PUBLIC VERSION

UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON, D.C. 20436

In the Matter of **CERTAIN UMTS AND LTE CELLULAR COMMUNICATION MODULES AND PRODUCTS CONTAINING THE SAME**	**Inv. No. 337-TA-1240**

FINAL INITIAL DETERMINATION

Administrative Law Judge David P. Shaw

Pursuant to the notice of investigation, 86 Fed. Reg. 7305 (Jan. 27, 2021), this is the Initial Determination in *Certain UMTS and LTE Cellular Communication Modules and Products Containing the Same*, United States International Trade Commission Investigation No. 337-TA-1240.

It is held that a violation of section 337 (19 U.S.C. § 1337) has not occurred with respect to U.S. Patent No. 7,944,935; U.S. Patent No. 7,554,943; U.S. Patent No. 8,199,711; and U.S. Patent No. 7,831,271.

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The following abbreviations may be used in this Initial Determination:

ALJ	-	Administrative Law Judge
CDX	-	Complainants' Demonstrative Exhibit
CPX	-	Complainants' Physical Exhibit
CX	-	Complainants' Exhibit
Dep.	-	Deposition
EDIS	-	Electronic Document Imaging System
JPX	-	Joint Physical Exhibit
JX	-	Joint Exhibit
P.H.	-	Prehearing
RDX	-	Respondents' Demonstrative Exhibit
RPX	-	Respondents' Physical Exhibit
RWS	-	Rebuttal Witness Statement
RX	-	Respondents' Exhibit
Tr.	-	Transcript
WS	-	Witness Statement

I. Background

A. Institution of the Investigation; Procedural History

By publication of a notice in the *Federal Register* on January 27, 2021, pursuant to subsection (b) of section 337 of the Tariff Act of 1930, as amended, the Commission instituted this investigation to determine:

> [W]hether 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 products identified in paragraph (2) by reason of infringement of one or more of claims 1–4, 9–12 and 17 of the '935 patent [U.S. Patent No. 7,944,935]; claims 12 and 15 of the '943 patent [U.S. Patent No. 7,554,943]; claims 9 and 12 of the '711 patent [U.S. Patent No. 8,199,711]; claims 1–8 of the '271 patent [U.S. Patent No. 7,831,271]; and whether an industry in the United States exists as required by subsection (a)(2) of section 337.

86 Fed. Reg. 7305 (Jan. 27, 2021).

Pursuant to section 210.10(b)(1) of the Commission's Rules of Practice and Procedure, 19 C.F.R. 210.10(b)(1):

> [T]he plain language description of the accused products or category of accused products, which defines the scope of the investigation, is "UMTS and LTE cellular communication modules of Thales (Gemalto/Cinterion), Telit and Quectel, and machine to machine (M2M) cellular communication devices (*i.e.*, gateways, routers, trackers, monitors, readers, controllers, and M2M cellular connected sensor products) that incorporate such UMTS and LTE cellular communication modules of Thales (Gemalto/Cinterion), Telit and Quectel."

Id.

Pursuant to Commission Rule 210.50(b)(1), 19 C.F.R. § 201.50(b)(1):

> [T]he presiding administrative law judge shall take evidence or other information and hear arguments from the

> parties and other interested persons with respect to the public interest in this investigation, as appropriate, and provide the Commission with findings of facts 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), and (g)(1).

Id.

The complainants are Koninklijke Philips N.V. of Eindhoven, Netherlands; and Philips RS North America LLC of Pittsburgh, Pennsylvania. The respondents are:

1. Thales DIS AIS USA, LLC of Bellevue, Washington;
2. Thales DIS AIS Deutschland GmbH of München, Germany;
3. Thales USA, Inc. of Arlington, Virginia;
4. Thales S.A. of Paris, France;
5. Telit Wireless Solutions, Inc. of Durham, North Carolina;
6. Telit Communications PLC of London, United Kingdom;
7. Quectel Wireless Solutions Co., Ltd. of Shanghai, China;
8. CalAmp Corp. of Irvine, California;
9. Xirgo Technologies, LLC of Camarillo, California; and
10. Laird Connectivity, Inc. of Akron, Ohio.

The Office of Unfair Import Investigations is a party to this investigation. *Id.*

The target date for completion of this investigation was originally set at sixteen months, *i.e.*, May 27, 2022. *See* Order No. 3 (Jan. 28, 2021).

The Commission affirmed the following initial determinations:

- Order No. 15 (Initial Determination Extending the Target Date) (Jan. 13, 2022), *aff'd*, Commission Determination Not to Review an Initial Determination to Extend the Target Date for Completion of This Investigation (Feb. 9, 2022).

- Order No. 16 (Initial Determination Extending the Target Date) (Feb. 15, 2022), *aff'd*, Commission Determination Not to Review an Initial Determination to Extend the Target Date for Completion of This Investigation (Mar. 15, 2022).

As noted above, on February 15, 2022, the undersigned issued Order No. 16 (initial determination) extending the target date. Order No. 16 set the target date at approximately eighteen months, *i.e.*, August 1, 2022, which made the deadline for this initial determination April 1, 2022.

A prehearing conference was held on October 6, 2021, with the evidentiary hearing in this investigation commencing immediately thereafter. The hearing concluded on October 12, 2021. *See* Order No. 7 (Aug. 19, 2021); P.H. Tr. 1-35; Tr. 1-1119. The parties were requested to file post-hearing briefs not to exceed 350 pages in length, and to file reply briefs not to exceed 100 pages in length. *See* Order No. 8 (Sept. 23, 2021). On November 1, 2021, the parties filed a joint outline of the issues to be decided in the Final Initial Determination. *See* Joint Outline of Issues to Be Decided in the Final Initial Determination ("Joint Outline") (EDIS Doc. ID No. 755625). On November 16, 2021, the parties filed a joint outline for the reply briefs. *See* Joint Outline of Issues to Be Decided in the Final Initial Determination (All Post-Hearing Briefs) ("Joint Reply Outline") (EDIS Doc. ID No. 756661).

B. The Parties

1. Complainants

As noted above, the complainants are Koninklijke Philips N.V. ("KPNV") of Eindhoven, Netherlands; and Philips RS North America LLC ("Philips") of Pittsburgh, Pennsylvania. 86 Fed. Reg. 7305 (Jan. 27, 2021).

KPNV includes the Philips Sleep business unit, which is part of Philips, which is a wholly owned subsidiary of KPNV. Complaint, ¶ 21. Through this Philips Sleep business unit, Philips researches and develops sleep therapy devices with monitoring technology, which include Continuous Positive Airway Pressure ("CPAP") devices. Philips develops and sells products that allow individuals to monitor and improve their health, and transfers or licenses its technologies and/or the patents that protect its technologies to customers who use the technologies in their products. Complaint, ¶ 14. The two complainant entities are referred collectively as "Philips" or "complainants" in this ID.

2. Respondents

As noted above, the respondents are:

1. Thales DIS AIS USA, LLC of Bellevue, Washington;
2. Thales DIS AIS Deutschland GmbH of München, Germany;
3. Thales USA, Inc. of Arlington, Virginia;
4. Thales S.A. of Paris, France;
5. Telit Wireless Solutions, Inc. of Durham, North Carolina;
6. Telit Communications PLC of London, United Kingdom;
7. Quectel Wireless Solutions Co., Ltd. ("Quectel") of Shanghai, China;
8. CalAmp Corp. ("CalAmp") of Irvine, California;
9. Xirgo Technologies, LLC ("Xirgo") of Camarillo, California; and
10. Laird Connectivity, Inc. ("LCI") of Akron, Ohio.

86 Fed. Reg. 7305 (Jan. 27, 2021).

Respondent Thales DIS USA is an entity organized under the laws of the State of Delaware and has a regular and established place of business in Bellevue, Washington. Complaint, ¶ 22. Respondent Thales DIS AIS Deutschland is a German entity headquartered in München, Germany. *Id.* at ¶ 22. Respondent Thales S.A. is a French entity headquartered in Paris, France. *Id.* at ¶ 24. Respondent Thales USA is an entity organized under the laws of the State of Delaware and has a regular and established place of business in Arlington, Virginia. *Id.* at ¶ 25. These respondents are referred to collectively as "Thales" in this ID.

Respondent Telit Wireless is an entity organized under the laws of the State of Delaware and has a regular and established place of business in Durham, North Carolina. Complaint, ¶ 31. Respondent Telit Communications is the parent of Telit Wireless and a UK entity headquartered in London, United Kingdom. *Id.* at ¶ 32. These respondents are referred to collectively as "Telit" in this ID.

Quectel is a corporation with its corporate headquarters in China, located in Shanghai, China. Complaint, ¶ 38.

CalAmp is a Delaware corporation with its corporate headquarters located in Irvine, California. Complaint, ¶ 43.

Xirgo is a Delaware corporation with its corporate headquarters located in Camarillo, California. Complaint, ¶ 45.

LCI is a Delaware corporation with its corporate headquarters located in Akron, Ohio. Complaint, ¶ 45.

3. Office of Unfair Import Investigations

The Office of Unfair Import Investigations ("OUII" or "Staff") is also a party to this investigation. 86 Fed. Reg. 7305 (Jan. 27, 2021).

C. Asserted Patents and Technological Background

United States Patent No. 7,944,935 ("the '935 patent), entitled "Method for Priority Based Queuing and Assembling of Packets," issued on May 17, 2011, to named inventors Paul Bucknell, Matthew P.J. Baker and Timothy J. Moulsley. JX-0001 ('935 Patent). The '935 patent issued from Application No. 11/718,720, filed on May 7, 2007, which claims priority to GB 0424918.1 filed on November 11, 2004. *Id.* The '935 patent relates to "a method of multiplexing data packets, to a multiplexing apparatus for multiplexing data packets, to a communication terminal comprising the multiplexing apparatus, and to a communication system comprising the communication terminal. The invention has application in, for example but not exclusively, mobile communication systems such as the Universal Mobile Telecommunication System (UMTS)." JX-0001 at 1:4-12. The '935 patent has a total of 18 claims. Complainants assert independent method claim 1, and dependent method claims 2 and 3, and independent apparatus claim 9, and dependent apparatus claims 10, 11, and 17 of the '935 patent. *See* Joint Outline at 3; Staff Br. at 6.

United States Patent No. 7,554,943 ("the '943 patent), entitled "Radio Communication System," issued on June 30, 2009, to named inventors Timothy James Moulsley and Matthew Peter John Baker. JX-0002 ('943 Patent). The '943 patent issued from Application No. 10/503,429, filed on August 3, 2004, which claims priority to GB 0203263.9 and GB 0202991.6 filed on February 12 and 8, 2002, respectively. *Id.* The

‘943 patent relates to “a radio communication system and further relates to primary and secondary stations for use in such a system and to a method of operating such a system. While the present specification describes a system with particular reference to the Universal Mobile Telecommunication System (UMTS), it is to be understood that such techniques are equally applicable to use in other mobile radio systems.” JX-0002 at 1:5-12. The ‘943 patent has a total of 17 claims. Complainants assert independent apparatus claim 12 of the ‘943 patent. *See* Joint Outline at 4-5; Staff Br. at 6.

United States Patent No. 8,199,711 (“the ‘711 patent), entitled “Radio Communication System,” issued on June 12, 2012, to named inventors Timothy James Moulsley and Matthew Peter John Baker. JX-0003 (‘711 Patent). The ‘711 patent issued from Application No. 12/472,049, filed on May 27, 2009, and is a continuation of Application No. 10/503,429, filed on August 3, 2004, now the ‘943 patent. *Id.* The ‘711 and ‘943 patents share the same specification. The ‘711 patent relates to “a radio communication system and further relates to primary and secondary stations for use in such a system and to a method of operating such a system. While the present specification describes a system with particular reference to the Universal Mobile Telecommunication System (UMTS), it is to be understood that such techniques are equally applicable to use in other mobile radio systems.” JX-0003 at 1:13-20. The ‘711 patent has a total of 12 claims. Complainants assert independent apparatus claim 9 and independent method claim 12 of the ‘711 patent. *See* Joint Outline at 4-5; Staff Br. at 6.

United States Patent No. 7,831,271 (“the ‘271 patent), entitled “Communication System and Method of Operating the Communicating System,” issued on November 9, 2010, to named inventors Matthew P.J. Baker and Timothy J. Moulsley. JX-0004 (‘271

Patent). The ‘271 patent issued from Application No. 10/567,042, filed on February 2, 2006, which claims priority to GB 0318735.8 and GB 0410905.4 filed on August 11, 2003 and May 4, 2004. *Id.* The ‘271 patent relates to “a communication system, to a station for use in a communication system, and to a method of operating a communication system. The present invention has particular, but not exclusive, application to spread spectrum systems such as UMTS (Universal Mobile Telecommunication System).” JX-0004 at 1:5-10. The ‘271 patent has a total of nine claims. Complainants assert independent method claim 1, and dependent method claims 2-4, and independent apparatus claim 5, and dependent apparatus claims 6-8 of the ‘271 patent. *See* Joint Outline at 6; Staff Br. at 6.

D. The Accused Products

According to complainants, the accused products form two categories. The first category is cellular communication modules. Such modules are designed to be incorporated into a wireless product, such as a tracker (*i.e.* a location tracker in a vehicle), a smart sensor (such as a temperature sensor that can send readings over a network for remote monitoring of equipment), or another type of internet device. Such modules make it easier for many manufacturers (including home appliance and automobile manufacturers) to add cellular wireless capability to their products without the expenses associated with wireless design, device conformance testing to satisfy wireless carriers, and FCC authorization. *See* Compls. Br. at 26.

The second category of accused products are products that incorporate cellular communication modules. Such products include modules as components, and the modules carry out the cellular communications required for the downstream products to function. Each of the accused modules is advertised as a UMTS and/or LTE module, and it is advertised as certified to operate on the United States wireless carriers. *See id.*

Quectel

The following Quectel devices are accused of infringing the asserted claims of the ‘935, ‘943, and ‘711 patents: BG95-M1, BG96, BG96-MA, BG96-MC, BG600L-M3, BG77, BG95, BC66, BC65, BC66-NA, BC68, BC92, BC95-G, EG12, EM12, EM12-G, AG520R, EG18, AG550Q, EC20, AG15, AG35, EC25, EG25-G, EG95, EM05, SC20 and all its variants, SC200R, EG06, EM06, EP06, SC600T, SC600Y, SC66, RG500Q, RM500Q-GL, EC21, EG21-G, and all variants of the EG91 including EG91-NA. *See* Compls. Br. at 26.

The following devices made by respondent Quectel are cellular communications modules having 3G UMTS capability and are accused of infringing the ‘271 patent: EC21, EG21-G, EG91 (and all variants thereof), UC20, UC15, UC200T, UG96, UC20, UC20-G, RG500Q, RM500Q-GL, EG12, EM12, EG18, AG550Q, EC20, AG35, EC25, EG25-G, EG95, SC20, SC200R, EG06, EM06, EP06, SC600T, SC600Y, SC66 and EM05. *See* Compls. Br. at 27 (citing CX-0012C (Lanning WS) at Q/A 57-58; CX-107-109; CX-113; CX-277; CX-1100; CX-1103-1105; CX-1093, CX-1094, CX-1097-1100; CX-1103-1107, CX-1110, CX-1113-1115; CX-1117-CX-1120; CX-1122-CX-1125; CX-1128-1132; CX-1134; CX-1136-1144; CX-1147-1152; CX-1218; and CX-1576).

Thales

The following Thales devices are accused of infringing the asserted claims of the ‘935, ‘943, and ‘711 patents: EMS31, EXS62-W, EXS82-W, TX62, PLPS9, mPLS8, PLS8, CL31, ELS81, mPLAS9, PLAS9, ELS31, ELS31-V, ELS61, ELS61-US, ENS22, mPLS62, PLS62, and PLS62-W. *See* Compls. Br. at 27.

The following devices made by Thales are cellular communications modules having 3G UMTS capability and are accused of infringing the the ‘271 patent: EHS5, EHS5T, EHS5-US, EHS6, EHS6T, EHS8, PDS5, PDS6, PH8, PHS8, PXS8, ELS61, ELS61-US, mPLS62, PLS62-W PLAS9, mPLAS9, PLPS9, mPLS8, PLS8, ELS81, ENS22. *See* Compls. Br. at 27-28 (citing CX-0012C (Lanning WS) at Q/A 59-60; CX-26, CX-1169; CX-1184, CX-1192, CX-1286-1288, CX-1303, CX-1311, CX-1318, CX-1319, CX-1326, CX-1333, CX-1529, CX-1530, and CX-1578-CX-1608).

Telit

The following Telit devices are accused of infringing the asserted claims of the ‘935, ‘943, and ‘711 patents: all ME910C1 variants including: (ME910C1-N1, ME910C1-NA, ME910C1-NV, ME910C1-WW), all ME910G1 variants including: (ME910G1-W1, ME910G1-WW), all ML865C1 variants including (ML865C1-NA), ME866A1-NA, ME866A1-NV, all ME310G1 variants including: (ME310G1-W1, ME310G1-WW), ML865G1-WW, NE910C1-NA, NL865B1, NL865H2-W1, all NE310H2 variants including NE310H2-W1, LE866A1-NA, LE866-SV1, all LE910 variants including: (LE910B1- NA, LE910B1-SA, LE910C1/C4-NF, LE910C1-LA, LE910C1-NA, LE910C1-NF, LE910C1-NS, LE910C1-SA, LE910C1-ST, LE910C1-SV, LE910-NA1, LE910-SV1, LE910-SVL, LE910B4-NA, LE910C4-NF, LE910-NA V2, LE910-NAG, LE910-NVG, LE910-SVG), LE920A4-NA, LE920-NA, LE920- NAG, LE940A9, LE940B6, LM940 and all its variants including (LM940A11), LM960 and all its variants including (LM960A18, LM960A9-P), LN930, LN931-NAG, LN932, LN940 and all its variants including (LN940A9, LN940A11), LN960A16, and the FN980 module and all its variants (including the FN980M). *See* Compls. Br. at 28.

The following Telit devices are cellular communications modules having 3G UMTS capability and are accused of infringing the '271 patent: FN980, FN980M, HE863NAD, HE863-NAG, HE910NA (and all variants, including HE910-NAR, HE920, HE922-3GR), HS3002-NA, UC864, UE866-N3G, all UE910 variants (including UE910-GL, UE910-NA V2, UE910-NAD, UE910-NAR), UL865-NAD, UL865-NAR, and HC864, LE910B1-NA, LE901B1-SA, LE910C1/C4-NF, LE910C1-NA, LE910-NA1 LE910B4-NA, LE910C4-NF, LE910 V2, LE910-NAG, LE910-NVG, LE920-NA, LE920-NAG, LE940A9, LE940B6, LM940, LM960, LN930, LN931-NAG, LN932, LN940, UL865-N3G. *See* Compls. Br. at 29 (citing CX-0012C (Lanning WS) at Q/A 61-62; CX-115-117, CX-1153, CX-1154, CX-1156-CX-1158, and CX-1170).

<u>CalAmp</u>

The following CalAmp products incorporate one of the accused Quectel, Thales or Telit devices as a component.

Device Manufacturer	**Device Product Number**	**Module Manufacturer**	**Module Product Number**
CalAmp[1]	NA	[redacted]	[redacted]
CalAmp	NA	[redacted]	[redacted]
CalAmp	NA	[redacted]	[redacted]
CalAmp	NA	[redacted]	[redacted]
CalAmp	NA	[redacted]	[redacted]
CalAmp	NA	[redacted]	[redacted]
CalAmp	NA	[redacted]	[redacted]
CalAmp	NA	[redacted]	[redacted]
CalAmp	NA	[redacted]	[redacted]
CalAmp	NA	[redacted]	[redacted]
CalAmp	NA	[redacted]	[redacted]
CalAmp	NA	[redacted]	[redacted]
CalAmp	NA	[redacted]	[redacted]

See Compls. Br. at 29-30.

<u>Xirgo</u>

The following Xirgo products incorporate one of the accused Quectel, Thales or Telit devices as a component.

[1] CalAmp has identified over [redacted] distinct model/part numbers of products that incorporate one of the accused Quectel, Thales or Telit modules as a component. Therefore, this table identifies only each separate Quectel, Thales or and Telit module that is included in one or more of CalAmp's products. A full list of the CalAmp product numbers that incorporate one of the accused Quectel, Thales, or Telit modules can be found in CalAmp's Responses to Complainants' Interrogatory Nos. 4-6 (Tables 1-5). *See* Compls. Br. at 29 n.2.

Device Manufacturer	Device Product Number	Module Manufacturer	Module Product Number
Xirgo	[redacted]	[redacted]	[redacted]
Xirgo	[redacted]	[redacted]	[redacted]
Xirgo	[redacted]	[redacted]	[redacted]
Xirgo	[redacted]	[redacted]	[redacted]
Xirgo	[redacted]	[redacted]	[redacted]
Xirgo	[redacted]	[redacted]	[redacted]
Xirgo	[redacted]	[redacted]	[redacted]
Xirgo	[redacted]	[redacted]	[redacted]
Xirgo	[redacted]	[redacted]	[redacted]

See Compls. Br. at 30.

<u>LCI</u>

The following Laird products incorporate one of the accused Quectel, Thales or Telit devices as a component.

Device Manufacturer	Device Product Number	Module Manufacturer	Module Product Number
Laird	Sentrius IG60	[redacted]	[redacted]
Laird	Sentrius RG191	[redacted]	[redacted]

See Compls. Br. at 31.

E. The Domestic Industry Products

The Philips domestic industry products that allegedly practice the '271 patent are the DreamStation and SystemOne devices. These are CPAP devices provided to patients, and they include the [redacted] cellular communications module and the following Thales Gemalto modules: [redacted] module and [redacted] module. *See* Compls. Br. at 31-32 (citing CX-0012C (Lanning WS) at

Q/A 121-22). Each CPAP machine includes cellular connectivity to allow the patient to upload his or her data to a health care provider, and each of the modules that is in a Philips domestic industry product for the '271 patent is advertised as a 3G UMTS module or a multi-mode module that includes 3G UMTS functionality. *See* Compls. Br. at 32 (citing CX-0012C (Lanning WS) at Q/A 123).

The Philips domestic industry products that allegedly practice the '935, '943 and '711 patents are the DreamStation, the DreamStation2, and the DreamStation Go (DsGo). Each of these devices is also a CPAP machine with cellular connectivity, and each is a downstream device that incorporates or has incorporated the LTE [redacted] modules identified in a demonstrative exhibit (shown below) of Philips' expert Dr. Brogioli's direct witness statement. *See* Compls. Br. at 32; CX-0011C (Brogioli WS) at Q/A 24-25; CDX-0001C (Brogioli Demonstrative) at 8.

[redacted]

CDX-0001C (Brogioli Demonstrative) at 8 (CX-0011C (Brogioli WS) at Q/A 24-25).

For the '935 patent, Dr. Brogioli opines that the infringement analysis and the domestic industry analysis for these products is materially identical to the analysis for the corresponding module that each product incorporates as a component. *See* Compls. Br. at 32; CX-0011C (Brogioli WS) at Q/A 33-35. Philips' expert Dr. Jackson reaches the same conclusion based on his analysis for the '943 and '711 patents. *See* Compls. Br. at 33; CX-2398C (Jackson WS) at Q/A 5, 99-109, 265-69.

II. Jurisdiction and Importation

Section 337(a)(1)(B) declares unlawful, *inter alia*, "[t]he importation into the United States, the sale for importation, or the sale within the United States after importation by the owner, importer, or consignee, of articles that . . . infringe a valid and enforceable United States patent." 19 U.S.C. § 1337(a)(1)(B). Complainants have filed a complaint alleging a violation of this subsection, and the Commission therefore has subject matter jurisdiction. *See Amgen, Inc. v. United States Int'l Trade Comm'n*, 902 F.2d 1532, 1535-37 (Fed. Cir. 1990). Indeed, respondents do not contest the subject matter jurisdiction. *See* Resps. Br. at 8.

No respondent contested the Commission's personal jurisdiction. *See id.* Indeed, all respondents have appeared and participated in the investigation. The Commission therefore has personal jurisdiction over those respondents. *See e.g., Certain Liquid Crystal Display Modules, Products Containing Same, and Methods for Using the Same*, Inv. No. 337-TA-634, Final Initial and Recommended Determinations at 3 (June 12, 2009) (unreviewed). Respondents do not contest the personal jurisdiction. *See* Resps. Br. at 8.

The Commission has *in rem* jurisdiction over accused products that have been imported into the United States.

Respondents "deny that Respondents have committed any unlawful act or that any products they import, sell for importation, or sell after importation infringe any of the asserted claims." Resps. Br. at 9 (footnote omitted). Respondents argue:

> ***Quectel does*** [redacted] ***CX-0408C (Quectel's 2/22/2021 Resp. Interrog. No. 1) at 8; JX-0039C (L. Zhang Dep.) at 77:10-79:19, 98:5-21***. Apart from [redacted]. CX-0437C.7-.8 (Supp. Resps. Interrog. 13). Thales S.A. and Thales USA, Inc. [redacted]. RX-3321 (Rougeron Decl.) ¶ 6; RX-3322 (Marion Decl.) ¶ 5. Telit entered into a stipulation regarding inventory and importation (CX-0615C), as did the downstream Respondents CalAmp (CX-0001C), Xirgo (CX-0002C), and LCI (CX-0004C).

Id. at 9 n.6 (emphasis added).[2]

With respect to Quectel, however, in their prehearing brief, respondents argued:

> Although Philips accuses an extensive number of Quectel modules, only a small subset of these products are imported in the United States, and thus, at issue in this investigation. In fact, ***Respondents provided the following list of Quectel products imported into the Unites States, the "Quectel modules":*** [redacted] ***CX-0585C (Quectel's 2/22/2021 Resp. Interrog. No. 1) at 8***. Philips has no evidence regarding the importation of any other Quectel module, and cannot meet this threshold showing that any other modules manufactured by Quectel are imported into the U.S.

Resps. P.H. Br. at 17 (emphasis added). Complainants did not argue otherwise. Thus, as argued by respondents in their prehearing brief, the evidence establishes importation (and thus jurisdiction) with respect to only the following Quectel accused products: [redacted]

As noted, "Telit entered into a stipulation regarding inventory and importation (CX-0615C), as did the downstream Respondents CalAmp (CX-0001C), Xirgo (CX-

[2] In this Initial Determination, unless noted otherwise, when quoting, emphases are from the original source, and footnotes from the original source are omitted.

0002C), and LCI (CX-0004C)."[3] Resps. Br. at 9 n.6. CalAmp's accused products contain accused communication modules from Thales, Telit, and Quectel. Xirgo's accused products contain accused communication modules from Thales and Quectel. LCI's accused products contain accused communication modules from Thales and Quectel. *See* Complaint, ¶¶ 44 (CalAmp), 46 (Xirgo); 48 (LCI).

III. General Principles of Applicable Law

A. Claim Construction

Claim construction begins with the plain language of the claim.[4] Claims should be given their ordinary and customary meaning as understood by a person of ordinary skill in the art, viewing the claim terms in the context of the entire patent.[5] *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312-13 (Fed. Cir. 2005), *cert. denied*, 546 U.S. 1170 (2006).

In some instances, claim terms do not have particular meaning in a field of art, and claim construction involves little more than the application of the widely accepted meaning of commonly understood words. *Phillips*, 415 F.3d at 1314. "In such

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[3] *See also* EDIS Doc. ID Nos. 744188 (June 7, 2021) (Telit); 744448 (June 10, 2021) (CalAmp); 744828 (June 15, 2021) (LCI); and 745088 (June 21, 2021) (Xirgo).

[4] Only those claim terms that are in controversy need to be construed, and only to the extent necessary to resolve the controversy. *Vanderlande Indus. Nederland BV v. Int'l Trade Comm.*, 366 F.3d 1311, 1323 (Fed. Cir. 2004); *Vivid Tech., Inc. v. American Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999).

[5] Factors that may be considered when determining the level of ordinary skill in the art include: "(1) the educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) educational level of active workers in the field." *Environmental Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 696 (Fed. Cir. 1983), *cert. denied*, 464 U.S. 1043 (1984).

circumstances, general purpose dictionaries may be helpful." *Id.*

In many cases, claim terms have a specialized meaning, and it is necessary to determine what a person of skill in the art would have understood the disputed claim language to mean. "Because the meaning of a claim term as understood by persons of skill in the art is often not immediately apparent, and because patentees frequently use terms idiosyncratically, the court looks to 'those sources available to the public that show what a person of skill in the art would have understood disputed claim language to mean.'" *Phillips*, 415 F.3d at 1314 (quoting *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1116 (Fed. Cir. 2004)). The public sources identified in *Phillips* include "the words of the claims themselves, the remainder of the specification, the prosecution history, and extrinsic evidence concerning relevant scientific principles, the meaning of technical terms, and the state of the art." *Id.* (quoting *Innova*, 381 F.3d at 1116).

In cases in which the meaning of a claim term is uncertain, the specification usually is the best guide to the meaning of the term. *Phillips*, 415 F.3d at 1315. As a general rule, the particular examples or embodiments discussed in the specification are not to be read into the claims as limitations. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 979 (Fed. Cir. 1995) (*en banc*), *aff'd*, 517 U.S. 370 (1996). The specification is, however, always highly relevant to the claim construction analysis, and is usually dispositive. *Phillips*, 415 F.3d at 1315 (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)). Moreover, "[t]he construction that stays true to the claim language and most naturally aligns with the patent's description of the invention will be, in the end, the correct construction." *Id.* at 1316.

Claims are not necessarily, and are not usually, limited in scope to the preferred embodiment. *RF Delaware, Inc. v. Pacific Keystone Techs., Inc.*, 326 F.3d 1255, 1263 (Fed. Cir. 2003); *Decisioning.com, Inc. v. Federated Dep't Stores, Inc.*, 527 F.3d 1300, 1314 (Fed. Cir. 2008) ("[The] description of a preferred embodiment, in the absence of a clear intention to limit claim scope, is an insufficient basis on which to narrow the claims."). Nevertheless, claim constructions that exclude the preferred embodiment are "rarely, if ever, correct and require highly persuasive evidentiary support." *Vitronics*, 90 F.3d at 1583. Such a conclusion can be mandated in rare instances by clear intrinsic evidence, such as unambiguous claim language or a clear disclaimer by the patentees during patent prosecution. *Elekta Instrument S.A. v. O.U.R. Sci. Int'l, Inc.*, 214 F.3d 1302, 1308 (Fed. Cir. 2000); *Rheox, Inc. v. Entact, Inc.*, 276 F.3d 1319 (Fed. Cir. 2002).

If the intrinsic evidence does not establish the meaning of a claim, then extrinsic evidence may be considered. Extrinsic evidence consists of all evidence external to the patent and the prosecution history, and includes inventor testimony, expert testimony, and learned treatises. *Phillips*, 415 F.3d at 1317. Inventor testimony can be useful to shed light on the relevant art. In evaluating expert testimony, a court should discount any expert testimony that is clearly at odds with the claim construction mandated by the claims themselves, the written description, and the prosecution history, in other words, with the written record of the patent. *Id*. at 1318. Extrinsic evidence may be considered if a court deems it helpful in determining the true meaning of language used in the patent claims. *Id.*

B. Infringement

1. Direct Infringement

Under 35 U.S.C. §271(a), direct infringement consists of making, using, offering to sell, or selling a patented invention without consent of the patent owner. The complainant in a section 337 investigation bears the burden of proving infringement of the asserted patent claims by a "preponderance of the evidence." *Certain Flooring Products*, Inv. No. 337-TA-443, Comm'n Notice of Final Determination of No Violation of Section 337, 2002 WL 448690, at *59, (Mar. 22, 2002); *Enercon GmbH v. Int'l Trade Comm'n*, 151 F.3d 1376 (Fed. Cir. 1998).

Literal infringement of a claim occurs when every limitation recited in the claim appears in the accused device, *i.e.*, when the properly construed claim reads on the accused device exactly.[6] *Amhil Enters., Ltd. v. Wawa, Inc.*, 81 F.3d 1554, 1562 (Fed. Cir. 1996); *Southwall Tech. v. Cardinal IG Co.*, 54 F.3d 1570, 1575 (Fed Cir. 1995).

If the accused product does not literally infringe the patent claim, infringement might be found under the doctrine of equivalents. "Under this doctrine, a product or process that does not literally infringe upon the express terms of a patent claim may nonetheless be found to infringe if there is 'equivalence' between the elements of the accused product or process and the claimed elements of the patented invention." *Warner-Jenkinson Co., Inc. v. Hilton Davis Chemical Co.*, 520 U.S. 17, 21 (1997) (citing *Graver Tank & Mfg. Co. v. Linde Air Products Co.*, 339 U.S. 605, 609 (1950)). "The

[6] Each patent claim element or limitation is considered material and essential. *London v. Carson Pirie Scott & Co.*, 946 F.2d 1534, 1538 (Fed. Cir. 1991). If an accused device lacks a limitation of an independent claim, the device cannot infringe a dependent claim. *See Wahpeton Canvas Co. v. Frontier, Inc.*, 870 F.2d 1546, 1552 n.9 (Fed. Cir. 1989).

determination of equivalence should be applied as an objective inquiry on an element-by-element basis."[7] *Id*. at 40.

"An element in the accused product is equivalent to a claim limitation if the differences between the two are insubstantial. The analysis focuses on whether the element in the accused device 'performs substantially the same function in substantially the same way to obtain the same result' as the claim limitation." *AquaTex Indus. v. Techniche Solutions*, 419 F.3d 1374, 1382 (Fed. Cir. 2005) (quoting *Graver Tank*, 339 U.S. at 608); *accord Absolute Software*, 659 F.3d at 1139-40.[8]

Prosecution history estoppel can prevent a patentee from relying on the doctrine of equivalents when the patentee relinquished subject matter during the prosecution of the patent, either by amendment or argument. *AquaTex*, 419 F.3d at 1382. In particular, "[t]he doctrine of prosecution history estoppel limits the doctrine of equivalents when an applicant makes a narrowing amendment for purposes of patentability, or clearly and unmistakably surrenders subject matter by arguments made to an examiner." *Id*. (quoting *Salazar v. Procter & Gamble Co.*, 414 F.3d 1342, 1344 (Fed. Cir. 2005)).

2. Indirect Infringement

a. Induced Infringement

[7] "Infringement, whether literal or under the doctrine of equivalents, is a question of fact." *Absolute Software, Inc. v. Stealth Signal, Inc.*, 659 F.3d 1121, 1130 (Fed. Cir. 2011).

[8] "The known interchangeability of substitutes for an element of a patent is one of the express objective factors noted by *Graver Tank* as bearing upon whether the accused device is substantially the same as the patented invention. Independent experimentation by the alleged infringer would not always reflect upon the objective question whether a person skilled in the art would have known of the interchangeability between two elements, but in many cases it would likely be probative of such knowledge." *Warner-Jenkinson*, 520 U.S. at 36.

Section 271(b) of the Patent Act provides: "Whoever actively induces infringement of a patent shall be liable as an infringer." 35 U.S.C. § 271(b).

Under 35 U.S.C. § 271(b), whoever actively induces infringement of a patent shall be liable as an infringer. In contrast to direct infringement, liability for inducing infringement attaches only if the defendant knew of the patent and that the induced acts constituted patent infringement. *Commil USA, LLC v. Cisco Sys., Inc.*, 135 S. Ct. 1920, 1926 (2015); *see also Microsoft Corp. v. Datatern, Inc.*, 755 F.3d 899, 904 (Fed. Cir. 2014) (to prove induced infringement, patentee must show that accused inducer took an affirmative act to encourage infringement with knowledge that the induced acts constitute patent infringement). Induced infringement requires a finding that the infringer possessed a specific intent to encourage another's infringement. *i4i Ltd. Partnership v. Microsoft Corp.*, 598 F.3d 831, 851 (Fed. Cir. 2010), *aff'd*, 564 U.S. 91 (2011).

b. Contributory Infringement

Section 271(c) of the Patent Act provides: "Whoever offers to sell or sells within the United States or imports into the United States a component of a patented machine, manufacture, combination or composition, or a material or apparatus for use in practicing a patented process, constituting a material part of the invention, knowing the same to be especially made or especially adapted for use in an infringement of such patent, and not a staple article or commodity of commerce suitable for substantial noninfringing use, shall be liable as a contributory infringer." 35 U.S.C. § 271(c).

Section 271(c) "covers both contributory infringement of system claims and method claims."[9] *Arris*, 639 F.3d at 1376 (footnotes omitted). To hold a component supplier liable for contributory infringement, a patent holder must show, inter alia, that (a) the supplier's product was used to commit acts of direct infringement; (b) the product's use constituted a material part of the invention; (c) the supplier knew its product was especially made or especially adapted for use in an infringement" of the patent; and (d) the product is not a staple article or commodity of commerce suitable for substantial noninfringing use. *Id.*

C. Validity

One cannot be held liable for practicing an invalid patent claim. *See Pandrol USA, LP v. AirBoss Railway Prods., Inc.*, 320 F.3d 1354, 1365 (Fed. Cir. 2003). Nevertheless, each claim of a patent is presumed to be valid, even if it depends from a claim found to be invalid. 35 U.S.C. § 282; *DMI Inc. v. Deere & Co.*, 802 F.2d 421 (Fed. Cir. 1986).

A respondent that has raised patent invalidity as an affirmative defense must overcome the presumption by "clear and convincing" evidence of invalidity. *Checkpoint Systems, Inc. v. United States Int'l Trade Comm'n*, 54 F.3d 756, 761 (Fed. Cir. 1995).

1. Obviousness

Under section 103 of the Patent Act, a patent claim is invalid "if the differences between the subject matter sought to be patented and the prior art are such that the subject

[9] "Claims which recite a 'system,' 'apparatus,' 'combination,' or the like are all analytically similar in the sense that their claim limitations include elements rather than method steps. All such claims can be contributorily infringed by a component supplier." *Arris*, 639 F.3d at 1376 n.8.

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."[10] 35 U.S.C. § 103. While the ultimate determination of whether an invention would have been obvious is a legal conclusion, it is based on "underlying factual inquiries including: (1) the scope and content of the prior art; (2) the level of ordinary skill in the art; (3) the differences between the claimed invention and the prior art; and (4) objective evidence of nonobviousness." *Eli Lilly and Co. v. Teva Pharmaceuticals USA, Inc.*, 619 F.3d 1329 (Fed. Cir. 2010).

The objective evidence, also known as "secondary considerations," includes commercial success, long felt need, and failure of others. *Graham v. John Deere Co.*, 383 U.S. 1, 13-17 (1966); *Dystar Textilfarben GmbH v. C.H. Patrick Co.*, 464 F.3d 1356, 1361 (Fed. Cir. 2006). "[E]vidence arising out of the so-called 'secondary considerations' must always when present be considered en route to a determination of obviousness." *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1538 (Fed. Cir. 1983). Secondary considerations, such as commercial success, will not always dislodge a determination of obviousness based on analysis of the prior art. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 426 (2007) (commercial success did not alter conclusion of obviousness).

"One of the ways in which a patent's subject matter can be proved obvious is by noting that there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent's claims." *KSR*, 550 U.S. at 419-20. "[A]ny

[10] The standard for determining whether a patent or publication is prior art under section 103 is the same as under 35 U.S.C. § 102, which is a legal question. *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1568 (Fed. Cir. 1987).

need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed." *Id*.

Specific teachings, suggestions, or motivations to combine prior art may provide helpful insights into the state of the art at the time of the alleged invention. *Id*. at 420. Nevertheless, "an obviousness analysis cannot be confined by a formalistic conception of the words teaching, suggestion, and motivation, or by overemphasis on the importance of published articles and the explicit content of issued patents. The diversity of inventive pursuits and of modern technology counsels against limiting the analysis in this way." *Id*. "Under the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed." *Id*. A "person of ordinary skill is also a person of ordinary creativity." *Id*. at 421.

Nevertheless, "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); *see KSR*, 550 U.S. at 416 (a combination of elements must do more than yield a predictable result; combining elements that work together in an unexpected and fruitful manner would not have been obvious).[11]

[11] Further, "when the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be nonobvious." *KSR*, 550 U.S. at 416 (citing *United States v. Adams*, 383 U.S. 39, 52 (1966)).

2. Enablement

The Patent Act requires that "[t]he full scope of the claimed invention . . . be enabled." *Sitrick v. Dreamworks, LLC*, 516 F.3d 993, 999 (Fed. Cir. 2008); *see also Northpoint Tech. Ltd. v. MDS America Inc.*, 413 F.3d 1301, 1308-10 (Fed. Cir. 2005) (affirming a finding of invalidity for lack of enablement due to the patent's failure to disclose an embodiment with an antenna that met the "directional reception range" limitation of each claim). Namely, "[a] patentee who chooses broad claim language must make sure the broad claims are fully enabled. 'The scope of the claims must be less than or equal to the scope of enablement' to 'ensure[] that the public knowledge is enriched by the patent specification to a degree at least commensurate with the scope of the claims.'" *Sitrick*, 516 F.3d at 999 (quoting *National Recovery Techs., Inc. v. Magnetic Separation Sys., Inc.*, 166 F.3d 1190, 1195-96 (Fed. Cir. 1999)). The enablement requirement is satisfied when one skilled in the art, after reading the specification, could practice the claimed invention without undue experimentation. *AK Steel Corp. v. Sollac & Ugine*, 344 F.3d 1234, 1244 (Fed. Cir. 2003), citing *In re Wands*, 858 F.2d 731, 737 (Fed. Cir. 1988).

> The question of undue experimentation is a matter of degree, and what is required is that the amount of experimentation not be "unduly extensive." *Chiron Corp. v. Genentech, Inc.*, 363 F.3d 1247, 1253 (Fed. Cir. 2004) (quoting *PPG Indus., Inc. v. Guardian Indus., Corp.*, 75 F.3d 1558, 1564 (Fed. Cir. 1996)). For example, the fact that a clinician's involvement may be necessary to determine effective amounts of the single compound effervescent agent and its corresponding soluble acid source does not itself constitute undue experimentation. *See Ortho–McNeil Pharm., Inc. v. Mylan Labs., Inc.*, 520 F.3d 1358, 1365–66 (Fed. Cir. 2008) ("[E]ven if clinical trials informed the anticonvulsively effective amount, this record does not show that extensive or 'undue' tests would be required to practice the invention."). In addition, extensive experimentation does not necessarily render the experiments unduly

> extensive where the experiments involve repetition of known or commonly used techniques. *See Johns Hopkins Univ. v. CellPro, Inc.*, 152 F.3d 1342, 1360 (Fed. Cir. 1998) (finding that the difficulty in producing certain antibodies could not be attributed to the shortcomings in the disclosure of the patent at issue, but rather, the difficulty was attributed to the technique commonly used during experimentation that generally required repetition). Thus, the focus "is not merely quantitative, since a considerable amount of experimentation is permissible, if it is merely routine, or if the specification in question provides a reasonable amount of guidance . . . ." *PPG Indus., Inc.*, 75 F.3d at 1564 (citation and quotation omitted).

Cephalon, Inc. v. Watson Pharms., Inc., 70 F.3d 1330, 1338-39 (Fed. Cir. 2013).

Enablement is determined from the viewpoint of persons of ordinary skill in the field of the invention at the time the patent application was filed. *Ajinomoto Co., Inc. v. Archer-Daniels-Midland Co.*, 228 F.3d 1338, 1345 (Fed. Cir. 2000). A claim in an issued patent can be rendered invalid due to lack of enablement if its scope is not fully enabled. *Id*.

3. Written Description

The issue of whether a patent is invalid for failure to meet the written description requirement of 35 U.S.C. § 112, ¶ 1 is a question of fact. *Bard Peripheral Vascular, Inc. v. W.L. Gore & Assocs., Inc.*, 670 F.3d 1171, 1188 (Fed. Cir. 2012). A patent's written description must clearly allow persons of ordinary skill in the art to recognize that the inventor invented what is claimed. The test for sufficiency of a written description is "whether the disclosure of the application relied upon reasonable conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date." *Id.* (quoting *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (*en banc*)).

4. Indefiniteness

The definiteness requirement of 35 U.S.C. § 112 ensures that the patent claims particularly point out and distinctly claim the subject matter that the patentee regards to be the invention. *See* 35 U.S.C. § 112, ¶ 2; *Metabolite Labs., Inc. v. Lab. Corp. of Am. Holdings*, 370 F.3d 1354, 1366 (Fed. Cir. 2004). If a claim's legal scope is not clear enough so that a person of ordinary skill in the art could determine whether or not a particular product infringes, the claim is indefinite, and is, therefore, invalid. *Geneva Pharm., Inc. v. GlaxoSmithKline PLC,* 349 F.3d 1373, 1384 (Fed. Cir. 2003).[12]

Thus, it has been found that:

> When a proposed construction requires that an artisan make a separate infringement determination for every set of circumstances in which the composition may be used, and when such determinations are likely to result in differing outcomes (sometimes infringing and sometimes not), that construction is likely to be indefinite.

Halliburton Energy Servs. v. M-I LLC, 514 F.3d 1244, 1255 (Fed. Cir. 2008).

The Supreme Court addressed the issue of indefiniteness, and stated that a finding of indefiniteness should not be found if the 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.*, 572 U.S. 898, 910 (2014).

The burden is on the accused infringer to come forward with clear and convincing evidence to prove invalidity. *See Young v. Lumenis, Inc.*, 492 F.3d 1336, 1344 (Fed. Cir.

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[12] Indefiniteness is a question of law. *IGT v. Bally Gaming Int'l, Inc.*, 659 F.3d 1109 (Fed. Cir. 2011).

2007) ("A determination that a patent claim is invalid for failing to meet the definiteness requirement in 35 U.S.C. § 112, ¶ 2 is a legal question reviewed de novo.").

D. Patentability Under 35 U.S.C. § 101

In *Alice Corp. Pty. Ltd. v. CLS Bank International*, the Supreme Court reaffirmed a two-step inquiry to determine whether claims "are directed to a patent-ineligible concept" under section 101, such as an abstract idea. 573 U.S. 208, 218 (2014). Step one "look[s] at the focus of the claimed advance over the prior art to determine if the claim's character as a whole is directed to excluded subject matter." *Koninklijke KPN N.V. v. Gemalto M2M GmbH ("KPN")*, 942 F.3d 1143, 1149 (Fed. Cir. 2019). The Federal Circuit has "caution[ed] against 'overgeneralizing claims' in the § 101 analysis, explaining that characterizing the claims at 'a high level of abstraction' that is 'untethered from the language of the claims all but ensures that the exceptions to § 101 swallow the rule.'" *TecSec, Inc. v. Adobe Inc.*, 978 F.3d 1278, 1294 (Fed. Cir. 2020) (quoting *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1337 (Fed. Cir. 2016)). At step one, a court cannot "disregard elements of the claims at issue that the specification makes clear are important parts of the claimed advance in the combination of elements." *Id*. Claims that are "directed to a specific improvement in the capabilities of computing devices" are not abstract, and the *Alice* inquiry ends. *Core Wireless Licensing S.A.R.L. v. LG Elecs., Inc.*, 880 F.3d 1356, 1361 (Fed. Cir. 2018).

Even if the claims are directed to ineligible material at step one, the claims are nonetheless eligible at step two if the claims add "an 'inventive concept.'" *Alice*, 573 U.S. at. 217-18. "[A]n inventive concept can be found in the non-conventional and non-generic arrangement of known, conventional pieces." *BASCOM Global Internet Servs. v.*

AT&T Mobility LLC, 827 F.3d 1341, 1350 (Fed. Cir. 2016). The party challenging the claims must establish that the additional elements, individually or in combination, do not "involve more than performance of well-understood, routine, and conventional activities previously known to the industry." *Aatrix Software, Inc. v. Green Shades Software, Inc.*, 882 F.3d 1121, 1128 (Fed. Cir. 2018). "The question of whether a claim element or combination of elements is well-understood, routine and conventional to a skilled artisan in the relevant field is a question of fact … [that] must be proven by clear and convincing evidence." *Berkheimer v. HP Inc.*, 881 F.3d 1360, 1368 (Fed. Cir. 2018).

E. Domestic Industry

A violation of section 337(a)(1)(B), (C), (D), or (E) can be found "only if an industry in the United States, with respect to the articles protected by the patent, copyright, trademark, mask work, or design concerned, exists or is in the process of being established." 19 U.S.C. § 1337(a)(2). Section 337(a) further provides:

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

19 U.S.C. § 1337(a)(3).

These statutory requirements consist of an economic prong (which requires certain activities) and a technical prong (which requires that these activities relate to the intellectual property being protected). *Certain Stringed Musical Instruments and*

Components Thereof, Inv. No. 337-TA-586, Comm'n Op. at 13 (May 16, 2008) ("*Stringed Musical Instruments*"). The burden is on the complainant to show by a preponderance of the evidence that the domestic industry requirement is satisfied. *Certain Multimedia Display and Navigation Devices and Systems, Components Thereof, and Products Containing Same*, Inv. No. 337-TA-694, Comm'n Op. at 5 (July 22, 2011) ("*Navigation Devices*").

IV. U.S. Patent No. 7,944,935

United States Patent No. 7,944,935 ("the '935 patent), entitled "Method for Priority Based Queuing and Assembling of Packets," issued on May 17, 2011, to named inventors Paul Bucknell, Matthew P.J. Baker and Timothy J. Moulsley. JX-0001 ('935 Patent). The '935 patent issued from Application No. 11/718,720, filed on May 7, 2007, which claims priority to GB 0424918.1 filed on November 11, 2004. *Id.* The '935 patent relates to "a method of multiplexing data packets, to a multiplexing apparatus for multiplexing data packets, to a communication terminal comprising the multiplexing apparatus, and to a communication system comprising the communication terminal. The invention has application in, for example but not exclusively, mobile communication systems such as the Universal Mobile Telecommunication System (UMTS)." JX-0001 at 1:4-12. The '935 patent has a total of 18 claims. Complainants assert independent method claim 1, and dependent method claims 2 and 3, and independent apparatus claim 9, and dependent apparatus claims 10, 11, and 17 of the '935 patent. *See* Joint Outline at 3; Staff Br. at 6.

As noted, complainants assert independent method claim 1, and dependent method claims 2 and 3, and independent apparatus claim 9, and dependent apparatus claims 10, 11, and 17 of the '935 patent. *See* Joint Outline at 3; Staff Br. at 6.

Asserted method claims 1-3, and apparatus claims 9-11, and 17 of the '935 patent read as follows:

> **1**. [pre] A microprocessor-based method of multiplexing data packets having different assigned priorities, comprising:
>
> [1.1] receiving data packets;
>
> [1.2] operating a ***queue*** for each different priority of data packet;
>
> [1.3] assembling a group of the data packets wherein a first portion of the group is populated with data packets selected from one or more of the ***queues*** according to a first rule and a second portion of the group is populated with data packets selected from one or more of the ***queues*** according to a second rule; and
>
> [1.4] ***transmitting the group***, wherein ***the size of the first and second portions is adapted according to the delay experienced by data in each queue relative to a delay criterion for the respective queue***.
>
> **2**. The method of multiplexing as claimed in claim 1 wherein according to the first rule data packets are selected from the queue containing the highest priority of the data packets.
>
> **3**. The method of multiplexing as claimed in claim 1, wherein according to the second rule data packets are selected from one or more of the queues containing data packets having a lower priority than the highest priority.
>
> **9**. [pre] A multiplexing apparatus for multiplexing data packets having different assigned priorities, comprising:
>
> [9.1] means for receiving data packets;
>
> [9.2] ***means for operating a queue store for each different priority of data packet***;
>
> [9.3] ***means for assembling a group of the data packets*** wherein a first portion of the group is populated

> with data packets by selecting data packets from one or more of the ***queue stores*** according to a first rule and a second portion of the group is populated with data packets by selecting data packets from one or more of the queue stores according to a second rule; and
>
> [9.4] ***means for transmitting the group***, wherein ***the size of the first and second portions is adapted according to the delay experienced by data in each queue relative to a delay criterion for the respective queue***.
>
> **10**. The multiplexing apparatus as claimed in claim 9 wherein according to the first rule data packets are selected from the ***queue store*** containing the highest priority of the data packets.
>
> **11**. The multiplexing apparatus as claimed in claim 9, wherein according to the second rule data packets are selected from one or more of the queue stores containing data packets having a lower priority than the highest priority.
>
> **17**. A communication terminal comprising the multiplexing apparatus as claimed in claim 9.

JX-0001 (‘935 Patent) at 6:5-26, 6:48-7:4, 8:9-10 (emphasis added).

A. Claim Construction

1. A Person of Ordinary Skill in the Art

Complainants argue:

> As explained by Philips’ experts, a POSA with respect to the claimed inventions would have at least a bachelor’s degree in computer science, electrical engineering, computer engineering, or a related field, with 3-5 years’ experience wireless communications systems, including familiarity with UMTS. *See* CX-0012C (Lanning WS) at Q/A 23; CX-2398C (Jackson WS) at Q/A 19.

Compls. Br. at 25.

Respondents argue:

> Respondents defined the applicable level of a POSA as having at least a Bachelor’s degree in computer science, electrical engineering,

> computer engineering, or a related field, with 2-3 years of experience in wireless communication systems and/or networking, with superior education compensating for less work experience. RX-3212 (Bims WS) at Q/A 10, 11; RX-3341C (Min RWS) at Q/A 10. Philips did not provide any description of a POSA in its prehearing brief, despite Ground Rule 7c. Staff P.H. Br. at 18. Staff agrees with Respondents' definition of a POSA. *Id.* There is no meaningful difference in the POSA levels proposed by the parties during discovery as to any of the asserted patents. RX-3212 (Bims WS) at Q/A 11; RX-3341C (Min RWS) at Q/A 10; RX-3215C (Wells RWS) at Q/A 22; RX-3214C (Akl RWS) at Q/A 15-16.

Resps. Br. at 15-16.

The Staff argues:

> Respondents contend that the applicable level of ordinary skill in the art as having at least a Bachelor's degree in computer science, electrical engineering, computer engineering, or a related field, with 2-3 years of experience in wireless communication systems and/or networking, with superior education compensating for less work experience. *See* Resps.P.H.Br. at 24, fn 21. Philips did not provide a contention in its pre-hearing brief, and thus any argument regarding one of ordinary skill in the art has been abandoned/withdrawn. *See* Ground Rule 7.c. Staff agrees with Respondents' contention.

Staff Br. at 18 (footnote omitted).

round Rule 7.c. states:

> A statement of the issues to be considered at the hearing that sets forth with particularity a party's contentions on each of the proposed issues, including citations to supporting facts and legal authorities, *e.g.*, proposed exhibits. ***Incorporation by reference is not allowed. Any contentions not set forth in detail as required therein shall be deemed abandoned or withdrawn***, except for contentions of which a party is not aware and could not be aware in the exercise of reasonable diligence at the time of filing the prehearing statement. The prehearing statement and the brief may be combined into one document.

Order No. 2 (Ground Rules) (Jan. 21, 2021) at 11 (emphasis added).

Despite the unambiguous requirements of Ground Rule 7.c, complainants did not provide any definition of a person of ordinary skill in the art ("POSA" or "POSITA") in their prehearing brief. *See* Compls. P.H. Br. *generally*.[13] Complainants' belated argument in their posthearing brief does not cure this clear defect. Therefore, complainants' contention concerning the definition of a POSA was waived.

As proposed by respondents and the Staff, the administrative law judge finds that a person of ordinary skill in the art with respect to the '935 patent is a person who has at least a bachelor's degree in computer science, electrical engineering, computer engineering, or a related field, with 2-3 years of experience in wireless communication systems and/or networking, with superior education compensating for less work experience. *See* RX-3212 (Bims WS) at Q/A 10, 11; RX-3341C (Min RWS) at Q/A 10.

2. "delay criterion" (claims 1, 9)

Below is a chart showing the parties' proposed claim constructions.

Complainants' Construction	Respondents' Construction	Staff's Construction
"A principle or standard indicating an amount of delay, such as the duration of time waiting in the respective queue, or the amount of data in the respective queue"	"a predetermined duration of time for waiting in the respective queue"	"a predetermined duration of time for waiting in the respective queue"

Compls. Br. at 42; Resps. Br. at 26; Staff Br. at 21.

[13] Complainants, however, provided arguments using a "person of ordinary skill in the art" throughout their claim construction and invalidity sections of their prehearing brief, albeit, without the benefit of a clear definition of such a person. *See* Compls. P.H. Br. *generally*.

For the reasons discussed below, the administrative law judge has determined that the claim term "delay criterion" should be construed to mean "a predetermined duration of time for waiting in the respective queue."

The asserted claims recite adapting the size of the first and second portion according to the delay experienced by data in each queue relative to a delay criterion. *See* JX-0001 ('935 Patent) at claim 1 ("the size of the first and second portions is adapted according to the delay experienced by data in each queue relative to a delay criterion for the respective queue"), and claim 9 ("the size of the first and second portions is adapted according to the delay experienced by data in each queue relative to a delay criterion for the respective queue"). As both respondents' experts Dr. Bims and Dr. Min testified,[14] a POSA would have understood "delay" to refer to an amount of time. *See* RX-3212 (Bims WS) at Q/A 77, 82; RX-3341C (Min RWS) at Q/A 145, 149, 151.

The specification distinguishes delay as a separate metric from an amount of data in regard to adapting the first and second portions. The transmission delay, amount of data in a queue, and priorities of data packets are each independent metrics that may be used to guide adaptation of the portions. *See* JX-0001 ('935 Patent) at 2:23-28, 3:46-55, 1:40-45, 2:17-28, 3:38-41; RX-3212 (Bims WS) at Q/A 77, 82; RX-3341C (Min RWS) at Q/A 146-147, 149, 151-152. The specification also expressly uses "occupancy threshold" as an alternative to a "delay threshold," indicating that delay refers to time and not an amount of data. JX-0001 ('935 Patent) at 3:33-43 (separately describing "delay

[14] Both experts were accepted as experts in the field of telecommunications, including cellular communication technologies and the fields to which the asserted patents are directed. *See* Brogioli Tr. 711; Bims Tr. 1011.

threshold" in the context of "experience[ing] delay" and "occupancy threshold" as a "number of data packets").

An indication that "delay criterion" refers to a duration of time is further found in the specification describing adapting the portions according to Quality of Service ("QoS") requirements. *See* JX-0001 ('935 Patent) at 5:10-15; RX-3212 (Bims WS) at Q/A 77, 82; RX-3341C (Min RWS) at Q/A 148. The delay requirements (*e.g.*, QoS) are defined in terms of time, such as milliseconds. Named inventor Paul Bucknell testified that "QoS delay requirement[]," a well-known "very generic term," is "the minimum time for the transmission of that packet," JX-0019C at 61:9-22, 62:4-12, further confirming that a POSA would understand "delay" in the specification to refer specifically to time, not data. *See* RX-341C (Min RWS) at Q/A 148.

The specification also states that delay requirements (*i.e.,* time) are distinct from bit rate requirements (*i.e.*, amount of data over time). *See* JX-0001 ('935 Patent) at 1:40-45 ("Strictly priority-based multiplexing of MAC-d PDUs into the MAC-e PDUs will not always lead to the optimal filling of the MAC-e PDUs and would be too inflexible to satisfy all QoS (Quality of Service) requirements for PDUs, such as delay requirements and bit rate requirements."); RX-3212 (Bims WS) at Q/A 78; RX-3341C (Min RWS) at Q/A 153. This means the "size" and "delay" of a queue are two different things. For example, there can be two queues with the same amount of data stored in each, but that does not mean that the data in both queues has experienced the same delay because data in one queue may have waited in its queue longer than the data in the other queue.

During prosecution, the applicants amended the independent claims to add "wherein the size of the first and second portions is adapted according to the delay experienced by data in each queue relative to a delay criterion for the respective queue," and distinguished the Abel prior art reference on the basis that it disclosed a token bucket procedure that transmits data by consuming credits accumulated by a queue.[15] *See* RX-3341C (Min RWS) at Q/A 32-35, 155-56; JX-0005.102-103 ('935 Patent Prosecution History); JX-0005.115-121. By making this amendment and argument, the applicants rejected any scope for delay covering adjusting the amount of data selected based on available credits/tokens. Thus, a POSA at the time of the '935 patent would understand the term "delay criterion" to mean "a predetermined duration of time for waiting in the respective queue," not an amount of credits as described in Abel. The applicants also distinguished the Hosein prior art reference on the basis that it disclosed changing the data rate of the queue (*i.e.*, throughput) rather than adapting the size of the portions within a transmission. *See* JX-0005.160-161 ('935 Patent Prosecution History); RX-3212 (Bims WS) at Q/A 78; RX-3341C (Min RWS) at Q/A 156.

Accordingly, a POSA at the time of the '935 patent would understand that in the context of the claims, specification, and prosecution history "delay experienced" refers to "wait time encountered" and "delay criterion" refers to "a predetermined duration of time for waiting in the respective queue" as proposed by the Staff and respondents.

3. "queue" (claim 1) / "queue store" (claim 9)

Below is a chart showing the parties' proposed claim constructions.

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[15] Complainants' expert offered no opinions concerning the prosecution history of the '935 patent. *See* Brogioli Tr. 403.

"queue"		
Complainants' Construction	**Respondents' Construction**	**Staff's Construction**
"a collection of data packets in sequence"	"distinct memory for storing data packets in sequence"	Same as Respondents
"queue store"		
Complainants' Construction	**Respondents' Construction**	**Staff's Construction**
"memory for storing data packets in sequence"	"distinct memory for storing data packets in sequence"	Same as Respondents

Compls. Br. at 47; Resps. Br. at 29; Staff Br. at 23.

For the reasons discussed below, the administrative law judge has determined that the claim terms "queue" and "queue store" should be construed to mean "distinct memory for storing data packets in sequence."

Method claim 1 recites "operating a queue for each different priority of data packet," and apparatus claim 9 recites a means for "operating a queue store for each different priority of data packet." JX-0001 ('935 Patent) at claim 1, 9. The claims and specification use the terms "queue" and "queue store" interchangeably. *See* Brogioli Tr. 773-774; JX-0001 ('935 Patent) at claims 1, 9, Fig. 3 (step 210), 3:60-64.

Inasmuch as the claim language specifies a queue (or queue store) for storing data packets "for each different priority of data packet," it follows that distinct locations must exist for storing data packets having different priorities. *See* RX-3341C (Min RWS) at Q/A 84; RX-3212 (Bims WS) at Q/A 53. Figure 3, which illustrates the method of multiplexing, indicates "stor[ing] data packets in queues according to priority" at step

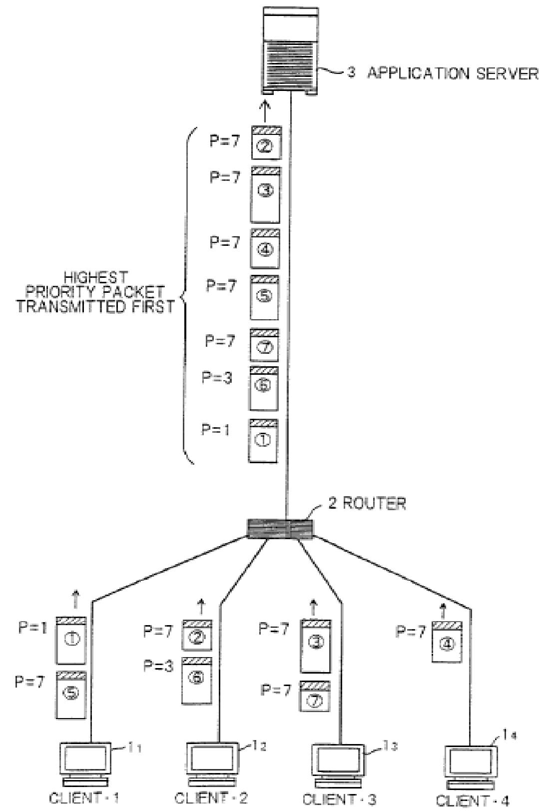
210. *See* JX-0001 (‘935 Patent) at Fig. 3, 3:56-64. Thus, a POSA would interpret “queue” / “queue store” to mean a distinct memory for storing data packets in sequence. *See* JX-0001 (‘935 Patent) at 3:60-61 (“one queue store for each priority level”); RX-3212 (Bims WS) at Q/A 53; RX-3341C (Min RWS) at Q/A 84.

The specification also confirms distinct queues/queue stores for data packets having different priorities. *See* RX-3212 (Bims WS) at Q/A 53; RX-3341C (Min RWS) at Q/A 84. For example, Figure 1 of the ‘935 patent, as described at 1:31-34, “shows queues 5 of MAC-d PDUs having different priorities”). *See* JX-0001 (‘935 Patent) at Fig. 1. In addition, Figure 2, *id.* at 2:65-3:1, depicts the queue stores as separate memory locations, namely, “a plurality of queue stores 50 for containing queues and which may comprise a storage medium such as random access memory.” *See* JX-0001 (‘935 Patent), Fig.2, 2:65-3:1; RX-3212 (Bims WS) at Q/A 53; RX-3341C (Min RWS) at Q/A 15-19, 84.

The ‘935 patent does not disclose a single memory that houses all data packets, including those having different priority. Therefore, in the context of the ‘935 patent, a POSA would understand that the term “a queue” and “a queue store” as used in the asserted claims to mean “distinct memory for storing data packets in sequence.” *See* RX-3212 (Bims WS) at Q/A 52-53; RX3341C (Min RWS) at Q/A 83-84.

During prosecution, the applicants argued that the asserted prior art did "not operate a queue for each different priority of data packets as required by claim 1."[16] *See* JX-0005. 71 ('935 Patent Prosecution History); JX-0005.90; RX-3212 (Bims WS) at Q/A 54; RX-3341C (Min RWS) at Q/A 24-25, 28-30, 85; *Rheox, Inc. v. Entact, Inc.*, 276 F.3d 1319, 1325 (Fed. Cir. 2002) ("The prosecution history limits the interpretation of claim terms so as to exclude any interpretation that was disclaimed during prosecution.").

FIG. 9 PRIOR ART



Specifically, the examiner cited to Figure 9 of the Yamamoto reference (RX-0181), reproduced below. The examiner observed that Yamamoto taught "queuing, via FIFOs [first in/first out buffers] between the clients 1_{1-4} operating as a sender and "a router 2, for each different priority 1, 3, and 7 of data packet 1-7. JX-0005. 71 ('935 Patent Prosecution History); RX-3341C (Min RWS) at Q/A 29, 85; RX-3212 (Bims WS) at Q/A 54. In response, the applicants argued that the prior art did not show queues for each different priority but a single queue for all data packets regardless of the priority of the data packet:

> Yamamoto at Fig. 9 seems to illustrate three different priority levels for packets, e.g. priority level 7, priority level 3, and priority level 1.

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[16] As noted, Philips's expert offered no opinions concerning the prosecution history of the '935 patent. Brogioli Tr. 403.

> However, **Yamamoto does not disclose operating a queue for each different priority level of data packets**. For example, Yamamoto does not operate **a queue** for priority level 7 data packets, **another queue** for priority level 3 packets, and **another queue** for priority 1 packets. Therefore, Yamamoto does not disclose operating a queue for each different priority of data packet as set forth in claim 1. Thus, claim 1 is not anticipated by Yamamoto.

JX-0005.90-91 (‘935 Patent Prosecution History) (emphasis added); RX-3212 (Bims WS) at Q/A 54; RX-3341C (Min RWS) at Q/A 30, 85. The applicants expressly argued that a single memory including multiple priorities was not covered by the claims, whereas the claims required a distinct queue for each data packet priority. *See* RX-3341C (Min RWS) at Q/A 30, 85; JX-0005.90. Thus, based on the prosecution history, a POSA would understand the term “a queue” and “a queue store,” as used in the asserted claims, to mean “distinct memory for storing data packets in sequence.” *See* RX-3212 (Bims WS) at Q/A 54; RX-3341C (Min) at Q/A 30, 85.

Although the applicants’ arguments resulting in disclaimer did not directly result in an allowance or fully persuade the examiner, disclaimer still applies as a matter of law. *Microsoft Corp. v. Multi-Tech Sys., Inc.*, 357 F.3d 1340, 1350 (Fed. Cir. 2004) (“a patentee’s statements during prosecution, whether relied on by the Examiner or not, are relevant to claim interpretation”); *Seachange Intern., Inc. v. C-COR, Inc.*, 413 F.3d 1361, 1374 (Fed. Cir. 2005) (rejecting patentee’s argument that since examiner did not rely on argument for patentability, argument should not serve to limit claim). Thus, the construction of this term must be consistent with the applicants’ disclaimer of scope during prosecution. *Bell Atlantic Network Serv. v. Covad Comm’cns*, 262 F.3d 1258, 1269 (Fed. Cir. 2001) (“The prosecution history is considered to determine whether or not there were any express representations made in obtaining the patent regarding the scope and meaning of the claims.”).

Accordingly, the specification and prosecution history support the meaning of “queue” and “queue store” as meaning “distinct memory for storing data packets in sequence.” Complainants’ proposed constructions of “a queue store” as “memory for storing data packets in sequence” and “a queue” as “[a] collection of data packets in sequence” would permit a single queue to store all data packets regardless of different priorities, which is inconsistent with the intrinsic record. *See* RX-3212 (Bims WS) at Q/A 55; RX-3341C (Min RWS) at Q/A 86; Brogioli Tr. 731-732.

4. “means for operating a queue store for each different priority of data packet” (claim 9)

Below is a chart showing the parties’ proposed claim constructions.

Complainants’ Construction	Respondents’ Construction	Staff’s Construction
Subject to 35 U.S.C. § 112, ¶ 6 <u>Function</u>: operating a queue store <u>Structure</u>: one or more routing switches and memory and equivalents thereof (e.g., Figure 2 (items 30, 50))	means plus function term under Section 112 ¶ 6 <u>Function</u>: operating a queue store for each different priority of data packet <u>Structure</u>: microprocessor (110), input buffer (20), first routing switch (30), and bank 40 (memory), and equivalents thereof	Subject to 35 U.S.C. § 112, ¶ 6 <u>Function</u>: same as Respondents <u>Structure</u>: same as Respondents

Compls. Br. at 49; Resps. Br. at 33; Staff Br. at 28.

For the reasons discussed below, the administrative law judge has determined that the claim term “means for operating a queue store for each different priority of data packet" should be construed as a means-plus-function limitation as proposed by respondents and the Staff.

The parties agree that this is a means plus function term subject to 35 U.S.C.§ 112 ¶ 6. JX-0014 (Corrected Joint Proposed Claim Construction Chart) at 11-12. Respondents and the Staff agree that based on the claim language, the function performed by this means element is "operating a queue store for each different priority of data packet" (RX-3212 (Bims WS) at Q/A 100; RX-3341C (Min RWS) at Q/A 191-92), and that the corresponding structure for this function is a microprocessor (110), input buffer (20), first routing switch (30), and bank 40 (memory), and equivalents thereof. *See* Resps. Br. at 33; Staff Br. at 28; RX-3212 (Bims WS) at Q/A 55, 101; RX-3341C (Min RWS) at Q/A 191-94; JX-0001 ('935 Patent) at 2:61-3:26 (describing the operation of control means 110, input buffer (20), first routing switch (30), and memory bank 40).

Figure 2 shows how queues are operated for each different priority of data packet. *See* RX-3212 (Bims WS) at Q/A 101; RX-3341C (Min RWS) at Q/A 191-193; JX-0001 ('935 Patent) at 2:61-3:26 (describing operation of control means 110, input buffer (20), first routing switch (30), and memory bank 40).

Complainants, on the other hand, did not include any argument or analysis in support of its proposed construction for this term in its prehearing brief and therefore waived their construction under Ground Rule 7.c. *See* Compls. P.H. Br. at 130-203.

Figure 2 in the specification, as described in JX-0001 ('935 Patent) at 2:61-3:26, depicts how queues are operated for each different priority of data packet. *See* RX-3212 (Bims WS) at Q/A 101; RX-3341C (Min RWS) at Q/A 191-193; JX-0001 ('935 Patent) at 2:61-3:26 (describing operation of control means 110, input buffer (20), first routing switch (30), and memory bank 40).

5. “the size of the first and second portions is adapted according to the delay experienced by data in each queue relative to a delay criterion for the respective queue” (claims 1, 9)

Below is a chart showing the parties’ proposed claim constructions.

Complainants’ Construction	Respondents’ Construction	Staff’s Construction
“The amounts of the first and second portions of data are adapted according to the delay experienced [as construed] in each queue relative to a delay criterion [as construed] for the respective queue”	Indefinite	“the amount of memory for each of the first portion and the second portion is made suitable according to the *delay experienced* [as construed] in each *queue* [construed below] relative to a *delay criterion* [as construed] for the respective queue”

Compls. Br. at 49; Resps. Br. at 34; Staff Br. at 26.

For the reasons discussed below, the administrative law judge has determined that the claim term “the size of the first and second portions is adapted according to the delay experienced by data in each queue relative to a delay criterion for the respective queue” should be construed to mean “the amount of memory for each of the first portion and the second portion is made suitable according to the delay experienced in each queue relative to a delay criterion for the respective queue.”

The Staff and complainants are largely in agreement, the only difference being that the Staff’s proposed construction clarifies that “the size of the first and second portions” means the “amount of memory,” and “adapted” means “made suitable.” Other than arguing that this term in not indefinite (Compls. P.H. Br. at 194-96), complainants did not submit an argument in their prehearing brief in support of their proposed construction, or that the Staff's proposed construction is improper. Thus, complainants have abandoned any proposed construction for this term. *See* Ground Rule 7.c; Compls. P.H. Br. at 130-203.

The Staff's construction is consistent with the specification, which, as discussed above with respect to "delay criterion," discloses that the first portion 90 and second portion 95 are portions of memory within buffer 80, and the size of memory for the first and second portions can be changed (or made suitable) (*i.e.*, adapted) according to the delay experienced in each queue relative to a delay criterion for the respective queue:

> The control means 110 may adapt the size of the first portion 90 and the second portion 95 according to the prevailing mix of priorities of the data packets stored in the bank 40, or according to the amount of data packets stored in the queue stores 50, or according to the delay experienced by data packets in each queue store 50 ***relative to a delay criterion for the respective queue***, or according to a received signal indicative of a mix of first and second portions. In the latter case, the mix may comprise, for example, ***an indication of relative proportions or absolute sizes***.

JX-0001 ('935 Patent) at 3:45-55 (emphasis added).

> At step 220 a first portion 90 of a group of data packets is assembled from data packets having the highest priority of the stored data packets. At step 230 a second portion 95 of a group of data packets is assembled from data packets having a lower priority, or lower priorities. At step 240 the assembled group comprising the first portion 90 and second portion 95 is transmitted. The process is repeated for further data packets.
>
> Some examples are given below of how the data packets may be selected from the queues in the queue stores 50 to populate the group of data packets assembled in the first portion 90 and second portion 95 of the output buffer 80. In general ***we can assume that the resources available for the first portion 90 and the second portion 95 are both known before the multiplexing operation is carried out***, for example in terms of the

> number of PDU's which can be transmitted. ***In the case that the resources are not known exactly in advance***, for example if the total available resource depends in any way on the outcome of the multiplexing, ***it may be necessary to consider the outcome of the multiplexing for a number of possible resource allocations and then select one of them***.
>
> ...
>
> 3) As a variation on 2), ***if the resource available for the first portion 90 is not fully used, then the unused resource can be made available for the second portion 95***.
>
> ....
>
> 11) ***The size of the resource for each portion 90, 95 can be adapted to take into account the amount of data in each queue, for example dividing the resource in a way which is proportional to the amount of data in the relevant queues***.
>
> 12) ***The size of the resource for each portion 90, 95 can be adapted to take into account the QoS requirements of the data in each queue, for example dividing the resource in a way which gives more resource to the selection which has the strictest QoS requirements***.
>
> 13) ***The size of the resource for each portion 90, 95 can be adapted to take into account the QoS currently being achieved for the data in each queue, for example dividing the resource in a way which gives more resource to the portion 90, 95 which is not meeting, or is furthest from meeting, any delay requirements***.

Id. at 3:64-5:15 (emphasis added).

In addition, the dictionary definition of "adapt" ("to make suitable or fit (as for a new use or for a different situation"))[17] is consistent with the specification's disclosure that the delay criterion is a predetermined duration of time for waiting.

6. "means for receiving data packets" (claim 9)

Below is a chart showing the parties' proposed claim constructions.

[17] *See* Staff's Proposed Constructions (EDIS Doc. ID No. 739370 (attached 2004 Merriam-Webster dictionary definitions of "adapt") (Apr. 8, 2021)).

Complainants' Construction	Respondents' Construction	Staff's Construction
Subject to 35 U.S.C. § 112, ¶ 6 <u>Function</u>: receiving data packets <u>Structure</u>: an input and equivalents thereof	means plus function term under Section 112 ¶ 6 <u>Function</u>: receiving data packets <u>Structure</u>: Multiplexing apparatus (300) having input (10) (e.g., a transceiver (310)) and input buffer (20)	Subject to 35 U.S.C. § 112, ¶ 6 <u>Function</u>: receiving data packets <u>Structure</u>: input (10), and equivalents thereof.

Compls. Br. at 50; Resps. Br. at 37; Staff Br. at 29-30.

Complainants did not argue or submit an analysis of its proposed construction for this term in their prehearing brief, and thus have abandoned any contention for this term. *See* Ground Rule 7.c;[18] Compls. P.H. Br. at 130-203.

Claim 9 recites "means for receiving data packets." JX-0001 ('935 Patent) at claim 9. The function proposed by respondents and the Staff, "receiving data packets," comes directly from the claim language.

The specification demonstrates that the structure for receiving data packets is an "input 10." JX-0001 ('935 Patent) at 2:61-63) ("There is an input 10 for receiving data packets.").

Respondents seek to include as structure multiplexing apparatus 300, which also includes a transceiver 310 and input buffer 20. *See* Resps. Br. at 37; RX-3341C (Min

[18] In the prehearing brief, complainants argued that the accused products satisfy this limitation, but did not present an argument to support their proposed construction for the term. *See* Compls.P.H.Br. at 155.

RWS) at Q/A 189. However, respondents' proposed structure is over-inclusive because it includes structure that does much more than receive data packets.

Accordingly, the administrative law judge has determined that the claim term "means for receiving data packets" should be construed as a means-plus-function limitation as proposed by the Staff.

7. "means for assembling a group of the data packets …" (claim 9)[19]

Below is a chart showing the parties' proposed claim constructions.

[19] The entire claim term to construe is: "means for [4] assembling a group of the data packets wherein a first portion of the group is populated with data packets by [1] selecting data packets from one or more of the queue stores according to a first rule and [2] a second portion of the group is populated with data packets by selecting data packets from one or more of the queue stores according to a second rule …. [3] wherein the size of the first and second portions is adapted according to the delay experienced by data in each queue relative to a delay criterion for the respective queue." *See* JX-0014 (Corrected Joint Proposed Claim Construction Chart) at 7-8.

Complainants' Construction	Respondents' Construction	Staff's Construction
Subject to 35 U.S.C. § 112, ¶ 6 Function: assembling a group of data packets Structure: one or more routing switches, an output buffer or other storage, and equivalents thereof (e.g., Figure 2 (items 60, 70, 80, 110))	means plus function term under Section 112 ¶ 6 Function: assembling a group of data packets wherein a first portion of the group is populated with data packets by selecting data packets from one or more of the queue stores according to a first rule and a second portion of the group is populated with data packets by selecting data packets from one or more of the queue stores according to a second rule wherein the size of the first and second portions is adapted according to the delay experienced by data in each queue relative to a delay criterion for the respective queue Structure: indefinite under § 112, ¶ 6 for lack of structure	Subject to 35 U.S.C. § 112, ¶ 6 Function: (1) selecting data packets from one or more of the queue stores according to a first rule for populating a first portion of a group of data packets, (2) selecting data packets from one or more of the queue stores according to a second rule for populating a second portion of the group of data packets, (3) adapting the size of the first and second portions according to the delay experienced by data in each queue relative to a delay criterion for the respective queue, and (4) assembling the first and second portions of the group. Structure: Controller 110, routing switch 60, switch 70, output memory buffer 80, first portion 95 of output memory buffer 80, second portion 90 of output memory buffer 80, and the specific algorithm(s) disclosed at '935, at 4:5-5:15, and equivalents thereof, for performing the recited function.

Compls. Br. at 50; Resps. Br. at 38; Staff Br. at 31.

For the reasons discussed below, the administrative law judge has determined that the claim term "means for assembling a group of the data packets …" should be construed as a means-plus-function limitation as proposed by the Staff.

The parties agree that this is a means-plus-function term subject to 35 U.S.C. § 112, ¶ 6. As a means-plus-function term, the claimed function includes the four functions set forth in the claim term, as set forth and proposed by the Staff and respondents.

The specification discloses that the hardware structure of Figure 2 (shown below) performs the recited functions, which includes controller 110, routing switch 60, switch 70, output memory buffer 80, first portion 95 of output memory buffer 80, second portion 90 of output memory buffer 80.

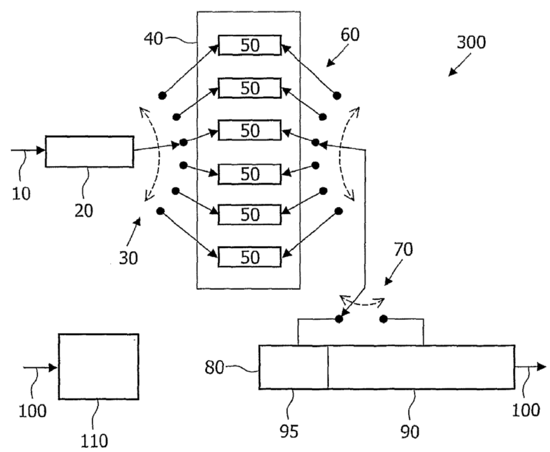

FIG. 2

JX-0001 ('935 Patent), Figure 2; *see also id.* at 2:61-3:26.

The specification further discloses that the controller 110 adapts the sizes of the first portions and the second portions 90, 95 according to delay experienced relative to a delay criterion:

> The ***control means 110 may adapt the size of the first portion 90 and the second portion 95*** according to the prevailing mix of priorities of

> the data packets stored in the bank 40, or according to the amount of data packets stored in the queue stores 50, or ***according to the delay experienced by data packets in each queue store 50 relative to a delay criterion for the respective queue***, or according to a received signal indicative of a mix of first and second portions. In the latter case, the mix may comprise, for example, an indication of relative proportions or absolute sizes.

JX-0001 ('935 Patent) at 3:46-55 (emphasis added).

A POSA would understand that the algorithms for performing the recited functions are programmed in a microprocessor of controller 110. *See* RX-3212C (Bims WS) at Q/A 42. The associated structure must be a special purpose computer/microprocessor programmed to carry out the disclosed algorithms for performing the claimed functions. The '935 patent specification discloses the following, which is one or more algorithms for performing the claimed functions (functions (1) – (4) of the Staff's proposed construction):

> ***<u>Some examples are given below of how the data packets may be selected from the queues in the queue stores 50 to populate the group of data packets assembled in the first portion 90 and second portion 95 of the output buffer 80</u>***. In general we can assume that the resources available for the first portion 90 and the second portion 95 are both known before the multiplexing operation is carried out, for example in terms of the number of PDU's which can be transmitted. In the case that the resources are not known exactly in advance, for example if the total available resource depends in any way on the outcome of the multiplexing, it may be necessary to consider the outcome of the multiplexing for a number of possible resource allocations and then select one of them.
>
> 1) Strict priority based selection: In this case each MAC-d flow is assigned a priority. Then for the first selection, data packets are taken from the queue having the highest priority until the resource available for the first portion **90** is filled. If this queue becomes empty, data packets are taken from the queue with the next highest priority and so on. For the second portion **95** the same procedure is carried out, but for a subset of the queues. Suitable selection of the subset can enable the multiplexing apparatus **300** to avoid starvation of particular queues, ***for***

example to enable a delay criterion to be met.

2) 2) Fair selection for the second portion: In this case the second portion **95** is populated by taking one data packet in turn from each of the subset of queues, excluding the highest priority queue. To maximise fairness, especially when a large number of queues are present, the last selected queue may be remembered for use in subsequent multiplexing operations.

3) 3) As a variation on 2), if the resource available for the first portion **90** is not fully used, then the unused resource can be made available for the second portion **95**.

4) As a further variation on 2), the second portion **95** can be populated before the first portion **90**. This may allow some flexibility in regard to which queues make use of which of the portions.

5) The first and second portions **90**, **95** could be populated from different subsets of the queues.

6) The priorities can modified in a dynamic way, for example in response to commands or information received by the multiplexing apparatus **300**. Such modification can be applied to either or both of the first and second portions **90**, **95**. For example, ***if the transmission delay of a particular queue increases above a particular threshold***, the priority of that queue may be temporarily increased in order to enable data from that queue to use a different one of the portions.

....

10) The selection can be based on the QoS currently achieved for a particular data flow. For example, data can be preferentially selected from a queue where the average or ***worst case delay is exceeding a QoS requirement***.

11) The size of the resource for each portion 90, 95 can be adapted to take into account the amount of data in each queue, for example dividing the resource in a way which is proportional to the amount of data in the relevant queues.

12) The size of the resource for each portion 90, 95 can be adapted to take into account the QoS requirements of the data in each queue, for example dividing the resource in a way which gives more resource to the selection which has the strictest QoS requirements.

> 13) ***The size of the resource for each portion 90, 95 can be adapted to take into account the QoS currently being achieved for the data in each queue, for example <u>dividing the resource in a way</u> which gives more resource to the portion 90, 95 which is <u>not meeting, or is furthest from meeting, any delay requirements</u>.***

JX-0001 ('935 Patent), 4:5-5:15 (emphasis added); *see also id.*, Figure 3.

These are disclosures of assembling groups of data packets by populating first and second portions according to a first rule and second rule, respectively, and size of the memory (*i.e.*, resource) for each portion 90, 95 according to the delay experienced by data in each queue relative to a delay criterion for the respective queue (*i.e.*, more resource to the portion 90, 95 which is not meeting, or is furthest from meeting, any delay requirements.). This means-plus-function element is limited to these disclosed algorithms.[20]

8. "transmitting the group" (claim 1) / "means for transmitting the group" (claim 9)

Below is a chart showing the parties' proposed claim constructions.

[20] The specification also discloses an alternative method using a multiplexing apparatus 300 adapted to receive a signal indicative of a mix of first and second portions 90, 95, which may be adapted to set the size of the first and second portions 90, 95 in response to the signal. *See* JX-0001 ('935 Patent) at 5:25-46. However, this description is insufficient to find disclosure of an algorithm for performing the claimed function.

“transmitting the group” (claim 1)		
Complainants’ Construction	**Respondents’ Construction**	**Staff’s Construction**
“outputting the group of data packets”	“sending the group of data packets over a network via an antenna”	“sending out the group of data packets”
“means for transmitting the group” (claim 9)		
Complainants’ Construction	**Respondents’ Construction**	**Staff’s Construction**
Subject to 35 U.S.C. § 112, ¶ 6 Function: transmitting the group of data packets Structure: an output, and equivalents thereof (can be performed by a general purpose computer)	means plus function term under Section 112 ¶ 6 Function: transmitting the group Structure: transceiver (310) having an antenna	Subject to 35 U.S.C. § 112, ¶ 6 Function: transmitting the group Structure: transceiver (310) having an antenna, and equivalents thereof.

Compls. Br. at 51; Resps. Br. at 42; Staff Br. at 35.

Complainants did not argue or submit an analysis of its proposed construction for these terms in their prehearing brief, and thus any such arguments are abandoned. *See* Ground Rule 7.c;[21] Compls. P.H. Br. at 130-203.

For the “means for transmitting ….” element, the parties agree this is a means-plus-function term subject to 35 U.S.C. § 112, ¶ 6. The claim language recites that the function is “transmitting the group.” JX-0001 (‘935 Patent), claim 9. The claim recites, and the parties agree, that the group includes data packets (from the first portion and

[21] Complainants argued that the accused products satisfy this limitation, but they did not present an argument to support their proposed constructions for these terms. *See* Compls. P.H. Br. at 150, 157.

second portion). *Id.* The specification discloses that the structure for performing the function of transmitting data packets is transceiver 310, which transmits and receives data (*i.e.*, data packets) and acknowledgment signals:

> Referring to FIG. 4, there is illustrated a communication system comprising a communication terminal 410 for transmitting data and a communication terminal 400 for receiving the transmitted data. The communication terminal 410 for transmitting data comprises the apparatus for multiplexing 300 as described above with reference to FIG. 2 ***coupled to a transceiver 310 for transmitting data and receiving acknowledgements***, and a processor 320 for processing the received acknowledgements and delivering a signal on an output 330.
>
> The multiplexing apparatus 300 may be adapted to receive on an input 100, ***for example via the transceiver 310***, a ***signal*** indicative of a mix of first and second portions 90, 95, and may be adapted to set the size of the first and second portions 90, 95 in response to the signal. The multiplexing apparatus 300 may be adapted to receive on an input 100, for example via the transceiver 310, ***a signal*** indicative of how the data packets may be selected from the queue stores 50 to populate the group of data packets assembled in the first portion 90 and second portion 95 of the output buffer 80, and to adapt its operation in accordance with the signal. Such signals may be transmitted by the communication terminal 400 or another source.

JX-0001 (‘935 Patent) at 5:24-46 (emphasis added).

In addition, Figure 4 of the ‘935 patent illustrates that the transceiver 310 includes an antenna. JX-0001 (‘935 Patent), Figure 4. In the context of the ‘935 patent and this means-plus-function term, “transmit” refers to wireless transmission, which requires an antenna. A POSA would have also considered the antenna to be part of the structure for “means for transmitting.” *Id.* Without the antenna shown in Figure 4, the transceiver would not be capable of transmitting data wirelessly. *Id.* While the ‘935 patent discloses an output 100 (JX-0001 (‘935 patent) at 3:11-14), Figure 4 shows output 100 is what connects the multiplexing apparatus 300 of the terminal 410 to the transceiver 310 and antenna. Merely sending data from a processor to a transceiver would not be considered "transmitting the data." A POSA would have understood that it is the transceiver 310 and specifically its antenna that transmits the group of data packets from the first communication terminal 410 to the second communication terminal 400 because data on line 100 has not yet been outputted from the communication terminal 410. *See* RX-3341C (Min RWS) at Q/A 207.

Accordingly, the administrative law judge has determined that the claim term "means for transmitting the group" should be construed as a means-plus-function limitation as proposed by respondents and the Staff.

With respect to the "transmitting the group" term in method claim 1 (not a means-plus-function term), there is no reason to limit the term to the disclosed structure. The parties agree that data packets are transmitted, but respondents' proposed construction requires that the data packets be sent "over a network via an antenna." Although the context of the '935 patent is wireless communication (UMTS), there is nothing in the claims or specification that expressly limits this term to wireless communications or "over a network."

Accordingly, the administrative law judge has determined that the claim term "transmitting the group" should be construed to mean "sending out the group of data packets."

B. Infringement and Domestic Industry (Technical Prong) of the '935 Patent

As noted above, complainants assert independent method claim 1, and dependent method claims 2 and 3, and independent apparatus claim 9, and dependent apparatus claims 10, 11, and 17 of the '935 patent. *See* Joint Outline at 3; Staff Br. at 6.

1. Direct Infringement (and Technical Prong)

a. Independent Claims 1 and 9

i. "the size of the first and second portions is adapted according to the delay experienced by data in each queue relative to a delay criterion for the respective queue." (Claim Limitations [1.4] and [9.4])

Claims 1 and 9 require that "the size of the first and second portions is adapted according to the delay experienced by data in each queue relative to a delay criterion for the respective queue." The evidence demonstrates that the accused 3GPP Specification does not satisfy this limitation. *See, e.g.*, RX-3341C (Min RWS) at Q/A 141-43.

First, Philips pointed to Bj as being both the delay experienced (CX-0011C (Brogioli WS) at Q/A 81, 84), and the delay criterion. *Id.* at Q/A 80, 98; RX-3341 (Min RWS) at Q/A 157, 166. However, this is incorrect as the asserted claims clearly require the two terms ("delay experienced" and "delay criterion") to have separate meanings. Specifically, the claims require that the size of the first and second portions be adapted "according to the delay experienced by the data in each queue relative to a delay criterion." Complainants have not shown how the Bj value can be used relative to itself to determine the size of the alleged first and second portions of data. *See* RX-3341 (Min RWS) at Q/A 167.

Second, Bj is not a delay under the Staff and respondents' proposed construction of the term "delay experienced"[22] or any construction of "delay criterion." As discussed

[22] As discussed in the Claim Construction section above., inasmuch as Philips's prehearing brief does not address "delay experienced," Philips has waived its

above in the Claim Construction section, the proper construction for "delay experienced" is the "wait time encountered," and similarly, the proper construction for "delay criterion" is "predetermined duration of time for waiting in the queue." However, even under complainants' proposed construction, "delay criterion" must relate to an amount of delay, *i.e.*, time.

A POSA would understand the term delay to relate directly to an amount of time, *i.e.*, something having units of time (*e.g.*, milliseconds). *See* RX-3341C (Min RWS) at Q/A 150-53. It is undisputed that Bj is measured in bytes, *i.e.*, an amount of data, not time.[23] *See* RX-3341C (Min RWS) at Q/A 158, 167. Dr. Brogioli's calculations confirm that Bj is measured in bytes. *See e.g.*, CX-0011C (Brogioli WS) at Q/A 69 ("B_{j2}=800 bytes"). It is further confirmed by Mr. Bucknell, the lead inventor of the '935 patent, who testified that Bj is not a measure of time. *See* JX-0019C (Bucknell Dep. Tr.) at 102-103, 104-106; RX-3341C (Min RWS) at Q/A 158.

Further, there is no connection between Bj for a logical channel and the wait time encountered by data in the logical channel. *See* RX-3341C (Min RWS) at Q/A 157-65. Indeed, the Bj for a logical channel increases independently of whether there is data waiting. *Id*. at Q/A 159, 167-68. In particular, the Bj for a channel is increased by a

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construction for that term under Ground Rule 7.c. *See* Compls. P.H. Br. at 130-203.

[23] Although measured in bytes, Bj does not represent the amount of data waiting in a logical channel. *See* RX-3341C (Min RWS) at Q/A 164. For example, Bj can be negative (even with data in the logical channel), but the amount of data waiting to be sent cannot be negative. *Id*. at Q/A 56. Bj also does not track of how much data is waiting for a logical channel because Bj is not always decreased by the amount of data removed from the logical channel. The 3GPP specification does not require Bj to be decremented if data is sent in Step 3. *Id*. at Q/A 164. Bj is also limited by the bucket size, but there is no correlated limit on the amount of data waiting for a logical channel. *Id*. at Q/A 59.

fixed amount every time interval with the size of the fixed amount determined by the PBR of the channel. *Id.* at Q/A 159, 169; CX-0011C (Brogioli WS) at Q/A 98. The result of increasing Bj regardless of whether data is actually waiting is that there could be empty channels with higher Bj than a channel with lower Bj that actually has data waiting to be transmitted. RX-3341C (Min RWS) at Q/A 159, 164. Thus, Bj does not reflect either (1) how long data has been waiting in the channel or (2) how much data is waiting to be transmitted. *Id.* at Q/A 160, 163-164. In fact, Dr. Brogioli admits that "the Bj value of a channel does not necessarily match how long any specific packet of data has waited in the queue associated with the channel." *See* CX-0011C (Brogioli WS) at Q/A 81; RX-3341 (Min RWS) at Q/A 157, 159-60. Accordingly, Bj cannot be the "delay criterion" because it is not a "principle or standard indicating an amount of delay" with respect to either a duration of time or an amount of data as required under complainants' proposed construction. *See* RX-3341C (Min RWS) at Q/A 170-72.

Moreover, the Bj value cannot exceed the bucket size (cap on maximum Bj value) of the channel, which further prevents Bj from reflecting the amount of delay experienced by the data. *See* CX-0131.26 (3GPP TS 36.321 § 5.4.3.1). This results in the Bj value remaining the same after the maximum has been reached, even as data in the channel continues to await transmission (*i.e.*, the delay increases while Bj remains unchanged). *See* RX-3341C (Min RWS) at Q/A 159-60, 165; CX-2334.265 (3GPP 36.523-1). Dr. Brogioli's own calculations showed that Bj reached and remained at its maximum value within the cited test data. *See* CX-0011C (Brogioli WS) at Q/A 69 (CDX-0001C.50 showing Bj_4 remaining at 3200 during timestamps 19:58:17:565, 19:58:17:585, 19:58:17:605 despite no data from DRB_Identity 4 being sent during those time frames).

Another reason why Bj is not a "delay experienced" or "delay criterion" is Bj can be negative (RX-3341C (Min RWS) at Q/A 161), which Dr. Brogioli's calculations confirm. *See* CX-0011C (Brogioli WS) at Q/A 69 (CDX-0001C.51 showing Bj2 with -160); CX-0131.26 (3GPP TS 36.321 § 5.4.3.1). A negative Bj value further illustrates that Bj is unrelated to the delay as delay time (or even a delayed amount of data) cannot be negative. *See* RX-3341C (Min RWS) at Q/A 161. Dr. Brogioli's opinion that a negative Bj value indicates data has been transmitted more recently than a positive Bj value is also incorrect. *See* RX-3341C (Min RWS) at Q/A 161-62. As Dr. Min illustrated, two channels can transmit the same amount of data in the same TTI, but one of the channels may have a negative Bj while the other channel maintains a positive Bj because of differences in initial Bj values or bucket sizes for the channels. *Id.* A channel with a negative Bj value can also contain data that has waited longer for resources than a channel with a positive Bj value. *Id.* Conversely, a positive Bj value at the end of a TTI does not mean that a channel did not transmit any data. In short, a negative Bj is no indication of lack of delay of data in a queue.

Third, Bj is not a "principle or standard" as required under complainants' proposed construction. As discussed above, Bj is a token measured in bytes. Bj does not represent an amount of time waiting in the logical channel or the amount of data in the logical channel because Bj increases regardless of whether there is any data waiting in the channel. *See* RX-3341C (Min RWS) at Q/A 167.

Fourth, in tacit recognition that Bj cannot be the claimed delay experienced or delay criterion, Philips attempts to argue infringement under the doctrine of equivalents. However, the prosecution history precludes Philips from reading the claims onto systems that use tokens or credits such as Bj. As discussed above, the applicants amended the claim during prosecution to overcome prior art that employed a token bucket selection procedure. In particular, the applicants amended the independent claims to add the instant "wherein" limitation that includes "delay experienced" and "delay criterion." In addition, the applicants distinguished the Abel prior art (RX-0275) on the basis that it did not disclose delay, but rather disclosed consuming credits to transmit data. *See* JX-0005.120-121 ('935 Patent Prosecution History); RX-3341C (Min RWS) at Q/A 24, 26, 31-35; RX-0275 (Abel) at [0044]-[0047], [0053], FIG. 4.

Thus, the applicants specifically relinquished claim scope covering what it now seeks to recapture through the doctrine of equivalents. *See* RX-3341C (Min RWS) at Q/A 210. Inasmuch as token bucket selection was known at the time of the application (as discussed below in connection with invalidity), Philips cannot claim this alleged "equivalent" was unforeseeable. The applicants also made arguments during prosecution with respect to adapting the first and second portions of the group that further limit the scope of available equivalents. As discussed above, the applicants distinguished prior art disclosing controlling the link rate (RX-0276 (Hosein)), from adjusting individual first and second portions of a group of data packets in a specific transmission. *See* RX-3341C (Min RWS) at Q/A 27, 36-38. Inasmuch as link rate adjustment was known at the time of the application and disclaimed, Philips cannot now argue the claim covers Bj, which regulates transmission based on the prioritized bit rate of logical channels.

Even if the doctrine of equivalents were not precluded based on the prosecution history, Dr. Brogioli's rote recitation of the function / way / result phrasing of the doctrine of equivalents is inadequate. *See* CX-0011C (Brogioli WS) at Q/A 94-97. As

Dr. Min explained, Dr. Brogioli is mistaken that the products perform substantially same function in substantially the same way to obtain the same result. *See* RX-3341C (Min RWS) at Q/A 175-79, 211-13. Transmitting data based on the Bj for a logical channel is different from adapting the transmission based on the amount of time that has elapsed while the data is awaiting transmission or the amount of data in the queue. *See* RX-3341C (Min RWS) at Q/A 211. A channel accumulates Bj as long as it has not already reached the bucket size, regardless of whether there is any data waiting in that channel. *Id.* If a burst of data arrives into an empty channel, which already accumulated a large Bj, the standard does not allocate resources differently than if that burst of data had been waiting (was delayed) in the channel the entire time the Bj accumulated. *Id.*

In fact, Dr. Brogioli's own testing demonstrated that the claimed result and the tested result are different. As Dr. Min explained, the testing discussed by Dr. Brogioli shows performance of Step 1 of the standard, and there is no evidence of Step 3. RX-3341C (Min RWS) at Q/A 116-40, 173-79, 212. Bj thus controls the flow of data over time to match the prioritized bit rate (PBR) of a logical channel and does not control transmission based on delay or amount of data in each logical channel. *Id*. at Q/A 174-179. This is not substantially the same as adapting the transmission "according to the delay experienced by data in each queue relative to a delay criterion for the respective queue."

ii. "a group of the data packets wherein a first portion of the group is populated with data packets selected from one or more of the queues according to a first rule and a second portion of the group is populated with data packets selected from one or more of the queues according to a second rule" (Claim Limitations [1.3] and [9.3])

The claims require assembling "a group of the data packets wherein a first portion of the group is populated with data packets selected from one or more of the queues according to a first rule and a second portion of the group is populated with data packets selected from one or more of the queues according to a second rule." JX-0001 ('935 Patent) at claims 1 and 9. Dr. Brogioli's "first rule" is an implausible amalgamation of Steps 1 and 3: "if the Bj for the highest priority channel is greater than zero or if Bj of all channels is less than zero, then data packets are selected from the queue associated with the highest priority channel…." *See* CX-0011C (Brogioli WS) at Q/A 62-63; RX-3341C (Min RWS) at Q/A 106, 109. This cannot be the "first rule."

First, Dr. Brogioli's alleged rules are not rules under the agreed-upon construction (*i.e.*, "procedures for selecting a packet") within the context of the accused 3GPP Specification. *See* RX-3341C (Min RWS) at Q/A 108-11. Rather Dr. Brogioli's alleged rules describe the result of applying steps 1 or 3 from 3GPP TS 36.321 § 5.4.3.1 to certain scenarios. *See* RX-3341C (Min RWS) at Q/A 112. As discussed above, the accused 3GPP Specification has two steps[24] (Steps 1 and 3) for determining whether data in a logical channel receives transmission resources. Dr. Brogioli does not identify either

[24] Inasmuch as Step 2 (the UE shall decrement Bj by the total size of MAC SDUs served to logical channel j in Step) does not describe the actual allocation of resources (*i.e.*, transmitting of data), only steps 1 and 3 can be considered rules for purposes of the instant limitation.

Steps 1 or 3 as his first or second rule, despite them being used by the 3GPP Specification.

Instead, Dr. Brogioli departs from 3GPP TS 36.321 § 5.4.3.1, and devises his own rules by applying Steps 1 or 3 in certain limited scenarios relating to Bj and logical channel priority. *See* RX-3341C (Min RWS) at Q/A 112-13. In particular, Dr. Brogioli's first rule includes two parts: [a] "if the Bj for the highest priority channel is greater than zero or" [b]" if Bj of all channels is less than zero, then data packets are selected from the queue associated with the highest priority channel and the Bj for the highest priority. *See* CX-0011C (Brogioli WS) at Q/A 62. Part [a] of Dr. Brogioli's first rule is the result from the application of Step 1 when the highest priority channel has a positive Bj. In contrast, Part [b] of Dr. Brogioli's first rule is the result that would occur from the application of Step 3 as it mentions Bj of all channels being less than zero, a situation that would not invoke Step 1, which requires at least one channel with a positive Bj. *See* RX-3341C (Min RWS) at Q/A 112; CX-0131.26 (3GPP TS 36.321); CX-0011C (Brogioli WS) at Q/A 62).

Similarly, Dr. Brogioli's second rule is "if the Bj for the highest priority channel is less than zero and Bj for a lower priority channel is greater than zero, then the data packets are selected from the queues associated with the lower priority channels." *See* CX-0011C (Brogioli WS) at Q/A 62. Comparing Dr. Brogioli's second rule to Step 3, however, reveals the second rule is simply the result that would occur from the application of Step 1 when the Bj for a channel is greater than zero and data is being selected from a lower priority channel (*i.e.*, the Bj of the highest priority channel is less than 0). *See* RX-3341C (Min RWS) at Q/A 112; CX-0131.26 (3GPP TS 36.321); CX-

0011C (Brogioli WS) at Q/A 62. Importantly, neither of Dr. Brogioli's alleged rules are actual procedures applied by 3GPP TS 36.321 § 5.4.3.1 to select packets for transmission.

Dr. Brogioli opines that Step 1 of the 3GPP TS 36.321 § 5.4.3.1 specification, when applied to different scenarios, satisfies both rules in the asserted claims of the '935 patent. Specifically, he opines that Step 1 applied to the highest priority logical channel is a different rule than when applied to the lower priority channels. *See* CX-0011C (Brogioli WS) at Q/A 62; *see also* RX-3341C (Min RWS) at Q/A 112. This is incorrect inasmuch as Step 1 does not distinguish between the highest priority logical channel and other logical channels. *See* RX-3341C (Min RWS) at Q/A 115. Instead, Step 1 merely states that "[a]ll logical channel with Bj > 0 are allocated resources in decreasing priority order." *See* CX-0131.25-26 (3GPP TS 36.321 § 5.4.3.1).

First, the testing relied on by Dr. Brogioli further demonstrates Dr. Brogioli's identification of the alleged first and second rules cannot actually be two rules within the context of the 3GPP Specification. Specifically, by applying Steps 1 and 3 of 3GPP TS 36.321 § 5.4.3.1 to Dr. Brogioli's calculations of Bj, it becomes apparent that the testing relied on by Dr. Brogioli shows only Step 1 being performed. *See* RX-3341C (Min RWS) at Q/A 114, 119-24. In particular, subpart [b] of Dr. Brogioli's first rule, which describes the result of the application of Step 3, never occurs. *Id.* at Q/A 114, 124. This leaves Dr. Brogioli with the unsupported opinion that the operation of Step 1 in different limited situations can be broken up as a first rule and a second rule. However, 3GPP TS 36.321 § 5.4.3.1 (CX-0131.26) describes Step 1 as a single procedure for determining which logical channel should allocated resources. *See* RX-3341C (Min RWS) at Q/A 111. 3GPP TS 36.321 § 5.4.3.1 does not describe any procedure for selecting data packets in the manner described by Dr. Brogioli. Accordingly, Dr. Brogioli blends Steps 1 and 3 as his "first rule" in order to obscure the fact that the testing shows only Step 1 being performed. Even so, Step 3 cannot be a rule that meets the asserted claims because it does not consider Bj, meaning that even according to Philips's arguments, there is no adjustment based on delay experienced relative to a delay criterion. *See* CX-0131.26 (3GPP TS 36.321 § 5.4.3.1); RX-3341C (Min RWS) at Q/A 111.

Second, Dr. Brogioli has not identified the "first portion" and the "second portion" of the group purportedly being assembled. As Dr. Min testified, the "first portion" and the "second portion" of the group have to exist prior to application of the first and second selection rules in order to be "populated with data packets" and for their size to be "adapted" based on delay. *See* RX-3341C (Min RWS) at Q/A 139-140. Dr. Brogioli seems to argue that the first portion is created merely by selecting data packets according to the "first rule" and the second portion is created merely by selecting data packets according to the "second rule." *See* CX-0011C (Brogioli WS) at Q/A 62-63. However, this does not show that the size of the portions is adapted. *See* RX-3341C (Min RWS) at Q/A 107.

Third, regarding claim element [9.3] in particular, Dr. Brogioli has not identified the "means for assembling …." *See* RX-3341C (Min RWS) at Q/A 199-205. Dr. Brogioli argues that "[c]ertainly the [accused products and domestic industry products] include at least the equivalent of … routing switches [60 and 70, in the '935 patent,] because the data packets must be routed into the first and second portion of the group so that they may be transmitted together" as the accused products "would not be able to follow the steps for allocation of resources to the logical channels as provided by the

3GPP specifications that I previously outlined." *See* CX-0011C (Brogioli WS) at Q/A 119. However, Dr. Brogioli does not provide any support for his conclusion that the logical channel prioritization procedure cannot be performed without the routing switches 60 and/or 70 in Figure 2 of the '935 patent (JX-0001) or equivalents, thereof. *See* RX-3341C (Min RWS) at Q/A 196, 202, 204.

As explained by Dr. Min, when linked lists are used to support multiple logical channels in a single memory, pointers link the data packets associated with the respective logical channel so that all arriving data packets, regardless of their associated logical channel and priority levels, are put into the same memory. *See* RX-3341C (Min RWS) at Q/A 197-98, 202. The arriving data packets would be stored in the memory one after another without regard for priority. *Id*. Rather than organize the data packets themselves, logical channel identifies and priority levels are maintained by the linked list of pointers. *Id*. Thus, Dr. Brogioli did not establish that any of the accused products or domestic industry products include the routing switches, or equivalents, identified by Philips and the Staff as structure for performing the functions identified by Philips and the Staff for "means for assembling."

iii. Philips's Testing (Claim Limitations [1.3] / [9.3])

The testing on which Dr. Brogioli relied does not show that the accused products and domestic industry products meet claim elements [1.3] and [9.3], which require assembling a single group of data packets using a first rule and a second rule. The testing only shows servicing packets in descending priority order and that separate messages serviced data packets from each logical channel. *See* RX-3341C (Min RWS) at Q/A 137, 140; Brogioli Tr. 407-408. Under Philips's own "first rule," data is taken only from the "highest priority" channel. CX-0011C (Brogioli WS) at Q/A 85 ("if the Bj for the highest priority channel is greater than zero or if Bj of all channels is less than zero, then data packets are selected from the queue associated with the highest priority channel").

The testing relied upon by Dr. Brogioli shows only the application of Step 1. Specifically, when Dr. Brogioli's purported values for Bj are applied to Steps 1 and 3, it is apparent Dr. Brogioli's testimony never demonstrates Step 1 being performed. *See* RX-3341C (Min RWS) at Q/A 119-25. In other words, Philips has not demonstrated that Step 3 is ever performed. *See* RX-3341C (Min RWS) at Q/A 114-17, 119-25, 137. This means that Philips's "first rule" is effectively identical to its "second rule," both being instances of Step 1 applied to different priority levels. *See* RX-3341C (Min RWS) at Q/A 138. Moreover, even if Step 3 was considered a second rule, Philips still cannot show infringement by any accused product. Since Step 3 of TS 36.321 § 5.4.3.1 is completely independent of the Bj value ("regardless of the value of Bj") for any logical channel, the size of the second portion is not adapted according to delay experienced by the data in each queue relative to the delay criterion, even under Philips's interpretation of Bj. *See* CX-0131.26 (3GPP TS 36.321 § 5.4.3.1); RX-3341C (Min RWS) at Q/A 111.

As discussed above, the logical channel prioritization procedure begins at Step 1 with every new transmission, and does not reach Step 3 unless Step 1 has been completed with resources remaining in the UL grant. *See* CX-0131.26 (3GPP TS 36.321 § 5.4.3.1). Inasmuch as Step 1 requires allocating resources for all logical channels (in descending priority order) having Bj > 0, Step 3 can only be reached when all logical channels have Bj that is zero or negative at the same time. *Id*. In other words, Step 3 only selects data from logical channels with a Bj value less than or equal to zero. *See* RX-3341C (Min RWS) at Q/A 128. Dr. Brogioli does not disagree, as he states, "data is never selected from a queue whose associated channel has Bj value less than zero as long as at least one Bj value is greater than zero." *See* CX-0011C (Brogioli WS) at Q/A 70. Therefore, if Bj is always positive for at least one of the channels (*e.g.*, DRB4), then Step 3 is never reached. *See* RX-3341C (Min RWS) at Q/A 128-29.

Referring to CDX-0001C.51 (discussed in CX-0011C (Brogioli WS) at Q/A 69-70), it is clear that the Bj for logical channel DRB4 is always positive. In the transmissions annotated by Dr. Brogioli, Bj is at its maximum value of 3,200 bytes. *See* RX-3341C (Min RWS) at Q/A 130. As discussed below, Dr. Min explained that Bj for this DRB4 is never negative. *See* RX-3341C (Min RWS) at Q/A 128-36; CX-0131.26 (3GPP TS 36.321). By way of background, the testing protocol required that before performing the first transmission, each channel wait over 400 ms in order to give the channels time to reach their maximum bucket size. DRB4 had a PBR of 32 kilobytes per second, which means that during operation, its Bj will be incremented by 32 bytes every 1 ms TTI. Inasmuch as DRB4's bucket size duration is 100ms, it reaches its maximum Bj of 3,200 bytes within 100ms, or well before the first transmission. *See* RX-3341C (Min RWS) at Q/A 130. As the testing protocol grants the UE an uplink resource transmission every 20 ms (or 20 TTI intervals), the Bj for DRB4 accumulates at a rate of 20×32 bytes, or 640 bytes between new transmissions, or the equivalent of two 320 byte data packets every transmission. The 3,200 byte maximum bucket size of DRB4 corresponds to ten of these 320 byte data packets. *See* RX-3341C (Min RWS) at Q/A 130.

As illustrated in CDX-0001C.51 (discussed in CX-0011C (Brogioli WS) at Q/A 69), the first time that DRB4 has any data selected is at time stamp 19:58:17.625, when DRB4 sends two 320 byte data packets, so its Bj was decremented from 3,200 bytes to 2,560 bytes. *See* RX-3341C (Min RWS) at Q/A 131. However, the next transmission was over 20ms later (time stamp 19:58:17.646), so the Bj for DRB4 was incremented by at least 640 bytes, reaching its maximum value again. *See* RX-3341C (Min RWS) at Q/A 131. The only instances where DRB4 transmits more than two packets are when it sent three packets, resulting in a decrement of 960 bytes; however, in all those instances, DRB4 did not transmit any data packets in the immediately following transmission, so that by the time of the next transmission, it had 40ms of time (or the equivalent of four 320 byte data packets) to accumulate Bj credits, which was enough time to replenish Bj back to its maximum value. *See* RX-3341C (Min RWS) at Q/A 131 (discussing RDX-5037). Thus, as the Bj for DRB4 never goes negative, Step 3 is never reached. *See* RX-3341C (Min RWS) at Q/A 130-132.

Inasmuch as all transmissions from the highest priority channel (DRB2) are performed during Step 1, only condition [a] of Philips's "first rule" is met (*i.e.*, "[a] if the Bj for the highest priority channel is greater than zero…"), and complainants have not shown that condition [b] is met (*i.e.*, "[b] if Bj of all channels is less than zero…"). *See* RX-3341C (Min RWS) at Q/A 112, 114. Therefore, in practice, Philips's "first rule" is effectively identical to its second rule, which cannot be correct. *Id*. at Q/A 112, 115. In addition to running afoul of prosecution history estoppel, this reading would mean the '935 patent is anticipated by the strict priority selection rule of UMTS, which the '935 patent described as prior art.

The testing of the accused products used three channels: DRB2, DRB3, and DRB4. *See* CX-2334.240; CX-0011C (Brogioli WS) at Q/A 68 (citing to CDX-0001C.47-49). As shown in CDX-0001C.47-49, these DRBs have the priority levels of 6, 7, and 8 respectively; however, the highest priority level is 1. Therefore, even under Philips's own definition, the "first rule" which applies to highest priority level 1, is never performed, and transmissions from DRB2, DRB3, and DRB4 are only under Philips's "second rule," which applies to all lower priority channels. Consequently, even when a transmission includes a group of data packets from DRB2, DRB3, and DRB4, these are not selected using a first rule and a second rule, but only Philips's "second rule." *See* RX-3341C (Min RWS) at Q/A 136. In addition, the testing never showed a single transmission with two portions.

Dr. Brogioli opines that transmissions sent at the same time are in fact one grouped transmission, but the viewer Dr. Brogioli relies on lists single messages by each message's unique ID. Brogioli Tr. 405-406 (citing CX-2324 (CMWMars Message Analyzer manual) at 200); *see also* RX-3341C (Min RWS) at Q/A 137. The viewer therefore undercuts Dr. Brogioli's opinion, and the test results never show the grouping of data packets by first and second rules as required by limitation [1.3] / [9.3]. The testing does not show that the accused products and domestic industry products adapt the size of the first and second portions "according to the delay experienced by data in each queue relative to a delay criterion for the respective queue." *See* RX-3341C (Min RWS) at Q/A 139. The testing does not show that adaptation occurred based on the delay experienced by data in each queue as opposed to the delay experienced by data in the queue that was serviced.

iv. “queue” / “queue store” (Claim Limitations [1.2] / [9.2])

As discussed above, a “queue” / “queue store” means a “distinct memory for storing data packets in sequence.” However, Philips did not show that any of the accused products (or Philips’s domestic industry products) meets the limitation of requiring “operating a queue for each different priority of data packet,” *i.e.*, operating a distinct memory for each different priority level. *See* RX-3341C (Min RWS) at Q/A 83-90.

The 3GPP Specification at issue refers only to logical channels; however, these do not require specific hardware, but are a logical construct that transmits data between different protocols. *Id*. at Q/A 88. A logical channel, as the name suggests, is a channel, *i.e*., a communication medium. *See* RX-3341C (Min RWS) at Q/A 88; Brogioli Tr. 401-402. This means a logical channel is used to transmit/receive data between the two end points of this medium. *See* CX-0131. 11 (3GPP TS 36.321 § 4.5.2); RX-3341C (Min RWS) at Q/A 88. A logical channel is not a distinct memory for storing data packets in sequence. *See* RX-3341C (Min RWS) at Q/A 88.

Similarly, when reporting the testing results, Dr. Brogioli considers a data radio bearer (DRB) to be a queue. However, these are channels that transfer (and do not necessarily store) data in a distinct memory, as required by the claim. *See* RX-3341C (Min RWS) at Q/A 91. Dr. Brogioli’s testing does not show that limitations [1.2] / [9.2] are satisfied under any party’s proposed construction. Dr. Brogioli’s testing also does not show any data packet priority for data packets stored in the alleged queue or any claimed queues that serves data packets for each priority of received data packet as required by the claims. *See* RX-3341C (Min RWS) at Q/A 94-95 (discussing RDX-5023).

Nor has Philips shown that the modules have a distinct memory for storing data packets in sequence "for each different priority of data packet" as required. In fact, Step 3 of the logical channel prioritization procedure provides for multiple logical channels having the same priority, so there is not necessarily one queue for each priority level. *See* CX-0131.26 (3GPP TS 36.321 § 5.4.3.1) ("Logical channels configured with equal priority should be served equally."). *See also* RX-3341C (Min RWS) at Q/A 89; Brogioli Tr. 402. Dr. Min has testified that a more common and efficient way of organizing packets of differing priorities is in a linked list, where a single memory is used to store all received data packets regardless of their priorities. *See* RX-3341C (Min RWS) at Q/A 93-99. Dr. Brogioli did not present any evidence to demonstrate that distinct memories are necessarily used by the products at issue. *See* Brogioli Tr. 401.

Dr. Brogioli points to the optional buffer status reporting procedure described in CX-0131.27 (3GPP TS 36.321 § 5.4.5) to show that 3GPP specification compliance requires a collection of data packets in sequence. *See* CX-0011C (Brogioli WS) at Q/A 64, 100. The portion of the 3GPP specification at issue refers to a "buffer" (Brogioli Tr. 34), but a logical channel is not a buffer. A buffer is a memory or a region of memory for temporarily storing data. While a certain type of buffers (*i.e.*, FIFO buffer) may operate as a queue (Brogioli Tr. 394-395), not all buffers operate like a queue and store data in sequence. *See* Brogioli Tr. 395-396. A logical channel, in contrast, does not store data and, therefore, is not a buffer. *See* RX-3341C (Min RWS) at Q/A 88. Nor does the 3GPP Specification require a distinct buffer for each different priority of data packet, (RX-3341C (Min RWS) at Q/A 100-04), nor require that the buffer be a FIFO buffer and store data in sequence. *See* Brogioli Tr. 396-399. Further, Dr. Brogioli admitted that he does not know how logical channels are implemented (*e.g.*, whether a FIFO buffer is used) and acknowledged that other buffers types could be used. *See* Brogioli Tr. 383-394, 395, 396-399.

Also, 3GPP TS 36.321 § 5.4.5 does not require a distinct buffer for each different priority of data packet nor does it require storing a collection of data packets in sequence. *See* RX-3341C (Min RWS) at Q/A 100. 3GPP TS 36.321 § 6.1.3.1 allows for data of different priority levels to be mixed together and stored in the same buffer, as part of a logical channel group. *See* RX-3341C (Min RWS) at Q/A 100-101; RDX-5024 (CX-0131.36 (3GPP TS 36.321 § 6.1.3.1)). Thus, there is not a one-to-one correlation between the buffer status reports and the different priorities for data in the logical channels. *See* RX-3341C (Min RWS) at Q/A 101; *see also* CX-0131.36 (3GPP TS 36.321 § 6.1.3.1); RX-2699.171 (3GPP TS 36.331 § 6.3.2).

In addition, the buffer status report procedure of the 36.321 standard does not prohibit storing data of different priority in the same memory, or in that manner, in the same buffer. This is because when the optional logical channel groups are not assigned, then the buffer status report would report a single value in "bytes" which represents the total amount of data that is buffered. *See* RX-3341C (Min RWS) at Q/A 103-04; RX-2699.171 (3GPP TS 36.331 § 6.3.2). Therefore, the 36.321 standard does not require a distinct buffer for each different priority of data packet.

The test results also do not indicate anything about whether the particular baseband processor implementation uses a distinct memory or another memory structure. *See* RX-3341C (Min RWS) at Q/A 91-92. Additionally, Dr. Brogioli provides no analysis or identification of any design specifications, source code, testimony, or other information regarding the accused products that would enable him to reliably conclude that they contain "a queue for each different priority of data packet." *Id*. at Q/A 90. Specifically regarding claim element [9.2], Dr. Brogioli has not identified any of the hardware required by the "means for operating a queue store…." *See* RX-3341C (Min RWS) Q/A 191-98; *see also* Brogioli Tr. 388-389.

Dr. Brogioli has not reviewed any third party materials, such as source code or design specs, to determine how any third party hardware component functions. *See* RX-3341C (Min RWS) Q/A 63, 70, 74-75; *see also* Brogioli Tr. 388-389. Dr. Brogioli opines, "[c]ertainly, [the accused products and domestic industry products] include at least the equivalent of [the] routing switches [in the '935 patent] because the data packets must be routed into queues based on their priority so that they may be transmitted based on the Bj value of a particular queue," "[o]therwise, the [accused products and domestic industry products] would not be able to operate as provided by the standards." *See* CX-0011C (Brogioli WS) at Q/A 116. However, Dr. Brogioli has not shown that the standard requires operating different queue stores, under any party's construction, for different priority data or that the accused products or domestic industry products operate different queue stores for each different priority of data. *See* RX-3341C (Min RWS) at Q/A 195-96. As Dr. Min explained, a linked list would not satisfy this claim element. *See* RX-3341C (Min RWS) at Q/A 98, 197-98.

Finally, Philips has not shown infringement under the doctrine of equivalents. As explained by Dr. Min, if a linked list were used, all arriving data packets, regardless of their logical channel identities and priority levels are put into the same memory. The arriving data of different priorities would be stored in the memory one after another without sorting or routing. All that is needed is to maintain the linked list of the data packets according to their logical channel identities and priority levels. *See* RX-3341C (Min RWS) at Q/A 98, 197-98.

v. "receiving data packets" / "means for receiving data packets" (Claim Limitations [1.1] / [9.1])

Philips has not established that either element [1.1] or [9.1] is met. Dr. Brogioli states that "[t]he baseband processor for each of the [Quectel/Thales/Telit/Philips] Modules receives these data packets through an input," but he has not identified information regarding any of the baseband processors. *See* CX-0011C (Brogioli WS) at Q/A 52; RX-3341C (Min RWS) at Q/A 82. Therefore, there is no basis to assume that the "input" is "where the data enters the module and goes to the baseband processor where it is processed in accordance with the standards before being output to a transceiver." *See* CX-0011C (Brogioli WS) Q/A 52; RX-3341C (Min RWS) at Q/A 82; *see also* Brogioli Tr. 403-405.

Dr. Brogioli's simulation testing is similarly insufficient as it just shows data packets allegedly being received from a base station emulator. *See* CX-0011C (Brogioli WS) at Q/A 54-55; RX-3341C (Min RWS) at Q/A 80-82. Dr. Brogioli further opines that the baseband processor processes data in accordance with a standard in the manner required by the claims. However, since there is no evidence that the baseband processors in the accused products or domestic industry products comply with any standard or satisfy this claim, there is a failure of proof. *See* RX-3341C (Min RWS) at Q/A 82. Specifically, there is no evidence that the baseband processor performs recited function as Dr. Brogioli alleges given the fact that he did not analyze any baseband processors to reliably reach any conclusion about their operation. *See* RX-3341C (Min RWS) at Q/A 42, 46, 67; Brogioli Tr. 388-89.

Regarding claim element 9[a], at least input 10 of Figure 2 is part of the corresponding structure for the means for receiving data packets. *See* RX-3341C (Min RWS) at Q/A 189. However, as Dr. Brogioli has not reviewed any schematics of the baseband processors, he has not shown the products to include this element. *Id*. at Q/A 189-90.

vi. "transmitting the group" / "means for transmitting." (Claim Limitations [1.4] and [9.4])

Philips has not shown the step of "transmitting the group" or "means for transmitting."[25] *See* RX-3341C (Min RWS) at Q/A 180-86, 206-09. As explained by Dr. Min, the testing performed by Dr. Brogioli involved data packets that have not left the product at issue, for example, by an antenna. *Id*. at Q/A 183. Dr. Brogioli has not shown that, during testing, any data was output or sent out from any of the accused products or domestic industry products, or that any data was transmitted over a network. *Id.* Dr. Brogioli also admits that the accused modules do not include an "antenna" at the time of manufacture or sale. *See* CX-0011C (Brogioli WS) at Q/A 35.

b. Dependent Claims 2-3, 10-11, and 17 of the '935 Patent

As discussed above, Philips has not shown that the accused products practice independent claims 1 and 9. Thus, Philips cannot demonstrate that the accused products practice claims 2-3, which depend from claim 1 of the '935 patent, or claims 10-11 and

[25] Philips did not argue or submit an analysis of its proposed construction for "transmitting" in its prehearing brief, and thus, any such arguments are waived pursuant to Ground Rule 7.c. *See* Compls. P.H. Br. at 130-203.

17, which depend from claim 9 of the ‘935 patent. *See* RX-3341C (Min RWS) at Q/A 214.

c. Additional Infringement and Technical Prong Issues

i. Philips’s Testing

<u>Overview of 3GPP Specification and Philips’s Testing</u>

Philips’s infringement allegations are based on 3GPP Specifications relating to multiplexing, particularly the Logical Channel Prioritization Procedure in 3GPP Technical Specification (TS) 36.321 § 5.4.3.1 (“logical channel prioritization procedure”). *See, e.g.*, CX-0011C (Brogioli WS) at Q/A 36, 62. The limited third party compliance testing cited by Dr. Brogioli showed performance of substantially less than the claims require, as discussed below.

<u>Logical Channel Prioritization Specification</u>

3GPP TS 36.321 § 5.4.3.1 requires that a mobile device (also called user equipment, or UE) use a particular multiplexing process, i.e., the “Logical Channel Prioritization Procedure[,] when a new transmission is performed.” *See* CX-0131.25-26 (3GPP TS 36.321 § 5.4.3.1); RX-3341C (Min RWS) at Q/A 48, 50-51.

To implement this process, each logical channel is assigned an integer priority value, which is inversely related to the priority level (i.e., “an increasing priority value indicates a lower priority level”). *See* CX-0131.25-26 (3GPP TS 36.321 § 5.4.3.1); RX-3341C (Min RWS) at Q/A 51. The standard also provides that each logical channel is assigned a Prioritized Bit Rate (PBR) and Bucket Size Duration (BSD). *See* CX-0131.25-26 (3GPP TS 36.321 § 5.4.3.1). The logical channel’s PBR, which has units of kilobytes per second, is the data rate given to that logical channel. *See* CX-1491.115

(3GPP TS 36.331 § 6.3.2); JX-0019 (Dep. Bucknell) at 92:11-21; RX-3341C (Min RWS) at Q/A 57. A logical channel's BSD, which has units of milliseconds, is determined for each logical channel to accommodate the fluctuating data rate of the channel over time. *See* JX-0019 (Dep. Bucknell) at 92:22-93:14; RX-3341C (Min RWS) at Q/A 59-60.

The logical channel prioritization procedure described in the 3GPP specification, which implements a token bucket selection procedure, requires that the UE maintain a variable "Bj" for each logical channel j. *See* CX-0131.25-26 (3GPP TS 36.321 § 5.4.3.1); RX-3341C (Min RWS) at Q/A 51. Bj can be thought of as credits, or like tickets to a ride, where one has to exchange a certain amount to be able to get on a certain ride. *See* RX-3341C (Min RWS) at Q/A 51. As discussed below, the value of Bj at any given time is the number of tokens for that channel, *i.e.*, how much data (in bytes) that logical channel j is potentially allowed to transmit. *See* JX-0019 (Bucknell Dep. Tr.) at 131, 132.

Philips's expert, Dr. Brogioli admitted that Bj is denoted in units of memory, and not time. *See* CX-0011C (Brogioli WS) at Q/A 69 ("Bj2 is equal to 800 bytes"). The value of Bj is set to zero when the logical channel is established, and then incremented each transmission time interval (TTI) by a fixed number of bytes calculated as the product of PBR × TTI duration. *See* CX-0131.25-26 (3GPP TS 36.321 § 5.4.3.1); RX-3341C (Min RWS) at Q/A 56-61. For example, if a logical channel j has a PBR of 8 kilobyte per second, and the TTI is 1 millisecond, then the logical channel's Bj is incremented by 8 bytes every millisecond. If the UE has an uplink (UL) resource grant (*i.e.*, permission to send a transmission) every 40 ms, then that logical channel will accumulate 320 Bj credits between transmissions (*i.e.*, 8 Bj increments per TTI × 40 TTI between transmissions). *See* RX-3341C (Min RWS) at Q/A 58, 61. Dr. Brogioli admitted this increment is fixed (CX-0011C (Brogioli WS) at Q/A 98), and therefore does not depend on the amount of data waiting in a logical channel. The value of Bj accumulates until it reaches the bucket size of the logical channel, which is equal to the number of credits accumulated over the period of the bucket size duration, or PBR × BSD. *See* CX-0131.25-26 (3GPP TS 36.321 § 5.4.3.1); RX-3341C (Min RWS) at Q/A 59-60. For the example given above, if the BSD is 100 ms, then the maximum bucket size that the Bj cannot exceed is 800 bytes.

The Logical Channel Prioritization Procedure requires that when selecting data packets for transmission, the UE allocates resources to the logical channels using the three-step process explained below. *See* CX-0131.25-26 (3GPP TS 36.321 § 5.4.3.1).

<u>Step 1</u>: The UE allocates resources to all logical channels having Bj > 0 in decreasing priority order (*i.e.*, following strict priority). *See* CX-0131.25-26 (3GPP TS 36.321 § 5.4.3.1); RX-3341C (Min RWS) at Q/A 52. That is, the logical channel with a Bj > 0 having the highest priority is allotted resources up to its assigned Bj value. RX-3341C (Min RWS) at Q/A 52. Then, if space remains in the UL grant, the next highest priority logical channel with a Bj > 0 is allotted resources up to its assigned Bj value. *Id.* The process continues until the current transmission has no available resources to allot, or all the data in the logical channels with a Bj > 0 have been allocated resources. *Id.* The standard provides that if the PBR of a given logical channel is set to infinity, then the UE will service that logical channel until the channel empties before allocating resources to a lower priority logical channel with a Bj > 0. *Id.*

Step 2: The UE decrements the Bj of any logical channel served in Step 1 by the amount of data that was served. *See* CX-0131.25-26 (3GPP TS 36.321 § 5.4.3.1); RX-3341C (Min RWS) at Q/A 53.

Step 3: If any resources remain after the allocations made during Step 1, then the remaining resources are distributed to the logical channels in strict priority order, "regardless of Bj" until either the UL grant is exhausted or the data for the logical channel is depleted, whichever comes first. *See* CX-0131.25-26 (3GPP TS 36.321 § 5.4.3.1); RX-3341C (Min RWS) at Q/A 54.

In short, Step 1 (token bucket selection) and Step 3 (strict priority selection) may both be applied to all channels, with only two differences (RX-3341C (Min RWS) at Q/A 55):

(1) in Step 1, only logical channels with a Bj > 0 are serviced, whereas in Step 3 all logical channels may be serviced; and
(2) in Step 1, the resources allocated to a channel are limited to Bj, whereas in Step 3, there is no limit to the amount of data allocated.

Philips has alleged that Bj represents "delay experienced." *See* CX-0011C (Brogioli WS) at Q/A 80. However, there is no dispute that (a) Bj is a measure of data, not time (*see* CX-0011C (Brogioli WS) at Q/A 69 ("Bj2 is equal to 800 bytes")); (b) Bj can be positive for a logical channel having no data waiting to be sent (*see* CX-0011C (Brogioli WS) at Q/A 81 ("The Bj value of a channel constantly increases (up to the bucket size)"), and (c) Bj can be zero or negative for a logical channel having data waiting to be sent (CDX-1C.50; CX-0011C (Brogioli WS) at Q/A 69; CDX-1C.25-33; CX-0011C (Brogioli WS) at 54). Indeed, Dr. Brogioli admits that "the Bj value of a channel does not necessarily match how long any specific packet of data has waited in the queue associated with that channel[.]" *See* CX-0011C (Brogioli WS) at Q/A 81. Therefore, Bj does not measure the amount of data waiting in the logical channel, or even the amount of data waiting to be sent.

Dr. Brogioli's Testing Only Addresses Steps 1 and 2

Dr. Brogioli admitted that the third party baseband processor performs the accused prioritization method. *See* CX-0011C (Brogioli WS) Q/A 30-31, 122 ("the baseband processors use algorithms in order to follow the 3GPP specification"); Brogioli Tr. 388. Dr. Brogioli did not, however, consider any source code, technical or design specifications, configuration files, or other third party materials. *See* RX-3341C (Min RWS) at Q/A 62-63, Brogioli Tr. 388-389. Philips's entire infringement case and its technical domestic industry case rest on blind-faith conformance to the 3GPP TS 36.321 § 5.4.3.1 standard, as well as Dr. Brogioli's unsupported speculation as to whether and how different baseband processor manufacturers may each have chosen to implement the standard.

The only other material Dr. Brogioli considered, other than the standard itself, was the testing of certain modules to determine compliance with the above standard. *See* Brogioli Tr. 378, 385-386. But even this testing did not establish that the modules perform the entire standard as required. Further, the testing was only of nine of the accused products and over 70 implicated modules were not tested. *See* Brogioli Tr. 386, 387. The testing procedure set up three logical channels (data radio bearers, or DRBs) with different priorities and prioritized bit rates, and populated them with a series of data packets in order to establish that the UE successfully multiplexes data packets from these logical channels.

Dr. Brogioli's Testing Contains Deficiencies

First, Dr. Brogioli's conformance testing does not demonstrate that the accused products and domestic industry products satisfy each of the limitations of the asserted claims. For example and as explained in the sections below, none of the conformance testing demonstrates that the accused products and domestic industry products "operate a queue for each different priority of data packet," "assembl[e] a group of the data packets," and "transmit[] the group" as required by the claims.

Second, Dr. Brogioli did not analyze all accused products.[26] Although Dr. Brogioli identified a long list of modules for Quectel, Thales, and Telit that are accused of infringement, he has not analyzed each such module to support his infringement opinion. *See* RX-3341C (Min RWS) at Q/A 42-47, 62-63, 65-75. Instead, Dr. Brogioli randomly chose only certain modules for testing and assumed they were exemplary. Brogioli Tr. 386, 387. These "exemplary" products are only a small sample of all accused products. Moreover, these products have different baseband processors (which Dr. Brogioli has not analyzed) that offer different functionality. *See* RX-3341C (Min RWS) at Q/A 42-47, 67-71; Brogioli Tr. 387-388.

Third, Dr. Brogioli did not analyze any of the baseband processors, which he admitted perform the accused functions in the accused products. *See* RX-3341C (Min RWS) at Q/A 63, 67-69; Brogioli Tr. 388-389; *see also* CX-0011C (Brogioli WS) at Q/A 30-31, 113, 116, 119, 122. Despite acknowledging that the accused products have different baseband processors, Dr. Brogioli offers no information or support for his

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[26] The only Quectel products imported into the U.S. are [redacted] *See* RX-3341C (Min RWS) at Q/A 64.

assumption that these baseband processors operate the same. *See, e.g.,* CX-0011C (Brogioli WS) at Q/A 29-32; Brogioli Tr. 387-388; RX-3341C (Min RWS) at Q/A 42, 46, 62. Dr. Brogioli admits that he did not rely on any source code or documents pertaining to the baseband processors that he alleges are necessary for infringement because they perform the accused functions. *See* Brogioli Tr. 388-389. Although he admitted these processors may be different, Dr. Brogioli simply concluded these third party baseband processors operate identically merely because they all support LTE, even opining that if they are different, they must infringe under the doctrine of equivalents. *See* CX-0011C (Brogioli WS) Q/A 31-34, 94-97; Brogioli Tr. 381-385; RX-3341C (Min RWS) at Q/A 65-75.

Furthermore, Dr. Brogioli performed tests that were not based on an actual network. *See* Brogioli Tr. 402-403. Specifically, he requested tests using a base station emulator, which did not use any settings or configuration information from any actual U.S. carrier network. *See* CX-0011C (Brogioli WS) at Q/A 5, 38, 52; Brogioli Tr. 402-403. Thus, expert testing alone is insufficient to show that any method claims are satisfied. *Fujitsu Ltd. v. Netgear Inc.*, 620 F.3d 1321, 1329 (Fed. Cir. 2010); *Ericsson, Inc. v. D-Link Sys.*, 773 F.3d 1201, 1221 (Fed. Cir. 2014) ("Because the asserted claim is a method claim, however, the accused devices must also actually perform that method").

ii. Reliance on a Standard

Dr. Brogioli's analysis assumes that conforming to the logical channel prioritization procedure specified in the 3GPP technical specification results in infringement. *See* CX-0011C (Brogioli WS) at Q/A 32, 41-42; RX-3341C (Min RWS) at Q/A 48, 76. Yet, Federal Circuit precedent precludes reliance on a standard whose provisions are not mandatory or do not cover every implementation. *Fujitsu*, 620 F.3d at 1327-28. Only in the situation where a patent covers every possible implementation of a standard will it be enough to prove infringement by showing standard compliance. *Id.*; *see* RX-3341C (Min RWS) at Q/A 78, 80-81; JX-0017C (Bossard Dep. Tr.) at 129-130. Specifically, the Federal Circuit cautioned, "in many instances, an industry standard does not provide the level of specificity required to establish that practicing that standard would always result in infringement." *Fujitsu*, 620 F.3d at 1327. Likewise, where "the relevant section of the standard is optional," the court warned that "standards compliance alone would not establish that the accused infringer chooses to implement the optional section." *Id.* at 1327-1328. When that is the case, "it is not sufficient for the patent owner to establish infringement by arguing that the product admittedly practices the standard, therefore it infringes." *Id.* at 1328.

Here, not all cited portions of the 3GPP technical specifications are mandatory, are required in all implementations, and/or always result in infringement. *See* RX-3341C (Min RWS) at Q/A 49. For example, the standard says nothing as to whether Bj is to be decremented after Step 3. *See* RX-3341C (Min RWS) at Q/A 53-54. In addition, Dr. Brogioli cites 3GPP TS 36.321 (CX-0131) § 5.4.5 as support for his opinion that the accused products satisfy the assembling a group of the data packets limitation by conforming to the standard. *See* CX-0011C (Brogioli WS) at Q/A 64. Dr. Brogioli disregards the next sentence indicating that the actual signaling is optional: "RRC controls BSR reporting by configuring the two timers periodicBSR-Timer and retxBSR-Timer and by, for each logical channel, optionally signalling logicalChannelGroup which allocates the logical channel to an LCG." CX-0131.27 (3GPP TS 36.321 § 5.4.5); RX-3341C (Min RWS) at Q/A 49, 76-81, 100-104.

One of the named inventors of the '935 patent, Timothy Moulsley, admitted that optional features may not be practiced by standard compliant products at all:

> Q. But you don't need 100 percent conformance to a standard in order to interoperate over that standard. Do I have that right?
>
> …
>
> THE WITNESS: Okay. In a sense, you are right. The device – devices, in principle, could operate in a system without conforming to standard, but any device that is seriously put into the market is expected to conform to standards and indicate – and be offered on the basis that it does. There is actually considerable flexibility because there are a lot of option features.
>
> …
>
> Yeah. The – conforming to standard, in my mind, means that the features which are supported are supported according to the standard and other optional features may not be supported at all.

JX-0024C (Moulsley Dep. Tr.) at 31-33; *accord* JX-0017C (Bossard Dep. Tr.) at 129-130 ("If a product does not implement an option, then the patent which covers the option is not infringed by the product").

3. Indirect Infringement

Complainants have not shown indirect infringement for a number of reasons. First, as shown above, there is no direct infringement based on either the 3GPP standard or the testing discussed by Dr. Brogioli. *See* RX-3341C (Min RWS) at Q/A 215. Second, Dr. Brogioli did not identify any instances in which the modules are placed into an infringing configuration after importation into the United States by any purchaser. *See* RX-3341C (Min RWS) at Q/A 215.

Third, Dr. Brogioli identifies no information to support his assumption that respondents "intend their customers to infringe and induce actual infringements" of the actual steps of the claim. *See* CX-0011C (Brogioli WS) at Q/A 134; RX-3341C (Min RWS) at Q/A 215. Complainants and Dr. Brogioli did not identify any specific product configurations that go beyond simply complying with the standard as discussed previously, and there are optional portions of the standard. *See* Compls. Br. at 74-87; RX-3341C (Min RWS) at Q/A 49, 76-81, 100-02, 215. Thus, merely showing materials stating that a product complies with a standard does not show the product is intended to operate in a manner that satisfies the claims.

Fourth, many of the accused products do not include an "antenna" at the time of manufacture or sale. *See* CX-0011C (Brogioli WS) at Q/A 35; RX-3341C (Min RWS) at Q/A 215. For example, certain CalAmp products are sold without an antenna. Such CalAmp products do not infringe the '935 patent claims inasmuch as they lack requisite structures, *i.e.*, antenna, or functionality that satisfies at least the following identified limitations: (1) "means for transmitting the group" in claim 9 and its dependent claims, including the requirement of an antenna; and (2) "transmitting the group" in claim 1 and its dependent claims, including the requirements of sending over a network via an antenna. *See* RX-3219C (Burrington WS) at Q/A 7-14; RX-3199C (List of CalAmp products lacking an internal antenna).

Fifth, Dr. Brogioli has not considered other substantial uses of respondents' products that do not practice the claims. For example, respondents' products practice protocols other than LTE, which are not accused of infringement, such as 2G, 3G, WiFi, HSPA, UMTS, and GSM/GPRS/EGPRS, as shown in, for example the following user manuals, technical specifications, and BOMs: RX-2592C-RX-2599C, RX-2592C-RX-2599C (Quectel modules); RX-1079-RX-1084, RX-1086, RX-1088, RX-1090-RX-1104, RX-1150-RX-1152 (Thales modules); RX-3031, RX-3040, RX-3055, RX-3063, RX-3160-RX-3169 (Telit modules). *See* RX-3341C (Min RWS) at Q/A 216-17. Dr. Brogioli has not provided any analysis that such other protocols implement the claimed subject matter of the asserted claims of the '935 patent, nor that conformance with the specifications of those protocols requires practicing the asserted claims. *Id.* at Q/A 218. Accordingly, the use of these products having the ability to communicate using any other protocols is a substantial non-infringing use. *Id.* at Q/A 216-18.

C. Patentability Under 35 U.S.C. § 101

Respondents argue:

> The asserted claims of the '935 patent are directed to the abstract idea of prioritizing deliveries based on capacity and timing requirements and recite only well-known and conventional elements that fail to transform the abstract idea into patent-eligible subject matter. *FairWarning IP, LLC v. Iatric Sys., Inc.*, 839 F.3d 1089, 1094 (Fed. Cir. 2016) ("claims merely implement an old practice in a new environment"). The alleged invention is nothing more than the longstanding human practice of receiving packets, storing packets according to priority, assembling a first portion of a group, assembling a second portion of a group, and transmitting the group, applied in the cellular communications environment. JX-0001 ('935 patent) Fig. 3, 2:57-58.

Resps. Br. at 75.

Complainants and the Staff disagree. *See* Compls. Br. at 87-90; Staff Br. at 82-85.

For the reasons set forth below, it has not been shown by clear and convincing evidence that the asserted claims of the '935 patent are patent ineligible under 35 U.S.C. § 101.

1. Applicable Law

In *Alice Corp. Pty. Ltd. v. CLS Bank International*, the Supreme Court reaffirmed a two-step inquiry to determine whether claims "are directed to a patent-ineligible concept" under section 101, such as an abstract idea. 573 U.S. 208, 218 (2014). Step one "look[s] at the focus of the claimed advance over the prior art to determine if the claim's character as a whole is directed to excluded subject matter." *Koninklijke KPN N.V. v. Gemalto M2M GmbH ("KPN")*, 942 F.3d 1143, 1149 (Fed. Cir. 2019). The Federal Circuit has "caution[ed] against 'overgeneralizing claims' in the § 101 analysis, explaining that characterizing the claims at 'a high level of abstraction' that is 'untethered from the language of the claims all but ensures that the exceptions to § 101 swallow the rule.'" *TecSec, Inc. v. Adobe Inc.*, 978 F.3d 1278, 1294 (Fed. Cir. 2020) (quoting *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1337 (Fed. Cir. 2016)). At step one, a court cannot "disregard elements of the claims at issue that the specification makes clear are important parts of the claimed advance in the combination of elements." *Id*. Claims that are "directed to a specific improvement in the capabilities of computing devices" are not abstract, and the *Alice* inquiry ends. *Core Wireless Licensing S.A.R.L. v. LG Elecs., Inc.*, 880 F.3d 1356, 1361 (Fed. Cir. 2018).

Even if the claims are directed to ineligible material at step one, the claims are nonetheless eligible at step two if the claims add "an 'inventive concept.'" *Alice*, 573 U.S. at. 217-18. "[A]n inventive concept can be found in the non-conventional and non-generic arrangement of known, conventional pieces." *BASCOM Global Internet Servs. v. AT&T Mobility LLC*, 827 F.3d 1341, 1350 (Fed. Cir. 2016). The party challenging the claims must establish that the additional elements, individually or in combination, do not "involve more than performance of well-understood, routine, and conventional activities previously known to the industry." *Aatrix Software, Inc. v. Green Shades Software, Inc.*, 882 F.3d 1121, 1128 (Fed. Cir. 2018). "The question of whether a claim element or combination of elements is well-understood, routine and conventional to a skilled artisan in the relevant field is a question of fact … [that] must be proven by clear and convincing evidence." *Berkheimer v. HP Inc.*, 881 F.3d 1360, 1368 (Fed. Cir. 2018).

2. Patentability

a. Whether the Claims Are Abstract

The invention of the '935 patent arose out of efforts to develop a more flexible approach to multiplexing data packets of different priorities on packet communication networks that handled packets of different priority levels, such as UMTS, that would avoid starvation of lower-priority packets. *See* CX-2399 (Moulsley WS) at Q/A 15-18. The claimed multiplexing system would receive data packets, operate a queue for each different priority of data packet, assemble a first portion of an assembled group of data packets from one or more of the queues according to a first rule, assemble a second portion of an assembled group of data packets from one or more of the queues according to a second rule, and transmitting the group such that the size of the first and second portions is adapted according to the delay experienced by data in each queue relative to a delay criterion for the respective queue. *See* JX-0001 ('935 Patent) claims 1 and 9; *see also* CX-2399 (Moulsley WS) at Q/A 16-18. The claimed invention is dramatically different from the inflexible pre-existing system demonstrated in Fig. 1 of the '935 patent, which simply bundled data packets together in a manner that prioritized the higher priority ones, and which made it more difficult to meet quality-of-service demands while risking packet starvation. The invention represents technological improvements to a system for multiplexing data packets of different priorities in a packet-based communication network, and thus the invention is not directed to an abstract idea. *Cf., e.g., Enfish*, 822 F.3d at 1336 (finding that "a specific improvement to the way computers operate" is not an abstract idea).

A plain reading of the claims (which are limited to a specific implementation for multiplexing data packets of different priorities in a packet-based communication network) demonstrates that the claimed invention is not merely a practice of "organizing human activity." Humans do not receive or transmit data packets or multiplex them. In addition, the claims only describe one specific way to solve the problem utilizing dedicated queues and the application of certain rules (and which is limited to multiplexing data packets of different priorities in a packet-based communication network).

Respondents do not account for the technical improvement the invention actually made to systems for multiplexing data packets of different priority in packet-based networks. *See, e.g., McRO, Inc. v. Bandai Namco Games Am. Inc.*, 837 F.3d 1299, 1313 (Fed. Cir. 2016) (a "court must be careful to avoid oversimplifying the claims by looking at them generally and failing to account for the specific requirement of the claims") (quotation omitted); *see also Diamond v. Diehr*, 450 U.S. 175, 189 n.12 (1981) (cautioning that overgeneralizing claims, "if carried to its extreme, make[s] all inventions un-patentable because all inventions can be reduced to underlying principles of nature which, once known, make their implementation obvious").

The claims thus are not directed to the abstract idea of "managing queues to accommodate priority and avoid delay." The claims do not cover an abstract result to be achieved, but rather a specific implementation of a system for multiplexing data packets of different priorities in a packet-based communication network.

b. Whether the Asserted Claims Add an Inventive Concept

If *Alice* step two is analyzed, the facts already of record demonstrate that the claims are directed to an inventive concept. A claim is not patent-ineligible under the second step of *Alice* "when the claim limitations involve more than performance of well-understood, routine, [and] conventional activities previously known to the industry." *Aatrix*, 882 F.3d at 1128 (internal quotation omitted). As explained above, the claims describe a technological improvement to systems for multiplexing data packets of different priority levels in packet-based communications networks. *See also* CX-2399 (Moulsley WS) at Q/A 15-19. The use of unique queues for each different priority level and applying rules to those queues such that at least two different groups of data-packets end up multiplexed was not routine or conventional at the time of the invention. Rather, simply multiplexing by bundling data packets while giving priority to higher priority to higher priority data packets was the norm. *See id*.

Similarly, the processes described in the '935 patent, when considered as an entire combination of elements (*i.e.*, including means for receiving data packets, operating queues for each different priority of data packet, assembling at least two different portions of a group data packets according to two different rules, wherein the size of the first and second portions is adapted according to the delay experienced by data in each queue relative to a delay criterion, and transmitting the group, etc.) was also not well understood, routine or conventional, including because using queues in this manner (instead of rote multiplexing by priority) in the context of a multiplexing data packets of different priority levels in a packet-based communication network transformed whatever might conceivably deemed abstract into a patent-eligible application. *See id.*

Accordingly, it has not been shown by clear and convincing evidence that the asserted claims of the ‘935 patent are patent ineligible under 35 U.S.C. § 101.

D. Validity of the ‘935 Patent

Respondents argue that (1) “all of the asserted claims are indefinite because a POSA would not be able to discern with reasonable certainty the boundaries of the limitation requiring that ‘the size of the first and second portions is adapted according to the delay experienced by data in each queue relative to a delay criterion for the respective queue’”; (2) “[t]he ‘935 patent lacks adequate written description to inform a POSA how to select data from ‘one or more of the queues’ or queue stores when using two rules and a single queue or queue store”; and (3) “Claims 1-3, 9-11, and 17 of the ‘935 patent are rendered obvious by: (1) Emanuel (RX-0014) alone; and (2) Emanuel in view of Chow (RX-0019). Claims 9-11 and 17 are also rendered obvious by Emanuel in view of Chow and Devadas (RX-0015).” Resps. Br. at 79, 81; *see id.* at 79-104.

Complainants and the Staff disagree. *See* Compls. Br. at 90-115; Staff Br. at 85-97.

For the reasons set forth below, respondents have not shown by clear and convincing evidence that the asserted claims of the ‘‘935 patent are invalid.

1. Indefiniteness

Respondents argue that "all of the asserted claims are indefinite because a POSA would not be able to discern with reasonable certainty the boundaries of the limitation requiring that 'the size of the first and second portions is adapted according to the delay experienced by data in each queue relative to a delay criterion for the respective queue.'" Resps. Br. at 79; *see id.* at 79-81.

Complainants and the Staff disagree. *See* Compls. Br. at 90-94; Staff Br. at 85-88.

As an initial matter, in the claim construction section above, the administrative law judge determined that the claim term "the size of the first and second portions is adapted according to the delay experienced by data in each queue relative to a delay criterion for the respective queue" should be construed to mean "the amount of memory for each of the first portion and the second portion is made suitable according to the delay experienced in each queue relative to a delay criterion for the respective queue."

As Dr. Brogioli opines, Dr. Bims's analysis overcomplicates the plain claim language to create an indefiniteness issue that does not exist. *See* CX-2419 (Brogioli RWS) at Q/A 23. Dr. Bims opines in his response to question number 36 in his direct witness statement that it is unclear what the "delay experienced by data in each queue" refers to. Dr. Brogioli opines that the plain language of claims 1 and 9 and the specification of the '935 patent is clear to a POSA. *Id.* Indeed, the size of the first and second portions of data are adapted according to an amount of time waiting in the respective queue, the amount of data in the respective queue, or the type or priority of data in the respective queue, and the queues in question are the queues that make up the first and second portions of the group.

Dr. Bims opines that the specification is unclear about which queues need to experience delay in order to adapt the size of the two portions. Dr. Brogioli opines that Dr. Bims is attempting to import requirements that contradict the plain language of claims 1 and 9. *Id.* The plain language itself merely requires that the size of the first and second portion of the group of packets be adapted based on the delay experienced by data in each queue that makes up the first portion relative to a delay criterion for the respective queue, and the delay experienced by data in each queue that makes up the second portion relative to a delay criterion for the respective queue. Based on this, for example, if a group of packets is being assembled from three source queues, the claim simply requires that the size of the first and second portions are adapted according to the delay experienced by data in each queue relative to a delay criterion for each respective queue. Consistent with Dr. Brogioli's opinions on infringement of the '935 patent, Dr. Brogioli opines that a POSA understands what that plain language means, which is all that is required under the standard for definiteness. *Id.*

Dr. Bims states in his responses to question numbers 40-47 in his direct witness statement that "means for assembling a group of data packets" is indefinite. In response to question number 40, Dr. Bims states that "[t]he specification . . . describes populating the group and adapting the size of the first and second portions of the group as both being functions performed by the same means element: 'control means 110.'" In response to question number 42, Dr. Bims opines that "the specification states that the control means 110 is a microprocessor." In that same response, he states that there is insufficient structure and algorithm disclosed in the specification for how the microprocessor performs the "wherein the size of the first and second portions is adapted according to the delay experienced by data in each queue relative to a delay criterion for the respective queue" portion of claim 9.

Dr. Brogioli opines that this portion of claims 1 and 9 are sufficiently definite based on the plain language of the claims themselves. *Id.* at Q/A 24. Much of Dr. Bims's analysis is premised on the assumption that the "wherein the size of the first and second portions is adapted according to the delay experienced by data in each queue relative to a delay criterion for the respective queue" of claim 9 is subject to means-plus-function. Complainants have proposed that the "wherein the size of the first and second portions is adapted according to the delay experienced by data in each queue relative to a delay criterion for the respective queue" portion of claim 9 should not be subject to mean-plus-function. Indeed, as noted above, the administrative law judge construed this claim term, but not as a term that is subject to mean-plus-function.

Accordingly, respondents have not shown by clear and convincing evidence that the claim term "the size of the first and second portions is adapted according to the delay experienced by data in each queue relative to a delay criterion for the respective queue" is indefinite.

2. Written Description

Respondents argue, "The '935 patent lacks adequate written description to inform a POSA how to select data from 'one or more of the queues' or queue stores when using two rules and a single queue or queue store." Resps. Br. at 81.

Complainants and the Staff disagree. *See* Compls. Br. at 94-95; Staff Br. at 89.

Dr. Bims opines that the claim element "one or more queues" / "one or more queue stores" lacks written description support in the specification. *See* RX-3212C (Bims WS) at Q/A 34, 47. Dr. Bims provides minimal explanation to support his opinion that there is insufficient support for the limitation. *See* CX-2419 (Brogioli RWS) at Q/A 27. It is unclear what hypothetical situation Dr. Bims is referring to when he opines that the limitation lacks support, and Dr. Bims provides no evidence or explanation beyond a few statements to support this opinion. The '935 patent explains the selection of data from queues and provides examples as to how the groups can be populated.

Dr. Brogioli opines that claim 1 does not encompass a single queue. *See* CX-2419 (Brogioli RWS) at Q/A 27. The preamble of claim 1 recites data packets having different assigned priorities, and the first limitation recites operating a queue for each different priority of data packet. Dr. Brogioli further opines that the preamble and the first limitation, read as a whole, would support the scope not encompassing a single queue. *Id.* Even if the preamble were construed as non-limiting, the phrase "each different priority" implies that there are at least two different priorities. *See* JX-0001 ('935 Patent) at 1:50-54; Staff Br. at 89.

This same reasoning applies to claim 9 with respect to "queue stores" and Dr. Brogioli opines that "one or more queue stores" is not indefinite. *See* CX-2419 (Brogioli RWS) at Q/A 27. Regarding Dr. Bims's questions related to "overlap," Dr. Brogioli opines that Dr. Bims attempts to import extra requirements into claims 1 and 9. *Id.* Nothing in the claim requires that the rules be mutually exclusive concerning the queues. The claim does not necessitate that the portions are adjusted "equally." There is no requirement that "to determine which of the first and second portion are furthest from meeting their QoS delay requirements." The claim simply requires that the first and second portions are adapted according to the delay experienced by the data relative to a delay criterion. Dr. Brogioli opines that a POSA can reasonably conclude that the inventor had possession of the claimed invention at the time of the effective filing date of the patent, which is all that is required under the legal standard for written description support. *Id.*

Accordingly, respondents have not shown by clear and convincing evidence that the the claim term "one or more queues" / "one or more queue stores" lacks written description support in the specification.

3. Obviousness

Respondents argue, "Claims 1-3, 9-11, and 17 of the '935 patent are rendered obvious by: (1) Emanuel (RX-0014) alone; and (2) Emanuel in view of Chow (RX-0019). Claims 9-11 and 17 are also rendered obvious by Emanuel in view of Chow and Devadas (RX-0015)." Resps. Br. at 81; *see id.* at 81-104.

Complainants and the Staff disagree. *See* Compls. Br. at 95-115; Staff Br. at 90-97.

a. Emanuel Alone

Background

The focus of Emanuel is "problems relating to the partially delayed transmission of data of high quality of service…." *See* Emanuel (CX-0034) at [0004]. For example, if speech data and download data are transmitted together, "a delayed transmission of data of high quality of service (*e.g.*, speech data) takes place because the transmission path is occasionally blocked by internet protocol datagrams containing data of low quality of service, these datagrams also generally being large." *See* Emanuel (CX-0034) at [0002].

Emanuel proposes a solution to these problems. The solution includes arranging and classifying data "in accordance with their respective quality of service, in queues assigned to the respective quality of service." *Id.* at [0007]. The solution further includes extracting data packets from the relevant queues and grouping the packets in a container. "The container is preferably firstly filled with data packets comprising data of high quality of service and the remaining container space is filled with data packets comprising data of low quality of service until the payload quantity is reached." *Id.* The solution further includes making the container "available for transmission." *Id.*

i. Independent Claim 1

<u>"assembling a group…" (claim 1)</u>

Dr. Brogioli opines that Emanuel discloses only one rule for determining which queues to service. *Id.* at Q/A 32. Emanuel does not disclose that there are two rules. Emanuel makes clear that the one rule always applies: "In the present case the queues QC, QS, QI and QB are serviced in descending order of priority, so that for example data packets from the queue QC are ***always*** handled preferentially while data packets from the queue QB are extracted only if no data packets are otherwise awaiting transmission." *See* Emanuel (CX-0034) at [0048] (emphasis added). Dr. Brogioli opines that by disclosing that one rule must be followed (Emanuel (CX-0034) at [0048]) and disclosing preference for one rule (Emanuel (CX-0034) at [0007]), Emanuel teaches away from two rules. *See* CX-2419 (Brogioli RWS) at Q/A 52. Emanuel discloses how that one rule is applied: "[a] container is preferably firstly filled with data packets comprising data of high quality of service and the remaining container space is filled with data packets comprising data of low quality of service until the payload quantity is reached." *See* Emanuel (CX-0034) at [0007].

Moreover, Emanuel's stated goal is to solve "problems related to the partially delayed transmission of data of high quality of service." *See* Emanuel (CX-0034) at [0004]. Thus, Dr. Brogioli opines that the only rule needed is to service data in descending order of priority, so that high priority data packets are always handled first. *See* CX-2419 (Brogioli RWS) at Q/A 32. Dr. Bims has not identified a second rule and he has not explained why a person of ordinary skill would have been motivated to add additional rules.

Dr. Bims opines that a second rule is that "queues QI and QB are in any case to be serviced at predetermined time intervals." *Id.* However, Dr. Brogioli opined that Emanuel does not disclose two rules when opining that "the queues QI and QB are in any case to be serviced at predetermined time intervals." *Id.*; *see also* Emanuel (CX-0034) at [0048]. Dr. Brogioli further opines that the rule is that the queues "are serviced in descending order of priority" and determining the priority is based on the "predetermined time intervals," and Emanuel is describing an implementation of that rule. *See* CX-2419 (Brogioli RWS) at Q/A 32. As Dr. Brogioli explains, in the very next sentence after introducing "predetermined time intervals," Emanuel states "[f]or example it is possible for the priority of a queue to increase if it has not been serviced over a predetermined period of time or if it seems likely to overflow." *Id.; see also* Emanuel (CX-0034) at [0048]. The single rule in Emanuel is to service the queues in order of priority which is not the invention of the '935 patent.

Demonstratives 1-7 to Dr. Brogioli's witness statement (CDX-0007 at 3-9) are an illustrative example of the one rule of servicing in descending order of priority. Through these exhibits and his related testimony, Dr. Brogioli explains how Emanuel's single rule (order of priority) is different from the claimed invention.

As Dr. Brogioli opined, the opinion of Dr. Bims that "[a] POSA would have understood Emanuel's reference to 'at least one aggregation rule' . . . to mean that a container may be filled by applying multiple (*e.g.*, two) aggregation rules," is incorrect. *See* CX-2419 (Brogioli RWS) at Q/A 35. At no point does Emanuel give concrete examples of a second rule, or explicitly state that there is "a second" rule or "two rules." *Id.* Moreover, Emanuel refers to "the aggregation rule" (without the "at least one" modifier) implying that there is only one rule. *See* Emanuel (CX-0034) at [0048]. In light of the disclosure in Emanuel, which gives no concrete examples of any rules except for servicing in order of priority, Dr. Brogioli opines that a POSA would have understood that Emanuel teaches one and only one aggregation rule. *See* CX-2419 (Brogioli RWS) at Q/A 35. There is also no embodiment in Emanuel having more than one aggregation rule, and Dr. Bims has not shown any teaching or suggestion of additional aggregation rules in the reference. Moreover, the purpose of the invention of Emanuel is carried out through the single aggregation rule.

Dr. Brogioli further opines that Emanuel does not disclose a first portion and a second portion of a group, or two portions populated according to two different rules. *Id.* at Q/A 36. Emanuel states that the container is to be understood as "an illustrative term for grouping of data packets." *See* Emanuel (CX-0034) at [0010]. Claim 1 of the '935 patent requires that the first portion is populated "according to a first rule" and a second portion is populated "according to a second rule." As discussed above, the container in

Emanuel is filled according to only one rule. There is no "first portion" and "second portion" – there is only a stream of data entering the container in order of priority.

Regardless of which constructions are applied, Dr. Brogioli opines that this element is not taught. *See* CX-2419 (Brogioli RWS) at Q/A 37. Philips has proposed (a) "rule" to mean "a procedure for selecting data packets" and (b) "a queue" to mean "[a] collection of data packets in sequence." Dr. Brogioli opines that Emanuel does not disclose "assembling a group of the data packets wherein a first portion of the group is populated with data packets selected from one or more of the queues according to a first rule and a second portion of the group is populated with data packets selected from one or more of the queues according to a second rule" under complainants' proposed construction. *Id.* In short, Emanuel describes applying a single rule to select data packets from a queue, whereas the claim requires two rules.

Respondents and the Staff have proposed (a) "rule" to mean "a procedure for selecting data packets" and (b) "a queue" to mean "distinct memory for storing data packets in sequence." Dr. Brogioli opines that Emanuel does not disclose "assembling a group of the data packets wherein a first portion of the group is populated with data packets selected from one or more of the queues according to a first rule and a second portion of the group is populated with data packets selected from one or more of the queues according to a second rule" under respondents' and the Staff's construction. *Id.* Emanuel describes applying a single rule to select data packets from a queue, whereas the claim requires two rules.

"transmitting the group…" (claim 1)

Emanuel also does not disclose adapting the size of the first and second portions according to delay experienced in each queue relative to a delay criterion. *Id.* at Q/A 38. The container does not have different portions according to different rules. Inasmuch as the container lacks two portions, two portions cannot be adapted.

Emanuel also does not consider the wait time encountered by the data by two queues or compare the wait time encountered to a threshold. *Id.* Rather, Emanuel states that "the at least one aggregation rule specifies that the queues QI and QB are in any case to be serviced at predetermined time intervals." *See* Emanuel (CX-0034) at [0048]. At least the high priority queue is always serviced without any delay. The claims of the '935 patent require that the size of the first and second portions of group be adapted according to a delay criterion, and Emanuel never applies any type of delay criterion for the highest and lower priority queues.

As Dr. Brogioli opined, the opinion of Dr. Bims that the time limit is the delay criterion and that a predetermined payload quantity of the container can be variable based on a predetermined time limit in his response to question number 86 in his direct witness statement, is incorrect. *See* CX-2419 (Brogioli RWS) at Q/A 39. Dr. Brogioli opines that, under any construction, the claimed "delay criterion" is not the same as the time limit in Emanuel relied on by Dr. Bims. Emanuel states that "the packet is transmitted" when the predetermined time limit is reached. *Id; see also* Emanuel (CX-0034) at [0015].

Dr. Brogioli opines that a POSA would understand that the time limit is the transmission time interval (TTI). *Id.* TTI is a well-known concept in UMTS and it refers to the duration of a transmission once the data is already grouped in the container. Yet, the "time limit" of Emanuel is not related to the grouping of packets, the priority of the queues, or which packets are included in a transmission. *Id.*

Even if the "predetermined time limit" is related to delay experienced, the delay experienced is the delay experienced in the "relevant container," not the queue. *See* CX-2419 (Brogioli RWS) at Q/A 39. The "predetermined time limit" is the same for all queues.

Dr. Bims mischaracterizes the container by referring to it as a portion of a group rather than the group itself. *See* CX-2419 (Brogioli RWS) at Q/A 40. Emanuel states that the container is "a grouping of data packets." *See* Emanuel (CX-0034) at [0010].

Emanuel does not teach the delay experienced by data in each queue relative to a delay criterion for the respective queue as Emanuel does not teach a delay criterion for each queue. *See* CX-2419 (Brogioli RWS) at Q/A 40. Emanuel does not teach a delay criterion for the highest priority queue. The "predetermined time limit" is not related to any delay experienced by data in the high priority queue. Dr. Brogioli further opines that the "predetermined time interval" is not a delay criterion for the highest priority queue. *Id*. In his direct witness statement, Dr. Bims is silent on whether "predetermined time interval" is a delay criterion for the highest priority queue. As shown in Demonstrative 8 to Dr. Brogioli's witness statement, the "predetermined time interval" only applies to the lower priority queues. *See* CDX-0007.11.

Dr. Brogioli further opines that Emanuel does not disclose adapting the size of the first and second portions. *See* CX-2419 (Brogioli RWS) at Q/A 40. Emanuel does not disclose adapting the size of the first and second portions according to delay experienced in each queue relative to a delay criterion. In his response to question number 86 in his direct witness statement, Dr. Bims points to paragraph [0048] of Emanuel, which Dr.

Bims claims teaches that “the predetermined payload quantity” of a given container can be “fixed or [i]s variable within predetermined limits,” and, to implement this adaption, “suitable priority procedures can … be defined in the aggregation rule.” This is incorrect. The “suitable priority procedures” is not referring to adapting the payload but to increasing a priority of a queue if it has not been serviced. *See* Emanuel (CX-0034) at [0048]. Paragraph [0048] of Emanuel is completely silent as to what adapts the “variable” predetermined payload quantity.

Regardless of which claim construction is applied, Dr. Brogioli opines that this element is not taught. *See* CX-2419 (Brogioli RWS) at Q/A 41. Emanuel discloses filling a container with data packets using a single rule. Inasmuch as Emanuel describes only single rule, the container has only one portion. In addition, Emanuel does not disclose use of the claimed delay criterion to adapt the size of the first and second portions of a group of packets.

Respondents have proposed (a) “delay criterion” to mean “a predetermined duration of time for waiting in the respective queue,” (b) “delay experienced” to mean “wait time encountered,” (c) “the size of the first and second portions is adapted according to the delay experienced by data in each queue relative to a delay criterion for the respective queue” to be indefinite, and (d) “transmitting the group” to mean “sending the group of data packets over a network via an antenna.”

The Staff has proposed (a) “delay criterion” to mean “a predetermined duration of time for waiting in the respective queue,” (b) “delay experienced” to mean “wait time encountered,” (c) “the size of the first and second portions is adapted according to the delay experienced by data in each queue relative to a delay criterion for the respective queue" to mean "the amount of memory for each of the first portion and the second portion is made suitable according to the delay experienced [as construed] in each queue [construed below] relative to a delay criterion [as construed] for the respective queue," (d) "transmitting the group" to mean "sending out the group of data packets." Dr. Brogioli opines that Emanuel does not disclose the limitation under the Staff's proposed construction. *Id.* Emanuel discloses filling a container with data packets using a single rule. In addition, Emanuel does not disclose use of the claimed delay criterion to adapt the size of the first and second portions of a group of packets.

ii. Dependent Claims 2 and 3

As discussed above, elements 1.3 and 1.4 are not disclosed by Emanuel. Claims 2 and 3 depend from claim 1, and require elements 1.3 and 1.4, and thus claims 2 and 3 are not rendered obvious by Emanuel.

Additionally, even if servicing queues at "predetermined time intervals" did qualify as a second rule, Emanuel does not teach using two rules where the first rule is to service queues including the highest priority packets. *See* CX-2419 (Brogioli RWS) at Q/A 43. In the containers depicted in Figure 5 of Emanuel, container C1 contains packets from the highest priority queue, QC, but that container was packed based on a descending priority scheme. *See* Emanuel (CX-0034) at Fig. 5, [0048]. In contrast, Emanuel teaches that container C2 is packed with lower priority packets according to a "predetermined time interval[]." *See* Emanuel (CX-0034) at [0048]. Indeed, the Container C2 does not contain any packets from the highest priority queue (QC). *See* Emanuel (CX-0034) at [0048]. Thus, there is no teaching in Emanuel that there is a packing scheme in which two rules are applied to select packets for transmission.

iii. Independent Claim 9

<u>"means for assembling a group…" (claim 9)</u>

As discussed above, Emanuel does not disclose element 1.3. That analysis applies equally to element 9.3. Among other things, Emanuel does not disclose use of multiple rules or forming multiple groups of packets. Emanuel does not disclose element 9.3 for the same reasons provided with respect to element 1.3.

Additionally, Dr. Brogioli opines that Emanuel does not disclose "means for assembling a group" in limitation element 9.3. *See* CX-2419 (Brogioli RWS) at Q/A 44. Philips and the respondents propose the "means for assembling a group" as "one or more routing switches, an output buffer or other storage, and equivalents thereof." Emanuel is silent as to routing switches, an output buffer, or other storage between the queues and the container, and Dr. Bims has not identified where these structures are found in Emanuel.

Regardless of which construction is applied, Dr. Brogioli opines that this element is not taught. *Id.* at Q/A 45. Emanuel describes applying a single rule to select data packets, whereas the claim requires two rules. For the reasons previously stated for element 1.3, Dr. Brogioli opines that Emanuel does not disclose "means for assembling a group of the data packets wherein a first portion of the group is populated with data packets by selecting data packets from one or more of the queue stores according to a first rule and a second portion of the group is populated with data packets by selecting data packets from one or more of the queue stores according to a second rule" under the Staff's proposed construction. *Id.*

Emanuel describes applying a single rule to select data packets, whereas the claim requires two rules. Emanuel also lacks routing switches, an output buffer, or other storage between the queues and the container which is identified as required structure under the Staff's proposed construction. For the reasons previously explained Emanuel does not perform the same function and does not have an equivalent structure for the "means for assembling."

<u>"means for transmitting…" (claim 9)</u>

As discussed above, Emanuel does not disclose element 1.4. That analysis applies equally to element 9.4. Emanuel does not disclose use of the claimed delay criterion to adapt the size of the first and second portions of a group of packets.

Regardless of which construction is applied, Dr. Brogioli opines that this element is not taught. *See* CX-2419 (Brogioli RWS) at Q/A 47. As explained above, Dr. Brogioli has analyzed the claim limitation under the parties' proposed constructions and he has determined that the limitation is not met under any party's proposed construction as Emanuel does not perform the same function and does not have an equivalent structure for the claimed "means for assembling."

Respondents have proposed "means for transmitting the group" to have a function "[t]ransmitting the group" and to have a structure "transceiver (310) having an antenna." Dr. Brogioli opines that Emanuel does not disclose "means for transmitting the group, wherein the size of the first and second portions is adapted according to the delay experienced by data in each queue relative to a delay criterion for the respective queue" under the Staff's construction. *Id.* As Dr. Brogioli explained for element 1.4, Emanuel discloses filling a container with data packets using a single rule. Inasmuch as Emanuel describes only single rule, the container has only one portion. Therefore, Emanuel cannot adapt the first and second portions. In addition, Emanuel does not disclose use of the claimed delay criterion to adapt the size of the first and second portions of a group of packets which is required by this claim element.

The Staff has proposed "means for transmitting the group" to have a function "[t]ransmitting the group" and to have a structure "[o]utput 100, and equivalents therefore" Dr. Brogioli opines that Emanuel does not disclose "means for transmitting the group, wherein the size of the first and second portions is adapted according to the delay experienced by data in each queue relative to a delay criterion for the respective queue" under the Staff's construction. *Id.* As Dr. Brogioli explained for element 1.4, Emanuel discloses filling a container with data packets using a single rule. Inasmuch as Emanuel describes only single rule, the container has only one portion. Therefore, Emanuel cannot adapt the first and second portions. In addition, Emanuel does not disclose use of the claimed delay criterion to adapt the size of the first and second portions of a group of packets which is required by this claim element.

iv. Dependent Claims 10, 11, 17

As discussed above, claim 9 is not rendered obvious by Emanuel. Dependent claims 10, 11, and 17 depend from claim 9, and thus, claims 10, 11, and 17 are not rendered obvious by Emanuel.

b. Emanuel in Combination with Chow

The Chow reference (U.S. Patent No. 6,438,134 B1, CX-0039) is directed to "a scheduler and related method for efficiently allocating the bandwidth of a communications link amongst multiple queues which may be associated with a variety of service classes." *See* Chow (CX-0039) at 1:12-16. Chow describes a problem scenario for service classes in asynchronous transfer mode (ATM) systems that use a "fair" scheduling scheme for idle bandwidth "wherein each queue, corresponding to each connection, is assigned a weight proportional to its allocated service rate." Chow (CX-0039) at 1:55-58. For example, if a first connection has a rate of 980 kbps and a second connection has a rate of 20 kbps, the idle bandwidth distribution is 98% for the first connection and 2% for the second connection. *See* Chow (CX-0039) at 2:64-3:1.

The purpose of Chow is to provide a more even idle bandwidth distribution between connections of disparate rates. Chow achieves this by including an idle bandwidth scheduler. "In the preferred embodiment, the idle bandwidth scheduler partitions the instantaneous idle bandwidth in a fixed manner or ratio between QoS classes, and equally between all connections associated with a particular QoS class." Chow (CX-0039) at 3:67-4:4.

i. Independent Claim 1

"assembling a group…" (claim 1)

Dr. Bims does not show that Chow teaches assembling a group of data packets. CX-2419 (Brogioli RWS) at Q/A 60. Dr. Bims's opinion that Chow discloses a first scheduler which uses a first procedure for selecting data packets "for inclusion as a first portion of a group of data packets transmitted on communications link 16" is incorrect. *Id*. Dr. Bims has not provided any support for his opinion that Chow teaches a group of data packets.

Chow does not teach "a group of the data packets," or assembling a group of data packets wherein a first portion of the group is populated with data packets selected from one or more of the queues according to a first rule and a second portion of the group is populated with data packets selected from one or more of the queues according to a second rule. Chow states that "the task of scheduler 10 is to schedule data packets 12 stored in a plurality of input queues 14 to a limited resource, such as output communications link 16." *See* Chow (CX-0039) at 5:1-2. The communication link 16 is divided into *time slots* with "one data packet 12 per time slot." Chow (CX-0039) at 5:9-12. Therefore, each data packet is transmitted individually. Chow does not disclose that there is a group of data packets, or that a group of data packets are being assembled.

Demonstratives 10-14 to Dr. Brogioli's witness statement (CDX-0007.14-CDX-0007.18) illustrate how packets are sent one at a time in the system of Chow. Chow, alone or in combination with Emanuel, does not teach "a first portion" and "a second portion." There is no group of data packets. Therefore, there is no "first portion" and "second portion" of the non-existent group of data packets.

Dr. Bims opined that the group of packets is stored within [exhaustive] scheduler, but Dr. Brogioli opined that Chow does not disclose that the scheduler 30 can store more than one packet at a given time. *See* CX-2419 (Brogioli RWS) at Q/A 62. Thus, the exhaustive scheduler 30 cannot be the "group" of packets. *Id.* Dr. Brogioli further testifies that, even if Dr. Bims is implying that one of the shaper scheduler 20, the idle bandwidth scheduler 25, or communications link 16 is the "group of packets," like the exhaustive scheduler 30, at no point does Chow state that any of the shaper scheduler 20, the idle bandwidth scheduler 25, or communications link 16 can store a more than one packet at a given time. *Id.*

Accordingly, none of the shaper scheduler 20, the idle bandwidth scheduler 25, or communications link 16 is the group of packets. Dr. Brogioli has analyzed the claim limitation under the parties' proposed constructions and determined that the limitation is not met under any party's proposed construction. Emanuel in view of Chow describes applying a single rule to select data packets from a queue and does not teach adapting a first portion and second portion of a group of packets.

"transmitting the group…" (claim 1)

Dr. Bims has not provided any support for his opinion that Chow teaches transmitting a group of data packets. *Id.* at Q/A 64. As discussed above, Chow states that "the task of scheduler 10 is to schedule data packets 12 stored in a plurality of input queues 14 to a limited resource, such as output communications link 16." Chow (CX-0039) at 5:1-2. The communication link 16 is divided into *time slots* with "one data packet 12 per time slot." *See* Chow (CX-0039) at 5:9-12. Therefore, each data packet is being transmitted individually and there is no group of packets to transmit.

Emanuel does not teach adapting the size of the first and second portions according to the delay experienced by data in each queue relative to a delay criterion. Dr. Brogioli further opines that Chow, alone or in combination with Emanuel, does not teach adapting the size of the first and second portions. *See* CX-2419 (Brogioli RWS) at Q/A 64. As discussed above, Chow does not teach a first portion and a second portion of a group of data packets, and Dr. Bims has not shown any evidence that Chow teaches a first portion and a second portion of a group.

Dr. Brogioli opines that Chow, alone or in combination with Emanuel, does not teach adapting the size of the first and second portions as Emanuel does not teach delay criterion. *Id.* at Q/A 65. Chow merely discloses that the time stamp TETi is the inverse of the associated guaranteed minimum service rate (Ri) and that the queue is not eligible to be serviced until the TETi is below a certain value. *See* Chow (CX-0039) at 9:15-28 (emphasis added). As shown in Demonstrative 15 to Dr. Brogioli's witness statement (CDX-0007.20), the "time stamps" are associated with when a queue is eligible to even be serviced, not whether or how long data is in the queue. Dr. Brogioli opines that this teaching is incompatible with the express teaching of Emanuel that high priority data will be transmitted regardless of delay, and Dr. Bims does not explain why it would have been obvious to combine these teachings or how they could be combined. *See* CX-2419 (Brogioli RWS) at Q/A 65.

ii. Dependent Claims 2 and 3

As discussed above, elements 1.3 and 1.4 would not have been obvious to a POSA in light of Emanuel in view of Chow. Claims 2 and 3 depend from claim 1, and requires elements 1.3 and 1.4, and thus, claims 2 and 3 are not rendered obvious by Emanuel in view of Chow.

iii. Independent Claim 9

"means for assembling a group…" (claim 9)

As discussed above, element 1.3 would not have been obvious to a POSA in light of Emanuel and Chow. That analysis applies equally to element 9.3. With regards to Chow, as Dr. Brogioli previously explained, Chow, among other things, does not disclose the use of the claimed first and second rules and does not disclose assembling groups of packets. Thus, Chow does not disclose element 9.3 for the same reasons provided with respect to element 1.3.

<u>“means for transmitting the group…” (claim 9)</u>

As discussed above, element 1.4 would not have been obvious to a POSA in light of Emanuel and Chow. That analysis applies equally to element 9.4. Chow does not disclose a structure that performs the claimed function of transmitting a group of packets. Thus, Chow does not disclose element 9.4 for the same reasons provided with respect to element 1.4.

Emanuel in view of Chow describes applying a single rule to select data packets from a queue and does not teach adapting a first portion and a second portion of a group of data packets.

iv. Dependent Claims 10, 11, 17

As discussed above, elements 9.3 and 9.4 would not have been obvious to a POSA in light of Emanuel and Chow. Claims 10, 11, and 17 depend from claim 9 and require elements 9.3 and 9.4, and thus, those dependent claims are not rendered obvious by Emanuel in view of Chow.

v. Motivation to Combine Emanuel and Chow

As Dr. Brogioli opines, a POSA would not have been motivated to combine the teachings of Emanuel and Chow. *See* CX-2419 (Brogioli RWS) at Q/A 67. Generally, Emanuel is directed to methods and means in the medium access control (MAC) layer. For example, Emanuel is directed to how “the data to be transmitted are arranged [and] classified in accordance with their respective quality of service . . . .” *See* Emanuel (CX-0034) at [0007]. Emanuel discloses that “[a] number of extracted data packets are in each case grouped to form a container . . . .” *See* Emanuel (CX-0034) at [0007] (emphasis added). In contrast, Chow is directed to methods and means in the physical (PHY) layer.

Chow is directed to scheduling contending connections in a communications link, for example, in an Asynchronous Transfer Mode (ATM) system. *See* Chow (CX-0039) at Abstract, 8:28. A POSA would understand that ATM system is a PHY layer system that deals with physical transmission of the bit stream. The communication link 16 is divided into time slots with "one data packet 12 per time slot." *See* Chow (CX-0039) at 5:9-12. Chow is concerned with when to transmit a packet (*e.g.*, what timeslot to schedule a packet in, Chow (CX-0039) at 6:9-12) rather than which packets to group into an allocated resource. Dr. Brogioli opines that a POSA would understand that the PHY layer is responsible for scheduling transmissions, whereas the MAC layer has no control over transmission times. *See* CX-2419 (Brogioli RWS) at Q/A 65. Chow generates a "stream of data packets." Chow (CX-0039) at 3:49-50. A POSA would understand that the physical layer is where data is transmitted as a continuous, raw bit stream. *See* CX-2419 (Brogioli RWS) at Q/A 65. Inasmuch as Chow teaches improvements to the PHY layer, a POSA would not look to Chow to improve a MAC layer mechanism in Emanuel. *Id.*

The stated goals of Chow and Emanuel are different. *Id.* Emanuel is trying to solve "problems related to the partially delayed transmission of data of high quality of service." In contrast, Chow's goal is to "achieve a more efficient distribution of idle bandwidth." Chow (CX-0039) at 3:13-14. Idle bandwidth "aris[es] from the idle, non-busy periods," where delayed transmission is not an issue because all qualities of service are satisfying their rate requirements. Chow (CX-0039) at 2:17-18. A POSA looking to solve problems contemplated by Emanuel would not be motivated to look to Chow for solutions to such problems. *See* CX-2419 (Brogioli RWS) at Q/A 65.

A POSA would not have been motivated to combine the teachings of the two references as they are directed to solving different problems and the underlying functionality used to solve the problems in each reference would not be combined. *Id.*

c. Emanuel in Combination with Chow and Devadas

The Devadas reference (U.S. Patent Publication No. 2004/0163084 A1, CX-0035) is directed to "methods and systems for allocating bandwidth over a shared link" and maintaining "quality of service guarantees." *See* Devadas (CX-0035) at [0001]. Devadas states that goals of a switching system are "to maximize [bandwidth] usage of the switch" and "to prevent certain packets from being queued in the switching system for unacceptably long periods of time prior to transmission." *See* Devadas (CX-0035) at [0004]. Devadas states that prior art segments packets at ingresses and reassembles them at egresses, but "[s]uch segmentation and reassembly can constrain the performance of the switching system 10." Devadas (CX-0035) at [0005]. Devadas achieves the goals by "calculating a guaranteed rate for each queue based on the queue metric information and a guaranteed bandwidth amount for the group of queues" and, using the guaranteed rate, "determin[ing] a priority for the queue" Devadas (CX-0035) at [0017].

i. Independent Claim 1

<u>"assembling a group…" (claim 1)</u>

Dr. Bims does not opine that Devadas teaches this element. *See* CX-2419 (Brogioli RWS) at Q/A 75. Dr. Bims has not shown that this element would have been obvious in view of these three references, and Dr. Brogioli further opines it would not have been obvious. *Id.*

<u>"transmitting the group…" (claim 1)</u>

Dr. Bims does not opine that Devadas teaches this element. *See* CX-2419 (Brogioli RWS) at Q/A 77. Dr. Bims has not shown that this element would have been obvious in view of these three references, and Dr. Brogioli further opines it would not have been obvious. *Id.*

ii. Dependent Claims 2 and 3

As discussed above, elements 1.3 and 1.4 would not have been obvious to a POSA in light of Emanuel in view of Chow and Devadas. Claims 2 and 3 depend from claim 1 and requires elements 1.3 and 1.4, and thus, claims 2 and 3 are not rendered obvious by Emanuel in view of Chow and Devadas.

iii. Independent Claim 9

<u>"means for assembling a group…" (claim 9)</u>

By Dr. Bims's own admission, Devadas does not disclose element 9.3. *See* CX-2419 (Brogioli RWS) at Q/A 81. In response to question number 163 in his direct witness statement, Dr. Bims opines that Devadas discloses "a switching system" and "using hardware or software switches to route data from queue buffers having different priorities to different output buffers of an egress." However, Dr. Bims has not shown that Devadas discloses that any of the "switches" or the "output buffer" perform a function of "assembling a group of data packets" and nor does he show that such a function is performed by an equivalent structure. Thus, Devadas does not teach, suggest, or disclose element 9.3.

Emanuel in view of Chow and Devadas describes applying a single rule to select data packets from a queue and does not teach adapting a first portion and a second portion of a group of data packets. Further, for the reasons previously explained by Dr. Brogioli, Emanuel in view of Chow and Devadas does not perform the same function and does not have an equivalent structure for the claimed "means for assembling a group."

<u>"means for transmitting the group…" (claim 9)</u>

As with element 1.4, Dr. Bims has not shown that this element would have been obvious in light of Emanuel, Chow, and Devadas. In his response to question number 166 in his direct witness statement, Dr. Bims does not even attempt to argue that Devadas discloses the grouping of packets where the size of the portions are adapted according to a delay criterion. *See* CX-2419 (Brogioli RWS) at Q/A 81. Devadas therefore cannot disclose element 9.4. By extension, element 9.4 is not disclosed by a combination of Emanuel, Chow, and Devadas.

iv. Dependent Claims 10, 11, 17

As discussed above, elements 9.3 and 9.4 would not have been obvious to a POSA in light of Emanuel, Chow, and Devadas. Claims 10, 11, and 17 depend from claim 9 and require elements 9.3 and 9.4, and thus, those dependent claims are not rendered obvious by Emanuel in view of Chow and Devadas.

v. Motivation to Combine Emanuel, Devadas, and Chow

As Dr. Brogioli opined, A POSA would not have been motivated to combine Emanuel with Chow. Dr. Brogioli opined that a POSA would not be motivated to additionally combine Emanuel with Devadas as Devadas teaches away from Emanuel. *See* CX-2419 (Brogioli RWS) at Q/A 79. Emanuel teaches segmenting packets as part of solving the stated problem of partially delayed transmission. *See* Emanuel (CX-0034) at

[0007], [0044]. However, Devadas disparages segmentation of packets. For example, Devadas discloses that "[s]uch segmentation and reassembly can constrain the performance of the switching system 10." Devadas (CX-0035) at [0005]. In addition, Devadas discloses that "a need exists for a method and system for maximizing utilization of a timeslot for data transfer without causing a segmentation and reassembly problem." Devadas (CX-0035) at [0006].

Dr. Brogioli further explains that Devadas is directed to improving a routing device for packetized data. *See* CX-2419 (Brogioli RWS) at Q/A 79. Devadas shows a link 108 connected between multiple ingresses and multiple egresses. *See* Devadas (CX-0035) at FIG. 2. Devadas is directed to selecting which egress to route packetized data from a given ingress, which is the function of a router. The improvement in Devadas is the arbiter chip 106, which is improving the functionality of the link 108. Inasmuch as Devadas teaches improvements to the routing device, a POSA would not look to Devadas to improve a MAC layer mechanism in Emanuel.

d. Secondary Considerations

The patented invention arose in the context of the 3GPP RAN (Radio Access Network) working groups where other skilled artisans from around the world were attempting to solve the same problem and the inventors' solution was selected out of multiple possible alternatives. *See* CX-2399 (Moulsley WS) at Q/A 4-7. Dr. Brogioli opines that the patented invention is standards essential and is widely used in 3GPP wireless communication standard. *See* CX-0011C (Brogioli WS) at Q/A 86. Thus, others failed in solving the problem and the patented invention has been commercially successful. These factors support the conclusion that the invention would not have been obvious to a person of ordinary skill at the time of invention. *Id.*

V. U.S. Patent Nos. 7,554,943 and 8,199,711

United States Patent No. 7,554,943 ("the '943 patent), entitled "Radio Communication System," issued on June 30, 2009, to named inventors Timothy James Moulsley and Matthew Peter John Baker. JX-0002 ('943 Patent). The '943 patent issued from Application No. 10/503,429, filed on August 3, 2004, which claims priority to GB 0203263.9 and GB 0202991.6 filed on February 12 and 8, 2002, respectively. *Id.* The '943 patent relates to "a radio communication system and further relates to primary and secondary stations for use in such a system and to a method of operating such a system. While the present specification describes a system with particular reference to the Universal Mobile Telecommunication System (UMTS), it is to be understood that such techniques are equally applicable to use in other mobile radio systems." JX-0002 at 1:5-12. The '943 patent has a total of 17 claims. Complainants assert independent apparatus claim 12 of the '943 patent. *See* Joint Outline at 4-5; Staff Br. at 6.

United States Patent No. 8,199,711 ("the '711 patent), entitled "Radio Communication System," issued on June 12, 2012, to named inventors Timothy James Moulsley and Matthew Peter John Baker. JX-0003 ('711 Patent). The '711 patent issued from Application No. 12/472,049, filed on May 27, 2009, and is a continuation of Application No. 10/503,429, filed on August 3, 2004, now the '943 patent. *Id.* The '711 and '943 patents share the same specification. The '711 patent relates to "a radio communication system and further relates to primary and secondary stations for use in such a system and to a method of operating such a system. While the present specification describes a system with particular reference to the Universal Mobile Telecommunication System (UMTS), it is to be understood that such techniques are equally applicable to use in other mobile radio systems." JX-0003 at 1:13-20. The '711 patent has a total of 12 claims. Complainants assert independent apparatus claim 9 and independent method claim 12 of the '711 patent. *See* Joint Outline at 4-5; Staff Br. at 6.

As noted, complainants assert independent apparatus claim 12 of the '943 patent, and independent apparatus claim 9 and independent method claim 12 of the '711 patent. *See* Joint Outline at 4-5; Staff Br. at 6.

Asserted independent apparatus claim 12 of the '943 patent reads as follows:

> **12**. [pre] A secondary station for use in a radio communication system having
>
> [12.1] a data channel for the transmission of data packets from ***a primary station*** to the secondary station and
>
> [12.2] a plurality of control channels for signaling of control information relating to the data packets from ***the primary station*** to the secondary station,
>
> [12.3] wherein means are provided for determining which of the control channels is allocated to the secondary station, the ***allocated control channel*** being changed according to ***a defined sequence known*** to both ***the primary station*** and the secondary station, and for monitoring the currently allocated control channel to determine information about packet transmissions, wherein
>
> [12.4] the defined sequence is configured to reduce probability of an allocation collision to 1/N, where N is a total number of the control channels.

JX-0002 ('943 Patent) at 9:17-30 (emphasis added).

Asserted independent claims 9 and 12 of the '711 patent read as follows:

> **9**. [pre] A secondary station for use in a radio communication system having

> [9.1] a data channel for the transmission of data packets from ***a primary station*** to the secondary station and
>
> [9.2] a plurality of control channels for signaling of control information relating to the data packets from ***the primary station*** to the secondary station,
>
> [9.3] wherein means are provided for determining which of the control channels is allocated to the secondary station wherein the control channels are allocated for a plurality of secondary stations according to ***a plurality of respective defined sequences, all of which are different***, the allocated control channel being changed according to a respective defined sequence, and for monitoring the currently allocated control channel to determine information about packet transmissions.
>
> **12**. [pre] A method of operating a radio communication system having
>
> [12.1] a data channel for the transmission of data packets from ***a primary station*** to a secondary station and
>
> [12.2] a plurality of control channels for signaling of control information relating to the data packets from ***the primary station*** to the secondary station, the method comprising
>
> [12.3] ***the primary station*** allocating one of the control channels to the secondary station and changing the allocated control channel according to a defined sequence, and the secondary station monitoring the currently allocated control channel to determine information about packet transmissions,
>
>> wherein ***the primary station*** allocates control channels for a plurality of secondary stations according to a plurality of respective defined sequences, all of which are different.

JX-0003 ('711 Patent) at 9:19-10:3, 10:13-27 (emphasis added).

A. Claim Construction

1. A Person of Ordinary Skill in the Art

Complainants argue:

> As explained by Philips' experts, a POSA with respect to the claimed inventions would have at least a bachelor's degree in computer science, electrical engineering, computer engineering, or a related field, with 3-5 years' experience wireless communications systems, including familiarity with UMTS. *See* CX-0012C (Lanning WS) at Q/A 23; CX-398C (Jackson WS) at Q/A 19.

Compls. Br. at 25.

Respondents argue:

> Respondents defined the applicable level of a POSA as having at least a Bachelor's degree in computer science, electrical engineering, computer engineering, or a related field, with 2-3 years of experience in wireless communication systems and/or networking, with superior education compensating for less work experience. RX-3212 (Bims WS) at Q/A 10, 11; RX-3341C (Min RWS) at Q/A 10. Philips did not provide any description of a POSA in its prehearing brief, despite Ground Rule 7c. Staff P.H. Br. at 18. Staff agrees with Respondents' definition of a POSA. *Id.* There is no meaningful difference in the POSA levels proposed by the parties during discovery as to any of the asserted patents. RX-3212 (Bims WS) at Q/A 11; RX-3341C (Min RWS) at Q/A 10; RX-3215C (Wells RWS) at Q/A 22; RX-3214C (Akl RWS) at Q/A 15-16.

Resps. Br. at 15-16.

The Staff argues:

> Respondents contend that the applicable level of ordinary skill in the art as having at least a Bachelor's degree in computer science, electrical engineering, computer engineering, or a related field, with 2-3 years of experience in wireless communication systems and/or networking, with superior education compensating for less work experience. *See* Resps.P.H.Br. at 24, fn 21. Philips did not provide a contention in its pre-hearing brief, and thus any argument regarding one of ordinary skill in the art has been abandoned/withdrawn. *See* Ground Rule 7.c. Staff agrees with Respondents' contention.

Staff Br. at 18 (footnote omitted).

Ground Rule 7.c. states:

> A statement of the issues to be considered at the hearing that sets forth with particularity a party's contentions on each of the proposed issues, including citations to supporting facts and legal authorities, *e.g.*, proposed exhibits. ***Incorporation by reference is not allowed. Any contentions not set forth in detail as required therein shall be deemed abandoned or withdrawn***, except for contentions of which a party is not aware and could not be aware in the exercise of reasonable diligence at the time of filing the prehearing statement. The prehearing statement and the brief may be combined into one document.

Order No. 2 (Ground Rules) (Jan. 21, 2021) at 11 (emphasis added).

Despite the unambiguous requirements of Ground Rule 7.c, complainants did not provide any definition of a person of ordinary skill in the art ("POSA") in their prehearing brief. *See* Compls. P.H. Br. *generally*.[27] Complainants' belated argument in their posthearing brief does not cure this clear defect. Therefore, complainants' contention concerning the definition of a POSA is deemed abandoned.

As proposed by respondents and the Staff, the administrative law judge finds that a person of ordinary skill in the art with respect to the '943 and '711 patents is a person who has at least a bachelor's degree in computer science, electrical engineering, computer engineering, or a related field, with 2-3 years of experience in wireless communication systems and/or networking, with superior education compensating for less work experience. *See* RX-3212 (Bims WS) at Q/A 10, 11; RX-3341C (Min RWS) at Q/A 10.

[27] Complainants, however, provided arguments using a "person of ordinary skill in the art" throughout their claim construction and invalidity sections of their prehearing brief, albeit, without the benefit of a clear definition of such a person. *See* Compls. P.H. Br. *generally*.

2. "defined sequence" ('943 patent claim 12; '711 patent claims 9, 12)

Below is a chart showing the parties' proposed claim constructions.

Complainants' Construction	**Respondents' Construction**	**Staff's Construction**
Plain and ordinary meaning: ("defined ordering of allocation")	"a predetermined control channel allocation shuffling pattern specifying the control channel used by the secondary station in each time interval"	Same as Respondents

Compls. Br. at 122; Resps. Br. at 106; Staff Br. at 37.

For the reasons discussed below, the administrative law judge has determined that the claim term "defined sequence" should be construed to mean "a predetermined control channel allocation shuffling pattern specifying the control channel used by the secondary station in each time interval."

Philips did not argue or submit an analysis of its proposed construction for this term in its prehearing brief, and thus any such arguments are abandoned. *See* Ground Rule 7.c;[28] Compls. P.H. Br. at 203-58.

Claim 12 of the '943 patent recites, in part, "the allocated control channel being changed according to a defined sequence known to both the primary station and the secondary station, and for monitoring the currently allocated control channel to determine information about packet transmissions, wherein the defined sequence is configured to reduce probability of an allocation collision to 1/N, where N is a total number of the

[28] In its prehearing brief, Philips did argue that the accused products satisfy this limitation, but it did not present an argument to support its proposed construction for this term. *See* Compls. P.H. Br. at 150, 157.

control channels." The claim therefore requires that the "defined sequence" must be "configured to reduce probability of an allocation collision to 1/N, where N is a total number of the control channels."

Claim 9 of the '711 patent recites the term within a means-plus-function element: "wherein means are provided for determining which of the control channels is allocated to the secondary station wherein the control channels are allocated for a plurality of secondary stations according to a plurality of respective defined sequences, all of which are different, the allocated control channel being changed according to a respective defined sequence, and for monitoring the currently allocated control channel to determine information about packet transmissions." *Id.*

Claim 12 of the '711 patent recites, in part, "the method comprising the primary station allocating one of the control channels to the secondary station and changing the allocated control channel according to a defined sequence, and the secondary station monitoring the currently allocated control channel to determine information about packet transmissions, wherein the primary station allocates control channels for a plurality of secondary stations according to a plurality of respective defined sequences, all of which are different." *Id.*

The patent specification provides explicit disclosure and examples of "defined sequences," which are consistent with the Staff and respondents' proposed construction of the term:

> In a system made in accordance with the present invention, this problem is addressed by ***shuffling the allocation of control channels from one TTI to the next***. ***Hence, if two stations 110 share a control channel in one TTI they will have different ones in the next TTI***. If such a scheme is applied to the example above of two active stations **110**, ***then***

> ***a well-designed shuffling scheme should be able to reduce the probability of an "allocation collision" to 1/N_{con}, where N_{con} is the total number of control channels (four in the above examples)***. The maximum loss in throughput would then be 0.5/N_{con}, or 12.5% with N_{con}=4 (compared to 50% without shuffling).
>
> Some examples of how ***shuffling*** may be done will now be presented, although the schemes themselves are not necessarily optimal.
>
> First consider the case of two control channels [0, 1] and four [mobile] stations **110** [0, 1, 2, 3]. ***The allocation of control channels to each station (0 to 3) for each TTI (0 to 4) in a 10 ms frame is***:
>
> | | TTI | | | | |
> |---|---|---|---|---|---|
> | station | 0 | 1 | 2 | 3 | 4 |
> | 0 | 0 | 0 | 0 | 0 | 0 |
> | 1 | 1 | 1 | 1 | 1 | 1 |
> | 2 | 0 | 1 | 0 | 1 | 0 |
> | 3 | 1 | 0 | 1 | 0 | 1 |
>
> This scheme could either repeat in the next frame or be made into a longer cycle.

JX-0002 ('943 Patent) at 4:1-29 (emphasis added) (two control channels (0, 1) and four mobile stations (0, 1, 2, 3).

The second example is an extension of the first scheme (above) with two control channels (0, 1) and six mobile stations (0, 1, 2, 3, 4, 5):

	TTI				
station	0	1	2	3	4
0	0	0	0	0	0
1	1	1	1	1	1
2	0	1	0	1	0
3	1	0	1	0	1
4	0	0	1	1	0
5	1	1	0	0	1

Id. at 4:30-5:50.

The third example in the specification has four control channels (0, 1, 2, 3) and twelve mobile stations 110:

	TTI				
station	0	1	2	3	4
0	0	0	0	0	0
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	0	1	2	3	0
5	1	2	3	0	1
6	2	3	0	1	2
7	3	0	1	2	3
8	0	3	2	1	0
9	1	0	3	2	1
10	2	1	0	3	2
11	3	2	1	0	3

Id. at 4:46-65.

The patent specification further provides a mathematical representation of the shuffling pattern of the third example:

> The shuffling pattern of the third example can be represented as
>
> $$n_{CCH}=[(a\times n_{TTI})+b] \bmod N_{CCH}$$
>
> where: n_{CCH} is the number of the control channel to be used; N_{CCH} is the total number of control channels available; n_{TTI} is the number of the TTI in the frame; a is a parameter taking values 0, 1 or 3; and b is a parameter taking values 0, 1, 2 or 3.

Id. at 5:8-16.

These disclosures provide the only guidance in the specification for the meaning of "defined sequence."[29]

[29] Outside of the claims, abstract, and means-plus-function language in the "summary of the invention" section of the patent, the term "defined sequence" is recited only once in

3. “control channel” / “allocated control channel” (‘943 patent claim 12; ‘711 patent claims 9, 12)

Below is a chart showing the parties’ proposed claim constructions.

“control channel”		
Complainants’ Construction	**Respondents’ Construction**	**Staff’s Construction**
Plain and ordinary meaning. (“a communications path used to carry information about the operations and/or configuration of the communications system)”	“a communications channel for informing a mobile station of the presence of a data packet for it to receive and providing information relating to the packet”	Same as Respondents
“allocated control channel”		
Complainants’ Construction	**Respondents’ Construction**	**Staff’s Construction**
Plain and ordinary meaning. (“The group of candidate control channel elements made available to the secondary station”)	Plain and ordinary meaning apart from “control channel:” “assigned *control channel* [as construed] to the secondary station”	Same as Respondents

Compls. Br. at 123; Resps. Br. at 107; Staff Br. at 41.

For the reasons discussed below, the administrative law judge has determined that (1) the claim term “control channel” should be construed to mean “a communications channel for informing a mobile station of the presence of a data packet for it to receive and providing information relating to the packet,” and (2) the claim term “allocated

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the specification. *See* JX-0002 (‘943 Patent) at 8:2-5 (“Therefore the change could be to a new channel from a small set of available channels or to a new channel which is the next one in a defined sequence.”)

control channel" should be construed to mean "assigned control channel to the secondary station."

Philips did not argue or submit an analysis of its proposed construction for these terms in its prehearing brief, and thus any such arguments are abandoned. *See* Ground Rule 7.c; [30] Compls. P.H. Br. at 203-58.

The claims require that the "a plurality of control channels for signaling of control information relating to the data packets from the primary station to the secondary station." Thus, the claim requires that the control channel signal information relating to data packets to the mobile station (*i.e.*, secondary station).

The patent specification further discloses what a "control channel" is and does, which is consistent with the Staff and respondents' proposed construction:

> A particular problem with the design of the HSDPA scheme is the mechanism ***for informing a MS of the presence of a data packet for it to receive and providing information relating to the packet*** (typically including details of the particular transmission scheme employed, for example spreading code, modulation scheme and coding scheme). As currently proposed, ***this information is signalled on*** one of four available downlink ***control channels***, distinguished by their spreading codes. The ***MS is instructed to*** decode one of the ***control channels*** by a two-bit indicator signal which is transmitted on a low data rate dedicated downlink channel (the signal being inserted by puncturing). The MS then monitors the same control channel for subsequent packets in a burst.

JX-0002 ('943 Patent) at 1:26-40 (emphasis added).

Thus, the claim term "control channel" should be construed to mean "a communications channel for informing a mobile station of the presence of a data packet for it to receive and providing information relating to the packet."

[30] In its prehearing brief, Philips did argue that the accused products satisfy this limitation, but it did not present an argument to support its proposed construction for these terms. *See* Compls. P.H. Br. at 213-21.

An "allocated" control channel is an "assigned" control channel. First, the claims recite "means are provided for determining which of the control channels [is/are] *allocated for a plurality of secondary stations*" (JX-0002 ('943 Patent), claim 12 and JX-0003 ('711 Patent), claim 9), and "the primary station *allocating one of the control channels to the secondary station* and changing the allocated control channel according to a defined sequence." *See* JX-0003 ('711 Patent), claim 12 (emphasis added). The plain language of the claims is thus clear that an allocated control channel is one that is assigned to a secondary station. Second, and as discussed above, the specification discloses allocating (*i.e.*, assigning) a control channel to secondary stations in a shuffling pattern:

> In a system made in accordance with the present invention, this problem is addressed by shuffling the ***allocation of control channels from one TTI to the next***. Hence, if two stations **110** share a control channel in one TTI they will have different ones in the next TTI. If such a scheme is applied to the example above of two active stations **110**, then a well-designed shuffling scheme should be able to reduce the probability of an "allocation collision" to $1/N_{con}$, where N_{con} is the total number of control channels (four in the above examples). The maximum loss in throughput would then be $0.5/N_{con}$, or 12.5% with $N_{con}=4$ (compared to 50% without shuffling).

JX-0002 ('943 Patent) at 4:1-12 (emphasis added); *see also* Jackson Tr. 574-579.

Thus, the claim term "allocated control channel" should be construed to mean "assigned control channel to the secondary station."

4. “allocation collision” / “reduce probability of an allocation collision to 1/N, where N is the total number of control channels” (‘943 patent claim 12)

Below is a chart showing the parties’ proposed claim constructions.

“allocation collision”		
Complainants’ Construction	**Respondents’ Construction**	**Staff’s Construction**
Plain and ordinary meaning: (“more than one secondary station simultaneously allocated to the same control channel”)	Indefinite (*see* “reduce probability of an allocation collision to 1/N, where N is the total number of control channels”)	Same as Complainants
“reduce probability of an allocation collision to 1/N, where N is the total number of control channels”		
Complainants’ Construction	**Respondents’ Construction**	**Staff’s Construction**
“reduce probability of an allocation collision to 1/N, where N is the total number of control channels”	Plain and ordinary meaning: (“reduce the probability of more than one secondary station being simultaneously allocated to the same control channel to 1/N”)	Same as Complainants

Compls. Br. at 123; Resps. Br. at 107; Staff Br. at 44.

The ‘943 patent is directed to improving the ability to download large blocks of data in mobile communication systems. *See* JX-0002 (‘943 Patent) at 1:5-26. The patent specification explains the problems with the strategy (at the time of the patent application) in transferring data packets in a Universal Mobile Telecommunication System (UMTS):

> A particular problem with the design of the HSDPA scheme is the mechanism for informing a [Mobile Station or secondary station] MS of

> the presence of a data packet for it to receive and providing information relating to the packet (typically including details of the particular transmission scheme employed, for example spreading code, modulation scheme and coding scheme). As currently proposed, this information is signalled on one of four available downlink control channels, distinguished by their spreading codes. The MS is instructed to decode one of the control channels by a two-bit indicator signal which is transmitted on a low data rate dedicated downlink channel (the signal being inserted by puncturing). The MS then monitors the same control channel for subsequent packets in a burst.
>
> This scheme conveniently supports the scheduling of up to four packets to different MSs in the same time interval. Use of the indicator signal is intended to reduce the complexity of the MS and its power consumption, as the MS only needs to monitor the dedicated downlink channel for the indicator signal instead of having to receive continuously all four control channels. However, there are significant drawbacks with the use of the indicator signal. One drawback is that an additional slot format is required for the dedicated downlink channel (to accommodate the extra signal), which adds complexity. Another drawback is that the transmission power required for the indicator signal can be relatively high to ensure reliable reception of the signal even at the edge of a cell.

JX-0002 (‘943 Patent) at 1:27-53.

The patent discusses an alternative approach to using an indicator signal, but further discusses the problems associated with that approach:

> As an alternative each MS **110** could be allocated one of the control channels to monitor, thereby avoiding the need for an indicator signal. However, if more than one MS **110** is allocated to a particular control channel the flexibility of packet scheduling is restricted. For example, consider two mobile stations **110**, each with data to be sent but both allocated the same control channel. It would generally be desirable to send data simultaneously to both stations **110**. However as both stations are sharing a control channel, only one packet can be sent at a time. Given that packet transmission is often bursty in nature, this situation is likely to continue for several TTIs and the system throughput could be only 50% of the maximum. Greater scheduling flexibility could be introduced by requiring each MS **110** to monitor two control channels, but at the cost of increased MS power consumption.

Id. at 3:54-67.

The '943 patent discloses a purported solution to the above problems, which is embodied in claim 12:

> In a system made in accordance with the present invention, this problem is addressed by ***shuffling the allocation of control channels*** from one TTI to the next. ***Hence, if two stations 110 share a control channel in one TTI they will have different ones in the next TTI***. If such a scheme is applied to the example above of two active stations **110**, ***then a well-designed shuffling scheme should be able to reduce the probability of an "allocation collision" to 1/N_{con}, where N_{con} is the total number of control channels (four in the above examples)***. The maximum loss in throughput would then be 0.5/N_{con}, or 12.5% with N_{con}=4 (compared to 50% without shuffling).

Id. at 4:1-12 (emphasis added); *see also* CX-2398C (Jackson WS) at Q/A 68-74 ("The Meaning of 1/Ncon"); Jackson Tr. 579-583. From the above disclosure, it is clear that the Staff and the complainants' proposed constructions are consistent with the patent specification.

Accordingly, the administrative law judge has determined that (1) the claim term "allocation collision" should be construed to mean "more than one secondary station simultaneously allocated to the same control channel," and (2) the claim term "reduce probability of an allocation collision to 1/N, where N is the total number of control channels" should be construed to mean "reduce probability of an allocation collision to 1/N, where N is the total number of control channels."

<u>Respondents' first indefiniteness argument</u>

Respondents argue that "there are always 'more than one mobile station simultaneously allocated to the same control channel' at every time interval, Staff P.H. Br. at 41 (proposed construction of "allocation collision"), resulting in 100% probability of allocation collision regardless of the ‘total number of the control channels’ in the system.” Resps. Br. at 144.

The ‘943 patent provides three examples of how shuffling may be done so as to reduce the probability of an allocation collision to 1/Ncon, where Ncon is the number of control channels. *See* JX-0002 (‘943 Patent) at 4:13-5:16. The shuffling pattern of the first example, with two control channels and four secondary stations (or mobile stations, MS), is shown below:

	TTI				
station	0	1	2	3	4
0	0	0	0	0	0
1	1	1	1	1	1
2	0	1	0	1	0
3	1	0	1	0	1

JX-0002 (‘943 Patent) at 4:20-30. In the example above, in the first transmission time interval, TTI 0, control channel “0” is allocated to mobile station “0” and “2,” but not “1” and “3.” For TTI 1, control channel “0” is allocated to mobile station “0” and “3,” but not “1” and “2,” and so on for each transmission time intervals 2, 3 and 4. As demonstrated, an allocation collision (*i.e.*, more than one secondary station simultaneously allocated to the same control channel) occurs no more that 50% of the time (2/4),[31] or ½ (1/Ncon). In the second example (two control channels and six mobile stations), for each transmission time interval, an allocation collision occurs no more than three times (*e.g.*, mobile stations 0, 2 and 4 are allocated to control channel “0” at that

[31] 2 out of the 4 stations (2/4).

same TTI) over six mobile stations (3/6),[32] or no more than 50% of the time, or ½ = 1Ncon. *See id.* at 4:35-45. The same is true of the third example, with four control channels and 12 mobile stations: for each transmission time interval (TTI), an allocation collision occurs no more than three times (*e.g.*, mobile stations 0, 4 and 8 are allocated to control channel "0" at TTI "0") over 12 mobile stations (3/12),[33] or no more than 25% of the time, or 1/4 (1/Ncon).[34]

As Philips' expert, Dr. Jackson, testified,

> The method described in the patent is based on a set of sequences. One sequence in that set is associated with each mobile unit. Both the base station and the mobile unit are aware of and can calculate or otherwise obtain each element of the sequence. The control channel allocated to the mobile unit is derived from the current value of the sequence. ***In claim 12 of the '943 patent, the sequence must be designed so that, if there are N control channels, then the chances that two mobile units are allocated the same channel are 1/N***.

CX-2398C (Jackson WS) at Q/A 60 (emphasis added); *see also id.* at Q/A 68-75 (explaining "the meaning of 1/Ncon"); *see also* Jackson Tr. 579-583.

As noted, respondents argue that in each example above, "there are always 'more than one mobile station simultaneously allocated to the same control channel' at every time interval, Staff P.H. Br. at 41 (proposed construction of "allocation collision"), resulting in 100% probability of allocation collision regardless of the 'total number of the control channels' in the system." Resps. Br. at 144. However, claim 12 does not require

[32] 3 out of the 6 stations (3/6).

[33] 3 out of the 12 stations (3/12).

[34] The '943 patent further disclosed a mathematical equation that represents the third example (with four control channels and twelve mobile stations110). *See* JX-0002 ('943 Patent) at 5:8-16; *see also* CX-2398C (Jackson WS) at QA 61-67 (explaining the equation and reproducing the third example in the specification).

that an allocation collision is eliminated, but rather that the probability of an allocation collision be reduced to 1/Ncon. As discussed above, each example disclosed in the '943 patent does just that, which is consistent with Philips' and the Staff's proposed construction of the "allocation collision" and "reduce probability of an allocation collision to 1/N, where N is the total number of control channels" limitations.

Thus, the evidence does not show that the claim term "allocation collision" is indefinite.

<u>Respondents' second indefiniteness argument</u>

Respondents argue that "the probability of an "allocation collision" cannot be determined without knowing additional, unclaimed conditions of the system, such as the total number of secondary stations." Resps. Br. at 144.

To demonstrate, in the third example in the '943 patent discussed above (four control channels and twelve mobile station), if the number of mobile stations is reduced to, *e.g.*, 5, then using the shuffling pattern of that example, the probability of an allocation collision is 2/5 = 40% (stations 0 and 4 are allocated control channel 0; stations 1, 2, and 3 are not), rather than 25% (1/4). In this third example, the only way to confirm that the allocation collision is reduced to ¼ (25%) is to know the number mobile stations that are active in the system, and in this example, that number is 12. If a few of those mobile stations are not active in the system, the probability of an allocation collision departs from the claimed 1/Ncon (25%), assuming the same shuffling pattern.

Thus, claim 12 requires a secondary station with an "allocation control channel being changed according to a defined sequence…that is configured to reduce probability of an allocation collision to 1/N, where N is a total number of control channels." JX-

0002 ('943 Patent) at claim 12 (see above). According to respondents, without knowing the number of active secondary stations in the system, it is not possible to determine whether the defined sequence that may be used reduces the probability of an allocation collision to 1/N, as required in claim 12.

However, respondents have not demonstrated that the number of active secondary stations in the system cannot be known. Indeed, in the above hypotheticals, and the three examples in the specification, the number of active secondary stations are known (or presumed), in which case one of ordinary skill in the art can determine, as was done above, whether the defined sequence "reduces the probability of an allocation collision to 1/N." Given that those examples are disclosed in the specification, one of ordinary skill in the art could design such systems with a known number of active secondary stations. The same may be true for systems with many more secondary stations, and if so, one could determine whether the requirements of claim 12 are satisfied. Consequently, respondents' argument appears to present an infringement issue (of an extremely narrow claim), rather than an indefiniteness issue. That is, to prove infringement, Philips may have to demonstrate the number of active secondary stations in the communication system in order to determine whether the accused defined sequence "reduces the probability of an allocation collision to 1/N."[35]

Thus, it has not been shown that the claim term "allocation collision" is indefinite.

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[35] *See* CX-2398 (Jackson WS) at Q/A 73-74 (explaining how to satisfy the 1/N requirement of claim 12).

5. "means … for determining … and for monitoring …" ('943 patent claim 12; '711 patent claim 9)

Below is a chart showing the parties' proposed claim constructions.

Complainants' Construction	Respondents' Construction	Staff's Construction
Not governed by § 112, ¶ 6 because the claim limitation includes the structure, material or acts necessary to perform the recited function. *See* MPEP 2181 Plain and ordinary meaning. ("Control channels are allocated to the secondary stations according to more than one unique defined ordering of allocation of control channels, and the secondary station monitors the currently allocated control channel to determine information about the transmission of data.")	means plus function term under Section 112 ¶ 6 <u>Function</u>: determining which of the control channels is allocated to the secondary station **and monitoring the currently allocated control channel to determine information about packet transmissions** <u>Structure</u>: indefinite under § 112, ¶ 6 for lack of structure	Subject to 35 U.S.C. § 112, ¶ 6 <u>Function</u>: (1) Determining which of the control channels is allocated to the secondary station, (2) allocating control channels for a plurality of secondary stations according to a plurality of respective defined sequences, all of which are different, (3) changing the allocated control channel according to a respective defined sequence, and (4) monitoring the currently allocated control channel to determine information about packet transmissions <u>Structure</u>: indefinite under § 112, ¶ 6 for lack of structure[36]

Compls. Br. at 124; Resps. Br. at 108; Staff Br. at 50-51.

The third limitation of claim 12 recites, "means are provided for determining which of the control channels is allocated to the secondary station, the allocated control

[36] The Staff states, "Staff initially proposed structure for this element; however, after further consideration of Respondents' arguments, the Staff modified its contention in its prehearing brief to that shown above, and agrees that the term is indefinite." Staff Br. at 51 n.39.

channel being changed according to a defined sequence known to both the primary station and the secondary station, and for monitoring the currently allocated control channel to determine information about packet transmissions." Similarly, the third limitation of claim 9 recites, "means are provided for determining which of the control channels is allocated to the secondary station wherein the control channels are allocated for a plurality of secondary stations according to a plurality of respective defined sequences, all of which are different, the allocated control channel being changed according to a respective defined sequence, and for monitoring the currently allocated control channel to determine information about packet transmissions."

Philips did not argue or submit an analysis of its proposed construction for these terms in its prehearing brief, and thus any such arguments are abandoned. *See* Ground Rule 7.c; Compls. P.H. Br. at 203-58. In addition, Philips did not argue that this means-plus-function element is definite, or that the specification provides sufficient structure for this element. *See* Compls. P.H. Br. at 253 (arguing only that the "allocation collision" term of claim 12 is not indefinite).

Under any construction, claims 12 of the '943 patent and 9 of the '711 patent are invalid as indefinite because there is no disclosure of a structure adequately linked to the claimed "means… for determining… and for monitoring." *See* RX-3212 (Bims WS) at Q/A 193, 195-97, 297-300; *Blackboard, Inc. v. Desire2Learn, Inc.*, 574 F.3d 1371, 1383-85 (Fed. Cir. 2009). Neither the claims nor the specification disclose any structure, material, or acts adequately linked to the function of "determining which of the control channels is allocated to the secondary station" and "monitoring the currently allocated control channel to determine information about packet transmissions." *See* RX-3212

(Bims WS) at Q/A 193-95; *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1352 (Fed. Cir. 2015). Although the specification lists several components of a primary station and a secondary station, it does not disclose which, if any, of those components perform the claimed function. *See* RX-3212 (Bims WS) at Q/A 195.

Philips did not rebut the presumption that the terms are subject to Section 112, ¶ 6. *See* RX-3212 (Bims WS) at Q/A 196. A POSA would have understood that claim 12 of the '943 patent and claim 9 of the '711 patent do not recite what structures, if any, within the claimed secondary station perform the specialized function of monitoring the allocated control channel to determine information about the transmission of data. *See* RX-3212 (Bims WS) at Q/A 196.

Dr. Jackson did not identify any structure linked to the claimed function. *See* CX-2421 (Jackson RWS) at Q/A 20. Dr. Jackson opined that an algorithm disclosed in the specification provides the necessary structure for the "determining" portion of the function but failed to identify any component that implements or performs that algorithm. *See* CX-2421 (Jackson RWS) at Q/A 20. Further, even if such a structure could be identified, Philips has still failed to identify any single structure that performs the "dual" function of "determining which of the control channels is allocated to the secondary station" and "monitoring the currently allocated control channel to determine information about packet transmissions." *See* RX-3212 (Bims WS) at Q/A 196.

Accordingly, the administrative law judge has determined that the claim term "means … for determining … and for monitoring …" is indefinite.

B. Infringement and Domestic Industry (Technical Prong) of the '943 and '711 Patents

As noted, complainants assert independent apparatus claim 12 of the '943 patent, and independent apparatus claim 9 and independent method claim 12 of the '711 patent. *See* Joint Outline at 4-5; Staff Br. at 6.

1. Direct Infringement

a. "primary station"

As an initial matter, respondents cannot infringe claim 12 of the '711 patent because claim 12 is a method claim that expressly requires a "primary station," which is a base station operated by a network carrier, to perform various steps:

> "the method comprising the ***primary station allocating*** one of the control channels to the secondary station ***and changing*** the allocated control channel according to a defined sequence …";

JX-0003 ('711 Patent) at claim 12 (emphasis added); RX-3215C (Wells RWS) at Q/A 96-102. In order to directly infringe a method claim, all steps recited in the claim have to be carried out and be attributable to the same respondent. *Limelight Networks, Inc. v. Akamai Tech., Inc.*, 572 U.S. 915, 921-22 (2014).

Indeed, Philips's expert Dr. Jackson admits that certain steps recited in claim 12 are performed by the "primary station" (or base station). Jackson Tr. 485-486 ("Q. ... Going to claim 12 of the '711 patent, you agree the primary station is responsible for signal – signaling control information, allocating control channels, and changing the allocated control channels, right? A. Yes"). However, Dr. Jackson also admits none of the respondents manufacture, sell, import, or configure any base station. *Id*. at 489:8-

490:7. Thus, none of the respondents can directly infringe claim 12 of the '711 patent as a matter of law.

Additionally, claim 12 of the '943 patent and claim 9 of the '711 patent repeatedly recite a "primary station" and its corresponding functionalities:

> "a data channel for the transmission of data packets from a primary station to the secondary station …";
>
> "a plurality of control channels for signaling of control information relating to the data packets from the primary station to the secondary station …";
>
> "the allocated control channel being changed according to a defined sequence known to both the primary station and the secondary station …";

JX-0002 ('943 Patent) at claim 12; JX-0003 ('711 Patent) at claim 9; RX-3215C (Wells RWS) at Q/A 96-102. For these claims, Philips's expert Dr. Jackson admitted he believed the functionalities of the primary station, the network base station, are required functionalities of these asserted claims. Jackson Tr. 487 ("Q. ... Do you agree with me that you believe the primary station is responsible for changing the allocated control channel when it comes to claim 12 of the '943 patent? A. Yes, that's a function that is performed by the primary station."); Wells Tr. 693-694; RX-3215C (Wells RWS) at Q/A 98. Yet, he did not consider any evidence of any network carrier or base station, and thus cannot establish that any secondary station interacts with a primary station as claimed.

Philips agrees that the "primary station" is the carrier's base station (an "eNodeB" in LTE networks) (Jackson Tr. 488-489), which is required to practice the asserted claims, as Dr. Jackson admitted. *Id*. at 485-487, 693-694. Philips also lack carrier and carrier equipment information, such as source code, technical documents, and settings necessary to determine whether the claims at issue are satisfied. Indeed, it is undisputed that many of the claims at issue involve interactions between a carrier's base station and a mobile station. Dr. Jackson acknowledged that respondents do not manufacture, sell, or import base stations. *See* Jackson Tr. 489. Dr. Jackson further admitted that network carriers or carrier contractors (not any of the respondents) configure the primary stations on the network. *Id*. at 489-490. Indeed, Philips's expert Dr. Jackson admitted he did not review any real network, carrier technical information or carrier equipment information. *See* Jackson Tr. 507-508, 612-613. Yet, with respect to claim 12 of the '943 patent and claims 9 and 12 of the '711 patent, each of the asserted claims recites functionality that is performed by a "primary station."

b. "allocated control channel" (Limitations [12.3] of the '943 patent and [9.3], [12.3] of the '711 patent)

Claim limitation [12.3] of the '943 patent and limitations [9.3] and [12.3] of the '711 patent each recite an "allocated control channel." Contrary to Philips's argument that the UE search space is the "allocated control channel" (CX-2398C (Jackson WS) at Q/A 171 ("what is actually allocated to each UE is the UE search space")), the UE search space cannot satisfy the limitation under any party's construction for the term. *See* RX-3215C (Wells RWS) at Q/A 142-48, 172-74, 176-77.

First, it is well-recognized that a search space is not a control channel. *See* RX-3215C (Wells RWS) at Q/A 143-45. Rather, a search space is defined by a set of resources that may be used as control channels. *Id.* at Q/A 35, 155. The accused 3GPP Specification plainly states as much. *See* RX-2586.361 (TS 36.213) at Section 9.1.1. ("[T]he set of PDCCH candidates to monitor are defined in terms of search spaces.").

This is further confirmed by the inventors of the '943 and '711 patents. *See* JX-0024C (Moulsley Dep. Tr.) at 56-57 ("Q. What is the search space? A. That's -- that's another way of describing the set of candidates. It's referred to as a search space because the UE is effectively searching amongst the candidates in that space to find a control channel that's actually intended for it. Q. So is the search space the control channel? A. I would say no. The control channel is transmitted in the search space. Q. Got it. A. Or somewhere in the search space. They're not the same thing."); JX-0015C (Baker Dep. Tr.) at 177. 3GPP TS 36.213 § 9.1.1 makes clear that a search space is a set of candidate resources. *Id*.; RX-2586.361-365 (3GPP TS 36.213) at Section 9.1.1. Thus, although search spaces define the set of resources that may be used to communicate with a mobile station, the search space itself is a different concept from an "allocated control channel." *See* RX-3215C (Wells RWS) at Q/A 143-46.

Second, Dr. Jackson also recognizes that a search space is not a control channel. For example, Dr. Jackson confirmed that control channel candidates are located within a search space. *See* Jackson Tr. 598-600. Dr. Jackson acknowledged that a search space includes a set of control channels, and is not itself a control channel. *See* CX-2398C (Jackson WS) at Q/A 127, 171, 174.

Third, aside from a search space not being a control channel, a search space cannot be the claimed "allocated control channel" because none of the resources within a search space ever need to be actually allocated to the UE. *See* RX-3215C (Wells RWS) at Q/A 146-48. Also, the search space cannot be the claimed "allocated control channel," at least because the 3GPP specification defines a search space by a set of PDCCH candidates, one of which may (or may not be) be assigned to a given UE. *See* RX-

2586.361-365 (3GPP TS 36.213 § 9.1.1); RX-3215 (Wells RWS) at Q/A 146. Moreover, the number of PDCCH candidates in a set depends on the aggregation level as described in Section 9.1.1 of TS 36.213, where search spaces at different aggregation levels have different numbers of PDCCH candidates. *See* RX-2586.361-64 (3GPP TS 36.213 § 9.1.1); RX-3215 (Wells RWS) at Q/A 36. However, not a single control channel candidate in the search space needs to be assigned to the UE, and thus, the search space cannot satisfy the claim limitations requiring an "allocated control channel." *See* RX-3215 (Wells RWS) at Q/A 146. Dr. Moulsley and Mr. Baker also confirmed that a search space does not necessarily contain an assigned control channel. *See* JX-0024C (Moulsley Dep. Tr.) at 49-50; JX-0015C (Baker Dep. Tr.) at 165, 168-169.

The lack of an "allocated control channel" is further highlighted by the "blind decoding" process used by the UE to determine whether a search space contains a control channel that actually is assigned to the UE. *See* RX-2698.253-54 (Sesia). Blind decoding requires the UE to attempt to decode search spaces in hopes of finding a control channel assigned to that UE. *See* RX-2698.253-254 (Sesia); Jackson Tr. 511-512; JX-0024C (Moulsley Dep. Tr.) at 50-51; JX-0015C (Baker Dep. Tr.) at 166. The blind decoding process could result in the UE not finding any control channel assigned to the UE. *See* RX-2698.253-54 (Sesia); RX-3215C (Wells RWS) at Q/A 37-39, 146-148; JX-0015C (Baker Dep. Tr.) at 166. This blind decoding process underscores that the search space is not the "allocated control channel." If a search space itself were the "allocated control channel," there would be no need for the UE to engage in blind decoding to know what control channel was assigned to the UE, if one was assigned at all. *See* RX-3215C (Wells RWS) at Q/A 148. Accordingly, a search space cannot be an "allocated control channel." Further, as Dr. Jackson admitted, the order in which the UE blindly decodes the control channel candidates is implementation specific with respect to the baseband processor incorporated into the UE, but neither Dr. Jackson nor Philips obtained or presented any evidence of the function of any baseband processor. *See* Jackson Tr. 512-513.

c. "allocated control channels being changed according to a defined sequence" (Limitations [12.3] of '943 patent and [9.3], [12.3] of the '711 patent)

The asserted claims of the '943 and '711 patents require that the "allocated control channel" be changed according to a defined sequence. *See* JX-0002 ('943 Patent) at Claim 12; JX-0003 ('711 Patent) at Claim 9 and 12. The accused products do not change an "allocated control channel" according to a "defined sequence" under any party's construction of the term. *See* RX-3215C (Wells RWS) at Q/A 149-57, 174, 178, 180.

First, Philips has not provided any evidence or analysis as to how the "allocated control channel" is changed, much less changed according to a defined sequence. In particular, Dr. Jackson opines that search spaces (i.e., sets of PDCCH candidates) described in 3GPP TS 36.213 § 9.1.1 are the "allocated control channel." *See* CX-2398C (Jackson WS) at Q/A 172. Dr. Jackson appears to opine that the UE's attempted decoding of candidate control channels within search spaces relates to the changing of the control channels. *Id.*

Dr. Jackson's opinion, however, contains a mismatch of what he previously identified as satisfying the "allocated control channel." Specifically, Dr. Jackson relates the changing of the allocated control channel to the UE's blind decoding process (*i.e.*, the attempted decoding of candidate control channels within a search space). *See* CX-2398C (Jackson WS) at Q/A 172 ("If it was addressed to that UE, then the UE proceeds to use the control information. If it was not addressed to that UE, the UE goes to the next candidate location and processes that information. Therefore, the system includes changing the allocated control channel according to a defined sequence that is known to both the primary station and the secondary station, and the UE monitors the currently allocated control channel to determine information about packet transmissions"). Dr. Jackson's explanation as to how the changing of the allocated control channel occurs (*i.e.*, blindly decoding of candidate channels) is at odds with what he has identified as the "allocated control channel" in the first place: the search space.

Second, the Y_k value is not a "defined sequence" as required by the claims. The asserted claims of the '943 and '711 patents plainly require that the allocated control channel be changed according to the defined sequence. $Y_{k,}$ however, does not cause the control channel assigned to the UE to be changed. RX-3215C (Wells RWS) at Q/A 85, 93, 95, 154, 161. Nor is it used to locate the "allocated control channel." *Id*. Rather, as the 3GPP Specification indicates, Y_k is one of many parameters related to the calculation of LTE search spaces.[37] *Id*.; RX-2605.285-88 (TS 36.213 § 9.1.1). Indeed, only when a base station has data for a given UE, it may use the formula identified in Section 9.1.1 of TS 36.213 and calculate a search space based on the required aggregation level (*i.e.*, the size of the data packet to be transmitted) and other parameters. *See* RX-3215C (Wells

[37] One of the named inventors testified that the point of the '943 and '711 patents was to have a defined sequence by which the control channel would change so that the identity of the control channel would change according to a defined sequence. *See* JX-0015C (Baker Dep. Tr.) at 137.

RWS) at Q/A 43-44, 46. How the base station decides which of the PDCCH candidates within the calculated search space to assign for the transmission of control information is vendor specific and does not at all depend on Y_k. *See* RX-3215C (Wells RWS) at Q/A 51. Thus, Y_k cannot be a "defined sequence" according to which the control channel allocated to a mobile station is changed because not even the base station knows what PDCCH candidate it will assign to a given transmission until it actually has data to transmit. *See* RX-3215C (Wells RWS) at Q/A 43-44, 50-51.

Third, the blind decoding process employed to search for an assigned control channel underscores the lack of a defined sequence in assigning the control channel. *See* RX-3215C (Wells RWS) at Q/A 158-59. Under 3GPP TS 36.213 § 9.1.1, a UE blindly decodes PDCCH candidates because it does not know whether the base station assigned a control channel to the UE at all, and if the base station did, where the control channel is located within a search space. *Id.* at Q/A 150, 156; RX-2605.300-02 (TS 36.213 § 9.1.5). This is confirmed by Mr. Baker and Dr. Moulsley. *See* JX-0015C (Baker Dep. Tr.) at 166; JX-0024C (Moulsley Dep. Tr.) at 230-231; RX-2698.253-54 (Sesia). Instead of following a defined sequence informing the UE which specific control channel the UE is supposed to use as prescribed by the '943 and '711 patents, the UE has to search for the control channel by blindly decoding each control channel candidate to determine which candidate, if any, carries information for that UE. *See* RX-3215C (Wells RWS) at Q/A 150, 156; JX-0015C (Baker Dep. Tr.) at 166; JX-0024C (Moulsley Dep. Tr.) at 230-231; RX-2698.253-254 (Sesia). Further, the process and order used by the UE to perform the blind decoding is implementation-specific, does not necessarily follow a particular sequence, and could be random. *See* X-0024C (Moulsley Dep. Tr.) 50-51.

Fourth, Dr. Jackson's reliance on the test logs from Bureau Veritas is also misplaced. *See* RX-3215C (Wells RWS) at Q/A 162-63. The test logs only show that the base station simulator assigned to the UE one control channel out of a set of control channel candidates and do not show a sequence according to which a control channel is being allocated. *Id*. The test logs do not demonstrate that the "allocated control channel" is being changed according to a defined sequence, or a sequence known to both the base station and UE.

d. "known to both the primary station and the secondary station" (Limitation [12.3] of the '943 patent)

Although only claim 12 of the '943 patent expressly recites that the defined sequence must be "known to both the primary station and the secondary station," Dr. Jackson and the inventors agree that "defined sequence" in the context of the '943 and '711 patent specification refers to a sequence that is known to both the mobile station and the base station.[38] *See* JX-0002 ('943 Patent) at claim 12; CX-2398C (Jackson WS) at Q/A 63 ("The inventors consistently use defined sequence to refer to a sequence that is known to both the mobile station and the base station and that can be calculated or retrieved in a coordinated fashion.") Thus, there is no dispute that the asserted claims of the '711 patent also implicitly require that the "defined sequence" is known to both the primary station and the secondary station.

[38] As Mr. Baker testified, the important point is that the "defined sequence" is known to both the base station and the user equipment, and as long as they both have the same knowledge of what the sequence is, then the invention would work," and that the defined sequence "identifies which particular control channel is assigned to the user equipment at a given timeframe." *See* JX-0015C (Baker Dep. Tr.) at 138.

Moreover, the blind decoding employed by the UE shows that the UE does not know the "defined sequence." *See* RX-3215C (Wells RWS) at Q/A 160-163. The UE searches for the control channel the base station assigned to it, if any, by attempting to decode control channel candidates during each TTI. *See* RX-2605.285-88 (TS 36.213 § 9.1.1); RX-2698.253-254 (Sesia); Jackson Tr. 511-512; JX-0024C (Moulsley Dep. Tr.) at 50-51; JX-0015C (Baker Dep. Tr.) at 166; CX-2398C (Jackson WS) at Q/A 174. The blind decoding process would be unnecessary and wasteful if the UE knew the "defined sequence" identifying the "allocated control channel" to the UE in advance. *See* RX-3215C (Wells RWS) at Q/A 152, 160; JX-0024C (Moulsley Dep. Tr.) at 230-231; JX-0015C (Baker Dep. Tr.) at 166. In such a scenario, which is the solution envisioned by the '943 and '711 patents, the UE would move onto the next control channel in the sequence, as opposed to using valuable resources during each TTI to search for a control channel assigned to the UE, if one had been assigned at all.

e. "currently allocated control channel" (Limitations [12.3] of the '943 patent and [9.3], [12.3] of the '711 patent)

The asserted claims of the '943 and '711 patents require "monitoring the currently allocated control channel." JX-0002 ('943 Patent) at claim 12; JX-0003 ('711 Patent) at Claims 9 and 12. The accused and technical domestic industry products, however, do not monitor the currently allocated control channel as required by the claims. *See* RX-3215C (Wells RWS) at Q/A 158-59, 175, 179.

First, the asserted claims recite that "monitoring the currently allocated control channel" is "to determine information about packet transmissions." JX-0002 ('943 Patent) at Claim 12; JX-0003 ('711 Patent) at Claims 9 and 12. The common specification confirms that the act of monitoring is to obtain information about the packet transmissions from the already allocated control channel. *See* JX-0002 ('943 Patent) at 1:39-40, 2:11-12, 2:45-47, 2:57-60. In contrast, the accused "monitoring" within the 3GPP Specification is not for determining information about packet transmissions. As made clear by the 3GPP Specification, the alleged monitoring is part of the search process (*i.e.*, blind decoding) to locate an assigned control channel, if one had been assigned at all. *See* RX-2586.361-65 (TS 36.213) at Section 9.1.1; RX-2698.253-54 (Sesia). This is accomplished by attempting to decode the LTE search spaces. *See* RX-2586.361-65 (TS 36.213) at Section 9.1.1. A successful decoding means that the UE is able to identify the location of an assigned control channel. JX-0015C (Baker Dep. Tr.) at 170 ("Q. And once a user equipment identifies which control channel is assigned to it, would it then monitor the specific control channel? A. No. The monitoring and identification are not sequential in that way, so the process of identifying the control channel carrying control messages to that UE is part of the monitoring process").

Second, attempting to locate the control channel (*i.e.*, decode the channel within the search space) cannot be "monitoring the currently allocated control channel" because the decoding occurs before the UE knows which control channel it was assigned (if one were assigned at all). Through the decoding process the UE figures out whether there is a control channel assigned to it and if there is, the location of that control channel. *See* RX-3215C (Wells RWS) at Q/A 158-59; JX-0015C (Baker Dep. Tr.) at 166. Philips's argument that the search to locate a control channel that was assigned (if one were assigned) to a given UE is the claimed "monitoring the currently allocated control channel" is incorrect. A UE would not "know" which control channel to "monitor," as that term is used in the asserted claims, if it does not know the control channel it was assigned (if any).

Third, the search space also cannot be the "currently allocated control channel," much less the monitored control channel. As discussed above with respect to "allocated control channels" (in Section V.B.1.c), it is well recognized that the search space is not a control channel, and that the two are different concepts. *See* RX-3215C (Wells RWS) at Q/A 143-46. Rather, a search space defines a set of PDCCH candidates. *See* RX-2586 (3GPP TS 36.213) at § 9.1.1; RX-3215C (Wells RWS) at Q/A 146. Moreover, the monitoring of search spaces requires the decoding of all possible resources within all search spaces (*i.e.*, search spaces at all different aggregation levels). *See* JX-0024C (Moulsley Dep. Tr.) at 230-233. To the extent decoding qualifies as monitoring as Philips argues, the decoding of all possible control channels is the opposite of the solution the '943 and '711 patents purport to achieve. JX-0002 ('943 Patent) at 1:40-53 (describing the drawbacks of the indicator signal), 6:52-55 ("In the second, shown as a dashed line, an indicator signal is used to inform a MS of which control channel to monitor, hence each MS is effectively monitoring all four channels.").

f. "reduce probability of an allocation collision to 1/N" (Limitation [12.4] of the '943 patent)

Claim 12 of the '943 patent requires that the "defined sequence" is configured to "reduce probability of an allocation collision to 1/N." JX-0002 ('943 Patent) at claim 12. Under Philips's and the Staff's construction (adopted by the administrative law judge) of this term, the accused products do not practice this limitation. *See* RX-3215C (Wells RWS) at Q/A 166-71.

Assuming that there is a "defined sequence," it is not possible to have such a sequence "configured to reduce probability of an allocation collision to 1/N." *See* RX-3215C (Wells RWS) at Q/A 166. The probability of an allocation collision cannot be based solely on "a total number of the control channels," regardless of which proposed construction is applied. *Id*. For example, knowing the number of secondary stations in the system is essential to determining the probability of an allocation collision. *Id*. Dr. Jackson acknowledges that for low numbers of secondary stations, "each can be assigned its own channel and collisions will never occur," because in such systems, the probability of an allocation collision is 0%, not "1/N," no matter how many control channels (N) are in the system. *See* CX-2398C (Jackson WS) at Q/A 73.

Moreover, the probability of an allocation collision also depends on the number of active, as opposed to inactive, secondary stations with which the primary station is communicating. *See* RX-3215C (Wells RWS) at Q/A 167. Indeed, Dr. Moulsley acknowledged that the probability of allocation collision cannot be calculated without actually knowing how many of the secondary stations are active. *See* JX-0024C (Moulsley Dep. Tr.) at 225. Dr. Jackson also recognized the significance of "the number of active mobile units." *See* CX-2398C (Jackson WS) at Q/A 57. A POSA would readily understand that secondary stations can, and do, switch from active to inactive status at various, irregular times in radio communication systems such as LTE networks. *See* RX-3215C (Wells RWS) at Q/A 168. Dr. Jackson further acknowledged that the value of "N" (*i.e.*, the total number of the control channels in the system) could change based on numerous factors, including the configuration of the primary station and the bandwidth of the system. Jackson Tr. 519. As a result, the value of "1/N" is not constant, and it is not possible to have a "defined sequence" (particularly one that is predetermined) that is "configured" to reduce the probability of an allocation collision to a value that can vary over time. *Id*.

Dr. Jackson's hypotheticals are not persuasive. For example, Dr. Jackson describes a hypothetical system having 1024 secondary stations and 4 control channels, and states that "[t]he 1/N condition is satisfied if an equal number of stations are assigned to each control channel." *See* CX-2398C (Jackson WS) at Q/A 73. That system, however, does not actually satisfy the 1/N limitation. Rather, like in the example systems in the patent specification, every secondary station in his system collides with at least one other secondary station in every TTI, so the probability of an allocation collision is 100%. *See* RX-3215C (Wells RWS) at Q/A 169. The probability of an "allocation collision" is still 100% because there is constantly "more than one secondary station simultaneously allocated to the same control channel." *Id*.; *see also* RX-3212 (Bims WS) at Q/A 198-200; JX-0024C (Moulsley Dep. Tr.) at 224; JX-0002 ('943 Patent) at 4:20-64.

Dr. Jackson's other hypothetical, where two mobile units share the same control channel location resulting in a likelihood of an allocation collision using the "defined sequence" to 1/N, is similarly unpersuasive. *See* CX-2398C (Jackson WS) at Q/A 198. In this hypothetical, Dr. Jackson has just a single allocated control channel, and an unspecified number of other control channels. *See* RX-3215C (Wells RWS) at Q/A 170. The fact that two out of an unknown number of UEs in a system collide does not mean that the likelihood of an allocation collision is 1/N. Dr. Jackson does not provide any analysis to that effect. *Id*.

Indeed, Dr. Jackson did not analyze or cite to real-world examples of any actual LTE systems, or systems in which respondents' products are allegedly used, where a defined sequence is configured to reduce probability of an allocation collision to 1/N. *See* RX-3215C (Wells RWS) at Q/A 171. Dr. Jackson's own hypotheticals show that a secondary station in an LTE system can have a probability of an allocation collision other than "1/N," such as 0% or 100%. *Id.* Thus, the accused products do not satisfy limitation 12.4.

Dr. Jackson does not opine that the probability of an allocation collision must be 1/N as recited in claim 12 of the '943 patent. Instead, Dr. Jackson opines that this limitation is met when the reduction of probability of an allocation collision is "something along the lines of sufficiently close to 1/N." *See* CX-2398C (Jackson WS) at Q/A 74; *see also id*. at Q/A 81. To the extent Philips argues that this limitation is satisfied by reducing the probability of an allocation collision to something other than 1/N, as the literal language of the claim requires, Philips would be making an argument under the doctrine of equivalents. Prosecution history estoppel, however, bars the doctrine of equivalents. Philips amended the claim to add the limitation "wherein the defined sequence is configured to reduce probability of an allocation collision to 1/N, where N is a total number of the control channels" during prosecution to overcome prior art. JX-0006.146-152 ('943 patent prosecution history). Thus, Philips cannot rely on the doctrine of equivalents to recapture that relinquished claim scope.

h. Additional Infringement Issues

i. Variable Yk Specified in 3GPP

The variable Y_k specified in 3GPP TS 36.213 §9.1.1 (accused by Philips as the claimed "defined sequence") is one of many parameters related to the calculation of LTE search spaces. *See* RX-2605.285-88 (TS 36.213 § 9.1.1); RX-3215C (Wells RWS) at Q/A 44-46, 77-87. In LTE, the base station (not the UE) determines search spaces, which are defined by sets of PDCCH candidates. *See* RX-3215C (Wells RWS) at Q/A 44, 78. Pursuant to Section 9.1.1 of TS 36.213, the UE may "monitor a set of PDCCH candidates" "where monitoring implies attempting to decode each of the PDCCHs in the set …." RX-2605.285-88 (TS 36.213 § 9.1.1). The 3GPP specifications do not, however, specify how the UE will attempt to decode the candidate set, nor that a UE has to use Y_k to identify the search space. *See* RX-3215C (Wells RWS) at Q/A 45, 79-80. Indeed, the implementation of how a UE identifies and analyzes the PDCCH candidate set is vendor-specific. *Id*. Thus, in order to ascertain how a UE searches for and decodes PDCCH candidates, one would have to consult the baseband manufacturer, which Dr. Jackson and Philips did not do. *See* Jackson Tr. 512-513.

There are multiple ways in which a UE can find an assigned PDCCH, if there is one, without using Y_k. *See* RX-3215C (Wells RWS) at Q/A 81. For example, a UE can blindly decode all possible PDCCH locations in the control region to determine whether there is a PDCCH assigned to that UE. *See* RX-3215C (Wells RWS) at Q/A 45, 81; RX-2698.253-254 (Sesia). A POSA would find such functionality simple to implement, without any complex instructions. *Id*. Another way for a UE to find an assigned PDCCH is to use knowledge of the CCE aggregation requirements, and blindly decode the subset of allocations defined by this hierarchy. *See* RX-3215C (Wells RWS) at Q/A 82; RX-2698.253-254 (Sesia). Also, the UE could assess the likely aggregation level (*i.e.*, the number of control channel elements that make up a control message) of a PDCCH assignment, and attempt to decode that section of the control region first, which the UE can determine from the CQI (channel quality indicator) that it is required to measure. *See* RX-3215C (Wells RWS) at Q/A 82. The UE could also blindly decode every n^{th} CCE for an n-CCE aggregation PDCCH (*e.g.*, at aggregation level 8, the UE could decode every 8^{th} CCE), and expect to find any resulting PDCCHs in this space. *Id*.

None of those alternative options require a UE to use, or even know, the Y_k value, yet all of them allow a UE to search all PDCCH candidates, as specified Section 9.1.1. *See* RX-3215C (Wells RWS) at Q/A 83. Thus, a UE can be compliant with the 3GPP LTE specifications without using Y_k, as confirmed by Dr. Jackson. *See* RX-3215C (Wells RWS) at Q/A 83; CX-2398C (Jackson WS) at Q/A 96.

ii. Third Party Testing

While Philips briefly mentioned carrier certification testing by third parties, PTCRB and GFC, Philips's expert Dr. Jackson admitted he did not review – or even ask for – any tests or results from these laboratories. *See* Jackson Tr. 518-519, 611. Nor did Dr. Jackson review any confidential information exchanged between any network carrier and these third party laboratories. *See* Jackson Tr. 612-613. As observed by respondents' expert, Dr. Jonathan Wells,[39] these tests are performed in isolation, in a laboratory environment in contrast to "over-the-air" testing, which would involve

[39] Dr. Wells is an expert in telecommunications, including cellular communication technologies. *See* Wells Tr. 679.

implementing the tested module into a device operating on an actual LTE (or other) network. *Id*. at Q/A 57. Thus, these lab tests do not show how the tested modules operate as implemented in an actual device, nor do they show how the modules necessarily operate in a network operated in the United States. *Id.*; *see also* Jackson Tr. 612-613.

Instead of relying on network conformance certifications, Dr. Jackson relied solely on manufactured tests performed with a base station simulator that is untethered to any actual network. *See* Jackson Tr. 500, 517-518. Indeed, neither Philips nor Dr. Jackson have performed any "over-the-air" testing on any of the accused products or domestic industry products nor obtained any discovery from U.S. network carriers or their equipment providers. *Id*. at 507-508, 515, 611-613.

Compliance with the 3GPP specification does not mean that a product must implement all sections of the 3GPP specifications. *See* Jackson Tr. 493-495; RX-3215C (Wells RWS) at Q/A 57-76, 113. For example, the 3GPP specification includes sections that are optional or recommended, and whether or not these sections are implemented is up to the device manufacturer. *See* RX-3215C (Wells RWS) at Q/A 59-60; Jackson Tr. 493-495. Some of the cellular communication functionality, such as assignment of a PDCCH to a UE and the process a UE uses to decode search spaces and identify an assigned control channel, is not defined in the 3GPP specifications, and is therefore implementation-specific and may vary amongst different device manufacturers. *See* RX-3215C (Wells RWS) at Q/A 40, 60-61, 80; Jackson Tr. 424-425, 512; JX-0024C (Moulsley Dep. Tr.) at 49-51. Following the ETSI Drafting guide, the 3GPP specification indicates whether certain sections are mandatory, recommended, or optional. *See* RX-3215C (Wells RWS) at Q/A 61; CX-1011 (ETSI Directives); Jackson Tr. 494-495.

When a standard is optional or allows for implementation variations, reliance on the standard alone is not sufficient to establish infringement. *Fujitsu*, 620 F.3d at 1327-28. In such instances, "it is not sufficient for the patent owner to establish infringement by arguing that the product admittedly practices the standard, therefore it infringes" and "the patent owner must compare the claims to the accused products or, if appropriate, prove that the accused products implement any relevant optional sections of the standard." *Id.*; *Godo Kaisha IP Bridge 1 v. TCL Commc'n Tech. Holdings Ltd.*, 967 F.3d 1380, 1383 (Fed. Cir. 2020). Here, to show infringement of the asserted claims of the '943 and '711 patents by the accused products, Dr. Jackson was required to compare the asserted claims to the accused products, but he did not do so. *See* RX-3215C (Wells RWS) at Q/A 113-14, 141; CX-2398C (Jackson WS) at Q/A 108-109, 121, 141-264; Jackson Tr. 493-495, 598-601. Dr. Jackson did not review any source code, technical specifications, or other evidence that would reveal whether and how certain aspects of the 3GPP specification are implemented into the accused products. *See* RX-3215C (Wells RWS) at Q/A 115; Jackson Tr. 512-514.

iii. Philips's Test Reports

As noted above, Philips relies solely on test reports provided by Bureau Veritas, a third-party test laboratory, for the CalAmp LMU3640LAB, [redacted], Quectel [redacted], Quectel [redacted], Quectel [redacted], Quectel [redacted], Laird RG191+LTE, Telit LE910-Bl-NA, Telit LE910-NA-V2, [redacted]

[redacted] modules. *See* CX-2398C (Jackson WS) at Q/A 114-16; CX-2335 – CX-2349; CX-2353 – CX-2361; RX-3215C (Wells RWS) at Q/A 88-90.

Although Philips has argued that the purpose of these tests was to determine whether those modules conform to TS 36.321 § 5.4.3.1, which is called "Logical channel prioritization," (CX-2398C (Jackson WS) at Q/A 116), all that a POSA can conclude from the resulting log files is that the simulator is sending transmission parameters to the tested device.[40] *See* RX-3215C (Wells RWS) at Q/A 93. There is nothing in the log files that shows how the tested device actually locates or decodes the assigned control channel, or that the device uses the Y_k value from 3GPP TS 36.213 § 9.1.1 to determine the location of the assigned control channel.[41] *Id.* The test results provide information on the functionality of the base station simulator, not of the actual secondary station being tested. *Id.* at Q/A 95.

That a UE is able to communicate with a base station, or a communication channel has been established between a base station and a UE, does not mean the asserted claims are practiced. *See* RX-3215C (Wells RWS) at Q/A 113. The asserted claims relate to how a control channel is assigned to the UE, and how the UE monitors that control channel. The mere fact that communications channels have been established

[40] Dr. Jackson admitted that the tests are conducted with a base station simulator and do not describe any over-the-air testing. *See* Jackson Tr. 500.

[41] Dr. Jackson testified that each UE associated with a base station has a unique identifier, or RNTI value, that is assigned by the base station, but the test log files he relies upon show the same RNTI for each of the allegedly tested devices. *See* Jackson Tr. 503, 504-505. Such testing does not prove that the tested devices practice the asserted claims, particularly with respect to at least claims 9 and 12 of the '711 patent (which expressly recite "a plurality of secondary stations"), given that even Dr. Jackson agrees that each secondary station in an LTE system has a unique RNTI value. *See* Jackson Tr. 503.

between the UE and base station does not provide any insight into how the control channel has been assigned, or monitored by the UE. *Id*.

iv. Various 3GPP Releases

3GPP uses a system of "releases" that provide developers with a stable platform for the implementation of features at a given point in time and then allow for the addition of new functionality in subsequent releases. *See* RX-3215C (Wells RWS) at Q/A 103-08. Each release contains changes over the previous release, which means that a device that adopts a given release might not operate in conformance with later (or prior) releases. *Id.*; Jackson Tr. 510.

The accused products are designed to different releases of the 3GPP specification. *See* RX-3215C (Wells RWS) at Q/A 106-07. For example, the [redacted] module is designed to adopt Release 10, the [redacted] modules are designed to adopt Release 11, the [redacted] modules are designed to adopt Release 13, and the [redacted] is designed to adopt Release 14 of the 3GPP Specifications. *Id.* at Q/A 107, 120; RX-2596C ([redacted]); RX-2592C ([redacted]); RX-2593C ([redacted]); RX-2599C ([redacted]); RX-2594C ([redacted]); RX-2595C ([redacted]). The Thales [redacted] modules are designed to adopt Release 9, the [redacted] is designed to adopt Release 10, and the [redacted] is designed to adopt Releases 12 and 13. *See* RX-3215C (Wells RWS) at Q/A 124, 126-28; RX-1086; RX-1090; RX-1094C. The Telit LE910B1-NA, LE910B1-SA, LE910-NA1, LE910-SV1, and LE910-SVL modules are designed to adopt Release 9, the LE910C1-LA, LE910C1-NA, LE910C1-NF, LE910C1-NS, LE910C1-SA, LE910C1-ST, and LE910C1-SV modules are designed to adopt Releases 9 and 10, the

LM940 module is designed to adopt Release 11, and the FN980 and FN980M modules are designed to adopt Release 15 of the 3GPP Specifications. *Id*.

Neither Philips nor Dr. Jackson could identify how the release of the 3GPP Specification applied to each of the accused products in the infringement analysis. *See* RX-3215C (Wells RWS) at Q/A 104. In fact, Dr. Jackson testified that he did not tie any of the accused products to a particular release of the 3GPP Specification. *See* Jackson Tr. 510-511; RX-3215C (Wells RWS) at Q/A 104. Consequently, Philips's infringement allegations based on the 3GPP Specification are unsupported and unreliable.

Dr. Jackson opined that Philips's domestic industry products that include a variety of [redacted] modules[42] practice the asserted claims of the '943 and '711 patents merely because all of the devices, whether modules or products including modules, include LTE functionality and carry out cellular data transmissions in accordance with the 3GPP standard. *See* RX-3215C (Wells RWS) at Q/A 135. Dr. Jackson, however, never tied any domestic industry product to a particular release of the 3GPP Specification, and provided no analysis of the actual design and implementation of the [redacted] modules that are incorporated into these CPAP devices. *Id*.; Jackson Tr. 511.

3. Indirect Infringement

The accused products do not indirectly infringe the asserted claims at least because there is no direct infringement, as shown above. In addition, Philips has not

[42] Dr. Jackson identifies the following [redacted] modules as being incorporated into Philips's domestic industry products: [redacted] *See* RX-3215C (RWS Wells) at Q/A 136.

shown that the accused products constitute at least a material part of the alleged invention, knowing the same to be especially made or especially adapted for infringement and not a staple article or commodity of commerce suitable for substantial noninfringing use at importation or thereafter. *See* Compls. Br. at 124-46.[43] For example, respondents' products practice protocols other than LTE that are not accused of infringement, such as 2G, 3G, WiFi, HSPA, UMTS, and GSM/GPRS/EGPRS. *See* RX-3215C (Wells RWS) at Q/A 120-121, 181-182; RX-3169 (PLS62-W); RX-1086 (ELS61); RX-1082 (CL31); RX-1151 (ELS81); RX-1080 (ENS22); RX-3161 (EXS82/62); RX-3165 (PLAS9); RX-1090 (PLPS9); RX-1091 (PLS8); RX-1079 (TX62); RX-2592C ([redacted]); RX-2596C ([redacted]); RX-2593C ([redacted]); RX-2599C ([redacted]); RX-2594C ([redacted]); RX-2595C ([redacted]).

Dr. Jackson also recognized uses for the accused devices that do not involve or require compliance with ETSI standards. *See* Jackson Tr. 590. Moreover, the evidence is insufficient to show that any of respondents' alleged conduct was done with "knowledge that the induced acts constitute patent infringement." *Global-Tech Appliances, Inc. v. SEB S.A.*, 563 U.S. 754, 766 (2011). Nor is the evidence sufficient to show any alleged "willful blindness," because respondents have not acted with a "subjective belief in the high probability" that their actions are infringing. *Id.* at 769. Respondents thus have not acted with "knowledge" that any of their activities constitute patent infringement or a "subjective belief in the high" probability that any of their actions are infringing.

[43] Dr. Jackson has not provided any analysis regarding indirect infringement. Indeed, at the hearing, Dr. Jackson was not able to identify any theory of indirect infringement. *See* Jackson Tr. 485.

4. Domestic Industry (Technical Prong)

For the same reasons discussed above regarding infringement with respect to the accused products, Philips's alleged domestic industry products do not practice claim 12 of the '943 patent and claims 9 and 12 of the '711 patent. *See* RX-3215C (Wells RWS) at Q/A 183-88. Specifically, Dr. Jackson did not provide any claim-by-claim analysis concerning any of the Philips domestic industry products and instead relied on general LTE functionality of these products. *Id.*; Compls. Br. at 124-46. As discussed above regarding "allocated control channels being changed according to a defined sequence" (in Section V.B.1.c), having LTE functionality does not mean that a product practices the asserted claims, or even that the product implements all portions of the LTE standard. *See* RX-3215C (Wells RWS) at Q/A 183-88. As with the accused products, for the domestic industry products, Dr. Jackson provided no real support for his assumptions that the cited portions of the 3GPP specification are mandatory, are required in all implementations, or always result in practicing the asserted claims. *Id.*

C. Patentability Under 35 U.S.C. § 101

Respondents argue:

> The asserted claims of the '943 and '711 patents are unpatentable under 35 U.S.C. § 101 because they are directed to the abstract idea of sharing limited resources through the use of a common schedule and do not provide any inventive concept, reciting only well-known and conventional elements, arranged as in prior art systems, that fail to transform that abstract idea into patent-eligible subject matter. *Affinity*, 838 F.3d at 1257 ("The 'abstract idea' step of the [§ 101] inquiry calls upon us to look at the 'focus of the claimed advance over the prior art' to determine if the claim's 'character as a whole' is directed to excluded subject matter.").

Resps. Br. at 136; *see id.* at 136-41.

Complainants and the Staff disagree. *See* Compls. Br. at 146-49; Staff Br. at 115-19.

1. Patentability

a. Whether the Claims Are Abstract

The claimed inventions of the '943 and '711 patents arose out of challenging efforts to increase the throughput of data downloads to mobile devices as part of an effort to develop HSDPA for UMTS, and the inventors developed a solution that overcame significant drawbacks with the previous approaches that utilized an "indicator signal." *See* CX-2399 (Moulsley WS) at Q/A 20-24. The system to which the invention would be applied involved mobile devices (secondary stations) that would receive data packets on a data transmission channel and also required receipt of a control signal over a control channel in order handle receipt of those data packets. *See id*. Instead of adopting a prior approach that utilized an "indicator signal," the inventors developed a new approach because they recognized that the indicator signal approach increased both complexity and power consumption. The inventors' systems allocate control channels according to a defined sequence across time intervals, that is known to both the base station and the mobile station so as to avoid collisions without the need for a completely additional "indicator signal." *See id*. These represent technological improvements to radio communication systems, and thus the invention is not directed to an abstract idea. *Cf., e.g., Enfish*, 822 F.3d at 1336 (finding that "a specific improvement to the way computers operate" is not an abstract idea).

The technological components of what is actually claimed in the '943 and '711 patents is demonstrated by the elements of claim 12 of the '943 patent, for example, which describes in detail how the invention works, covering a radio communication system.

A plain reading of the claims, which are limited to specific features and a specific implementation of a radio communications system, demonstrates that the claimed invention could not merely be accomplished by a human with pencil and paper. Humans do not send and receive electronic radio communications, humans do not allocate control channels or have allocation collisions, and humans do not receive data packets along data transmission lines using information provided by control signals.

Respondents do not account for the technical improvement the invention made to radio communications systems and has also oversimplified and disregarded the claims. The claims thus are not directed to the abstract idea of "assigning resources based on a set schedule." The claims do not cover an abstract result to be achieved, but rather a specific implementation of a radio communication system. This system cannot be implemented by a human alone, and was a specific advancement in the technology of radio communications by drastically increasing the throughput available for downloading data to a mobile device while conserving limited resources both as to complexity and power consumption.

b. Whether the Asserted Claims Add an Inventive Concept

If *Alice* step two is analyzed, the claims are directed to an inventive concept. Indeed, the facts clearly show that the claims are directed to an inventive concept. A claim is not patent-ineligible under the second step of *Alice* "when the claim limitations involve more than performance of well-understood, routine, [and] conventional activities previously known to the industry." *Aatrix*, 882 F.3d at 1128 (internal quotation omitted). As explained above, the claims describe a technological improvement to radio communication systems that was never been used in the industry before. *See* CX-2399 (Moulsley WS) at Q/A 20-24. The particular "shuffling" which included allocating one of the control channels to the secondary station and changing the allocated control channel according to a defined sequence was not well understood, routine or conventional at the time of the invention, and instead, at the time, an indicator signal was used. *See* JX-0002 ('943 Patent) at 1:16-53; CX-2399 (Moulsley WS) at Q/A 22-24. Similarly, the processes described in the '943 and '711 patents, when considered as an entire combination of elements (*i.e.*, including a primary station, a secondary station, a data channel, a plurality of control channels, etc.) was also not well understood, routine or conventional, including because using the defined sequence (instead of the indicator signal approach) in the context of a radio communication system with those elements transformed whatever might be deemed abstract about it into a patent-eligible application. *Id.*

Accordingly, it has not been shown by clear and convincing evidence that the asserted claims of the '943 and '711 patents are patent ineligible under 35 U.S.C. § 101.

D. Validity of the '943 and '711 Patents

Respondents argue that (1) "Because a POSA would not understand the scope of claim 12 of the '943 patent and claim 9 of the '711 patent with reasonable certainty, the claims are invalid as indefinite"; (2) "Claims 9 and 12 of the '711 patent are invalid for lack of written description and enablement with respect to the limitation 'a plurality of respective defined sequences, all of which are different'"; and (3) various combinations of three prior art references (Dhar, Parizhsky, and Sydon) render claim 12 of the '943 patent and claims 9 and 12 of the '711 patent obvious. Resps. Br. at 142, 147; *see id.* at 142-74.

1. Indefiniteness

a. "means ... for determining ... and for monitoring"

Respondents argue, *inter alia*:

> Under any construction, claims 12 of the '943 patent and 9 of the '711 patent are invalid as indefinite because there is no disclosure of a structure adequately linked to the claimed "means… for determining… and for monitoring." RX-3212 (Bims WS) at Q/A 193, 195-197, 297-300; *Blackboard, Inc. v. Desire2Learn, Inc.*, 574 F.3d 1371, 1383-85 (Fed. Cir. 2009). Neither the claims nor the specification disclose any structure, material, or acts adequately linked to the function of "determining which of the control channels is allocated to the secondary station" and "monitoring the currently allocated control channel to determine information about packet transmissions." RX-3212 (Bims WS) at Q/A 193-195; *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1352 (Fed. Cir. 2015). Although the specification lists several components of a primary station and a secondary station, it does not disclose which, if any, of those components perform the claimed function. RX-3212 (Bims WS) at Q/A 195.

Resps. Br. at 142; *see id.* at 142-43.

The Staff agrees with respondents. *See* Staff Br. at 120. Complainants disagree. *See* Compls. Reply Br. at 55.

As discussed above in the Claim Construction section, the administrative law judge determined that the claim term "means ... for determining ... and for monitoring" is indefinite. *See* Section V.A.5, *supra*.

b. "allocation collision" / "reduce probability of an allocation collision to 1/N, where N is a total number of the control channels"

Respondents argue, *inter alia*:

> A POSA would not have been able to understand the scope of claim 12 of the '943 patent with reasonable certainty because the limitation "reduce probability of an allocation collision to 1/N, where N is a total number of the control channels" is at odds with both the patent specification and the claimed result that the probability of allocation collision must be 1/N (i.e., one divided by the number of control channels). RX-3212 (Bims WS) at Q/A 198. As a result, claim 12 is invalid as indefinite. *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901 (2014).

Resps. Br. at 143-44.

Complainants and the Staff disagree. *See* Compls. Br. at 149-51; Staff Br. at 120.

As discussed above in the Claim Construction section, the administrative law judge construed these claim terms and determined that they are not indefinite. *See* Section V.A.4, *supra*. Thus, respondents have not shown by clear and convincing evidence that these claim terms are indefinite.

2. Written Description and Enablement ("a plurality of defined sequences, all of which are different")

Respondents argue, *inter alia*:

> Claims 9 and 12 of the '711 patent are invalid for lack of written description and enablement with respect to the limitation "a plurality of respective defined sequences, all of which are different." These claims recite an unbounded number of "secondary stations" to be allocated control channels according to an unbounded number of "defined sequences, all of which are different." JX-0003 ('711 patent) at 9:26-28, 10:24-27. The specification states, however, that when "the number of secondary stations is ... too great," it is not possible to have "a plurality of respective defined sequences, all of which are different." RX-3212 (Bims WS) at Q/A 301; JX-0003 ('711 patent) at 2:30-35; *AK Steel Corp. v. Sollac & Ugine*, 344 F.3d 1234, 1244-45 (Fed. Cir. 2003) ("Worse than

> being silent as to the aspect of the invention, the specification clearly and strongly warns that such an embodiment would not [work] well.")

Resps. Br. at 147; *see id.* at 147-48.

Complainants and the Staff disagree. *See* Compls. Br. at 151; Staff Br. at 120-21.

As noted above, respondents argue, "The specification states, however, that when 'the number of secondary stations is ... too great,' it is not possible to have 'a plurality of respective defined sequences, all of which are different.'" Resps. Br. at 147.

The '711 patent specification discloses at least three examples in the specification having a limited number of active secondary stations as well as a plurality of defined sequences, and all the defined sequences disclosed are different. *See* JX-0003 ('711 Patent) at 4:23-5:13. Given that those examples are disclosed in the specification, presumably one of ordinary skill in the art could design such systems. Even if respondents' argument with respect to a large number of secondary stations is correct, the specification does provide written description for the term with a limited number of secondary stations. Consequently, the claim may be limited to a system with a small number of secondary stations so that the defined sequences are all different.

Accordingly, respondents have not shown by clear and convincing evidence that claims 9 and 12 of the '711 patent are invalid based on lack of written description or enablement of "a plurality of respective defined sequences, all of which are different."

3. Obviousness

Respondents argue that various combinations of three prior art references (Dhar, Parizhsky, and Sydon) render claim 12 of the '943 patent and claims 9 and 12 of the '711 patent obvious. *See* Resps. Br. at 148-74.

Complainants disagree. *See* Compls. Br. at 156-77. The Staff disagrees with complainants with respect to claim 12 of the '943 patent, but agrees with complainants with respect to claims 9 and 12 of the '711 patent. *See* Staff Br. at 121-41.

a. Claim 12 of the '943 Patent

i. Dhar (RX-0024) alone

Respondents argue that Dhar renders obvious claim 12 of the '943 patent. *See* Resps. Br. at 148-51, 151-57.

Element [12.1]: This element requires "a data channel for the transmission of data packets from a primary station to the secondary station." The evidence shows that Dhar discloses this limitation. Dr. Bims testified:

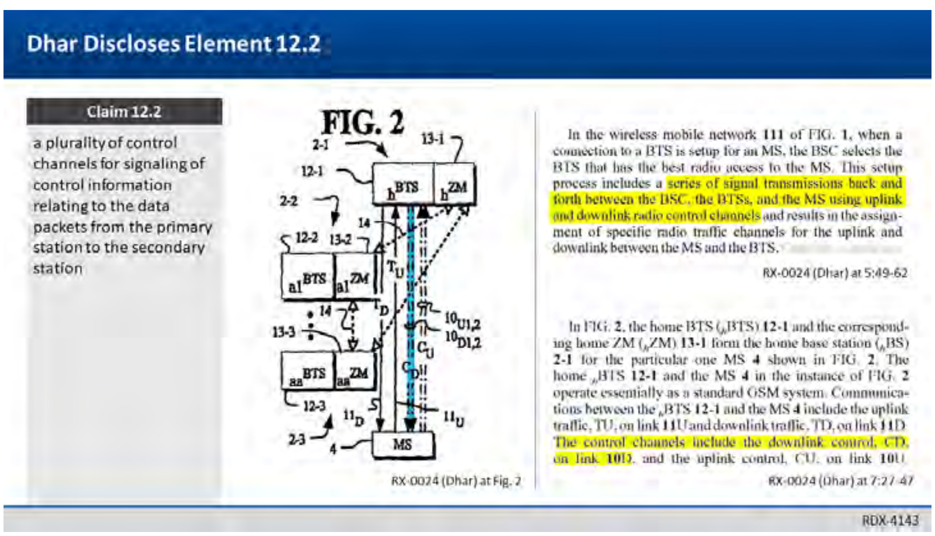
> At 2:35-38 and 5:49-62, shown on RDX-4142, Dhar discloses that mobile users in the communication network may communicate on uplink and downlink traffic channels with a base station and user traffic is transmitted between a mobile station and a base station.
>
> …
>
> Q205. *Is Dhar's system a circuit-switched system?*
>
> A205. Although Dhar mentions to GSM-based systems, it is in no way limited to a specific GSM implementation. In addition, GSM-based systems are capable of transferring data packets. For example, mobile stations operating in a GSM-based systems may transmit text messages, which are data packets.
>
> Further, GPRS, or Generic Packet Radio Services, which is a packet switching technology that enables data transfers through cellular networks, was introduced into GSM-based networks in the year 2000.

RX-3212C (Bims WS) at Q/A 205, 206.

Indeed, although Dr. Jackson testified in his witness statement that Dhar teaches only a GSM system without any data transmission, he testified on cross-examination that he was mistaken on this point, and that Dhar does disclose data transmission and a packet-switch type architecture, rather than only a circuit-switch type architecture. *See* Jackson Tr. 521-531. Thus, Dr. Jackson's testimony regarding Dhar's failure to teach this limitation, and others, on the grounds that it only discloses a GSM-based system (and does not teach data transmission) is given no weight.

Element [12.2]: This element requires "a plurality of control channels for signaling of control information relating to the data packets from the primary station to the secondary station." The evidence shows that Dhar discloses this element. Dr. Bims testified:

> Yes, at 5:49-62, 7:27-47 and Figure 2 shown on RDX-4143, Dhar discloses that a connection between a base station and a mobile station is set up by a series of signal transmissions back and forth between the base station and the mobile station using uplink and downlink radio control channels that results in the assignment of specific radio traffic channels for the uplink and downlink between the mobile station and the base station. Dhar also discloses that, while traffic channels used for uplink and downlink between mobile stations a base station, the radio control channels are used for operation, maintenance, and signaling between the base station and mobile stations in the communication network.



> A POSA would understand the term "control channel" to mean "a communications channel for informing a mobile station of the presence of

> a data packet for it to receive and providing information relating to the packet" as proposed by Staff and Respondents in the context of the '943 and '711 patents, for example, at Abstract, 1:27-35, 2:1-12, 2:20-24, 3:20-48, and 3:53-4:12.
> The specification describes that downlink control channels are used to signal information related to packet transmission at Abstract and 1:27-33. The '943 and '711 patents propose a scheme for informing a mobiles station of the presence of a data packet for it to receive and providing information relating to the data packet. Therefore, a POSA would understand that the term "control channel" as used in the asserted claims means "a communications channel for informing a mobile station of the presence of a data packet for it to receive and providing information relating to the packet."

RX-3212C (Bims WS) at Q/A 206-208.

Further, Dr. Jackson's original, mistaken opinion that Dhar teaches only a GSM system and not data transmission (discussed above), led him to opine that Dhar fails to teach "control channels" of element [12.2]. *See* CX-2421 (Jackson RWS) at Q/A 28, 29, 38. Given that Mr. Jackson agrees with Dr. Bims that Dhar discloses a packet-switched architecture, respondents have demonstrated that Dhar discloses element [12.2].

Element [12.3]: This element recites "means are provided for determining which of the control channels is allocated to the secondary station, the allocated control channel being changed according to a defined sequence known to both the primary station and the secondary station, and for monitoring the currently allocated control channel to determine information about packet transmissions." As discussed above in the Claim Construction section, the administrative law judge determined that the claim term "means ... for determining ... and for monitoring" is indefinite. *See* Section V.A.5, *supra*.

Philips proposed construction of this term is: "control channels are allocated to the secondary stations according to more than one unique defined ordering of allocation of control channels, and the secondary station monitors the currently allocated control channel to determine information about the transmission of data." *See id*. The evidence shows that Dhar alone renders this limitation obvious. First, as testified to by Dr. Bims, "[s]ince Philips did not construe limitation 12.3 as a means-plus-function term, Philips' proposed construction relates to only the functional aspect of limitation 12.3. Dhar alone renders obvious limitation 12.3." *See* RX-3212C (Bims WS) at Q/A 218. Second, Dr. Bims testified that functional aspects of this limitation are obvious in view of Dhar:

> At Figure 1, 5:19-31, 5:49-62, 6:11-21, and 9:25-34 as shown on RDX-4145, Dhar discloses a base station system (105) in Figure 1, which is the "primary station" which includes a transceiver station (12), "transceiver 104," and a zone manager (13). A POSA would have understood that the transceiver is connected to an antenna, which is "antenna 106," for signal transmission between the base station and the mobile station. Zone manager (13) includes a macrodiversity processor (20), which is the "microcontroller 102," and an airlink controller (22). Dhar's airlink controller is responsible for controlling the radio links between the base station and mobile stations, including determining and setting transmit power levels. Further, at 5:58-62, Dhar explains that the base station controls the operation of the radio traffic channels, including power control. Therefore, a POSA would have understood that Dhar's base station system (105) includes a "power control means 107."

RX-3212C (Bims WS) at Q/A 220 (functions and structure of the primary station).

> Dhar's communication system includes mobile stations (4), which are the "secondary stations." A POSA would have understood that a mobile station includes a microcontroller, a transceiver connected to an antenna, and power control means for signal transmissions back and forth between a base station and the mobile station as discussed at 5:49-62 and 6:11-21.
> ....

RX-3212C (Bims WS) at Q/A 222 (functions and structure of the secondary station).

> Yes, at 3:58-61; 5:49-56, 7:27-47 and Fig. 2 as shown on RDX-4148, Dhar discloses transmitting downlink signals to and uplink signals from a mobile station where the base station system uses downlink and uplink radio control channels for the assignment of radio traffic channels. Therefore, Dhar discloses a "downlink channel 112 for communicating from the base station to the mobile station."

RX-3212C (Bims WS) at Q/A 226 (functions and structure of a downlink channel).

> Yes, at 12:65-13:14 Dhar discloses that the zone manager (13) of Dhar's "primary station" includes allocation means and hopping sequence extraction means that are implemented in computer code executed on processor (20) and use information stored in database (25). The information stored in database (25) for each mobile station includes hopping sequences, MAIOs, MSs, frame numbers, and similar information.
>
> Further, at 14:37-44; 14:58-66, Dhar describes how the mobile stations use the MAIOs, which are the "defined sequences," stored in the database (25). A POSA would have understood that, for a mobile station to use a MAIO, the mobile station must know the frequencies, or control channels, defined by the respective MAIO before the mobile station can use it. A POSA would have further understood that, for the mobile station to know the frequencies defined by the MAIO it is supposed to use, the algorithm for determining the frequencies must be programmed in the respective mobile station.

RX-3212C (Bims WS) at Q/A 228 (functions and structure of the microcontroller of the secondary station).

The evidence further shows that Dhar discloses "determining which of the control channels is allocated to the secondary station," and "defined sequences" (under both the Staff and Philips' proposed functions):

> At 13:22-33, or also 13:34-57, as shown on RDX-4152, Dhar discloses that home radio resources, or "secondary stations," change the radio frequency used for bursts in accordance with a specific hopping sequence (FHS) and offset MAIO. This operation is implemented during connection set-up by sending a channel activation message from the base station to the mobile station that includes hopping sequence information consisting of a hopping sequence (HS) number and a MAIO assignment for the mobile station on the particular time slot. Based on this information, the mobile station determines its hopping sequence. In other words, it determines which of the control channels is allocated to the "secondary station."
>
> Further, as I have discussed previously, Dhar describes how the mobile stations use the MAIOs, which are the "defined sequences." Accordingly, a POSA would have understood that, based on the MAIO a mobile station

> uses, it determines what frequency, or control channel, to use to communicate with the base station.

RX-3212C (Bims WS) at Q/A 234, 233.

The evidence also shows that Dhar renders obvious the "monitoring the currently allocated control channel to determine information about packet transmissions" limitation of element [12.3]:

> As discussed before, I agree with Respondents that the means-plus-function term is indefinite. Under Philips' and Staff's proposed construction, however, Dhar discloses this limitation.
>
> At 5:49-56 as shown on RDX-4156, Dhar discloses that each mobile station is allocated, by the base station, a frequency, or a control channel, in each frame number, or time frame, according to a specific mobile allocation index off-set (MAIO). Further, as discussed above, a POSA would have understood that the mobile allocation index off-set (MAIO) associated with a frequency hopping sequence is known to both, the base station and the mobile station. Dhar discloses that setting up a connection between the base station and a mobile station includes a series of signal transmissions back and forth between the base station and the mobile station using uplink and downlink radio control channels.
>
> Therefore, a POSA would have understood that the mobile station monitors the frequency, or control channel, assigned to the mobile station according to a MAIO for "a series of signal transmissions," such as information about packet transmissions, to establish the allocation of specific radio traffic channels for the uplink and downlink between the mobile station and the base station.

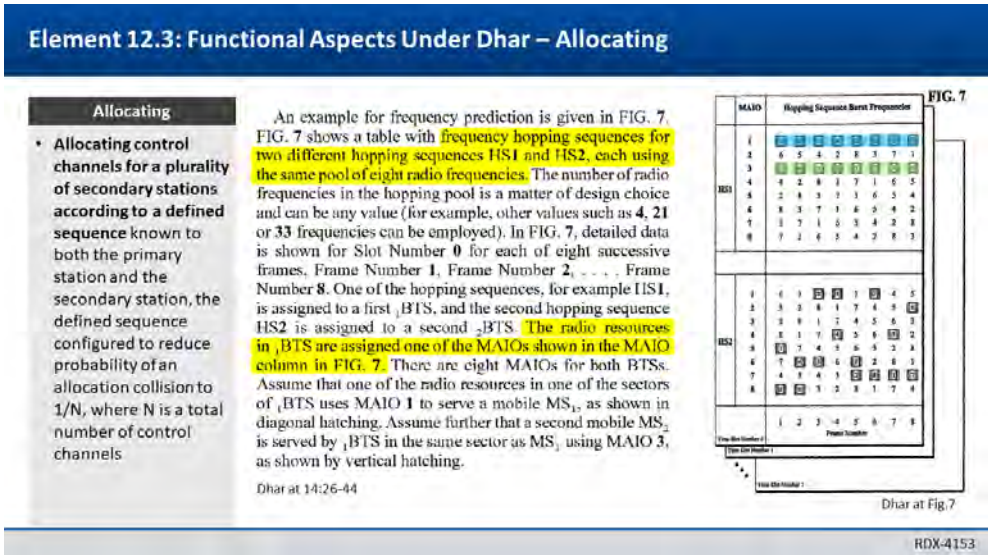
RX-3212C (Bims WS) at Q/A 243.

Although Dr. Jackson testified that Dhar lacks any corresponding structure or method under any proposed construction for this "monitoring…." limitation, his testimony is based on his mistaken opinion, discussed above, that Dhar discloses only a GSM system, circuit-switched type architecture, rather than a packet-switched architecture with data transmission. *See* CX-2421 (Jackson RWS) at Q/A 48. Therefore, this testimony is given no weight.

Element [12.4]: This element requires "the defined sequence is configured to reduce probability of an allocation collision to 1/N, where N is a total number of the control channels." Respondents did not clearly and convincingly demonstrate that Dhar discloses this element.

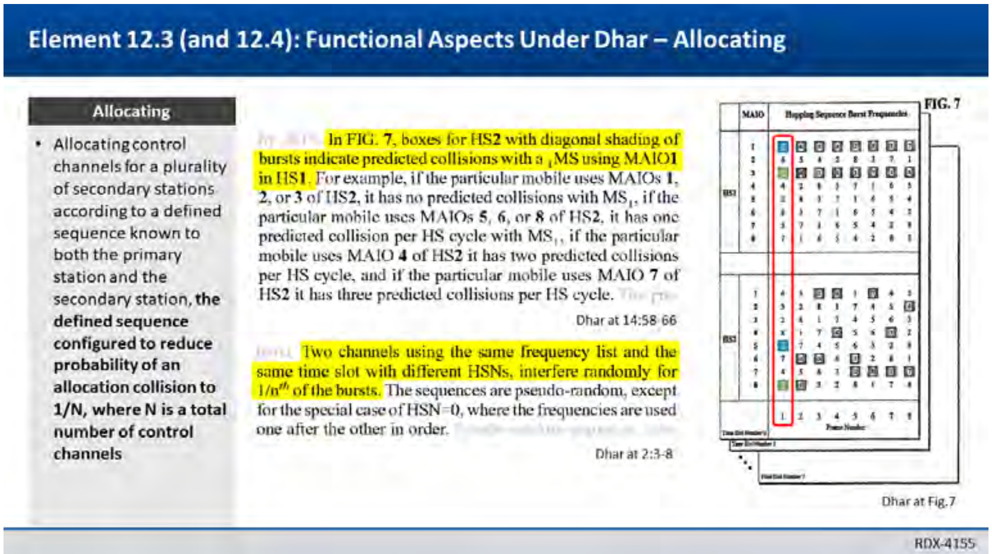
Dr. Bims testified:

> As discussed previously, Dhar discloses that mobile stations, or "secondary stations," use the MAIOs that define frequencies, or control channels, the respective mobile station is supposed to use.
>
> RDX-4153 shows two different hopping sequences HS1 and HS2, each using the same pool of eight radio frequencies as discussed at Figure 7, 14:26-44, 14:37-44, and 14:26-15:20. The number of radio frequencies in the hopping pool is a matter of design choice and can be any value. The hopping sequences are assigned to base stations and the mobile stations associated with a base are assigned to one of the MAIOs of the respective hopping sequence. In the example shown on RDX-4153, MAIO 1 defines frequency sequence {1, 6, 5, 4, 2, 8, 3, 7}, a "defined sequence," to be used in time frames 1-8. MAIO 3 defines frequency sequence {5, 4, 2, 8, 3, 7, 1, 6}, another "defined sequence," to be used in time frames 1-8. Therefore, as shown in Dhar's example, the MAIOs of hopping sequence HS1 and HS2 are configured such that there is no collision of frequencies *within* the respective hopping sequences. When using hopping sequences, HS1 and HS2, the MAIOs using 8 frequencies can be configured to minimize the probability of allocation collision to a maximum of one occurrence per time frame, which is 1/N, where N is the number of frequencies, or control channels, to which mobile stations can be assigned.



As shown on RDX-4154, Dhar discloses that the zone manager of the base station system includes a database that stores, amongst other information, hopping sequences, MAIOs, MSs, frame numbers and similar information for each mobile station at 12:65-13:14, 15:21-29. Dhar further states that the data shown in Figure 7 we discussed previously is known. Therefore a POSA would have understood that the mobile allocation index off-set (MAIO), the "defined sequence," associated with a frequency hopping sequence is known to both, the base station and the mobile station. Even though the set of frequency hopping sequences is predetermined, the base station controls the allocation of control channels to the mobile stations as discussed at 1:63-2:1, 5:58-62.

At 14:58-66 and 2:3-8 as shown on RDX-4155 Dhar discloses that the system operates such that the sequences generated by use of differing MAIO and HSN values have statistical properties similar to random sequences. As a result, two channels using the same frequency list and the same time slot with different HSNs, interfere randomly for 1/nth of the bursts, n being the number of frequencies. A POSA would have recognized that the scheme described in Dhar includes frequency hopping sequences and MIAOs such that interference between channels will occur randomly for 1/N of the bursts, wherein N is the number of frequencies in the set.



Further, as discussed previously, even if Dhar does not expressly disclose the specific algorithm disclosed at 4:1-5:50 of the '943 patent, it would have been obvious to a POSA to combine the disclosure of Parizhsky's algorithm defining tone hopping sequences with Dhar as discussed above.

RX-3212C (Bims WS) at Q/A 237.

Dr. Jackson, on the other hand, testified in-part:

It is my opinion that Dr. Bims has not shown that Dhar discloses the claim limitation of "wherein the defined sequence is configured to reduce the probability of an allocation collision to 1/N, where N is the total number of control channels." Dhar does not disclose any a system or configuration in which a base station assigns multiple mobile units to each of a plurality of control channels transmitted by that base station under any of the proposed constructions for control channel or defined sequence.

Dr. Bims points to the fact that different GSM hopping sequences take on the same value for 1/*N*th of the values of the sequences. He does not offer a reference for this assertion. But in GSM each hopping sequence is used by a different base station and by the mobiles associated with that base station. In contrast, in the '943 and '711 patents a base station uses as many sequences as it has associated mobile units and each mobile unit uses exactly one of these sequences.

In response to question number 237 in his direct witness statement, Dr. Bims analyzes Figure 7 from Dhar and asserts that, "[w]hen using hopping sequences, HS1 and HS2, the MAIOs using 8 frequencies can be configured to minimize the probability of allocation collision to a maximum of one occurrence per time frame, which is 1/N, where N is the

> number of frequencies, or control channels, to which mobile stations can be assigned." He cites no reference for this assertion. Yet, Figure 7 with his highlighting shows mobile station 1 on HS1 colliding 3 times with mobile station 7 on HS2 in 4 frames. Figure 6, below, is assembled from various portions of Dhar Figure 7 with Dr. Bims's highlighting. Note that mobile station 1 on HS1 and mobile station 7 on HS2 use the same burst frequency 2, 8 in successive frames.

CX-2421 (Jackson RWS) at Q/A 45.[44]

Accordingly, respondents have not shown by clear and convincing evidence that Dhar alone renders this element, and claim 12 of the '943 patent, obvious.

ii. Dhar (RX-0024) and Parizhsky (RX-0023)

Respondents argue that Dhar (RX-0024) in combination with Parizhsky (RX-0023) renders obvious claim 12 of the '943 patent. *See* Resps. Br. at 157-58.

As discussed above, the only limitation of claim 12 that is missing from Dhar is element [12.4]. Dr. Bims testified that Dhar in combination with the "tone hopping sequences" of Parizhsky renders this element obvious. *See* RX-3212C (Bims WS) at Q/A 237. With respect to the hopping sequence of Parizhsky, Dr. Bims testified:

> Parizhsky at Fig. 1, 3:4-34, and 11:1-20 discloses a cellular communication system in which multiple base stations serve multiple wireless terminals in adjacent potentially overlapping cells. RX-0023 at 3:4-34, 11:1-20; RX-0361 at PRIOR_ART_000005555. RDX-4128 shows Fig. 1 of Parizhsky. Specifically, Parizhsky relates to the allocating and using of tones in a multi-tone communications system. RX-0023 at 2:54-57; RX-0361 at PRIOR_ART_000005551. Parizhsky at Fig. 4 teaches that tones are allocated by the base station according to tone hopping sequences to minimize collisions between hopping sequences of neighboring base stations (e.g., base stations with overlapping broadcast

[44] As discussed above, the evidence shows, and further testimony by Dr. Jackson demonstrated that Dhar teaches data transmission and packet-switch architecture in addition to GSM. In this regard, the bases for Dr. Jackson's opinion that Dhar does not teach element [12.4] does not appear to be based on his original, mistaken opinion that Dhar teaches GSM only.

> regions). RDX-4129 shows Fig. 4 of Parizhsky. RX-0023 at 2:60-65; RX-0361 at PRIOR_ART_000005551. The allocation of tones by a first base station is performed according to a first function that allocates each of the P tones used by the first base station to a different one of the P tone hopping sequence during each of the plurality of P sequential tone allocation periods. RX-0023 at 3:18-23, 14:7-25; RX-0361 at PRIOR_ART_000005551-52. Allocation of tones according to the first function repeats after P allocation periods. In addition, a second base station with a broadcast area that overlaps the broadcast area of the first base station allocates tones in a second set of P tones, once during each of the first plurality of P sequential tone allocation periods according to a second function. RX-0023 at 3:25-29; RX-0361 at PRIOR_ART_000005551-52. The second function allocates, during each tone allocation period, each of the P tones in the second set of P tones, to a different one of a second plurality of P tone hopping sequences. The second function is different from said first function resulting in different tone-to-tone sequence allocations in the first and second cells.
>
> …
>
> Parizhsky's tone hopping is based on mutually orthogonal Latin squares which provides that the interference between cells is optimally averaged in the sense that one tone hopping sequence of one cell collides with another tone hopping sequence of an adjacent cell exactly once in one period of the hopping sequence as discussed at RX0361 PRIOR_ART_000005551-5552 and RX-0023 6:20-33.
>
> At RX-0361 PRIOR_ART_000005552 and RX0023 6:34-57 as shown on RDX-4133, the Latin square based hopping sequence is being formulated as $f = Z[(a \cdot t + b) \mathrm{mod} P]$, where "P is a prime number representing the total number of tones, t is the time index, f is the tone index, b is the index of a particular hopping sequence, and a is the slope parameter that characterizes the hopping pattern." Figure 3 shows an exemplary allocation of tones.

RX-3212C (Bims WS) at Q/A 187-189; *see also id*. at Q/A 230; RDX-4151.

Dr. Jackson testified:

> There is no quantity in Parizhsky corresponding to N and there is no event corresponding to collision in the allocation of control channels to mobile units. Therefore, because Parizhsky does not teach the allocation of control channels or the defined sequence, Parizhsky does not teach a defined sequence that is configured to reduce probability of an allocation collision to 1/N as claimed.

CX-2421 (Jackson RWS) at Q/A 73.

Accordingly, respondents have not shown by clear and convincing evidence that Dhar (RX-0024) in combination with Parizhsky (RX-0023) renders element [12.4], and claim 12 of the '943 patent, obvious.

iii. Sydon (RX-0020) alone

Respondents argue that Sydon (RX-0020) renders obvious claim 12 of the '943 patent. *See* Resps. Br. at 158-63.

Element [12.1]: This element requires "a data channel for the transmission of data packets from a primary station to the secondary station." The evidence shows that Sydon teaches element [12.1]. The evidence shows that:

> At RX-0020 6:63-67, 7:1-15; 9:44-48; 7:51-55, 7:41-43, 7:24-27 and Figure 2 as shown on RDX-4160, Sydon explains that a frame is a logical construct for transmitting control signals and data, such as payload data, between a mobile station and a base station. As shown in Figure 2, the control information is transmitted from the base station to the mobile station in first byte of each second subframe, and the payload data is transmitted from the base station to the mobile station in last 8 bytes of each second subframe.
>
> Therefore, a POSA would have understood that the last 8 bytes, the payload section, of each second subframe of a given frequency is a logical data channel for the transmission of data packets from a base station, or a primary station, to a mobile station, or a secondary station.

RX-3212C (Bims WS) at Q/A 256.

Element [12.2]: This element requires "a plurality of control channels for signaling of control information relating to the data packets from the primary station to the secondary station." The evidence shows that this element is obvious in view of Sydon. Dr. Bims testified:

> At RX-0020 9:44-48, Sydon discloses that a channel is a particular frequency and, in the disclosed embodiment, a mobile station and a base station may communicate using any of 52 distinct channels. As discussed previously, at RX-0020 7:3-5, 7:24-27, 7:33-37, and Figure 2, Sydon discloses that each frame is logically divided into a first sub-frame for uplink transmission from a mobile station to a base station and into a second sub-frame for downlink transmission from a base station to a mobile station.
>
> At 7:41-52 and 8:13-28, Sydon explains that control data controls the connection between the mobile station and the base station, for example, control data may comprise identification data, a change command, a power management command and other suitable control data associated with communication between mobile station and a base station.
>
> A POSA would have understood Sydon's Figure 2 on RDX-4161 to show that the downlink subframe is further logically divided into two logical channels; a downlink control channel for transmitting control information, and a data channel for transmitting payload data from the base station to the mobile station, as discussed at 7:24-55. Therefore, a POSA would have understood that the first byte, control section of each second subframe of a given frequency is a logical control channel for transmission of the control information relating to data packets being transmitted in the last 8 bytes of the second subframe.

RX-3212C (Bims WS) at Q/A 259.

Element [12.3]: This element recites "means are provided for determining which of the control channels is allocated to the secondary station, the allocated control channel being changed according to a defined sequence known to both the primary station and the secondary station, and for monitoring the currently allocated control channel to determine information about packet transmissions." The evidence shows that Sydon renders obvious element [12.3]. Dr. Bims testified:

> Since Philips did not construe limitation 12.3 as a means-plus-function term, Philips' proposed construction relates to only the functional aspect of limitation 12.3. Sydon alone renders obvious limitation 12.3.

RX-3212C (Bims WS) at Q/A 265.

> At RX-0020 4:37-54 and Figure 1 as shown on RDX-4163, Sydon discloses base unit (12), or the "primary station 100," which includes a microprocessor (24), or the "microcontroller 102", and transceiver (32), or the "transceiver 104", which transmits a signal through an antenna (34), or the "antenna 106," to the mobile unit (14).
>
> Sydon further discloses at 7:7-11 that transmitted control data may comprise identification data, a channel change command, a power management command and other suitable control data associated with communication between a mobile station and a base station. Thus, a POSA would have understood that Sydon's base station and mobile station include a power control means for controlling the transmit power in response to received power management commands.

RX-3212C (Bims WS) at Q/A 267 **(**functions and structure of the primary station).

> Yes, at 4:55-64, 7:7-11 and Figure 1 as shown on RDX-4165, Sydon discloses mobile unit (14), or the "secondary station 110," which includes a microprocessor (56), or the "microcontroller 112", and transceiver (52), or the "transceiver 114", which transmits data through an antenna (50), or the "antenna 116." Sydon further discloses at 7:7-11 that transmitted control data may comprise identification data, a channel change command, a power management command and other suitable control data associated with communication between a mobile station and a base station. Thus, a POSA would have understood that Sydon's base station and mobile station include a power control means for controlling the transmit power in response to received power management commands.

RX-3212C (Bims WS) at Q/A 270 **(**functions and structure of the secondary station).

> Yes, at RX-0020 7:1-5, 7:28-30 and Figures 2 and 2A as shown on RDX-4167, Sydon discloses a frame structure of the multi-frame communication protocol, where the frame has first and second sub-frames and each of sub-frames has control data and payload data.
>
> Further, as I explained previously, each of the physical channels is designed to transmit control information relating to downlink data packets from the base station to the mobile station in the first byte, the control section, of each subframe of the corresponding frequency, and to transmit the downlink data packets to the mobile station in the last 8 bytes, the payload section, of each subframe. Thus, a POSA would have understood

that Sydon discloses a downlink channel for communicating from the base station to a mobile station.

RX-3212C (Bims WS) at Q/A 270 **(**functions and structure of a downlink channel).

A275. Yes. At 4:55-64, 6:16-18, 6:8-14, and Figure 1B as shown on RDX-4168, Sydon discloses that mobile unit (14) includes a microprocessor (56), or the "microcontroller 112." The microprocessor (56) communicates with an internal memory (58) for supporting communication between mobile unit 14 and base unit 12.

In the flow chart at RX-0020 Figure 5 and 11:11-18 as shown on RDX-4169, Sydon discloses a method for channel hopping. The mobile unit 14 and base unit 12 independently determine which channel to hop to next, where a hop comprises changing from one channel to another channel. Both mobile unit 14 and base unit 12 utilize the same method, a "defined sequence," for determining the next channel and therefore remain in synchronization without exchanging channel change information during normal operation.

Sydon provides an exemplary formula according to which the next channel of the "defined sequence" can be determined at 13:11-15, which is "next channel = 13 x set counter + offset." Sydon explains at 13:17-24 that the constant value 13 is determined by the number of channels in each set. For example, if only 5 channels are in each set then the constant 13 would be replaced by 5. By multiplying the number of channels by the set counter, the proper set of channels is determined and by then adding in the offset, a particular channel within the set is determined. Then, the mobile unit and base unit 14 and 12 change to the next channel.

A POSA would have understood that both the mobile station and the base station each have access to look up tables and maintain and increment a plurality of counters the same way, which the mobile station and base station use, together with an identifier for the mobile station, to determine which channel will be allocated next in the unique "defined sequence" as disclosed, for example, at Abstract, 11:35-13:24 and Figure 5.

Also, a POSA would have understood that microprocessor (56), the "microcontroller 112," which retrieves information, such as a frame counter (74), a set counter (76), an index counter (78), a sequence number (80), an offset (82), and identifier (48), from memory (58), as discussed at 6:8-14, is programmed with the formula, or an "algorithm", to determine the next channel in the hopping sequence.

> Also, when assuming that Sydon does not expressly disclose the specific algorithm disclosed at 4:1-5:50 of the '943 patent, it would have been obvious to a POSA to combine Parizhsky's algorithm defining tone hopping sequences, or "defined sequences," with Sydon.

RX-3212C (Bims WS) at Q/A 275 (functions and structure of the microcontroller of the secondary station).

The evidence further shows that Sydon discloses "determining which of the control channels is allocated to the secondary station," and "defined sequences" (under both the Staff and Philips' proposed functions):

> As we discussed previously, Sydon discloses at 11:11-18, shown at RDX-4172, that the mobile unit (14) and base unit (12) independently determine which channel to hop to next, where a hop comprises changing from one channel to another channel and both mobile unit (14) and base unit (12) utilize the same method, or "defined sequence," for determining the next channel and thus remain in synchronization without exchanging channel change information during normal operation.

RX-3212C (Bims WS) at Q/A 279, 278.

The evidence also shows that Sydon renders obvious the "monitoring the currently allocated control channel to determine information about packet transmissions" limitation of element [12.3]:

> Sydon discloses that both the base unit (12) and mobile unit (14) have frame counters (38) and (74), respectively to maintain synchronization so that multi-frame messages are received and decoded in the proper order as discussed at 9:1-10 shown on RDX-4175. The frame counters are used to determine which element of message is being communicated by base and mobile units (12) and (14), and the frame counters are aligned with each other so that message is properly received. Accordingly, a POSA would have understood that Sydon discloses monitoring a control channel to determine information about packet transmissions.
>
> Even if Sydon did not expressly disclose this limitation, it would have been obvious to a POSA to combine the disclosure of Dhar with Sydon as we discussed with respect to the Dhar reference, as shown on RDX-4176.

RX-3212C (Bims WS) at Q/A 287.

Element [12.4]: This element requires "the defined sequence is configured to reduce probability of an allocation collision to 1/N, where N is a total number of the control channels." As discussed below, Sydon does not render this element obvious.

Dr. Bims testified:

> A282. At RX-0020 12:11-21 and 12:41-50, Sydon uses a unique identifier associated with the mobile unit (14) to generate a unique sequence of channels for that mobile unit (14). An advantage of using the identifier as part of the channel hopping method is that the likelihood of two base unit/mobile unit pairs colliding on multiple frequency hops is decreased. For example, if all base unit/mobile unit pairs hopped in the exact same order, any two base unit/mobile unit pairs could continuously interfere regardless of the number of channel hops. In contrast, by using the identifier as part of the determination of the next channel to hop to, unrelated base unit/mobile unit pairs are unlikely to continuously interfere with each other after channel hopping.
>
> In other words, the shuffling sequence is designed so that two mobile stations should not share the same channel, or have a risk of collision, more than once in a sequence. Therefore, if two mobile stations share a control channel for the same time interval, they will have different ones in the next time interval. Each hopping sequence, or "defined sequence," shuffles through all 52 available channels as Sydon discusses at 9:44-48, 9:67-10:1, 10:63-13:24, and Figure 5.
>
> Therefore, Sydon's hopping sequence, used for changing the allocated channel of a given mobile station, is able to reduce the number of times more than one mobile station is allocated the same control channel to be only once in an assigned sequence of 52 available control channels, or 1/N, where N is the total number of control channels.
>
> Even if Sydon did not expressly disclose that the defined sequence is configured to reduce probability of an allocation collision to precisely 1/N, where N is a total number of the control channels, a POSA would have recognized that many of the objects of Sydon's invention, including providing increased quality and reliability of communicate on service by implementing the disclosed hopping sequence as discussed at 11:31-34, are analogous to reducing the probability of an allocation collision.
>
> Also, it would have been obvious to a POSA to incorporate the frequency hopping sequence and mobile allocation index off-set (MAIO) of Dhar as

> we discussed previously with respect to the Dhar reference, as shown on RDX-4174, into the channel hopping of Sydon.
>
> Further, as discussed previously, even if Sydon does not expressly disclose the specific algorithm disclosed at 4:1-5:50 of the '943 patent, it would have been obvious to a POSA to combine the disclosure of Parizhsky's algorithm defining tone hopping sequences with Sydon as we discussed
>
> previously.

RX-3212C (Bims WS) at Q/A 282.

On the other hand, as Dr. Jackson testified:

> As I explained above, there is nothing in Sydon involving the assignment of multiple mobile units to control channels or any quantity corresponding to N. Therefore, because Sydon does not teach the allocation of control channels or the definition of sequences to allocate control channels, Sydon does not teach a defined sequence that is configured to reduce probability of an allocation collision to 1/N as claimed. The sequences that Dr. Bims attempts to correlate with the defined sequence of claim have not been shown to have the 1/N property. Sydon does not assert that the sequences have the 1/N property and Dr. Bims provides no analysis showing that they do.

CX-2421 (Jackson RWS) at Q/A 55.

Accordingly, respondents have not shown by clear and convincing evidence that Sydon (RX-0020) renders element [12.4], and claim 12 of the '943 patent, obvious.

iv. Sydon (RX-0020) in combination with Dhar (RX-0024) and Parizhsky (RX-0023)

Respondents argue that Sydon (RX-0020) in combination with Dhar and Parizhsky renders obvious claim 12 of the '943 patent. *See* Resps. Br. at 163-65.

As discussed above, the only element missing in Sydon is element [12.4]. However, Dhar and Parizhsky, discussed above, also do not disclose or render obvious element [12.4].

Accordingly, respondents have not shown by clear and convincing evidence that Sydon in combination with Dhar and Parizhsky render obvious all the elements of claim 12 of the ‘943 patent.

b. Claims 9 and 12 of the ‘711 Patent

i. Dhar (RX-0024) alone

Respondents argue that Dhar (RX-0024) renders obvious claims 9 and 12 of the ‘711 patent. *See* Resps. Br. at 165-67.

Element [9.1]: This element requires “a data channel for the transmission of data packets from a primary station to the secondary station.” For the same reasons discussed above with respect to element [12.1] of the ‘943 patent, Dhar discloses this element. *See also* RX-3212C (Bims WS) at Q/A 303.

Element [9.2]: This element requires “a plurality of control channels for signaling of control information relating to the data packets from the primary station to the secondary station.” For the same reasons discussed above with respect to element [12.2] of the ‘943 patent, Dhar discloses this element. *See also* RX-3212C (Bims WS) at Q/A 303.

Element [9.3]: This element requires “means are provided for determining which of the control channels is allocated to the secondary station wherein the control channels are allocated for a plurality of secondary stations according to a plurality of respective defined sequences, all of which are different, the allocated control channel being changed according to a respective defined sequence, and for monitoring the currently allocated control channel to determine information about packet transmissions.” For the same reasons discussed above with respect to the Dhar reference and element [12.3] of the ‘943 patent, Dhar alone renders this limitation obvious. *See also* RX-3212C (Bims WS) at Q/A 311.

Element [12.1]: This element requires "a data channel for the transmission of data packets from a primary station to a secondary station." For the same reasons discussed above with respect to element [9.1], Dhar discloses this element. *See also* RX-3212C (Bims WS) at Q/A 318.

Element [12.2]: This element requires "a plurality of control channels for signaling of control information relating to the data packets from the primary station to the secondary station." For the same reasons discussed above with respect to element [9.2], Dhar discloses this element. *See also* RX-3212C (Bims WS) at Q/A 318.

Element [12.3]: Element [12.3] is similar to element [9.3], and requires "the primary station allocating one of the control channels to the secondary station and changing the allocated control channel according to a defined sequence, and the secondary station monitoring the currently allocated control channel to determine information about packet transmissions, wherein the primary station allocates control channels for a plurality of secondary stations according to a plurality of respective defined sequences, all of which are different." For the same reasons discussed above with respect to element [9.3] and element [12.3] of the '943 patent, Dhar renders this element obvious. *See also* RX-3212C (Bims WS) at Q/A 318.

Accordingly, respondents have shown by clear and convincing evidence that Dhar alone renders claims 9 and 12 of the '711 patent obvious.

ii. Dhar (RX-0024) and Parizhsky (RX-0023)

Respondents argue that Dhar in view of Parizhsky renders obvious claims 9 and 12 of the ‘711 patent. *See* Resps. Br. at 168-69.

Dhar in view of Parizhsky renders obvious claims 9 and 12 of the ‘711 patent for the same reasons discussed above with respect to Dhar and claims 9 and 12 of the ‘711 patent, and with respect to elements [12.1], [12.2], and [12.3] of the ‘943 patent.

Accordingly, respondents have shown by clear and convincing evidence that Dhar in view of Parizhsky renders claims 9 and 12 of the ‘711 patent obvious.

iii. Sydon (RX-0020) alone

Respondents argue that Sydon alone renders obvious claims 9 and 12 of the ‘711 patent. *See* Resps. Br. at 169-72.

Sydon alone renders obvious claims 9 and 12 of the ‘711 patent for the same reasons discussed above with respect to Sydon and element [12.1], [12.2], and [12.3] of the ‘943 patent (which parallel elements [9.1], [9.2], [9.3] and [12.1], [12.2], and [12.3] of the ‘711 patent). *See* RX-3212C (DWS Bims) at Q/A 320-35.

Accordingly, respondents have shown by clear and convincing evidence that Sydon alone renders claims 9 and 12 of the ‘711 patent obvious.

iv. Sydon (RX-0020) in combination with Dhar (RX-0024) and Parizhsky (RX-0023)

Respondents argue that Sydon in combination with Dhar and Parizhsky renders obvious claims 9 and 12 of the ‘711 patent. *See* Resps. Br. at 172-74.

Sydon in combination with Dhar and Parizhsky renders obvious claims 9 and 12 of the ‘711 patent for the same reasons discussed above with respect to (i) Sydon and element [12.1], [12.2], and [12.3] of the ‘943 patent (which parallel elements [9.1], [9.2], [9.3] and [12.1], [12.2], and [12.3] of the ‘711 patent), and (ii) Dhar and elements [9.1], [9.2], [9.3], [12.1], [12.2] and [12.3] of the ‘711 patent. *See* RX-3212C (DWS Bims) at Q/A 320-35.

Accordingly, respondents have shown by clear and convincing evidence that Sydon in combination with Dhar and Parizhsky renders claims 9 and 12 of the ‘711 patent obvious.

i. Secondary Considerations

There is some evidence of secondary considerations that support non-obviousness. The patented inventions arose through 3GPP RAN (Radio Access Network) working groups where other skilled artisans from around the world were attempting to solve the same problem and the inventors’ solution was selected out of multiple possible alternatives. *See* CX-2399 (Moulsley WS) at Q/A 5-7.

VI. U.S. Patent No. 7,831,271

United States Patent No. 7,831,271 (“the ‘271 patent), entitled “Communication System and Method of Operating the Communicating System,” issued on November 9, 2010, to named inventors Matthew P.J. Baker and Timothy J. Moulsley. JX-0004 (‘271 Patent). The ‘271 patent issued from Application No. 10/567,042, filed on February 2, 2006, which claims priority to GB 0318735.8 and GB 0410905.4 filed on August 11, 2003 and May 4, 2004. *Id.* The ‘271 patent relates to “a communication system, to a station for use in a communication system, and to a method of operating a communication system. The present invention has particular, but not exclusive, application to spread spectrum systems such as UMTS (Universal Mobile Telecommunication System)." JX-0004 at 1:5-10. The '271 patent has a total of nine claims. Complainants assert independent method claim 1, and dependent method claims 2-4, and independent apparatus claim 5, and dependent apparatus claims 6-8 of the '271 patent. *See* Joint Outline at 6; Staff Br. at 6.

As noted, complainants assert independent method claim 1, and dependent method claims 2-4, and independent apparatus claim 5, and dependent apparatus claims 6-8 of the '271 patent. *See* Joint Outline at 6; Staff Br. at 6.

Asserted method claims 1-4 and apparatus claims 5-8 of the '271 patent read as follows:

> **1**. [pre] A method of operating a communication station (MS) adapted to transmit a plurality of signals simultaneously at respective power levels, the method comprising:
>
> [1.1] ***transmitting one or more first signals (DPCCH, DPDCH) simultaneously*** at a ***specified maximum combined transmit power level*** $\boldsymbol{(P_{max})}$;
>
> [1.2] wherein, ***in response to a received signal, reducing the transmit power of the one or more first signals (DPCCH, DPDCH)*** and ***transmitting simultaneously with the one or more first signals (DPCCH, DPDCH) an additional one of a second signal (ACK or NACK)*** at a respective ***second specified power level*** $\boldsymbol{(P_A}$ ***or*** $\boldsymbol{P_N)}$ and a third signal (NACK or ACK) at a respective ***third specified power level*** $\boldsymbol{(P_N}$ ***or*** $\boldsymbol{P_A)}$,
>
> [1.3] wherein the ***second specified power level*** $\boldsymbol{(P_A}$ ***or*** $\boldsymbol{P_N)}$ exceeds the ***third specified power level*** $\boldsymbol{(P_N}$ ***or*** $\boldsymbol{P_A)}$;
>
> [1.4] wherein the reduction in transmit power of the one or more first signals (DPCCH, DPDCH) corresponds to the ***second specified power level*** $\boldsymbol{(P_A}$ ***or*** $\boldsymbol{P_N)}$ irrespective of whether the additional signal is the second signal (ACK or NACK) or the third signal (NACK or ACK), such that when the additional signal is the third signal (NACK or

ACK) the combined transmit power level is less than the ***specified maximum combined transmit power level (P_{max})***.

2. A method of operating a communication station (MS) as claimed in claim 1 wherein the one or more first signals (DPCCH, DPDCH) are transmitted in first frames or time slots and the additional signals are transmitted in second frames or time slots, wherein the boundaries between the first frames or time slots are not coincident with the boundaries between the second frames or time slots, wherein the reduction in transmit power of the one or more first signals (DPCCH, DPDCH) commences at the first frame or time slot boundary immediately preceding the transmission of the additional signal.

3. A method of operating a communication station (MS) as claimed in claim 1, wherein the second signal (ACK or NACK) is a positive acknowledgement and the third signal (NACK or ACK) is a negative acknowledgement.

4. A method of operating a communication station (MS) as claimed in claim 1, wherein the signals are spread spectrum signals.

5. [pre] A communication station (MS) adapted to transmit a plurality of signals simultaneously at respective power levels, comprising:

[5.1] ***transceiver means (38) for transmitting one or more first signals (DPCCH, DPDCH) simultaneously*** at a ***specified maximum combined transmit power level (P_{max})***, for receiving signals, and for, in response to a received signal, ***transmitting simultaneously with the one or more first signals (DPCCH, DPDCH) an additional one of a second signal (ACK or NACK)*** and a third signal (NACK or ACK);

[5.2] ***control means (30) for controlling the transmitted power level of the one or more first signals (DPCCH, DPDCH) and the additional signal (ACK, NACK)***;

[5.3] wherein the control means (**34**) is ***adapted to, in response to the received signal, reduce the transmit power of the one or more first signals (DPCCH, DPDCH)*** and to set the transmit power of the additional signal, if the additional signal is the second signal (ACK or NACK), to a respective ***second specified power level (P_A or P_N)*** and, if the additional signal is the third signal (NACK or ACK), to a respective ***third specified power level (P_N or P_A)***, wherein the ***second specified power level (P_A or P_N)*** exceeds the ***third specified power level (P_N or P_A)***;

[5.4] wherein the reduction in transmit power of the one or more first signals (DPCCH, DPDCH) corresponds to the second specified power level (P_A or P_A) irrespective of whether the additional signal is the second signal (ACK or NACK) or the third signal (NACK or ACK), such that when the additional signal is the third signal (NACK or ACK) the combined transmit power level is less than the specified maximum combined transmit power (Pmax).

6. A communication station (MS) as claimed in claim 5 wherein the control means (**34**) is adapted to transmit the one or more first signals (DPCCH, DPDCH) in first frames or time slots and to transmit the additional signals in second frames or time slots, wherein the boundaries between the first frames or time slots are not coincident with the boundaries between the second frames or time slots, wherein the reduction in transmit power of the one or more first signals (DPCCH, DPDCH) commences at the first frame or time slot boundary immediately preceding the transmission of the additional signal.

7. A communication station (MS) as claimed in claim 5 wherein the second signal (ACK or NACK) is a positive acknowledgement and the third signal (NACK or ACK) is a negative acknowledgement.

8. A communication station (MS) as claimed in claim 5 wherein the signals are spread spectrum signals.

JX-0004 (‘271 Patent) at 5:36-6:11, 6:12-60 (emphasis added).

A. Claim Construction

1. A Person of Ordinary Skill in the Art

Complainants argue:

> As explained by Philips' experts, a POSA with respect to the claimed inventions would have at least a bachelor's degree in computer science, electrical engineering, computer engineering, or a related field, with 3-5 years' experience wireless communications systems, including familiarity with UMTS. *See* CX-0012C (Lanning WS) at Q/A 23; CX-2398C (Jackson WS) at Q/A 19.

Compls. Br. at 25.

Respondents argue:

> Respondents defined the applicable level of a POSA as having at least a Bachelor's degree in computer science, electrical engineering, computer engineering, or a related field, with 2-3 years of experience in wireless communication systems and/or networking, with superior education compensating for less work experience. RX-3212 (Bims WS) at Q/A 10, 11; RX-3341C (Min RWS) at Q/A 10. Philips did not provide any description of a POSA in its prehearing brief, despite Ground Rule 7c. Staff P.H. Br. at 18. Staff agrees with Respondents' definition of a POSA. *Id.* There is no meaningful difference in the POSA levels proposed by the parties during discovery as to any of the asserted patents. RX-3212 (Bims WS) at Q/A 11; RX-3341C (Min RWS) at Q/A 10; RX-3215C (Wells RWS) at Q/A 22; RX-3214C (Akl RWS) at Q/A 15-16.

Resps. Br. at 15-16.

The Staff argues:

> Respondents contend that the applicable level of ordinary skill in the art as having at least a Bachelor's degree in computer science, electrical engineering, computer engineering, or a related field, with 2-3 years of experience in wireless communication systems and/or networking, with superior education compensating for less work experience. *See* Resps.P.H.Br. at 24, fn 21. Philips did not provide a contention in its pre-hearing brief, and thus any argument regarding one of ordinary skill in the art has been abandoned/withdrawn. *See* Ground Rule 7.c. Staff agrees with Respondents' contention.

Staff Br. at 18 (footnote omitted).

Ground Rule 7.c. states:

> A statement of the issues to be considered at the hearing that sets forth with particularity a party's contentions on each of the proposed issues, including citations to supporting facts and legal authorities, *e.g.*, proposed exhibits. ***Incorporation by reference is not allowed. Any contentions not set forth in detail as required therein shall be deemed abandoned or withdrawn***, except for contentions of which a party is not aware and could not be aware in the exercise of reasonable diligence at the time of filing the prehearing statement. The prehearing statement and the brief may be combined into one document.

Order No. 2 (Ground Rules) (Jan. 21, 2021) at 11 (emphasis added).

Despite the unambiguous requirements of Ground Rule 7.c, complainants did not provide any definition of a person of ordinary skill in the art ("POSA") in their prehearing brief. *See* Compls. P.H. Br. *generally*.[45] Complainants' belated argument in their posthearing brief does not cure this clear defect. Therefore, complainants' contention concerning the definition of a POSA is deemed abandoned.

As proposed by respondents and the Staff, the administrative law judge finds that a person of ordinary skill in the art with respect to the '271 patent is a person who has at least a bachelor's degree in computer science, electrical engineering, computer engineering, or a related field, with 2-3 years of experience in wireless communication systems and/or networking, with superior education compensating for less work experience. *See* RX-3212 (Bims WS) at Q/A 10, 11; RX-3341C (Min RWS) at Q/A 10.

[45] Complainants, however, provided arguments using a "person of ordinary skill in the art" throughout their claim construction and invalidity sections of their prehearing brief, albeit, without the benefit of a clear definition of such a person. *See* Compls. P.H. Br. *generally*.

2. “control means (30) for controlling the transmitted power level of the one or more first signals (DPCCH, DPDCH) and the additional signal (ACK, NACK)” (‘271 patent, claims 5, 6)

Below is a chart showing the parties’ proposed claim constructions.

Complainants’ Construction	Respondents’ Construction	Staff’s Construction
Subject to 35 U.S.C. § 112, ¶ 6 Function: “controlling the transmitted power level” Structure: “a controller (30) and equivalents thereof” (Can be performed by a general purpose computer)	means plus function term under Section 112 ¶ 6 <u>Function</u>: controlling the transmitted power level of the one or more first signals (DPCCH, DPDCH) and the additional signal (ACK, NACK), and in response to the received signal, reduce the transmit power of the one or more first signals (DPCCH, DPDCH) and to set the transmit power of the additional signal, if the additional signal is the second signal (ACK or NACK), to a respective second specified power level (PA or PN) and, if the additional signal is the third signal (NACK or ACK), to a respective third specified power level (PN or PA), wherein the second specified power level (PA or PN) exceeds the third specified power level (PN or PA), wherein the reduction in transmit power of the one or more first signals (DPCCH, DPDCH) corresponds to the second specified power level (PA or PA) irrespective of whether the additional signal is the second signal (ACK or NACK) or the third signal (NACK or ACK), such that when the additional signal is the third signal (NACK or ACK) the combined transmit power level **is less than the specified maximum combined transmit power (Pmax)** <u>Structure</u>: indefinite under § 112, ¶ 6 for lack of structure	Subject to 35 U.S.C. § 112, ¶ 6 <u>Function</u>: controlling the transmitted power level of the one or more first signals (DPCCH, DPDCH) and the additional signal (ACK, NACK)” <u>Structure</u>: Controller 30, which includes microprocessor 32, transmit power controller 34, and power scaler 36, and equivalents thereof

Compls. Br. at 186; Resps. Br. at 175; Staff Br. at 52-53.

For the reasons discussed below, the administrative law judge has determined that the claim term "control means (30) for controlling the transmitted power level of the one or more first signals (DPCCH, DPDCH) and the additional signal (ACK, NACK)" should be construed as a means-plus-function limitation as proposed by the Staff.

Claim 5 of the '271 patent recites "control means (30) for controlling the transmitted power level of the one or more first signals (DPCCH, DPDCH) and the additional signal (ACK, NACK)." JX-0004 ('271 Patent) at claim 5. The function proposed by the Staff, "controlling the transmitted power level of the one or more first signals (DPCCH, DPDCH) and the additional signal (ACK, NACK)," comes directly from the claim language.

The specification shows that the structure for performing this function is controller 30, which includes microprocessor 32, transmit power controller 34, and power scaler 36, as proposed by the Staff. The specification discloses:

> [Referring to Figure 1], [t]he mobile station MS is controlled by a ***controller 30*** which carries out the many functions involved in the operation of the mobile station, including the sending and receiving of signals. For convenience of illustration and to facilitate an understanding of the present invention the ***controller 30 is shown as comprising a microprocessor 32, a transmit power controller 34 and a power scaler 36***. A transceiver 38 is coupled to an antenna 40 for the transmission and reception of spread spectrum signals from the base station BS.

JX-0004 ('271 Patent) at 2:64-3:5 (emphasis added).

Figure 1 of the '271 patent is reproduced below.

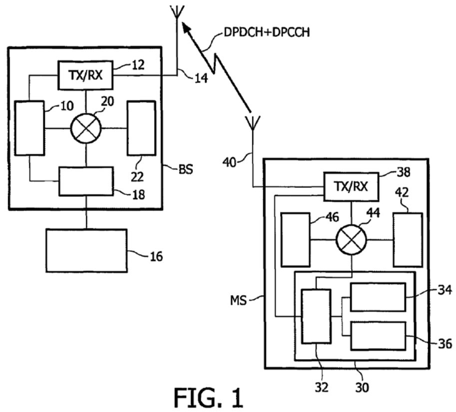


FIG. 1

JX-0004 ('271 Patent) at Figure 1.

As shown in Figure 1 above, controller 30 includes transmit power controller 34, power scaler 36, and microprocessor 32.

The specification further discloses that the transmit power levels of DPDCH and DPCCH are controlled by a controller:

> In the case of UMTS the operating standard requires each mobile station to transmit spread spectrum uplink signals substantially continuously. These signals are formatted into successive frames or time slots whose duration is specified by the system. ***Two signals are often transmitted continuously and these are a dedicated physical data channel DPDCH and dedicated physical control channel DPCCH, these signals are shown in FIG. 1***. Only DPCCH is transmitted when there is no data. ***The relative transmission power levels P_D and P_C of the DPDCH and DPCCH channels are regulated so as to maintain a fixed power ratio for a given data type and their combined powers are controlled so as not to exceed an allowable maximum power level P_{max}. Further while maintaining the fixed power ratio, the power level P_C of the DPCCH is adjusted periodically by a closed-loop power control mechanism***.

JX-0004 ('271 Patent) at 3:17-32 (emphasis added).

The specification further discloses that the mobile station (MS) transmits a positive (ACK) or negative (NACK) acknowledgement, that these relative power levels are different and determined by the base station (BS) and notified to the mobile station, which then reduces the transmit power level at the time slot prior the start of the

ACK/NACK transmission by an amount corresponding to whichever of ACK or NACK has the higher power requirement:

> Under the UMTS standard, the mobile station MS must transmit a positive (ACK) or negative (NACK) acknowledgement for each HSDPA packet received, depending for example on the outcome of a cyclic redundancy check (CRC) evaluation.
>
> …
>
> The relative transmit powers of the ACKs and NACKs are different and the respective transmit powers are determined by the base station BS and notified to the mobile station MS.
>
> …
>
> Since this is not possible, the mobile station MS reduces the transmit power at the time slot prior to the start of the ACK/NACK transmission by an amount corresponding to whichever of ACK or NACK has the higher power requirement P_A or P_N, respectively. In this way, the mobile station MS can ensure that enough transmit power is available for the ACK/NACK transmission regardless of the final outcome of the CRC evaluation process.

JX-0004 (‘271 Patent) at 3:36-4:11.

Based on at least the above disclosures, a person of ordinary skill in the art would have known that the controller 30 within the mobile station MS performs these functions recited in the claim term.[46] Thus, the intrinsic evidence shows that this element is not indefinite.

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[46] *See* CX-0012C (Lanning WS) at Q/A 276 (“At the time of the ‘735 application, a person of ordinary skill in the art would have understood the ‘control means (30)’ of claim 5 to refer to a controller in the mobile station for controlling the power amplification used by the mobile station. At that time, mobile stations used in UMTS had controllers for controlling the power amplification levels of signals sent by the mobile station. Therefore, at the time of the ‘735 application, controllers in mobile stations and base stations for controlling power were well known to persons of skill in the art. A person of skill in the art would have known how to program such a controller to achieve the desired functionality, such as the functionality disclosed in the ‘735 application and the ‘271 patent.”).

3. “transceiver means (38) for transmitting one or more first signals…” (‘271 patent, claim 5)

Below is a chart showing the parties’ proposed claim constructions.

Complainants’ Construction	Respondents’ Construction	Staff’s Construction
Subject to 35 U.S.C. § 112, ¶ 6 Function: “transmission and reception of signals” Structure: “a transceiver (38) and equivalents thereof” (Can be performed by a general purpose computer)	means plus function term under Section 112 ¶ 6 Function: (1) transmitting one or more first signals (DPCCH, DPDCH) simultaneously at a specified maximum combined transmit power level (Pmax), (2) receiving signals, and (3) in response to a received signal, transmitting simultaneously with the one or more first signals (DPCCH, DPDCH) an additional one of a second signal (ACK or NACK) and a third signal (NACK or ACK) Structure: a transceiver (38) and antenna (40), and equivalents thereof.	Subject to 35 U.S.C. § 112, ¶ 6 Function: Same as Respondents Structure: Same as Respondents

Compls. Br. at 186; Resps. Br. at 180; Staff Br. at 56-57.

For the reasons discussed below, the administrative law judge has determined that the claim term “transceiver means (38) for transmitting one or more first signals…” should be construed as a means-plus-function limitation as proposed by respondents and the Staff.

The parties agree this term is a means-plus-function term under § 112, ¶ 6. Respondents’ and the Staff’s proposed construction includes the full function recited by the claim and corresponding structure. Philips did not include any argument or analysis in support of its proposed construction for this term in its prehearing brief and therefore waived its proposed construction under Ground Rule 7.c. *See* Compls. P.H. Br. at 76-130.

Inasmuch as "transceiver means" is only a portion of the claim term, a POSA would have understood that the complete claim element, "transceiver means (38) for transmitting one or more first signals (DPCCH, DPDCH) simultaneously at a specified maximum combined transmit power level (P_{max}), for receiving signals, and for, in response to a received signal, transmitting simultaneously with the one or more first signals (DPCCH, DPDCH) an additional one of a second signal (ACK or NACK) and a third signal (NACK or ACK)," describes the function performed by the "transceiver means." *See* RX-3212 (Bims WS) at Q/A 449; JX-0004 ('271 Patent) at 6:15-22. The claim language indicates that the transceiver means is for transmitting one or more first signals, then transmitting a second signal in response to a received signal. Thus, the function must encompass all of the limitations listed in the clause. *Aoyama*, 656 F.3d at 1296-97 ("The court must construe the function of a means-plus-function limitation to include the limitations contained in the claim language, and only those limitations."). A POSA would have recognized that the function stated in claim 5 for the transceiver means describes specific functionalities that are not found in a generic transceiver, and would thus have understood that "transmission and reception of signals," as proposed by Complaints' construction, would be inadequate to describe the complete function of the "transceiver means" stated in the claim. *See* RX-3212 (Bims WS) at Q/A 449-50.

There is no dispute that transceiver 38, depicted in Figure 1 of the '271 patent, is part of the structure for the transceiver means, which is consistent with the identification of "transceiver means (38)" in the claim. Given that the technology background of the

‘271 patent is in mobile communications, and more specifically UMTS, a POSA would have also considered antenna 40, shown in Figure 1 as connected to transceiver 38, to be part of the structure for the transceiver means. *See* RX-3212 (Bims WS) at Q/A 451; JX-0004 (‘271 Patent) at 1:5-10; Figure 1. Figure 1 also depicts wireless communication between the mobile station (MS) and base station (BS). Inasmuch as a transceiver not connected to an antenna would not be capable of transmitting or receiving wireless signals, a POSA would have understood that both the transceiver (38) and the antenna (40) must be part of the structure for performing the function of the claimed “transceiver means.” *See* RX-3212 (Bims WS) at Q/A 451.

4. “second specified power level (P_A or P_N)” / “third specified power level (P_N or P_A)” / “specified maximum combined transmit power level (P_{max})” (‘271 Patent, claims 1, 5)

Below is a chart showing the parties’ proposed claim constructions.

“second specified power level (P_A or P_N)”		
Complainants’ Construction	**Respondents’ Construction**	**Staff’s Construction**
Plain and ordinary meaning. “The power level of ACK (PA) or NACK (PN)”[47]	“the power level of ACK (PA) or NACK (PN) assigned by the base station”	Same as Respondents

[47] The parties agree that “ACK” means “a positive acknowledgment,” and “NACK” means “a negative acknowledgment.” *See* Joint Proposed Claim Construction Chart (EDIS Doc. ID No. 740301).

“third specified power level (P_N or P_A)”		
Complainants’ Construction	**Respondents’ Construction**	**Staff’s Construction**
Plain and ordinary meaning. “The power level of the other of ACK (PA) or NACK (PN)”	“the power level of NACK (PN) or ACK (PA) assigned by the base station”	Same as Respondents
“specified maximum combined transmit power level (P_{max})”		
Complainants’ Construction	**Respondents’ Construction**	**Staff’s Construction**
Plain and ordinary meaning. (“an allowable maximum power level”)	“upper limit of the allowed communication station (MS) transmission power assigned by the base station”	Same as Respondents

Compls. Br. at 186; Resps. Br. at 181; Staff Br. at 58.

For the reasons discussed below, the administrative law judge has determined that (1) the claim term “second specified power level (P_A or P_N)” should be construed to mean “the power level of ACK (PA) or NACK (PN) assigned by the base station,” (2) the claim term “third specified power level (P_N or P_A)” should be construed to mean “the power level of NACK (PN) or ACK (PA) assigned by the base station,” and (3) the claim term “specified maximum combined transmit power level (P_{max})” should be construed to mean “upper limit of the allowed communication station (MS) transmission power assigned by the base station.”

Based on the claim language, specification, and testimony from the named inventors of the ‘271 patent, these terms should be construed to mean that the base station specifies the second and third specified power levels and the maximum combined power level. *See* RX-3212 (Bims WS) at Q/A 346-48, 374-78; RX-3214C (Akl RWS) at Q/A 63, 64. Each of the claims recite the modifier "specified" for power levels, the specification expressly states that the power levels for the ACK and NACK are "specified by the base station," which also "can specify the maximum power at which a mobile station can transmit," and Dr. Moulsley confirmed that these power levels are set by the network.[48] *See* JX-0004 ('271 Patent) at Abstract, 3:46-49, 2:45-47; JX-0024C (Moulsley Dep. Tr.) at 122, 123, 131-132; CX-2399 (Moulsley WS) at Q/A 12; RX-0056 (Moulsley Decl.) ¶ 5.

Claims 1 and 5 each recite the limitation "second specified power level" twice: (1) transmitting a second signal at a "second specified power level (P_A or P_N)," (2) reducing the transmit power of one or more first signals by an amount correspond to the "second specified power level (P_A or P_N)." *See* JX-0004 ('271 Patent) at 5:44-53, 6:29-38. Mr. Lanning's interpretation that the two recitations of the "second specified power level" within the same claim should be construed differently (Lanning Tr. 951-952),

[48] Complainants' expert, Mr. Lanning, also agreed that the second specified power level, third specified power level, and the maximum combined transmission power level are assigned by the base station. *See* CX-0012C (Lanning WS) at Q/A 31, 136, 142, 193; Lanning Tr. 993, 952-953. For example, with respect to the test reports he cites, Mr. Lanning testified that the "Second specified power level: PA," "Third specified power level: PN," and "Pmax" were "transmitted to the tested device from the base station emulator in the same way a UMTS base station (NodeB) sends them to the MS in an operating UMTS network." *See* CX-0012C (Lanning WS) at Q/A 136. Mr. Lanning also stated that "the maximum power level setting [is] specified by the serving base station." *See* CX-0012C (Lanning WS) at Q/A 31; Lanning Tr. 953; RX-3214C (Akl RWS) at Q/A 64; Akl Tr. 815.

contradicts the requirement that the same claim term in the same patent or related patents carries the same construed meaning.[49]

Mr. Lanning's written testimony that the "second specified power level" and "third specified power level" do not need to be in an amount equal to P_A or P_N as assigned by the base station, and instead are whatever "power levels at which the second and third signals are transmitted" reads out the term "specified" from the claim. *See* CX-0012C (Lanning WS) at Q/A 250; RX-3214C (Akl RWS) at Q/A 68; *Akzo Nobel Coating Inc. v. Dow Chem. Co.,* 811 F.3d 1334, 1340 (Fed. Cir. 2016) ("Interpretations that render some portion of the claim language superfluous are disfavored."). Applying the same rationale to the "specified maximum combined transmit power level (P_{max})," which all parties agree is specified by the base station, results in Pmax being defined as whatever total power at which the mobile station is transmitting. Under this construction, there would be no reason to "reduc[e] the transmit power of the one or more first signals (DPCCH, DPDCH)" as required by the asserted claims because the total uplink transmit power always is, and never exceeds, the Pmax. *See* JX-0004 ('271 Patent) at 5:42-44. Such a result is clearly contrary to the purpose of Pmax, and thus, reading "specified" out of "[second/third] specified power level" conflicts with the purpose of these signals. *Compare* CX-0012C (Lanning WS) at Q/A 30 *with* JX-0004 ('271 Patent) at 3:46-49;

[49] Philips never advanced any such proposed construction and has maintained that the "specified power level" terms have plain and ordinary meaning. *See* JX-0014 (Corrected Joint Proposed Claim Construction Chart) at 41-42. In addition, Mr. Lanning has offered conflicting opinions regarding the "plain and ordinary meaning" of this claim term. *Compare* Lanning Tr. 951-952 (construing two recitations of "second specified power level" in claim differently) *with* CX-0012C (Lanning WS) at Q/A 250 (reading out "specified" from the claim term "second specified power level" for both recitations).

RX-0056 (Moulsley Decl.) ¶ 5 ("the solution of the '271 patent… allowed for the ACK or NACK signal to be transmitted at the intended power level…").

5. "transmitting" ('271 patent, all claims)

Below is a chart showing the parties' proposed claim constructions.

Complainants' Construction	Respondents' Construction	Staff's Construction
Plain and ordinary meaning. ("transmitting one or more signals")	"sending over a network via an antenna"	"sending out one or more signals"

Compls. Br. at 189; Resps. Br. at 183; Staff Br. at 61.

The Staff's proposed construction is consistent with claim language ("transmitting one or more first signals") and the specification. *See, e.g.*, JX-0004 ('271 Patent) at 3:36-40 ("the mobile station MS must transmit a positive (ACK) or negative (NACK) acknowledgement"). Philips' proposed construction is improper because it contains the term being construed, "transmitting."

Although Figure 1 of the '271 patent illustrates an antenna, and the context of the patent is wireless communication (UMTS), there is nothing in the claims[50] or specification that expressly limits this term to wireless communications or "over a network."

Accordingly, the administrative law judge has determined that the claim term "transmitting" should be construed to mean "sending out one or more signals."

[50] Although the preamble recites a mobile station ("communication station (MS)"), the parties have not argued that the preamble is limiting.

6. “transmitting one or more first signals (DPCCH, DPDCH) simultaneously” (‘271 patent, claims 1 and 5)

Below is a chart showing the parties’ proposed claim constructions.

Complainants’ Construction	**Respondents’ Construction**	**Staff’s Construction**
Plain and ordinary meaning. (“transmitting DPCCH or DPCCH and DPDCH at the same time”)	Indefinite	Indefinite[51]

Compls. Br. at 189; Resps. Br. at 184; Staff Br. at 60-61.

Philips argues:

> The claim language is sufficiently clear, and the Respondents do not argue that any alleged ambiguity affects the claim scope or that a person of ordinary skill would not understand what it means. The Respondents position is that a single signal cannot be transmitted “simultaneously,” which only supports the conclusion that the language is reasonably certain (it means sending a first signal or two signals at the same time). And, even though the Respondents bear the burden to demonstrate that the claim is indefinite by clear and convincing evidence, they simply cite the words in isolation without addressing the context or explaining why the language would not be reasonably certain.

Compls. Br. at 189. However, “simultaneous” transmission (as required by the claim term) is only possible if more than one signal is being transmitted. The scope of the claim term is therefore uncertain.

A POSA would not be able to ascertain the scope of the invention with reasonable certainty due to the ambiguity of this claim limitation, rendering the term indefinite.

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[51] The Staff argues, “The Staff initially proposed a construction for this term. *See* Corrected Joint Claim Construction Chart, EDIS Doc. ID 747528, at 44. However, after further considering the parties’ arguments in their prehearing briefs, Staff agrees with Respondents that this term in indefinite.” Staff Br. at 60 n.53.

Nautilus, Inc. v. Biosig Instruments, Inc., 572 U.S. 898, 901 (2014); RX-3212 (Bims WS) at Q/A 371-73. It is unclear whether the claim encompasses the scenario of transmitting only "one … first signal," since the claim also requires that the transmission be performed "simultaneously," which can only be possible if there is more than one first signal being transmitted at the same time. *See* RX-3212 (Bims WS) at Q/A 372. Complainants' proposed construction of "transmitting DPCCH or DPCCH and DPDCH at the same time" is incorrect because the claim requires that the first signals are transmitted "simultaneously," which is only possible if there is more than one first signal. Therefore, complainants' proposed construction ("transmitting DPCCH or DPCCH and DPDCH at the same time"), which includes the possibility of "transmitting DPCCH" cannot be correct.

Accordingly, the evidence shows that this claim term is indefinite.

7. "transmitting simultaneously with the one or more first signals (DPCCH, DPDCH) an additional one of a second signal (ACK or NACK) … and a third signal (NACK or ACK)" ('271 patent, claims 1 and 5)

Below is a chart showing the parties' proposed claim constructions.

Complainants' Construction	Respondents' Construction	Staff's Construction
Plain and ordinary meaning. ("transmitting ACK or NACK at the same time as DPCCH and/or DPDCH")	Plain and ordinary meaning: "transmitting either a second signal (ACK or NACK) or a third signal (NACK or ACK) at the same time as one or more first signals (DPCCH, DPDCH)"	Same as Respondents

Compls. Br. at 190; Resps. Br. at 184; Staff Br. at 62.

For the reasons discussed below, the administrative law judge has determined that the claim term "transmitting simultaneously with the one or more first signals (DPCCH, DPDCH) an additional one of a second signal (ACK or NACK) … and a third signal (NACK or ACK)" should be construed to mean "transmitting either a second signal (ACK or NACK) or a third signal (NACK or ACK) at the same time as one or more first signals (DPCCH, DPDCH)."

Philips did not argue or submit an analysis of its proposed construction for this term in its prehearing brief, and thus any such arguments were abandoned. *See* Ground Rule 7.c.[52] *See* Compls. P.H. Br. at 76-130.

A POSA would have understood the term "transmitting simultaneously with the one or more first signals (DPCCH, DPDCH) an additional one of a second signal (ACK or NACK) … and a third signal (NACK or ACK)" to have its plain and ordinary meaning, an example of which is "transmitting either a second signal (ACK or NACK) or a third signal (NACK or ACK) at the same time as one or more first signals (DPCCH, DPDCH)." *See* RX-3212 (Bims WS) at Q/A 394. A POSA would have recognized that the parentheticals of the claims associated with the first, second, and third signals specifically call out that the first signals can be a DPCCH and DPDCH, the second signal can be an ACK or NACK, and the third signal can be a NACK or ACK. *See* RX-3212 (Bims WS) at Q/A 394. A POSA would understand that the phrasing, "transmitting simultaneously… an additional one of …" indicates that either the second signal or the

[52] In attempting to demonstrate that the accused products and domestic industry products satisfy this limitation, Philips did argue that this limitation is met. *See, e.g.*, Compls.P.H.Br. at 85, 86, 88, 101. However, in making those arguments, Philips did not present an argument in support its proposed construction for the term. *See id*.

third signal is transmitted at the same time as the one or more first signals, with each as defined in the claim. *See* RX-3212 (Bims WS) at Q/A 394.

B. Infringement and Domestic Industry (Technical Prong) of the '271 Patent

As noted, complainants assert independent method claim 1, and dependent method claims 2-4, and independent apparatus claim 5, and dependent apparatus claims 6-8 of the '271 patent. *See* Joint Outline at 6; Staff Br. at 6.

1. Direct Infringement

Philips's infringement and domestic industry technical prong allegations are based on the 3GPP specifications, including 3GPP TS 25.214 § 5.1.2.6 ("maximum and minimum power limits"). *See* CX-1087 (ETSI TS 125 214 v5.11.0 (2005-06)); CX-0012C (Lanning WS) at Q/A 32, 33, 51-54. Philips also relies on testing of various accused products and of Philips' DreamStation product (a domestic industry product) including a [redacted] Module, performed by a third party. *See* CX-0012C (Lanning WS) at Q/A 91-127. Dr. Lanning's testimony for the accused products and domestic industry products are the same and they are analyzed together. Therefore, the analysis below for each limitation applies to both the accused products and domestic industry products.

a. "wherein the reduction in transmit power of the one or more first signals (DPCCH, DPDCH) corresponds to the second specified power level (PA or PN)" (limitations [1.4] and [5.4])

The accused and domestic industry products do not meet limitations [1.4] and [5.4] as a result of their compliance with 3GPP TS 25.214 § 5.1.2.6. RX-3214C (Akl

RWS) at Q/A 53, 63-71. The ‘271 patent requires that the claimed “second specified power level,” “third specified power level,” and “specified maximum combined transmit power level” are power levels assigned, or “specified,” by a base station. *See* JX-0004 (‘271 Patent) at Abstract, 1:07-14, 3:46-49; RX-3214C (Akl RWS) at Q/A 17-24, 63-64; RDX-6009, RDX-6010; CX-0012C (Lanning WS) at ¶¶ 31, 136, 142, 193; Lanning Tr. 952-953, 993; RX-0056 (Moulsley Decl.) ¶ 5; JX-0024C (Moulsley Dep. Tr.) at 122, 123, 131-132. The ‘271 patent (JX-0004) and TS 25.214 § 5.1.2.6 (CX-1087) both address a situation where the total power level in an uplink transmission exceeds the maximum allowed value assigned by a base station, but they prescribe two fundamentally different solutions. *See* RX-3214C (Akl RWS) at Q/A 66-70; CX-1087.21-22 (3GPP TS 25.214 § 5.1.2.6); CX-1461.21-22 (3GPP TS 25.214 § 5.1.2.6).

The ‘271 patent describes a solution where the power level of “one or more first signals (DPCCH, DPDCH)” is reduced by the amount of power assigned by a base station for transmitting the ACK/NACK signal. *See* JX-0004 (‘271 Patent) at 3:58-62, 4:03-07, 5:51-53, 6:36-38, Figures 3 and 4; RX-3214C (Akl RWS) at Q/A 25-31, 66-68; RX-0056 (Moulsley Decl.) ¶ 5; JX-0024C (Moulsley Dep. Tr.) at 87-88; RDX-6011 through 6015; Akl Tr. 815, 817. In contrast, TS 25.214 § 5.1.2.6 requires scaling the total transmit power if it would exceed the maximum allowed value, *i.e.*, applying a scaling factor to all signals in the uplink transmission, including the DPCCH, DPDCH, and HS-DPCCH (ACK/NACK signals). *See* CX-1087.21-22 (3GPP TS 25.214 § 5.1.2.6); CX-1461.21-22 (3GPP TS 25.214 § 5.1.2.6); RX-3214C (Akl RWS) at Q/A 69; RDX-6023; JX-0024C (Moulsley Dep. Tr.) at 60-61; Akl Tr. 823-824. The implementation of the ‘271 patent (JX-0004) of reducing the power of DPCCH and

DPDCH in an amount equal to the power level of the ACK or NACK specified by a base station is different from TS 25.214 § 5.1.2.6 (CX-1087) which calls for scaling of all signals. *See* RX-3214C (Akl RWS) at Q/A 70, 71 (describing RDX-6025); CX-0012C (Lanning WS) at Q/A 250.

Not only does the patent describe that the claimed "reduction" and the unclaimed "scaling" are performed by different components ("power control stage **34**" v. "scaling stage **36**"), the patent also describes them as distinct operations leading to different outcomes. With respect to the unclaimed "scaling" operation, the patent explains that "the result of the scaling process in accordance with the present invention may in fact be to increase the DPCCH (+DPDCH) transmit power." JX-0004 ('271 Patent) at 5:05-07. In contrast, the claimed "reduction" operation cannot lead to such an outcome because the transmit power of the DPDCH and DPCCH must be "reduced." *Id.* at 4:62-66. Further, as the named inventor explains, scaling requires the ratio among the scaled channels to remain constant as "the same scaling factors would be applied to … all the channels that the UE is transmitting." JX-0024C (Moulsley Dep. Tr.) at 60-61. In contrast, the claimed power reduction imposes no such requirement, which is evident from the claim language, "reducing the transmit power of one or more first signals (DPCCH, DPDCH)," (*e.g.*, the reduction can be performed on DPCCH alone without affecting the DPDCH). JX-0004 ('271 Patent) at 5:51-52.

The evidence shows that the patentee likely understood the distinction between the unclaimed scaling operation (described in the "scaling stage **36**") and the claimed power reduction operation (described in the "power control stage **34**"). *Compare* JX-0024C (Moulsley Dep. Tr.) at 60-61 (discussing unclaimed scaling) *with id.* at 87-88 (discussing claimed reduction). Thus, Philips is barred from recapturing the "scaling" operation it chose not to claim. *Eagle Pharms. Inc. v. Slayback Pharma LLC*, 958 F.3d 1171, 1175 (Fed. Cir. 2020) ("[W]hen a patent drafter discloses but declines to claim subject matter, … this action dedicates the unclaimed subject matter to the public."). As Dr. Moulsley confirmed, "[a]lthough many other possibilities could have been envisaged, the solution of the '271 patent was to reduce the transmit power on the continuous uplink signals by an amount equal to the power consumed by the greater of ACK or NACK." *See* RX-0056 (Moulsley Decl.) ¶ 5; JX-0024C (Moulsley Dep. Tr.) at 87-88; JX-0004 ('271 Patent) at Figs. 3, 4; RX-3212C (Bims WS) at Q/A 341; RX-3214C (Akl RWS) at Q/A 31, 68; Akl Tr. 817.

b. "transmitting simultaneously with the one or more first signals (DPCCH, DPDCH) an additional one of a second signal (ACK or NACK) at a respective second specified power level (P_A or P_N) and a third signal (NACK or ACK) at a respective third specified power level (P_N or P_A)" (limitations [1.2] and [5.1])

The accused and domestic industry products do not meet the limitations [1.2] and [5.1] as a result of their compliance with 3GPP TS 25.214 § 5.1.2.6. *See* RX-3214C (Akl RWS) at Q/A 53, 72-78. Inasmuch as the '271 patent and TS 25.214 § 5.1.2.6 prescribe two fundamentally different operations for reducing power levels in an uplink transmission exceeding a maximum allowed value, these operations each result in different power levels for the second and third signals (P_A or P_N) in the uplink transmission. *See* RX-3214C (Akl RWS) at Q/A 53, 73.

The asserted claims of the '271 patent require the ACK/NACK signal to be transmitted at their respective power level (P_A or P_N) specified by the base station. *See*

JX-0004 ('271 Patent) at 3:46-49; RX-3214C (Akl RWS) at Q/A 17-24, 74-75; CX-0012C (Lanning WS) at Q/A 31, 136; Lanning Tr. 993; RX-0056 (Moulsley Decl.) ¶ 5; JX-0024C (Moulsley Dep. Tr.) at 87-88; Akl Tr. 815.

In contrast, when the total power level of an uplink transmission exceeds the maximum allowed value, TS 25.214 § 5.1.2.6 requires that all signals, including the ACK/NACK signal, to be scaled, thus the ACK/NACK signal (*i.e.*, the claimed second or third signal) are transmitted at a "scaled" power level under TS 25.214 § 5.1.2.6, as opposed to the value specified by a base station under the '271 patent. *See* CX-1087.19, 21-22 (3GPP TS 25.214 § 5.1.2.5-6); CX-1461.19, 21-22 (3GPP TS 25.214 § 5.1.2.5-6); RX-3214C (Akl RWS) at Q/A 76-77; RDX-6026; Akl Tr. 823-824. The scaling of the ACK/NACK signal results in a power level lower than the power level specified by the base station. Accordingly, a device complying with TS 25.214 § 5.1.2.6 would not transmit the second or third signal at the second specified power level or third specified power level (P_A or P_N), as required by the asserted claims. *See* RX-3214C (Akl RWS) at Q/A 78 (describing RDX-6025).

c. "in response to a/the received signal, reducing the transmit power of the one or more first signals (DPCCH, DPDCH)" (limitations [1.2] and [5.3])

The accused and domestic industry products do not meet limitations [1.2] and [5.3] by complying with TS 25.214 § 5.1.2.6. *See* RX-3214C (Akl RWS) at Q/A 79. The asserted claims require the reduction in power of the one or more first signals to be triggered by a received signal. *See* JX-0004 ('271 Patent) at 3:33-40, 5:42-44, 6:26-28. TS 25.214 § 5.1.2.6, in contrast, does not describe power scaling in response to a received signal. Rather, the criteria stated in the standard is, "[i]n the case that the total

UE transmit power … would exceed the maximum allowed value," which may occur without the UE ever receiving any signals. *See* CX-1087.21-22 (3GPP TS 25.214 § 5.1.2.6); CX-1461. 21-22 (3GPP TS 25.214 § 5.1.2.6); RX-3214C (Akl RWS) at Q/A 79; Akl Tr. 827. For example, when signals are received and DPCCH/DPDCH and ACK/NACK signals are being sent, whether a power reduction occurs depends on the maximum allowed value Pmax. *See* RX-3214C (Akl RWS) at Q/A 79. Accordingly, a device complying with TS 25.214 § 5.1.2.6 does not reduce the transmit power of the one or more first signals in response to a received signal as required by all asserted claims. *Id.*

Further, this limitation requires a power reduction performed in response to a received signal, which relates directly to the logic applied by the components (*e.g.*, the baseband processor) within the accused and domestic industry products. *See* RX-3214C (Akl RWS) at Q/A 157. Without source code, one cannot determine specific implementations, including whether any power reduction was performed "in response to a received signal." *See* RX-3214C (Akl RWS) at Q/A 38. This is because source code and engineering documentation is needed to know the functions and logic performed by components within any module. *See* RX-3214C (Akl RWS) at Q/A 114. Mr. Lanning admitted to not having reviewed any source code. *See* Lanning Tr. 950. Thus, Mr. Lanning cannot reliably conclude that the accused and domestic industry products ever perform a power reduction in response to a received signal. *See* RX-3214C (Akl RWS) at Q/A 38, 157.

d. “the second specified power level (P_A or P_N) exceeds the third specified power level (P_N or P_A)” (limitations [1.3] and [5.3])

The accused and domestic industry products do not meet the limitations [1.3] and [5.3], which require the ACK signal and the NACK signal to be transmitted at different power levels, *i.e.*, $P_A \neq P_N$. *See* RX-3214C (Akl RWS) at Q/A 29, 57, 80-87; JX-0004 (‘271 Patent) at 3:46-49, 62-64, 5:49-51, 6:34-35; RDX-6013. The accused and domestic industry products do not dictate ACK and NACK signals’ power levels because these values are assigned by base stations controlled by individual network carriers, such as AT&T or T-Mobile. *See* RX-3214C (Akl RWS) at Q/A 17-24, 80, 81, 87; RDX-6010. The UMTS 3G standard on which Mr. Lanning relies provides a wide range of implementation options for assigning power levels for ACK and NACK signals, and whether a base station assigns them to be equal or different values is entirely optional. *See* CX-1086.10; RX-2015.13; RX-3214C (Akl RWS) at Q/A 57, 82-84, 86; RDX-6020; *Fujitsu*, 620 F.3d at 1327-28; *Godo*, 620 F.3d at 1384. Accordingly, the only way to determine if the accused and domestic industry modules meet limitations [1.3] and [5.3] is to examine information or documents (*e.g.*, design specifications, source code, testimony) on how network carriers like AT&T and T-Mobile configure their base stations or to perform customized testing in actual carrier networks. *See* RX-3214C (Akl RWS) at Q/A 84.

Philips chose to do neither and cannot meet its burden of proving that the accused and domestic industry products practice limitations [1.3] and [5.3]. *See* RX-3214C (Akl RWS) at Q/A 84, 87. Philips also did not identify or analyze any information or documents relating to how any base station from the real world configures power levels for ACK and NACK signals. *See* RX-3214C (Akl RWS) at Q/A 81; Lanning Tr. 953-954, 957-960. Furthermore, tests on selected modules do not provide any information on whether network carriers configure the P_A and P_N to be equal or different because these tests are simulations using a NodeB simulator, and the various power level values (including P_A and P_N) used were arbitrarily selected by Mr. Lanning. *See* RX-3214C (Akl RWS) at Q/A 85; CX-0012C (Lanning WS) at Q/A 136; Lanning Tr. 956-957, 958-959, 961-962.

e. Additional Infringement and Technical Prong Issues

i. Philips Has Not Addressed the Majority of the Accused and Domestic Industry Products

Philips has not met its burden of proving that each and every accused and domestic industry product practices the asserted claims. *See* RX-3214C (Akl RWS) at Q/A 9-16, 32-50. Philips alleges infringement of claims 1-8 of the ‘271 patent by 29 Quectel modules, 22 Thales modules, and 33 Telit modules, as well as two Laird devices, nine Xirgo devices, and over [redacted] CalAmp devices that each allegedly incorporate an accused Quectel, Thales, or Telit module. Philips also relies on two Philips devices incorporating any one of five different communication modules, including four Thales modules, for its alleged domestic industry.

Despite identifying around 90 modules and over [redacted] devices, Philips’s infringement expert provides infringement analysis for only nine accused modules (Quectel [redacted], Quectel [redacted], Quectel [redacted], Thales MPLAS9W, Thales ELS61-US, Thales EHS6T, Telit UE91-GL, Telit LE910-BI-NA, Telit LE910-NA-V2) and one module for domestic industry ([redacted]). *See* CX-0012C (Lanning WS) at Q/A

91, 92; Lanning Tr. 943-944, 955, 956. Indeed, Mr. Lanning relies on power measurements found in the test results for the subset of products that were tested. *See* Lanning Tr. 955. Without any test results or implementation details for the remaining untested modules, Mr. Lanning has no evidence that the ten modules he examined are "materially identical" to or "operate in materially identical manner" as the remaining modules (except for Telit FN908 and FN908M modules) because all these modules comply with the UMTS 3G standards. *Godo*, 967 F.3d at 1384 ("We recognize in *Fujitsu* that the fact that a patent's claims cover an industry standard does not necessarily establish that all standard-compliant devices implement the standard in the same way."); *Fujitsu*, 620 F.3d at 1327-28.

A patentee may rely on an industry standard to show infringement by a standard compliant device only when the asserted claims cover mandatory aspects of a standard and the asserted claim must cover every possible implementation of a standard. *See* *Fujitsu*, 620 F.3d at 1327-28; *Godo*, 620 F.3d at 1384; JX-0017C (Bossard Tr.) at 129:18-130:06; RDX-6036. As explained by Dr. Akl,[53] the UMTS 3G standard on which Mr. Lanning relies expressly allows different implementation options, enumerated (a) and (b), for computing the maximum HS-DPCCH power under 3GPP TS 25.214 § 5.1.2.6, and multiple options for assigning ACK or NACK power levels provided in Table 1A of TS 25.213. *See* RX-3214C (Akl RWS) at Q/A 35, 57; Lanning Tr. 954, 995; CX-1087.21-22 (3GPP TS 25.214 § 5.1.2.6); CX-1461.21-22 (3GPP TS 25.214 § 5.1.2.6); CX-1086.10; RX-2015.13; RDX-6020.

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[53] Dr. Robert Akl was received as an expert in the field of telecommunications, including cellular communications technologies. *See* Akl Tr. 812.

Mr. Lanning acknowledged that the asserted '271 patent claims do not cover every possible implementation of the standard but only implementations that use option (b) under TS 25.214 § 5.1.2.6. *See* RX-3214C (Akl RWS) at Q/A 35; Lanning Tr. 954-955, 995. It appears that Mr. Lanning assumed, without supporting evidence or analysis, that all of the accused and domestic industry modules implement the specific options that he relies on for his infringement analysis. *See* RX-3214C (Akl RWS) at Q/A 35, 41, 44, 47, 50. Further, some of the accused modules are designed to adopt different releases of the 3GPP specification and may implement different functionalities as provided in the various releases. *See* RX-3214C (Akl RWS) at Q/A 36; RX-2592; RX-2593; RX-2594; RX-2595; RX-2596; RX-2597; RX-2598; RX-2599.

Mr. Lanning also acknowledged that all or some of the accused power control functionality may be performed by the baseband processors in the accused and domestic products. Lanning Tr. 946. He did not, however, address any baseband processor, or the power management functionality, in his analysis. *See* RX-3214C (Akl RWS) at Q/A 34; Lanning Tr. 947-948. The accused and domestic modules use different baseband processors provided by third parties. *See* RX-3214C (Akl RWS) at Q/A 34, 37, 41, 44, 47, 50. Mr. Lanning did not analyze any documentation or source code for any of the baseband processors or any other component, which is necessary to determine whether all the accused and domestic modules actually operate "in materially identical manner" and satisfy every limitation of the asserted claims of the '271 patent. *See* Lanning Tr. 948-949, 950; CX-0012C (Lanning WS) at Q/A 94; RX-3214C (Akl RWS) at Q/A 34, 38, 41, 44, 47, 50.

ii. Carrier Evidence

Philips's failures of proof extend beyond lack of analysis of source code and engineering documents for module baseband processors, and network carrier and carrier equipment information, including source code, technical documents, and settings that are required to demonstrate the claims at issue are satisfied. The claims at issue involve interactions between a base station and user equipment, as well as specification configurations provided by the base station to the user equipment. *See* Lanning Tr. 951-952, 952-953, 993. Indeed, Mr. Lanning admitted he did not review any real network, carrier, or carrier equipment discovery (Lanning Tr. 953-954, 957-960), despite recognizing that the carrier's base station sets the maximum power level, the second specified power level, and the third specified power level. *See, e.g.*, CX-0012C (Lanning WS) at Q/A 136, 142, 193. Mr. Lanning also testified that "the transmit power of the DPCCH and/or DPDCH is reduced in response to receiving signals such as data signals from the base station." *See* CX-0012C (Lanning WS) at Q/A 218.

iii. Philips's Testing

The Bureau Veritas test reports show that the tested modules do not practice option (b) of TS 25.214 § 5.1.2.6 or the asserted claims of the '271 patent. *See* RX-3214C (Akl RWS) at Q/A 60, 113, 145-52. The asserted claims of the '271 patent require the "reduction in transmit power of the one or more first signals (DPCCH, DPDCH)" to be the greater of ACK and NACK irrespective of whether an ACK or NACK was transmitted. *See* JX-0004 ('271 Patent) at 4:3-7, 5:51-56, 6:36-40. Option (b) of TS 25.214 § 5.1.2.6, which Philips accuses to satisfy the claims, states that the maximum HS-DPCCH power used for computing the scaling of the total UE transmit power shall be computed using whichever of the ACK and NACK is the largest. *See* CX-1087. 21-22 (3GPP TS 25.214 § 5.1.2.6); CX-1461. 21-22 (3GPP TS 25.214 § 5.1.2.6). In other words, the accused portion of the UMTS standard and the asserted claims require that the amount of change in power reduction in the first signals (DPCCH and DPDCH) to be the same (the greater of the required ACK or NACK power) regardless of whether an ACK signal or NACK signal is being transmitted.

According to Mr. Lanning, the testing shows that the reduction varies with whether an ACK or NACK is transmitted. Mr. Lanning confirmed at the hearing that the testing performed by Bureau Veritas shows that the amount of reduction in the DPCCH and DPDCH is greater (*i.e.*, different) when an ACK signal is transmitted compared to when a NACK signal is transmitted, which is the opposite of what is required by both option (b) of TS 25.214 § 5.1.2.6 as well as every claim of the '271 patent. *See* Lanning Tr. 967-968; CDX-2C.31-32; CX-1080.18-19 (Bureau Veritas Report). Thus, according to Philips's expert, Mr. Lanning, the Bureau Veritas testing purportedly representative of all accused and domestic industry products, shows that none of these products practice any asserted claim of the '271 patent. *See* Lanning Tr. 955.

<u>Reduction of the Transmit Power of the One or More First Signals (DPCCH, DPDCH) (limitations [1.2], [1.4], [5.3], and [5.4])</u>

Philips does not show any reduction of the transmit power of the one or more first signals (DPCCH, DPDCH) as required by limitations [1.2], [1.4], [5.3], and [5.4] of the asserted claims. *See* RX-3214C (Akl RWS) at Q/A 61, 120-52. Mr. Lanning opines that figures 2a-2c of the test reports for the accused modules and figure 3a-3c of the test report for the domestic industry module demonstrate these modules reduce the transmit power of the DPCCH and/or DPDCH when an ACK is transmitted. However, Mr. Lanning makes the fundamental error of misinterpreting the dip in relative power values to mean a reduction in the absolute power level without performing any mathematical investigation, leading to his internally inconsistent analysis. *See* RX-3214C (Akl RWS) at Q/A 121, 128-30. When correctly interpreted, these figures show no reduction in the transmitted power for the DPCCH and DPDCH signals when an ACK is transmitted. *See* RX-3214C (Akl RWS) at Q/A 120-27, 131-39, 145-52.

Further, the asserted claims of the '271 patent require that the addition of an ACK or a NACK signal would cause the total transmit power to exceed the maximum allowed value Pmax because the "one or more first signals (DPCCH, DPDCH)" were being transmitted at the Pmax. *See* RX-3214C (Akl RWS) at Q/A 26; JX-0004 ('271 Patent) at 3:50-52, 5:39-41, 6:15-17. Applying the ACK and NACK power levels selected by Mr. Lanning (ΔACK = 8 and ΔNACK = 5) to the figures in the cited test reports also confirms that the transmissions Mr. Lanning describes as ACK and NACK messages do not cause the total combined transmit power to exceed the maximum allowed value of Pmax as required by the asserted claims of the '271 patent. *See* RX-3214C (Akl RWS) at Q/A 140-52; RX-2015.13; CX-1087.21-22 (3GPP TS 25.214 § 5.1.2.6); CX-1461.21 (3GPP TS 25.214 § 5.1.2.6).

Practice of the Optional Portions of 3GPP TS 25.214 § 5.1.2.6

Philips does not show the accused and domestic industry products practice the optional portions of 3GPP TS 25.214 § 5.1.2.6 relied on by Philips for its infringement argument. *See* RX-3214C (Akl RWS) at Q/A 54, 56-58, 61, 88-119. 3GPP TS 25.214 § 5.1.2.6 is optional, not mandatory, and the specification provides at least two device-specific implementations (option (a) and option (b)) for computing the "maximum HS-DPCCH power." *See* RX-3214C (Akl RWS) at Q/A 96-99; CX-1087.21-22 (3GPP TS 25.214 § 5.1.2.6); CX-1461.21-22 (3GPP TS 25.214 § 5.1.2.6); Lanning Tr. 944, 954, 995; JX-0024C (Moulsley Dep. Tr.) at 31-33, 64; Akl Tr. 828-829. Philips concedes that the '271 patent claims do not cover all possible implementations under TS 25.214 § 5.1.2.6, only option (b). *See* RX-3214C (Akl RWS) at Q/A 100; Lanning Tr. 944, 954, 995; RDX-6037; JX-0017C (Bossard Dep. Tr.) at 129-130; RDX-6036. As each accused or domestic industry product is free to implement the non-infringing option (a), Philips must prove that each accused or domestic industry product practices option (b), which Philips did not do. *See* RX-3214C (Akl RWS) at Q/A 100, 101.

When sections of a standard relied upon by a patentee for infringement are expressly optional, standard compliance alone is not enough to prove infringement and the patentee must compare each product to every limitation of the asserted patent claims. *Fujitsu*, 620 F.3d at 1327-28; *Godo*, 620 F.3d at 1384; JX-0017C (Bossard Dep. Tr.) at 129-130; RDX-6036. Mr. Lanning has not looked at any source code or design documentation of any of the accused and domestic industry products and relies solely on citations to test reports to conclude that the ten modules he arbitrarily selected as "representative" practice option (b) of 3GPP TS 25.214 § 5.1.2.6. *See* RX-3214C (Akl RWS) at Q/A 114; Lanning Tr. 948, 950, 954-955. As noted above, Mr. Lanning misinterpreted the data shown in the test reports, but even under his erroneous interpretation, the test reports show that none of the accused or domestic industry products practice option (b) of TS 25.214 § 5.1.2.6. *See* RX-3214C (Akl RWS) at Q/A 96, 102-19.

For example, Mr. Lanning opines that figures 4a-4f of the test reports for the accused modules and figures 5a-5f of the test report for the domestic industry module demonstrate that each tested module practices option (b) of TS 25.214 § 5.1.2.6 by showing a reduction of the transmit power of the DPCCH and DPDCH when a NACK signal is transmitted. Some of these figures, *i.e.*, 4a and 5a, show the absolute power level for all combined signals expressed in dBm whereas other figures, i.e., 4b-c and 5b-c, show a signal's relative power level (or percentage weight), expressed in dB, compared to the total transmit power of all combined signals. *See* RX-3214C (Akl RWS) at Q/A 88-95.

In offering his opinion, Mr. Lanning misinterpreted a dip in relative value (i.e., a percentage weight) to equate to a reduction in absolute power level. *See* RX-3214C (Akl RWS) at Q/A 59, 110-12. In reality, these figures actually show no reduction in DPCCH and DPDCH power level at any time slot and that there was no need for any reduction since the total transmit power of the combined signals for the DPCCH, DPDCH, and NACK were well below the maximum allowed value for Pmax throughout the entire time. *See* RX-3214C (Akl RWS) at Q/A 96, 103-09, 112, 115-18; RDX-6038 through 6044, 6047, 6048; RX-2019; Akl Tr. 831. Figures 2a-2c of the cited test reports for the accused modules and figures 3a-3c of the cited test report for domestic industry module likewise show there was no reduction in the DPCCH or DPDCH at any time slot. *See* RX-3214C (Akl RWS) at Q/A 145-52; RX-2019.

Transmitting the First Signals (DPCCH, DPDCH) at Pmax and Reducing the Transmit Power of the First Signals in Response to a Received Signal

Philips has not shown transmitting the first signals (DPCCH, DPDCH) at Pmax and reducing the transmit power of the first signals in response to a received signal, as required by all asserted claims. *See* RX-3214C (Akl RWS) at Q/A 160-66. The tests provided by Mr. Lanning were performed according to TS 34.121 § 5.7A and were designed to look at the over- or undershoot of the transmitter power output when changing transmit power levels, and they are not designed to assess the functionality of the asserted claims or the optional power reduction function of TS 25.214 § 5.1.2.6. *See* RX-3214C (Akl RWS) at Q/A 160; CX-1092. 258; CX-1087. 21-22 (3GPP TS 25.214 § 5.1.2.6); CX-1461. 21-22 (3GPP TS 25.214 § 5.1.2.6). None of the tests cited by Mr. Lanning matches the asserted claims' requirements that DPCCH and DPDCH are transmitted at Pmax, and then decreased to accommodate the ACK/NACK signal. *See* RX-3214C (Akl RWS) at Q/A 160; JX-0004 ('271 Patent) at 5:39-44, 6:15-17, 26-28, Fig. 4. Instead, Mr. Lanning relies on two sets of unrelated tests to create an impression that there is a reduction in transmit power of the DPCCH and DPDCH signals. *See* RX-3214C (Akl RWS) at Q/A 160, 166; Lanning Tr. 999, 1001-1002; Akl Tr. 833-835.

Mr. Lanning relies on figures 1a-1c of the test reports for the accused modules and figures 2a-2c of the test report for the domestic industry module as the first set of tests showing transmission of DPCCH and DPDCH signals at Pmax, but these figures do not show any reduction in transmission power of the DPCCH and/or DPDCH at any given time slot. *See* RX-3214C (Akl RWS) at Q/A 161; RDX-6031; RDX-6032; RX-2019. Mr. Lanning then relies on figures 2a-2c, 4a-4f of the test reports for the accused modules and figures 3a-3c, 5a-5f of the test report for the domestic industry module as a second set of tests showing that the transmit power of DPCCH and DPDCH signals was reduced. *See* RX-3214C (Akl RWS) at Q/A 161. However, these figures likewise do not show (1) any reduction in transmission power of the DPCCH and/or DPDCH at any given time lot and (2) the combined transmission power of DPDCH and DPCCH at or near the Pmax value at any time slot. *Id.* Therefore, these graphs do not match the requirement in the claims for transmitting the first signals (DPCCH, DPDCH) at Pmax. *See* RX-3214C (Akl RWS) at Q/A 161; RDX-6053; RDX-6044; RX-2019.

Mr. Lanning admitted that the first set of tests allegedly showing transmission of DPCCH and DPDCH signals at Pmax (figures 1a-1c of the test reports for the accused modules and figure 2a-2c of the test report for the domestic industry module) are unrelated to the second set of tests allegedly showing the transmit power of DPCCH and DPDCH signals was reduced (figures 2a-2c, 4a-4f of the test reports for the accused modules and figure 3a-3c, 5a-5f of the test report for the domestic industry module). *See* RX-3214C (Akl RWS) at Q/A 162-63; Lanning Tr. 999, 1001-1002.

First, there was no downlink information transmitted in the first set of tests since Mr. Lanning "used the test mode where the mobile station was not receiving any data … [and] the test mode excludes receiving any data from the base station," which renders them inapplicable to the asserted claims that require receiving a signal. *See* RX-3214C (Akl RWS) at Q/A 162; CX-0012C (Lanning WS) at Q/A 253; Lanning Tr. 1001.

Second, Mr. Lanning deliberately sets the base station emulator to a different test mode for the first set of tests than for the second set of tests, so the two sets of tests are completely unrelated. *See* Lanning Tr. 1001; RX-3214C (Akl RWS) at Q/A 162; CX-

1068. 7, -.10; CX-1069.6, -.9; CX-1073.6, -.9; CX-1074.6, -.9; CX-1075.6, .-.9; CX-1077.6, -.9; CX-1078.6, -.9; CX-1079.6, .-9; CX-1080.6, -.9; CX2343.6, -.9; RDX-6057.

Third, the time slots shown in all of these figures begin at time slot zero, confirming that different sets of figures are not continuations of the same test. *See* RX-3214C (Akl RWS) at Q/A 166. Fourth, even if the tested module performed the power scaling under the TS 25.214 § 5.1.2.6 as Mr. Lanning assumes, the specification requires the ratio of DPCCH to DPDCH to be maintained, but the DPCCH/DPDCH ratio in the first set of tests is approximately 1:3 whereas the DPCCH/DPDCH ratio in the second set of tests is 1:1. *See* RX-3214C (Akl RWS) at Q/A 163; CX-1087. 21-22 (3GPP TS 25.214 § 5.1.2.6); CX-1461. 21-22 (3GPP TS 25.214 § 5.1.2.6); RDX-6032; RDX-6050; RDX-6051.

iv. "control means"

Under the construction proposed by Philips, Mr. Lanning did not identify the "control means" in any accused or domestic industry modules. *See* RX-3214C (Akl RWS) at Q/A 153-56; *MobileMedia Ideas LLC v. Apple Inc.*, 780 F.3d 1159, 1170 (Fed. Cir. 2015) ("Literal infringement of a [means-plus-function] limitation requires 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."); RX-3214C (Akl RWS) at Q/A 154, 155. Instead, Mr. Lanning lists various generic components like "microprocessor," and points to "functional diagrams," which are insufficient to identify the claimed "control means." *See* RX-3214C (Akl RWS) at Q/A 154; CX-0012C (Lanning WS) at Q/A 276. Mr. Lanning did not identify any design specifications, source code, or other engineering documentation or provide any analysis to show that any of these components perform the function under any of the proposed constructions. Along with generic components, Mr. Lanning points to certain high level, or functional, block diagrams, which are likewise inadequate to disclose the claimed "control means" because they do not reflect the specific parts and components that actually make up a device or the functionality and logic performed by such parts and components. *See* RX-3214C (Akl RWS) at Q/A 156.

v. "in response to a received signal, reducing the transmit power of the one or more first signals (DPCCH, DPDCH) in response to a/the received signal"

Philips did not address the claim limitation that the power reduction of the first signals (DPCCH, DPDCH) is performed "in response to a received signal" in any of the accused products or domestic industry products. *See* Compls. Br. at 200-04; RX-3214C (Akl RWS) at Q/A 157-59; JX-0004 ('271 Patent) at 5:42-43; 6:26-28. Mr. Lanning cannot rely on the compliance with UMTS standard to meet this limitation because, as discussed above, the standard does not describe reducing transmit power in response to a received signal, as required by the claims. *See* RX-3214C (Akl RWS) at Q/A 157; CX-1087.21-22 (3GPP TS 25.214 § 5.1.2.6); CX-1461.21-22 (3GPP TS 25.214 § 5.1.2.6).

The requirement of the asserted claims directly pertains to the logic applied by the accused and domestic industry products, and making that connection requires the examination of source code or other evidence describing the logic applied within the accused or domestic industry products. *See* RX-3214C (Akl RWS) at Q/A 157; Akl Tr. 830-831, 837-838. Philips does not identify or offer any analysis of any source code, design specifications, or other engineering documents regarding the logic of components such as the baseband processor within the accused and domestic industry modules, and thus has not shown whether any of the accused and domestic industry products performs power reduction "in response to a received signal." *See* Compls. Br. at 200-04; RX-3214C (Akl RWS) at Q/A 79, 157.

None of the test reports cited by Mr. Lanning show that any tested device performed a power reduction triggered by the receipt of a signal. *See* RX-3214C (Akl RWS) at Q/A 158-59. While Mr. Lanning claims the tested module was receiving a signal from the base station emulator throughout the duration of the test, he does not provide any information as to whether the tested module performs logic to take an action in response to a received signal. *See* RX-3214C (Akl RWS) at Q/A 158. Further, as confirmed by Mr. Lanning, the test reports contain no information on whether any tested module performed a cyclic redundancy check (CRC), an indication of whether an ACK or NACK signal was transmitted in response to a received HSDPA packet under UMTS standard, or any information regarding what is contained in the transmissions to or from the tested modules. *See* RX-3214C (Akl RWS) at Q/A 159; Lanning Tr. 965; JX-0004 ('271 Patent) at 3:36-40; RDX-6056. Therefore, none of the test reports provide any information on whether any tested module performed "transmitting simultaneously… one of a second signal (ACK or NACK) at a respective second specified power level (PA or PN) and a third signal (NACK or ACK) at a respective third specified power level (P_N or P_A)," in response to a received signal. *See* RX-3214C (Akl RWS) at Q/A 159.

2. Indirect Infringement

Philips did not prove that any respondent in this investigation indirectly infringes the asserted claims of the '271 patent. *See* RX-3214C (Akl RWS) at Q/A 9-16, 167-76.

There can be no indirect infringement without direct infringement. *Limelight Networks, Inc. v. Akamai Tech., Inc.*, 572 U.S. 915, 920-21 (2014). Thus, Philips cannot show any indirect infringement inasmuch as it has not shown that any of the accused Quectel, Thales, and Telit modules practice the asserted claims. *ACCO Brands, Inc. v. ABA Locks Mfr. Co.*, 501 F.3d 1307, 1313 (Fed. Cir. 2007) ("In order to prove [the underlying] direct infringement, a patentee must either point to specific instances of direct infringement or show that the accused device necessarily infringes the patent in suit"); RX-3214C (Akl RWS) at Q/A 168.

Philips also did not present any evidence of alleged direct infringement where any of the accused modules were placed into an infringing configuration after importation into the United States by any purchaser. For example, none of the accused products includes an "antenna" at the time of manufacture or sale and cannot meet (1) "transceiver means for transmitting one or more signals" in claim 5 and its dependent claims, including the requirement of an antenna; and (2) "transmitting" in claims 1 and 5 and their dependent claims, including the requirements of sending over a network via an antenna. In particular, certain CalAmp products sold without an antenna do not infringe upon the asserted claims of the '271 patent because they lack structures or functionality that must be present to satisfy these limitations. *See* RX-3219C (Burrington WS) at Q/A 7-14; RX-3199C (list of CalAmp products lacking an internal antenna).

Both induced infringement and contributory infringement require proof that respondents knew the accused modules are "especially made or especially adapted for use in an infringement." *Cleveland Clinic Found. v. True Health Diagnostics LLC*, 859 F.3d 1352, 1363-64 (Fed. Cir. 2017); *Commil USA, LLC v. Cisco Sys., Inc.*, 575 U.S. 632, 639-40 (2015). Mr. Lanning assumed that respondents "intend for their product to be used for data communications in a manner that infringes the asserted claims of the '271 patent," without identifying any information to support that assumption or consideration of the alleged direct infringement. Relying on certain marketing materials and data sheets indicating the accused products implement one or more 3GPP and/or Wi-Fi standards, Mr. Lanning opined that respondents are instructing purchasers to use the accused products to practice the asserted claims. As discussed above, standard compliance under these circumstances is insufficient to show infringement, and neither Philips nor Mr. Lanning provided any information showing that respondents instruct their customers to configure their products in a certain manner to satisfy the steps of the asserted claims. *See* RX-3214C (Akl RWS) at Q/A 169; *see also* Compls. Br. at 190-218.

Furthermore, the accused modules have substantial uses other than the alleged infringing use, which defeats a claim for contributory infringement and negates any alleged intent to induce infringement. *Vita-Mix Corp. v. Basic Holding, Inc.*, 581 F.3d 1317, 1328-29 (Fed. Cir. 2009); RX-3214C (Akl RWS) at Q/A 170-76. First, as discussed above, the base station controls whether or not the second and third specified power levels are equal to, as opposed to exceeding, one another, thus the accused modules may be operated in a fashion where the specified power levels for the second and third signals are equal at a communications network's discretion. *See* RX-3214C (Akl RWS) at Q/A 170. Second, each of the accused Quectel, Thales, and Telit modules which Mr. Lanning addressed in his infringement opinions also support wireless communication on protocols other than the 3G UMTS, such as GSM, LTE, EDGE, GPRS. *See* RX-3214C (Akl RWS) at Q/A 172-175; RX-1098.2, -.3 (EHS6T datasheet); RX-1086.1-3 (ELS61 datasheet); RX-3165.1-3 (mPLAS9-W datasheet); RX-3302C.8 ([redacted] datasheet); RX-3303C.7 ([redacted] Datasheet); RX-1060.13 ([redacted] datasheet); RX-1078.1-14 ([redacted] Datasheet); RX-1058.9 (UE910 datasheet); RX-1055.1, -.4-5 (LE910 datasheet); Lanning Tr. 944-945.

Likewise, Mr. Lanning admits that his opinions only apply to UMTS 3G and that other 3GPP specifications, such as LTE, are not included in his analysis. *See* Lanning Tr. 944-945. The 3G UMTS standard, first released in 1999, is so outdated today that only AT&T and T-Mobile still maintain UMTS networks, and both carriers currently plan to retire their UMTS networks before July 2022. *See* Lanning Tr. 945-946, 963; CX-0012C (Lanning WS) at Q/A 29.

Third, the accused modules may also be used by stationary devices such as power meters for a smart energy grid, as opposed to the claimed "communication station (MS)," or mobile station claimed in the '271 patent. *See* RX-3214C (Akl RWS) at Q/A 176; JX-0004 ('271 Patent) at 2:35.

C. Patentability Under 35 U.S.C. § 101

Respondents argue:

> The asserted claims of the '271 patent are directed toward the abstract idea of accommodating multiple possibilities by budgeting enough margin to cover two known scenarios. Because they recite only well-known and conventional elements that fail to transform the abstract idea into patent-eligible subject matter, claims 1-8 of the '271 patent are invalid for failure to meet the requirements of 35 U.S.C. § 101. Philips's expert testified that prior to the time of the purported invention, a POSA would have known how to allocate the greater of the ACK or the NACK power levels to offset DPCCH and DPDCH using conventional, well-known technology. Hr'g Tr. (Lanning) at 973:6-974:15.

Resps. Br. at 207.

Complainants and the Staff disagree. *See* Compls. Br. at 219-22; Staff Br. at 167-69.

1. Patentability

a. Whether the Claims Are Abstract

The inventions of the '271 patent arose out of efforts to improve communication systems, such as UMTS, where there was a problem in that it is sometimes necessary to transmit more than one signal simultaneously, while also a need to limit the power level for the combined transmissions, making sure it does not exceed a certain level. This also must be done within the constraints of predetermined time intervals without injecting delay in transmissions of DPDCH and DPCCH signals or compromising their signal integrity. There is a further problem in this situation because the exact nature of the additional signal(s) may not be known until a point in time that is after when the reduction in combined transmit power must occur. Waiting until the additional signal is known may not be possible, for example because there will be insufficient time for the terminal to evaluate a critical feature, such as CRC (cyclic redundancy check) in a received signal. *See* JX-0004 ('271 Patent) at 1:5-39; CX-2399 (Moulsley WS) at Q/A 13-14.

The '271 patent solved these problems in communications systems, including in UMTS, with a solution of reducing the transmit power of the first signals (DPCCH and DPDCH) in a time slot before the start of the additional signal that is either ACK or NACK, with the second signal having specified power level that exceed the specified power level of the third signal. *See* JX-0004 ('271 Patent) at 3:50-4:44 and claims 1 and

5; CX-2399 (Moulsley WS) at Q/A 12-13. This is done without knowing whether the additional signal will be ACK or NACK and thus choosing the reduction in power of the first signals to correspond to the second specified power level regardless of whether the additional signal that actually gets transmitted is the second signal or the third signal. *See id.*

The '271 patent is thus a technological improvement to pre-existing communication systems, such as UMTS, and thus the invention is not directed to an abstract idea. *Cf., e.g., Enfish*, 822 F.3d at 1336 (finding that "a specific improvement to the way computers operate" is not an abstract idea).

The technological nature of what is actually claimed in the '271 patent is demonstrated by the elements of claim 1, for example, which describe in detail how the invention works. The dependent claims provide further limitations. For example, dependent claims 2 and 6 provide further limitations on time slots, providing that the one or more first signals (DPCCH, DPDCH) are transmitted in first frames or time slots, with the boundaries between the first frames or time slots not being coincident with the boundaries between the second frames or time slots, and with the reduction in transmit power of the one or more first signals commencing at the first frame or time slot boundary immediately preceding the transmission of the additional signal. *See* JX-0004 ('271 Patent) at claims 2 and 6. The claims are very specific and include a technical improvement.

The claims of the '271 patent are not directed to an abstract idea. Rather, they are a specific implementation of a communication system, providing specific advancements in the technology of communication systems by allowing for multiple signals to be transmitted simultaneously while not exceeding a predetermined power level, and doing so in a manner that reduces power before the nature of the additional signal(s) are known.

b. Whether the Asserted Claims Add an Inventive Concept

A claim is not patent-ineligible under the second step of *Alice* "when the claim limitations involve more than performance of well-understood, routine, [and] conventional activities previously known to the industry." *Aatrix*, 882 F.3d at 1128 (internal quotation omitted). As explained above, the claims describe a technological improvement to communication systems that was never been used in the industry before. The particular ideas from the invention (which included a specific implementation of a communication system, providing specific advancements in the technology of communication systems by allowing for multiple signals to be transmitted simultaneously while not exceeding a predetermined power level, and doing so in a manner that reduces power before the nature of the additional signal(s) are known) were not well understood, routine or conventional at the time of the invention. *See id.* Indeed, the patent explains that UMTS was not using such a process at the time of the invention, and that the invention would be an improvement to spread spectrum systems like UMTS. *See* JX-0004 ('271 Patent) at 1:7-10; *see also* CX-2399 (Moulsley WS) at Q/A 11-14. If conventional, one wonders why it was not part of UMTS already at the time of the invention. Rather, when the invention was conceived, it was adopted into the standard for UMTS, it being the best solution proposed at the time. *See id.*

The processes described in the '271 patent, when considered as a combination of elements (*i.e.*, including a communication station / mobile station, transmitting one or more first signals at a maximum combined transmit power level, reducing the transmit power of one or more first signals, transmitting one of a second signal at a second power level and third signal at a third specified power level, wherein the second power level exceeds the third power level, wherein the reduction in transmit power of the one or more first signals corresponds to that second power level irrespective of whether that additional signal is the second or third signal, which means that the combined transmit power is less than the maximum combined transmit power level) were also not well understood, routine or conventional, including that they allowed reduction of the power level to occur at a time instant when the exact nature of the additional signal was not yet known, ensuring that the maximum power level is not exceeded without having that additional information. This combination of elements was certainly not well understood, routine or conventional in the context of a communication system, and thus that combination of elements transformed whatever might be deemed abstract about it into a patent-eligible application. *Id.*

Accordingly, it has not been shown by clear and convincing evidence that the asserted claims of the ‘271 patent are patent ineligible under 35 U.S.C. § 101.

D. Validity of the ‘271 Patent

Respondents argue that (1) “all of the asserted claims of the ‘271 patent are indefinite because the recited limitation ‘transmitting one or more first signals (DPCCH, DPDCH) simultaneously’ fails to inform, with reasonable certainty, a POSA about the scope of the invention”; (2) “the asserted claims 5-8 are also indefinite as the specification fails to disclose adequate structure for the means plus function term ‘control means’”; (3) “all of the asserted claims fail to meet the written description requirement” with respect to claim limitations "one or more first signals (DPCCH, DPDCH)" and "an additional one of a second signal (ACK or NACK) ... and a third signal (NACK or ACK)'"; (4) "[t]he asserted claims of the '271 patent are not entitled to a priority date earlier than May 14, 2004 because foreign priority application GB 0318735 ('735 application; JX-0008.42-48) does not comply with the requirements of 35 U.S.C. § 112 with respect to the limitations 'second specified power level' and 'third specified power level' for all asserted claims, and 'transceiver means' and 'control means' for asserted claims 5-8"; and (5) "the asserted claims 1-8 of the '271 patent are rendered obvious by: (1) 3GPP UMTS I, (2) 3GPP UMTS II, and (3) U.S. Patent No. 7,054,633 ('Seo')." Resps. Br. at 209-10, 210, 212, 214; *see id.* at 214-53.

1. Indefiniteness

Respondents argue:

> For the reasons discussed above in the claim construction section, all of the asserted claims of the '271 patent are indefinite because the recited limitation "transmitting one or more first signals (DPCCH, DPDCH) simultaneously" fails to inform, with reasonable certainty, a POSA about the scope of the invention. RX-3212 (Bims WS) at Q/A 371-373; *Nautilus*, 572 U.S. at 901; Staff P.H. Br. at 57-58. Further, the asserted claims 5-8 are also indefinite as the specification fails to disclose adequate structure for the means plus function term "control means." RX-3212 (Bims WS) at Q/A 457-462; *Synchronoss*, 987 F.3d at 1367-68; *Diebold Nixdorf*, 899 F.3d at 1303.

Resps. Br. at 209-10.

Complainants disagree. *See* Compls. Br. at 222-24. The Staff argues that "control means" is not indefinite but that the limitation "transmitting one or more first signals (DPCCH, DPDCH) simultaneously" is indefinite. *See* Staff Br. at 53-56, 170.

a. "control means…"

Respondents argue and Dr. Bims opines that the term "control means" in claim 5 is indefinite. *See* Resps. Br. at 210; RX-3212C (Bims WS) at Q/A 459-62. However, Dr. Bims opines that such controllers were known in the art and that the '271 patent claims include only well-known components. *See* RX-3212C (Bims WS) at Q/A 455-57; Q/A 10. Mr. Lanning also opines that controllers for controlling power were well known. *See* CX-0012C (Lanning WS) at Q/A 276.

At the time of the '735 application (the priority application), a POSA would have understood the "control means (30)" of claim 5 to refer to a controller in the mobile station for controlling the power amplification used by the mobile station. *See* CX-2422 (Lanning RWS) at Q/A 23. At that time, mobile stations used in UMTS had controllers for controlling the power amplification levels of signals sent by the mobile station. *Id.* Therefore, at the time of the '735 application, controllers in mobile stations and base stations for controlling power were well known to persons of skill in the art. *Id.* A POSA would have known how to program such a controller to achieve the desired functionality, such as the functionality disclosed in the '735 application and the '271 patent. *Id.* A POSA also would have known how to program the controller to perform all of the functions listed by Dr. Bims. *Id.*

The document 3GPP TS 25.214 v5.5.0 (2003-06) (CX-1481) existed prior to the earliest priority date for the '271 patent and included a provision for power control in § 5.1.2.6. *See* CX-1481 (Phys Layer Procedures (FDD), 3GPP TSG RAN 25.214) at 21-22. Section 5.1.2.6 states: "If the UE applies any additional scaling to the total transmit power as described above, this scaling shall be included in the computation of any

DPCCH power adjustments to be applied in the next transmitted slot." *Id.* Accordingly, Section 5.1.2.6 indicates that a POSA at the time of the earliest priority date knew how to program the power controller to scale the power of DPCCH. *See* CX-2422 (Lanning RWS) at Q/A 232.

In addition, as Dr. Bims opines, the LGE Tdoc document (CX-1479) proposes different power levels for ACK and NACK, and sets forth exemplary values for the different power levels. *See* RX-3212C (Bims WS) at Q/A 393, 396. Therefore, once Philips conceived the invention to use the greater of the ACK or NACK power levels to offset DPCCH or DPDCH, a POSA already had the requisite knowledge to program the power controller to implement the invention, including various functions Dr. Bims identified. *See id.* at Q/A 459.

Accordingly, respondents have not shown by clear and convincing evidence that the claim term "control means…" in claim 5-8 is indefinite.

b. "transmitting one or more first signals (DPCCH, DPDCH) simultaneously"

As discussed above in the Claim Construction section (Section VI.A.6), the evidence demonstrates that the claim term "transmitting one or more first signals (DPCCH, DPDCH) simultaneously" is indefinite, and, thus, respondents have shown claims 1-8 of the '271 patent are invalid by clear and convincing evidence.

It was determined that a POSA would not be able to ascertain the scope of the invention with reasonable certainty due to the ambiguity of this claim limitation, rendering the term indefinite. It is unclear whether the claim encompasses the scenario of transmitting only "one … first signal," as the claim also requires that the transmission be performed "simultaneously," which can only be possible if there is more than one first signal being transmitted at the same time. *See* RX-3212 (Bims WS) at Q/A 372. Complainants' proposed construction of "transmitting DPCCH or DPCCH and DPDCH at the same time" is incorrect because the claim requires that the first signals are transmitted "simultaneously," which is only possible if there is more than one first signal.

2. Written Description

Respondents argue that "all of the asserted claims fail to meet the written description requirement" with respect to claim limitation "transmitting one or more first signals (DPCCH, DPDCH) simultaneously," and that claims 1 and 5 fail to meet the written description requirement with respect to claim limitation "an additional one of a second signal (ACK or NACK) ... and a third signal (NACK or ACK)." *See* Resps. Br. at 210-12.

Complainants disagree. *See* Compls. Br. at 224-25. The Staff agrees with respondents with respect to the limitation "transmitting one or more first signals (DPCCH, DPDCH) simultaneously," but disagrees with respect to the limitation "an additional one of a second signal (ACK or NACK) ... and a third signal (NACK or ACK)." *See* Staff Br. at 170-71.

a. "transmitting one or more first signals (DPCCH, DPDCH) simultaneously" (claims 1-8)

Respondents argue and Dr. Bims opines that the term "one or more first signals (DPCCH, DPDCH)" lacks written description support. *See* Resps. Br. at 210; RX-3212C (Bims WS) at Q/A 373.

Claims 1 and 5 of the '271 patent each require "transmitting" and "reducing the transmit power of" "one or more first signals (DPCCH, DPDCH)." *See* RX-3212 (Bims WS) at Q/A 373. In view of the language "one or more" and the parenthetical (DPCCH, DPDCH), a POSA would have understood this claim limitation to encompass one signal, which may be a DPCCH or DPDCH, or both signals. *See* RX-3212 (Bims WS) at Q/A 373. Although the specification describes transmitting only a DPCCH (JX-0004 at 3:25-26), there is no mention of transmitting or reducing the power of only a DPDCH without a DPCCH. *See* RX-3212 (Bims WS) at Q/A 373. Mr. Lanning likewise does not identify any disclosure of DPDCH being transmitted alone. *See* CX-2422 (Lanning RWS) at Q/A 27. A POSA would have recognized that there is no disclosure in the specification for the full scope of the limitation "one or more first signals (DPCCH, DPDCH)." *See* RX-3212 (Bims WS) at Q/A 373.

Philips does not dispute this lack of disclosure in the patent specification but only argues that "a POSA would have understood this claim language to mean one or more signals would be transmitted by the UE and the specific signals specified by the parenthetical are the DPCCH and/or the DPDCH." *See* Compls. Br. at 224; CX-2422 (Lanning RWS) at Q/A 27. Philips's reliance on a POSA's knowledge is not persuasive as written description analysis "compares the claims with the invention disclosed in the specification, and if the claimed invention does not appear in the specification … the claim … fails regardless whether one of skill in the art could make or use the claimed invention." *Ariad Pharms. Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1348 (Fed. Cir. 2010). Inasmuch as all of the remaining asserted claims depend from claim 1 or claim 5, all of the asserted claims fail to meet the written description requirement with respect to this claim limitation. *See* RX-3212 (Bims WS) at Q/A 373.

Accordingly, the evidence demonstrates that "transmitting one or more first signals (DPCCH, DPDCH) simultaneously" lacks adequate written description, and, thus, respondents have shown that claims 1-8 of the '271 patent are invalid by clear and convincing evidence.

b. "an additional one of a second signal (ACK or NACK) . . . and a third signal (NACK or ACK)" (claims 1 and 5)

Respondents argue and Dr. Bims opines that the term "an additional one of a second signal (ACK or NACK) . . . and a third signal (NACK or ACK)" lacks written description support. *See* Resps. Br. at 211; RX-3212C (Bims WS) at Q/A 394.

Dr. Bims is incorrect because a POSA would have understood that a communication station (MS) had two response choices to send back to the NodeB regarding a packet that it just received. Indeed, Mr. Lanning testified:

> Dr. Bims is incorrect because a POSITA would have understood that a communication station (MS) had two response choices to send back to the NodeB regarding a packet that it just received. These two choices, as appropriately required by these claims, are either an ACK, which is a positive acknowledgement or a NACK, which is a negative acknowledgement. These claims are written to cover both of these response combinations. If the UE initially receives the packet correctly from the NodeB, it will send an ACK as the "second signal" and a NACK will be the "third signal" in the claims. Conversely, if the UE initially receives a packet incorrectly from the NodeB, it will send a NACK as the "second signal" and an ACK will be the "third signal."

CX-2422 (Lanning RWS) at Q/A 28; *see* JX-0004 ('271 Patent) at 3:58-4:67; Figures 4 and 5.

Thus, these two choices, as required by these claims, are either an ACK, which is a positive acknowledgement, or a NACK, which is a negative acknowledgement. *Id.* These claims are written to cover both of these response combinations. *Id.* If the UE initially receives the packet correctly from the NodeB, it will send an ACK as the "second signal" and a NACK will be the "third signal" in the claims. *Id.* Conversely, if the UE initially receives a packet incorrectly from the NodeB, it will send a NACK as the "second signal" and an ACK will be the "third signal." *Id.*

Accordingly, the evidence shows that this limitation is supported by adequate written description, and thus, respondents have not shown that claims 1 and 5 of the '271 patent are invalid by clear and convincing evidence.

3. Priority Date

Respondents argue:

> The asserted claims of the '271 patent are not entitled to a priority date earlier than May 14, 2004 because foreign priority application GB 0318735 ('735 application; JX-0008.42-48) does not comply with the requirements of 35 U.S.C. § 112 with respect to the limitations "second specified power level" and "third specified power level" for all asserted claims, and "transceiver means" and "control means" for asserted claims 5-8. *Lockwood v. Am. Airlines, Inc.*, 107 F.3d 1565, 1571 (Fed. Cir. 1997) ("In order to gain the benefit of the filing date of an earlier application under 35 U.S.C. § 120, each application in the chain leading back to the earlier application must comply with the written description requirement of 35 U.S.C. § 112."); RX-3212 (Bims WS) at Q/A 12, 344, 349.

Resps. Br. at 212; *see id.* at 212-14.

Complainants and the Staff disagree. *See* Compls. Br. at 225-33; Staff Br. at 160-67.

<u>Legal Standards</u>

Section 119 governs the priority of a patent application claiming priority from a prior foreign application. *See* 35 U.S.C. § 119.[54] For an application to claim priority from a prior foreign application, the prior foreign application must meet the requirements of 35 U.S.C. § 112, ¶ 1, in order to "preserve symmetry" with § 120 (for priority claims based on U.S. applications). *In re Gosteli*, 872 F.2d 1008, 1010 (Fed. Cir. 1989) ("Under section 119, the claims set forth in a United States application are entitled to the benefit of a foreign priority date if the corresponding foreign application supports the claims in the manner required by section 112, ¶ 1."). "The reference to the 'invention' in section 119 clearly refers to what the claims define, not what is disclosed in the foreign application." *Id.* at 1011. "[I]f the effective filing date of what is claimed in a United States application is at issue, to preserve symmetry of treatment between sections 120 and 119, the foreign priority application must be examined to ascertain if it supports, within the meaning of section 112, ¶ 1, what is claimed in the United States application." *Id.*[55]

Section 112, ¶ 1 imposes two distinct requirements, a written description requirement and an enablement requirement. *See Ariad Pharmaceuticals, Inc. v. Eli Lilly and Co.*, 598 F.3d 1336, 1340 (Fed. Cir. 2010). In a written description case involving § 112, ¶ 1,

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[54] 35 U.S.C. § 119 recites, in part: "An application for patent for an invention filed in this country by any person who has, or whose legal representatives or assigns have, previously regularly filed an application for a patent for the same invention in a foreign country which affords similar privileges in the case of applications filed in the United States or to citizens of the United States, or in a WTO member country, shall have the same effect as the same application would have if filed in this country on the date on which the application for patent for the same invention was first filed in such foreign country, if the application in this country is filed within 12 months from the earliest date on which such foreign application was filed…." 35 U.S.C. § 119.

[55] Comparing *Kawai*, 480 F.2d at 886, 178 USPQ at 162–63 (construing the section 112, ¶ 1 requirements of section 119) *with Scheiber*, 587 F.2d at 62, 199 USPQ at 784–85 (construing the section 112, ¶ 1 requirements of section 120).

> the 'primary consideration is factual and depends on the nature of the invention and the ***amount of knowledge imparted to those skilled in the art by the disclosure***.' *Union Oil Co. of Cal. v. Atlantic Richfield Co.,* 208 F.3d 989, 996, 54 USPQ2d 1224, 1232 (Fed.Cir. 2000) (quoting *In re Wertheim,* 541 F.2d 257, 262, 191 USPQ 90, 96 (CCPA 1976)). An analysis of the adequacy of a disclosure begins with a direct comparison of the claims to the disclosure in the priority document. ***If the claim language is not expressly supported by the disclosure, then the language of the priority document must be analyzed for what it conveys to one skilled in the art***. *Ralston Purina v. Far–Mar–Co ., Inc.,* 772 F.2d 1570, 1575, 227 USPQ 177, 179 (Fed.Cir. 1985). The written description requirement does not dictate that the applicant describe the invention exactly. Rather, what is required is that, as of the filing date, ***the inventor convey with reasonable clarity to those skilled in the art that the inventor was in possession of the subject matter claimed***. *See Vas–Cath Inc. v. Mahurkar,* 935 F.2d 1555, 1563–64, 19 USPQ2d 1111, 1117 (Fed.Cir. 1991).

In re Wako Pure Chemical *Inds. Ltd*., 4 Fed. Appx. 852, 854 (Fed. Cir. 2001) (unpublished) (emphasis added); *see also Enzo Biochem, Inc. v. Gen-Probe Inc.,* 323 F.3d 956, 968 (Fed. Cir. 2002) (the "disclosure must allow one skilled in the art to visualize or recognize the identity of the subject matter purportedly described."); *K&K Jump Start/Chargers, Inc. et al. v. Schumacher Electric Corp*., 13 Fed.Appx. 982, 984 (Fed. Cir. 2001) ("*K&K Jump Start*") (unpublished) (citing *Tronzo v. Biomet, Inc.,* 156 F.3d 1154, 1158 (Fed.Cir.1998)). Compliance with the written description requirement of Section 112, ¶ 1, is a question of fact. *See K&K Jump,* 13 Fed.Appx. at 984 (citing *Wang Lab., Inc. v. Toshiba Corp.,* 993 F.2d 858, 865, 26 USPQ2d 1767, 1774 (Fed.Cir.1993)).

Section 112, ¶ 6 permits claim limitations to be written in mean-plus-function format. *See* 35 U.S.C. § 112, ¶ 6. However, § 112, ¶ 6 does not impose any additional requirement beyond that required by § 112, ¶ 1 and an application that invokes means-plus-function language must still "accurately define the invention" as required by § 112,

¶¶ 1, 2. *See In Re Knowlton*, 481 F.2d 1357, 1366 (CCPA 1973). In claiming priority from a prior application "[t]he understanding of one of skill in the art does not relieve the patentee of the duty to disclose sufficient structure to support means-plus-function claim terms." *Lucent Technologies, Inc. v. Gateway, Inc.*, 543 F.3d 710, 719 (Fed. Cir. 2008) (citing *Biomedino, LLC v. Waters Techs Corp.*, 490 F.3d 946, 952 (Fed. Cir. 2007)). The written description must give "structural significance" to the means-plus-function language. *See Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1351 (Fed. Cir. 2015). The U.S. Patent Office's guidance for determining whether there is written description support (under § 112, ¶ 1) for means-plus-function terms is instructive:

> If a claim limitation invokes 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, it must be interpreted to cover the corresponding structure, materials, or acts in the specification and "equivalents thereof." *See* 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph. *See* also *B. Braun Medical, Inc. v. Abbott Labs.*, 124 F.3d 1419, 1424, 43 USPQ2d 1896, 1899 (Fed. Cir. 1997). In considering whether there is 35 U.S.C. 112(a) or pre-AIA 35 U.S.C. 112, first paragraph, support for a means- (or step) plus- function claim limitation, the examiner must consider not only the original disclosure contained in the summary and detailed description of the invention portions of the specification, but also the original claims, abstract, and drawings. ***A means- (or step-) plus-function claim limitation is adequately described under 35 U.S.C. 112(a) or pre-AIA 35 U.S.C. 112, first paragraph, if: (1) The written description adequately links or associates adequately described particular structure, material, or acts to perform the function recited in a means- (or step-) plus- function claim limitation; or (2) it is clear based on the facts of the application that one skilled in the art would have known what structure, material, or acts disclosed in the specification perform the function recited in a means- (or step-) plus-function limitation.*** *See Aristocrat Techs. Australia PTY Ltd. v. Int'l Game Tech.*, 521 F.3d 1328, 1336-37, 86 USPQ2d 1235, 1242 (Fed. Cir. 2008) ("'consideration of the understanding of one skilled in the art in no way relieves the patentee of adequately disclosing sufficient structure in the specification.' It is not enough for the patentee simply to state or later argue that persons of ordinary skill in the art would know what structures to use to accomplish the claimed function."), quoting *Atmel Corp. v. Information Storage Devices, Inc.*, 198 F.3d 1374, 1380, 53 USPQ2d

> 1225, 1229 (Fed. Cir. 1999); *Biomedino, LLC v. Waters Technologies Corp.,* 490 F.3d 946, 953, 83 USPQ2d 1118, 1123 (Fed. Cir. 2007) ("***The inquiry is whether one of skill in the art would understand the specification itself to disclose a structure***, not simply whether that person would be capable of implementing a structure."). ….

MPEP § 2163.II.3.a (emphasis added).[56]

a. "second specified power level" and "third specified power level"

Respondents argue that there is no disclosure of anything specifying a power level for the claimed second or third signals (*i.e.*, ACK or NACK signals) within the '735 application. *See* Resps. Br. at 212; RX3212C (Bims WS) at Q/A 345, 349, 350.

For several reasons identified by Mr. Lanning, the '735 application contains this disclosure. First, the '735 application clearly states that a mobile terminal's power limit will be based on its physical constraints or in response to an instruction received from the base station (controller), which may be at the UE's maximum capacity or a lower maximum power level with: "[t]erminals in mobile communication systems usually have a maximum transmit power limit, which may be set by physical constraints or in response to an instruction received from a controller." *See* CX-2422 (Lanning RWS) at Q/A 32.

Second, the '735 application clearly states that the ACK and NACK responses may be at different power levels multiple times. *See* JX-0008 ('271 Patent File History) at 42-48. None of the asserted claims of the '271 patent require a specific power level (*e.g.*, dB or dBm) for the ACK or NACK as Dr. Bims seems to be implying. *See* CX-2422 (Lanning RWS) at Q/A 32. Instead, the claims only require a different transmit

[56] Guidelines for the Examination of Patent Applications Under the 35 U.S.C. 112(a) or Pre-AIA 35 U.S.C. 112, first paragraph, "Written Description" Requirement [R-10.2019] (https://www.uspto.gov/web/offices/pac/mpep/s2163.html).

power level be used for the ACK and the NACK being sent by the mobile station (UE) to the base station (NodeB). *Id.*

Third, the ‘735 application states that “[d]ifferent types of additional signal[s] may have different transmit power requirements …. According to the present invention, the transmit power of the first signal is reduced by an amount equal to the greatest power requirement of any of the set of possible additional signals which may be subsequent transmitted.” *See* JX-0008 (‘271 Patent File History) at 42-48. As with the maximum power setting being received by the MS from the base station as described directly above, the power settings for these “possible additional signals” *e.g.*, ACK and NACK, can also be received from the disclosed “controller” (base station). *See* CX-2422(Lanning RWS) at Q/A 32.

Fourth, as Dr. Bims acknowledges, the use of ACK and NACK pre-dates the earliest priority date of the ‘271 patent. In 3GPP TS 25.308 v5.0.0 (2001-09), § 7.1.1 states, “In the uplink, a report is used indicating either ACK (positive acknowledgement) or NACK (negative acknowledgement).” *See* RX-0342 (3GPP TS 25.308 v5.0.0 (2001-09)). Therefore, a POSA already knew how to program the assignment of power levels for ACK and NACK. *See* CX-2422 (Lanning RWS) at Q/A 32. The overall power control structure of UMTS also pre-dates the earliest priority date of the ‘271 patent. *See* CX-2422 (Lanning RWS) at Q/A 32-33. Thus, a POSA already knew the overall power control structure of UMTS that would be used for purposes of the ‘271 patent, including that the power levels for signals (including ACKs and NACKs) are determined by the network (not by the UEs themselves) and then signaled to the UEs using higher layer signaling. *Id.*

b. "transceiver means …." and "control means …"

Respondents argue that the '735 application also contains no description of any structure that can perform the function associated with either the "transceiver means …" or "control means…" under any proposed construction. *See* Resps. Br. at 213; RX3212C (Bims WS) at Q/A 345.

With respect to "transceiver means," the '735 application discloses:

> In one embodiment of the present invention, a ***UMTS mobile station (MS) transmits*** some continuous uplink (UL) signals to a base station (BS). The ***MS also receives*** some downlink (DL) packet data, typically using the High-Speed Downlink Packet Access (HSDPA) feature of UMTS. The MS must transmit a positive (ACK) or negative (NACK) acknowledgment for each HSDPA packet received, depending for example on the outcome of a CRC evaluation.

JX-0008 ('271 Patent File History) at 45, at lines 4-13 (emphasis added).

> According to the present invention, the MS reduces the transmit power at the timeslot prior to the start of the ACK/NACK transmission by an amount corresponding to whichever the ACK or NACK has the highest power requirement. In this way, the UE can ensure that enough transmit power is available for the ACK/NACK transmission regardless of the final outcome of the CRC evaluation process.

JX-0008 ('271 Patent File History) at 45, at lines 24-29.

From the above disclosure, the mobile station (MS) is explicitly linked to the proposed claimed functions, as proposed by all the parties.

A person skilled in the art would have known that a "transceiving" or "transceiver means" refers to the functions of transmitting and receiving, including in the structure provided in UMTS including DL packets and UL signals. *See* CX-2422 (Lanning RWS) at Q/A 33. It was common at the time of the ‘735 application to use the term “transceive” or “transceiver” as shorthand to refer to “transmit” and “receive” as one word. *Id.*

Indeed, Dr. Bims opines that transceivers being known in the art prior to the invention of the ‘271 patent. *See* RX-3212C (Bims WS) at Q/A 444-48. Mr. Lanning opines that at the time of the ‘735 application, mobile stations used in UMTS communication had transceivers and that such transceivers were well known in the art. *See* CX-2422 (Lanning RWS) at Q/A 33.

At the time of the ‘735 application, a person of ordinary skill in the art would have understood the “transceiver means (38)” of claim 5 to refer to a transceiver (transmitter and receiver) in a mobile station. At that time, mobile stations used in UMTS had a transceiver for transmitting and receiving signals that contained data. *Id.* At the time of the ‘735 application, transceivers in mobile stations and base stations were well known to POSAs. A POSA would have known how to program such a transceiver to achieve the desired functionality, such as functionality disclosed in the ‘735 application and the ‘271 patent. *Id.*

In fact, the 3G UMTS transceiver, initially defined in 1999 by 3GPP, supported multiple spread spectrum channels with power control. *See* CX-2422 (Lanning RWS) at Q/A 33. This transceiver was an evolution of the earlier 2G IS-95 transceivers which were described in the 2G CDMA (spread spectrum) cellular standard. The IS-95 transceiver also supported multiple spread spectrum channels with power control. *Id.* The CDMA (spread spectrum) transceivers in the mid-1990s were typically comprised of three chips: one for the digital baseband processing, one for the analog radio frequency processing and one for power amplification/control. *Id*.

With respect to "control means…," the '735 application discloses that transmit power for the ACK and NACK is reduced under certain circumstances:

> If the transmission of the ACK or NACK in parallel with the continuous uplink signals would require more transmit power than is available, the transmit power of the other uplink channels is ***reduced*** at the timeslot boundary immediately preceding the start of the ACK or NACK transmission. …
>
> According to the present invention, the MS ***reduces*** the transmit power at the timeslot prior to the start of the ACK/NACK transmission by an amount corresponding to whichever of ACK or NACK has the highest power requirement.

JX-0008 ('271 Patent File History) at 45, at lines 14-25 (emphasis added).

> In UMTS [] HSDPA (High-Speed Downlink Packet Access), it is necessary to ***scale down the uplink transmission power*** at certain times in order to allow sufficient power for essential uplink ACK/NACK signalling…..According to the present invention, the ***power scaling*** is carried out based on the power required for whichever of ACK or NACK requires the most power…."

JX-0008 ('271 Patent File History) at 47, at lines 5-12 (Abstract) (emphasis added). Mr. Lanning testified that one of ordinary skill in the art (a) would understand that the disclosed reduction/scaling down of the transmit power would be done by a controller in the mobile station (MS), and (b) would have known how to program such a controller to achieve the desired functionality, such as the functionality disclosed in the '735 application and the '271 patent. *See* CX-2422 (Lanning RWS) at Q/A 33. The '735 application further discloses a specific algorithm (equations and illustrations) for reducing/scaling down the transmit power. *See* JX-0008 ('271 Patent File History) at 45, line 30 – 46, line 8; Figure 1.

*   *   *

Accordingly, the evidence establishes that the claims of the ‘271 patent are entitled to a priority date based on the ‘735 application.

4. Obviousness

Respondents argue that “the asserted claims 1-8 of the ‘271 patent are rendered obvious by: (1) 3GPP UMTS I, (2) 3GPP UMTS II, and (3) U.S. Patent No. 7,054,633 (‘Seo’).” Resps. Br. at 214; *see id.* at 214-53.

Complainants and the Staff disagree. *See* Compls. Br. at 233-41; Staff Br. at 171-79.

a. 3GPP UMTS I and POSA (claims 1-4)

As discussed below, respondents have not shown by clear and convincing evidence that 3GPP UMTS I renders claims 1-4 of the ‘271 patent obvious.

As argued by respondents,

> 3GPP UMTS I is comprised of four documents, three technical specifications and one proposal, published by 3GPP as part of the UMTS standard. RX-3212 (Bims WS) at Q/A 354-56. The specifications are TS 25.308 v5.0.0, dated September, 2001 (RX-0342) (“TS 25.308 I”); TS 25.211 v5.4.0, dated June, 2003 (RX-0341) (“TS 25.211 I”); and TS 25.214 v5.5.0, dated June, 2003 (RX-0340) (“TS 25.214 I”). *Id.* The proposal is 3GPP TSG RAN WG1 meeting #23, R1-020060, dated Jan. 8-11, 2002 (RX-0293) (“LGE Tdoc”). *Id.*

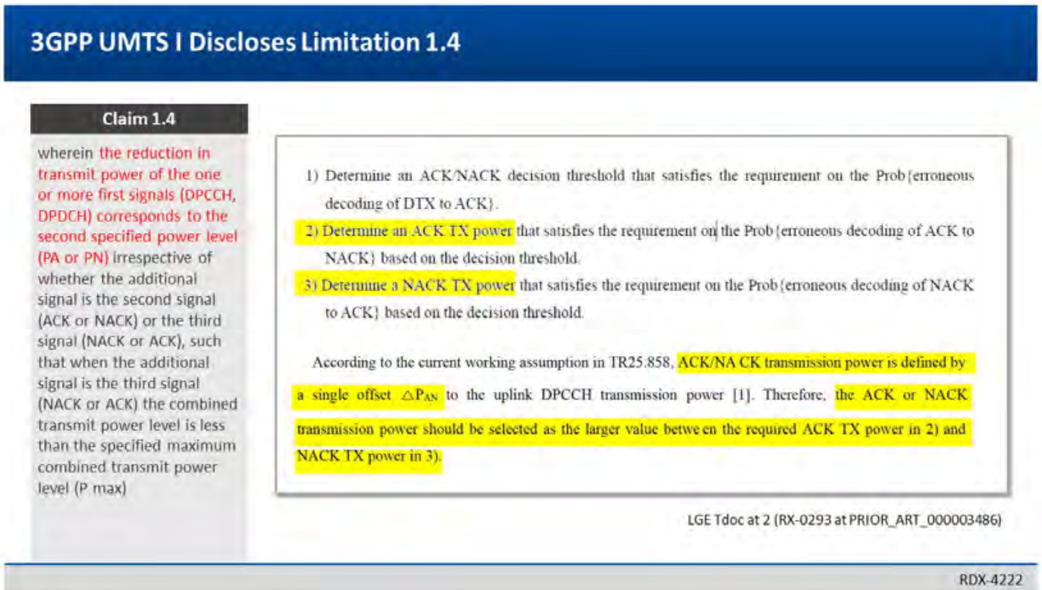
Resps. Br. at 215. The evidence shows that 3GPP made all of these documents publicly available before August 11, 2003 (the ‘271 patent’s priority date) as part of its standard practices to foster discussion and collaboration amongst 3GPP members and other interested persons of skill in the art. *See* RX-3212C (Bims WS) at Q/A 357; Resps. Br. at 215; JX-0004 (‘271 Patent).

Respondents argue that these four documents should be included as a single reference describing UMTS, and that a person of ordinary skill in the art would have been motivated to combine these references because all of them were published by 3GPP as part of its public efforts for defining and developing the UMTS standard and cross reference one another. *See* RX-3212C (Bims WS) at Q/A 364.

The only element that Philip disputes is element [1.4]. *See* Compls. Br. at 234-36; Resps. Br. at 214 (“Philips’s expert, Mr. Lanning, does not dispute that 3GPP UMTS I alone and 3GPPS UMTS I in view of Seo discloses all of the limitations of the asserted claims except limitations [1.4] and [5.4].”). Respondents’ expert Dr. Bims testified that 3GPP UMTS I in view of the knowledge of a person of ordinary skill in the art renders claim limitation [1.4] obvious:

> The LGE Tdoc [RX-0293] describes that the ACK and NACK transmission power is defined by a single offset, and to select the larger of the ACK or NACK transmit power as the value for that single power offset. RX-0293 at PRIOR_ART_000003486. A POSA would have understood that using this value for the offset would result in reducing the transmit power of the DPCCH and DPDCH, which are the first signals, by an amount corresponding to the larger of the ACK or NACK transmit powers. A POSA would have understood that, by definition, this means that when the lesser of the ACK or NACK signals is transmitted, the total combined transmit power would be less than the maximum allowed value.
>
> Q398. *How does 3GPP UMTS I disclose selecting the larger of the ACK or NACK transmit power as the value for the single power offset?*
>
> A398. 3GPP UMTS I discloses transmit power control based on the greater of the ACK or NACK power levels. On page two of the LGE Tdoc, it explains that since the “ACK/NACK transmission power is defined by a single offset $\triangle$PAN to the uplink DPCCH transmission power,” this “transmission power should be selected as the larger value

> between the ACK transmit power and NACK transmit power that are determined based on the decision threshold." I have prepared a demonstrative, RDX-4222, showing these passages. In other words, the LGE Tdoc describes that the larger value of either the ACK or NACK power level should be used to generate the value for △PAN.



RX-3212C (Bims WS) at Q/A 397, 398.

Dr. Bims testified that 3GPP UMTS I discloses reducing the first signals by an amount corresponding to the larger of the ACK or NACK*:*

> A POSA would have understood that this △PAN power offset would be used by the other processes and procedures outlined in 3GPP UMTS, including the power control procedure of TS 25.214 I. Again, TS 25.214 Section 5.1.2.6 states that if the combined transmit power would exceed the maximum allowed value, the total transmit power is scaled down. RX-0340 at PRIOR_ART_000005127. ***Since the first signals are already at the maximum allowed power level, a POSA would have understood that △PAN, which is set to the greater of the ACK or NACK power levels, would be used as part of the procedure for scaling power down to the maximum allowed value. The actual transmission power level of the ACK or NACK is the specific power level that was determined based on the decision threshold, which is then scaled by the scaling factor calculated based on △PAN***. In this circumstance, if the acknowledgement signal (i.e., ACK/NACK) with the lower of the two power levels is transmitted, the total combined power transmitted by the UE would have a lower transmitted power than the maximum allowed value.

RX-3212C (Bims WS) at Q/A 399 (emphasis added).

> As I explained earlier, the introduction on page one of the LGE Tdoc explains that the purpose of the proposal is to allow for different transmission power levels between the ACK and NACK signaling to reduce the overall ACK and NACK transmission power. RX-0293 at PRIOR_ART_000003485. Tables 1 and 2 show that there are different values for the ACK and NACK. RX-0293 at PRIOR_ART_000003487. On page two, the LGE Tdoc notes that there is currently only one power offset value provided for the signaling of the ACK and NACK, which makes sense if the power levels for the ACK and NACK are both the same value. RX-0293 at PRIOR_ART_000003486. So the LGE Tdoc is proposing the use of different power levels for the actual transmission of the ACK or NACK, examples of which are shown in table 1 and 2, which are named △PACK and △PNACK in the conclusion section on page 4. RX-0293 at PRIOR_ART_000003487, PRIOR_ART_000003488. ***As a result, a POSA would have understood that the reason for setting △PAN to the greater of the ACK or NACK power levels is to accommodate the fact that the rest of the standard was currently designed to function using a single power offset value for the ACK and NACK signals, as opposed to two values per the LGE Tdoc proposal***.

RX-3212C (Bims WS) at Q/A 400 (emphasis added).

Dr. Bims also testified that based on his opinion, discussed above, 3GPP UMTS I discloses the term “combined transmit power level” of element [1.4]. *See* RX-3212C (DWS Bims) at Q/A 401; Resps. Br. at 228.

However, Philips’ expert, Mr. Lanning, testified that Dr. Bims has misinterpreted the teachings of the LGE Tdoc (CX-1479). *See* Compls. Br. at 234. Mr. Lanning testified:

> Dr. Bims cites the LGE Tdoc (CX-1479) for his support of this limitation. ***I disagree with Dr. Bims that the LGE Tdoc discloses element 1.4 and believe that he has misinterpreted the LGE Tdoc***. Contrary to Dr. Bims’ characterization, the LGE Tdoc is actually describing the various transmission power requirements for an ACK and a NACK based on different probabilities that the ACK and/or NACK will be erroneously decoded when it is received by the base station. Based on LGE’s simulation, the LGE Tdoc provides the relative transmission power (dB) required for an ACK and NACK during normal operation (e.g., non25

handover) in Table 1 and during a soft handover (SHO) in Table 2. Each table includes three columns that include the required transmission power levels that LGE determined were required to achieve the target probabilities of nonerroneous decoding of the response by the base station. For example, Table 1 shown below provides the transmission power levels required for an ACK and a NACK in order to achieve the desired probabilities of the base station not performing an erroneous decoding of 1/10, 1/100 and 1/1000 responses (from left to right in the first row). As shown by the highlighted numbers in this table below, LGE is stating that, in order to achieve the target of erroneous decoding occurrences by the base station to less than 1 per 1000 responses, the ACK TX power relative to the UL DPCCH should be +3 dB and the NACK TX power relative to the UL DPCCH should be -16.5 dB. As shown by the two columns left of the far right column, lower ACK transmission power levels would result in a higher number of erroneous decodings by the base station.

Table 1. Power requirements in the ACK/NACK transmission

Prob{erroneous decoding of DTX to ACK}	$<10^{-1}$	$<10^{-2}$	$<10^{-3}$
Threshold to Interference ratio	-0.5 dB	4.5 dB	7 dB
ACK TX power relative to UL DPCCH	-0.5 dB	2 dB	3 dB
NACK TX power relative to UL DPCCH	-4 dB	-9 dB	-16.5 dB
ACK TX power − NACK TX power	3.5 dB	11 dB	19.5 dB

(CX-1479 at PRIOR ART 000005105 (LGE Tdoc p. 3).)

Therefore, when the LGE Tdoc states the passage shown below as used by Dr. Bims for support, ***it is not referring to the UE reducing its transmit power before the end of the packet was received by the "second specified power level (PA or PN)," which would result in the UE transmitting at a power level less than Pmax when its response to the received packet from the NodeB is the "third signal" as required by this element as Dr. Bims opines. Instead, this document is stating that the larger power for the ACK (3 dB) and NACK (-16.5 dB) listed in Table 1 should be used so that the base station would perform minimal erroneous decodings***.

According to the current working assumption in TR25.858, ACK/NACK transmission power is defined by a single offset $\triangle P_{AN}$ to the uplink DPCCH transmission power [1]. Therefore, the ACK or NACK transmission power should be selected as the larger value between the required ACK TX power in 2) and NACK TX power in 3).

Table 1 shows the power requirements of ACK and NACK signals with Prob{erroneous decoding of ACK to NACK} < 10^{-2}, Prob{erroneous decoding of NACK to ACK} < 10^{-4}, and various restrictions on the Prob{erroneous decoding of DTX to ACK}. To get these simulation results, we set several assumptions as follows:

(CX-1479 at PRIOR ART 000005104 (LGE Tdoc p. 2).)

The "Conclusions" section in the LGE Tdoc shown below also supports my interpretation of this document and it does not support Dr. Bims' opinion.

3. Conclusions

We propose to define the ACK and NACK transmission power offsets respectively, for example, as $\triangle P_{ACK}$ and $\triangle P_{NACK}$. Since the difference between the ACK and NACK power requirements can be significant, setting a same transmission power for ACK/NACK signaling will cause an unnecessary power consumption of UE. Acceptable reliabilities on the ACK/NACK signaling, which involve ACK/NACK decision threshold and the transmission power, will be system management parameters in a deployment stage of HSDPA. Hence, there is no need to limit the possibility to reduce the power consumption in the ACK/NACK transmission by restrict the ACK/NACK power as a same level.

Therefore, we propose to define separate power offsets relative to UL DPCCH for ACK and NACK signals in TR25.858 and make a Liaison statement to WG2 that requests a definition of separate parameters for ACK and NACK transmission power offsets.

(CX-1479 at PRIOR ART 000005106 (LGE Tdoc p. 4).)

Accordingly, the LGE Tdoc does not teach the power offset aspect of element 1.4. Dr. Bims does not cite any other prior art that teaches the power offset aspect of element 1.4. Nor does he opine that this aspect would have been obvious to a POSITA based on only the knowledge of a POSITA at the time of the '271 patent.

For at least these reasons, it is my opinion that Dr. Bims has not shown any of the UMTS I documents disclose this element, he has not shown it would have been obvious to a POSITA and the number of prior art references he uses to try to support his opinions, is additional proof that this element was not obvious.

CX-2422 (Lanning RWS) at Q/A 39 (emphasis added); *see also* Lanning Tr. 978-991.

However, contrary to Mr. Lanning's testimony, Dr. Bims does not opine that 3GPP UMTS I discloses element [1.4] by itself (otherwise Philips would have made an anticipation argument). Rather, as discussed above, Dr. Bims combines 3GPP UMTS I with the knowledge of one of ordinary skill in the art to assert that the element is obvious.

In addition, on cross-examination Mr. Lanning testified that the portion of LGE Tdoc (RX-0293) that Mr. Bims relies on for disclosing reducing the first signals by an amount corresponding to the larger of the ACK or NACK ("Therefore, the ACK or NACK transmission power should be selected as the larger value between the required ACK TX power in 2) and NACK TX power in 3"),[57] discussed above, corresponds to the "current working assumption" in which the two signals (ACK and NACK) are not split apart. *See* Lanning Tr. 988-989. Thus, although LGE Tdoc (RX-0293) is directed to a new approach (to the "current working assumption") by splitting up the ACK and NACK signals separately in order to reduce erroneous decoding (as testified by Mr. Lanning), Dr. Bims appears to rely on the reference for what it teaches about the "current working assumption," discussed above. Thus, Dr. Bims does not appear to have misinterpreted LGE Tdoc (RX-0293), as opined by Mr. Lanning.

Notwithstanding the foregoing issues, respondents have not shown by clear and convincing evidence that claims 1-4 are obvious in view of 3GPP UMTS I and the knowledge of one of ordinary skill in the art. Specifically, in addition to Mr. Lanning's testimony above with respect to element [1.4], he further testified:

> Q. … Once it was decided to use a different value or a different power level for ACK and NACK, why wasn't it obvious to just always

[57] RX-0293.0002 (LGE Tdoc).

> reduce the power on the DPCCH and DPDCH by the greater of those two values?
>
> A. Because the history of all the CDMA, that would be counterintuitive to do what the '271 patent requires. Typically you want to send as much power for a channel as you can from a mobile station to the base station without 1 interfering with other mobiles. And so all of the research I did and all the 3 papers, it was counterintuitive and never mentioned that the power should be reduced for the larger of the ACK or he NACK. And LGE didn't address that. They were just addressing what should the power be for ACK and NACK if the two are sent separately, as in -- stated in option A of the 3GPP standard.

Lanning Tr. 1002-1003.

b. 3GPP UMTS I, Seo (RX-0022), and POSA (claims 1-8)

The only element that Philip disputes is element [1.4], and [5.4]. *See* Resps. Br. at 215-16; Compls. Br. at 237-38.

Dr. Bims testified that element [1.4] and [5.4] are obvious in view of 3GPP UMTS I and Seo (RX-0022) and the knowledge of one or ordinary skill in the art:

> In addition to what I explained regarding 3GPP UMTS I with respect to this claim limitation, ***Seo (RX-0022) describes uncoupling the power level of the HS-DPCCH from the DPCCH, which in turn uncouples the power level from the DPDCH as well***. I described this earlier with respect to Respondents' and Staff's construction of the second and third specified power levels. So a POSA would have understood that in combination, ***3GPP UMTS I in view of Seo results in a system that applies the power scaling procedure of TS 25.214 I Section 5.1.2.6 using △PAN, which is set to the greater of the ACK or NACK power levels, but would uncouple the HS-DPCCH in this procedure and only reduce the transmit powers of the DPCCH and DPDCH***. RDX-4230.
>
> Q432. *Does 3GPP UMTS I in view of Seo disclose limitation [1.4] under Philips' and Staff's proposed construction for the term "combined transmit power level?"*
>
> A432. ***Yes, in addition to what I already explained about how 3GPP UMTS I discloses this limitation under Philips' construction for this***

> ***term***, at 17:63-18:2, Seo (RX-0022) discloses that the uplink DPCCH, DPDCH, and HS-DPCCH are summed together, modulated, and transmitted, and this is also shown in Figure 16. A POSA would have understood that since the signals are summed and transmitted together, the signal transmitted through the antenna of the UE would include all three signals. RDX-4232.

RX-3212C (Bims WS) at Q/A 431, 432 (emphasis added); *see also id.* at Q/A 465, 466.

However, Mr. Lanning testified in rebuttal:

> For at least the same reasons stated in my responses to question numbers 39 and 40, the addition of Seo still does not disclose this element because Dr Bims is still using the LGE Tdoc for his support for the power offset aspect of element 1.4 and not any disclosure by Seo. Similar to the LGE Tdoc, Seo discloses using different power levels for ACK and NACK (e.g., CX-0042 at 9:39-41). ***However, Seo does not disclose using the greater of the power for ACK and NACK as an offset***.
>
> To my knowledge, Dr. Bims does not opine that the power offset aspect of this element would have been obvious to a POSITA based on the sheer knowledge of a POSITA. Accordingly, it is my opinion that Dr. Bims has not shown that the combination of UMTS I and Seo disclose this element and he has not shown
> that this element would have been obvious to a POSITA.

CX-2422 (Lanning RWS) at Q/A 43, 44 (element [5.4]) (emphasis added).

Accordingly, for essentially the same reasons discussed above with respect to 3GPP UMTS I alone, respondents have not shown by clear and convincing evidence that 3GPP UMTS I in view of Seo (RX-0022) and the knowledge of one of ordinary skill in the art renders claims 1-8 of the '271 patent obvious.

c. 3GPP UMTS II and POSA (claims 1-4); 3GPP UMTS II, Seo (RX-0022), and POSA (claims 1-8)

Respondents argue:

> 3GPP UMTS II comprises three documents, which are updated versions of the same three technical specifications of 3GPP UMTS I: TS 25.308 v5.5.0, dated March, 2004 (RX-0353) ("TS 25.308 II"); TS 25.211 v5.5.0, dated September, 2003 (RX-0347) ("TS 25.211 II"); and TS

> 25.214 v5.8.0 dated March, 2004 (RX-0350) ("TS 25.214 II"). RX-3212 (Bims WS) at Q/A 358-59.

Resps. Br. at 216. Unlike their argument above with respect to 3GPP UMTS I, respondents do not argue that these three documents should be included as a single reference. *See id.*

Respondents argue that 3GPP UMTS II qualifies as prior art because the asserted claims of the '271 patent are not entitled to a priority date earlier than May 14, 2004. However, as discussed above, the asserted claims are entitled to the August 11, 2003 priority date. Therefore, the evidence demonstrates that 3GPP UMTS II does not qualify as prior art to the '271 patent. Thus, 3GPP UMTS II cannot be used to demonstrate obviousness of the asserted claims 1-8 of the '271 patent.

Accordingly, respondents have not shown by clear and convincing evidence that (1) 3GPP UMTS II and the knowledge of one of ordinary skill in the art renders claims 1-4 of the '271 patent obvious, and (2) 3GPP UMTS II in view of Seo (RX-0022) and the knowledge of one of ordinary skill in the art renders claims 1-8 of the '271 patent obvious.

d. Secondary Considerations

There is some evidence of secondary considerations that support non-obviousness. Mr. Lanning tesfied that the invention of the '271 patent was incorporated into the 3GPP Standard. *See* CX-2422 (Lanning RWS) at Q/A 52-53. Mr. Lanning explained how the invention of the '271 patent is incorporated into the 3GPP Standard. *See id.* at Q/A 45-52. In addition, the patented invention arose in the context of the RAN (Radio Access Network) working groups where other skilled artisans were attempting to solve the same problem at the same time. *Id.* In fact, the invention arose out of a change to the existing standard, meaning that numerous skilled artisans had worked on a solution to the problem and were not able to solve it in the manner achieved by the inventors. *See* CX-2399 (Moulsley WS) at Q/A 12-14.

VII. Other Defenses

A. ETSI IPR Disclosure Defense

Respondents argue, *inter alia*:

> Undisputed evidence showed Philips intentionally delayed declaring its alleged intellectual property rights ("IPR") for six-years after the relevant standards were adopted. This misconduct breached ETSI's Rules, Clause 4.1.
>
> Controlling United States caselaw is unambiguous: ESTI members have a duty to declare IPR **before** a standard is enacted; failure to do so violates Clause 4.1, making the patents unenforceable against the standard. *Core Wireless Licensing S.A.R.L. v. Apple Inc.*, 899 F.3d 1356, 1367-68 (Fed. Cir. 2018) (holding "ETSI member's duty to disclose a patent application on particular technology attaches at the time of the proposal…" and IPR owner had a "duty to disclose its IPR no later than [the date the standard was adopted]."); *Conversant Wireless Licensing S.A.R.L. v. Apple, Inc.*, No. 15-CV-05008-NC, 2019 WL 4038419 (N.D. Cal. May 10, 2019) (holding patents unenforceable because of the patentee's late disclosure four years after the standard was enacted); *see also Apple Inc. v. Motorola Mobility, Inc.*, 886 F. Supp. 2d 1061, 1086-88 (D. Wis. 2012) (IPR owner had a duty to disclose before the standard was adopted) (hereinafter: *Apple*); *Qualcomm Inc. v. Broadcom Corp.*, 548 F.3d 1004, 1021-22 (Fed. Cir. 2008) (same).

Resps. Br. at 254; *see id.* at 254-75.

Complainants disagree. *See* Compls. Br. at 243-56. The Staff agrees with respondents. *See* Staff Br. at 224-41.

For the reasons discussed below, it has been shown by clear and convincing evidence that the four asserted patents are unenforceable under the doctrine of implied waiver.

1. Legal Discussion

According to 19 U.S.C. § 1337(c), "[a]ll legal and equitable defenses may be presented in all cases." 19 U.S.C. § 1337(c). Respondents' defense based on lack of IPR disclosure is one of implied waiver. *See*, *e.g.*, Staff Br. at 225. With respect to implied waiver, particularly as it concerns the duty to make disclosures to ETSI (which is the European Telecommunications Standards Institute), an SSO (which is a standards-setting organization), the courts have held:

> Even when a patent is otherwise valid, "[a] member of an open standard setting organization may ... have impliedly waived its right to assert infringement claims against standard-compliant products." *Hynix Semiconductor Inc. v. Rambus Inc.*, 645 F.3d 1336, 1347–48 (Fed. Cir. 2011) (quoting *Qualcomm Inc. v. Broadcom Corp.* ("*Qualcomm II*"), 548 F.3d 1004, 1019 (Fed. Cir. 2008)); *see also Core Wireless*, 899 F.3d at 1365.
>
> To succeed on an implied waiver claim in the SSO context, the accused infringer must first show by clear and convincing evidence that: "(1) the patentee had a duty of disclosure to the standard setting organization, and (2) the patentee breached that duty." *Hynix*, 645 F.3d at 1348. Because implied waiver is an equitable defense, however, the doctrine "may only be applied in instances where the patentee's misconduct resulted in [an] unfair benefit." *Core Wireless,* 899 F.3d at 1368 (quoting *Therasense, Inc. v. Becton, Dickinson & Co.*, 649 F.3d 1276, 1292 (Fed. Cir. 2011) (en banc)). Alternatively, implied waiver may also be found in cases of "egregious misconduct sufficient to justify the sanction of unenforceability of the patent at issue." *Id.*

Conversant Wireless Licensing S.A.R.L. v. Apple, Inc., No. 15-CV-05008-NC, 2019 WL 4038419 (N.D. Cal. May 10, 2019) at *2 ("*Conversant*"); *Core Wireless Licensing S.A.R.L. v. Apple Inc.*, 899 F.3d 1356, 1367-68 (Fed. Cir. 2018) (holding "ETSI member's duty to disclose a patent application on particular technology attaches at the time of the proposal…" and IPR owner had a "duty to disclose its IPR no later than [the date the standard was adopted].");[58] *see also Apple Inc. v. Motorola Mobility, Inc.*, 886 F. Supp. 2d 1061, 1086-88 (D. Wis. 2012) (IPR owner had a duty to disclose before the standard was adopted) ("*Apple*"); *Qualcomm Inc. v. Broadcom Corp.*, 548 F.3d 1004, 1021-22 (Fed. Cir. 2008) (duty to disclose).

2. Duty of Disclosure and Breach of Duty

For the reasons discussed below, the evidence shows Philips had a duty of disclosure to the standard setting organization, and it breached that duty.

a. ETSI Rule, Clause 4.1

Clause 4.1 has two parts, one for participants in ETSI/3GPP standard-setting committees, and the other for members that submit technical proposals to those committees. This clause highlights the additional responsibility participating members

[58] In *Core Wireless*, the Federal Circuit explained:

> A participant in a standards-setting organization may waive its right to assert infringement claims against products that practice the standard. *Hynix Semiconductor Inc. v. Rambus Inc.*, 645 F.3d 1336, 1347–48 (Fed. Cir. 2011); *see also Qualcomm Inc. v. Broadcom Corp.*, 548 F.3d 1004, 1020–24 (Fed. Cir. 2008). Implied waiver occurs when the patentee's "conduct was so inconsistent with an intent to enforce its rights as to induce a reasonable belief that such right has been relinquished." Hynix, 645 F.3d at 1348 (quoting *Qualcomm*, 548 F.3d at 1020). The court in *Hynix* made clear that "[s]uch conduct can be shown where (1) the patentee had a duty of disclosure to the standard setting organization, and (2) the patentee breached that duty." *Id*. (citing *Qualcomm*, 548 F.3d at 1011–12).

899 F.3d at 1368.

have to be forthcoming with ETSI and distinguishes them from "passive" members that are not involved in the standard-setting process. Clause 4.1 reads:

> [1] Subject to Clause 4.2 below, each MEMBER shall use its reasonable endeavours, ***in particular during the development*** of a STANDARD or TECHNICAL SPECIFICATION where it participates, to inform ETSI of ESSENTIAL IPRs in a ***timely fashion***.
>
> [2] In particular, a MEMBER **submitting** a technical proposal for a STANDARD or TECHNICAL SPECIFICATION ***shall, on a bona fide basis, draw the attention of ETSI*** to any of that MEMBER's IPR ***which might be ESSENTIAL if that proposal is adopted***.

RX-2446 (ETSI Directives) at 34 (emphasis added). "By using the terms 'might' and 'if,' the policy clearly requires members to make efforts to disclose intellectual property rights **before** a standard is adopted." *Apple*, 886 F. Supp. 2d at 1086 (emphasis in original); *see also Core Wireless*, 899 F.3d at 1366, 68; *Conversant*, 2019 WL 4038419 at *6-7.

As discussed below, Philips breached Clause 4.1's disclosure obligation under French law, which controls the interpretation of ETSI's Rules. Respondents' French law expert, Dr. Philippe Stoffel-Munck testified on cross-examination:

> [T]he obligation and the rule is very clear. It's as soon as possible, as early as possible. You have repeatedly this expression emphasizing the importance of the timely disclosure, and timely is before the standard is enacted. … But the crucial time is during deliberation of the standard, and that's why you have so many times this reference to as soon as possible, as early as possible, et cetera. So my question is, why is it a breach, because the rule says so.

Stoffel-Munck Tr. 904-905; *see also id.* at 911:7-11; RX-3208C (Stoffel-Munck WS) at Q/A 50-53.

Philips's French law expert Dr. Jean-Sebastien Borghetti did not render an opinion on whether Philips breached Clause 4.1. *See* Borghetti Tr. 643; *see Adams v.*

Department of Transp., 735 F.2d 488, 492 (Fed. Cir. 1984) ("Silence is often evidence of the most persuasive character"; awarding an adverse inference.).

Dr. Borghetti had no opinion on whether Philips used reasonable endeavors here. *See* Borghetti Tr. 642-643. He also has not offered an opinion on whether Philips acted on a bona fide basis when declaring its IPR to ETSI. *See* Borghetti Tr. 646. Indeed, he had no opinion whether disclosing IPR six years after a standard was enacted was at the earliest possible time. *See* Borghetti Tr. 650. However, the law is clear: "[M]embers of ETSI should disclose [IPR] that they know are relevant to potential standards while the standard is being discussed and ***before the standard is adopted***." *Apple,* 886 F. Supp.2d at 1085 (emphasis added); *see also Core Wireless,* 899 F.3d at 1367-68; *see also Qualcomm*, 548 F.3d at 1008, 1016-22 ("Qualcomm ***had a duty to disclose*** the asserted patents to the JVT [a standard setting organization], [and] it breached this duty …"; the language requiring disclosure in the JVT SSO ("reasonably might be necessary to practice the [] standard") is nearly identical to the ETSI clause in question ("might be ESSENTIAL if that proposal is adopted")) (emphasis added).

Dr. Borghetti acknowledged that Philips's obligation to declare SEPs under ETSI Rules Clause 4.1 is an "obligation of means" under French law that required Philips to act with diligence. Borghetti Tr. 638-639. However, there is no evidence that Philips acted with any diligence. *See Qualcomm*, 548 F.3d at 1014 (noting "[Qualcomm] did not present evidence of any efforts, much less best efforts, to disclose patents…").[59]

[59] Dr. Borghetti agreed that the terms in Clause 4.1, "during the development of a standard" and "which might be essential if that proposal is adopted," were clear and unambiguous, and therefore did not need judicial interpretation. See Borghetti Tr. 639, 641-642, 644. He also agreed that the last sentence of Clause 4.1 refers to a proposal that

Philips did not act with diligence, as French law required. Philips's Licensing Program Leader, Kevin Scott, admitted that Philips's licensing program for its 3G patents had "been dormant waiting for a significant market to develop." *See* RX-0089C (Scott testimony in the UK) at 4, ¶16. This is the type of opportunistic delay that is forbidden by ETSI's policy, and amounts to "patent ambush," which ETSI specifically addressed as a key problem. *See* RX-2446.48 (ETSI Guide); RX-3338C (Stoffel-Munck RWS) at Q/A 16; RX-3208C (Stoffel-Munck WS) at Q/A 14, 41. Philips's "waiting for a significant market to develop" is evidence that Philips failed to engage in "reasonable endeavors" or a "bona fide" effort to declare its IPR.

According to Mr. Scott, Philips waited years to declare IPR. Mr. Scott admitted Philips made no effort whatsoever to declare IPR until after the standard was enacted:

> Q. So you're waiting until the standard is enacted before you do this matching?
>
> A. We're waiting until we do this matching generally. So until someone gets round to doing the matching, because it's a non-trivial operation in the sense that patents and standards don't match themselves. So it needs some effort, so it needs the right people to have time to do it.
>
> Q. … But the question is, do you make any effort to match your patents or your applications to anything before the standard is issued?
>
> A. Well, before the standard is issued it's not clear what the standard is.
>
> …
>
> A. Until there is a standard either in a finalized or a draft form, there's nothing you can map against, so you can't do it. Not possible.

---

has not been adopted (Borghetti Tr. 644), and that requiring a member to use "reasonable endeavours" in Clause 4.1 does not mean that member can wait as long as it wants to declare its IPRs (Borghetti Tr. 642).

JX-0027C (Scott Dep. Tr.) at 252-253, 262. Another Philips witness testified to the same effect:

> Q. Does Philips generally wait until a standard is released before it makes its ETSI declaration?
>
> A. Yes. For the reason that we wait until the release for them, to be able to have the claim chart.

JX-0017C (Bossard Dep. Tr.) at 101; *see also id.* at 112. These admissions show Philips made a strategic decision to delay. In *Qualcomm*, the Federal Circuit recognized that IPR owners that failed to disclose IPRs prior to adoption of a standard, would be "in a position to 'hold up' industry participants from implementing the standard" (citation, quotation omitted):

> Industry participants who have invested significant resources developing products and technologies that conform to the standard will find it prohibitively expensive to abandon their investment and switch to another standard.

Qualcomm, 548 F.3d at 1010; *see also* RX- 3338C (Stoffel-Munck RWS) at Q/A 16 (citing RX-2446.61-63 (ETSI Directive) at §§ 4.6 and 4.6.3.12 (also referred to as "patent ambush")).

b. ETSI Rules and ETSI Guide Concerning Declaration

ETSI declarations form a binding contract with technology implementers, that are third-party beneficiaries, as a matter of French law. *See Apple*, 886 F. Supp. 2d at 1083, 1085, 1088. One of ETSI's primary objectives is expressed as the following: "investment in the preparation, adoption and application of standards could be wasted as a result of an ESSENTIAL IPR for a STANDARD or TECHNICAL SPECIFICATION being unavailable." *See* RX-2446.34 (ETSI Directives) at Annex 6, Clause 3.1; *see also id.* at

49, § 1.1; RX-3208C (Stoffel-Munck WS) at Q/A 14, 74. As the case cited above makes plain, IPR owners must inform ETSI, its members, and technology implementers, promptly of the existence of IPR to allow ETSI's policy makers to decide intelligently whether to use technology that may be subject to patent protection, or to use a solution that avoids potential patent disputes and costs.

To inform ETSI, and by extension its members, competitors and technology implementers alike, IPR owners "declare" IPR to ETSI using a prescribed form, stating:

> [T]he Declarant and/or its AFFILIATES hereby informs ETSI that it is the Declarant's and/or its AFFILIATES' present belief that the IPR(s) disclosed in the attached IPR Information Statement Annex ***may be or may become*** ESSENTIAL in relation to at least the ETSI Work Item(s), STANDARD(S) and/or TECHNICAL SPECIFICATION(S) identified in the attached IPR Information Statement Annex.

RX-2446.41-42 (ETSI Directives) (emphasis added). The language, "may be or may become," shows IPR owners are expected to declare IPR before the standard is enacted (before the technology becomes "Essential") to give sufficient notice to the relevant parties to consider alternatives. *See Apple*, 886 F. Supp. 2d at 1086.

There is no dispute that "IPR," which must be disclosed, included patent applications. *See* JX-0027C. 74 (Scott Dep. Tr.) at 258; RX-2446.39 (ETSI Directives) at ¶ 15, Clause 7; *see also Apple*, 886 F. Supp. 2d at 1086. The fact that patent applications must be disclosed, not just issued patents, is further evidence that IPR owners must inform ETSI promptly, before a patent is issued. Indeed, for the '271 patent, Philips did not wait for the patent to issue. *See* RX-3213 (Min WS) at Q/A 135.

The ETSI Guide, released in 2004, "place[d] special emphasis on the 'timely disclosure of Essential IPRs…'" *See* RX-2022.11. The Guide included numerous statements reiterating members' obligation to disclose IPR promptly. Members participating in Technical Bodies must "respond ***at the earliest possible time*** to the Call for IPRs" at the beginning of each meeting. *See* RX-2446.52 (ETSI Directives), § 2.1.1, ¶ 2, Note 2 (emphasis added). The Call for IPR "is performed to foster the disclosure of Essential IPRs in ***a timely fashion***" (*id.* § 2.1.1, ¶ 2) (emphasis added), and to encourage members to make "detailed disclosures" "***as soon as feasible***" (*id*. § 2.1.1, ¶ 4) (emphasis added). Further, the Guide requires:

> Members having IPR portfolios should improve their internal IPR coordination processes to ensure, as far as possible, that their participants in Technical Bodies are aware of any alleged-essential IPR the company may have (related to the on-going work on a particular ETSI Standard or Technical Specification), that they understand their obligations, and that they know how to discharge them.

Id. § 2.1.1., ¶ 3.

The importance of timely disclosure was further evidenced by the requirement that "Calls for IPRs" "***shall***" be made at the beginning of **each** technical meeting, "a reminder of the Member's obligations under the ETSI IPR Policy and is performed to foster the disclosure of Essential IPRs in ***a timely fashion***." *See* RX-2446.54 (ETSI Directives), § 2.3.2 (emphasis added).

c. Involvement of Named Inventors (Philips Employees) in 3GPP Standard-Setting Technical Committees

The undisputed evidence showed that all three named inventors (Messrs. Baker, Moulsley and Bucknell) were actively involved in ETSI/3GPP standard-setting groups (where IPR calls were made) prior to the enactment of the standards at issue. *See* JX-0015C (Baker Dep. Tr.) at 29-30; JX-0024C (Moulsley Dep. Tr.) at 13-14, 20-21, 23; JX-

0019C (Bucknell Dep. Tr.) at 23-27. Mr. Baker submitted a technical proposal, which was adopted, and now stands accused of infringement. *See* RX-3213C (Min WS) at Q/A 135-37, *see also* 31-54.

From 1996 to 2009, Mr. Baker was either a member or team leader of Philips's 3GPP standardization project. JX-0015C (Baker Dep. Tr.) at 29-31. The "project in Philips research which was aiming to contribute to 3GPP standardization activities." JX-0015C (Baker Dep. Tr.) at 30. Before Mr. Baker left, he was the "project team leader with responsibility for the 3GPP standardization activities" at Philips. *See* JX-0015C (Baker Dep. Tr.) at 29.

On August 11, 2003, Mr. Baker sent a message to his standard-setting group that proposed a 3GPP standard related to "power scaling." *See* RX-3213C (Min WS) at Q/A 39, 42; RX-2690C (Baker email). That same day, Philips filed the application that issued as the '271 patent, related to "power scaling." Minor revisions to Mr. Baker's proposal were made, and the standard was adopted. *See* RX-3213C (Min WS) at Q/A 43-50.

The fact that the patent application and technical proposal submissions were made on the same day demonstrates that any argument that Philips's patent group did not know what its engineers were doing is not credible. In any event, ETSI provides:

> The steps that must be taken to identify essential patents **focus on the activities and knowledge of the ETSI Member's representatives who are active in a particular ETSI matter**.…
>
> Accordingly, it seems that the "reasonable endeavours" that are to be taken to disclose patents that are essential to a particular ETSI deliverable **should be measured in terms of the knowledge of representatives of an ETSI Member who are actively involved in the work of the body developing that ETSI deliverable**.

RX-2446. 64 (ETSI Directives) at § 4.6.3.5 (emphasis added). According to ETSI's policy, that Philips's IP&S group, which dealt with IPR declarations (CX-2401C (Scott WS) at Q/A 11), was unaware of the activities in the technical committee is irrelevant. The relevant question, according to the Guide, is: were the named inventors (who in this case were also meeting-participants) aware of the technology discussed in standard setting meetings they attended, especially if one of them submitted a technical proposal.

Philips had an obligation to disclose its IPR when it made a "formal submission of a technical solution" (RX-2446. 55 (ETSI Directives), § 2.3.3), and "participate[d] in or contribute[d], directly or indirectly, to the work of" a "Technical Body" (RX-2446.64, § 4.6.3.3). The ETSI Guide further provides that members of a "Technical Body," *i.e.*, the named inventors here, were obligated to disclose IPR when "an employee (or otherwise authorised representative) of such Member" who "attends a meeting of" or "participates in or contributes, directly or indirectly, to the work of" a Technical Body or Working Group responsible for a standard. *See* RX-2446.64 (ETSI Directives) § 4.6.3.3.

Mr. Moulsley, another named inventor (and the 3GPP project leader at Philips before Baker (*see* JX-0015C (Baker Dep. Tr.) at 29, 42) testified that "[d]uring my time representing Philips in 3GPP, I regularly attended meetings of technical groups related to the evolution of standards related to UMTS, and later also LTE and LTE Advanced." *See* RX-3146 (Moulsley Dec., Philips Opp. Thales MSD), ¶ 2. He testified that "[p]roposals based on the inventions in each of these patents were either presented to 3GPP or considered in technical discussions for incorporation into the relevant 3GPP specifications at the time." *Id.* at ¶ 3.

Messrs. Moulsley and Baker attended the 3GPP working group meeting RAN#53 held on May 5-9, 2008, as Philips's representatives. *See* RX-0010.1 (R-082229 Change Req.); RX-3213C (Min WS) at Q/A 80-81, 83. On May 16, 2008, at the RAN#53 technical group meeting, Ericsson proposed a change to the standard. *See* RX-0010.1 (R-082229 Change Req.); RX-3213C (Min WS), Q/A 76. This change was later adopted. *See* RX-3213C (Min WS) at Q/A 39-42.

Philips argues that the language in the change request is covered by the asserted claims of the '943 and '711 patents. *See* RX-3213C (Min WS) at Q/A 85. The proposal to change the standard to add the language that Philips now asserts is covered by the asserted claims of the '935 patent was discussed in a 3GPP working group meeting held May 5-9, 2008. *See* RX-3213C (Min WS) at Q/A 120; RX-0038 (RAN WG2 #62 Agenda Proposal); RX-0037 (RAN 2#62 List of Participants). That proposal was agreed to in a later 3GPP working group meeting held June 30 to July 4, 2008. *See* RX-3213C (Min WS) at Q/A 122, 126; RX-0041 (Report, RAN WG2 #62bis). That standard was published September 2008. *See* RX-3213C.23-24 (Min WS) at Q/A 127.

Another named inventor, Mr. Bucknell, attended both the May 5-9 and June 30-July 4 working group meetings as a Philips representative. *See* RX-3213C (Min WS), Q/A 122-24; RX-0037.1 (Agenda Proposal RAN WG2 #62); RX-0039.1 (RAN2 #62 List of Participants). Although the named inventors attended these meetings as part of Philips's standardization "project," Philips did not declare these three asserted patents to ETSI as "essential" to the standard for over six years. *See* JX-0027C (Scott Dep. Tr.) at 251-253; RX-0027C (Philips IPR Decl.); RX-2685.21-25 (Philips's Corrected RFA Resp. Nos. 28-35). Philips had the necessary information to make timely disclosures.

Section 2 of the ETSI Guide, entitled "Importance of timely disclosure of Essential IPRs," identifies the main problems which may arise from late disclosure of IPR, including: "Licenses for Patents which have been disclosed late and which are available, but not on Fair, Reasonable and Non-Discriminatory (FRAND) terms, i.e., the company is unwilling to make a 'FRAND' undertaking/licensing declaration." *See* RX-2446.52 (ETSI Directives) at § 2. The Notes accompanying this section set forth what ETSI means by "Intentional Delay" in disclosing potentially essential IPR:

> Note 2: … "Intentional Delay" has arisen when it can be demonstrated that an ETSI Member has ***deliberately withheld IPR disclosures significantly beyond what would be expected from normal considerations of "Timeliness."***
>
> This description of "Intentional Delay" should be interpreted in a way that is consistent with the current ETSI IPR Policy. In complying with the requirements of timeliness under Clause 4.1 of the IPR Policy, Members are recommended to make IPR disclosures ***at the earliest possible time*** following their becoming aware of IPRs which are, or are likely to become, Essential.
>
> NOTE 3: ***"Intentional Delay," where proven, should be treated as a breach of the IPR Policy*** (Clause 14 of the ETSI IPR Policy) and can be sanctioned by the General Assembly.

RX-2446.52 (ETSI Directives) § 2 (emphasis added). According to ETSI's Rules, "[i]ntentional non-disclosure" occurs "when a representative participating in a Technical Body on behalf of a Member has actual knowledge of EIPR [Essential IPR], and yet [] holds back notification." *See* RX-2446.63 (ETSI Directives) § 4.6.3.2. Submitting a technical proposal to 3GPP and filing a patent application on the same day, yet waiting for years after that to inform ETSI, is evidence of "[i]ntentional nondisclosure." *Qualcomm*, 548 F.3d at 1020-21, n.8.

Referring to Note 2 in Section 2 of the ETSI Guide, Dr. Borghetti testified he "cannot not tell if waiting six years is significantly beyond what would be expected from normal considerations of timeliness." *See* Borghetti Tr. 647-648 (testifying about RX-2446.52 (ETSI Directives)). He also could not say if in this case a delay of six years was timely. *See* Borghetti Tr. 648.

With respect to Note 2 in Section 2, Dr. Stoffel-Munck said that the phrase "what would be expected from normal considerations of timeliness," when considered under French law, "implies that the intentional delays -- delay -- occurs ***when the standard is in the course of its deliberation***. Because what would be expected from normal considerations of timeliness must be understood in the context of the elaboration of the standard." Stoffel-Munck Tr. 907-909 (emphasis added).

According to Dr. Borghetti: "It is a well-established rule under French law that clear and unambiguous contractual terms should not be interpreted. A judge, if asked to apply such a term, should heed its plain meaning; and '[c]lear and unambiguous terms are not subject to interpretation as doing so risks their distortion.'" *See* CX-0010C (Borghetti WS), Q/A 51. Among other things, that means express Rules, like Clause 4.1, should not be rewritten to appease a litigant. This is particularly true here because the Guide explains what the terminology means. For example, Dr. Borghetti agreed that the terms "deliberately withheld" and the "description of intentional delay should be interpreted in a way that is consistent with current ETSI Policy," in Section 2, Note 2, were not ambiguous (Borghetti Tr. 649-650), and therefore require no special interpretation.

The ETSI Guide shows that timely disclosure occurs before the standard is enacted. There is no support for the argument that waiting six years satisfies the disclosure requirement, especially where all the named inventors regularly attended standard setting meetings and submitted at least one proposal.

d. Inequitable Benefit

Philips argues that "there is no no evidence of any inequitable benefit received by Philips." Compls. Br. at 256; see id. at 252-53.

In *Conversant*, the court held:

> Conversant asserts that Apple has not met their burden because they failed to connect their nondisclosure with the inequitable benefit. ***Such but-for proof, however, is not required***. Nokia's failure to disclose its IPR deprived ETSI members the opportunity to make a fully informed decision as to the technical solution for the GPRS standard. See *Core Wireless*, 899 F.3d at 1366. Nokia and Conversant cannot now "rely on the effects of its misconduct to shield it from the application of the equitable defense of implied waiver." *Qualcomm II*, 548 F.3d at 1021. In any case, Dr. Michael Walker, former Chairman of the Board of ETSI, testified that ETSI members are incentivized to choose technical solutions that are free of licensing costs. [] Dr. Walker's testimony suggests that, had Nokia disclosed its IPR, there was a reasonable possibility that the '151 patent would not have been incorporated into the GPRS standard.
>
> ***Nokia's failure to disclose its IPR allowed Nokia and Conversant to inequitably benefit from that misconduct***.

Conversant, 2019 WL 4038419, at *6-*7 (emphasis added); Staff Br. at 240 (quoting *Conversant*); *see also Broadcom Corp. v. Qualcomm*, 501 F.3d 297, 314 (3d Cir. 2007) ("That value [of a patent] become significantly enhanced, however, after the patent is incorporated in a standard."); *Conversant* 2019 WL 4038419, at *6 (Offering FRAND licenses "is beside the point. The issue is whether [Philips] should have been able to request a license at all …. [D]eclaring patents as standard essential "increase[ed] [Philips's] leverage by bolstering its patent portfolio"). All these are "inequitable benefits" derived from Philips's late disclosures.

As in *Conversant*, had Philips disclosed its "essential" IPR while the relevant standards were under consideration (rather than six years after the fact) there was a reasonable possibility that Philips's IPR would not have been incorporated as Philips has alleged into the relevant standard. Philips's deliberate non-disclosure, like Nokia's in *Conversant*, demonstrates inequitable benefit, satisfying that element of waiver.

e. Philips's Arguments

<u>Philips's Alleged "Search" Difficulties</u>

Philips's argument that locating its own IPR was "time intensive, and the Philips team was small" (Compls. Br. at 252) is not persuasive. *See, e.g.*, RX-3213 (Min WS) at Q/A 32, 40-47 (discussing power scaling in the context of the '271 patent and the accused standard). Philips's investigation of its own IPR should not have been difficult given (as discussed above) the named inventors participated in the standard-setting activities and knew precisely what technical proposals were made. Indeed, Philips was obligated to have these resources. *See* RX-2446.52 (ETSI Directives) at § 2.1.1 (Members "should improve their internal IPR co-ordination processes …" *e.g.*, a use database).

Philips's claim that IPR disclosure is compartmentalized from engineers in standard-setting groups, and that "searching" for potentially standard essential IPR is time-consuming (Compls. Br. at 251-52) is unpersuasive. *See, e.g.*, RX-3338C (Stoffel-Munck RWS) at Q/A 22. In fact, the application for the '271 patent was filed and that subject matter was submitted to the standard-setting body on the same day. *See* RX-3213 (Min WS) at Q/A 39, 135. Philips, with over 100,000 employees during the relevant time period (*see* Scott Tr. 210), hired a named inventor to "map[] them [patents] to the standards" (*id*. at 212-213, 210), and certainly had the necessary personnel to "search" its

IPR which "might be ESSENTIAL if that proposal is adopted." Philips made a business decision concerning the allocation of resources.

<u>Philips's General Declaration</u>

Philips argues that its "general declaration" (a one-page letter to Mr. Rosenbrock) (CX-2375C (Philips General Declaration to ETSI, 1-15-98)) satisfied its disclosure requirement under Clause 4.1. *See* Compls. Br. at 250-51. Philips argues that it waited until its patents issued and the standards were enacted to prevent "over declaration." *See* CX-2401C (Scott WS) at Q/A 15.

Section 2.1.3 of the Guide states: "Use of the General IPR licensing declaration does not take away the obligation for members to declare essential patents to ETSI as stated in 2.1.1." *See* RX-2446.53 (ETSI Directives). If members made general declarations they were required to "as soon as feasible, provide (or refine) detailed disclosures." *See* RX-2446.52 (ETSI Directives), at 52, ¶ 2.1.1.

Dr. Borghetti testified that Clause 6.1 requires "an SEP owner must give an irrevocable undertaking in writing that it is 'prepared to grant' a license on FRAND terms…" *See* CX-0010C (Borghetti WS) at Q/A 17. The European Commission ("EC") guideline Dr. Huber relied on (CX-2397C (Huber WS) at Q/A 60-61), says "[t]o ensure the effectiveness of the FRAND commitment" two conditions are required: the commitment must be (1) "irrevocable" and (2) transferable to any subsequent IPR owner. *See* CX-0949.60 (EC Comment) ¶ 285. However, Philips's "general declaration" says neither. *See* CX-2375C (Philips General Declaration to ETSI, 1-15-98). Philips's "general declaration" does not refer to patents or applications that "may be essential" to an ETSI standard. Rather, the "declaration" is limited to "patent rights which are deemed to be ESSENTIAL to this ETSI Standard," *i.e.*, after the standard has been enacted. *See* CX-2375C (Philips General Declaration to ETSI, 1-15-98). Moreover, Dr. Huber testified: "the obligatory use of the ETSI IPR Declaration Form was only introduced by ETSI at a later point in time …" *See* CX-2420C (Huber RWS) at Q/A 10. Thus, it appears Dr. Huber tacitly admitted IPR-specific disclosure was "obligatory."

The Staff questioned Dr. Huber regarding whether Philips's general declaration argument was inconsistent with Clause 4.1, and whether Clause 4.1 had no meaning. *See* Huber Tr. 331-336. After much back-and-forth, Dr. Huber admitted, "I did not elaborate on timeliness or not" (*id.* at 331:8-11), eventually agreed that an IPR owner "should disclose as soon as possible IPRs that may read on a ***standard that's being developed***." *Id.* at 335 (emphasis added). Philips's "general declaration" argument (*see* Compls. Br. at 11, 250), was rejected in *Apple*. 886 F. Supp. 2d at 1086.

Finally, Philips's argument that its "general declaration," and supposedly accompanying FRAND agreement, overcame its obligation to declare specific patents with regard to specific standards was rejected in *Apple. See* 886 F. Supp. 2d at 1086. Additionally, Mr. Rosenbrock explained that offering licensing rates that could not be accepted was not FRAND, and was a breach of the patent owner's underlying obligation. *See* RX- 3082 (Rosenbrock article) at 17. Dr. Stoffel-Munck agrees. *See* RX-3338C (Stoffel-Munck RWS) at Q/A 16.

<u>Third-Party Beneficiaries</u>

Case law fails to support Philips's argument that respondents are not third-party beneficiaries of Philips's ETSI commitment. *See* Compls. Br. at 244-45. Indeed, *Apple*, which applied French law, expressly held that the accused infringer was a third-party beneficiary. 886 F. Supp. 2d at 1085, 1088. Other cases discussing the merits of the late-disclosure issue found the accused infringer was a third-party beneficiary and had "standing" to assert the defense. *See e.g., Core Wireless*, 899 F.3d at 1366; *Conversant*, 2019 WL 4038419 at *6-7 (finding the patents unenforceable, but would not have done so unless Apple was a third-party beneficiary); Staff Br. at 234-45 ("[T]here can be no dispute that Philips contracted with ETSI, and that [Respondents are] third-party beneficiar[ies] of that contract (under either French or U.S. law)"; discussing cases).

U.S. cases control enforceability of U.S. patents. *See, e.g., Rivers v. Roadway Express*, 511 U.S. 298, 312-13 (1994) ("It is this Court's responsibility to say what a statute means, and once the Court has spoken, it is the duty of other courts to respect that understanding of the governing rule of law."). A French law expert's (or a German lawyer's) opinion cannot change that. Dr. Borghetti's testimony on this issue, therefore, is irrelevant. *See* Compls. Br. at 244-45.

B. Implied and/or Express License Defense

Respondents argue, *inter alia*:

> Philips has granted Thales both an express and an implied license to its self-declared SEPs, including the asserted patents, based on the FRAND licensing commitments that Philips made to ETSI and Thales's unconditional agreement to license the patents on the FRAND terms determined by the Delaware District Court.

Resps. Br. at 275; *see id.* at 275-78.

Complainants and the Staff disagree. *See* Compls. Br. at 256-58; Staff Br. at 241-42.

The ETSI IPR Policy does not require SEP holders to grant a license to other parties. *See* CX-1011 (ETSI Directives) at 41-42, IPR Policy, Clause 6.1; *see also* CX-

0010C (Borghetti WS) at Q/A 17-24. Rather, a SEP holder must only stand "prepared to grant irrevocable licenses" on FRAND terms and cannot actually enter a license unless both parties actually negotiate in good faith. *See* CX-1011 (ETSI Directives) at 41, IPR Policy, Clause 6.1; CX-0010C (Borghetti WS) at Q/A 23-24. Respondents' expert Prof. Contreras testified that the only enforceable thing is a "commitment to negotiate the license," and that there is no enforceable license itself. *See* JX-0040C (Contreras Dep. Tr.) at 102-104. On the implied license defense, Thales argues that the "entire course of conduct" led Thales to infer consent to sell products that practice the patents. However, as noted above, Philips' ETSI declaration is only an agreement to negotiate in good faith and does not create an actual license.

An "implied license looks for an affirmative grant of consent or permission to make, use, or sell: *i.e.*, a license." *See Certain Network Devices, Related Software and Components Thereof (II)*, Inv. No. 337-TA-945, ID at 271 (Dec. 9, 2016) ("*Network Devices II*") (citing *Wang Labs., Inc. v. Mitsubishi Elecs. Am., Inc.*, 103 F.3d 1571, 1580-81 (Fed. Cir. 1997)) (unreviewed in relevant part). Thales is thus required to prove that Philips conducted in such a way that led Thales to infer consent to use Philips' patents. *Id.* Thales did not submit any such evidence. To the contrary, Philips and Thales entered into lengthy negotiations demonstrating no such inference. *See* Staff Br. at 217-20. That Philips is obligated to negotiate in good faith toward a FRAND license is not evidence (and does not mean) that Philips gave an affirmative grant of a license before an actual license/agreement was reached. *See* Compls. Br. at 256-58. Respondents have not shown that Philips granted an express and/or implied license to the asserted patents.

C. Equitable Estoppel Defense

Respondents argue, *inter alia*:

> The record evidence demonstrates that Philips is equitably estopped by its FRAND commitments from seeking, and has waived its right to seek, an exclusion order against Thales, which is a willing licensee that negotiated in good faith. The equitable estoppel defense has been recognized by the ITC and requires: "(1) misleading conduct by the patentee, which can be either an affirmative act or inaction, that leads the alleged infringer to reasonably infer that patent rights will not be asserted against it; (2) reliance by the alleged infringer on the patentee's conduct; and (3) material prejudice to the alleged infringer." Where the defense of equitable estoppel is established, the claim is barred in its entirety.

Resps. Br. at 278 (citations omitted); *see id.* at 278-80, 306-44. Respondents argue the evidence shows that the three requirements are met. *See id.* at 278-80.

Complainants and the Staff disagree. *See* Compls. Br. at 258-59; Staff Br. at 242-43.

Thales provided no evidence of misleading conduct by Philips. Philips made its ETSI Licensing Declaration, which was not misleading at all, as Philips has since then licensed its patents to numerous licensees and attempted to license its patents to Thales on FRAND terms. *See* Staff Br. at 217-20 (discussing lengthy good faith negotiations between Philips and Thales). Philips was entitled to bring an infringement action, including one seeking an exclusion order, after those years of negotiations failed to lead to a license.

Thales argues that it "relied on Philips's FRAND commitments in expending the significant time and resources required to make, promote, and sell its products." Resps. Br. at 279. However, Thales has not provided specific costs as supporting evidence. Additionally, Thales provided no evidence of material prejudice. Thales argues material prejudice based on allegedly a "change of economic position," but cites no evidence of how its economic position would be changed. *See* Resps. Br. at 280; Staff Br. at 217-20 (discussing lengthy good faith negotiations between Philips and Thales).

Thus, the evidence does not demonstrate the three required elements of equitable estoppel. The evidence does not show that Thales relied on Philips' statements to such an extent that applying an equitable estoppel bar is warranted in this investigation. Thales' purported years of costly development and manufacturing of communication modules does not demonstrate that they relied on any specific statements Philips made to it or to ETSI. The evidence also does not show that the statements made by Philips were, in fact, misleading.

Accordingly, respondents have not shown by clear and convincing evidence that complainants are equitably estopped.

VIII. Domestic Industry (Economic Prong)

Complainants argue, *inter alia*:

> Philips satisfies the economic prong of the domestic industry requirement with respect to each of the Asserted Patents. Philips' satisfaction of the economic prong is based on its domestic production and research and development ("R&D") investments in Philips' Continuous Positive Airway Pressure ("CPAP") machines containing certain cellular communication modules that practice the Asserted Patents and associated software that enables exploitation of the patented technology. Philips has made significant and substantial domestic investments in CPAP machines that practice the Asserted Patents, including machines referred to as SystemOne, DreamStation, DreamStation2, and DreamStation Go (collectively, the "DI Devices"), and associated software that enables exploitation of the Asserted Patents—namely, CareOrchestrator, DreamMapper, and Encore*Anywhere* ("DI Software")—(the "DI Products").
>
> The DI Products are developed and brought to market by Philips

> Sleep, a business group within Philips Sleep & Respiratory Care ("Philips SRC"). Nearly all of the R&D-related investment in the DI Products occurred in and continues to occur in the United States. In addition, all of the production-related investment in the DI Devices occurred in and continues to occur in the United States. Philips' investments are significant under Section 337 subparagraphs A and B, and substantial under subparagraph C.
>
> [redacted]
>
> CDX-0004C (Akemann Demonstratives) at 1. Since the filing of the Complaint, Philips Sleep has also started manufacturing and selling the DreamStation2 CPAP machine, and is in the process of releasing a [redacted]. Thus, a domestic industry not only exists in products practicing the Asserted Patents, but is also in the process of being established with respect to the '711 Patent, '943 Patent, and '935 Patent, since Philips' production- and R&D-related investments in the DreamStation2 and [redacted] machines are significantly likely to be significant and substantial in the near future.

Compls. Br. at 259-60; *see id.* at 260-99.

Respondents disagree that economic prong of the domestic industry requirement has been satisfied. *See* Resps. Br. at 280-88. The Staff agrees with complainants with respect to subparagraphs (A) and (B), but disagrees with respect to subparagraph (C). *See* Staff Br. at 180-97.

Determining whether an investment is "significant" or "substantial" under 19 U.S.C. § 1337(a)(3) is context-dependent. *Certain Integrated Circuit Chips and Products Containing the Same*, Inv. No. 337-TA-859, USITC Pub. No. 4849, Comm'n Op. at 145 (Nov. 2018). "[T]he magnitude of the investment cannot be assessed without consideration of the nature and importance of the complainant's activities to the patented products in the context of the marketplace or industry in question." *Id*. However, "qualitative factors alone are insufficient" to show that an investment is significant. *Lelo Inc. v. International Trade Comm'n*, 786 F.3d 879, 885 (Fed. Cir. 2015). Section 337(a)(3) "requires a quantitative analysis to determine whether there is a 'significant' increase or attribution by virtue of the claimant's asserted commercial activity in the United States." *Id*. at 883.

"[T]here is no minimum monetary expenditure that a complainant must demonstrate to qualify as a domestic industry under the 'substantial investment' requirement" of 19 U.S.C. § 1337(a)(3)(C). *Stringed Musical Instruments*, Comm'n Op. at 25. "[T]he inquiry depends on 'the facts in each investigation, the article of commerce, and the realities of the marketplace.'" *Certain Carburetors and Products Containing Such Carburetors*, Inv. No. 337-TA-1123, Comm'n Op. at 8 (Oct. 28, 2019) (quoting *Printing and Imaging Devices*, Comm'n Op. at 27).

For the reasons discussed below, the record evidence supports a finding that Philips has satisfied the economic prong of the domestic industry requirement of 19 U.S.C. § 1337(a) under subparagraphs (A) and (B), but not under subparagraph (C).

A. "articles protected by the patent"

A violation of section 337(a)(1)(B), (C), (D), or (E) can be found "only if an industry in the United States, with respect to the ***articles protected by the patent***, copyright, trademark, mask work, or design concerned, exists or is in the process of being established." 19 U.S.C. § 1337(a)(2) (emphasis added). Section 337(a) further provides:

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

19 U.S.C. § 1337(a)(3) (emphasis added).

Respondents argue, *inter alia*:

> Philips has not shown that the Alleged DI Devices and Alleged DI Software are "articles protected by the patent" under Section 337(a)(3). At most, the domestic industry in this Investigation extends no further than the third-party cellular communication modules alleged to practice the asserted patents that are integrated into Philips downstream positive airway pressure ("PAP") products. RX-3339C (Lasinski RWS) at Q/A 26.

Resps. Br. at 281. It is argued:

> The domestic industry in this Investigation can extend no further than the third-party cellular communication modules alleged to practice claimed subject matter. RX-3339C (Lasinski RWS) at Q/A 77. Dr. Akemann did not offer any evidence, analysis, or opinions regarding any investments specific to the cellular communication modules (or their baseband processors) found in *some* of the Alleged DI Devices. CX-0009C (Akemann WS); RX-3339C (Lasinski RWS) at Q/A 77; RX-3211C (Vander Veen) at Q/A 116-17. Dr. Akemann did not analyze whether any of u-blox's investments satisfied Section 337(a)(3)(A), (B), or (C). Hr'g Tr. at 359:3-7 ("Q And you also conducted no domestic industry analysis whatsoever with respect to u-blox's investments in the cellular communications module, correct? A That's correct. I haven't focused on investments by u-blox."). He also did not analyze whether any investments by Qualcomm or any other baseband processor supplier satisfied Section 337(a)(3)(A), (B), or (C). *See generally* CX-009C (Akemann WS).

Id. at 286.

Complainants and the Staff disagree. *See* Compls. Br. at 290-97; Staff Br. at 182-

88.

As argued by Philips, the CPAP machines that allegedly practice the asserted patents, include machines referred to as SystemOne, DreamStation, DreamStation2, and DreamStation Go (collectively, the "DI Devices"), and associated software, *i.e.*, CareOrchestrator, DreamMapper, and Encore*Anywhere* ("DI Software"), collectively, the "DI Products." *See* Compls. Br. at 259-60. The Staff agrees with Philips. *See* Staff Br. at 182-88. As noted, respondents argue that the domestic industry extends only to expenditures relating to the cellular module and not expenditures relating to the CPAP machine and related software. *See* Resps. Br. at 281; RX-3339C (Lasinski RWS) at Q/A 40-69.

For the reasons discussed below, adopting the CPAP machine and associated software as the domestic industry article is consistent with "clear precedent holding that the economic prong may be satisfied by investments 'directed to significant components, specifically tailored for use in an article protected by the patent.'" *See Certain Lithium-Ion Battery Cells, Battery Modules, Battery Packs, Components Thereof, and Products Containing the Same,* Inv. No. 337-TA-1181, Order No. 28, 2020 WL 7640098, * 8 (Nov. 23, 2020) ("*Lithium-Ion Battery Cells*") (citing *Motorola Mobility, LLC v. Int'l Trade Comm'n*, 737 F.3d 1345, 1351 (Fed. Cir. 2013)) (*aff'd*, Commission Determination Not to Review an Initial Determination Granting Complainant's Motion for Summary Determination on Economic Prong (Dec. 23, 2020)).

As summarized in *Lithium-Ion Battery Cells*:

> It is well established that under subparagraphs (A) and (B) of section 337(a)(3) a domestic industry includes activities that do not relate directly to the patent-at-issue but in which the patented technology is exploited."

> *Id.* (citing *Certain Integrated Circuit Chips & Prod. Containing the Same* (*"Integrated Circuit Chips"*), Inv. No. 337-TA-859, Comm'n Op., 2014 WL 12796437, at *18 (Aug. 22, 2014). Otherwise stated, the correct inquiry is not whether the domestic activities relate to the patent but whether they relate to the patented article. *Id.* "For subparagraphs (a)(3)(A) and (B), we would only examine whether [the complainants'] 'investment in plant and equipment' or 'employment of labor or capital' relates to protected articles." *Id.* at *28.

Lithium-Ion Battery Cells, 2020 WL 7640098, *8.

> The Commission traditionally has resisted attempts to segregate articles of commerce into individual components and has instead counted as domestic industry investments amounts expended on the entire article, even where the patented element is sold separately. *See Certain Sleep-Disordered Breathing Treatment Sys*. (*"Sleep-Disordered Breathing"*), Inv. No. 337-TA-890, Initial Determination at 150 (Aug. 21, 2014) (finding the article of commerce was the H5i humidifier, although the patented component (the S9 flow generator) was also sold separately), determined not to review in relevant part, Comm'n Op. (Dec. 23, 2014) at 45 n. 13 ("The Commission determined not to review the ALJ's finding that ResMed established the existence of a domestic industry under 19 U.S.C. §§ 1337(a)(3)(A) and (B)."). *See also Certain Double-Sided Floppy Disk Drives and Components Thereof*, Inv. No. 337-TA-215, where the Commission agreed with the ALJ that the domestic industry should be defined as the domestic production of double-sided floppy disk drive rather than the patented head assemblies incorporated in the disk drives, because it was the importation and sale of the disk drives that competed directly with the domestic activities of the patentee. Comm'n Op. at 17-18 (Oct. 15, 1985) (cited in *Certain Video Game Systems and Wireless Controllers and Components Thereof* (*"Video Game"*), Inv. No. 337-TA-770, Comm'n Op. at 66-67 (Oct. 28, 2013)). As Complainants assert, the patented components are "irreversibly integrated" into the battery cell during the manufacturing process. Reply at 4. The integration in this instance is even more complete than the combination of the flow generator/humidifier "sold together as a co-pack" in *Sleep-Disordered Breathing. Id.*
>
> Importantly, *Batteries* and *Integrated Circuit Chips* indicate that the question of which activities may be counted toward satisfaction of the economic prong is "substantially legal, rather than factual." *Integrated Circuit Chips,* 2014 WL 12796437 at *18. In those cases, as here, the factual background was basically undisputed. The dispute concerned the legal impact of the facts, which is classically an issue to be resolved on summary determination. Under such circumstances, it is appropriate to

> determine the proper scope of the domestic industry product as a matter of law on a motion for summary determination.

Id. at *8 -*9.

The evidence shows that the article at issue includes the patented cellular communications modules as well as the CPAP machine and associated software (the DI Device and DI Software, respectively). Philips's witness, Mr. Bowen (Director of Product Development and Engineering at Philips Sleep & Respiratory Care) testified:

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

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[redacted]

[redacted]

[redacted]

CX-0005C (Bowen WS) at Q/A 12-24; *see also id.* at Q/A 51-50; Compls. Br. at 263-64.

Consistent with the above testimony, Philips's expert Michael Akemann testified that the DI products should be CPAP machines (DI Devices) containing certain cellular modules, in combination with the DI Software. *See* CX-0009C (Akemann WS) at Q/A 50-52.

Accordingly, the evidence shows that the article for economic prong investments, which it sells in commerce, includes the patented cellular communications modules as well as the CPAP machine and associated software.

B. Investments in Plant and Equipment

As discussed below, Philips's domestic investments in plant and equipment related to the domestic industry products that allegedly practice the asserted patents are significant under section 337 subparagraph (A). Philips's domestic investments under subparagraph (A) are quantitatively and qualitatively significant.

1. Background

Philips Sleep manufactures the DI Devices exclusively at its RIST facility in New Kensington, Pennsylvania, United States. *See* CX-0007C (Rogers WS) at Q/A 11 ("We call this the RIST facility."). As discussed below in more detail, from 2014 through 2020, Philips invested [redacted] in plant and equipment to manufacture the CPAP machines that allegedly practice the '271 patent, and [redacted] in plant and equipment to manufacture the CPAP machines that allegedly practice the '935, '711, and '943 patents. As further discussed below, from 2014 through 2020, Philips invested [redacted] in labor and capital to manufacture CPAP machines that allegedly practice the '271 patent, and [redacted] in labor and capital to manufacture CPAP machines that allegedly practice the '935, '711, and '943 patents.

Built in 2005 for approximately [redacted], the RIST facility totals approximately [redacted]. *Id.* at Q/A 12-16. As of 2020, the factory accounted for [redacted]; non-factory space accounted for [redacted]; warehousing space accounted for [redacted]; and cafeteria space accounted for [redacted] *Id.* at Q/A 18-21.

[redacted]. From 2009 to present, Philips "SRC" (Sleep & Respiratory Care) has manufactured CPAP machines at RIST, including the DI Devices, which are manufactured exclusively at RIST. *Id.* at Q/A 22. Only one CPAP product line is manufactured outside of RIST, and it is made in China for the Chinese market. *Id.*

From 2009 to present, and also at RIST, Philips SRC has manufactured mobile help buttons and related communicators ("Lifeline Products") on behalf of the Philips Lifeline business unit, and certain oxygen products on behalf of Philips Respiratory ("Oxygen Products"). *Id*. From 2009 through 2019, the production space devoted to the manufacture of the Lifeline Products was approximately [redacted]. *Id.*

Starting in 2017, [redacted]. *Id.* at Q/A 23. [redacted]. *Id.* Currently, Philips SRC devotes approximately [redacted] of the manufacturing space at RIST to the last manufacturing line used for [redacted] products. *Id.* [redacted]. *Id.*

As manufacture of the Lifeline Products transitioned out of RIST, Philips SRC's manufacture of the Oxygen Products transitioned in. *Id.* at Q/A 24. Thus, in 2019, Philips SRC began manufacturing the Oxygen Products at RIST in the space previously taken up by Philips SRC's manufacture of the Lifeline Products. *Id.* When Philips SRC transitioned manufacture of nearly all of the Lifeline products out of RIST by the end of 2019, Philips SRC was devoting approximately [redacted] of the production factory space at RIST to the manufacture of oxygen products, which continues today. *Id.* Philips Sleep accounted for [redacted] of the employee headcount at RIST as of 2019 and closer to [redacted] prior to 2019. *Id.* at Q/A 25.

Philips SRC tracks its production-related operating costs in the ordinary course of business and operations management [redacted]. *Id.* at Q/A 31-33; CX-0756C. Dr. Michael Akemann analyzed this data and determined that Philips Sleep invested approximately [redacted] in facility and equipment expenses and approximately [redacted] in labor and capital expenses at RIST from 2014 through 2020. *See* CX-0009C (Akemann WS) at Q/A 138-39, 168-69; CX-756C; CDX-0004C (Akemann Demonstratives) at 2, 10.

Philips SRC does not ordinarily [redacted]. *See* CX-0007C (Rogers WS) at Q/A 34-37. Thus, Dr. Akemann allocated the portion of RIST operating expenses (including both facilities and equipment and labor and capital expenses) attributable to CPAP machines (as opposed to, *e.g.*, [redacted] products), by adjusting RIST's annual operating expenses from 2014 to 2020 by the annual percentage of the RIST facility square footage devoted to Philips Sleep [redacted]. *See* CX-0009C (Akemann WS) at Q/A 134-42.

In addition, inasmuch as not all of Philips Sleep's CPAP machines contain cellular communications modules that allegedly practice one of the asserted patents, Dr. Akemann further allocated Philips Sleep's annual operating expenses from 2014-2020 using annual relative unit sales of Philips Sleep CPAP machines and installable modems produced at the RIST facility that contained cellular communication modules practicing the asserted patents to total Philips Sleep CPAP machines and installable modems produced at the RIST facility. *Id.* at Q/A 143-48.

Philips Sleep CPAP machines with cellular communications modules that allegedly practice the ‘271 patent accounted for [redacted] of worldwide unit sales of Philips Sleep CPAP machines and installable modems produced at RIST and [redacted] of worldwide revenues. *Id.* Philips Sleep CPAP machines with cellular communications modules that allegedly practice the ‘935, ‘711, and ‘943 patents accounted for [redacted] of worldwide unit sales of Philips Sleep CPAP machines and installable modems produced at RIST, and [redacted] of worldwide revenues. *Id.*

Following this allocation methodology, Philips Sleep invested [redacted] in plant and equipment from 2014 through 2020 for products practicing the ‘271 patent, and [redacted] for products practicing the ‘935, ‘711, and ‘943 patents. *Id.* Philips summarized the evidence presented by Dr. Akemann, as follows:

[redacted]

See CDX-0004C (Akemann Demonstratives) at 2.

2. Whether Philips’s Investments Are “Significant

Philips’s plant and equipment expenses are significant. Philips Sleep manufactures the CPAP machines (including the cellular communications modules) exclusively at Philips’s RIST facility in the United States. Philips investment in facilities and equipment expenses related to this manufacture is quantitatively significant. As discussed above, Philips Sleep’s allocated investments in plant and equipment are [redacted]

[redacted] for the '271 patent and [redacted] for the '935, '711, and '943 patents.

Philips's investments in plant and equipment are qualitatively significant. Sleep apnea is a significant health concern. Over 25 percent of adults between 30 and 70 (an estimated 25 million Americans) are dealing with sleep apnea and 80 percent of moderate and severe obstructive sleep apnea cases in the United States go undiagnosed. The sleep therapy industry has placed a significant emphasis on cloud-based patient monitoring, and even more emphasis in the midst of and after the impact of COVID-19.

For the asserted patents, Dr. Akemann evaluated Philips Sleep's plant and equipment investments in the context of its business and the industry, and provided the following analysis.

<u>The '271 Patent</u>

For the '271 patent, Dr. Akemann considered Philips Sleep's plant and equipment investments in the context of its business and the industry, and persuasively demonstrated that they were significant based on the following factors:

- Philips Sleep is an innovator in connected care technology and connected care devices, including CPAP machines that allegedly practice the '271 patent, and brings this technology and these devices to market and to United States consumers in part through these investments.

- CPAP machines that allegedly practice the '271 patent include established and commercially successful CPAP devices [redacted]

- CPAP machines that allegedly practice the '271 patent are also important within the context of the broader sleep therapy industry, which has emphasized the value of cloud-based patient monitoring, especially given the impact of COVID-19.

- CPAP machines that allegedly practice the '271 patent reflect ongoing innovation and new product development, [redacted]

[redacted].

- The overall level investment in CPAP machines that allegedly practice the ‘271 patent is approximately [redacted].

- The investments in CPAP machines that allegedly practice the ‘271 patent account for more than [redacted] of the total plant and equipment investments made by Philips Sleep at the RIST facility.

- Philips Sleep has used [redacted] of the square footage at the RIST facility to make the CPAP machines that allegedly practice the ‘271 patent.

- The plant and equipment investments in CPAP machines that allegedly practice the ‘271 patent amount to [redacted] used to develop and produce valuable new articles protected by the asserted patents.

- CPAP machines that allegedly practice the ‘271 patent account for approximately [redacted] in CPAP device sales revenues, accounting for a 3% share of overall CPAP device revenues for Philips Sleep.

- CPAP machines that allegedly practice the ‘271 patent account for approximately [redacted] CPAP device sales units, accounting for a [redacted] share of the overall CPAP device sales units for Philips Sleep.

- The connectivity supplied by the cellular communication modules and the associated software [redacted] that allegedly practice the ‘271 patent.

- CPAP machines that allegedly practice the ‘271 patent relate to the majority of the CPAP product lines for Philips Sleep.

See CX-0009C (Akemann WS) at Q/A 154-56.

<u>The ‘935, ‘711, and ‘943 Patents</u>

With respect to the ‘935, ‘711, and ‘943 patents, Dr. Akemann considered Philips Sleep’s plant and equipment investments in the context of its business and the industry, and persuasively demonstrated that they were significant based on the following factors:

- Philips Sleep is an innovator in connected care technology and connected care devices, including CPAP machines that allegedly practice the ‘935, ‘711, and ‘943 patents, and brings this technology and these products to the market and to United States consumers in part through these investments.

- CPAP machines that allegedly practice the ‘935, ‘711, and ‘943 patents include established and innovative commercially successful CPAP devices, [redacted]

- CPAP machines that allegedly practice the ‘935, ‘711, and ‘943 patents are also important within the context of the broader sleep therapy industry, which has emphasized the value of cloud-based patient monitoring, especially given the impact of COVID-19.

- CPAP machines that allegedly practice the ‘935, ‘711, and ‘943 patents reflect ongoing innovation and new product development, [redacted].

- The overall level of plant and equipment investment in CPAP machines that allegedly practice the ‘935, ‘711, and ‘943 patents is more than [redacted].

- The plant and equipment investments in CPAP machines that allegedly practice the ‘935, ‘711, and ‘943 patents are a [redacted] share of the plant and equipment investments made by Philips Sleep at the RIST facility.

- Philips Sleep has used [redacted] of the square footage at the RIST facility to make the CPAP machines that allegedly practice the ‘935, ‘711, and ‘943 patents.

- The plant and equipment investments in CPAP machines that allegedly practice the ‘935, ‘711, and ‘943 patents amount to [redacted] used to develop and produce valuable new articles protected by the asserted patents.

- CPAP machines that allegedly practice the ‘935, ‘711, and ‘943 patents account for CPAP device sales revenues of more than [redacted] accounting for more than a [redacted] share of overall CPAP device revenues of Philips Sleep.

- CPAP machines that allegedly practice the ‘935, ‘711, and ‘943 patents account for CPAP device sales units of approximately [redacted] accounting for a [redacted] share of overall CPAP device unit sales of Philips Sleep.

- The connectivity supplied by the cellular communication modules and the associated software [redacted] that allegedly practice the '935, '711, and '943 patents.

- CPAP machines that allegedly practice the '935, '711, and '943 patents relate to a majority of the CPAP product lines for Philips Sleep.

See CX-0009C (Akemann WS) at Q/A 157-59.

C. Investment in Labor and Capital

For the reasons discussed below, Philips's domestic investments in labor and capital related to the domestic industry products that allegedly practice the asserted patents are significant under section 337 subparagraph (B). Philips's domestic investments under subparagraph (B) are quantitatively and qualitatively significant.

1. Background

<u>Production-related Labor and Capital</u>

Philips Sleep manufactures the DI Devices exclusively at its RIST facility in New Kensington, Pennsylvania, United States. *See* CX-0007C (Rogers WS) at Q/A 11. Philips Sleep employs approximately [redacted] employees at its RIST facility, approximately [redacted] employees in direct labor production, and approximately [redacted] in indirect labor production. *See* CX-0009C (Akemann WS) at Q/A 167.

Like its investments in plant and equipment, Philips Sleep's investments in production-related labor and capital can be allocated to the DI Devices and corresponding asserted patents using the square footage utilized by Philips Sleep at the RIST facility to manufacture the CPAP devices, and further by using relative unit sales of the CPAP machines containing a cellular communications module that allegedly practices an asserted patent produced at the RIST facility to the total Philips Sleep CPAP machines produced at the RIST facility.

From 2014 to 2019, the RIST facility reported approximately [redacted] in production labor expenses. *See* CX-0009C (Akemann WS) at Q/A 168. From 2014 to 2019, the RIST facility had approximately [redacted] in production capital expenses. *Id.* Total production labor and capital expenses for the RIST facility from 2014-19 were [redacted]. *Id.* Dr. Akemann estimated 2020 RIST labor and capital expenses by applying the relative change in RIST CPAP device and installable modem unit sales from 2019 to 2020 to the 2019 RIST labor and capital expenses. *Id.* Using this 2020 estimate, the total RIST labor and capital expenses from 2014 to 2020 are approximately [redacted] *Id; see also id.* at Q/A 169-72; CDX-0004C (Akemann Demonstratives) at 10-13.

After square footage allocation, the total Philips Sleep production-related labor and capital expenses at the RIST facility from 2014-20 are approximately [redacted]. *See* CX-0009C (Akemann WS) at Q/A 173; CDX-0004C (Akemann Demonstratives) at 10. After unit sale allocation, Philips Sleep's investments in production-related labor and capital from 2014-20 are [redacted] for products practicing the '271 patent and [redacted] for the products practicing the '935, '711, and '943 patents. *See* CX-0009C (Akemann WS) at Q/A 174-75. *See* CDX-0004C (Akemann Demonstratives) at 10:

[redacted]

<u>R&D-related Labor and Capital</u>

Philips tracks its R&D-related investments in labor and capital and stores the data in its accounting and financial reporting system in the ordinary course of its business. *See* CX-0008C (Slater WS) at Q/A 12-19; CX-0231C; CX-0234C; CX-0233C; CX-0232C. To generate the data provided in this Investigation, Philips consulted employees with knowledge of Philips Sleep's project codes and products, including the DI Devices, and limited the expenditure data to projects associated with the particular DI Products in this Investigation. CX-0008C (Slater WS) at Q/A 20.

Dr. Akemann analyzed this data from 2011 through 2020 and determined that Philips Sleep invested approximately [redacted] in R&D-related labor and capital expenses for the SystemOne, DreamStation, DreamStation2, and DreamStation Go products. *See* CX-0009C (Akemann WS) at Q/A 176-80; CDX-0004C (Akemann Demonstratives) at 8-9, 20-21. Based on the cellular capability of these products, Dr. Akemann further allocated Philips Sleep's R&D-related labor and capital investments to each of the asserted patent. Dr. Akemann determined that Philips Sleep invested [redacted] in CPAP machines that allegedly practice the '271 patent totals and [redacted] in products practicing the '935, '711, and '943 patents. *See* CX-0009C (Akemann WS) at Q/A 176; CDX-0004C (Akemann Demonstratives) at 8-9.

In addition, Dr. Akemann determined that Philips Sleep invested approximately [redacted] in R&D-related labor and capital expenses for CareOrchestrator, DreamMapper, and Encore*Anywhere*. *See* CX-0009C (Akemann WS) at Q/A 181; CDX-0004C (Akemann Demonstratives) at 6-7. [redacted]. *See* CX-0005C (Bowen WS) at Q/A 22. [redacted]. *Id.* Allocating Philips Sleep's investments using these percentages, Philips Sleep invested [redacted] in R&D-related labor and capital for the DI Software from 2011 through 2020. *See* CX-0009C (Akemann WS) at Q/A 183-84; CDX-0004C (Akemann Demonstratives) at 6-7.

Philips SRC [redacted]. *See* CX-0008C (Slater WS) at Q/A 20. [redacted]. *Id.* at Q/A 18-19. Indeed, Kevin Bowen, Director of Product Development and Engineering at Philips SRC, testified that in his view [redacted]

[redacted]. *See* JX-0018C (Bowen Dep. Tr.), 74-76. Conservatively allocating at [redacted] Dr. Akemann concluded that Philip Sleep invested approximately [redacted] in R&D-related labor and capital in the U.S. for products practicing the '271 patent and [redacted] for products practicing the '935, '711, and '943 patents. *See* CX-0009C (Akemann WS) at Q/A 185-87; CDX-0004C (Akemann Demonstratives) at 5.

In addition, using unit sales and revenue information, Dr. Akemann determined the percentage of worldwide revenues attributable to products containing a patent-practicing cellular communications module. *See* CX-0009C (Akemann WS) at Q/A 188-90; CDX-0004C (Akemann Demonstratives) at 15-16. Dr. Akemann estimated that Philips Sleep invested approximately [redacted] from 2011 to 2020 in R&D-related labor and capital devoted to products practicing the '271 patent. *See* CX-0009C (Akemann WS) at Q/A 190; CDX-0004C (Akemann Demonstratives) at 5. Dr. Akemann estimated that Philips Sleep invested approximately [redacted] from 2011 to 2020 in R&D-related labor and capital devoted to products practicing the '935, '711, and '943 patents. *See* CX-0009C (Akemann WS) at Q/A 190. This is summarized at CDX-0004C (Akemann Demonstratives) at 5.

[redacted]

Combining Philips Sleep's production and R&D-related labor and capital investments, Dr. Akemann determined that Philips Sleep invested approximately [redacted] in labor and capital from 2011 to 2020 for products practicing the '271 patent and [redacted] in labor and capital from 2011 to 2020 for products practicing the '935, '711, and '943 patents. *See* CX-0009C (Akemann WS) at Q/A 191. This is summarized below at CDX-0004C (Akemann Demonstratives) at 4.

[redacted]

2. Whether Philips's Investments Are "Significant

As discussed below, Philips's domestic investments in labor and capital are quantitatively and qualitatively significant.

Philips Sleep's labor and capital expenses are significant. Philips's investments are quantitatively significant because the absolute level of investment is large, [redacted]. Philips's investment in production and R&D related labor and capital totaled [redacted] for the '271 patent, and [redacted] for the '935, '711, and '943 patents. Philips Sleep's labor and capital investment is also quantitatively significant in context since its production labor comprises [redacted] of Philips Sleep's manufacturing of DI Devices worldwide and its R&D labor comprises the vast majority, at least [redacted] of Philips Sleep's development work of the DI Devices and DI Software worldwide.

For the asserted patents, Dr. Akemann evaluated Philips Sleep's production and R&D related labor and capital investments in the context of its business and the industry, and provided the following analysis.

The '271 Patent

For the '271 patent, Dr. Akemann considered Philips Sleep's production and R&D related labor and capital investments in the context of its business and the industry, and persuasively demonstrated that they were significant, based on the following factors:

- Philips Sleep is an innovator in connected care technology and connected care devices, including CPAP machines that allegedly practice the '271 patent, and brings this technology and these devices to market and to United States consumers in part through these investments.
- CPAP machines that allegedly practice the '271 patent include established and commercially successful CPAP devices [redacted]
- CPAP machines that allegedly practice the '271 patent are also important within the context of the broader sleep therapy industry, which has emphasized the value of cloud-based patient monitoring, especially given the impact of COVID-19.

- CPAP machines that allegedly practice the '271 patent reflect ongoing innovation and new product development, [redacted].

- The overall level of labor and capital investments in CPAP machines that allegedly practice the '271 patent is more than [redacted].

- The labor and capital investments in CPAP machines that allegedly practice the '271 patent account for almost [redacted] of the total labor and capital investments made by Philips Sleep at the RIST facility.

- Philips Sleep has used [redacted] of the square footage at the RIST facility to make CPAP machines that allegedly practice the '271 patent.

- The labor and capital investments in CPAP machines that allegedly practice the '271 patent amount to [redacted] used to develop and produce valuable new articles protected by the asserted patents.

- CPAP machines that allegedly practice the '271 patent account for approximately [redacted] in CPAP device sales revenues, accounting for a [redacted] share of overall CPAP device revenues for Philips Sleep.

- CPAP machines that allegedly practice the '271 patent account for approximately [redacted] CPAP device sales units, accounting for a [redacted] share of the overall CPAP device sales units for Philips Sleep.

- The connectivity supplied by the cellular communication modules and the associated software [redacted] that allegedly practice the '271 patent.

- CPAP machines that allegedly practice the '271 patent relate to the majority of the CPAP product lines for Philips Sleep.

See CX-0009C (Akemann WS) at Q/A 193-95.

The '935, '711, and '943 Patents

With respect to the '935, '711, and '943 patents, Dr. Akemann considered Philips Sleep's production and R&D related labor and capital investments in the context of its business and the industry, and persuasively demonstrated that they were significant, based on the following factors:

- Philips Sleep is an innovator in connected care technology and connected care devices, including CPAP machines that allegedly practice the ‘935, ‘711, and ‘943 patents, and brings this technology and these products to the market and to United States consumers in part through these investments.

- CPAP machines that allegedly practice the ‘935, ‘711, and ‘943 patents include established and innovative commercially successful CPAP devices, [redacted]

- CPAP machines that allegedly practice the ‘935, ‘711, and ‘943 patents are also important within the context of the broader sleep therapy industry, which has emphasized the value of cloud-based patient monitoring, especially given the impact of COVID-19.

- CPAP machines that allegedly practice the ‘935, ‘711, and ‘943 patents reflect ongoing innovation and new product development, [redacted].

- The overall level labor and capital investments in CPAP machines that allegedly practice the ‘935, ‘711, and ‘943 patents is approximately [redacted].

- The labor and capital investments in CPAP machines that allegedly practice the ‘935, ‘711, and ‘943 patents are a [redacted] share of the labor and capital investments made by Philips Sleep at the RIST facility.

- Philips Sleep has used [redacted] of the square footage at the RIST facility to make the CPAP machines that allegedly practice the ‘935, ‘711, and ‘943 patents.

- The labor and capital investments in CPAP machines that allegedly practice the ‘935, ‘711, and ‘943 patents amount to [redacted] used to develop and produce valuable new articles protected by the asserted patents.

- CPAP machines that allegedly practice the ‘935, ‘711, and ‘943 patents account for CPAP device sales revenues of more than [redacted] accounting for more than a [redacted] share of overall CPAP device revenues of Philips Sleep.

- CPAP machines that allegedly practice the ‘935, ‘711, and ‘943 patents account for CPAP device sales units of approximately [redacted]

[redacted] accounting for a [redacted] share of overall CPAP device unit sales of Philips Sleep.

- The connectivity supplied by the cellular communication modules and the associated software [redacted] that allegedly practice the '935, '711, and '943 patents.

- CPAP machines that allegedly practice the '935, '711, and '943 patents relate to a majority of the CPAP product lines for Philips Sleep.

See CX-0009C (Akemann WS) at Q/A 196-98.

D. Subparagraph (C) - Investments in Exploiting the Patents

Complainants argue, *inter alia*:

> Philip Sleep's domestic investments in research and development exploiting the Asserted Patents are substantial under Section 1337 subparagraph (C). Philips Sleep's domestic investments in research and development are substantial by any measure. Philips R&D investments were identified and analyzed the same as its R&D-related labor and capital investments except conservatively limited to include only R&D investments in the CareOrchestrator, EncoreAnywhere, and DreamMapper (the DI Software). Dr. Akemann determined that from 2011 to 2020, Philips Sleep invested [redacted] researching and developing this software. CX-0009C (Akemann WS) at Q/A 204-206; CDX-0004C at 14. After allocating this investment to United States expenditures and solely to CPAP machines containing cellular communications modules that practice the Asserted Patents, Dr. Akemann determined that total domestic industry software R&D Investments from 2011 to 2020 are [redacted] for the '271 Patent and [redacted] for the '935 Patent, '711 Patent, and '943 Patent. CX-0009C (Akemann WS) at Q/A 207-09; CDX-0004C at 14.

Compls. Br. at 284-85; *see id.* at 285-88.

Respondents and the Staff disagree. *See* Resps. Br. at 285-86; Staff Br. at 197.

With respect to section 337(a)(3)(C), whether an investment in domestic industry is "substantial" is a fact-dependent inquiry for which the complainant bears the burden of proof. *Stringed Musical Instruments* at 14. There is no minimum monetary expenditure that a complainant must demonstrate to qualify as a domestic industry under the "substantial investment" requirement of this section. *Id.* at 25. There is no need to define or quantify an industry in absolute mathematical terms. *Id.* at 26. Rather, "the requirement for showing the existence of a domestic industry will depend on the industry in question, and the complainant's relative size." *Id.* at 25-26.

Investments in plant and equipment, labor, and capital that are also related to research and development or licensing may be considered under subparagraph (C) as well as under subparagraphs (A) and (B). *Certain Optoelectronic Devices for Fiber Optic Communications, Components Thereof, and Products Containing the Same*, Inv. No. 337-TA-860, USITC Pub. No. 4852, Comm'n Op. at 15 (Nov. 2018); *Certain Solid State Storage Drives, Stacked Electronics Components, and Products Containing Same*, Inv. No. 337-TA-1097, Comm'n Op. at 14 (June 29, 2018) ("[T]he text of the statute, the legislative history, and Commission precedent do not support narrowing subsections (A) and (B) to exclude non-manufacturing activities, such as investments in engineering and research and development. Rather, the guiding principle is whether the asserted expenditures satisfy the plain language of the statute.").

Under section 1337, subparagraph (C), a complainant must provide "a qualitative discussion of the relationship between the patented [invention] and the domestic investment," to establish a nexus between its investment and any of the asserted patents. *See Certain Integrated Circuit Chips and Products Containing The Same*, Inv. No. 337-TA-859, Comm'n Op. at 49-50, 38 (Aug. 22, 2014) ("*Integrated Circuit Chips*"). In certain circumstances, "[t]his nexus may readily be inferred based on evidence that the claimed investment is in the domestic industry article, which itself is the physical embodiment of the asserted patent." *Id.* at 40.

As noted above, Philips argues that its software R&D investments constitute exploitation of the asserted patents under section 1337, subparagraph (C). Philips presented research and developments expenses and attribute them to labor and capital expenses under subparagraph (B), which is permissible. Philips argues:

> Philips claims subparagraph (C) investments related to R&D in the CareOrchestrator, EncoreAnywhere, and DreamMapper suite of software products (the DI Software). These investments exploit the patented technology within the meaning of subparagraph (C) (sometimes referred to as the "nexus" requirement) because the cellular communication modules that practice the '935, '711, and '943 Patents enable the CPAP machine to transmit patient data over a cellular network for use with the DI Software, which provides actionable information to the patient's therapists, nurses, and physicians to communicate and coordinate care, consistent with Philips Sleep's objective of providing data timely and efficiently for the proactive delivery of care across the healthcare continuum. *See* discussion *supra*. The R&D devoted to the DI Software thus exploits the technology of the '935, '711, and '943 Patents, which allows improved cellular communications that incorporate LTE.

Compls. Br. at 288.

However, Philips does not cite to any expert testimony or evidence that the DI Software satisfies the nexus requirement of subparagraph (C). Philips's argument does not present evidence establishing a nexus between the asserted claims and the DI Software or DI Products, is insufficient to satisfy the domestic industry requirement under subparagraph (C).

Indeed, Philips did not rebut the Staff's argument that there is no "evidence establishing a nexus of the elements of the asserted claims to the DI Software or DI Products." Staff Br. at 197; *see* Compls. Reply Br. at 117-21. Thus, Philips has not shown that it satisfied the economic prong of the domestic industry requirement under subparagraph (C).

E. "process of being established"

Philips argues:

> Philips also satisfies the domestic industry requirement because, with respect to the '935, '711, and '943 Patents, ***a domestic industry is in the process of being established*** based on past and continued investment in the new DreamStation2 machine—which was commercially released and began domestic manufacture after the initiation of this Investigation—and the [redacted] In view of all of the evidence of plant and equipment and production and R&D labor and capital expenditures described above, Philips has taken and will continue to take the necessary, tangible steps to establish a domestic industry in the U.S.
>
> DreamStation2 is Philips Sleep's next generation CPAP machine designed as an improvement to the DreamStation CPAP machine. [redacted] With respect to both machines, Dr. Akemann considered Philips Sleep's production and R&D investments in the context of its business and the industry and concluded they not only were significant now, but will also will be significant in the future based on the following factors:
>
> - Philips has planned and executed tangible steps to design, develop, make, and sell the DreamStation2 and [redacted] devices, including, *e.g.*, [redacted]
> - The DreamStation2 and [redacted] devices are [redacted].
> - The overall level of labor and capital investments for CPAP machines that practice the '935, '711, and '943 Patents is expected to remain large for those products.
> - DreamStation2 is commercially released since the filing of Philips' Complaint and Philips Sleep has already received

[redacted].

> CX-0009C (Akemann WS) at Q/A 160-65, 199-203, 218-222. Philips Sleep also expects deliver approximately [redacted]. CX-0005C (Bowen WS) at Q/A 46.

Compls. Br. at 288-89 (emphasis added).

Philips' argument that "a domestic industry is in the process of being established based on past and continued investment in the new DreamStation2 machine" is unpersuasive because it does not show a sufficient relationship to the statutory requirements of 19 U.S.C. § 1337(a)(2) and (3). Thus, Philips has not shown that "a domestic industry is in the process of being established."

* * *

Accordingly, the record evidence supports a finding that Philips has satisfied the economic prong of the domestic industry requirement of 19 U.S.C. § 1337(a) under subparagraphs (A) and (B), but not under subparagraph (C).

IX. Conclusions of Law

1. The Commission has subject matter, personal, and *in rem* jurisdiction in this investigation.

2. The accused products have been imported or sold for importation into the United States.

3. The accused products do not infringe the asserted claims (method claims 1-3, and apparatus claims 9-11, and 17) of U.S. Patent No. 7,944,935.

4. The accused products do not infringe the asserted claim (apparatus claim

12) of U.S. Patent No. 7,554,943 and asserted claims (apparatus claim 9 and method claim 12) of U.S. Patent No. 8,199,711.

5. The accused products do not infringe the asserted claims (method claims 1-4 and apparatus claims 5-8) of U.S. Patent No. 7,831,271.

6. The domestic industry requirement has not been satisfied with respect to U.S. Patent No. 7,944,935.

7. The domestic industry requirement has not been satisfied with respect to U.S. Patent Nos. 7,554,943 and 8,199,711.

8. The domestic industry requirement has not been satisfied with respect to U.S. Patent No. 7,831,271.

9. It has not been shown by clear and convincing evidence that the asserted claims of the following patents are patent ineligible under 35 U.S.C. § 101: U.S. Patent No. 7,944,935; U.S. Patent No. 7,554,943; U.S. Patent No. 8,199,711; and U.S. Patent No. 7,831,271.

10. It has not been shown by clear and convincing evidence that the asserted claims of U.S. Patent No. 7,944,935 are invalid.

11. It has been shown by clear and convincing evidence that asserted claim 12 of U.S. Patent No. 7,554,943 and asserted claim 9 of U.S. Patent No. 8,199,711 are indefinite.

12. It has been shown by clear and convincing evidence that claims 9 and 12 of U.S. Patent No. 8,199,711 are rendered obvious by certain prior art references.

13. It has been shown by clear and convincing evidence that asserted claims 1-8 of U.S. Patent No. 7,831,271 are indefinite.

14. It has been shown by clear and convincing evidence that the four asserted patents are unenforceable under the doctrine of implied waiver.

15. Complainants have not granted express and/or implied license to the asserted patents.

16. Complainants are not equitably estopped from challenging invalidity of the asserted patents.

X. Initial Determination on Violation

Accordingly, it is the INITIAL DETERMINATION of the undersigned that a violation of section 337 (19 U.S.C. § 1337) has not occurred in the importation into the United States, the sale for importation, or the sale within the United States after importation, of certain UMTS and LTE cellular communication modules and products containing the same that infringe the asserted claims of U.S. Patent No. 7,944,935; U.S. Patent No. 7,554,943; U.S. Patent No. 8,199,711; and U.S. Patent No. 7,831,271.

Further, this Initial Determination, together with the record of the hearing in this investigation consisting of (1) the transcript of the hearing, with appropriate corrections as may hereafter be ordered, and (2) the exhibits received into evidence in this investigation, is CERTIFIED to the Commission.

In accordance with 19 C.F.R. § 210.39(c), all material found to be confidential by the undersigned under 19 C.F.R. § 210.5 is to be given *in camera* treatment.

The Secretary shall serve a public version of this Initial Determination upon all parties of record and the confidential version upon counsel who are signatories to the Protective Order, as amended, issued in this investigation.

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

XI. Order

To expedite service of the public version of this document, the parties shall file a joint proposed public version, on the date and in the manner required by Order No. 8.

DPShaw

David P. Shaw
Administrative Law Judge

Issued: April 1, 2022