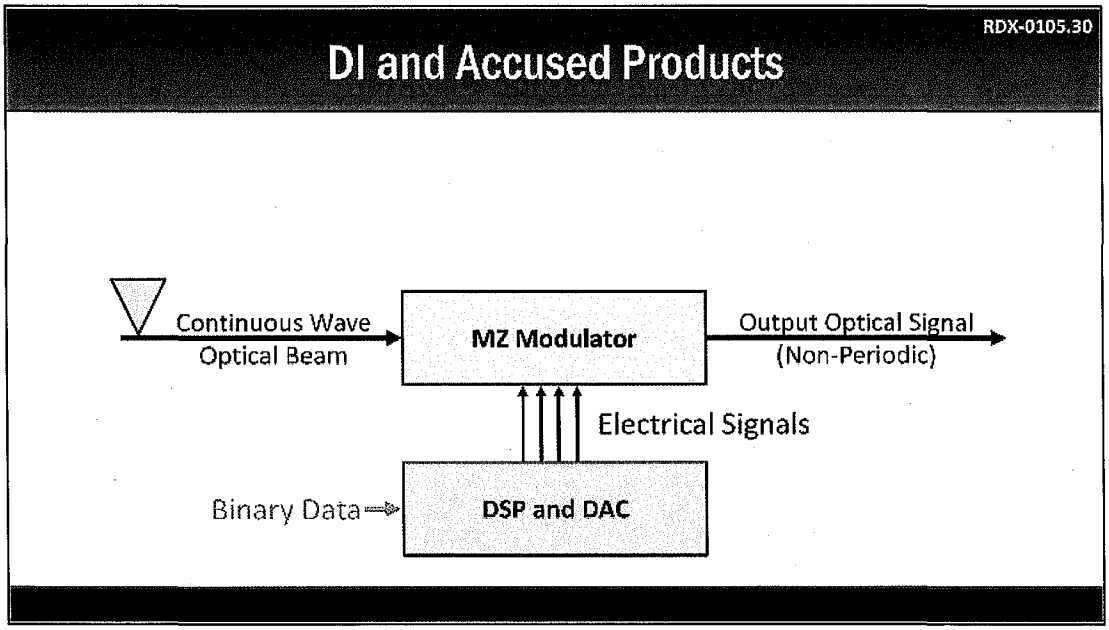
[8B] a filter having a spectral profile giving rise to carrier pulses,

[8C] each carrier pulse having a temporal profile extending over more than one time slot, the temporal profile having a minimum substantially in the center of each of the time slots adjacent to the time slot for that corresponding carrier pulse, the temporal profile of the corresponding carrier pulse further having an oscillating tail that extends from the minimum into at least one time slot that is even further from the time slot for the corresponding cg pulse; and

[8D] modulating means for modulating the pulses with data for transmission.

Id. at Cl. 8. Staff and Respondents organize their arguments by breaking the claim into four elements labeled 8A-8D above. I adopt the same convention.

In general, the parties agree that the Accused Products have three main components: (1) a continuous wave (CW) laser, (2) a Mach-Zehnder modulator (MZM), and (3) a digital signal processor (DSP), which includes a finite impulse response (FIR) filter, and a digital-to-analog converter (DAC). CIB at 78-79; RRB at 8-9; SIB at 14-15; Tr. at 59:4-15; RDX-0105.30 (reproduced below).



(1) Element 8A – "means for producing a period series of optical pulses"

Element 8A is means for producing a periodic series of optical pulses defining a series of time slots, wherein one pulse appears in each time slot. Xtera points to the combined structure of the continuous wave (CW) laser and Mach-Zander (MZ) modulator in the Accused Products as satisfying this "means for producing" element. For a means-plus-function limitation, "[l]iteral infringement . . . requires that the relevant structure in the accused device perform the identical function recited in the claim and be identical or equivalent to the corresponding structure in the specification." *Gen. Protecht Grp., Inc. v. Int'l Trade Comm'n*, 619 F.3d 1303, 1312 (Fed. Cir. 2010) (quoting *Applied Med. Res. v. U.S. Surgical Corp.*, 448 F.3d 1324, 1333 (Fed. Cir. 2006)). Below I apply each part of this test to the CW laser/MZ modulator combination in the Accused Products. The bottom line, however, is that the Accused Products have no structure that produces a periodic series of optical pulses. The structure identified by Xtera therefore does not perform the identical function recited in element 8A. Additionally, the structure identified by Xtera is not identical to the corresponding structure in the '403 patent specification for performing that function. Xtera also has not shown that the structure of the Accused Products is equivalent to the relevant corresponding structure disclosed in the '403 patent.

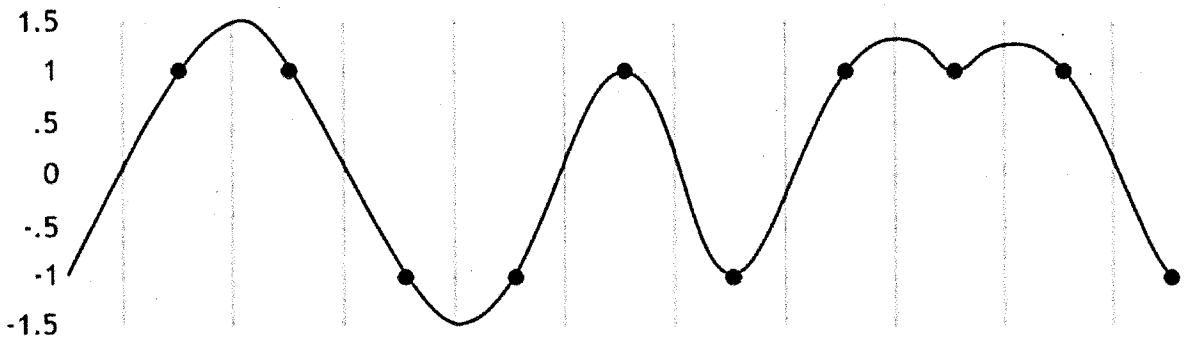
(a) The structure in the Accused Products does not perform the identical function

The first part of the means-plus-function test requires me to determine if the structure identified by Xtera performs "the identical function recited in the claim." *Gen. Protecht Grp., Inc.*, 619 F.3d at 1312. The agreed function of the "means for producing" is "producing a periodic series of optical pulses defining a series of time slots, wherein one pulse appears in each time slot." CIB at 12; SIB at 39; RIB at 62. There are only two optical signals produced by the structure identified by Xtera as corresponding to this claim limitation: the optical beam coming out of the

CW laser and the optical output of the MZ modulator. Neither meets the requirements of element 8A.

With respect to the CW laser, there is no dispute that the optical beam coming out of the laser does not comprise optical pulses; it is a continuous waveform at a constant frequency. Tr. at 816:20-817:3 (Brandt-Pearce); 974:19-25 and 987:11-20 (Blumenthal), 362:25-363:6 (Ralph), 527:5-527:19 and 556:13-18 (Willner), 138:19-22 (Pelouch).

The only other structure that produces optical signals is the MZ modulator. The MZ modulator uses encoded electrical signals from a digital signal processor to modulate the incoming continuous laser beam with data at predetermined intervals. Xtera's expert illustrated what a representative optical signal output from the MX modulator would look like:



CDX-0103C.33[5]. Because the data impressed on the laser beam is not periodic, the resulting output optical signal from the MX modulator shown above also is not periodic. Tr. at 814:17-819:10, 826:3-5, 827:8-828:21, 970:6-14; RDX-0105C.49-51. I find as a factual matter that the record shows the MX modulator output optical signal has no regularly repeating pattern and is not periodic.

[5] I am mindful that there are actually two optical signals output from the MZ modulator that are transmitted along each polarization, but each signal would generally have this profile. *See* RRB at 12; Tr. at 818:16-819:1.

Notwithstanding the fact that no periodicity is "visible" in the MX modulator output optical signal, Xtera argues that a periodic series of optical pulses must still "exist" in the Accused Products in order for the signal to be properly decoded at the receiver. *See, e.g.*, CIB at 14-17, 20, 81. Xtera notes that a receiver used with the Accused Products will evaluate the signal at regular intervals shown by the black dots in the illustration above to decode the transmitted data. *See id.* CIB at 14-17. But the behavior of a receiver does not determine whether a signal is periodic. If periodicity just means evaluating a signal at equally spaced, predetermined points in time, any signal could be evaluated that way and could be determined to be periodic. Claim element 8A requires producing a periodic series of optical pulses, not decoding a signal at predetermined periodic intervals. Tr. at 822:4-823:19, 818:16-819:10 (Brandy-Pearce), 970:4-23 (Blumenthal).

Xtera also argues that the Accused Products operate at a "specific bit/baud" rate, which is evidence of periodic signals produced in accordance with the claimed function of element 8A. CIB at 82. For example, in response to a question asking whether the Accused Products performed the function of producing a periodic series of optical pulses, Xtera's expert stated "it must, because it's part of a WDM system" and documentation of that system "explicitly that shows it has a specific Baud rate." Tr. at 323:8-14. This evidence, however, does not mean that a particular structure in the Accused Products produces a periodic series of optical pulses. Baud rate is related to the rate at which data is being transmitted. *See id.* at 825:7-9. The fact that a certain amount of data is transmitted within a certain time does not mean that a structure within the Accused Products must have produced a periodic series of optical pulses in the manner required by element claim 8A.

I also find, as a factual matter, that the output optical signal from the MZ modulator (illustrated by Xtera in the figure from CDX-0103C.33 above) has no features sufficiently distinct

to be called pulses. Xtera argues that individual pulse forms in the transmitted signal "exist and can be derived from the signal's spectrum," even if pulses are not visible in the optical signal output from the MZ modulator. *See, e.g.*, CIB at 81. The fact that pulses may derived from an output signal or that mathematical functions may be performed on an output signal to break that signal down into periodic constituents does not prove that a structure in the Accused Products actually produces such pulses. It may be true that an output signal can be broken down into periodic signals which, summed together, equal the signal in question, but it also may be equally true that the same output signal can be broken down into a summation of non-periodic constituents. The kinds of mathematical operations that can be performed after the fact on a signal coming out of the structure identified by Xtera does not demonstrate that the structure *produced* a periodic series of optical pulses.

Xtera next claims that documentation for the Accused Products "repeatedly refers to the transmitter output as pulses." *See* CIB at 96-98. I have examined the passages that Xtera cites and I find that those passages do not refer to the transmitter output optical signal as pulses. The passages in question refer to pulse-shaping attributes within various digital filters. *See* CX-0116C.0262 (describing a digital filter in the Acacia AC400 software specification); CX-1890C.0064 and CX-0304C.0064 (describing finite impulse response filters in an Alcatel-Lucent digital signal processor); CX-0010C.0018 and CX-0021C.0015 (describing pulse shaping attributes of a digital filter in a Nokia product); CX-0196C.0002 [redacted]. The pulse-shaping attribute of a digital filter is a characteristic of the filter, not a characteristic of the signal upon which the filter acts. *See* Tr. at 216:4-18; 806:12-18; 995:7-18. The documents cited by Xtera are not evidence that the accused CW laser and MZ modulator produce a pulsed signal.

Additionally, I find that all of the filters described in the documents cited by Xtera at CIB 96-98 are implemented in the electrical digital domain; they are not filters acting on optical signals. Tr. at 38:1-11, 553:8-14. For this additional reason these passages are not evidence the CW laser and MZ modulator identified by Xtera produce *optical* pulses.

My findings are supported by the testimony of experts in the field. Dr. Blumenthal gave a detailed explanation as to why lines of NEC code cited by Xtera describe attributes of a filter and do not demonstrate the production of a periodic series of optical pulses in the accused NEC products. Tr. at 994:2-10. Simiarly, Dr. Brandt-Pearce testified "[t]here is no pulse involved" in the accused modulation process. Tr. at 841:17-843:2.

Literal infringement requires that a structure in the Accused Products performs the identical function recited in the claim. *Gen. Protecht Grp., Inc.,* 619 F.3d at 1312. No structure in the Accused Products performs the claimed function of "producing a periodic series of optical pulses." For at least this reason, there is no literal infringement of claim 8.

(b) The structure in Accused Products is not identical to the corresponding structure in the '403 patent specification

The next question I must answer for means-plus-function element 8A is whether the relevant structure in the Accused Products is "identical" to the corresponding structure in the specification. *Gen. Protecht Grp., Inc.*, 619 F.3d at 1312. That question is easily answered: the structure is not identical.

I have determined above that the only structure in the '403 patent disclosed as corresponding to the claimed function in element 8A is a pulsed laser light source such as an active mode locked laser. A pulsed laser light source has an element in its cavity that creates oscillation to produce a series of short optical pulses. Tr. at 295:11-23, 807:21-808:4, 843:3-10, 985:22-986:5.

The structure that Xtera identifies in the Accused Products as satisfying element 8A is the combination of a continuous wave (CW) laser and MZ modulator. The CW laser in the Accused Products produces an optical signal with a relatively constant amplitude that does not include any pulses. Tr. at 138:19-22, 249:2-9, 362:25-363:6, 376:25-377:2, 527:5-19, 816:15-817:3, 974:19-23. There is no element in the cavity of the accused CW laser that creates oscillations to produce short optical pulses. Thus, the accused CW laser is not identical to the pulsed laser structure disclosed in the '403 patent. The MZ modulator in the Accused Products also is not identical to the pulsed laser structure disclosed in the '403 patent. It has no element in its cavity that oscillates to create a series of short optical pulses. Finally, the combination of the CW laser and the MZ modulator also is not structure identical to the pulsed laser light source disclosed in the '403 patent. The structure in the '403 patent that is clearly linked to the function of element 8A is pulsed laser, not a combination of a CW laser and MZ modulator. The combination of the CW laser and MZ modulator does not form an identical structure to the structure of the pulsed laser disclosed in the '403 patent. Thus, Xtera has failed to identify any structure in the Accused Products that is identical to the structure in the '403 patent specification closely linked to the function of producing a periodic series of optical pulses.

(c) The structure in Accused Products is not equivalent to the corresponding structure in the '403 patent specification

The last question I must resolve with respect to means-plus-function limitation 8A is whether the structure Xtera points to in the Accused Products is "equivalent to the corresponding structure" in the '403 patent specification. *Gen. Protecht Grp.*, 619 F.3d at 1312. A structure constitutes an equivalent to the corresponding structure in the patent "only if the accused structure performs the identical function 'in substantially the same way, with substantially the same result.'" *Id.* (quoting *Applied Med. Res.*, 448 F.3d at 1333).

Starting with the "function" prong, a structure in the Accused Products can only be equivalent to the structure disclosed in the '403 patent if it performs the identical function. *Id.* Here, the relevant function of element 8A is "producing a periodic series of optical pulses defining a series of time slots, wherein one pulse appears in each time slot." I have already found that the CW laser and MZM combination in the Accused Products do not perform that function. Accordingly, the CW laser and MZM combination is not a structure equivalent to the relevant structure disclosed in the '403 patent. Xtera's argument of infringement based on equivalent structure under § 112 fails for at least that reason.

Turning to the question of whether the CW laser and MZ modulator combination function in the same way as the pulsed laser in the '403 patent, Respondents' experts Dr. Brandt-Pearce and Dr. Blumenthal explained how the pulsed laser in the '403 patent produces optical pulses and how the continuous wave laser and MZ modulator in the Accused Products operate differently. For example, Dr. Brandt-Pearce explained a pulsed laser light source has an element in its cavity that creates oscillation, producing a series of short optical pulses. Tr. at 843:3-10, 985:22. In contrast, the combination identified by Xtera has an external modulator that does not create an oscillation. *Id.* Dr. Blumenthal agreed the structure Xtera identifies in the accused devices is not equivalent to the structure in the patent because the CW laser/MZ modulator combination operates in a different way. Tr. at 985:22-986:5 ("An active mode locked laser forms pulses by modulating inside the cavity . . . producing extremely short, very high quality pulses. And a CW laser is a completely different way of putting things together . . . . So they're not equivalent"). These explanations were clear and cogent.

In contrast, Xtera's expert Dr. Ralph could not clearly explain how the accused structures operate in the same way as the pulsed laser disclosed in the '403 patent. He merely stated that "it

involves an optical source" and "some way of identifying or having a clock of some presumably originating the electrical domain, to identify some periodicity and some way of modulating or creating pulses." Tr. at 298:2-7. Xtera's other expert, Dr. Willner, concluded that a CW laser plus modulator would "function in substantially the same way," but he never explained how he reached that conclusion. Tr. at 428:1-9; 446:1-15. I find the testimony of Dr. Brandt-Pearce and Dr. Blumenthal more convincing on this point than the testimony of Xtera's experts.

Xtera also asserts that a patent to Frankel teaches that continuous laser sources function in substantially the same manner as mode-locked lasers. *See* CIB at 87, citing RX-0651:6:23-29. Figure 7 of Frankel shows a system that uses mode-locked laser sources that produce optical pulses, while Figure 1 of Frankel shows a similar system that uses continuous laser sources.[6] But the specific passage in Frankel cited by Xtera does *not* state that continuous wave lasers function in the same way as mode-locked lasers that produce optical pulses. It is a summary statement that the "transmitting node" and "receiving node" of the system in Frankel Figure 7 "function in substantially the same manner" as the transmitting node and receiving node of Frankel Figure 1. *See* RX-0651:6:23-29.

Section 112, sixth paragraph, requires a much more discrete analysis than the holistic comparison in Frankel cited by Xtera. The relevant question here is whether the CW laser/MZ modulator combination in the Accused Products functions in the same way as a pulsed laser when it comes to "producing a periodic series of optical pulses." Frankel does not answer that question. In contrast to the Frankel reference, the opinions of Dr. Brandt-Pearce and Dr. Blumenthal were made after examining the technology at issue in this investigation. I find the Frankel reference is

[6] As I explain later, the Frankel reference discloses a system that anticipates the relevant claims of the'403 patent.

therefore less relevant than the testimony I heard from experts that considered the actual technology at issue here. In sum, I find that the structure identified by Xtera does not function in the same way as the pulsed laser disclosed in the '403 patent. Xtera's argument of infringement based on equivalent structure under § 112 fails for this additional reason.

As to the "result" prong, I find that Xtera failed to show by a preponderance of the evidence that the CW laser and MZ modulator in the Accused Products produces substantially the same result as a pulsed laser light source. Xtera's expert, Dr. Ralph, concluded that a CW laser and MZ modulator would achieve substantially the same result as an active mode locked laser. Tr. at 298:12-20. He stated that the structures "both produce pulses" and are "both capable of producing a series of optical – of optical pulses." *Id.* at 328:19-329:4. As explained above, however, the CW laser/MZ modulator combination does not produce a periodic series of optical pulses. *Compare* Tr. at 807:18-808:4, *with* 819:2-10, 822:21-823:11, 825:4-18, 843:11-22. The structure identified by Xtera in the Accused Products therefore does not achieve substantially the same result as the pulsed laser light source disclosed in the '403 patent. Xtera's argument of infringement based on equivalent structure under § 112 fails again for this reason.

(2) Elements 8B and 8C

Claim 8 requires that the Accused Products have "a filter" (element 8B) that gives rise to "carrier pulses" having a specific temporal profile (element 8C). '403 patent at Cl. 8. While the parties generally agree that the Accused Products have a digital signal processor (DSP) that includes a finite impulse response (FIR) filter acting on electrical signals, the parties disagree whether the filter gives rise to "carrier pulses." *See* CIB at 101, 104-110; Tr. at 551:1-4; RRB at 38; SIB at 50-52.

As an initial matter, Xtera's infringement expert provided unclear testimony regarding the location of the "carrier pulses" in the Accused Products. In fact, he identified three possible locations for such "carrier pulses" – (i) the output of the MZ modulator, (ii) in between the DAC and the MZ modulator, and (iii) inside the DSP. Tr. at 550:8-555:9, 587:9-589:16; RDX-130. Further undermining his credibility, he had difficulty remembering which one of the three possible locations he was relying on for the purposes of his infringement analysis. Tr. at 554:3-555:6. As previously discussed with respect to claim construction, according to the '403 patent, "carrier pulses" are optical pulses that have been filtered. *See supra* at IV.B.3. Xtera, however, fails to explain how the signals coming out of the FIR filter in the DSP are optical pulses. Instead, I find that signals coming out of the DSP and digital-to-analog convertor (DAC) and going into the MZ modulator are electrical signals, not optical signals. Tr. at 347:10-17 (describing "carrier pulses" between DAC and MZ modulator as "electrical analog signals"), 850:17-22 (output of FIR filter is "a stream of digital samples"). Moreover, I find that those electrical signals do not include any pulses. Tr. at 822:21-823:11, 855:2-7, 970:6-23. Accordingly, I find that Xtera has failed to prove by a preponderance of the evidence that the Accused Products have the filter and carrier pulses required by claim elements 8B and 8C.

(3) Element 8D

Element 8D is a "modulating means for modulating the pulses with data for transmission." As an initial matter, I note that Xtera's leading argument is that the Accused Products use a combination of a CW laser and an MZ modulator "to produce optical pulses while simultaneously modulating those optical pulses with data." CIB at 1. Consistent with that position, Xtera's expert Dr. Ralph testified that he did not interpret the "modulating means" of element 8D "to exclude the

ability to create the pulses and also put data on them at the same time." Tr. at 543:25-544:6.[7] I reject that argument. Xtera's position would rewrite claim 8 from requiring a structure for producing pulses and a structure for modulating those pulses into a claim requiring a structure for producing pulses modulated with data at the time of production. But claim 8 requires something different from Xtera's rewrite. The plain language of claim element 8D requires a structure (the "modulating means") to perform an action ("modulating") on what is grammatically the object of the phrase ("the pulses"). The modulating means cannot perform the action on an object if that object does not yet exist. For at least that reason, Xtera's argument about producing and modulating pulses simultaneously must be rejected.

A methodical examination of claim element 8D under § 112, sixth paragraph (which all parties agree applies), demonstrates that the Accused Products do not meet this claim limitation for additional reasons. Xtera points to the MZ modulator in the Accused Products as satisfying this limitation. Literal infringement of this means-plus-function limitation "requires that the relevant structure in the accused device perform the identical function recited in the claim and be identical or equivalent to the corresponding structure in the specification." *Gen. Protecht Grp., Inc.*, 619 F.3d at 1312. Below I apply each part of this test to the MZ modulator in the Accused Products.

---

[7] Under Xtera's theory, the MZ modulator in the Accused Products is involved both in the "means for producing" optical pulses as well as the "modulating means." While it is theoretically possible for one structure in an accused device to satisfy multiple limitations of a patent claim, that may only be the case when the patent claim does not require otherwise. *Compare, e.g., Powell v. Home Depot U.S.A., Inc.*, 663 F.3d 1221, 1231-32 (Fed. Cir. 2011) *with Becton, Dickinson & Co. v. Tyco Healthcare Group*, 616 F.3d 1249, 1254 (Fed. Cir. 2010); *Gaus v. Conair Corp.*, 363 F.3d 1284, 1288 (Fed. Cir. 2004); *and Engel Indus., Inc. v. Lockformer Co.*, 96 F.3d 1398, 1404–05 (Fed. Cir. 1996). As I explain in this section, the patent claim at issue here requires a pulse to be produced before it may be modulated.

(a) The structure in the Accused Products does not perform the identical function

The parties agree that the claimed function of element 8D is "modulating the pulses with data for transmission." Xtera argues that the MZ modulator in the Accused Products performs the identical function of claim element 8D. Staff and Respondents disagree.

I have determined above that "the pulses" in this claim element are optical pulses. *See* section IV.B.3. Thus, the relevant function may be considered to be "modulating optical pulses with data for transmission." But I have determined there is no periodic series of optical pulses in the Accused products. The MZ modulator in the Accused Products receives a continuous light beam from the CW laser. There are no pulses in a continuous light beam output from a CW laser. *See* Tr. at 362:25-363:6, 556:16-18, 810:7-9, 816:17-817:3, 974:16-25, 987:11-20. Without optical pulses, the MZ modulator structure cannot perform the claimed function of modulating optical pulses with data for transmission. Literal infringement requires that a structure in the Accused Products performs the identical function recited in the claim. *Gen. Protecht Grp., Inc.*, 619 F.3d at 1312. No structure in the Accused Products performs the claimed function of modulating the pulses with data for transmission. For at least this reason, there is no literal infringement of claim 8.

(b) The structure in Accused Products is identical to the corresponding structure in the '403 patent specification, but it does not perform the same function

The parties agree that the structure in the '403 patent specification clearly linked to performing the claimed modulating function in element 8D is "electro-optic modulators, including Mach-Zehnder modulators, and their equivalents." CIB at 120; RRB at 58; SIB at 53. The parties also agree that the MZ modulator in the Accused Products is identical to the MZ modulator described as performing the claimed function in the '403 patent. *See* CIB at 1, 94; RRB at 8-9,

12; SIB at 15. This identity, however, is not enough to support Xtera's claim of infringement. As explained above, the MZ modulator in the Accused Products does not perform the identical function as claim element 8D, so the claim element is not satisfied. *Gen. Protecht Grp., Inc.,* 619 F.3d at 1312.

(c) Equivalents to the corresponding structure in the '403 patent specification

As noted above, the parties agree that the MZ modulator in the Accused Products is identical to the MZ modulator described as performing the claimed function in the '403 patent. *See* CIB at 1, 94; RRB at 8-9, 12; SIB at 15. Accordingly, I need not evaluate potential equivalents to the claimed structure. *See Gen. Protecht Grp., Inc.,* 619 F.3d at 1312. The MZ modulator in the Accused Products does not perform the identical function as claim element 8D, so even if it were equivalent to the claimed structure this limitation is not satisfied. *Id.*

b) Claims 9 and 12 are not literally infringed

Because the Accused Products do not literally infringe independent claim 8 of the '403 patent, they also cannot infringe claims 9 and 12, which depend from claim 8.

2. No Infringement Under the Equitable Doctrine of Equivalents

The equitable doctrine of equivalents analysis, which is theoretically distinct from the statutory doctrine of equivalent structures under § 112, sixth paragraph, considers whether an accused product contains elements identical or equivalent to each claimed element of the patented invention. *Warner-Jenkinson Co., Inc. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 40 (1997). To satisfy a means-plus-function limitation under the doctrine of equivalents, "the accused structure must perform substantially the same function, in substantially the same way, to achieve substantially the same result, as the disclosed structure." *Kemco Sales, Inc. v. Control Papers Co., Inc.*, 208 F.3d 1352,

1364 (Fed. Cir. 2000). Furthermore, "[b]ecause the 'way' and 'result' prongs are the same under both the second 112, paragraph 6 and doctrine of equivalents tests, a structure failing the section 112, paragraph 6 test under either or both prongs must fail the doctrine of equivalents test for the same reason(s)." *Id.*

With respect to claim element 8A—the "means for producing a periodic series of optical pulses"I determined in my literal infringement analysis that the CW laser and MZ modulator combination in the Accused Products is not structure equivalent to the pulsed laser disclosed in the '403 patent for performing that function. *See* section IV.C.1.a)(1)(c). In making that determination, I found that the accused CW laser/MZ modulator combination does not operate in the same way as the disclosed structure or produce the same result as is disclosed in the '403 patent. Because the accused CW laser/MZ modulator combination fails both the "way" and "result" prongs of the § 112 equivalents analysis, that combination does not meet claim element 8A under the equitable doctrine of equivalents. There is no infringement of any patent claim under the doctrine of equivalents for at least this reason.

Xtera argues that to the extent that the filter limitation of claim element 8B is interpreted to require an optical filter, the Accused Products satisfy that limitation under the equitable doctrine of equivalents. See CIB at 91-93, 120. Because I do not need to resolve whether element 8B is limited to an optical filter to resolve the parties' disputes, I need not address Xtera's argument regarding doctrine of equivalence for the filter limitation in claim element 8B.

Xtera does not allege that the Accused Products practice any other claim element under the doctrine of equivalents. *See* CIB at 93-94, 120-22.

3. No Indirect Infringement

Xtera did not present any arguments in its post-hearing briefs regarding indirect infringement and thus, that contention is deemed withdrawn. Ground Rule 14.1 ("Any contentions for which a party has the burden of proof that are not set forth in detail in the post-hearing initial brief shall be deemed abandoned or withdrawn.").

D. The Technical Prong of the Domestic Industry Requirement Is Not Met

Xtera asserts that its domestic industry product, the NuWave Optima with AC400 module, practices claim 8 of the '403 patent, and thus satisfies the technical prong of the domestic industry requirement, in the same way that Nokia's 1830 and 1620 products and NEC's T740SW product practice 8, namely, with a CW laser and MZ modulator producing optical signals and with a filter that acts on electrical signals inside a digital signal processor. CIB at 78-79; *see also* RRB at 63 ("Xtera has not argued any meaningful differences between the Accused and DI Products."); SIB at 58 ("The evidence shows that the AC400 in the Nu-Wave Optima is the same as the AC400 in Nokia's 1620 products with XWAV line card"). Indeed, Xtera's arguments with respect to the technical prong of the domestic industry requirement are coextensive with those directed to infringement. *See* CIB at 78-94. In the infringement analysis above I explained why the CW laser/MZ modulator/DSP electrical signal filter configuration does not meet claim 8 and therefore cannot satisfy the other asserted claims. For those same reasons, I find that Xtera has failed to satisfy the technical prong of the domestic industry requirement.

E. Validity

1. Indefiniteness

As discussed in section IV.B.3.a), I have determined that the phrase "the pulses" is not indefinite. Respondents have therefore failed to prove the asserted claims of the '403 patent are invalid on that basis.

2. Written Description

Claim 8 of the '403 patent describes "a filter having a spectral profile giving rise to carrier pulses." Respondents argue that such language is broad enough to cover optical and digital filters but the specification of the '403 patent only describes optical filters, not digital filters. Respondents contend that claim 8 is invalid for lack of written description. RIB at 8-11.

Under 35 U.S.C. § 112, ¶ 1, every patent must "contain a written description of the invention, and of the manner and process or making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains . . . to make and use the same." Whether a specification complies with the written description requirement is a question of fact judged from the perspective of a person of ordinary skill. *Falkner v. Inglis*, 448 F.3d 1357, 1363 (Fed. Cir. 2006). Respondents must establish lack of written description by clear and convincing evidence. *Invitrogen Corp. v. Clontech Labs.*, 429 F.3d 1052, 1072 (Fed. Cir. 2005).

The parties appear to be in agreement that the specification of the '403 patent does not have an express example of a digital filter. RIB at 9-10 (citing Complainant's witnesses at Tr. at 209:4-211:13 (Dr. Wayne Pelouch, Xtera's corporate witness regarding inventorship of the '403 patent), 373:25-375:5 (Dr. Ralph), 581:20-583:18 (Dr. Willner); JX-0041C at 209:16-19, 211:6-13 (deposition transcript of Dr. Peloch)); CRB at 21. This in itself is not a problem under 35 U.S.C. § 112, ¶ 1, because the law does not require the specification to contain embodiments "explicitly covering the full scope of the claim language." *Falkner*, 448 F.3d at 1366. "'[T]he written description requirement does not demand either examples or an actual reduction to practice; a constructive reduction to practice' may be sufficient if it 'identifies the claimed invention' and does so 'in a definite way.'" *Centrak, Inc. v. Sonitor Techs., Inc.*, 915 F.3d 1360, 1367 (Fed. Cir. 2019) (quoting *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1352 (Fed. Cir. 2010) (en banc)).

Xtera counters Respondents' criticism of the lack of a digital filter embodiment by asserting that "the '403 patent describes the invention with respect to the use of a Nyquist pulse shaping filter in a WDM transmitter" without requiring the Nyquist pulse shaping filter to be optical or digital. CRB at 23. But Xtera fails to cite any evidence to support its assertion.

Staff, however, discusses convincing portions of the '403 patent and evidence that shows that a person of ordinary skill in the art would have understood that the claimed pulse shapes could have been created using either an optical or a digital filter at the time of the invention. SIB at 67-68. The specification describes modulating pulsed light with data using an "electro-optic modulator 21," and more specifically that "[e]lectrical NRZ data is written onto the pulsed light stream using a Mach Zehnder modulator driven by an electrical NRZ data source 22 . . . ." '403 patent, 3:17-21. The parties and witnesses appear to equate "electrical" with "digital," such that a person of ordinary skill in the art could have interpreted the electrical disclosures of the specification as relating to a digital filter. *See* RIB at 9 ("The output of a DSP is an electrical signal . . . ."); *id.* (discussing "an electronic filter implemented with a DSP" and arguing that the "specification does not teach now to implement an electronic filter"); CRB at 24. Staff further refers to U.S. Patent Number 6,628,728, which was filed on April 28, 1999, as teaching that a "Nyquist filter can be used as a matched filter in a digital communications system." RX-0786 at Abstract. Dr. Brandt-Pearce confirmed that the filter described in U.S. Patent Number 6,628,728 could be used to achieve the claimed temporal profile. Tr. at 871:16-872:25. She also confirmed that "a person of ordinary skill in the art would have known of both digital filters and optical filters that could create [Nyquist pulse shapes]." *Id.* at 949:5-11.

I find Respondents did not prove by clear and convincing evidence that a person of ordinary skill in the art would understand the inventors were not in possession of an embodiment of the invention of claim 8 that utilizes a digital filter.

3. Anticipation and Obviousness

Respondents contend that "it is undisputed that both the problem and solution described in the '403 patent were well known in the prior art." RIB at 14. Respondents posit that the "'403 patent is directed to alleviating the problem of intersymbol interference (ISI)," which "was a well-known problem in optical transmission systems. *Id.* at 12 (citing Dr. Willner at Tr. at 1086:24-1087:2, 1101:4-17, 1099:25-1100:3, 1101:18-1102:5, 1099:24, 1099:25-1100:3). Given this problem, Respondents posit that "a person of ordinary skill would have considered mechanisms for reducing the effects of ISI when designing an optical transmission system." *Id.* (citing Tr. at 797:18-800:23 (Dr. Brandt-Pearce), 899:7-900:8 (same), 1126:10-11 (Dr. Willner); RX-0882 at 228-30 (textbook co-authored in 1996 by Dr. Willner); RX-0790 at 15-17; RX-0786 at 1:50-60, 4:45-50, Figs. 3a, 3b). Respondents explain that root-raised-cosine filters and raised-cosine Nyquist filters are two mechanisms for reducing ISI that "meet the requirements of claim 8 and were taught in prior art textbooks." *Id.* at 12-13 (citing Tr. at 131:16-19 (Dr. Pelouch), 196:11-198:14 (Dr. Jones), 305:5-306:11 (Dr. Ralph), 896:16-899:6 (Dr. Brandt-Pearce); RX-0790 at 17; RX-0882 at 229; CX-0378 at 56-57). Respondents also put forth one patent, referred to as Frankel (RX-0651), as anticipating the asserted claims. *Id.* at 14-28. Respondents further contend that the asserted claims are rendered obvious in view of Frankel by itself, in view of Frankel in combination with a textbook referred to as Proakis, in view of another patent referred to as McCarty, and in view of McCarty in combination with a textbook referred to as Kaminow. *Id.* at 14-57.

Xtera, of course, disputes that the problem and solution described in the '403 patent were well known in the prior art, and Xtera disagrees with Respondents' contentions of anticipation and obviousness. CRB at 27-73. Xtera also proposes that the "[c]ommercial success of WDM systems with over 100 channels demonstrates non-obviousness." *Id.* at 74-80.

Staff agrees with Respondents that Frankel anticipates asserted claims 8 and 12, but disagrees that Frankel anticipates claim 9 or renders claim 9 obvious by itself or in combination with Proakis. SIB at 59. Staff also agrees with Respondents that the asserted claims are invalid as obvious in view of McCarty under Xtera's interpretation of the claims, but otherwise disagrees if Xtera's interpretation of the claims is not adopted. *Id.*

A patent is presumed valid. 35 U.S.C. § 282; *Microsoft Corp. v. i4i Ltd. P'ship*, 564 U.S. 91, 100 (2011). A respondent who has raised patent invalidity as an affirmative defense has the burden of overcoming this presumption by clear and convincing evidence. *See Microsoft*, 564 U.S. at 101-114. "Although not susceptible to precise definition, clear and convincing evidence has been described as evidence which produces in the mind of the trier of fact an abiding conviction that the truth of [the] factual contentions are highly probable." *Buildex Inc. v. Kason Indus., Inc.*, 849 F.2d 1461, 1463 (Fed. Cir. 1988) (internal quotations and citations omitted).

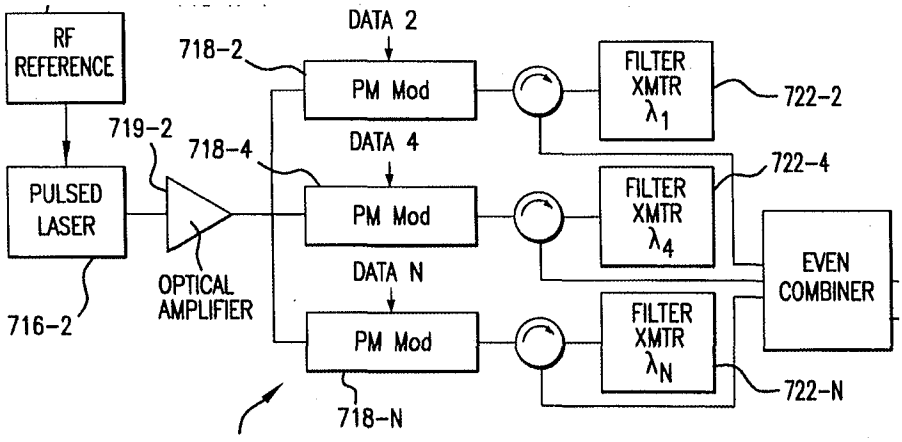
Based on the evidence and arguments of the parties set forth in detail in the following subsections, I find that Respondents have met their burden to prove by clear and convincing evidence that the asserted claims of the '403 patent are invalid as anticipated by Frankel.

a) The Frankel patent anticipates the asserted claims.

U.S. Patent Number 6,430,336 ("Frankel") was filed on December 18, 2000, and issued on August 6, 2002, to Michael Y. Frankel. RX-0651 at cover page. Xtera does not contend that Frankel was considered by the Patent Office during the prosecution of the '403 patent. *See* '403

patent at cover page. Xtera also does not contest that Frankel qualifies as prior art to the '403 patent under the relevant provisions of 35 U.S.C. § 102. *See* Tr. at 1102:14-17 (Dr. Willner).

According to Respondents, Frankel describes "a device and method for minimizing optical channel drift in a wavelength division multiplexed communication system" and "provid[ing] high channel density, i.e., spectral efficiency, and excellent signal transmission performance in multi-wavelength optical communication systems." RIB at 15 (quoting RX-0651 at 1:5-8, 2:16-22). Respondents refer to an excerpt of Figure 7 of Frankel, embedded below, to explain that Frankel teaches a pulsed laser light source (labeled "PULSED LASER"), a Mach-Zehnder modulator (labeled "PM Mod"), and a super-Gaussian filter (labeled "FILTER XMTR") in the same arrangement as Figure 2 of the '403 patent. RIB at 15-16 (embedding RDX-0105 at 92 and citing Tr. at 894:24-896:25 (Dr. Brandt-Pearce), 1108:1-5 (Dr. Willner); RX-0651 at 4:24-35, 8:47-59).



Xtera does not dispute that Frankel "discloses a pulsed laser light source such as a mode locked laser [or] . . . a modulator for modulating data onto a pulsed laser light source," and Respondents provided sufficient evidence on this point. Tr. at 1102:24-1103:6 (Dr. Willner); *see* RIB at 16-17, 25-28 (citing RX-0651 at 1:54-64, 6:23-47, 7:6-17, Figure 7; Tr. at 358:15-19, 538:22-541:17, 544:23-545:10, 884:2-19, 893:25-894:23, 896:11-15, 1077:24-1086:3, 1102:24-1103:6); SIB at 60 (citing Tr. at 862:4-21, 863:10-21, 882:4-896:15). Xtera also does not dispute

that Frankel discloses a filter having a spectral profile giving rise to carrier pulses, and the evidence is in accord. *See* RIB at 17 (citing RX-0651 at 4:24-35, 6:47-59, Figure 7; Tr. at 884:20-886:25). Xtera only contends that Respondents failed to show, for claim 8, that the filter disclosed in Frankel produces the required "temporal shape." Tr. at 1103:7-21 (Dr. Willner); *see* CRB at 29-48; SIB at 60. As to claim 9, Xtera contends that Respondents failed to show that the filter disclosed in Frankel produces a "substantially flat top spectral profile," which is part of claim element 8C. CRB at 48-50.

The "temporal shape" or "temporal profile" is described within claim element 8C as follows:

> a filter having a spectral profile giving rise to carrier pulses, each carrier pulse having a temporal profile extending over more than one time slot, the temporal profile having a minimum substantially in the center of each of the time slots adjacent to the time slot for that corresponding carrier pulse, the temporal profile of the corresponding carrier pulse further having an oscillating tail that extends from the minimum into at least one time slot that is even further from the time slot for the corresponding cg pulse . . . .

Respondents contend that Frankel discloses the claimed temporal profile. RIB at 19. Respondents point out that "Frankel's transmitter filter has, indisputably, a super-Gaussian spectral profile" and that the claimed temporal profile is present "in the mathematical nature of the super-Gaussian filter itself." *Id.* (citing RX-0651 at 5:43-51, claim 7; Tr. at 886:19-25 (Dr. Brandt-Pearce), 1103:22-1105:2 (Dr. Willner)); *see* SIB at 60 (citing RX-0651 at 4:24-42, 5:43-51; Tr. at 1108:5-1 (Dr. Willner)). Xtera admits that a "super-Gaussian filter of the sixth order would provide an impulse response that meets Claim 8's filter limitations," but Xtera asserts that "[a]nything less than a sixth order would require specific analysis of that particular super-Gaussian order to determine whether it would meet Claim 8's temporal profile." CRB at 32 (citing Tr. at 1079:4-22 (Dr. Willner), 1103:15-1104:8 (same), 1127:22-1128:22 (same)).

Xtera's response to Respondents' super-Gaussian argument requires an impermissibly narrow reading of Frankel. Frankel specifically describes a 2.3 order super-Gaussian filter, but it is not limited to any specific order. For example, as shown below, claim 8 of Frankel is limited to a 2.3-order super-Gaussian filter, but claim 7 of Frankel allows any super-Gaussian filter. RX-0651 at 8:1-9; Tr. at 895:21-896:10 (Dr. Brandt-Pearce), 1103:22-1106:3 (Dr. Willner testifying: "I'm certainly willing to agree to [Frankel is] not limiting it to any particular super-Gaussian [filter].").

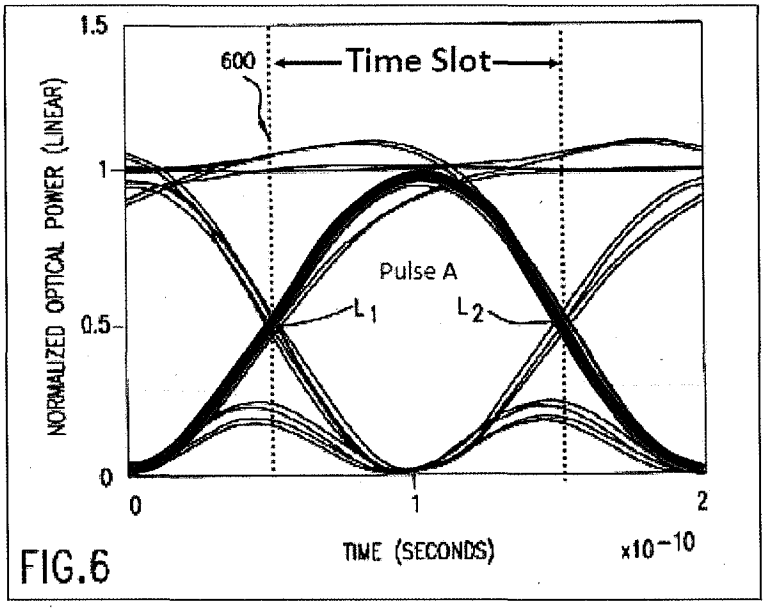
> **7**. An optical device according to claim **2**, wherein each said filter exhibits an amplitude response defined by a Super Gaussian function.
>
> **8**. An optical device according to claim **2**, wherein each said filter exhibits a reflectance characteristic in accordance with:

$$r = 0.65 \cdot e^{\left(\frac{f}{6.9 \cdot 10^9}\right)^{2.3}}$$

That Frankel is not limited to a specific super-Gaussian filter is important because, as Xtera's expert, Dr. Willner, admitted, a sixth order super-Gaussian filter "would provide an impulse response that meets Claim 8's filter limitations" and would have the required oscillating tails. Tr. at 1079:4-22, 1103:15-1107:25. He testified that "spectral filters with flat tops and steep sides would have been more difficult, complex, and expensive to implement than filters without spectral profiles having flat tops and steep sides," but he never suggested that a person of ordinary skill in the art would not have understood Frankel as disclosing a sixth order super-Gaussian filter. Tr. at 1091:15-1092:15. Respondents' expert, Dr. Brandt-Pearce, testified that a person of ordinary skill in the art would know that "a super-Gaussian filter of really any order higher than 2 . . . would have one or more visible bumps, oscillating tails." *Id.* at 887:6-23, 890:6-17; *see id.* at 1103:22-1104:8 (Dr. Willner agreeing that higher-order super-Gaussian filters can have oscillating tails, but equivocating that "not necessarily all of them" do). She also testified that that a person

of ordinary skill in the art would know to "pick the order that suits [their] needs." Tr. at 890:15-17, 896:3-10. The evidence therefore shows that Frankel discloses to a person of ordinary skill in the art the "temporal profile of the corresponding carrier pulse further having an oscillating tail" limitation either through the 2.3 super-Gaussian filter embodiment of Frankel or a higher-order super-Gaussian filter, such as a sixth-order super-Gaussian filter, that a person of ordinary skill in the art would have understood as disclosed in Frankel.

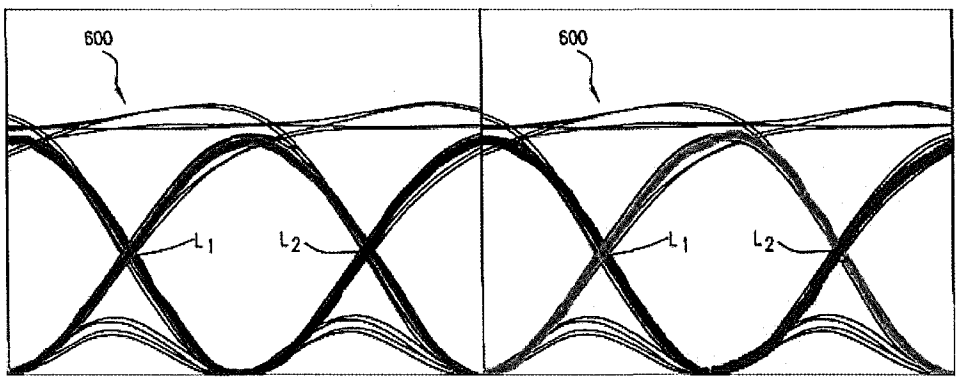
The only other limitation that Xtera challenges is whether the oscillating-tail super-Gaussian filter in Frankel also has a "temporal profile having a minimum substantially in the center of each of the time slots adjacent to the time slot for that corresponding carrier pulse." Respondents' expert, Dr. Brandt-Pearce, testified that this limitation is met by the nature of super-Gaussian filters and a person of ordinary skill in the art would know how to "pick the right parameters for your super-Gaussian filter" to satisfy the claim 8 requirements. Tr. at 887:19-23, 890:15-17. She also testified that Figure 6 of Frankel, referred to the parties as the "eye diagram," shows the "required minimum and oscillating tails." RIB at 20 (citing Tr. at 886-892:3). Regardless of whether Figure 6 shows oscillating tails, it clearly shows the pulse "minimum substantially in the center of each of the time slots adjacent to the time slot." Shown below is Figure 6 of Frankel that Dr. Brandt-Pearce annotated for this disputed limitation.



RDX-0105.87 (embedding RX-0651 at Figure (annotated)). Dr. Brandt-Pearce first confirmed that Figure 6 is "consistent with my knowledge of what the impulse response of a super-Gaussian filter looks like." Tr. at 888:23-889:12. She then explained that she annotated the time slot with dotted vertical blue lines. Tr. at 889:21-890:4. She also annotated "Pulse A" with a thick solid red line and explained that this pulse "is centered in that time slot" and extends into the previous and subsequent time slots. *Id.* As can be seen in Figure 6 of Frankel, only half of the previous and subsequent time slots are shown, and the "Pulse A" minimum is "substantially in the center of each of the time slots" as required by claim 8 of the '403 patent. RX-0651 at Figure 6; *see* Tr. at 890:21-891:4.

Xtera's evidence to the contrary is weak. Xtera only points to the testimony of its expert, Dr. Willner, that he does not "believe that necessarily all [super-Gaussian filters] would have a minimum substantially in the center of a neighboring time slot." CRB at 31 (quoting Tr. at 1127:22-1128:4). But his testimony says nothing about whether the super-Gaussian filters relied on by Respondents would or would not have minimums substantially in the center of a neighboring time slots.

Xtera's attack on Respondents' evidence is similarly unavailing. Xtera asserts that an eye diagram should not be used to determine complex pulse shapes because an "eye diagram superimposes pulses in multiple time slots carrying pseudo-random bits as if they all appear in the same time slot." CRB at 38 (citing Tr. at 891:5-11; JX-0010 at 298). However, Xtera then quotes from Frankel an admission that the "limited uses" of an eye diagram include the crossing points, useable eye width, and usable eye height which is consistent with Respondents' use of the eye diagram to show pulse minimums. *Id.* at 39 (citing RX-0651 at 6:1-8). Xtera focuses its attack on eye diagrams in the context of whether or not they show oscillating tails, but in doing so Xtera illustrates how the eye diagram shows the required pulse minimums. *See* CRB at 43. Specifically, Xtera takes a demonstrative first created by Dr. Brandt-Pearce (RDX-0105 at 89) in which she extended the signal in Figure 6 of Frankel and outlines in bold colors what it believes are the pulse shapes shown. This image in its brief, embedded below, clearly shows that the pulse minimums are "substantially in the center of each of the time slots adjacent to the time slot for that corresponding carrier pulse." CRB at 44.



Xtera also attacks the eye diagram of Frankel by complaining that it represents the "signal at the receiver after the signal had been influenced by multiple filters" instead of the signal at the filter of the transmitter as required by claim 8 of the '403 patent. CRB at 45-48. Frankel, however, states that "receiver filters" may "have a configuration substantially identical to the transmitter

filters," and both "are configured to reflect optical channels within a reflectance band" and "attenuate[]" all other channels. RX-0651 at 5:17-27. Therefore, although the eye diagram in Frankel is not direct evidence of the pulse shape as it exits the transmitter filter, it is certainly persuasive circumstantial evidence. *See* Tr. at 892:19-893:24 (Dr. Brandt-Pearce).

As to the additional limitation of claim 9 that the pulses have "a substantially flat top spectral profile," Respondent points to evidence showing that a sixth-order super-Gaussian filter meets this limitation. RIB at 27 (citing '403 Patent at 3:25-38). Xtera does not dispute this fact. CRB at 48-50. As discussed above, the evidence shows that a person of ordinary skill in the art would have understood Frankel as disclosing higher-order super-Gaussian filters, and such a person would have known to select a sixth-order super-Gaussian filter to use with Frankel's system. *See* Tr. at 890:15-17, 896:3-10.

Accordingly, Respondents have shown by clear and convincing evidence that Frankel anticipates claims 8 and 9 of the '403 patent. Respondents have also shown by clear and convincing evidence that Frankel anticipates claim 12, which depends on claim 8, as Xtera does not dispute Respondents' evidence that Frankel discloses the required Mach Zehnder modulator. As Frankel anticipates the asserted claims, analysis of whether Frankel alone or in combination with the Digital Communications book authored by John G. Proakis (RX-0790) is not necessary.

b) Respondents do not assert that McCarty (U.S. Patent Number 6,628,728) invalidates the asserted claims under the proper construction of the claims.

U.S. Patent Number 6,628,728 ("McCarty") was filed on April 28, 1999, and issued on September 30, 2003, to Robert Joseph McCarty, Jr. RX-0786 at cover page. Xtera does not contend that McCarty was considered by the Patent Office during the prosecution of the '403

patent. *See* '403 patent at cover page. Xtera also does not contest that McCarty qualifies as prior art to the '403 patent under the relevant provisions of 35 U.S.C. § 102.

Respondents assert that McCarty renders the asserted claims of the '403 patent as obvious "under the interpretation of the claims used by Xtera for its infringement theory." RIB at 35. As discussed above, I do not adopt the interpretation of the claims used by Xtera for its infringement theory. Accordingly, Respondents fail to show that the asserted claims, when properly construed, are invalid as obvious in view of McCarty, or in view of McCarty combined with the Optical Fiber Telecommunications IVB book co-authored by Kaminow (RX-0787).

V. DOMESTIC INDUSTRY – ECONOMIC PRONG

Xtera attempts to show a domestic industry under both sections 337(a)(3)(A) and (B), i.e., through significant investment in plant and equipment and through significant employment of labor or capital. Xtera presents no argument or evidence under section 337(a)(3)(C), which requires substantial investment in exploitation of the patent, including engineering, research and development, or licensing. Staff joins Xtera in its ultimate conclusion that, should the Commission find that the domestic industry products practice the '403 patent, the economic prong of the domestic industry requirement is satisfied. *See* SIB at 74-75.

Respondents raise multiple issues with Xtera's approach to the economic prong of the domestic industry requirement. The most prevalent of those issues is the assertion that Xtera counted investments in a version of the NuWave Optima product that does not practice the '403 patent in order to show a domestic industry with respect to a version of the NuWave Optima product that does allegedly practice the '403 patent. To put it succinctly: Respondents accuse Xtera of padding its domestic industry numbers by counting investments in articles that are not protected by the '403 patent. Further, Respondents assert that Xtera has abandoned any argument allocating its investments in the NuWave Optima system between protected and unprotected

version by failing to disclose that argument in its prehearing brief or during the evidentiary hearing. Finally, Respondents attack as unreliable certain evidence that Xtera relies on to establish its domestic industry investments. I address each issue in turn.

A. Investments in NuWave Optima with AC400 versus AC100

The thrust of Respondents' allocation argument is that Xtera has lumped together investments in a version of the NuWave Optima product that utilizes the AC400 module with versions of the NuWave Optima product that utilize the different AC100 module. *See* RRB at 65. Because there is no dispute that NuWave Optima products utilizing only the AC100 modules do not practice the '403 patent, Respondents contend that Xtera cannot rely on investments in NuWave Optima systems with AC100 modules to satisfy the economic prong of the domestic industry requirement. *See id.* Respondents also contend that Xtera's failure to allocate its investments between the NuWave Optima system with the AC400 module and other iterations of the NuWave Optima system is fatal to Xtera's domestic industry case. *See id.*

Xtera does not dispute that it did not attempt to allocate its investments in plant, equipment, labor, or capital between NuWave Optima systems with AC400 modules and NuWave Optima systems with AC100 modules. Instead, Xtera takes the position that no allocation is required. First, Xtera asserts that, as of 2015, NuWave Optima systems with the AC400 module became Xtera's only product, which if true, would mean that there is no allocation to perform, at least for the period beginning in 2015. *See* CIB at 123 ("As of 2015, Optima is Xtera's only product *and includes the '403 patent-practicing AC400.*" (emphasis added)). However, the Xtera relies on in support of that assertion paint a far less straightforward picture.

For instance, the transcript excerpts Xtera relies on to support that assertion establish only that NuWave Optima is Xtera's only product. The excerpts are silent as to whether Xtera deals exclusively in NuWave Optima products with the AC400 module. *See* Tr. at 596:9-14, 137:6-13;

CIB at 123 (citing same). Further, Xtera asserts that "[i]n late 2014, Xtera began marketing Optima with Acacia's AC400 module," CIB at 123 (citing CX-0336C at 0011), that it began "focusing on AC400 upgrades in 2016 to 2017," *id.* at 124 (citing JX-0039C at 114:24-115:3, 119:8-11; Tr. at 98:17-99, 111:20-24, 603:9-604:12), and by late 2017, "customers could no longer order AC100 cards to add capacity," *id.* at 124-25 (citing Tr. at 601:19-602:4). Rather than an abrupt transition from NuWave Optima systems with AC100 modules to NuWave Optima systems with AC400 modules in 2015, Xtera's own timeline shows a gradual transition, over a period of years, from NuWave Optima systems utilizing AC100 modules to systems utilizing AC400 modules. Further, by their own admission, Xtera made at least four system capacity upgrades in the 2017-2018 time period that did not include the AC400 module. *See* CIB at 125. Moreover, testimony from multiple witnesses, from both sides of this investigation, confirms that Xtera deals in NuWave Optima systems that utilize AC400 modules as well as NuWave Optima systems that use other modules. *See* Tr. at 142:16-18, 688:24-689:17, 1023:20-24; *see also* CX-380C (spreadsheet showing transactions broken down by module for the 2017-2018 period).

Based on the record before me, I do not find substantial evidence to support Xtera's contention that NuWave Optima systems with the AC400 module were Xtera's only product during the 2015 through 2017 time period in which it attempts to establish a domestic industry. Accordingly, Xtera cannot excuse the absence of any allocation of its investments between the NuWave Optima with the AC100 module versus the NuWave Optima with the AC400 module on the basis that NuWave Optima utilized only the AC400 module from 2015 onward.

I note that Xtera attempts to frame the allocation issue raised by Respondents as a question of whether its investments must be restricted to particular NuWave Optima components, or instead may encompass investments in the entire NuWave Optima system. *See* CIB at 125-26. Xtera's

argument is misplaced. Xtera need not confine its domestic industry investments to specific NuWave Optima components, such as the Acacia AC400 module. *See* RRB at 68-69 ("While is it true that the AC400 is but one component in a bigger system, Respondents have not attempted to limit expenditures only to the AC400 module or to the transponder containing it as opposed to the entire Optima system."). As such, Xtera's reliance on the initial determination in *Certain Windshield Wipers*, Inv. 337-TA-928/937, is inapposite. *See* CIB at 126 (citing *Certain Windshield Wipers*, Inv. 337-TA-928/937, Initial Determination at 15-17). The issue here is not that Xtera failed to limit its domestic industry evidence to a specific component within the NuWave Optima system; the issue is that Xtera has included investments in an indisputably unprotected version of the NuWave Optima system along with an allegedly protected version of the product for the purposes of establishing a domestic industry. Such an approach is not permitted by the plain language of the statute, which requires that the investments in plant and equipment or labor or capital relied upon to establish a domestic industry must be investments "with respect to the articles protected by the patent . . . ." 19 U.S.C. § 1337(a)(3).

Xtera also argues that it is appropriate in this instance to combine investments in NuWave Optima systems based on the realities of the marketplace. CIB at 138. It is true that the Commission "does not adhere to any rigid formula in determining the scope of the domestic industry as it is not precisely defined in the statute, but will examine each case in light of the realities of the marketplace." *Certain Double-Sided Floppy Disk Drives and Components Thereof*, Inv. No. 337-TA-215, Comm'n Op. at p. 23 (Nov. 1985); *see also Certain Video Game Systems and Wireless Controllers and Components Thereof*, Inv. No. 337-TA-770, Comm'n Op. at p. 66 (Oct. 28, 2013) ("[t]he Commission has held that in certain circumstances, the realities of the marketplace require a modification of the principle that the domestic industry is defined by the

patented article."). But, it is not true that Xtera has established facts sufficient to show that the realities of the marketplace require the inclusion of investments in NuWave Optima systems that utilize AC100 modules along with investments in NuWave Optima systems utilizing AC400 modules.

First, Xtera argues that no allocation between investments in NuWave Optima systems with AC400 modules versus AC100 modules is required because of "the market's view of the DI/accused product offerings as telecommunication systems, not individual components within them." CIB at 138. This facet of Xtera's "realities of the marketplace" argument is merely a recycling of its earlier argument about counting investments in the entire NuWave Optima system as opposed to components of that system. As noted *supra*, however, no party is arguing that Xtera must allocate investments to a single component of the NuWave Optima system. Rather, the dispute is whether investments in a version of the NuWave Optima system that does not practice the '403 patent can be combined with a version that does practice the '403 patent.

Expanding on its "realities of the marketplace" argument, Xtera attempt to analogize their domestic industry products to those at issue in *Certain Magnetic Tape Cartridges*, where investments in tape drives were counted along with investments in tape cartridges because it was undisputed that the patented tape cartridges could not be used except with a particular tape drive. CIB at 138 (citing *Certain Magnetic Tape Cartridges*, Inv. No. 337-TA-1058, ID at 207 (Aug. 17, 2018) ("*Magnetic Tapes*"), *affirmed with modified reasoning*, Comm'n Op. at 47-57). However, the issue in *Magnetic Tapes* is not analogous to the issue here. In *Magnetic Tapes*, the evidence showed that a tape cartridge that practiced the asserted patent could only be used with a specific corresponding tape drive. *See Magnetic Tapes*, Initial Determination at 208. Based on that corresponding relationship, *Magnetic Tapes* found it appropriate to consider investments in the

tape drives, even though it was undisputed that the tape drives did not practice the patent. *Id.* at 208-09. *Magnetic Tapes* did not present the issue, as here, of whether investments in a version of a product that is not protected by the asserted patent can be combined with investments in a version that allegedly is protected by the asserted patent. The analogous situation in the context of *Magnetic Tapes* would be if there were two versions of the tape cartridge—one allegedly protected by the patent and the other indisputably not—and one tape drive capable of playing both. Had that been the situation presented in *Magnetic Tapes*, it is not clear that the complainants would have been entitled to rely on *all* of the investments in the tape drives.

While the Commission has credited investments in articles that do not themselves practice an asserted patent when fact evidence about the realities of the marketplace supported such an approach, the doctrine is not unlimited in scope, and the Commission has, in prior investigations, limited consideration of investments in unprotected articles where the connection was too attenuated. For example, in *Certain Video Game Systems and Wireless Controller and Components Thereof* ("*Video Game Systems*"), the complainant urged the Commission to credit investments in a "live-action attraction called 'MagiQuest,'" which included a number of components including "the physical space, the various themes and effects that make up the play environment . . . the wand, other toys such as a compass that can be used to enhance the player's experience, and various other electronic items such as 'Quest Station' computers that train players on how to play the game." Inv. No. 337-TA-770, Comm'n Op. at 56-57 (Oct. 28, 2013) (public version) (omission redacted in original). Noting that the asserted patents in *Video Game Systems* involved "a wand having certain transmitter and motion-sensitive circuitries that interact wirelessly with receivers or actuators distributed throughout the play facility," the Commission found that the complainant had not produced evidence sufficient to show that the realities of the

marketplace required the entire MagiQuest attraction to exploit that patented toy wand. *Id.* at 67-68. Accordingly, the Commission declined to extend the articles protected by the asserted patents to cover the entire MagiQuest attraction because the complainant failed to show that "the physical space and the various design themes, physical props, peripheral attractions, and retail personnel that make up the play environment" had "any effect on the interactive capabilities of the wand." *Id.* at 68.

Additionally, in *Certain Digital Set-Top Boxes and Components Thereof*, Inv. No. 337-TA-712 ("*Set-Top Boxes*"), in considering what investment to credit towards the complainant's domestic industry, the Administrative Law Judge noted that "the FiOS network is used for other communications services beyond those technologies described in the asserted patents. Therefore, not all expenditures by Verizon in building its FiOS network should be counted toward a domestic industry." *Set-Top Boxes*, Order No. 33 at 15 (Jan. 11, 2011) (public version); *affirmed on other grounds*, Notice of Commission Determination Not to Review Final ID and Affirming in Part Summary Determination of Economic Prong of the Domestic Industry Requirement (July 21, 2011).

The present investigation presents essentially the same situation as the Commission addressed in *Video Game Systems* and *Set-Top Boxes*. There is no dispute that the whole NuWave Optima system is necessary to exploit the patented technology of the '403 patent, and, on that basis, Xtera is not limited only to their investments in the AC400 module. However, given that the NuWave Optima system is also used with AC100 modules that are not protected by the '403 patent, Xtera is not entitled to count all of its investments in all versions of the NuWave Optima system. The contrary approach would capture investments with no connection to the '403 patent, in contravention of the statutory text of section 337. The operative question then is how much of

Xtera's investments in NuWave Optima are attributable to its domestic industry in the patented technology.

However, Xtera did not present evidence sufficient to answer that question in this investigation. Instead, in an attempt to justify reliance on all of their investments in the NuWave Optima product, Xtera emphasizes that, around 2015, it took steps to ensure that the integration of AC400 modules into existing systems would be as seamless and interruption-free as possible for its customers. CIB at 139 (citing Tr. at 597:4-25, 134:21-137:5, 598:1-11; CX-0309C). Xtera also asserts that it planned to transition its customers from the AC100 module to the AC400 module gradually as the customers required additional capacity. *See id.* (citing Tr. at 599:15-17). And, Xtera points out that some NuWave Optima products may utilize both AC100 and AC400 modules. *See id.* (citing Tr. at 599:18-600:10). I note that Staff relies on substantially similar portions of the record to justify its conclusion that "at minimum, Xtera's investments in the LTE of its Nu-Wave Optima product after the first deployment of the AC400, in 2016, are investments in articles allegedly protected by the '403 patent." SIB at 72, n.18. Neither Xtera nor Staff point to precedent though that supports the conclusion that investments in a patent-practicing version of NuWave Optima can be combined with investments in non-practicing versions simply because Xtera is in the process of transitioning from one version to the other.

At bottom, Xtera's approach to allocating investments in its domestic industry product requires accepting that, since 2015, Xtera dealt only in the NuWave Optima with the AC400 module or accepting that the realities of the marketplace require treating all investments in NuWave Optima the same regardless of the module incorporated therein. I accept neither assertion. In the 2015 to 2017 time period that Xtera relies on to establish their domestic industry, the record shows that Xtera dealt in both NuWave Optima with the AC400 module and the

NuWave Optima with the AC100 module. Further, neither the record evidence nor Commission precedent support crediting Xtera's investments in NuWave Optima systems utilizing the AC100 module based on the realities of the marketplace. In sum, I find that Xtera's reliance on 100% of its investments in NuWave Optima systems is inconsistent with section 337's requirement that a domestic industry exist with respect to "articles protected by the patent." 19 U.S.C. § 1337(a)(2); *see also Certain Dimmable Compact Fluorescent Lamps,* Inv. No. 337-TA-830, Initial Determination at 63 (Feb. 27, 2013) (criticizing complainant for "includ[ing] expenses of non-domestic industry products in its investments allocated under prongs A and B."); *Certain Forensic Devices*, Inv. No. 337-TA-799, Initial Determination at 10 (Nov. 27, 2012) (public version) (criticizing complainant for aggregating investments in unrelated products where only one of the products practiced a given asserted patent), *unreviewed,* Notice of Comm'n Determination Not to Review the Final Initial Determination of the Administrative Law Judge (Dec. 21, 2012)..

B. The Requirement for a Quantitative Analysis

I note that one portion of Xtera's posthearing brief addressing the economic prong of the domestic industry appears to suggest that I may find Xtera's investments to be significant based solely on a qualitatively analysis. *See* CIB at 126-128. Particularly, Xtera's brief suggests that *Lelo, Inc. vs. ITC*, 786 F.3d 879 (Fed. Cir. 2015), supports the proposition that a quantitative analysis is not necessarily required to determine whether a domestic industry exists in articles protected by the patent. *See* CIB at 128 ("As in *Lelo, Inc. vs. ITC*, a quantitative analysis can also be required. 786 F.3d 879, 883-85 (Fed. Cir. 2015)."). I do not read *Lelo* as providing support for that proposition. Indeed, the holding of *Lelo* is "that qualitative factors alone are insufficient to show 'significant investment in plant and equipment' and 'significant employment of labor or capital' under prongs (A) and (B) of the § 337 domestic industry requirements." *Lelo*, 786 F.3d at

885. Thus, in view of *Lelo*, Xtera cannot, as its brief suggests, establish a domestic industry in the technology of the '403 patent based only on a showing of qualitative significance.

C. Xtera's Belated Allocation Argument

As explained above, Xtera's domestic industry showing is flawed because it combines investments in NuWave Optima systems utilizing the AC100 module, which do not practice the '403 patent, with investments in NuWave Optima systems utilizing the AC400 module, which allegedly do practice the '403 patent. In possible recognition of that failure, Xtera does include a section in their post-hearing brief that presents an allocation of their investments in plant and equipment and labor or capital between systems using the AC400 module and those not using that module. *See* CIB at 141-45. This argument, however, appears nowhere in the nearly 1500 pages of Xtera's prehearing brief, and is therefore deemed abandoned in accordance with Ground Rule 11.2. *See* CPB at 1301-1317; Order No. 11 (Amending Ground Rules). I will not credit an argument made for the first time after the close of the evidentiary hearing, when Respondents have no ability to seek expert economic analysis of that argument, or any ability to test the veracity of that argument through cross-examination of Xtera's economics expert. Moreover, I note that Xtera's last-minute allocation argument relies on assertions for which there is no evidentiary support. For example, Xtera asserts that, from the beginning of 2017 through September 2018, "[o]nly two upgrades used AC100 exclusively (the GTMO lines, accounting for at most [redacted] AC100 cards sold to DISA, including AC100 cards from the DISA-1 deployment predating AC400, CX-0379C)—the rest include AC400." CIB at 144. Other than the reference to CX-0379C in that assertion, no supporting citation is offered. Accordingly, at best, I can speculate that the assertion is based on attorney-argument interpreting CX-0379C. CX-0379C, which is a spreadsheet providing little in the way of internal explanation, is not so clear on its face that I can determine whether Xtera's interpretation is accurate.

The assertion that appears to reference CX-0379C is exemplary of the other assertions in this section of Xtera's brief, all of which consist primarily of attorney argument. Thus, even if Xtera's last minute allocation argument had not been abandoned, I would nonetheless be compelled to find that Xtera's proffered allocation lacked the support of substantial evidence.

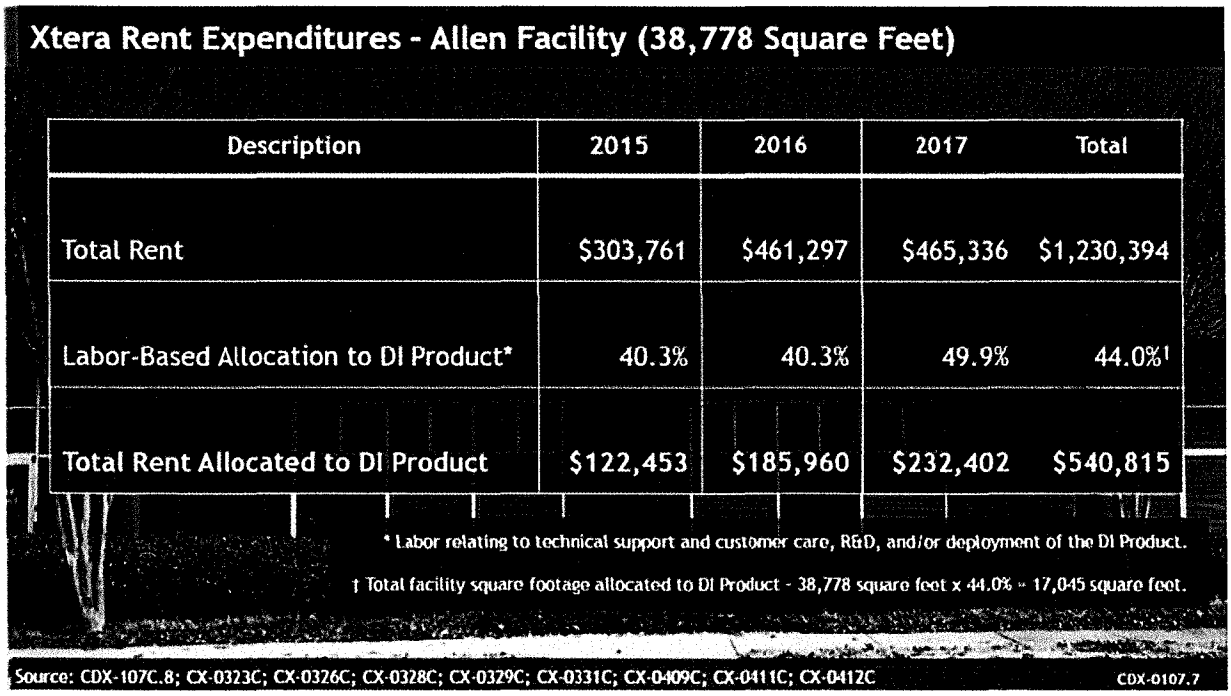
D. Xtera's Evidence of Investments in Plant and Equipment

As explained *supra*, Xtera's domestic industry allegations are flawed insomuch as they do not distinguish between investments in NuWave Optima systems utilizing AC400 module versus the AC100 module. Nonetheless, should the Commission determine to consider Xtera's investments as presented, I make the following findings regarding the evidence presented in support of a domestic industry based on investments in plant and equipment and labor or capital.

1. Plant Investments

With respect to investments in plant, Xtera points to its headquarters in Allen, Texas—a roughly 38,000ft^2 facility that Xtera leases for about $450,000 per year. *See* Tr. at 609:3-6, 609:15-17, 648:18-649:13; CX-0329C; CX-0331C. Xtera asserts that it paid about $1.2 million in rent for the Allen, Texas facility between 2015 and 2017. Tr. at 648:18-649:13. Relying on the testimony of their expert, Mr. Schoettelkotte, Xtera applies a 44% allocation factor to arrive at a total of $540,815 of plant expenditures in connection with the Allen, Texas facility allocable to the domestic industry product. *See* Tr. at 648:18-650:8. Mr. Schoettelkotte's testimony provides little explanation about his labor-based allocation, except that it "was based on Mr. Higginbotham's experience working at the facility," and that his understanding, through Mr. Higginbotham, was that more than one third of Xtera's employees dedicate 100% of their time to the domestic industry product, while other employees spend less than 100%, but still significant amounts of their time on the domestic industry product. Tr. at 649:2-5; *see also* Tr. at 650:2-8.

What is clear, however, from Mr. Schoettelkotte's testimony, is that he did not attempt to allocate Xtera's investments in plant to the versions of the NuWave Optima system that actually practice the '403 patent, i.e., those with the AC400 module. Indeed, Mr. Schoettelkotte's understanding of the domestic industry product is significantly broader, as demonstrated by his description of the domestic industry product at issue as "the LTE or line terminal equipment." *Id.* at 649:23-650:1. Mr. Schoettelkotte's allocation is summarized in the following demonstrative:



CDX-0107 at 0007. As CDX-0107 shows, Xtera, through Mr. Shoettelkotte, asserts that from 2015-2017, it invested $540,815 in plant via rent expenditures at their Allen, Texas facility allocable to the "DI Product." *See* CDX-0107. I note that the yearly breakdown shows both an increase in total rent paid, as well as an increase in the amount of rent that Mr. Shoettelkotte allocated to the domestic industry product as he understood it. *See id.* However, as explained *supra*, Mr. Schoettelkotte's allocation is flawed insomuch as it is based on the assumption that any line terminal equipment produced by Xtera is a qualifying domestic industry product, i.e., one that

practices the '403 patent. Accordingly, Mr. Schoettelkotte's allocation does not provide substantial evidence that Xtera has made significant investments in plant via their rent payments for the Allen, Texas facility between 2015 and 2017.

In addition to the Allen, Texas facility, Xtera points to the rent expenditures of MC Assembly ("MCA"), the company with which Xtera contracts to manufacture the domestic industry product. *See* Tr. at 612:5-16. MCA is located in Melbourne, Florida. *See id.* The evidence shows that approximately 5000-6000ft^2 of space at MCA is dedicated to manufacturing for Xtera. Tr. at 613:10-12. Accordingly, Mr. Schoettelkotte derived a 3.9% allocation factor for investments in rent made by MCA by comparing the 5300ft^2 of MCA's facility space dedicated to Xtera products to the total 134,900ft^2 of facility space at MCA's Melbourne, Florida facility. Tr. at 652:20-653:13. Applying that allocation factor to MCA's rent expenses for the period of March 2015 through 2017 yields $117,053 in MCA rent expenditures that Mr. Schoettelkotte attributes to Xtera's line terminal equipment. *See id.; see also* CX-0136C. Mr. Schoettelkotte also performed a similar calculation for the time period of March 2015 through July 2018 to arrive at $142,012 in MCA rent expenditures attributable to Xtera's Nu-Wave Optima product. These numbers are summarized in the following demonstrative exhibit:

MC Assembly Rent Expenditures - Melbourne Facility (134,900 Square Feet)

Description	2015 (March - December)	2016	2017	2018 (through July)
Total Rent	$859,988	$1,049,185	$1,070,168	$635,259
Xtera Cell as a % of Total*	3.9%	3.9%	3.9%	3.9%
Rent Attributable to Xtera Cell	**$33,788**	**$41,221**	**$42,045**	**$24,958**

	2015 - 2017	2015 - 2018
Total Rent	$2,979,341	$3,614,600
Rent Attributable to Xtera Cell	**$117,053**	**$142,012**

* 5,300 Xtera Cell Square Feet / 134,900 Total Facility Square Feet = 3.9%

Source: CX-0123C; CX-0127C; CX-0129C; CX-0136C; CX-0416C CDX-0107C.10

CDX-0107C at 0010.

Xtera explains that MCA's rent expenditures should be counted towards its investments in plant because "MCA takes costs associated with 'payroll, overhead facilities, rent, maintenance' and 'roll[s] them into the product cost for the products that Xtera is buying.'" CIB at 130 (citing Tr. at 616:14-617:10; CX-0357C). In other words, Xtera pays MCA based on the products MCA manufactures for them—not based on the amount of floor space MCA dedicates to manufacturing their products. Thus, in order to address the investments in plant contemplated by section 337(a)(3)(A), Xtera proffers the above allocation of MCA's rent expenditures as a means of capturing additional indirect investments in plant for the purposes of showing the existence of a domestic industry under 337(a)(3)(A). Neither Respondents nor staff challenge Xtera's approach to indirect investments in their posthearing briefs.

Here again, the evidence presented by Xtera does not reflect any attempt to separate investment in versions of the NuWave Optima system that do not practice the '403 patent from

those that do. Rather, Mr. Schoettelkotte's allocation assumes that every purchase order to MCA is directed to NuWave Optima systems utilizing the AC400 module, and thus all of MCA's rent expenditures that are attributable to Xtera are also attributable to a domestic industry product that practices the patent. However, Xtera's brief stops short of asserting that MCA only worked on NuWave Optima systems utilizing the AC400 module between 2015 and 2017, instead stating only that "Optima with AC400 was manufactured and tested," during that time period. CIB at 129. Similarly, the evidence Xtera relies on does not establish that MCA manufactured only NuWave Optima systems utilizing the AC400 module between 2015 and 2017. *See* CX-0136C; CX-0357C; Tr. at 612:5-16. Accordingly, as with the Allen, Texas facility, Mr. Schoettelkotte's allocation does not provide substantial evidence that Xtera has made significant indirect investments in plant via its purchase order payments to MCA between 2015 and 2017.

2. Equipment Investments

With respect to investments in equipment, Xtera points to investments in custom built test stands—common electrical test stands ("CETS") and common optical test stands ("COTS")—for testing the Nu-Wave Optima as qualifying investment in equipment under section 337(a)(3)(A). CIB at 130-131. Xtera emphasizes that CETS and COTS are specialized equipment, not available off-the-shelf, that require particular code and software to be integrated such that the stands are specifically tailored to each piece of equipment they will be used to test. *See id.* (citing Tr. at 617:11-619:10). To quantify its investments in CETS and COTS, Xtera presents a replacement cost for the stands based entirely on estimations given during the testimony of Xtera's employee, Mr. Higginbotham. CIB at 131 (citing Tr. at 618:16-18, 619:11-621:13). For CETS, the replacement cost estimate is $75,000 to $100,000, while for COTS it is $200,000 to $250,000. Tr. at 619:16-620:9. Mr. Higginbotham testified that there is one CETS and one COTS at Xtera's

Allen, Texas facility, and six CETS and six COTS at MCA's Melbourne, Florida facility. Tr. at 620:10-21.

From Mr. Higginbotham's estimates, Mr. Schoettelkotte posited that Xtera had invested between $775,000 and $1.3 million in lab equipment at the Allen, Texas facility associated with the Nu-Wave Optima., and between $1.6 million and $2.1 million in lab equipment at MCA's Melbourne, Florida facility. Tr. at 650:19-25, 654:6-14. I note that there is a discrepancy between what Mr. Schoettelkotte calculated in terms of lab equipment at the Allen, Texas facility and what Xtera's brief identifies to show qualifying investments in equipment under 337(a)(3)(A). Particularly, Mr. Schoettelkotte considered an additional piece of lab equipment—an optical spectrum analyzer ("OSA")—in tabulating equipment expenses at the Allen, Texas facility. Tr. at 650:19-25. Xtera does not discuss or purport to rely on the OSAs as qualifying investments in equipment in their brief, and instead assert that Mr. Schoettelkotte's analysis reflects $775,000-$1,350,000 in replacement value attributable to the CETS and COTS. *See* CIB at 131. However, Mr. Schoettelkotte's demonstrative, CDX-0107C, shows that the OSAs account for a majority of the $775,000-$1,350,000 that Xtera claims as equipment investments:

Laboratory Equipment for DI Product - Xtera (TX)

Equipment Type	Units	Replacement Cost per Unit (Materials Only)	Total Replacement Cost (Materials Only)
Common Electrical Test Stand (CETS)	1	$75,000 - $100,000	$75,000 - $100,000
Common Optical Test Stand (COTS)	1	$200,000 - $250,000	$200,000 - $250,000
Optical Spectrum Analyzer (OSA)	10	$50,000 - $100,000	$500,000 - $1,000,000
Total			$775,000 - $1,350,000

Source: CX-0127C; CX-0128C; CX-0129C; CX-0130C; CX-0131C; CX-0132C; CX-0133C; CX-0134C; CDX-0107C.8

CDX-0107C at 8. Subtracting the value of the OSAs from Mr. Schoettelkotte's tabulation yields a value of between $275,000 and $350,000 attributable solely to CETS and COTS at the Allen, Texas facility. Mr. Schoettelkotte's calculations for MCA lab equipment do not appear to include OSAs, and thus no modification of his values are needed for those investments. *See* CIB at 132.

I find that Xtera has not provided substantial evidence to support the conclusion that a domestic industry exists for the NuWave Optima with AC400 module based on its investments in CETS and COTS. Particularly, I find that the replacement values given to that equipment by Mr. Higginbotham lack sufficient indicia of reliability. The evidence in support of the replacement values posited by Xtera consists entirely of the conclusory testimony of Xtera's employee, Mr. Higginbotham. *See* CIB at 131 (citing Tr. at 618:16-18. 619:11-0621:13). Upon reviewing Mr. Higginbotham's testimony, I find there to be very little to indicate that his estimations of replacement costs for CETS and COTS are reliable. Indeed, Mr. Higginbotham's testimony simply presents as fact that it would take about 6 months and $75,000-$100,000 to replace a CETS,

and about 6-12 months and $200,000-$250,000 to replace a COTS. *See* Tr. at 619:11-620:9. Moreover, there can be no dispute that, at bottom, Mr. Higginbotham's estimate is speculative. No evidence has been presented that any of the CETS or COTS have been replaced, and thus Xtera's reliance on replacement costs for that equipment is akin to reliance on hypothetical investments. In the absence of any additional evidence corroborating the value of Xtera's investments in the COTS and CETS, such as for example evidence showing the original cost of fabricating the CETS and COTS, or even the value of the main components that would be used to replace the CETS or COTS, I do not find Mr. Higginbotham's replacement cost estimates to rise to the level of substantial evidence of Xtera's investments in the CETS and COTS.[8]

In addition to the CETS and COTS, Xtera relies on surface mount technology ("SMT") used by MCA—though not exclusively in connection with Xtera's products—as an investment in equipment that should be credited towards their domestic industry. CIB at 132. Acknowledging that MCA has many customers, of which Xtera is only one, Mr. Schoettelkotte derived a 5.2% allocation factor based on the ratio of MCA production revenue attributable to Xtera over MCA's total production revenue. Tr. at 655:7-22. Applying that factor to the $4.4 million value of the SMT line equipment yields a value of $228,000, which Mr. Schoettelkotte asserts is attributable to Xtera's domestic industry investments in equipment. Tr. at 655:14-22. Finally, Xtera points to $45,000 of investments in infrastructure to their manufacturing area at MCA, and a $45,783 thermal chamber that MCA uses exclusively to test Xtera's Nu-Wave Optima product.

As with its evidence of investments in plant, Xtera's evidence of investments in equipment is marred by the fact that their expert, Mr. Shoettelkotte, employed an overly broad definition of

[8] I note that my finding in this regard is specific to the evidence before me. I decline to find that testimony of a complainant's employee will never be reliable evidence of domestic industry investments absent additional corroborating evidence.

the domestic industry product—"line terminal equipment"—and in doing so captured investments in versions of NuWave Optima that do not practice the '403 patent along with those that do. Accordingly, I find that Mr. Schoettelkotte's allocations of equipment investments do not provide substantial evidence that Xtera has made significant investments in equipment, either through direct investment in COTS and CETS, or through indirect investment in equipment used by MCA.

Consistent with my findings above, I find that Xtera has not satisfied the economic prong of the domestic industry requirement via section 337(a)(3)(A) through evidence of investments in plant and equipment.

E. Xtera's Evidence of Investments in Labor or Capital

As with plant and equipment, Xtera points to its own direct investments in labor or capital via its own employees' salaries, as well as indirect investments in labor from MCA's employees. With respect to its own employees, Xtera relies on its witness, Mr. Higginbotham, to identify the percentage of each employee's time that was dedicated to the Nu-Wave Optima product. CIB at 134-135 (citing Tr. at 605:15-608:6; CX-0149; CX-0150; CX-0151). Mr. Higginbotham's allocation of each employee's time dedicated to Nu-Wave Optima is represented in three exhibits: CX-0149 for the year 2018; CX-0150 for the year 2017; and CX-0151 for the year 2016. Mr. Higginbotham testified that he took a "conservative" approach to allocating employee time to Nu-Wave Optima—excluding sales, marketing, and IT services, and also excluding any employee whose work assignment he could not precisely recall. *See* Tr. at 606:18-608:6. Based on Mr. Higginbotham's data, Xtera's expert, Mr. Schoettelkotte, used a labor-based allocation to posit that Xtera had invested $6.2 million in labor allocable to the domestic industry products between 2016 and 2018. Tr. at 651:4-652:6.

Xtera employs a similar approach to calculating qualifying labor investments from MCA with respect to the domestic industry product. Particularly, Mr. Schoettelkotte relied on a

declaration from MCA's CEO regarding the percentage of time each MCA employee spent on Xtera's projects to allocate labor investments based on those MCA employees' salaries. *See* CX-0136C. For the period of 2016 to 2017, Mr. Schoettelkotte's calculations yield $278,000 of MCA labor investments allocable to the domestic industry product, and $217,000 for 2018 alone. Tr. at 658:10-659:19.

Here again, Xtera's evidence of its investments is flawed insomuch as investments in labor related to NuWave Optima systems utilizing the AC400 module, which allegedly practice the '403 patent, were not separated from investments in labor related to NuWave Optima systems utilizing other modules, which do not practice the '403 patent. In describing the three exhibits that form the basis of Mr. Schoettelkotte's labor-based allocation, Mr. Higginbotham made no distinction between the versions of the NuWave Optima product. *See* Tr. at 605:15-608:6 (describing CX-0149C: "this is a listing of the 2018 Xtera employees, job titles, salaries and a time allocation related to the Nu-Wave Optima product."). Because Mr. Schoettelkotte relied exclusively on Mr. Higginbotham's allocations of employee time to NuWave Optima products, all of Mr. Schoetelkotte's calculations are flawed. Accordingly, I find that Mr. Schoettelkotte's allocations of Xtera's labor investments do not provide substantial evidence that Xtera has made significant investments in labor with respect to the domestic industry product.

Consistent with my findings above, I find that Xtera has not satisfied the economic prong of the domestic industry requirement via section 337(a)(3)(B) through evidence of investments in labor or capital.

F. Conclusion on Economic Prong of Domestic Industry Requirement

Based on the foregoing, I find that Xtera has failed to satisfy the economic prong of the domestic industry requirement for the '403 patent. Particularly, I find that Xtera improperly relies on 100% of its investments in the NuWave Optima product even though versions of the product

that do not utilize the AC400 module are not protected by the '403 patent. Moreover, Xtera failed to timely offer an allocation of its investments in the version of the NuWave Optima that incorporated the AC400 card, and the untimely allocation they offered for the first time in posthearing briefing is not supported by substantial evidence. Accordingly, Xtera has not satisfied the economic prong of the domestic industry requirement.

VI. CONCLUSIONS OF LAW

1. The Commission has personal jurisdiction over the parties, subject-matter jurisdiction over the investigation, and *in rem* jurisdiction over the accused products.

2. The importation requirement of section 337 is satisfied as to all respondents.

3. Respondents do not infringe, directly or indirectly, any asserted claim of U.S. Patent No. 7,860,403.

4. The asserted claims of U.S. Patent No. 7,860,403 are not invalid as indefinite or for lack of written description.

5. The asserted claims of U.S. Patent No. 7,860,403 are invalid as anticipated by Frankel (U.S. Patent Number 6,430,336).

6. The technical prong of the domestic industry requirement for U.S. Patent No. 7,860,403 has not been satisfied.

7. The economic prong of the domestic industry requirement for U.S. Patent No. 7,860,403 has not been satisfied.

8. No violation of section 337 has occurred based on alleged infringement of the asserted claims of U.S. Patent No. 7,860,403.

9. No violation of section 337 has occurred based on alleged infringement of the asserted claims of U.S. Patent No. 8,351,798.

VII. RECOMMENDED DETERMINATION ON THE PUBLIC INTEREST, REMEDY, & BOND

The Commission's Rules provide that the administrative law judge shall issue a recommended determination concerning the appropriate remedy in the event that the Commission finds a violation of section 337, and the amount of bond to be posted by Respondents during Presidential review of the Commission action under section 337(j). *See* 19 C.F.R. § 210.42(a)(l)(ii).

A. Public Interest

In connection with this Recommended Determination, and pursuant to Commission Rule 210.50(b)(1), 19 C.F.R. § 210.50(b)(1), the Commission ordered that the presiding administrative law judge

> shall take evidence or other information and hear arguments from the parties or 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 set forth in 19 U.S.C. §§ 1337(d)(1), (f)(1), (g)(1).

83 Fed. Reg. 3770 (Jan. 26, 2018).

Before issuing a remedy for a violation of section 337, the Commission must consider the effect of the remedy on the following public interest factors: (1) the public health and welfare; (2) competitive conditions in the U.S. economy; (3) the U.S. production of articles that are like or directly competitive with those that are the subject of the investigation; and (4) U.S. consumers. *See* 19 U.S.C. §§ 1337(d)(1), (f)(1). The Commission begins this analysis with the understanding that the public interest favors the protection of intellectual property rights by excluding infringing products. *See, e.g., Certain Two-Handle Centerset Faucets & Escutcheons & Components Thereof,* Inc. No. 337-TA-422, Comm'n Op. at 9 (July 21, 2000). It is rare for the Commission to determine that the public interest considerations outweigh the patent holder's rights. *See Spansion*

Inc. v. Int'l Trade Comm'n, 629 F.3d 1331, 1360 (Fed. Cir. 2010). The Commission can, however, tailor the remedy to minimize the impact on the public interest. *See e.g., Certain Personal Data and Mobile Commc'ns Devices & Related Software,* Inv. No. 337-TA-710, Comm'n Op. at 83 (delaying the effective date of an exclusion order based on competitive conditions in the U.S. economy).

1. Public Health and Welfare

I find that no evidence has been produced in this investigation that indicates an exclusion order would adversely affect the public health and welfare in the United States. Respondents make a number of broad and conclusory assertions that the public health and welfare would be negatively affected, but I find no support for those assertions in the few record citations offered in Respondents' briefing. *See* RIB at 72-73 (citing Tr. at 744:3-13, 747:3-748:14). Neither Xtera nor Staff argue that an exclusion order would adversely affect the public health or welfare in the United States. *See* SIB at 76; CRB at 80-81. Accordingly, I find that the public health and welfare does not support the denial or tailoring of any exclusion orders in this investigation.

2. Competitive Conditions in the United States Economy

Respondents make several arguments that appear to fall under the broad umbrella of competitive conditions in the United States economy. First, Respondents assert that NEC and Nokia's products perform better than Xtera's, and that Xtera thus has no competitive products that could replace those made by Respondents. RIB at 73-74 (citing Tr. at 744:8-13, 105:8-18). Similarly, Respondents argue that Xtera has not presented evidence to show that other competitors could provide products to replace NEC and Nokia's should an exclusion order issue. *See id.* (citing Tr. at 748:7-9, 754:5-12, 758:2-12, 715:18-716:4). Second, Respondents argue that Nokia and NEC's products could not be replaced in a reasonable timeframe. RIB at 74 (citing Xtera Public

Interest Statement at 5 (Dec. 22, 2017) (EDIS Doc. ID 632352); Xtera Public Interest Replay at 4; CX-269C at 0012, 0096). Third, Respondents argue that an exclusion order "could also result in higher prices to Respondents' customers," and that "Xtera has provided no indication or data suggesting it could meet the large demand that would be caused by any proposed remedial orders." RIB at 74-75 (citing Tr. at 744:11-13, 104:1-5).

I find none of these arguments to supported by record evidence. As an initial matter, Respondents' repeated criticism of Xtera for failing to present evidence that it could replace Nokia and NEC's products in the marketplace erroneously places an evidentiary burden on Xtera to show that the public interest will not be harmed if an exclusion order issues. No such burden exists, and placing one on Xtera would be contrary to the Commission's general approach of favoring the protection of intellectual property rights by excluding infringing products. *See, e.g., Certain Two-Handle Centerset Faucets & Escutcheons & Components Thereof,* Inc. No. 337-TA-422, Comm'n Op. at 9 (July 21, 2000). If Respondents believe evidence exists that shows the Commission should depart from its general approach by withholding or tailoring its remedial orders, it behooves Respondents to present that evidence.

With the forgoing in mind, I have reviewed all of the evidence cited by Respondents in the portion of their brief addressing competitive conditions in the United States economy, and I find that none of it persuasively establishes any of the supposed harms that Respondents posit in the context of competitive conditions. I particularly note that Respondents continue to cite the same few lines of the transcript for all manner of disparate assertions in the public interest section of their brief. *See* RIB at 70-71 (citing Tr. at 744:3-7 for the proposition that NEC's products "allow U.S. public and private entities to communicate domestically and internationally with other private and public entities, such as government agencies and hospitals."); RIB at 72 (citing Tr. at 744:11-

13 for the proposition that "NEC and Nokia are two of the top three industry providers" of subsea telecommunications systems); RIB at 72 (citing Tr. at 3-13 for the proposition that the "accused products accelerate a vast range of industries and research that benefit public health and welfare, and exclusion of these products without adequate substitutes would frustrate the efficient functioning of such industries."); RIB at 73 (citing Tr. at 744:8-13 for the proposition that "NEC's and Nokia's experience and capabilities with submarine telecommunications have allowed them to develop products whose capabilities exceed those of its competitors."); RIB at 75 (citing Tr. at 744:11-13 for the proposition that "Nokia and NEC are two of the three major competitors for such products (along with TE SubCom)."); RIB at 75 (citing Tr. at 744:3-13 for the proposition that exclusion of Nokia and NEC's systems "would lead to both a decrease in critical telecommunications services relied upon by U.S. consumers and an increase in prices paid by U.S. consumers for those critical telecommunications services as fewer competitors would be offering fewer products."); RIB at 76 (citing Tr. at 744:11-13 for the proposition that "removing Nokia and NEC from the market would eliminate two of the major market participants, which may have adverse market implications for consumers."). The portion of the transcript Respondents repeatedly cite actually reads:

Q How would you describe NEC's main field of business?

A The businesses we conduct at NEC are to provide solutions for the good of society and in particular, we have an emphasis on information communication.

Q Would it be fair to characterize NEC as a global leader in the IT industry?

A Yes, it would.

Q What is NEC's position in the submarine telecommunications industry?

A We are in the top three in the world.

Tr. at 744:3-13. While this testimony may be generously described as somewhat related to the assertions Respondents make in the public interest section of their brief, it is hardly persuasive evidence that the Commission should tailor or withhold an exclusion order on the basis of harm to the public interest. I do not find the few pieces of other evidence cited by Respondents to be particularly more persuasive. Accordingly, I find that Respondents have not shown that competitive conditions in the United States will be adversely affected by an exclusion order.

Separate from Respondents, I note that Staff asserts that competitive conditions in the United States economy do support "tailoring the requested remedial orders to exempt installing, servicing, and/or repairing subsea telecommunications systems that were purchased prior to the order's effective date." SIB at 76-77. I understand Staff's argument in this regard to be largely coextensive with its reasoning that United States consumers would be harmed by an exclusion order to the extent customers who purchased an accused system prior to the effective date of the exclusion would experience difficulty receiving replacement parts and service for their systems. *See* SIB at 78 (cross-referencing Staff's arguments on competitive conditions). As explained in the following section of this initial determination, I agree with Staff that the any exclusion order should be tailored to provide an exception for the service and repair of accused systems that were purchased prior to the effective date of any exclusion orders.

3. Production of Like or Directly Competitive Articles in the United States

I find that no evidence has been produced in this investigation that indicates an exclusion order would adversely affect the production of like or directly competitive articles in the United States. Indeed, no party presented any briefing arguing otherwise in this investigation. *See* RIB at 70-76; CRB at 85; SRB at 17-18. Accordingly, I find that the production of like or directly

competitive articles in the United States does not support the denial or tailoring of any exclusion orders in this investigation.

4. United States Consumers

Respondents argue that an exclusion order would adversely affect United States consumers in two places in their brief. RIB at 71, 75-76. In the first instance, Respondents focus on the harm an exclusion order would cause to customers of Nokia and NEC's products in need of obtaining repair services and replacement parts. *Id.* at 71. Staff is in accord with this aspect of Respondents' argument, but submits that the adverse effects can be mitigated through tailoring of any exclusion order. SIB at 78-79. Respondents' second argument is not well focused and meanders among a number of points, some of which address different public interest factors. RIB at 75-76. Respondents generically assert that the absence of Nokia and NEC's products from the domestic market would lead to a decrease in services and increase in prices for telecommunications services. *See* RIB at 75 (citing Tr. at 744:3-13). Respondents then recycle their competitive conditions argument by asserting that "[b]ecause Xtera and other competitors cannot adequately supply and meet the demand of the U.S. market, or at a minimum would be unable to meet that demand quickly enough to match the rapid growth in data consumption," consumer would be adversely affected. RIB at 75-76. Finally, Respondents rehash their repair and warranty argument a second time. RIB at 76. Xtera opposes both of Respondents' arguments about the impact on United States consumers. CRB at 85-88.

With respect to the first argument, Respondents point to record evidence to establish that their customers who purchase subsea line terminal equipment receive spare parts and warranty obligations from NEC or Nokia. *See* RRB at 77 (citing CX-0269C at 27-30; JX-0033C at 95:20-96:16, 130:6-25; 133:7-15; JX-0029 at 95:14-99:4; CX-447C at 0028; CX-1716C at 0006, 0023-

0024; Tr. at 759:10-760:5; Tr. at 720:3-722:15). This evidence undercuts Xtera's counter-argument that the "Commission has denied exceptions for repair parts when Respondents failed to present supporting evidence." CRB at 86. Indeed, Xtera relies on *Certain Magnetic Data Storage and Tapes and Cartridges Containing the Same (II)* ("*Magnetic Tapes II*"), Inv. No. 337-TA-1076, but there the respondents presented, quite literally, no evidence to support a warranty and repair exception, relying instead on the Commission's determinations from an earlier related investigation. *See id.*, Initial Determination at 174 (Nov. 19, 2018) (public version) ("Accordingly, in the absence of any evidence from Sony or its customers about warranty and repair services related to the LTO tapes at issue in this investigation, I do not recommend incorporating Sony's fourth exception into any limited exclusion order.").

Here, the evidence shows that the accused articles are complex systems that require substantial investments of time and money to procure and install. *See* Tr. at 637:3-7; JX-0015C at 23; CX-0269C at 16-17. Moreover, the evidence shows that, without access to replacement parts from Nokia or NEC, third parties that had invested in Respondents' systems would have limited ability to service those systems short of purchasing a new set of SLTE. *See* Tr. at 748:7-9, 754:5-17; JX-0039C at 116:21-117:6. Accordingly, I agree with Respondents and Staff that any exclusion order should be tailored to allow for warranty and repair services to protect the interests of third-parties that have invested substantially in the accused SLTE prior to the issuance of any exclusion order.

With respect to the second facet of Respondents' public interest argument about the effect an exclusion order would have on United States consumers, I do not find that Respondents have presented evidence sufficient to support their argument. By way of example, the portion of the transcript Respondents cite to support the assertion that exclusion of the accused systems "would

lead to both a decrease in critical telecommunications services relied upon by U.S. consumers and an increase in prices paid by U.S. consumers for those critical telecommunications services as fewer competitors would be offering fewer products," appears unrelated to that assertion. *See* RIB at 75 (citing Tr. at 744:3-13s). To the extent this portion of Respondents' domestic industry arguments does have evidentiary support, that support appears to be coextensive with the evidence supporting Respondents' repair and replacement parts argument. *See, e.g.,* RIB at 76 (citing Tr. at 622:18-623:25, 748:7-9, 754:5-17; JX-0039C at 116:21-117:6, 116:6-20). Accordingly, Respondents' additional arguments on the effect an exclusion order would have on United States consumers adds nothing beyond its arguments regarding repair and replacement parts for its customers.

B. Remedy & Bond

1. Limited Exclusion Order

Under section 337(d), the Commission may issue a limited exclusion order directed to a respondent's infringing products. *See* 19 U.S.C. § 1337(d). A limited exclusion order instructs the U.S. Customs Service to exclude from entry all articles that are covered by the patent at issue that originate from a named respondent in the investigation. *See Fuji Photo Film Co. Ltd. v. Int'l Trade Comm'n*, 474 F.3d 1281, 1286 (2007).

There is no dispute that, should the Commission find a violation, a limited exclusion order directed to the infringing articles upon which such a violation is predicated should issue. *See* CIB at 145; RRB at 75; SIB at 80. Respondents, however, seek to have any limited exclusion order tailored in a number of different ways. See RRB at 75. Particularly, Respondents request that any limited exclusion order "(*i*) exclude wet plant equipment, (*ii*) exclude terrestrial products, (*iii*) be limited to the specific components that contain the functionality found to infringe, (*iv*) contain an

exception to permit replacements and repairs for existing customers to avoid substantial harm to third-parties, and (*v*) contain a certification provision." *Id.*

The first three (*i-iii*) of Respondents' proposed limitations on any exclusion order all essentially amount an argument that any limited exclusion order should be limited to products actually found to infringe. Succinctly, Respondents assert that "[n]o evidence was presented during the hearing concerning alleged infringement by any wet plant equipment," RRB at 75, that this investigation is limited to subsea products and therefore terrestrial products should not be included in any exclusion order, *see id.*, and because the accused product lines—the ASN 1620 system, NAC 1830 system, and NS Series (Submarine Repeated Subsea Systems)—have many different configurations, any exclusion order should be specific in identifying the infringing configurations. As noted *supra*, I have not found infringement or a violation of section 337 in this investigation. However, should the Commission find a violation of section 337, it is the Commission's regular practice phrase limited exclusion orders in terms of articles that infringe asserted claims. *See, e.g.*, *Magnetic Tapes*, Inv. No. 337-TA-1058, Limited Exclusion Order at 2 (Mar. 25, 2019) (EDIS Doc. ID 671163) (issuing limited exclusion order to "[m]agentic tape cartridges and components thereof that infringe . . . ."); *see also* SIB at 80 n.21 (concurring that the Commission's standard exclusion order language is appropriate). Infringing articles should be excluded, whether or not they have been adjudicated in this proceeding. If Respondents have questions about whether products not adjudicated in this proceeding infringe, they may seek an advisory decision from the Commission or a determination from U.S. Customs and Border Patrol.

As to Respondents' fourth (*iv*) request, an exception for warranty and repair services to existing customers, Staff joins Respondents' request, arguing that "the statutory public interest factors support tailoring the LEO to exempt installing, servicing, and/or repairing subsea

telecommunications systems that were purchased prior to the order's effective date." SIB at 81. Consistent with the reasoning in the section of this initial determination addressing the effect an exclusion order would have on United States consumers, I agree with Respondents and Staff that an exemption for warranty and repair services should be incorporated into any limited exclusion order.

Respondents' fifth (*v*) point seeks a certification provision in any exclusion order. There appears to be no dispute that such a provision would be appropriate. Moreover, the Commission routinely includes such provisions in its exclusion orders. *See Magnetic Tapes*, Inv. No. 337-TA-1058, Limited Exclusion Order at 3 (Mar. 25, 2019) (EDIS Doc. ID 671163). Accordingly, I recommend the inclusion of such a provision.

Consistent with the foregoing, should the Commission find a violation, I recommend that an appropriate limited exclusion order issue.

2. Cease and Desist Order

Under section 337(f)(1), the Commission may issue a cease and desist order in addition to, or instead of, an exclusion order. *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, thereby undercutting the remedy provided by an exclusion order. *See Certain Crystalline Cefadroxil Monohydrate,* Inv. No. 337-TA-293, USITC Pub. 2391, Comm'n Op. on Remedy, the Public Interest and Bonding at 37-42 (June 1991); *Certain Condensers, Parts Thereof and Prods. Containing Same, Including Air Conditioners for Automobiles ("Condensers"),* Inv. No. 337-TA-334 (Remand), Comm'n Op. at 26-28, 1997 WL 817767, at *11-12 (U.S.I.T.C. Sept. 10, 1997).

Here, Xtera seeks a cease and desist order only as to Nokia based on an allegedly commercially significant inventory of 1830 products. CIB at 145-46. Particularly, Xtera relies on CX-2632C, which is a table summarizing NAC's domestic transponder inventory based on Xtera's interrogatory responses, to establish that NAC had [redacted] transponders that incorporated accused digital signal processors in its domestic inventory as of November 2018. *See* CIB at 146 (citing same). Xtera also relies on the testimony of their expert, Mr. Schoettelkotte, to support the characterization of that volume as "significant." *See* Tr. at 665:12-666:4.

Respondents do not challenge the accuracy of the information in CX-2632C, and indeed acknowledge in the responsive posthearing brief that NAC has [redacted] transponders in its domestic inventory. RRB at 78. Respondents argue, however, that only two of those transponders are subsea-specific, while the others are non-subsea-specific. *Id.* With respect to the two subsea-specific transponder, Respondents argue that they "are earmarked for a specific project for a specific customer and are not commercially saleable units to another customer." *Id.* On that basis, Respondents assert that those two units do not represent a commercially significant inventory of subsea products sufficient to support imposition of a cease and desist order to NAC. *Id.*

The primary dispute here is a familiar one, and it revolves around whether particular of NAC's transponders are "subsea" or not. NAC admits to holding [redacted] transponders in domestic inventory, but NAC contends those transponders are not subsea components and therefore not within the scope of the investigation. NAC concedes that if [redacted] transponders are within the scope of the investigation they would constitute commercially significant inventory. *Id.*

Respondents base their position on the testimony of Mr. Szilard Zsigmond, who is a product line manager of submarine products for Nokia. Tr. at 697:16-19. Particularly, Respondents rely on Mr. Zsigmond's testimony to establish that its terrestrial transponders are not

sold for subsea applications, and that there are hardware differences between Nokia's terrestrial and subsea transponders. *See* Tr. at 702:18-24, 703:21-704:10, 716:22-717:11.

The problem with Respondents' position is that Mr. Zsigmond also testified that prior to developing its submarine product line, Nokia offered its terrestrial transponder for sale in subsea applications. Tr. at 704:17-705:6. Mr. Zsigmond also testified that Nokia eventually marketed the interchangeability of its 1830 product for terrestrial and subsea application. Tr. at 707:11-18. And, Mr. Zsigmond acknowledged that terrestrial transponders have been used in subsea field trials. Tr. at 705:21-25. Additionally, both Xtera and Staff argue that Mr. Zsigmond's definition of "subsea" is unduly restrictive insomuch as it requires the use of repeaters. *See* SIB at 82; CIB at 146.

Recognizing that the "well-established purpose of cease and desist orders is to ensure complete relief to complainants when infringing goods are held in inventory in the United States and, therefore, beyond the reach of an exclusion order," I recommend that a cease and desist order issue as to NAC should the Commission find a violation of section 337 has occurred in this investigation. *Condensers,* Inv. No. 337-TA-334 (Remand), Comm'n Op. at 27 (Sep. 10, 1997). In support of that recommendation, I find that NAC maintains a commercially significant inventory of allegedly infringing transponders in the United States that could be sold for use in subsea applications and thus undercut any exclusion order. I do not agree with Respondents that [redacted] of the allegedly infringing transponders should be exempt from the analysis of commercially significant inventory because NAC has labeled them as terrestrial transponders. Mr. Zsigmond's testimony supports the conclusion that those terrestrial transponders could be used in subsea applications, *see* Tr. at 704:17-705:6, 705:21-25, 707:11-18, and thus would allow NAC an avenue to undercut any exclusion order and prevent Xtera from receiving complete relief.

Finally, I note that Xtera has presented no evidence to support issuing a cease and desist order to any respondent other than NAC. Accordingly, I do not recommend issuance of a cease and desist order to any other respondent in this investigation.

3. Bond During Presidential Review

Pursuant to section 337(j)(3), the Administrative Law Judge and the Commission must determine the amount of bond to be required of a respondent during the 60-day Presidential review period following the issuance of permanent relief, in the event that the Commission determines to issue a remedy. *See* 19 U.S.C. §1337(j)(3). The purpose of the bond is to protect the complainant from any injury. *See* 19 C.F.R. § 210.42(a)(1)(ii), § 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 Microsphere Adhesives, Processes for Making Same, and Prods. Containing Same, Including Self-Stick Repositionable Notes*, Inv. No. 337-TA-366, USITC Pub. 2949, Comm'n Op. at 24 (Dec. 8, 1995). In other cases, the Commission has turned to alternative approaches, especially when the level of a reasonable royalty rate could be ascertained. *See, e.g., Certain Integrated Circuit Telecomm. Chips and Prods. Containing Same, Including Dialing Apparatus*, Inv. No. 337-TA-337, Comm'n Op. at 41, 1993 WL 13033517, at *24 (U.S.I.T.C. June 22, 1993). A 100 percent bond has been required when no effective alternative existed. *See, e.g., Certain Flash Memory Circuits and Prods. Containing Same*, Inv. No. 337-TA-382, USITC Pub. No. 3046, Comm'n. Op. at 26-27 (July 1997) (imposing a 100% bond when price comparison was not practical because the parties sold products at different levels of commerce, and the proposed royalty rate appeared to be *de minimus* and without adequate support in the record).

Here, Xtera does not address bond in either their initial or responsive posthearing briefs. When a complainant "fail[s] to satisfy [its] burden to support a 100% bond or to properly explain why a reasonable royalty or price differential would be impractical," the Commission has set a zero bond during the Presidential review period. *Certain L-Tryptophan, L-Tryptophan Products, and their Methods of Production*, Inv. No. 337-TA-1005, Comm'n Op. at 53 (Jan. 11, 2018) (public version). Such a result follows from the fact that "[t]he complainant has the burden of supporting any bond amount it proposes." *Id.* at 52 (citing *Certain Rubber Antidegradants, Components Thereof and Products Containing Same*, Inv. No. 337-TA-533, Comm'n Op. at 40 (July 21, 2006)). Accordingly, because Xtera has failed to present evidence in support of any bond rate, I recommend that the Commission impose a 0% bond should it find a violation of section 337 has occurred in this investigation.

VIII. INITIAL DETERMINATION

Based on the foregoing, I have determined that 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 subsea telecommunication systems and components thereof alleged to infringe U.S. Patent No. 8,351,798 and U.S. Patent No. 7,860,403.

I hereby certify to the Commission this Initial Determination and the Recommended Determination.

The Secretary shall serve the confidential version of this Initial Determination upon counsel who are signatories to the Protective Order (Order No. 1) issued in this investigation. A public version will be served at a later date upon all parties of record.

Pursuant to 19 C.F.R. § 210.42(h), this Initial Determination shall become the determination of the Commission unless a party files a petition for review pursuant to 19 C.F.R.

§ 210.43(a) or the Commission, pursuant to 19 C.F.R. § 210.44, orders on its own motion a review of the Initial Determination or certain issues therein.

Within seven days of the date of this document, each party shall submit a statement to Cheney337@ustic.gov stating whether or not it seeks to have any portion of this document redacted from the public version. Any party seeking to have any portion of this document redacted from the public version thereof shall attach a copy of this document with red brackets indicating any portion asserted to contain confidential business information.[9] The parties' submissions concerning the public version of this document should not be filed with the Commission Secretary.

SO ORDERED.

Clark S. Cheney
Administrative Law Judge

[9] If the parties submit excessive redactions, they may be required to provide an additional written statement, supported by declarations from individuals with personal knowledge, justifying each proposed redaction and specifically explaining why the information sought to be redacted meets the definition for confidential business information set forth in Commission Rule 201.6(a). 19 C.F.R. § 201.6(a).

CERTAIN SUBSEA TELECOMMUNICATION SYSTEMS AND COMPONENTS THEREOF **Inv. No. 337-TA-1098**

PUBLIC CERTIFICATE OF SERVICE

I, Lisa R. Barton, hereby certify that the attached **NOTICE** has been served by hand upon the Commission Investigative Attorney, **Cortney Hoercherl, Esq.**, and the following parties as indicated, on **May 14, 2019**.

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

On Behalf of Complainants Neptune Subsea Acquisitions Ltd., Xtera Topco Ltd., and Xtera, Inc.:

Yar Chaikovsky, Esq.
PAUL HASTINGS LLP
1117 S. California Avenue
Palo Alto, CA 94304

☐ Via Hand Delivery
☒ Via Express Delivery
☐ Via First Class Mail
☐ Other:_____

On Behalf of Respondents NEC Corporation, NEC Networks & System Integration Corporation, and NEC Corporation of America:

Timothy W. Riffe, Esq.
FISH & RICHARDSON PC
1000 Maine Avenue, SW, Suite 1000
Washington, DC 20024

☐ Via Hand Delivery
☒ Via Express Delivery
☐ Via First Class Mail
☐ Other:_____

On Behalf of Respondents Nokia Corporation, Nokia Solutions and Networks B.V., Nokia Solutions and Networks Oy, Nokia Solutions and Networks US LLC, Alcatel-Lucent Submarine Networks SAS, Nokia of America Corporation:

Adam D. Swain, Esq.
ALSTON & BIRD LLP
950 F Street NW
Washington, DC 20004

☐ Via Hand Delivery
☒ Via Express Delivery
☐ Via First Class Mail
☐ Other:_____

UNITED STATES INTERNATIONAL TRADE COMMISSION

Washington, D.C.

In the Matter of CERTAIN SUBSEA TELECOMMUNICATION SYSTEMS AND COMPONENTS THEREOF	Investigation No. 337-TA-1098

NOTICE OF COMMISSION DECISION TO REVIEW, AND ON REVIEW, TO AFFIRM WITH MODIFICATION AN INITIAL DETERMINATION GRANTING-IN-PART RESPONDENTS' MOTION FOR SUMMARY DETERMINATION AS TO THE TECHNICAL PRONG OF THE DOMESTIC INDUSTRY REQUIREMENT WITH RESPECT TO U.S. PATENT 8,380,068

AGENCY: U.S. International Trade Commission.

ACTION: Notice.

SUMMARY: Notice is hereby given that the U.S. International Trade Commission has determined to review, and on review, to affirm with modification an initial determination ("ID") (Order No. 46) of the presiding administrative law judge ("ALJ") granting-in-part Respondents' motion for summary determination as to the technical prong of the domestic industry requirement with respect to U.S. Patent 8,380,068.

FOR FURTHER INFORMATION CONTACT: Houda Morad, Office of the General Counsel, U.S. International Trade Commission, 500 E Street SW., Washington, DC 20436, telephone (202) 708-4716. 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 SW., Washington, D.C. 20436, telephone (202) 205-2000. General information concerning the Commission may also be obtained by accessing its Internet server at *https://www.usitc.gov*. The public record for this investigation may be viewed on the Commission's electronic docket (EDIS) at *https://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 January 26, 2018, based on a complaint filed by Complainants Neptune Subsea Acquisitions Ltd. of the United Kingdom, Neptune Subsea IP Ltd. of the United Kingdom, and Xtera, Inc. of Allen, Texas. *See* 83 Fed. Reg. 3770-71 (Jan. 26, 2018). The complaint alleges violations of section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. 1337, based upon the importation into the United States, the sale for importation, and the sale within the United States after importation of certain subsea telecommunication systems and components thereof by reason of infringement of one or more claims of U.S. Patent No. 8,380,068 ("the '068 patent"); U.S. Patent

No. 7,860,403 ("the '403 patent"); U.S. Patent No. 8,971,171 ("the '171 patent"); U.S. Patent No. 8,351,798 ("the '798 patent"); and U.S. Patent No. 8,406,637 ("the '637 patent"). *See id.* The notice of investigation identified the following respondents: Nokia Corporation of Finland; Nokia Solutions and Networks B.V. of the Netherlands; Nokia Solutions and Networks Oy of Finland; Alcatel-Lucent Submarine Networks SAS of France; Nokia Solutions and Networks US LLC of Phoenix, Arizona; NEC Corporation of Japan; NEC Networks & System Integration Corporation of Japan; and NEC Corporation of America of Irving, Texas. *See id.* The Office of Unfair Import Investigations ("OUII") is also a party to the investigation. *See id.*

On September 25, 2018, Respondents filed a motion for summary determination that: (1) Complainants fail to satisfy the technical prong of the domestic industry requirement with respect to the '068 patent; (2) Complainants fail to satisfy the technical prong of the domestic industry requirement with respect to the '798 patent; and (3) the asserted claims of the '171 patent are invalid. On October 5, 2018, Complainants and OUII filed responses in opposition to Respondents' motion.

On November 19, 2018, in the subject ID, the ALJ granted-in-part Respondents' motion, specifically with respect to the technical prong of the domestic industry requirement as to the '068 patent, but Order No. 46 otherwise deferred ruling on the '798 and '171 patents. On November 28, 2018, Complainants filed a petition for Commission review of the subject ID, and on December 6, 2018, Respondents and OUII filed responses in opposition to Complainants' petition.

As explained in the Commission Opinion, the Commission has determined to review the ID, and on review, to affirm the ID with modification.

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 CFR part 210).

By order of the Commission.

Lisa R. Barton
Secretary to the Commission

Issued: December 19, 2018

CERTAIN SUBSEA TELECOMMUNICATION SYSTEMS AND COMPONENTS THEREOF **Inv. No. 337-TA-1098**

PUBLIC CERTIFICATE OF SERVICE

I, Lisa R. Barton, hereby certify that the attached **NOTICE** has been served by hand upon the Commission Investigative Attorney, **Cortney Hoercherl, Esq.**, and the following parties as indicated, on **December 19, 2018**.

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

On Behalf of Complainants Neptune Subsea Acquisitions Ltd., Xtera Topco Ltd., and Xtera, Inc.:

Yar Chaikovsky, Esq.
PAUL HASTINGS LLP
1117 S. California Avenue
Palo Alto, CA 94304

☐ Via Hand Delivery
☒ Via Express Delivery
☐ Via First Class Mail
☐ Other:_____

On Behalf of Respondents NEC Corporation, NEC Networks & System Integration Corporation, and NEC Corporation of America:

Timothy W. Riffe, Esq.
FISH & RICHARDSON PC
1000 Maine Avenue, SW, Suite 1000
Washington, DC 20024

☐ Via Hand Delivery
☒ Via Express Delivery
☐ Via First Class Mail
☐ Other:_____

On Behalf of Respondents Nokia Corporation, Nokia Solutions and Networks B.V., Nokia Solutions and Networks Oy, Nokia Solutions and Networks US LLC, Alcatel-Lucent Submarine Networks SAS, Nokia of America Corporation:

Adam D. Swain, Esq.
ALSTON & BIRD LLP
950 F Street NW
Washington, DC 20004

☐ Via Hand Delivery
☒ Via Express Delivery
☐ Via First Class Mail
☐ Other:_____

PUBLIC VERSION

UNITED STATES INTERNATIONAL TRADE COMMISSION

Washington, D.C.

In the Matter of **CERTAIN SUBSEA TELECOMMUNICATION SYSTEMS AND COMPONENTS THEREOF**	**Investigation No. 337-TA-1098**

COMMISSION OPINION

On November 19, 2018, the presiding Administrative Law Judge ("ALJ") in the above-identified investigation issued Order No. 46, an initial determination ("ID") granting-in-part Respondents NEC Corporation, NEC Networks & System Integration Corporation, NEC Corporation of America, Nokia Corporation, Nokia of America Corporation, and Alcatel Submarine Networks' (collectively, "Respondents") motion for summary determination with respect to the technical prong of the domestic industry requirement as to U.S. Patent No. 8,380,068. The ALJ deferred ruling on Respondents' motion for summary determination with respect to the technical prong of the domestic industry requirement as to U.S. Patent No. 8,351,798 and the validity of the asserted claims of U.S. Patent No. 8,971,171. For the reasons set forth below, the Commission has determined to review the ID, and on review, to affirm the ID with modification. Specifically, the Commission supplements the ID as explained below.

I. BACKGROUND

A. Procedural Background

By publication in the Federal Register on January 26, 2018, the Commission instituted this investigation, based on a complaint filed by Complainants Xtera Topco Ltd. of the United Kingdom, Neptune Subsea IP Ltd. of the United Kingdom, and Xtera, Inc. of Allen, Texas

(collectively, "Complainants" or "Xtera").[1] *See* 83 Fed. Reg. 3770-71 (Jan. 26, 2018). The complaint alleges violations of section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337, based upon the importation into the United States, the sale for importation, and the sale within the United States after importation of certain subsea telecommunication systems and components thereof by reason of infringement of one or more claims of U.S. Patent No. 8,380,068 ("the '068 patent"); U.S. Patent No. 7,860,403 ("the '403 patent"); U.S. Patent No. 8,971,171 ("the '171 patent"); U.S. Patent No. 8,351,798 ("the '798 patent"); and U.S. Patent No. 8,406,637 ("the '637 patent").[2] *See id.* The notice of investigation identified the following respondents: Nokia Corporation of Finland; Nokia Solutions and Networks B.V. of the Netherlands; Nokia Solutions and Networks Oy of Finland; Alcatel-Lucent Submarine Networks SAS of France; Nokia Solutions and Networks US LLC of Phoenix, Arizona; NEC Corporation of Japan; NEC Networks & System Integration Corporation of Japan; and NEC Corporation of America of Irving, Texas.[3] *See id.* The Office of Unfair Import Investigations ("OUII") is also a party to the investigation. *See id.*

---

[1] On July 10, 2018, the ALJ issued an ID granting Complainants' unopposed motion to amend the complaint to reflect the name change from Neptune Subsea Acquisitions Ltd. to Xtera Topco Ltd. *See* Order No. 21 (July 10, 2018), *unreviewed*, Comm'n Notice (July 27, 2018).

[2] On August 8, 2018, the ALJ issued an ID granting Complainants' unopposed motion to terminate the investigation as to the '637 patent. *See* Order No. 22, *unreviewed*, Comm'n Notice (Aug. 22, 2018).

[3] On March 19, 2018, the ALJ issued an ID granting Complainants' unopposed motion to amend the complaint to correct the name of Respondent Alcatel-Lucent Submarine Networks SAS to Alcatel Submarine Networks, and to terminate the investigation as to Respondents Nokia Solutions and Networks B.V., Nokia Solutions and Networks Oy, and Nokia Solutions and Networks US LLC. *See* Order No. 9 (Mar. 19, 2018), *unreviewed*, Comm'n Notice (Apr. 17, 2018). On August 27, the ALJ issued an ID adding Nokia of America Corporation of New Providence, New Jersey as a respondent. *See* Order No. 30 (Aug. 27, 2018), *unreviewed*, Comm'n Notice (Sept. 17, 2018).

On September 25, 2018, Respondents filed a motion for summary determination ("Respondents' Mot.") that: (1) Complainants fail to satisfy the technical prong of the domestic industry requirement with respect to the '068 patent; (2) Complainants fail to satisfy the technical prong of the domestic industry requirement with respect to the '798 patent; and (3) the asserted claims of the '171 patent are invalid. *See* ID (Order No. 46) at 1. On October 5, 2018, Complainants and OUII filed responses (respectively, "Complainants' Mot. Resp." and "OUII's Mot. Resp.") in opposition to Respondents' motion.

On November 19, 2018, the ALJ granted-in-part Respondents' motion with respect to the technical prong of the domestic industry requirement as to the '068 patent, but otherwise denied the motion. Specifically, the ID finds no genuine issue of material fact concerning the configuration of Complainants' domestic industry product—the Nu-Wave Optima system—and that Complainants cannot, as a matter of law, show that the Nu-Wave Optima system has the multiplexer required by claim 1 of the '068 patent. *See* ID at 14-15.

On November 28, 2018, Complainants filed a petition ("Complainants' Pet.") for Commission review of the subject ID, and on December 6, 2018, Respondents and OUII filed responses (respectively, "Respondents' Pet. Resp." and "OUII's Pet. Resp.") in opposition to Complainants' petition.

B. The '068 Patent

Complainants allege that their domestic industry system practices claim 1 of the '068 patent, which recites:

> **1. [1pre]** An optical assembly comprising:
>
> **[1a]** an input optical port for receiving a mixed optical signal containing a combination of coherent optical wavelength channels and non-coherent optical wavelength channels;

> **[1b]** an optical demultiplexer configured to separate the combination of optical wavelength channels present on the input optical port such that a plurality of coherent optical wavelength channels and no non-coherent optical wavelength channels are provided onto a coherent optical path, and such that a plurality of non-coherent optical wavelength channels and no coherent optical wavelength channels are provided onto a non-coherent optical path;
>
> **[1c]** a dispersive element disposed in one or both of the coherent and non-coherent optical paths and that operates such that a different amount of dispersion is applied to the plurality of non-coherent optical wavelength channels traveling through the non-coherent optical path than the amount of dispersion, if any, that is applied to the coherent optical path; and
>
> **[1d]** an optical multiplexer configured to receive and combine the optical wavelength channels from the coherent and non-coherent optical paths to form a mixed coherent and non-coherent optical output signal on an output of the optical multiplexer.

See '068 patent at 9:30-55 (alphanumeric designations added in accordance with Xtera's discussion of the "four" claim limitations).

The '068 patent generally relates to "an optical assembly [which] receives and demultiplexes two groups of optical wavelength channels which are each treated separately as far as dispersion compensation and discrete amplification are concerned" and "[t]he optical assembly then multiplexes the two groups back into the same fiber for further transmission." *See* '068 patent at Abstract. For example, the '068 patent explains that "one group of optical wavelength channels may each be coherent channels and subject to no dispersion in the optical assembly while the other group may contain non-coherent channels which are subject to dispersion compensation in the optical assembly." *See id.*

Figure 2A, reproduced below, illustrates a claimed embodiment wherein "[a]n optical demultiplexer **270** receives the optical wavelength channels and is configured to de-multiplex the signals into at least two paths **211** and **212**; one path contains the coherent optical channels and

the other path contains non-coherent optical channels." *See* '068 patent at 5:26-30. The '068 patent specification explains that "Path **211** comprises dispersive element (DE) **241**" and "Path **212** optionally comprises dispersive element (DE) **242**," but that "the dispersion of DE **242** (if used) will be different than the dispersion of DE **241.**" *See id.* at 5:35, 5:64-65, 6:3-4. The '068 patent specification further states that "[a]n optical multiplexer **280** receives and combines the signal wavelengths on paths **211** and **212** into a single path **220**." *See id.* at 6:27-28.

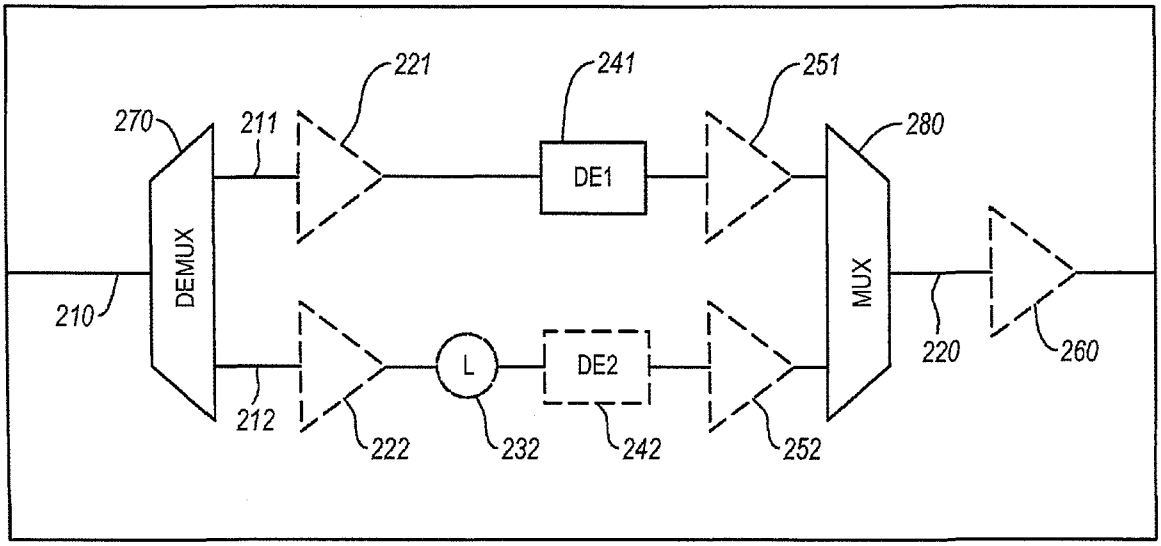


Fig. 2A

C. The Alleged Domestic Industry System

The relevant aspects of Complainants' domestic industry system, the Nu-Wave Optima System, are illustrated in Figure 4 of CX-340C (reproduced below), which shows "a schematic of a portion of the terminal equipment layout in Boca Raton, Florida." *See* Complainants' Pet. at 3-4, 8.

[

]

With respect to claim element [1a], Complainants argue that "the coupler DCPL1 [(highlighted in gray)] in Figure 4 has an input optical port for receiving a mixed optical signal [(highlighted in green)] containing a combination of coherent optical wavelength channels and non-coherent optical wavelength channels, satisfying the first claim limitation." *See id.* at 5-6 (citations omitted).

In addition, Complainants continue, as to claim element [1b], "[t]he multiplexer/demultiplexer BMD1 [(highlighted in yellow)] receives the mixed optical signal from the coupler DCPL1 and separates the combination of optical wavelength channels present on the input optical port such that a plurality of coherent optical wavelength channels [(traced in blue)] and no non-coherent optical wavelength channels are provided onto a coherent optical path" and "a plurality of non-coherent optical wavelength channels [(traced in yellow)] and no coherent optical wavelength channels are provided onto a non-coherent optical path." *See id.* at 6-7 (citations omitted).

Complainants also argue that the domestic industry system satisfies claim limitation [1c] because: (1) "[b]efore coherent optical Channels 28 and 31 arrive at the BMD1, they pass through a discrete dispersion compensating unit (SDC2) which applies [ ] to each of the coherent optical channels in this coherent optical path" and "[b]oth coherent optical wavelength channels also pass through tunable dispersion compensation units (TDC)"; and (2) "[b]efore coherent optical Channels 3 and 8 arrive at the BMD1, they will pass through a discrete dispersion compensating unit (SDC3), which applies [ ] to each of the non-coherent optical channels in this non-coherent optical path. *See id.* at 9-11.

Complainants further argue, with respect to claim element [1d], that "the exemplary coherent optical channels (Channels 28 and 31) travel a coherent optical path (in blue) to the

channel separator component CMDF3" (highlighted in orange) and that "[t]he CMDF3 component on this coherent optical path then further separates the coherent optical wavelength Channels 28 and 31 towards their respective muxponders in the coherent optical path, M100E #25 and #28, and then back to the same CMDF3 component," which "then combines the coherent optical Channels 28 and 31 together, and those two channels continue along this coherent optical path to the BMD1." *See id.* at 9. Similarly, Complainants argue, "[t]he CMDF4 component [(highlighted in orange)] on th[e] non-coherent optical path then further separates the non-coherent optical Channels 3 and 8 towards their respective muxponders in the non-coherent optical path, M40 #15 and #19, and then back to the same CMDF4 component," which "then combines optical Channels 3 and 8 together, and those two channels continue along this non-coherent optical path to the BMD1." *See id.* at 10-11. Lastly, Complainants argue, "[t]he BMD1 component will multiplex (*i.e.*, combine) Channels 3 and 8 from the non-coherent optical path and Channels 28 and 31 from the coherent optical path." *See id.* at 11.

II. LEGAL STANDARDS

A. Standard of Review

The Commission may review an ID either upon petition by one of the parties or on its own motion. *See* 19 C.F.R. §§ 210.43, 210.44. Review will be ordered if it appears:

> (i) that a finding or conclusion of material fact is clearly erroneous;
>
> (ii) that a legal conclusion is erroneous, without governing precedent, rule or law, or constitutes an abuse of discretion; or
>
> (iii) that the determination is one affecting Commission policy.

See 19 C.F.R. § 210.43(b)(1), (d)(2).

In addition, the Commission will "order review of an initial determination or certain issues therein when at least one of the participating Commissioners votes for ordering review." *See* 19 C.F.R. § 210.43(d)(3).

B. Domestic Industry Technical Prong

To satisfy the technical prong of the domestic industry requirement, a complainant must show that the domestic products practice one or more claims of each asserted patent. *See Crocs, Inc. v. Int'l Trade Comm'n*, 598 F.3d 1294, 1307 (Fed. Cir. 2010). "The test for the technical prong of the industry requirement 'is essentially the same as that for infringement, *i.e.*, a comparison of domestic products to the asserted claims.'" *See id.* (quoting *Alloc, Inc. v. Int'l Trade Comm'n*, 342 F.3d 1361, 1375 (Fed. Cir. 2003)).

C. Summary Determination

Under Commission Rule 210.18, summary determination "shall be rendered if pleadings and any depositions, answers to interrogatories, and admissions on file, together with the affidavits, if any, show that there is no genuine issue as to any material fact and that the moving party is entitled to a summary determination as a matter of law." 19 C.F.R. § 210.18(b). "[I]n deciding a motion for summary judgment, 'the evidence of the nonmovant is to be believed, and all justifiable inferences are to be drawn in his favor.'"[4] *Liebel-Flarsheim Co. v. Medrad, Inc.*, 481 F.3d 1371, 1377 (Fed. Cir. 2007) (citing *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 255 (1986)).

A party moving for summary determination "has the initial responsibility of identifying the legal basis of its motion, and of pointing to those portions of the record that it believes

[4] The standards for summary judgment in district courts apply to summary determinations at the U.S. International Trade Commission. *See Amgen Inc. v. Int'l Trade Comm'n*, 565 F.3d 846, 849 (Fed. Cir. 2009).

demonstrate the absence of a genuine issue of material fact." *See Novartis Corp. v. Ben Venue Labs., Inc.*, 271 F.3d 1043, 1046 (Fed. Cir. 2001) (citing *Celotex Corp. v. Catrett*, 477 U.S. 317, 323 (1986)). A respondent seeking summary determination that a complainant does not satisfy the technical prong may meet its initial burden "either by providing evidence that would preclude a finding" that the complainant practices a claim of an asserted patent "or by showing that the evidence on file fails to establish a material issue of fact essential to" the complainant's case. *See Novartis*, 271 F.3d at 1046. Once the respondent "has made this showing, the burden shifts to the nonmovant [(*i.e.*, the complainant)] to designate specific facts showing that there is a genuine issue for trial." *Id.* (citing *Celotex*, 477 U.S. at 324).

III. DISCUSSION AND ANALYSIS

A. The ID

The ALJ granted-in-part Respondents' motion for summary determination. Specifically, the ALJ agreed that Complainants cannot, as a matter of law, show that the domestic industry system practices claim 1 of the '068 patent, and therefore, Complainants fail to satisfy the technical prong of the domestic industry requirement for the '068 patent.

The ID finds that "'the' wavelength channels and 'the' coherent and non-coherent optical paths are those channels and paths introduced earlier in the claim in connection with the demultiplexer." *See* ID at 5. The ID explains that "claim 1 recites a multiplexer that combines 'the' wavelength channels from 'the' coherent and non-coherent optical paths" and "[w]hen a noun within a claim is introduced by a definite article like 'the' or 'said,' it is presumed that the claim is referring back to an antecedent noun introduced with an indefinite article like 'a' or 'an.'" *See id.* (citing *Baldwin Graphic Sys., Inc. v. Siebert, Inc.*, 512 F.3d 1338, 1342 (Fed. Cir. 2008); *Creative Internet Advert. Corp. v. Yahoo!, Inc.*, 476 F. App'x 724, 728 (Fed. Cir. 2011)

(unpublished)). However, the ID clarifies that "the claim language indicates there may be some flexibility in the relative positions of the dispersive element and the multiplexer so long as they both have the required relationship with the coherent and non-coherent optical paths. *See id.* at 5-6.

The ID determines that Respondents' motion points to undisputed evidence that the components identified by Xtera as satisfying the multiplexer operate on different wavelength channels than those channels identified by Xtera in connection with the demultiplexer, and that the channels that are demultiplexed in Xtera's system are never multiplexed back together again. *See id.* at 3; *see also id.* at 4 ("Xtera raises several arguments in response to the motion, but none are sufficient to resist summary determination"). The ID also finds that "Xtera has cited no evidence that the components it identified in its system as corresponding to the claimed multiplexer combine the same wavelength channels separated by the components that Xtera identified as the claimed demultiplexer and that are provided onto the same coherent optical path and non-coherent optical path associated with the separation performed by the demultiplexer." *See id.* at 10. The ID concludes that "Xtera has not shown any genuine issue of material fact that the Nu-Wave Optima system lacks a multiplexer configured as required by claim 1 of the '068 patent." *See id.*

Thus, the ID determines that "Xtera cannot, as a matter of law, show that its alleged domestic industry system is protected by the '068 patent" and that "respondents are entitled to summary determination on that issue."[5] *See id.* at 15.

[5] The ID also rejects Complainants' waiver and claim differentiation arguments as well as OUII's doctrine of equivalents argument. Complainants did not petition for review of those findings and have therefore waived any challenge to such findings.

B. Analysis

The ID correctly concludes that Complainants cannot, as a matter of law, show that the Nu-Wave Optima system satisfies the technical prong of the domestic industry requirement with respect to the '068 patent. However, the Commission has determined to review the ID, and on review, to affirm the ID with modification. Specifically, the Commission supplements the ID as explained herein.

Complainants present no genuine issue as to any material fact to survive summary determination on the technical prong of the domestic industry requirement as to the '068 patent. In particular, Complainants argue: (1) "[t]he ID relies upon an erroneous legal conclusion regarding the claim construction of 'multiplexer'"; and (2) "[t]he ID relies on a clearly erroneous conclusion of material fact that the multiplexer identified in the Xtera domestic industry system does not combine the same wavelength channels that are separated by the demultiplexer identified in Xtera domestic industry system." *See* Complainants' Pet. at 1.

The claim language shows that the sequence of the demultiplexer and multiplexer components matters. As the ID finds, "claim 1 recites a multiplexer that combines 'the' wavelength channels from 'the' coherent and non-coherent optical paths" and "'the' wavelength channels and 'the' coherent and non-coherent optical paths are those [same] channels and paths introduced earlier in the claim in connection with the demultiplexer." *See* ID at 5. Complainants do not appear to challenge these findings. *See, e.g.*, Complainants' Pet. at 18, 23. But Complainants argue that wavelength channels having the same frequency in both the transmit and receive directions are part of the same optical path regardless of the presence of intervening components such as a muxponder. *See* Complainants' Pet. at 22. However, it is not the presence of intervening components (*e.g.*, muxponders) that is fatal to Complainants'

technical prong position but their failure to raise a genuine issue of fact in the face of undisputed evidence showing that the coherent and non-coherent optical paths and the optical wavelength channels separated by the demultiplexer are not the same as those combined by the multiplexer. There is neither a legal (claim construction) nor a factual dispute preventing summary determination in this case.

To begin with, Complainants' petition improperly raises arguments that were never presented in response to Respondents' motion for summary determination. For example, Complainants argue that wavelength channels are defined by their frequency and that the wavelength channels output from the demultiplexer are the same as the wavelength channels input to the multiplexer because they have identical frequencies. *See, e.g.*, Complainants' Pet. at 18, 23. This argument was not raised in opposition to Respondents' motion for summary determination and as such, it is waived at this juncture. *See Certain Ground Fault Circuit Interrupters & Prods. Containing Same*, Inv. No. 337-TA-739, Comm'n Op., 2012 WL 2394435, *47 (June 8, 2012) ("We find . . . that none of the arguments related to these four claims were presented to the ALJ, and they have therefore been waived.").

Complainants' arguments also fail on the merits. The '068 patent specification states that "[e]ach optical wavelength channel is allocated a particular frequency for optical communication," *see* '068 patent at 3:37-38, but nowhere does the specification suggest that the same frequency means the same wavelength channel as Complainants contend. In fact, the '068 patent specification directly contradicts such position by distinguishing "western optical wavelength channel" and "eastern optical wavelength channel" based on signal direction. *See* '068 patent at 3:12-56; *see also id.* at 3:22-24 ("The terms 'eastern' and 'western' are simply terms of art used to allow for easy distinction between the two optical signals traveling in

opposite directions."). Thus, the patent shows that the term "channel" is not defined by frequency alone, but that different signal directions can mean different channels.

The ID also does not conflate "channel" and "signal" as Complainants contend, and in any event, such contention is a distinction without a difference. The '068 patent claim language and specification show that "channel" and "signal" are closely related terms and any distinction between the two terms has little, if any, relevance to the technical prong issue at hand. The claim language recites "a mixed optical signal containing a combination of coherent optical wavelength channels and non-coherent optical wavelength channels." *See* '068 patent at claim 1; *see also id.* at 5:17-20 ("The received optical signal is mixed coherent and non-coherent optical signal in that it includes both coherent optical channels and non-coherent optical wavelength channels."). The "signal" direction is relevant not because it is somehow distinguishable from "channel," but because the optical wavelength channels and their corresponding optical paths in the "transmit" and "receive" directions are distinct, in contradiction with the claim language which requires the optical wavelength channels separated by the demultiplexer (*i.e.*, in the "receive" direction of the domestic industry system) and their corresponding optical paths, to be the same as those combined by the multiplexer (*i.e.*, in the "transmit" direction of the domestic industry system). *See* ID at 8-9 (citing Figure 18, Respondents' Mot., Ex. 4 (Dr. Willner[6] Report) at ¶ 573, reproduced below).

[6] Dr. Alan Willner is one of Complainants' experts.

[

]

First, the "transmit" and "receive" optical wavelength channels travel on distinct optical fibers. *See* Complainants' Pet. at 12 (citing CX-2132C at 438:21-439:2 (Dr. Ralph[7])) ("And another important point is, as I indicated earlier, all these systems are done bidirectionally. There are two separate fibers, one outbound, one inbound."); *see also* '068 patent at 1:22-24 ("If the fiber-optic link is bi-directional, information may be optically communicated in reverse typically using separate optical fiber."); *compare* '068 Patent at 1:57-64 ("The optical assembly receives and de-multiplexes two groups of optical wavelength channels which are each treated separately as far as dispersion compensation and discrete amplification are concerned. The optical assembly then multiplexes the two groups back into ***the same fiber*** for further transmission.") (emphasis added); *accord* OUII's Pet. Resp. at 2; *accord* Respondents' Pet. Resp. at 24.

Second, other than conclusory attorney argument, Complainants presented no evidence showing that the optical wavelength channels separated by the demultiplexer, and their corresponding optical paths, are the same as those combined by the multiplexer. For example, Complainants argue for the first time (and thereby waived) that "[t]he CMDF3 component on this coherent optical path then further separates the coherent optical wavelength Channels 28 and 31 towards their respective muxponders in the coherent optical path, M100E #25 and #28, ***and then back to the same CMDF3 component.***" *See* Complainants' Pet. at 8 (emphasis added).[8] But Complainants provide no support for their argument. In fact, Complainants' own corporate

[7] Dr. Stephen Ralph is one of Complainants' experts.

[8] As an example, Complainants' petition includes six new diagrams that counsel "altered" to provide "more accurate" depictions of the Nu-Wave Optima system. *See, e.g.*, Complainants' Pet. at 8, 10, 11, and 15-17. The altered diagrams and the corresponding explanations in Complainants' petition are not contained elsewhere in the record, and not supported by record evidence.

representative, Dr. Robinson,[9] testified that "the channels that are demultiplexed in Xtera's system are never multiplexed back together again." *See* ID at 3; *see also* Respondents' Mot., Ex. 7 at 118:10-14 (Dr. Robinson) ("Q Okay. But those channels are never then multiplexed back together, as shown in the schematic, correct? A That's correct, yes. And on the receive side, yes, they're separated and then decoded."); *accord* OUII's Pet. Resp. at 8. Nor did Complainants, in their response to Respondents' motion for summary determination, dispute Respondents' contention that "[t]he channels being combined [by the multiplexer] are not the channels output from the demultiplexer" and "[i]nstead, those channels originate from transponders on the transmit side." *See* Respondents' Mot. at 10; *accord* Respondents' Pet. Resp. at 23 (citing Complainants' Mot. Resp., App. A (Material Facts Nos. 17-18) (citing Dr. Willner)).[10]

Third, Complainants admit that "the exemplary coherent optical channels (Channels 28 and 31) travel a coherent optical path (in blue) to the channel separator component CMDF3," which "then further separates the coherent optical wavelength Channels 28 and 31 towards their respective muxponders in the coherent optical path, M100E #25 and #28, and then back to the same CMDF3 component."[11] *See* Complainants' Pet. at 9-10 (showing enlarged portion of

---

[9] Dr. Andrew Robinson is one of Complainants' corporate representatives.

[10] Complainants also cites to the testimony of Dr. Ralph (expert) and Dr. Pelouch (corporate representative) to argue that the wavelength channels are the same on the "transmit" and "receive" directions because they have the same frequency. *See* Complainants' Pet. at 12-13. Such testimony, however, fails to raise a genuine issue of material fact because, as explained *supra*, the same frequency does not mean the wavelength channels are the same.

[11] Complainants also argue for the first time (and thereby waived) that "the CMDF3 and CMDF4 components use the same port for a particular channel, regardless of whether that channel is being received by or transmitted from the component." *See* Complainants' Pet. at 13. Complainants do not explain how the use of the same port for multiplexing and demultiplexing means that the wavelength channels are the same in the "transmit" and "receive" directions.

Figure 4 of CX-340C, reproduced below). In other words, after the channel separator CMDF3 component, the claimed coherent optical path no longer exists as it no longer includes a "plurality of coherent optical wavelength channels" as required by claim 1.[12] *See id.*; *accord* Respondents' Pet. Resp. at 23.

[

]

Thus, the ALJ correctly determined that "Xtera has cited no evidence that the components it identified in its system as corresponding to the claimed multiplexer combine the same wavelength channels separated by the components that Xtera identified as the claimed demultiplexer and that are provided onto the same coherent optical path and non-coherent optical path associated with the separation performed by the demultiplexer." *See* ID at 10, 14-15. Accordingly, the ALJ correctly concluded that "Xtera has not shown any genuine issue of material fact that the Nu-Wave Optima [domestic industry] system lacks a multiplexer

[12] The same conclusion applies to Complainants' discussion of the non-coherent optical wavelength channels and the non-coherent optical path. *See* Complainants' Pet. at 10-11.

configured as required by claim 1 of the '068 patent," and that "Xtera cannot, as a matter of law, show that its alleged domestic industry system is protected by the '068 patent." *See id.*

IV. CONCLUSION

For the foregoing reasons, the Commission has determined to review the ID, and on review, to affirm the ID with modification. Specifically, the Commission supplements the ID as explained above.

By order of the Commission.

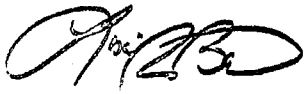
Lisa R. Barton
Secretary to the Commission

Issued: February 14, 2019

CERTAIN SUBSEA TELECOMMUNICATION SYSTEMS AND COMPONENTS THEREOF **Inv. No. 337-TA-1098**

PUBLIC CERTIFICATE OF SERVICE

I, Lisa R. Barton, hereby certify that the attached **OPINION** has been served by hand upon the Commission Investigative Attorney, **Cortney Hoercherl, Esq.**, and the following parties as indicated, on **February 14, 2019**.



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

On Behalf of Complainants Neptune Subsea Acquisitions Ltd., Xtera Topco Ltd., and Xtera, Inc.:

Yar Chaikovsky, Esq.
PAUL HASTINGS LLP
1117 S. California Avenue
Palo Alto, CA 94304

☐ Via Hand Delivery
☒ Via Express Delivery
☐ Via First Class Mail
☐ Other:_____

On Behalf of Respondents NEC Corporation, NEC Networks & System Integration Corporation, and NEC Corporation of America:

Timothy W. Riffe, Esq.
FISH & RICHARDSON PC
1000 Maine Avenue, SW, Suite 1000
Washington, DC 20024

☐ Via Hand Delivery
☒ Via Express Delivery
☐ Via First Class Mail
☐ Other:_____

On Behalf of Respondents Nokia Corporation, Nokia Solutions and Networks B.V., Nokia Solutions and Networks Oy, Nokia Solutions and Networks US LLC, Alcatel-Lucent Submarine Networks SAS, Nokia of America Corporation:

Adam D. Swain, Esq.
ALSTON & BIRD LLP
950 F Street NW
Washington, DC 20004

☐ Via Hand Delivery
☒ Via Express Delivery
☐ Via First Class Mail
☐ Other:_____

PUBLIC VERSION

UNITED STATES INTERNATIONAL TRADE COMMISSION

Washington, D.C.

In the Matter of	
CERTAIN SUBSEA TELECOMMUNICATIONS SYSTEMS AND COMPONENTS THEREOF	**INV. NO. 337-TA-1098**

ORDER NO. 46: INITIAL DETERMINATION GRANTING-IN-PART RESPONDENTS' MOTION FOR SUMMARY DETERMINATION

(November 19, 2018)

On September 25, 2018, respondents NEC Corporation, NEC Networks & System Integration Corporation, and NEC Corporation of America (collectively, "NEC") and respondents Nokia Corporation, Nokia of America Corporation, and Alcatel Submarine Networks (collectively, "Nokia")[1] moved (1098-029) for summary determination that: (1) complainants Xtera Topco Ltd., Neptune Subsea IP Ltd., and Xtera, Inc. (collectively, "Xtera") have failed to satisfy the technical prong of domestic industry for U.S. Patent No. 8,380,068 ("the '068 patent'); (2) complainants have failed to satisfy the technical prong of domestic industry for U.S. Patent No. 8,351,798 ("the '798 patent''); and (3) the asserted claims of U.S. Patent No. 8,971,171 (''the '171 patent'') are invalid in view of U.S. Patent Publication No. 2002/0027684A1 ("Ait Sab").

[1] This initial determination refers to NEC and Nokia collectively as "respondents."

On October 5, 2018, Xtera and the Commission investigative attorney ("Staff") each filed oppositions to the motion.

This document contains an initial determination of no violation with respect to the '068 patent. The discussion of respondents' motion with respect to the '798 patent and '171 patents is not part of that initial determination.

I. THE '068 PATENT

Xtera asserts that its Nu-Wave Optima system practices claim 1 of the '068 patent in satisfaction of the technical prong of the domestic industry. Respondents assert that there is no dispute that the Nu-Wave Optima system does not practice claim 1. Claim 1 is reproduced below with the material language highlighted:

> 1. An optical assembly comprising:
>
> an input optical port for receiving a mixed optical signal containing a combination of coherent optical wavelength channels and non-coherent optical wavelength channels;
>
> an optical demultiplexer configured to separate the combination of optical wavelength channels present on the input optical port such that **a plurality of coherent optical wavelength channels** and no non-coherent optical wavelength channels are **provided onto a coherent optical path**, and such that **a plurality of non-coherent optical wavelength channels** and no coherent optical wavelength channels are **provided onto a non-coherent optical path**;
>
> a dispersive element disposed in one or both of the coherent and non-coherent optical paths and that operates such that a different amount of dispersion is applied to the plurality of non-coherent optical wavelength channels traveling through the non-coherent optical path than the amount of dispersion, if any, that is applied to the coherent optical path; and
>
> **an optical multiplexer** configured to receive and combine **the optical wavelength channels from the coherent and non-coherent optical paths** to form a mixed coherent and non-coherent optical output signal on an output of the optical multiplexer.

'068 Patent at Cl. 1.

Respondents argue in their summary determination motion that there is no dispute that Xtera's Nu-Wave Optima system does not have an optical multiplexer that combines optical wavelength channels from the coherent and non-coherent optical paths in the manner required by claim 1. Specifically, respondents contend that the coherent and non-coherent optical paths combined in the multiplexer must be the same paths introduced earlier in the claim in connection with the optical demultiplexer. Mem. at 6-7.[2] The claim states that the demultiplexer separates a combination of optical wavelength channels and provides coherent optical wavelength channels onto a coherent optical path and non-coherent optical wavelength channels onto a non-coherent optical path. '068 Patent at Cl. 1. Respondents contend that the components Xtera has identified as satisfying the multiplexer operate on different paths than the paths Xtera has identified in connection with the demultiplexer. In particular, Xtera cites the deposition testimony of its corporate witness, Dr. Robinson, that the channels that are demultiplexed in Xtera's system are never multiplexed back together again. Mem. at 9-10 (quoting Mot., Ex. 7 at 118:3-14 ("Q Okay. But those channels are never then multiplexed back together, as shown in the schematic, correct? A That's correct, yes...")). Respondents argue that because there is no dispute about which paths are combined within the asserted multiplexer, there is no dispute that Xtera's system does not practice claim 1.

Respondents' motion additionally argues that claim 1 requires a particular "order" or "sequence" in the arrangement of the demultiplexer, the dispersion element, and the multiplexer "because each element of the claims acts on the signals output from the prior element." Mem. at

---

[2] Respondents' filing consists of a motion and a memorandum in support of that motion, each with its own pagination. Citations in this initial determination to "Mot." refer to the motion, while citations to "Mem." refer to the memorandum.

8. Xtera raises several arguments in response to the motion, but none are sufficient to resist summary determination.

Xtera's first argument is one of waiver. Xtera asserts that respondents never stated in the claim construction phase of the investigation that claim 1 requires the recited components to be arranged in a particular order, and therefore they are precluded from doing so now. Xtera Opp. at 3.[3] However, I note that the same might be said for Xtera's brief in opposition. Xtera's brief urges me to construe claim 1 as lacking any restriction on the arrangement of the various elements recited in the claim, *see id.* at 4-5, but Xtera raised no such argument in the claim construction proceedings. A tribunal "may engage in a rolling claim construction, in which [it] revisits and alters its interpretation of the claim terms as its understanding of the technology evolves." *Jack Guttman, Inc. v. Kopykake Enterprises, Inc.*, 302 F.3d 1352, 1361 (Fed. Cir. 2002). There is no prejudice to Xtera from considering respondents' arguments about antecedents and about the ordering of claim elements at this stage of the proceedings, particularly when Xtera has been afforded an opportunity to respond and indeed did respond. I therefore disagree that respondents forfeited the arguments raised in their summary determination motion simply because those arguments involve a legal determination about the scope of claim 1 that was not raised in earlier claim construction proceedings.

Turning to the merits of respondents' argument, Xtera contends that, because claim 1 is an apparatus claim, the elements of the claim need not be arranged in any particular order. Xtera

---

[3] Xtera's argument is more properly characterized as forfeiture, not waiver. Forfeiture is the failure to make the timely assertion of a right, while waiver is the intentional relinquishment or abandonment of a known right. *United States v. Olano*, 507 U.S. 725, 733 (1993). Xtera has shown no evidence that respondents intentionally relinquished an argument concerning the order of components required by claim 1.

Opp. at 6-7. However, the Federal Circuit has stated that it is error to treat apparatus claims "as mere catalogs of separate parts, in disregard of the part-to-part relationships set forth in the claims and that give the claims their meaning." *Lindemann Maschinenfabrik GMBH v. Am. Hoist & Derrick Co.*, 730 F.2d 1452, 1459 (Fed. Cir. 1984). For example, in *Ball Aerosol & Specialty Container, Inc. v. Ltd. Brands, Inc.*, 555 F.3d 984, 994 (Fed. Cir. 2009), the Federal Circuit found the language of an apparatus claim "clearly specifies a particular configuration" of recited elements and infringement of the claim required the same configuration.

To determine whether the recited elements in apparatus claims must be configured in a certain way, "[f]irst, we look to the words of the claims themselves." *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996). Here, claim 1 recites a multiplexer that combines "the" wavelength channels from "the" coherent and non-coherent optical paths. When a noun within a claim is introduced by a definite article like "the" or "said," it is presumed that the claim is referring back to an antecedent noun introduced with an indefinite article like "a" or "an." *Baldwin Graphic Sys., Inc. v. Siebert, Inc.*, 512 F.3d 1338, 1342 (Fed. Cir. 2008), *see also Creative Internet Advert. Corp. v. Yahoo!, Inc.*, 476 F. App'x 724, 728 (Fed. Cir. 2011) (unpublished). Here, "the" wavelength channels and "the" coherent and non-coherent optical paths are those channels and paths introduced earlier in the claim in connection with the demultiplexer. Respondents are correct as far as that assertion.

Respondents go too far, however, when arguing that "each element of the claims acts on the signals output from the prior element." Mem. at 8. No words in the claim require the input of the multiplexer to be the output of the dispersive element. Both the multiplexer and the dispersive element act on "the" wavelength channels and "the" coherent and non-coherent optical paths introduced in connection with the demultiplexer. Thus, the claim language indicates there may be

some flexibility in the relative positions of the dispersive element and the multiplexer so long as they both have the required relationship with the coherent and non-coherent optical paths.

Xtera additionally argues that the respondents' argument imports limitations from a preferred embodiment disclosed in the specification into the claims. Specifically, Xtera characterizes the respondents' position as an argument that the components recited in claim 1 "must be arranged in a particular order, in-line." Xtera Opp. at 5. Xtera contends that claim 1 "does not require such an order and imposing such a limitation from Fig. 2 of the patent specification is clear error." *Id.*

Respondents' brief does make frequent reference to the specification and drawings, but I interpret that exposition as a demonstration that respondents' interpretation of the relationship between the multiplexer and "the" wavelength channels and "the" coherent and non-coherent optical paths is consistent with the disclosures in the '068 patent specification and drawings. In any event, I do not limit my interpretation of claim 1 to the figures and specification text cited by the respondents.

Xtera next argues that the respondents' position violates the doctrine of claim differentiation. Specifically, Xtera asserts that claim 2 "contains the additional claim limitations of the particular ordered sequence of components that Respondents seek to impose on claim 1." *Id.* at 5. Claim 2 provides as follows:

> 2. The optical assembly in accordance with claim 1, further comprising one or more optical elements that are configured to approximately equalize the optical gain or loss of a first path and a second path from the input optical port to the output of the optical multiplexer, the first path leading from the input optical port through the optical demultiplexer through the non-coherent optical path through the optical multiplexer and to the output of the optical multiplexer, the second path leading from the input optical port through the optical demultiplexer through the coherent optical path through the optical multiplexer and to the output of the optical multiplexer.

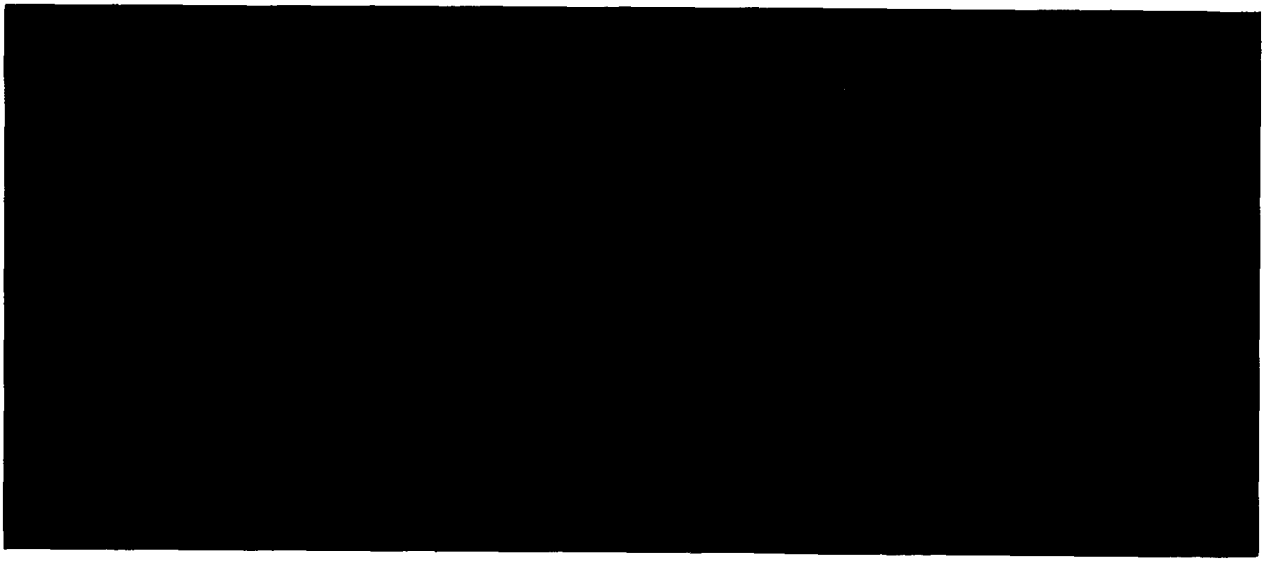
'068 Patent at Cl. 2.

Xtera recites the entirety of claim 2 in its brief but never explains what language in claim 2 corresponds to "the particular ordered sequence of components" that the respondents assert is required by claim 1. This failure is enough to reject Xtera's claim differentiation argument. However, the argument also fails on the merits.

Claims 1 and 2 are distinct in more than one way. For example, one distinction between them is that claim 2 adds additional elements not found in claim 1. Specifically, claim 2 includes "one or more optical elements that are configured to approximately equalize the optical gain or loss of a first path and a second path." '068 Patent at Cl. 2. These optical elements for equalizing gain or loss are not recited in claim 1. *Cf. id.* at Cl. 1. A second distinction is that claim 2 describes the two paths that optical elements act upon in a way that makes it clear that those two paths are not identical to the two optical paths defined in claim 1. *Compare id.* at Cl. 1 *with* Cl. 2. The "first path" and "second path" of claim 2 include much more detail than the "non-coherent optical path" and the "coherent optical path" of claim 1. *See id.* Like the optical elements for equalizing gain or loss, the landmarks along the first path and second path of claim 2 differentiate the two paths in claim 2 from the two paths in claim 1.Because there are multiple facets of claim 2 that render it narrower than claim 1, claim 2 does little to inform the correct interpretation of claim 1. *See Andersen Corp. v. Fiber Composites, LLC*, 474 F.3d 1361, 1367 (Fed. Cir. 2007) (the doctrine of claim differentiation does not apply where the claims being compared "are not otherwise identical but for" the limitation at issue; where "there are numerous other differences varying the scope of the claimed subject matter" in the dependent claim beyond the limitation at issue, the doctrine does not apply); *see also Sunrace Roots Enter. Co. v. SRAM Corp.*, 336 F.3d 1298, 1302–03 (Fed. Cir. 2003).

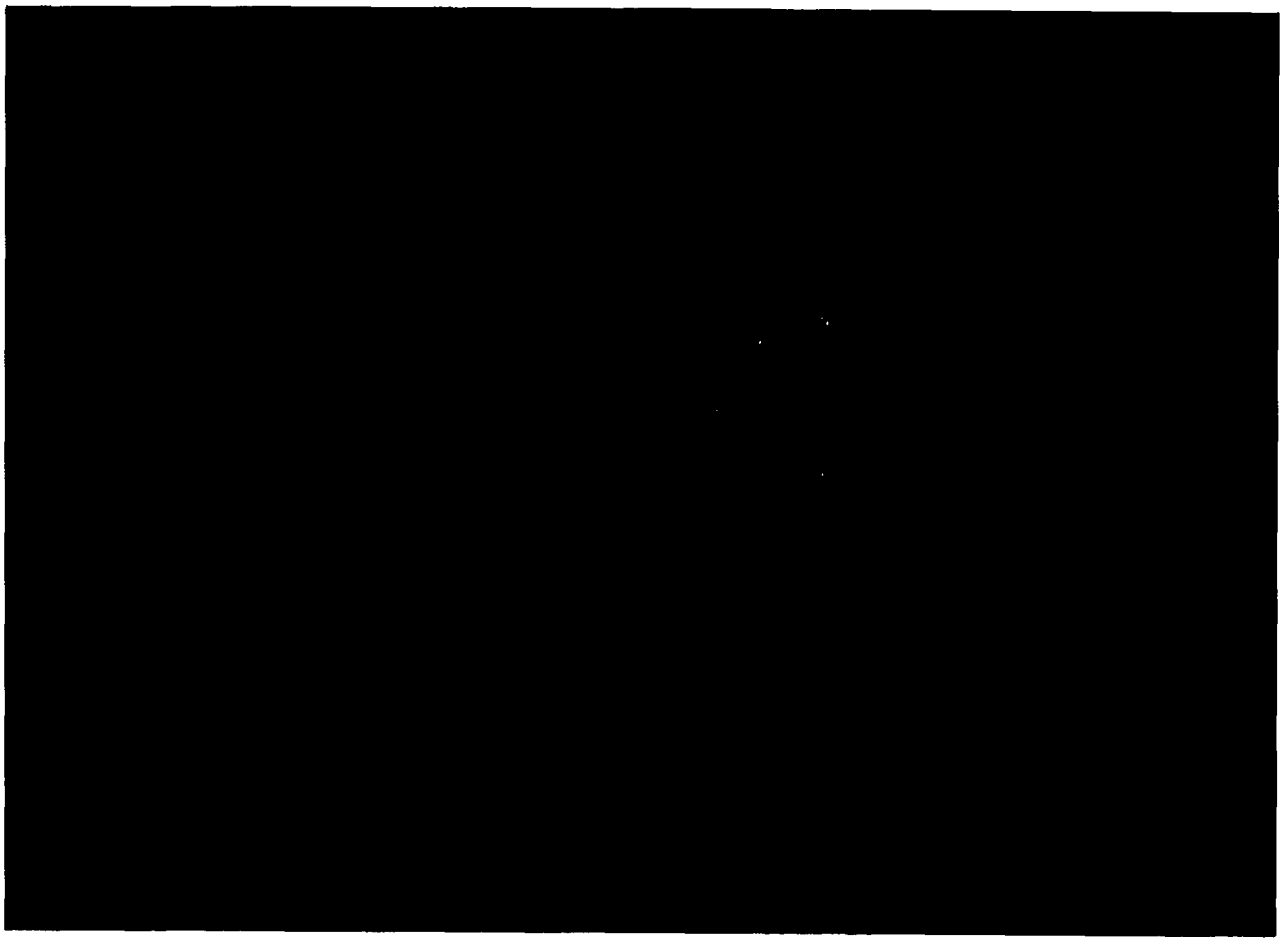
It is notable, however, that Xtera does not rely on claim 2 to satisfy the domestic industry requirement. Each path in claim 2 goes "*from* the input optical port . . . *to* the output of the optical multiplexer." '068 Patent at Cl. 2 (emphasis added). Thus, the input optical port is the beginning of each path, and the output of the optical multiplexer is the end of each path. *See id.* Xtera adduces no evidence that its domestic industry product has such a path, and presumably for this reason Xtera does not rely on claim 2 to meet its domestic industry burden. This informs the question as to whether there is any genuine issue of fact about how Xtera's domestic industry product is configured.

That brings us to the last issue in Xtera's brief: whether there are any genuine issues of material fact about how the components in Xtera's Nu-Wave Optima are configured. Xtera argues that the optical multiplexer recited in claim 1 reads on "the combination of" several components: (1) the coupler / decoupler DCPL-1, (2) the band multiplexer / demultiplexer BMDM-C, and (3) the band multiplexer / demultiplexer BMD1." Xtera Opp. at 8-9. Xtera points to the following schematic from the record as illustrating the arrangement of the BMDM-C and DCPL1:



Xtera Opp., Ex. 21 at 52; Mot., Ex. 4 at 301. In the schematic above, the blue, green, and red markings are from Xtera's expert witness Dr. Willner. I have added the bold labels above the BMDM-C and DCPL1 components. Dr. Willner states that the signal lines circled in blue correspond to optical wavelength channels from the coherent optical path and the signal lines circled in green correspond to optical wavelength channels from the non-coherent optical path. Look carefully at the directions of the arrows in the green and blue circles. Dr. Willner has identified signal paths going in opposing directions—the transmit direction and the receive direction.

Xtera also points to the following schematic from the record as illustrating the arrangement of the BMD1 and DCPL1 components:



Xtera Opp., Ex. 21 at 35. In the schematic above, the red and orange markings are from Xtera. I have added the bold labels above the BMD1 and DCPL1 components. Xtera states that the red and orange annotations trace a path of non-coherent signals. *Id.* at 34.

Construing in Xtera's favor factual assertions about the configuration of its Nu-Wave Optima system, I find no genuine issue of material fact exists as to the configuration of the components in the Nu-Wave Optima system. No party disputes that the schematics above are accurate representations of the relevant portions of the Nu-Wave Optima system. Xtera has cited no evidence that the components it identified in its system as corresponding to the claimed multiplexer combine the same wavelength channels separated by the components that Xtera identified as the claimed demultiplexer and that are provided onto the same coherent optical path and non-coherent optical path associated with the separation performed by the demultiplexer. That is the dispositive issue. Xtera has not shown any genuine issue of material fact that the Nu-Wave Optima system lacks a multiplexer configured as required by claim 1 of the '068 patent.

I next turn to Staff's opposition to summary determination with respect to the '068 patent. Staff's sole argument is that respondents' motion does not address whether the '068 patent protects the Xtera domestic industry system under the doctrine of equivalents. This argument is unique to Staff, as Xtera did not assert a factual dispute based on the doctrine of equivalence. For the reasons detailed below, I find Staff's argument unpersuasive.

First, I disagree with Staff's articulation of the burdens of the moving and non-moving parties insomuch as it argues that respondents' motion should fail because it did not address Xtera's expert's contention that the domestic industry system practices claim 1 of the '068 patent under the doctrine of equivalents. *See* Staff Opp. at 7 (citing Mot., Ex. 4 at ¶ 602 (Expert Report of Dr. Alan Willner)). Respondents were not required to do so. Respondents' initial responsibility

in filing a motion for summary determination is merely to explain why they believe there is no genuine issue of material fact requiring trial; respondents were not required to address every contention that appears in an opposing expert report. Indeed, typically expert reports are not evidence at all, and thus cannot on their own form the basis of a dispute of fact. As the Supreme Court has explained, "a party seeking summary judgment always bears the initial responsibility of informing the district court of the basis for its motion, and identifying those portions of the pleadings, depositions, answers to interrogatories, and admissions on file, together with the affidavits, if any, which it believes demonstrate the absence of a genuine issue of material fact." *Celotex Corp. v. Catrett*, 477 U.S. 317, 323 (1986) (internal quotations omitted). But there is no requirement that the moving party "support its motion with affidavits or other similar materials *negating* the opponent's claim." *Id.* (emphasis in original). Here, respondents' motion explained the basis for why it believes there is no genuine issue of material fact concerning the '068 patent. Having done so, respondents were not required to negate a doctrine of equivalence theory or any number of other theories that might be the basis of relief. *See id.*

Second, as a matter of law, Staff's argument is too conclusory to support a determination that a genuine dispute of material fact exists regarding whether the Nu-Wave Optima system practices the '068 patent under the doctrine of equivalents. The Federal Circuit has repeatedly held that "cursory conclusions" about the doctrine of equivalents "will not withstand summary judgment." *Stumbo v. Eastman Outdoors, Inc.*, 508 F.3d 1358, 1365 (Fed. Cir. 2007). To defeat respondents' motion for summary determination, Staff must provide "particularized testimony *and linking argument* as to the insubstantiality of the differences between the claimed invention and the accused device or process, or with respect to the function, way, result test when such evidence is presented to support a finding of infringement under the doctrine of equivalents." *See Tex.*

Instruments, Inc. v. Cypress Semiconductor Corp., 90 F.3d 1558, 1567 (Fed. Cir. 1996) (emphasis added, internal quotations omitted). Here, however, Staff's brief does not discuss the function-way-result test or the differences between the claimed invention and the domestic industry system. Accordingly, Staff's opposition to summary determination cannot prevail.

Third, the evidence Staff cites in support of its opposition does not support the conclusion that there is a genuine issue of material fact with respect to the doctrine of equivalence. Staff's brief identifies only a single paragraph from a report of Xtera's expert Dr. Willner for its equivalents argument. The entirety of that paragraph is as follows:

> 593. Couplers / decouplers are well-understood components in the art. It is my opinion that any differences between the coupler / decoupler DCPL1, for example, and the claimed multiplexer / demultiplexer, are insubstantial. The coupler / decoupler DCPL1 performs substantially the same function (receiving and combining coherent and non-coherent channels to form a mixed coherent/non-coherent output signal) in substantially the same way (through use of wavelength-selective components) to achieve substantially the same result (combining coherent and non-coherent channels to form a mixed coherent/non-coherent output signal), and is thus equivalent to the claimed optical multiplexer.

Even if this paragraph from Dr. Willner's expert report constituted evidence, it would nonetheless fail to satisfy the legal requirements for showing infringement under the doctrine of equivalents for at least two reasons. First, it is broad and conclusory. "Broad conclusory statements" offered by an expert "are not evidence and are not sufficient to establish a genuine issue of material fact." *Telemac Cellular Corp. v. Topp Telecom, Inc.*, 247 F.3d 1316, 1329 (Fed. Cir. 2001). The opinion is particularly defective with respect to an explanation of the "way" the DCPL1 component in the domestic industry product performs like the optical multiplexer of the claimed invention. Dr. Willner merely asserts that unidentified "wavelength-selective" subcomponents perform wavelength selection, but he never explains the way those components work or how the operation of those components results in the required multiplexed signal. "Such

ambiguity and generality cannot create a genuine issue of material fact." *Akzo Nobel Coatings, Inc. v. Dow Chem. Co.*, 811 F.3d 1334, 1343 (Fed. Cir. 2016).

Second, Dr. Willner's testimony fails because he testified that the DCPL1 component performs the *opposite* function as the claimed element. Although not cited in Staff's brief, Dr. Willner testified that the function of the DCPL1 component is "*separating* an optical signal into coherent and non-coherent channels." Mot., Ex. 4 at ¶ 575 (emphasis added). Dr. Willner has therefore opined that a component that *separates* signals is not substantially different from the optical multiplexer that combines signals. That cannot be so as a matter of law. Where one element performs the opposite function of a claimed element, the two elements "cannot possess only insubstantial differences." *Augme Techs., Inc. v. Yahoo! Inc.*, 755 F.3d 1326, 1335 (Fed. Cir. 2014) (rejecting patent owner's attempt to survive summary judgement by arguing that an accused element that performed the opposite function of the claimed element was equivalent).

Xtera itself makes a similarly defective argument in its Second Supplemental Claim Chart Demonstrating Domestic Industry of U.S. Patent No. 8,380,068, by Xtera's Nu-Wave Optima, found in the motion papers as Exhibit 21. *See* Xtera Opp.,21. That document contains a chart with a row of evidentiary citations for each element of claim 1 of the '068 patent. *See id.* On the row for the optical multiplexer element that respondents assert is missing from the Nu-Wave Optima system, Xtera raises an alternative argument based on the doctrine of equivalents. Xtera states that "any differences between the couplers / *multiplexers / demultiplexers* in Xtera's Nu-Wave Optima and the claimed optical *demultiplexer* are insubstantial, and thus optical *demultiplexers* in Xtera's Nu-Wave Optima are equivalent to the optical *demultiplexer* recited by this claim." *Id.* at 52 (emphasis added). This statement is legally deficient to demonstrate application of the doctrine of equivalents for a number of reasons.

First, the claim term in question is a multiplexer, not a demultiplexer. Xtera's chart does not identify any structure in the Nu-Wave Optima that is equivalent to a multiplexer. If Staff or Xtera wanted to try this issue, they were "required to provide particularized testimony and linking argument on a limitation-by-limitation basis that created a genuine issue of material fact as to equivalents." *AquaTex Indus., Inc. v. Techniche Sols.*, 479 F.3d 1320, 1328-29 (Fed. Cir. 2007). Neither Staff nor Xtera did so.

Next, the doctrine of equivalents requires specific identification of a particular component in a system alleged to be equivalent to a particular claim element. Instead, Xtera's chart recited a list of component categories: "couplers / multiplexers / demultiplexers." To survive summary determination based on a doctrine of equivalents theory, Xtera and Staff must specifically identify the structure in the domestic industry system that is equivalent to the multiplexer claim element. *See Intellectual Sci. & Tech., Inc. v. Sony Elecs., Inc.*, 589 F.3d 1179, 1187 (Fed. Cir. 2009); *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1019 (Fed. Cir. 2006). Xtera's chart failed this legal standard.

Additionally, Xtera's chart lists components that perform the *opposite* function as being equivalent to the multiplexer element in claim 1. The chart states that "couplers / multiplexers / demultiplexers" are all equivalent to a multiplexer. A multiplexer combines channels and a demultiplexer separates channels; they are opposites. There cannot be insubstantial differences between a multiplexer and a demultiplexer. Such an argument fails as a matter of law. *See Augme Techs., Inc. v. Yahoo! Inc.*, 755 F.3d 1326, 1335 (Fed. Cir. 2014).

In sum, claim 1 requires a multiplexer that combines the same wavelength channels that the claimed demultiplexer separated from the same coherent and non-coherent optical paths onto which the demultiplexer provided those signals. There is no dispute that Xtera's Nu-Wave Optima

system lacks such a multiplexer. I therefore find that Xtera cannot, as a matter of law, show that its alleged domestic industry system is protected by the '068 patent. Xtera therefore cannot show a violation of section 337 based on infringement of that patent, and respondents are entitled to summary determination on that issue.

II. THE '798 PATENT

Xtera asserts that its Nu-Wave Optima system practices claim 13 of the '798 patent in satisfaction of the technical prong of the domestic industry. The background section of the '798 patent explains that light signals of different wavelengths tend to travel through optical fiber at slightly different speeds. '798 patent at 1:65-67. These differences, referred to as dispersion, can result in distortion and eventual loss of the signal over the long length of the optical fiber. *Id.* at 1:67-2:2. The invention disclosed in the '798 patent provides various methods to compensate for dispersion. Claim 13 is one method embodying the invention. Claim 13 is reproduced below with the material language highlighted:

> 13. A method for configuring an optical system that includes at least in one direction a transmit terminal, a receive terminal, and an optical fiber link coupled there between to allow a transmit optical signal to be transmitted by the transmit terminal, through the optical fiber link, and to the receive terminal, the method comprising:
>
> an act of **adjusting a tunable pre-compensation mechanism** at the transmit terminal such that at least a majority of a plurality of wavelength division multiplexed channels of the transmit optical signal at least initially reaches a minimum accumulated dispersion within a central distance of the length of the optical fiber link, wherein the act of adjusting is performed **using a closed control loop that measures bit error rate at the receive terminal, and further adjusts the tunable pre-compensation mechanism until an acceptable bit error rate is achieved.**

'798 Patent at Cl. 13.

As can be seen above, claim 13 recites a method for configuring an optical system. The first step of the method is "an act of adjusting a tunable pre-compensation mechanism." *Id.* The claim later specifies, *inter alia*, that this act of adjusting "is performed using a closed control loop."

Id. Xtera contends that, in its Nu-Wave Optima system, a human "setting up the system is part of the closed control loop and uses the closed control loop bit error rates reported by the loop to adjust the dispersion." Xtera Opp. at 12. Xtera further contends that a human uses a software interface in the alleged domestic industry system to adjust dispersion based on the error bit readings "from the closed control loop." *Id.* at 13.

Respondents assert in their summary determination motion that the Nu-Wave Optima system does not practice claim 13. Specifically, respondents contend that the "closed control loop" used in the method cannot, as a matter of law, be satisfied by "a human manually adjusting the pre-compensation." Mot. at 16. Respondents contend that there is no dispute that Xtera relies upon "a human operator that manually reads a bit error rate measurement, and then manually sets a different amount of pre-compensation based on that measurement." *Id.* at 12-16.

Respondents' motion raises a question of claim construction: What would a person of ordinary skill in the art understand a "closed control loop" to mean in the context of claim 13?

I being my analysis with the words of the claim itself. *See Vitronics Corp.*, 90 F.3d at 1582. As mentioned previously, claim 13 is a method for configuring an optical system. The first step of the method is "adjusting a tunable pre-compensation mechanism." The claim then states that the adjustment step is done "using" a closed control loop. This language indicates that a person performing the method *uses* a closed control loop, which supports an inference that a "closed control loop" is an apparatus, not a person. It would be odd for the claim to speak of "using" a person.

Next, the claim says that the closed control loop "measures bit error rate at the receive terminal." This again supports a conclusion that the closed control loop is an apparatus, not a person. Indeed, Xtera admits in its opposition brief that the closed control loop—not a human—

measures bit error rate. Xtera Opp. at 2 ("As Dr. Ralph and Dr. Robinson both explained, *the bit error rate measured by the closed control loop* is used to adjust (and further adjust) the tunable precompensation mechanism in an iterative fashion." (emphasis added)); 12 (*citing* Ex. 7, Robinson Tr. at 152:17-156:8 (characterized by Xtera as "Commissioner monitoring *bit error rates generated by the loop* and using those error rates over time to adjust dispersion") (emphasis added)). Xtera provides no intrinsic or extrinsic evidence that a person of ordinary skill in the art would understand that a human has the ability to measure bit error rates in the context of the '798 patent. The fact that the claimed closed control loop must measure bit error rates supports a conclusion that a closed control loop is an apparatus.

Next I turn to the '798 patent specification. The specification does not expressly describe the elements of a closed control loop, but some useful information can be gleaned by comparing differing methods disclosed in the '798 specification for determining pre-compensation. The '798 patent describes two ways to determine the amount of pre-compensation necessary in a given optical system. One way is to simply make an educated guess at the amount of compensation necessary. *See* '798 patent at 12:36-38 ("In some situations it may be sufficient to simply perform good initial estimate about the amount of pre-compensation needed."), 12:56-58 ("Generally speaking, the longer the transmission distance the initial guess should likely be closer to the mid-point in the transmission distance."), 13:64-65 ("...the initial guess for pre-compensation may be not to apply any pre-compensation at all.").

A closed control loop is given as a contrast to the guess method. If there is "variance" in pre-compensation and post-compensation, then the patent suggests that "perhaps the pre-compensation should be more adaptive using perhaps closed control loop to refine the pre-compensation (and post-compensation) through several iterations of bit error rate checking until

an acceptable bit error rate is achieved." '798 patent at 12:32-36; *see also id.* at 14:20-24. And "it is possible that the initial guess for pre-compensation may always be sufficient for the application. In those cases, the pre-compensation mechanism need not be adaptive at all." *Id.* at 14:63-67.

Although not dispositive, the fact that the '798 specification contrasts the guess method with the adaptive closed control loop is instructive. The specification implies that guesses are made by humans, whereas adaptive adjustment using a closed control loop relies upon an apparatus. Testimony from Xtera's own expert, Dr. Ralph, reinforces this understanding. In seeking to distinguish the '798 patent claims from the prior art, Xtera's expert Dr. Ralph stated that the closed control loop claimed in the '798 patent requires "dynamic dispersion compensation" constructed from "complex circuitry and software." *See* Mot., Ex. 12 at ¶¶ 144-145 ("the '798 patent claims a system having dynamic dispersion compensation . . . static compensation adjustment schemes [of the prior art] do not have the complex circuitry and software required to implement dynamic compensation adjustment and feedback loops"). Dr. Ralph's statement is consistent with the disclosures in the '798 patent, which associate a closed control loop with a dynamic system. *See, e.g.*, '798 Patent at 12:31-36; 13:22-27.

The '798 patent drawings are also instructive. The only figure that the specification expressly associates with the close control loop is Figure 8, reproduced below.

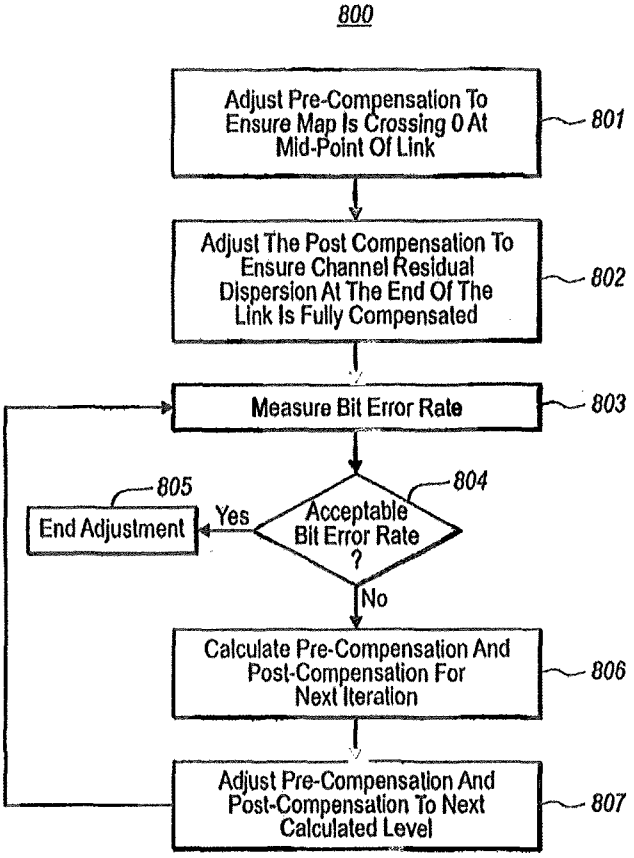


FIG. 8

The specification describes Figure 8 as a "flowchart of method for iteratively adjusting the tunable pre-compensation and post-compensation mechanism so as to reduce bit error rate." '798 patent at 4:20-22. In explaining the flowchart, the patent teaches that "the post-compensation is adjusted so as to reduce or eliminate residual accumulated dispersion at the receive terminal (act 802). The corresponding bit error rate is then measured (act 803), and the transmit terminal is notified via the closed control loop. If the bit error rate is acceptable (Yes decision block 804), the adjustment process may end (act 805)." '798 patent at 14:56-61. As can be seen in Figure 8, then, the "loop" can be traced by the arrows from 803 to 804 to 806 to 807 and back to 803. This configuration is a feedback loop found in many signal systems.

But claim 13 doesn't just speak of a control loop; it recites a *closed* control loop. Presuming that every word in that phrase has meaning (a proposition that Xtera does not rebut), the word closed must add something. The most logical meaning is that there is no interruption of the signal providing feedback from the receive terminal and adjustment of the transmit terminal. In the system shown in Figure 8, a human does not read the bit error rate at the receive terminal and notify the transmit terminal. Rather, there is a closed loop of the signal between the terminals. The disclosures in the specification therefore support a conclusion that a person of skill in the art would not understand a "closed control loop" to include a human.

Xtera contends that it is error to construe claim 13 as precluding any human involvement in the recited method. To be clear, I am not adopting such a construction here. Methods are performed by humans, and claimed methods are infringed by humans. But claim 13 requires a certain method step to be performing "using" a closed control loop. I conclude here that the "closed control loop" that must be used is an apparatus with a continuous signal path providing feedback from the receive terminal and adjustment of the transmit terminal.

Xtera contends that when the '798 patent says that Figure 8 illustrates a method for "iteratively (or continuously)" adjusting the tunable pre-compensation mechanism ('798 patent at 14:46-48), it is equating "iteratively" with human involvement and "continuously" with no human involvement. Opp. at 10. Xtera's interpretation is not well founded. By placing the words "or continuously" in parenthesis the inventors are equating the adverbs iteratively and continuously, not drawing a contrast.

Xtera also points out that the claimed step of adjusting the tunable pre-compensation mechanism) can be performed "in an environment in which an optical link is being upgraded" or "designed and/or installed." Opp. at 10 (citing '798 patent at 3:5-8). But that teaching is not

tethered to the disclosure of a closed control loop and does not inform the person of skill in the art about the nature of such a loop.

Xtera next cites expert testimony from Dr. Willner that a person of ordinary skill in the art would expect human involvement to be necessary to guide the initial network configurations of Xtera's Nu-Wave Optima. *Id.* Even if that were true and undisputed, it does not answer what such a person of skill would understand the closed control loop in claim 13 to mean.

Xtera also cites expert testimony from Dr. Ralph about how quickly dispersion pre-compensation must be adjusted to maintain an acceptable bit error rate. Opp. at 10-11. Dr. Ralph testified that the relevant time scale is "slow, very slow...human scale slow" and therefore "an embodiment that includes a human in the loop" is "not unreasonable." Ex. 9 at 355:9-14. Dr. Ralph's testimony that it is *possible* for a human to perform pre-compensation adjustment does not mean that a person of ordinary skill in the art would reading the '798 patent would understand a closed control loop to involve a human. The intrinsic evidence reviewed above weighs against that extrinsic conclusion.

Xtera additional cites testimony from an inventor, Dr. Joerg Schwartz. Opp. at 11. The compound question cited and the rambling testimony in response are nearly unintelligible, and certainly not dispositive of the issue presented in respondents' motion.

Xtera next claims that respondents have rewritten claim 13 to from stating that "the act of adjusting is performed using a closed control loop" to, in effect, "the closed control loop adjusts the tunable pre-compensation mechanism." Opp. at 11. But the plain language of the claim *does* specify that the "closed control loop . . . adjusts the tunable pre-compensation mechanism." '798 patent at claim 13. As noted above, the words of the claim must be given meaning.

In sum, the closed control loop recited in claim 13 is an apparatus with a continuous signal path providing feedback from the receive terminal and adjustment of the transmit terminal. Xtera contends that there are disputes of fact as to whether its asserted domestic industry system comprises the required closed control loop. I defer that issue for additional consideration, including during the telephonic hearing scheduled for November 20, 2018, at 4:00 p.m.

III. THE '171 PATENT

The portion of respondents' motion directed to the '171 shall be deferred pending further consideration.

Pursuant to 19 C.F.R. § 210.42(h), this initial determination shall be the determination of the Commission unless a party files a petition for review of the initial determination pursuant to 19 C.F.R. § 210.43(a), or the Commission, pursuant to 19 C.F.R. § 210.44, orders, on its own motion, a review of the initial determination or certain issues herein.

Within seven days of the date of this document, each party shall submit a statement to Cheney337@ustic.gov stating whether or not it seeks to have any portion of this document redacted from the public version. Any party seeking to have any portion of this document redacted from the public version thereof shall attach a copy of this document with red brackets indicating any portion asserted to contain confidential business information. The parties' submissions concerning the public version of this document should not be filed with the Commission Secretary.

SO ORDERED.

Clark S. Cheney
Administrative Law Judge

CERTAIN SUBSEA TELECOMMUNICATIONS SYSTEMS AND COMPONENTS THEREOF **Inv. No. 337-TA-1098**

PUBLIC CERTIFICATE OF SERVICE

I, Lisa R. Barton, hereby certify that the attached **ORDER NO. 46** has been served by hand upon the Commission Investigative Attorney, Cortney Hoecherl, Esq., and the following parties as indicated on **November 29, 2018.**

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

On Behalf of Complainants: Xtera Topco Ltd. and Xtera, Inc.:

Yar R. Chaikovsky, Esq.
PAUL HASTINGS LLP
1117 S. California Avenue
Palo Alto, CA 94304

☐ Via Hand Delivery
☑ Via Express Delivery
☐ Via First Class Mail
☐ Other:_____

On Behalf of Respondents: Nokia Corporation, Nokia Solutions and Networks B.V., Nokia Solutions and Networks Oy, Nokia Solutions and Networks US LLC, Alcatel Submarine Networks, and Nokia of America Corporation

Adam D. Swain, Esq.
ALSTON & BIRD LLP
950 F Street NW
Washington, DC 20004

☐ Via Hand Delivery
☑ Via Express Delivery
☐ Via First Class Mail
☐ Other:_____

On Behalf of Respondents: NEC Corporation, NEC Networks & System Integration Corporation and NEC Corporation of America

Timothy W. Riffe, Esq.
FISH & RICHARDSON P.C.
1000 Maine Avenue, SW
Suite 1000
Washington, DC 20024

☐ Via Hand Delivery
☑ Via Express Delivery
☐ Via First Class Mail
☐ Other:_____