

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE, INC., BLACKBERRY CORP.,¹
LG ELECTRONICS INC., SAMSUNG ELECTRONICS CO., LTD., and
SAMSUNG ELECTRONICS AMERICA, INC.,
Petitioner,

v.

UNILOC 2017 LLC,
Patent Owner.

IPR2019-00222
Patent 7,167,487 B2

Before JOSIAH C. COCKS, ROBERT J. WEINSCHENK, and
JOHN F. HORVATH, *Administrative Patent Judges*.

HORVATH, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

¹ BlackBerry Corp., who filed a petition in IPR2019-01282, has been joined as a petitioner to this proceeding.

I. INTRODUCTION

A. Background

Apple Inc., LG Electronics Inc., Samsung Electronics Co., Ltd., and Samsung Electronics America, Inc. (“Petitioner”)^{2,3} filed a Petition requesting *inter partes* review of claims 1–6 (“the challenged claims”) of U.S. Patent No. 7,167,487 B2 (Ex. 1001, “the ’487 patent”). Paper 5 (“Pet.”), 1. Uniloc 2017 LLC (“Patent Owner”), filed a Preliminary Response. Paper 9. Upon consideration of the Petition and Preliminary Response, we instituted *inter partes* review of all challenged claims on all grounds raised. Paper 11 (“Dec. Inst.”).

Patent Owner filed a Response to the Petition (Paper 14, “PO Resp.”), Petitioner filed a Reply (Paper 16, “Pet. Reply”), and Patent Owner filed a Sur-Reply (Paper 17, “PO Sur-Reply”). An oral hearing was held on March 3, 2020, and the hearing transcript is included in the record. See Paper 26 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6(b). This is a Final Written Decision under 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons set forth below, we find Petitioner has shown by a preponderance of evidence that claims 1–6 of the ’487 patent are unpatentable.

² Petitioner identifies LG Electronics U.S.A., Inc. and LG Electronics Mobilecomm U.S.A. Inc. as real parties-in-interest. Pet. 76.

³ BlackBerry Corp., which has been joined as a party to this proceeding, is also a Petitioner in this proceeding. See Paper 15.

B. Related Matters

Petitioner and Patent Owner identify various matters between Uniloc USA, Inc. or Uniloc 2017 LLC, and Apple, Inc., Blackberry Corp., HTC America, Inc., Huawei Device USA, Inc., LG Electronics USA, Inc., Microsoft Corp., Motorola Mobility, LLC, Samsung Electronics America, Inc., or ZTE (USA), in various Federal District Courts, including District Courts for the Eastern, Western, and Northern Districts of Texas, the Central and Northern Districts of California, the District of Delaware, and the Western District of Washington, as matters that can affect or be affected by this proceeding. *See* Pet. 76; Paper 7, 2.

*C. Evidence Relied Upon*⁴

References	Effective Date ⁵	Exhibit
<i>MAC protocol specification (Release 1999), 3rd Generation Partnership Project, 3GPP TS 25.321 V3.6.0 (2000–12) (“TS 25.321”).</i>	Dec. 10, 2000	1007
<i>Corrections to logical channel priorities in MAC protocol, 3rd Generation Partnership Project, 3GPP TSG-RAN WG2 Meeting #18 (“R2-010182”).</i>	Jan. 23, 2001	1008
<i>Services provided by the physical layer (Release 1999), 3rd Generation Partnership Project, 3GPP TS 25.302 V3.6.0 (2000–09) (“TS 25.302”).</i>	Oct. 16, 2000	1009

⁴ Petitioner also relies upon the Declarations of R. Michael Buehrer, Ph.D., FIEEE (Exs. 1002, 1019) and Craig Bishop (Exs. 1006, 1018).

⁵ Petitioner relies upon the Bishop Declarations to establish the public availability of TS 25.302, TS 25.321, and R2-010182, and their respective publication dates. *See* Pet. 9–10, 12, 15; Pet. Reply 1–16.

References		Effective Date ⁵	Exhibit
Peisa	US 6,850,540 B1	Feb. 25, 2000 ⁶	1013

D. Instituted Grounds of Unpatentability

We instituted review on the following grounds of unpatentability:

Claims Challenged	35 U.S.C. §	Reference(s)/Basis
1–6	103(a)	TS 25.321, TS 25.302, R2-010182
1, 2	103(a)	Peisa
4–6	103(a)	Peisa, TS 25.302

II. ANALYSIS

A. The '487 Patent

The '487 patent “relates to a network with a first plurality of logic channels with which is associated a second plurality of transport channels . . . for the transmission of transport blocks formed from packet units of the logic channels.” Ex. 1001, 1:4–8. According to the '487 patent, “[s]uch a network is known from the 3rd Generation Partnership Project (3GPP); Technical Specification Group (TSG) RAN; Working Group 2 (WG2); Radio Interface Protocol Architecture; TS 25.302 V3.6.0.” *Id.* at 1:9–12.

The '487 patent describes the 3GPP network architecture disclosed in TS 25.302 V3.6.0 as follows:

A physical layer offers transport channels or transport links to the MAC [Media Access Control] layer. The MAC layer makes logic channels or logic links available to an RLC layer (RLC=Radio Link Control). The packet units formed in the

⁶ Petitioner relies on the U.S. filing date of Peisa to establish its availability as prior art under 35 U.S.C. § 102(e). *See* Pet. 17.

RLC layer are packed in transport blocks in the MAC layer, which blocks are transmitted from the physical layer through physical channels to a terminal, or the other way about, by the radio network control. Apart from such a multiplex or demultiplex function, the MAC layer also has the function of selecting suitable transport format combinations (TFC). A transport format combination represents a combination of transport formats for each transport channel. The transport format combination describes inter alia how the transport channels are multiplexed into a physical channel in the physical layer.

Id. at 1:14–28. This architecture is illustrated in Figure 2 of the '487 patent, which is reproduced below.

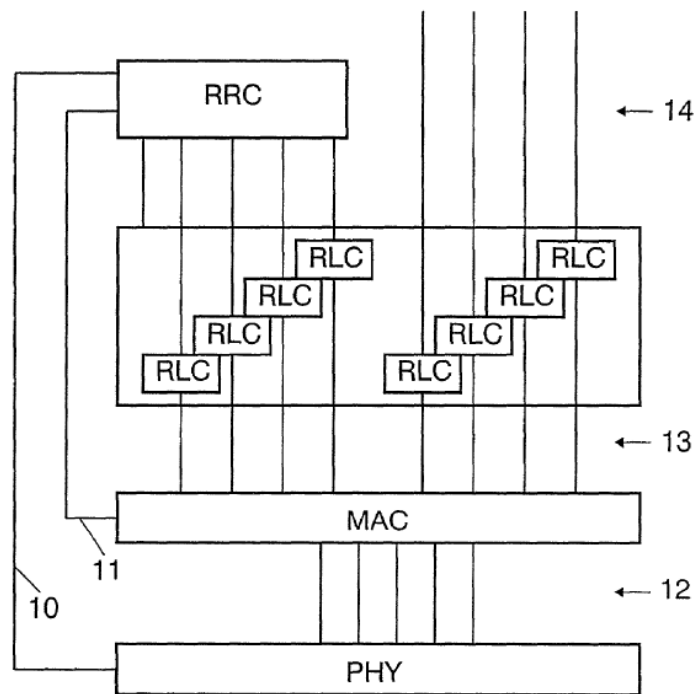


FIG. 2

Figure 2 is a “layer model” illustrating the various functions of a terminal or radio network controller in a 3GPP wireless network. *Id.* at 4:63–64, 6:9–16. The “layer model” includes a physical layer (PHY), a data connection

layer (MAC and RLC), and a radio resource control layer (RRC). *Id.* at 6:16–19. The RRC layer is responsible for signaling between a wireless terminal and a base station’s radio network controller (RNC), and “controls the layers MAC and PHY via control lines 10 and 11.” *Id.* at 6:22–27. The RLC layer receives data in the form of packet units from application channels 14. *Id.* at 6:32–35. The MAC layer makes logic channels 13 available to the RLC layer. *Id.* at 6:30–32. The PHY layer makes transport channels 12 available to the MAC layer. *Id.* at 6:29–30.

The MAC layer packs RLC layer packet units into transport blocks that are transmitted from a base station’s radio network controller to a mobile terminal, or vice versa, through a radio channel. *Id.* at 6:34–37. It does so by selecting a suitable transport format combination from a set of transport format combinations. *Id.* at 6:37–40. Each transport format combination describes “how the transport channels are multiplexed into a physical channel in the physical layer (time multiplex).” *Id.* at 6:42–45. The MAC layer selection is performed by a selection algorithm that can be implemented in hardware or software, and in a mobile station or radio network controller. *Id.* at 7:43–47. The selection algorithm selects a transport format combination based on MAC logic channel priorities (MLPs), RLC layer data buffer occupancies (BOs), and transport channel transmission time intervals (TTIs). *Id.* at 7:15–22.

The ’487 patent is directed toward “an optimized selection process for selecting a suitable transport format combination.” *Id.* at 1:29–31. The optimized selection process integrates into the MAC selection algorithm “the condition that a minimum bit rate can be guaranteed suitable for the respective logic channels.” *Id.* at 1:61–65.

B. Illustrative Claims

Of the challenged claims, claim 1 of the '487 patent is independent, and each of claims 2–6 depend from it, either directly or indirectly. Claim 1 is reproduced below.

1. A network with a first plurality of logic channels with which is associated a second plurality of transport channels, which transport channels are provided for transmitting transport blocks formed from packet units of the logic channels, wherein a plurality of valid transport format combinations is allocated to the transport channels, which combinations indicate the transport blocks provided for transmission on each transport channel, wherein a selection algorithm is provided for selecting the transport format combinations, and wherein the selection algorithm uses a minimum bit rate criteria applicable to the respective logic channel.

Ex. 1001, 14:40–50.

C. Level of Ordinary Skill in the Art

The Petition itself does not set forth the qualifications of a person of ordinary skill in the art, but instead cites to paragraphs 24 through 26 of the Buehrer Declaration. *See* Pet. 14 n.3 (citing Ex. 1002 ¶¶ 24–26). According to Dr. Buehrer, a person of ordinary skill in the art would have had “a Bachelor’s Degree (or higher degree) in an academic area emphasizing telecommunications systems with two or more years of work experience in telecommunications systems” or “at least a Master of Science Degree in an academic area emphasizing telecommunications systems, or an equivalent field (or a similar technical Master’s Degree, or higher degree) with a concentration in telecommunications systems.” Ex. 1002 ¶ 25. Patent Owner does not dispute this definition or offer an alternative. *See* PO Resp.

12.

We find Dr. Buehrer's opinion regarding the qualifications of a person of ordinary skill in the art reasonably reflects the level of skill evidenced by the prior art of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). Accordingly, we adopt it as our own.

D. Claim Construction

In an *inter partes* review filed before November 13, 2018, claim terms of an unexpired patent are given their broadest reasonable interpretation in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b) (2018); 83 Fed. Reg. 51,340. Under the broadest reasonable interpretation standard, claim terms are generally given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art, in the context of the entire disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). Only claim terms which are in controversy need to be construed and only to the extent necessary to resolve the controversy. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017).

Neither Petitioner nor Patent Owner propose any construction for any claim term. *See* Pet. 20–21; PO Resp. 13. Rather, both parties agree that no claim term requires express construction, and that all terms should be understood to have their broadest reasonable interpretation in light of the specification. *See* Pet. 20–21; PO Resp. 13. We did not construe any claim term in our Institution Decision, and neither party disputes that decision. *See* Dec. Inst. 7; PO Resp. 13, Pet. Reply 1–26.

Accordingly, we construe all claim terms to have their plain and ordinary meaning, and do not expressly construe any claim terms.

E. Public Availability of R2-010182

R2-010182 is a 3GPP change request entitled “Corrections to logical channel priorities in MAC protocol,” and proposes a modification to TS 25.321 affecting both the UE and RAN. Ex. 1008, 1, 4. Petitioner argues R2-010182 is a printed publication that is prior art under 35 U.S.C. § 102(a) because it was “discussed during meeting #18 of the 3GPP TSG RAN working group (WG2) in January 2001, and was publicly available on the 3GPP file server no later than January 23, 2001.” Pet. 12 (citing Ex. 1006 §§ IV, VII).

According to Petitioner’s declarant, Mr. Bishop, R2-010182 (Ex. 1008) is a true and correct copy of a Microsoft Word document dated January 16, 2001, that is contained in the compressed file R2-010182.zip that was uploaded to the 3GPP FTP (File Transfer Protocol) server on January 23, 2001. Ex. 1006 ¶ 35. Once the compressed file was uploaded, R2-010182 was available to any member of the public because “[n]o password is needed to access any information on the 3GPP Web site, all information is openly published.” *Id.* ¶ 24 (quoting Appx. B, 7) (emphasis omitted).⁷ Mr. Bishop further testifies that a version of R2-010182, differing in editorial but not technical content, was emailed to over 1000 subscribers of the 3GPP RAN WG2 email distribution list on January 11, 2001. *Id.*

⁷ Mr. Bishop identifies Appendix B as the 3GPP FAQ (Frequently Asked Questions) web page. Ex. 1006 ¶ 23. Although Mr. Bishop cites page 8 of the web page, the quoted material appears at the bottom of page 7. We correct the citation here. We also note that Mr. Bishop alternates between citing the pages of the Appendices to his declaration, as he does here, and citing the pages of the declaration itself. For example, page 7 of Appendix B is page 59 of the Bishop Declaration.

¶¶ 27–30, 39–40 (citing Appx. G).⁸ Once emailed, the technical content of R2-010182 was “effectively in the public domain, since membership of the exploder [i.e., email distribution list] is open to all and is (almost) unpoliced.” *Id.* ¶¶ 29, 40 (quoting Appx. B, 8). Finally, Mr. Bishop testifies that (a) meeting # 18 of 3GPP RAN WG2 was held in January 2001 and attended by 95 people, (b) R2-010182 was discussed at the meeting, and that as a result (c) R2-010182 was disseminated to “RAN2 # 18 meeting participants no later than the last day of the meeting which was January 19, 2001.” *Id.* ¶ 41 (citing Appx. H, 94–95).⁹ Mr. Bishop further testifies that it was the customary practice of 3GPP to place no restrictions on how “meeting participants dispose of the documents” presented at a meeting. *Id.* ¶ 40 (citing Appx. B, 56, 60).¹⁰

Patent Owner argues Petitioner has failed to establish the public accessibility of R2-010182 for several reasons. PO Resp. 14–18. First, Patent Owner argues that Petitioner has failed to demonstrate “the 3GPP file server is indexed or searchable in any meaningful way.” *Id.* at 15. Second, Patent Owner argues that R2-010182 “could not have been disseminated at a

⁸ Mr. Bishop identifies Appendix G as a true and correct copy of R2-0100xx, a Microsoft Word document having the same technical content as R2-010182 and contained in the compressed file R2-0100xx.zip that was attached to an email sent to the 3GPP RAN WG2 email distribution list on January 11, 2001. Ex. 1006 ¶ 39.

⁹ Mr. Bishop identifies Appendix H as “[t]he approved meeting report from RAN WG2 [meeting] # 18,” and cites to the pages of his declaration rather than to the pages of Appendix H itself. Ex. 1006 ¶ 41.

¹⁰ Mr. Bishop cites to the pages of his declaration, rather than to the pages of Appendix B itself.

meeting held from January 15th to 19th,” as Petitioner contends, because “[t]here is *no evidence* . . . that [R2-010182] was created prior to January 23, 2001.” *Id.* at 16. Third, Patent Owner argues that any discussion of R2-010182 at the January 2001 meeting is evidence of “what was ‘known . . . by others . . . rather than what was described in a printed publication,” and cannot be used as prior art in an *inter partes* review. *Id.* at 16–17. Fourth, Patent Owner argues Mr. Bishop does not have personal knowledge that ninety-five people attended the January 2001 meeting and provides no testimony indicating how many people attended the session at which R2-010182 was discussed. *Id.* at 17. Fifth, Patent Owner argues that Petitioner has failed to produce any evidence that R2-010182 was actually “shown to anyone” at the meeting or that anyone “accessed the document.” *Id.* Sixth, and finally, Patent Owner argues that even if R2-010182 had been disseminated at the January 2001 meeting, there is no evidence that anyone other than 3GPP members accessed the document, and access by 3GPP members alone “does not show accessibility of the type of skilled artisans interested in the subject matter that qualify for public accessibility.” *Id.* at 18 (citing *Samsung Elecs. Co. v. Infobridge Pte, Ltd.*, 929 F.3d 1363, 1372 (Fed. Cir. 2019)).

Petitioner, in its Reply, addresses each of Patent Owner’s objections via some combination of Mr. Bishop’s original declaration (Ex. 1006), Mr. Bishop’s supplemental declaration (Ex. 1018), and citations to public accessibility case law. *See* Pet. Reply 1–16.¹¹ For example, Petitioner

¹¹ Petitioner’s Reply is enumerated pages 1 through 4 followed by pages 1 through 16. Unless indicated otherwise, all citations to pages 1 through 4 of Petitioner’s Reply are to the second set of enumerated pages.

reiterates that R2-010182 was made publicly accessible because it was discussed at the 3GPP TSG RAN WG2 meeting in January 2001. *Id.* at 1 (citing Ex. 1006 ¶ 41). Petitioner adds that ninety-five people attended this meeting, including delegates from Mitsubishi, Qualcomm, Ericsson, and Philips, and Mitsubishi's delegate presented R2-010182 for discussion at the meeting. *Id.* at 1–2 (citing Ex. 1006 ¶ 41; Ex. 1018 ¶¶ 15, 19, 20).

Patent Owner, in its Sur-Reply, argues any public accessibility evidence or argument presented in Petitioner's Reply should not be considered because Petitioner's Reply amounts to "16 pages of entirely new arguments . . . and an additional over 100 pages of new Declaration and documents." PO Sur-Reply 2–3. Patent Owner argues this evidence and arguments are new because "the terms 'printed publication' and 'public accessibility' do not appear in the Petition" and "none of the Court of Appeals case law relating to the standard of public accessibility . . . appears in the Petition." *Id.* at 5.

Whether a reference "qualifies as a 'printed publication' under § 102 is a legal conclusion based on underlying factual determinations." *Kyocera Wireless Corp. v. Int'l Trade Comm'n*, 545 F.3d 1340, 1350 (Fed. Cir. 2008). Public accessibility is "the touchstone in determining whether a reference constitutes a 'printed publication.'" *In re Hall*, 781 F.2d 897, 898–99 (Fed. Cir. 1986). It "is determined on a case-by-case basis, and based on the 'facts and circumstances surrounding the reference's disclosure to members of the public.'" *In re Lister*, 583 F.3d 1307, 1311 (Fed. Cir. 2009) (quoting *In re Klopfenstein*, 380 F.3d 1345, 1350 (Fed. Cir. 2004)). "[A] variety of factors may be useful in determining whether a reference was publicly accessible." *Id.* One such factor is whether a party intended to

make the reference public. *See In re Wyer*, 655 F.2d 221, 227 (CCPA 1981). Other factors include the length of time the reference was displayed, the expertise of the audience to which it was displayed, whether the displaying party had a reasonable expectation that the reference would not be copied, efforts made to prevent copying, and the ease or simplicity with which the reference could have been copied. *Klopfenstein*, 380 F.3d at 1350–51. “Evidence of routine business practice can be sufficient to prove that a reference was made [publicly] accessible.” *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 1568–69 (Fed. Cir. 1988).

Upon consideration of the evidence and arguments presented, we find Petitioner has demonstrated by a preponderance of evidence that R2-010182 was publicly accessible. R2-010182 was presented at meeting #18 of 3GPP RAN WG2, which was attended by ninety-five people, and was discussed at that meeting. *See* Ex. 1006 ¶¶ 41–42 (citing App. H, 94–95). The customary practice of 3GPP was to place no restrictions on how “meeting participants dispose of the [meeting] documents,” and there is no evidence that 3GPP diverged from that practice with respect to R2-010182. *Id.* ¶ 40 (citing Appx. B, 56, 60). Moreover, the 3GPP members who were present at meeting # 18 and participated in the discussion of R2-010182 were representatives of various commercial entities (e.g., Qualcomm, Ericsson, and Philips) interested in the development of mobile communications, and were skilled in the relevant art. *Id.* at 94–95 (Appx. H).¹²

¹² We cite to the underlying evidence in the Bishop declaration (i.e., to the documents attached as Appendices to the Bishop declaration) by citing to the pages of the Bishop declaration and parenthetically indicating the Appendix to which the pages belong.

Together, these facts lead us to conclude that Mitsubishi Electric, the author of R2-010182, intended to and did distribute R2-010182 to skilled artisans who were interested in its technical content, with no restrictions on their ability to freely copy and distribute R2-010182.¹³ Thus, R2-010182 was made publicly accessible by its disclosure at meeting # 18. See *Klopfenstein*, 360 F.3d at 1352 (finding a fourteen-slide presentation was made publicly accessible when presented at a meeting of the American Association of Cereal Chemists and printed onto poster boards that were displayed without restriction for 2.5 days); see also *Massachusetts Inst. of Tech. v. AB Fortia*, 774 F.2d 1104, 1108–09 (Fed. Cir. 1985) (“MIT”) (finding a paper was made publicly accessible when it was presented to 50–500 cell culturists at the First International Cell Culture Congress and distributed without restriction to as many as six cell culturists).

We are not persuaded by Patent Owner’s numerous arguments that Petitioner has failed to demonstrate the public accessibility of R2-010182.¹⁴

¹³ Indeed, just prior to meeting # 18, Mitsubishi emailed, without restriction, a draft document having the same technical content as R2-010182 to over 1000 members of the 3GPP RAN WG2 distribution list, which was open to the public. Ex. 1006 ¶¶ 28–29, 39–40. This further evidences Mitsubishi’s intent to disseminate the technical content of R2-010182 to the public. See *Wyer*, 655 F.2d at 227 (finding “intent to make public” an aid in determining whether a document is a printed publication). To be clear, we do not rely on Mitsubishi’s email distribution as an independent basis for finding that R2-010182 was publicly accessible. Rather, we rely on the email distribution as further evidence of Mitsubishi’s intent to publicly disseminate R2-010182 at meeting # 18.

¹⁴ We conclude that R2-010182 was made publicly accessible solely on the theories and evidence presented in the Petition and Mr. Bishop’s first declaration. Patent Owner acknowledged at the oral hearing that there is no prejudice to Patent Owner if we rely only on the evidence submitted with the

First, the evidence shows that R2-010182 existed before meeting # 18 of 3GPP RAN WG2, and was discussed at that meeting. *See* Ex. 1006 ¶ 35 (Mr. Bishop’s testimony that the R2-010182.zip file “contain[s] a Microsoft Word document, ‘R2-010182.doc’, with a date stamp of ‘1/16/2001.’”); *id.* at 94–95 (Appx. H) (official minutes of 3GPP RAN WG2 meeting # 18 indicating R2-010182 was discussed at that meeting). Second, the public accessibility of R2-010182 does not depend on whether it was actually distributed to or accessed by anyone at meeting # 18. Its presentation, without restriction, to persons skilled in the art at the meeting is sufficient to establish its public accessibility. *See Klopfenstein*, 380 F.3d at 1347 (finding a document presented at a meeting was publicly accessible even though “no copies of the presentation were disseminated.”); *see also Constant*, 848 F.2d at 1569 (“If accessibility is proved, there is no requirement to show that particular members of the public actually received the information.”). Third, Mr. Bishop’s personal knowledge is not needed to prove R2-010182 was presented at meeting # 18. The documentary evidence cited by Petitioner and generated as part of 3GPP’s routine business practice is uncontested and demonstrates that R2-010182 was presented at the meeting. *See Constant* 848 F.2d at 1568–69 (“Evidence of routine business practice can be sufficient to prove that a reference was made [publicly] accessible.”).

Lastly, we are not persuaded by Patent Owner’s argument that Mitsubishi’s disclosure of R2-010182 to “other members of 3GPP who attended the meeting does not show accessibility by the type of skilled

Petition. Tr. 55:24–56:16. Thus, we do not address the merits of Patent Owner’s argument regarding the propriety of Petitioner’s Reply and Mr. Bishop’s second declaration.

artisans interested in the subject matter that qualify for public accessibility.” PO Resp. 18. As discussed above, Mitsubishi disclosed R2-010182, without restriction, to 3GPP members who were employees and representatives of various commercial entities that competed with Mitsubishi in the mobile communications market, including representatives from Qualcomm, Ericsson, and Philips. *See* Ex. 1006, 94–95 (Appx. H). The disclosure of a document to interested members of the relevant public, without restriction on the subsequent dissemination of the document, is sufficient to establish the public accessibility of the document, even when the disclosure is made in a private setting. *See, e.g., GoPro, Inc. v. Contour IP Holding LLC*, 908 F.3d 690, 695 (Fed. Cir, 2018) (finding dissemination of a document to trade show attendees who were interested in the art, without restriction, made the document publicly accessible even though the trade show was not open to the public); *see also Klopfenstein*, 360 F.3d at 1347, 1352 (finding the unrestricted disclosure of a document at a meeting of the *American Association of Cereal Chemists* made the document publicly accessible); *see also Garrett Corp. v. U.S.*, 422 F.2d 874, 865 (Ct. Cl. 1970) (finding that although distribution of a government report “to government agencies and personnel alone may not constitute publication . . . *distribution to commercial companies without restriction on use clearly does.*”) (emphasis added).¹⁵

We disagree with Patent Owner’s argument that *Infobridge* stands for

¹⁵ The Federal Circuit has adopted “the holdings of the Court of Claims and the Court of Customs and Patent Appeals announced before the close of business on September 30, 1982.” *South Corp. v. U.S.*, 690 F.2d 1368, 1370 (Fed. Cir. 1982) (en banc).

the opposite proposition, i.e., that the unrestricted disclosure of R2-010182 to members of 3GPP does not evidence a public disclosure. The facts presented in *Infobridge* are readily distinguishable from the facts presented here. First, the *Infobridge* petitioner did not argue, and thus waived any argument, that a contested “reference was publicly accessible because it was discussed at a [first] meeting or disseminated at [a second] meeting” of a standardization body. *Infobridge*, 929 F.3d at 1370. By contrast, Petitioner argues that R2-010182 was made publicly accessible *because* it was discussed at a standardization body meeting, i.e., at meeting # 18 of 3GPP RAN WG2. *See* Pet. 12. Second, the *Infobridge* petitioner could not have shown that presenting the contested document at a standardization group meeting made the document publicly accessible prior art because the evidence showed the contested document “was not created until *after* the [first] meeting” and any disclosure at the second meeting “occurred *after* the relevant critical date.” *Infobridge*, 929 F.3d at 1370. By contrast, the evidence presented by Petitioner sufficiently demonstrates that R2-010182 was created on January 16, 2001, which is *before* the January 17, 2001 start date of the portion of meeting # 18 dedicated to non-release 4 contributions, and that R2-010182 was discussed at meeting #18 sometime between January 17 and 19, 2001, which is *before* the critical date of May 21, 2001.¹⁶ *See* Ex. 1006 ¶¶ 35, 41 (citing Appx. H, 94–95).

¹⁶ Meeting # 18 of 3GPP TSG RAN WG2 was held between January 15 and 19, 2001. Ex. 1006, 66 (Appx. D). However, “[d]uring the 15th and 16th January 2001 only Release 4 contributions” were discussed at the meeting. *Id.* R2-010182 is dated January 17–19, 2001, i.e., for discussion during the non-release 4 portion of meeting # 18. Ex. 1008, 1.

For the reasons discussed above, we find Petitioner has demonstrated by a preponderance of evidence that R2-010182 is prior art under 35 U.S.C. § 102(a) because it was disclosed without restriction at meeting # 18 of 3GPP RAN WG2 in January 2001 and discussed at that meeting by interested representatives of competing commercial companies. Moreover, because we find this disclosure sufficiently demonstrates the public accessibility of R2-010182, we need not consider whether the subsequent uploading of R2-010182 to the 3GPP FTP server on January 23, 2001, also made the document publicly accessible. *See Beloit Corp. v. Valmet Oy*, 742 F.2d 1421, 1423 (Fed. Cir. 1984) (finding an administrative agency is at liberty to reach a decision based on a single dispositive issue).

F. The TS 25.321, R2-010182, and TS 25.302 Challenge

Petitioner argues claims 1–6 are unpatentable as obvious over the combination of TS 25.321, R2-010182, and TS 25.302. Pet. 21–47; Pet. Reply 16–21. Patent Owner disputes this. PO Resp. 19–21; PO Sur-Reply 11–16. For the reasons discussed below, Petitioner demonstrates by a preponderance of evidence that claims 1–6 are unpatentable over TS 25.321, R2-010182, and TS 25.302.

1. TS 25.321

TS 25.321 is a specification of the UMTS (Universal Mobile Telephone System) MAC layer protocol. Ex. 1007, 6. The specification describes, *inter alia*, the architecture, channel structure, functions, protocol data units (PDUs), formats, and parameters of the MAC layer. *Id.* The channel structure includes transport channels between the MAC layer and Layer 1 (e.g., Forward Access Channel or FACH), and logical channels between the MAC layer and RLC layer (e.g., Broadcast Control Channel or

BCCH). *Id.* at 15–16. The MAC layer functions to map logical channels to transport channels, select transport formats for each transport channel, handle data flow priorities, and multiplex PDUs from higher protocol layers into transport blocks delivered to physical layer transport channels (and vice-versa). *Id.* at 17–18.

A mobile terminal or user equipment (UE) MAC architecture is illustrated in Figure 4.2.3.1.1 of TS 25.321, which is reproduced below.

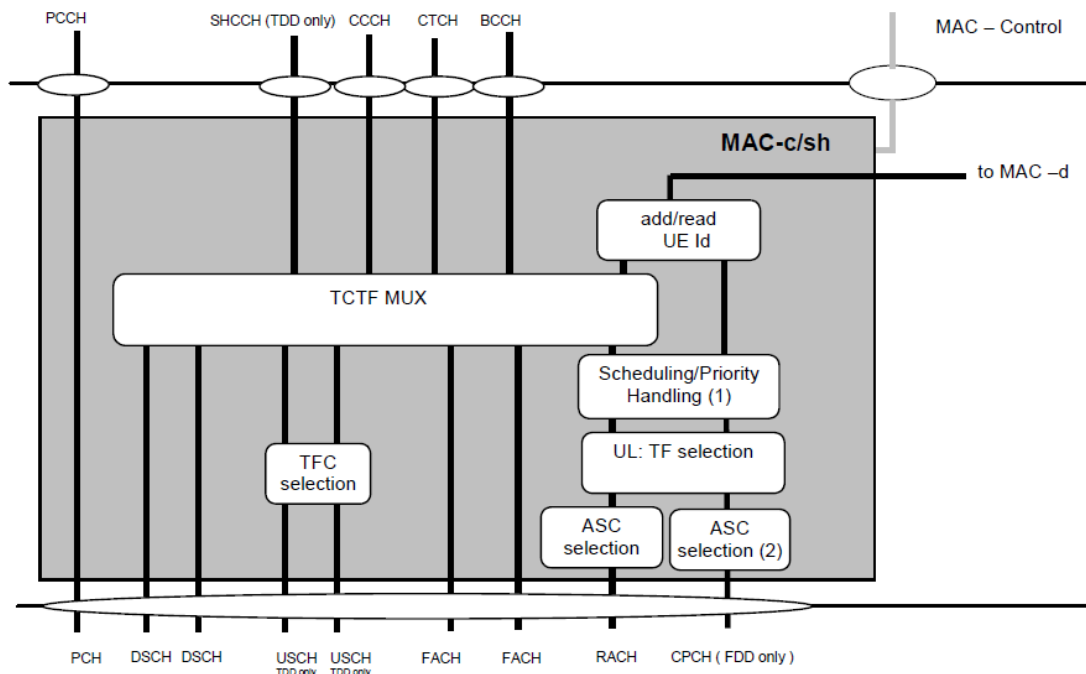


Figure 4.2.3.1.1 of TS 25.321 is a schematic illustration of the MAC layer on the UE side of the network. *Id.* at 11. The figure illustrates the mapping of logical channels (e.g., BCCH) to transport channels (e.g., FACH), which “depends on the multiplexing that is configured by RRC.” *Id.* at 9. In particular, RRC maps logical channels to transport channels by generating a set of transport format combinations (TFCs), and the MAC layer selects one of these TFCs to fit PDUs from the RLC layer into available transport blocks on the transport channels. *Id.* at 9–10.

TS 25.321 discloses another function of the MAC layer—handling different priorities for different UE data flows. *Id.* at 17. In particular, the RRC assigns a priority value—MLP or MAC Logical channel Priority—between 1 and 8 for each logical channel, and the MAC layer selects a TFC “according to the priorities between logical channels indicated by RRC.” *Id.* at 30, 38. The logical channel priorities are absolute, allowing the MAC to “maximize the transmission of high priority data.” *Id.*

In addition to disclosing the UE MAC layer architecture and functionality, TS 25.321 discloses the RNC (Radio Network Controller) MAC layer architecture and functionality, which exists on the UTRAN (UMTS Terrestrial Radio Access Network) side of the network. *See id.* at 12–15. The RNC MAC layer architecture and functionality is “similar to the UE case with the exception that there will be one MAC-d for each UE and each UE (MAC-d) that is associated with a particular cell may be associated with that cell’s MAC-c/sh.” *Id.* at 12. Moreover, the “MAC-c/sh is located in the controlling RNC while MAC-d is located in the serving RNC.” *Id.*

2. R2-010182

R2-010182 is a change request, entitled “Corrections to logical channel priorities in MAC protocol,” that proposes a modification to TS 25.321 affecting both the UE and RAN. Ex. 1008, 1, 4. R2-010182 introduces “new parameters to characterise MAC logical channels for TFC selection,” and modifies the TFC selection algorithm “to take into account these new parameters.” *Id.* The new parameters, i.e., MinGBr, MaxBr, and TW, “complete the current MLP for representing logical channel priorities.” *Id.* at 1.

R2-010182 identified several problems with “the current algorithm proposed for TFC selection in MAC . . . because of its absolute priority scheme.” *Id.* One problem was that the absolute priority algorithm provided “only one way to represent the quality of service at logical channel level (MLP),” which was “not sufficient to characterise all the applications foreseen for UMTS.” *Id.* Another problem was that the absolute priority algorithm systematically prevented low priority logical channels from transmitting data because “[l]ogical channels of higher MLP [lower priority] can never preempt lower MLP [higher priority] logical channels.” *Id.* at 2.

R2-010182 proposed introducing three “new parameters completing MLP to express accurately the needs of different applications in term[s] of bit rate.” *Id.* The new parameters are “TW” representing “the time period on which the allocated bit rate for the logical channel is estimated” based on a number of previous transmission time intervals (TTIs); “MinGBr” representing the minimum guaranteed bit rate or “basic needs of the logical channel,” and “MaxBr” representing the maximum bit rate or “nominal needs of the logical channel.” *Id.*

R2-010182 assigns separate values to the MLP, TW, MinGBr, and MaxBr parameters to characterize each of the logical channels in the proposed TFC selection algorithm. *Id.* This is shown in the table provided on page 2 of R2-010182, which is reproduced below.

	LC1	LC2
MLP	1	2
TW(TTI)	3	4
MinGBr	100	100
MaxBr	200	200

The Table shows how separate values of MLP, TW, MinGBr, and MaxBr are assigned to logical channels LC1 and LC2. *Id.* In particular, logical channel LC1 is assigned a priority (MLP) of 1, a minimum guaranteed bit rate (MinGBr) of 100 bits/TW measured over a time window (TW) of 3 TTI, and a maximum bit rate (MaxBr) of 200 bits/TW measured over the 3 TTI time window. *Id.* It also shows that logical channel LC2 is assigned a priority (MLP) of 2, a minimum guaranteed bit rate (MinGBr) of 100 bits/TW measured over a time window (TW) of 4 TTI, and a maximum bit rate (MaxBr) of 200 bits/TW measured over the 4 TTI time window. *Id.*

The proposed algorithm tries “to reach the MinGBr for each logical channel in . . . descending order of priority,” and upon achieving that goal tries “to reach the MaxBr for each logical channel in . . . descending order of priority,” and upon achieving that goal tries “to serve the logical channels which still have remaining data (best effort), still in . . . descending order of priority.” *Id.*

3. TS 25.302

TS 25.302 is “a technical specification of the services provided by the physical layer of UTRA [UMTS Terrestrial Radio Access] to upper layers.” Ex. 1009, 7. According to TS 25.302, “[t]he physical layer offers data transport services to higher layers. . . . through the use of transport channels

via the MAC sub-layer.” *Id.* at 10. The physical layer operates “according to the L1 radio frame timing,” and the transport blocks or “the data accepted by the physical layer to be jointly encoded is then tied exactly to this L1 frame timing.” *Id.*

TS 25.302 discloses that transport blocks are transmitted as transport block sets “exchanged between L1 and MAC at the same time instance using the same transport channel.” *Id.* at 17. Transport block sets are “transferred by the physical layer on the radio interface” over a transmission time interval (TTI) “defined as the inter-arrival time of Transport Block Sets” that is “always a multiple of the minimum interleaving period (e.g., 10ms, the length of one Radio Frame).” *Id.* This is illustrated in Figure 6 of TS 25.302, which is reproduced below.

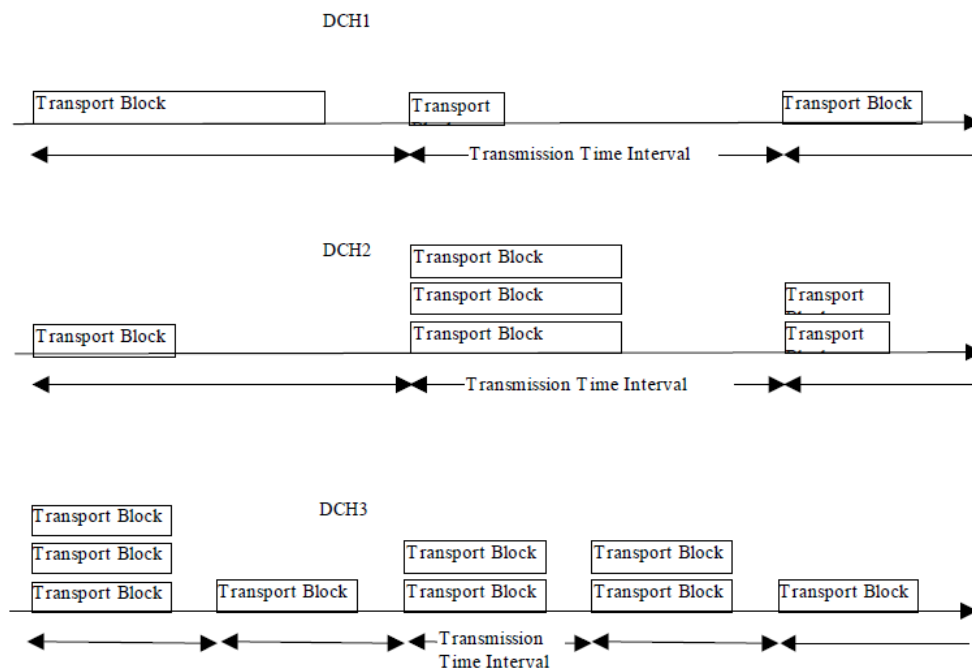


Figure 6: Exchange of data between MAC and L1

Figure 6 of TS 25.302 is a schematic illustration of “an example where Transport Block Sets, at certain time instances, are exchanged between

MAC and L1 via three parallel transport channels [DCH1–DCH3].” *Id.* “Each Transport Block Set consists of a number of Transport Blocks” transmitted over a transmission time interval (TTI), which is “the time between consecutive deliveries of data between MAC and L1.” *Id.*

TS 25.302 defines a transport format as “a format offered by L1 to MAC (and vice versa) for the delivery of a Transport Block Set during a Transmission Time Interval on a Transport Channel.” *Id.* at 18. TS 25.302 also defines a number of terms that are used to explain how the MAC layer selects a Transport Format to deliver a Transport Block Sset on a Transport Channel. First, a Transport Format Set is defined as “the set of Transport Formats associated to a Transport Channel.” *Id.* Next, a Transport Format Combination is defined as “an authorised combination of the combination of currently valid Transport Formats that can be submitted simultaneously to the layer 1 for transmission on a Coded Composite Transport Channel.” *Id.* at 19. Lastly, a Transport Format Combination Set is defined as “a set of Transport Format Combinations on a Coded Composite Transport Channel.” *Id.* TS 25.302 discloses:

The Transport Format Combination Set is what is given to MAC for control. However, the assignment of the Transport Format Combination Set is done by L3. When mapping data onto L1, MAC chooses between the different Transport Format Combinations given in the Transport Format Combination Set.

Id.

4. *The TS 25.321, R2-010182, and RS 25.302 combination*

Petitioner argues a person of ordinary skill in the art would have combined the teachings of TS 25.302 and TS 25.321 because they “describe features and functions of adjacent layers of the UMTS network

architecture—TS25.321 describes the MAC protocol specification while TS25.302 describes the services provided by the physical layer, which is below the MAC layer and provides services to the MAC layer.” Pet. 16 (citing Ex. 1002 ¶ 92). Petitioner further argues that “TS25.321 relies on several features corresponding to the physical layer, such as transport channels, transport format, and TFCs, which are defined in TS25.302,” and that TS 25.321 cites to TS 25.302 for “provisions which, through reference in [TS25.321] text, constitute provisions of the present [TS 25.321]” document. *Id.* (quoting Ex. 1007 § 2) (alteration in original). Relying on the testimony of Dr. Buehrer, Petitioner argues that a person of ordinary skill in the art, looking “to fully understand the specification of the MAC layer protocol in TS25.321, or to obtain a comprehensive view of the UMTS network, or both” would have “look[ed] at the two references together, combining their teachings” because “they are complementary technical specifications directed towards adjacent layers of the same UMTS protocol stack.” *Id.* at 16–17 (citing Ex. 1002 ¶¶ 101, 103).

Petitioner further argues that a person of ordinary skill in the art would have combined TS 25.321 and R2-010182 because the latter “explicitly notes that it is a change request (CR) for TS25.321,” and “copies verbatim § 11.4 of TS 25.321, marking the TFC selection algorithm in that section to show changes proposed by R2-010182.” *Id.* at 14 (citing Ex. 1008, 4–5). Relying on the testimony of Dr. Buehrer, Petitioner argues that a person of ordinary skill in the art “with knowledge of TS25.321 and considering possible limitations to its contents, such as the TFC selection algorithm, would have looked to routine 3GPP contributions (and change requests) like R2-010182,” and “would have understood that R2-010182

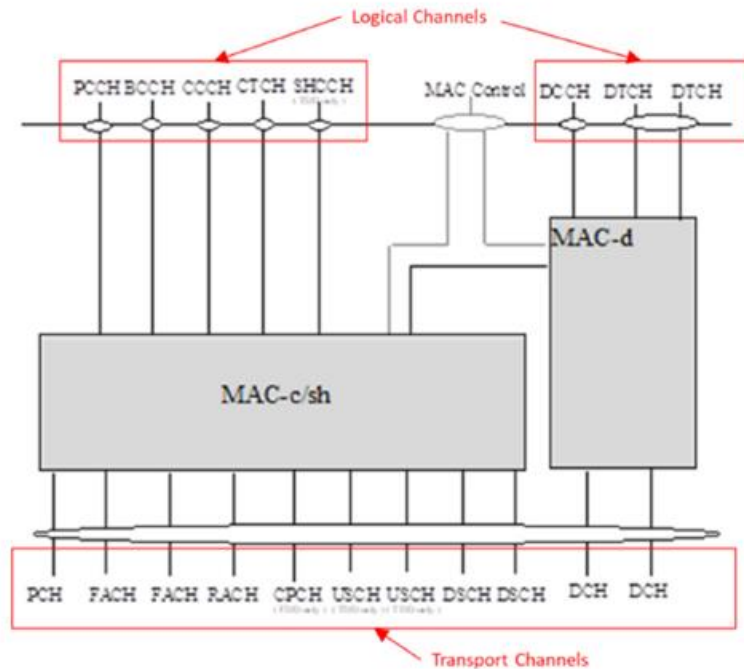
applies directly to TS25.321, and suggests improvements ‘to solve the problems encountered in the absolute priority scheme’ of TS25.321’s TFC selection algorithm.” *Id.* (quoting Ex. 1008, 2; citing Ex. 1002 ¶¶ 86–87).

Patent Owner does not dispute Petitioner’s reasoning to combine the teachings of TS 25.321, TS 25.302, and R2-010182. *See* PO Resp. 1–25.

We find Petitioner has articulated sufficient reasoning with rational underpinning to combine the teachings of TS 25.321, TS 25.302, and R2-010182 in the manner proposed. TS 25.321 and TS 25.302 are technical specifications for the MAC and PHY layers of the UMTS protocol, respectively, which are adjacent layers of the UMTS protocol stack designed to interoperate and pass data between them. Ex. 1002 ¶¶ 92–93. R2-010182 is a change request for TS 25.321 that proposes a specific change to the TFC selection algorithm described in TS 25.321. Ex. 1008, 4–5.

5. *Claim 1*

Claim 1 recites a network with a first plurality of logic channels associated with a second plurality of transport channels. Ex. 1001, 14:40–41. Petitioner demonstrates how TS 25.321 teaches this limitation. Pet. 22–23. For example, Petitioner provides an annotated version of Figure 4.2.3.1 of that reference, reproduced below, which shows a MAC layer that maps a plurality of logic channels to a plurality of transport channels.



TS25.321 FIG. 4.2.3.1 (annotated)

The Figure is a Petitioner-annotated version of Figure 4.2.3.1 shown in section 4.2.3 of TS 25.321, illustrating “specific connections between particular logic channels (e.g., PCCH, CCCH, DCCH) and particular transport channels (e.g., FACH, PCH, RACH).” *Id.* at 23 (citing Ex. 1007 §§ 4.3–4.3.3). For example, TS 25.321 discloses mappings between logic channel PCCH and transport channel PCH, logic channel CCCH and transport channels RACH and FACH, and logic channel DCCH and transport channels RACH and FACH. Ex. 1007 §§ 4.3.1–4.3.3. Patent Owner does not dispute Petitioner’s contentions regarding this limitation. See PO Resp. 19–21.

Claim 1 recites the transport channels are provided for transmitting blocks formed from packet units of the logic channels. Ex. 1001, 14:42–43.

Petitioner demonstrates how TS 25.321 teaches this limitation. *See* Pet. 23–24 (citing Ex. 1007 §§ 3.2–6.1; Ex. 1002 ¶¶ 112–113). For example, TS 25.321 teaches that “logical channels are described between MAC and RLC” layers, and the RLC layer “provides RLC-PDUs to the MAC, which fit into the available transport blocks on the transport channels.” Ex. 1007 §§ 4.2.3.1, 4.3. TS 25.321 further teaches the MAC layer “multiplex[es] . . . higher layer PDUs into . . . transport blocks delivered to . . . the physical layer on common transport channels.” *Id.* § 6.1. According to the un rebutted testimony of Dr. Buehrer, a person of ordinary skill in the art would have understand that PDUs or Protocol Data Units are “packet units of higher layers” that are “sent from a higher layer to a lower layer for processing.” Ex. 1002 ¶ 113. Patent Owner does not dispute Petitioner’s contentions regarding this limitation. *See* PO Resp. 19–21.

Claim 1 further recites a plurality of valid transport format combinations is allocated to the transport channels, which combinations indicate the transport blocks provided for transmission on each transport channel. Ex. 1001, 14:44–47. Petitioner demonstrates how TS 25.321 teaches this limitation by defining several of the terms used in a manner that expresses the recited relationships (e.g., that a transport format combination indicates the transport blocks that are provided for transmission on a transport channel). *See* Pet. 25–28 (citing/quoting Ex. 1009 §§ 7.1.2–7.1.9; Ex. 1002 ¶¶ 123–126). For example, TS 25.302 defines a Transport Format Combination Set as “a set of Transport Format Combinations on a Coded Composite Transport Channel,” where a Transport Format Combination is “a list of transport formats (Transport Format Set) which are applicable” to the Transport Channel. Ex. 1009 §§ 7.1.8, 7.1.9. TS 25.302 defines a

Transport Format as a format “for the delivery of a Transport Block Set during a Transmission Time Interval on a Transport Channel” having dynamic attributes that include Transport Block Size¹⁷ and Transport Block Set Size.¹⁸ *Id.* § 7.1.6. TS 25.302 defines a Transport Block Set as “a set of Transport Blocks, which are exchanged between L1¹⁹ and MAC at the same time instance using the same transport channel.” *Id.* § 7.1.2. Thus, TS 25.302 discloses that a transport format combination includes a list of transport formats, where each transport format includes a set of transport blocks that are provided to transmit data over a transport channel.

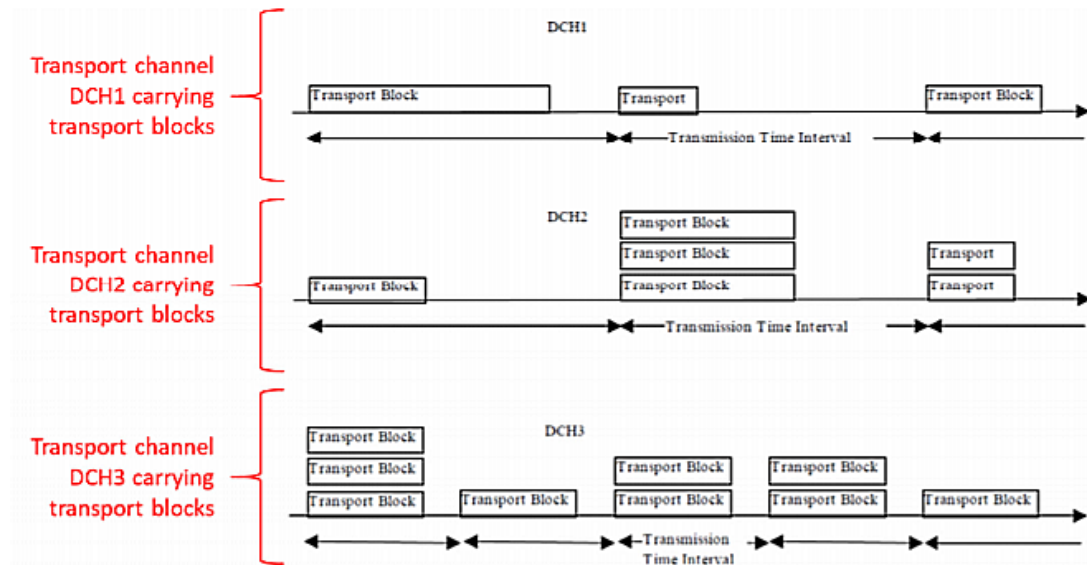
Moreover, TS 25.302 teaches that only valid transport format combinations are allocated to transport channels because “a Transport Format Combination Set need not contain all possible Transport Format Combinations that can be formed by Transport Format Sets of the corresponding Transport Channels. It is only the allowed combinations that are included,” where the allowed combinations contain only “Transport Formats . . . [that] do not correspond to high bit rates simultaneously.” *Id.* § 7.1.9.

Petitioner’s annotation of Figure 6 of TS 25.302, which is reproduced below, illustrates the meaning of some of these terms.

¹⁷ The Transport Block Size is “the number of bits in a Transport Block,” and is “fixed within a given Transport Block Set.” Ex. 1009 § 7.1.3.

¹⁸ The Transport Block Set Size is “the number of bits in a Transport Block Set.” Ex. 1009 § 7.1.4.

¹⁹ L1 refers to the physical or PHY protocol layer. *See* Ex. 1009 § 3.2.



TS25.302, FIG. 6 (annotated)

The Figure is a Petitioner-annotated version of Figure 6 of TS 25.302. See Pet. 28. Annotated Figure 6 illustrates the transmission of different Transport Block Sets on different Transport Channels (DCH1–DCH3) during different transmission time intervals (TTI’s). Ex. 1009 § 7.1.5. The Transport Block Sets that are shown differ in the number of transport blocks they contain, the length or size of the transport blocks they contain, and the number of TTI’s over which they are transmitted. Patent Owner does not dispute Petitioner’s contentions regarding this limitation. See PO Resp. 19–21.

Claim 1 further recites a selection algorithm for selecting the transport format combinations. Ex. 1001, 14:47–48. Petitioner demonstrates how TS 25.321 teaches this limitation. See Pet. 29 (citing/quoting Ex. 1007 §§ 4.2.3.1, 11.4; Ex. 1002 ¶¶ 132–133). For example, TS 25.321 teaches the MAC layer performs “transport format and transport format combination selection according to the transport format combination set . . . configured

by [the] RRC [layer].” Ex. 1007 § 4.2.3.1. TS 25.321 teaches each logical channel is assigned a priority value between 1 and 8 and “[t]he selection of TFC in the UE shall be done according to the priorities between logical channels indicated by RRC. Logical channels have absolute priority i.e. the UE shall maximize the transmission of high priority data.” *Id.* § 11.4. Patent Owner does not dispute Petitioner’s contentions regarding this limitation. *See* PO Resp. 19–21.

Lastly, claim 1 recites the selection algorithm uses a minimum bit rate criteria applicable to the respective logic channel. Ex. 1001, 14:49–50. The parties dispute whether this limitation is met. *See* Pet. 31–34; Pet. Reply 16–23; PO Resp. 19–21; PO Sur-Reply 11–16. Petitioner argues the limitation is met because R2-010182 proposes modifying the TFC selection algorithm described in § 11.4 of TS 25.321 by adding “new parameters . . . for MAC TFC selection,” including a minimum guaranteed bit rate (MinGBr) parameter. Pet. 31–32 (quoting Ex. 1008, 1, 5) (emphasis omitted). Petitioner argues MinGBr is the “minimum bit rate criteria” of claim 1 because it is integrated into the TFC selection algorithm and represents “the basic [(e.g., minimum)] needs of the logical channel,” which is consistent with the ’487 patent’s teaching of “integrating into the selection algorithm[] the condition that a minimum bit rate can be guaranteed suitable for the respective logical channels.” *Id.* at 32–33 (quoting Ex. 1001, 1:61–65; Ex. 1008, 2) (emphasis omitted) (alteration in original).

Petitioner argues a person skilled in the art, reading § 11.4 of TS 25.321 in view of R2-010182, would have modified TS 25.321’s absolute priority selection algorithm “to expressly consider a minimum bit rate criteria (MinGBr) of the logical channels” in order to “solve the

problems encountered in the absolute priority scheme,” including “the starvation of logical channels of lower priority.” *Id.* at 32–33 (quoting Ex. 1008, 2; citing Ex. 1002 ¶ 136).

Patent Owner argues the limitation is not met because the “minimum bit rate criteria” of claim 1 is a relative parameter that must be “applicable to the respective logical channel” and be “defined by [a] relevant application.” PO Resp. 19 (citing Ex. 1001, 1:65–2:1). By contrast, Patent Owner argues, MinGBr is “[a] global minimum bit rate criteria applicable to all logic channels” because it describes “the basic needs of the logical channel” and the amount of data that will be “transmitted with an absolute priority scheme.” *Id.* at 19–20 (quoting Ex. 1008, 2). Patent Owner further argues that the TFC selection algorithm in R2-010182 performs a single step for each logical channel, “and that step is to ‘try to reach *the* MinGBr,’” which is a single parameter “without any indication that it depends on the channel being considered.” *Id.* at 21. Patent Owner argues the Table on page 2 of R2-010182, which shows “the same value for MinGBr and MaxBr for both [logical] channels” LC1 and LC2, confirms that MinGBR is a global parameter. *Id.* This is evident from the Table, Patent Owner argues, because logical channels LC1 and LC2 can have different values for other parameters, such as MLP and TW. *See* PO Sur-Reply 13.

Petitioner counters that a person skilled in the art would have understood that R2-010182 “teaches that each logical channel has its own MinGBr parameter,” i.e., that R2-010182 modifies the TFC selection algorithm described in TS 25.321 to use a MinGBr “applicable to the respective logical channel” as required by claim 1. Pet. Reply 17 (citing Ex. 1002 ¶ 135). This is so, Petitioner argues, because MinGBr, MaxBr, and

TW are introduced to “complete the current MLP [absolute priority scheme] for representing Logical channel[] priorities,” and TS 25.321 teaches assigning MLP on a per channel basis. *Id.* at 18 (quoting Ex. 1008, 1; citing Ex. 1007 § 11.2.1; Ex. 1019 ¶ 10) (alteration in original). Moreover, Petitioner argues, R2-010182 introduces MinGBr, MaxBr, and TW to “express accurately the needs of different applications in terms of bit rate,” and “[a] global minimum bit rate for all logical channels is inconsistent with [this] objective.” *Id.* at 17–18 (quoting Ex. 1008, 2; citing Ex. 1019 ¶ 8). Petitioner further argues that both the ’487 patent and R2-010182 refer to the same 3GPP document, TS 23.107 (albeit different versions), to explain their minimum bit rate criteria. *Id.* at 19 (citing Ex. 1001, 2:1–6; Ex. 1008, 1; Exs. 1020–21). Finally, Petitioner argues that although the Table in R2-010182 shows two logical channels having the same MinGBr (i.e., 100 bits/TW), the two logical channels measure those bit rates over different TWs (i.e., 3 vs. 4 TTI) and so have different minimum guaranteed bit rates when measured in bits/sec. *Id.* at 21 (citing Ex. 1019 ¶¶ 11–13).

Finally, both parties argue we should ignore the other parties’ arguments. *See* Pet. Reply 17 (arguing that Patent Owner’s arguments that MinGBr is a global parameter are “only attorney arguments that should be given no weight.”); PO Sur-Reply 12–13 (arguing that “Petitioners seek to introduce the entirely new theory that the value of MinGBr of R2-010182 is variable. . . . the Board is respectfully requested not to consider Petitioners’ arguments.”).

Upon consideration of the evidence and arguments presented by the parties, summarized above, we find the combination of TS 25.321, TS 25.302, and R2-010182 teaches a TFC selection algorithm that “uses a

minimum bit rate criteria applicable to the respective logical channel” as recited in claim 1. First, we disagree with Patent Owner’s contention that we should ignore Petitioner’s Reply for seeking “to introduce the entirely new theory that the value of MinGBr is variable.” See PO Sur-Reply 12–13. The Petition identifies MinGBr as “read[ing] on the ‘minimum bit rate criteria’ recited in claim 1.” Pet. 32. Thus, the arguments and evidence presented in Petitioner’s Reply, i.e., that MinGBr is a “local” rather than a “global” parameter, were presented in response to Patent Owner’s arguments to the contrary. See PO Resp. 19–20. Petitioner is “not barred from elaborating on arguments on issues previously raised.” *Chamberlain Grp., Inc. v. One World Techs., Inc.*, 944 F.3d 919, 925 (Fed. Cir. 2019).

Second, in our Institution Decision, we made a preliminary finding, that:

although claim 1 requires each logical channel to have its own *respective* minimum bit rate that does not imply or require the minimum bit rate for every logical channel must be *different* from the minimum bit rate for every other logical channel. For example, logical channels *a*, *b*, and *c* can have *respective* minimum bit rates of (1) 100, 150, and 200, (2) 100, 100, and 200, or (3) 100, 100, and 100. In each case, logical channels *a*, *b*, and *c* have their own *respective* minimum bit rates, even though some or all of the logical channels *may* have the *same* minimum bit rate. In other words, claim 1 does not require the minimum bit rate for each logical channel to differ from the minimum bit rate for any or every other logical channel; it simply requires each logical channel to have its own or *respective* minimum bit rate that is independent of, though not necessary different from, the respective minimum bit rates for the other logical channels.

Dec. Inst. 37–38. Both parties agree with that preliminary finding, which we maintain here. See Tr. 24:19–25:5 (Petitioner’s agreement); *id.* at 72:15–73:3 (Patent Owner’s agreement).

TS 25.321 teaches a TFC selection algorithm that uses a single parameter (MLP) assigned to each logical channel to represent that logical channel’s priority. See Ex. 1007 § 11.2.1 (disclosing “*each* involved logical channel is assigned a MAC Logical channel Priority (MLP) in the range 1,...,8.”) (emphasis added). R2-010182 proposes modifying that TFC selection algorithm by introducing new parameters MinGBr, MaxBr, and TW to “*complete the current MLP for representing Logical channels priorities.*” Ex. 1008, 1 (emphasis added). R2-010182 teaches these new parameters are needed to “complet[e] MLP to express accurately the *needs of different applications* in term[s] of bit rate” because without these parameters “[t]here is only one way to represent the quality of service at logical channel level (MLP)” and the single MLP parameter “is not sufficient to *characterise all the applications* foreseen for UMTS.” *Id.* at 1–2 (emphasis added). R2-010182’s explanation that MinGBr is needed to “complete the current MLP” in order to accurately express “the needs of *different applications*” indicates that MinGBr (like MLP) can have different values assigned for different logical channels. *Id.* at 2 (emphasis added). Thus, MinGBr, MaxBR, and TW (like MLP) are parameters that “characterise MAC *logical channels* for TFC selection.” *Id.* at 4 (emphasis added).

This is expressly shown in the Table provided on page 2 of R2-010182, which is reproduced below.

	LC1	LC2
MLP	1	2
TW(TTI)	3	4
MinGBr	100	100
MaxBr	200	200

The Table shows two logical channels, LC1 and LC2, and the values assigned to the parameters MLP, TW, MinGBr, and MaxBr for each logical channel. Ex. 1008, 2. Logical channel LC1 is assigned an MLP of 1, a MinGBr of 100 bits/TW measured over a time window (TW) of 3 TTI, and a MaxBr of 200 bits/TW measured over the 3 TTI time window. *Id.*²⁰ Logical channel LC2 is assigned an MLP of 2, a MinGBr of 100 bits/TW measured over a 4 TTI time window, and a MaxBr of 200 bits/TW measured over the 4 TTI time window. *Id.*

Significantly, the Table shows logical channels LC1 and LC2 have separately assigned values for MLP, TW, MinGBr, and MaxBr, even though the MinGBr parameter for both channels is assigned the same value when that value is expressed as bits per TW (i.e., 100 bits/TW). *Id.* However, as discussed above, claim 1 does not require the minimum guaranteed bit rates for LC1 and LC2 to be different; only to be independent or separately assigned. Moreover, even though the Table shows LC1 and LC2 have the same MinGBr expressed in bits/TW, the Table also shows that LC1 and LC2 have different MinGBr's expressed in the more physical terms of bits/TTI or

²⁰ R2-010182 discloses that both MinGBr and MaxBr are measured in “units [of] Bits/TW.” Ex. 1008, 2.

bits/sec. When measured in bits/TTI, LC1 has a MinGBr of 33.3 bits/TTI and LC2 has a MinGBr of 25 bits/TTI.²¹ Assuming a TTI of 10 ms, LC1 has a MinGBr of 3.33 kbits/sec (33.3 bits/10 ms) and LC2 has a MinGBr of 2.5 kbits/sec (25 bits/10 ms).²²

For the reasons discussed above, we find Petitioner has demonstrated by a preponderance of evidence that the combination of TS 25.321, TS 25.302, and R2-010182 teaches all the limitations of claim 1, and that a person of ordinary skill in the art would have combined the teachings of these references in the manner suggested. Therefore, Petitioner has demonstrated that claim 1 is unpatentable over the combination of TS25.321, R2-010182, and TS25.302.

6. *Claim 2*

Claim 2 depends from claim 1, and further requires the network to carry out selection of the transport format combinations while taking into account a maximum bit rate obtaining for the respective logic channel. Ex. 1001, 14:51–54. Petitioner demonstrates how R2-010182 teaches this limitation. See Pet. 35–36 (quoting Ex. 1008, 2, 5). For example, R2-010182 teaches a TFC selection algorithm that uses a MaxBr parameter and tries “to reach the MaxBr for each logical channel in the descending order of priority.” Ex. 1008, 2. That is, the TFC selection algorithm tries to

²¹ LC1 and LC2 are both assigned a MinGBr of 100 bits/TW measured over time windows (TWs) of 3 TTI and 4 TTI, respectively. See Ex. 1008, 2. Thus, LC1 has a MinGBr of 33.3 bits/TTI (100 bits/3 TTI) and LC2 has a MinGBr of 25 bits/TTI (100 bits/4 TTI).

²² TTI is “defined as the inter-arrival time of Transport Block Sets” and is “always a multiple of the minimum interleaving period (e.g., 10 ms, the length of one Radio Frame).” Ex. 1009 § 7.1.5.

determine “a set of all TFCs . . . that allow the remaining amount of available N data bits to be transmitted such [that] MaxBr is not exceeded.” *Id.* at 5. Patent Owner does not dispute Petitioner’s contentions regarding this limitation. *See* PO Resp. 14–21.

For the reasons discussed above and in §§ II.F.4 and II.F.5, *supra*, we find Petitioner has demonstrated by a preponderance of evidence that the combination of TS 25.321, TS 25.302, and R2-010182 teaches all the limitations of claim 2, and that a person of ordinary skill in the art would have combined the teachings of these references in the manner suggested. Therefore, Petitioner has demonstrated that claim 2 is unpatentable over the combination of TS25.321, R2-010182, and TS25.302.

7. Claim 3

Claim 3 depends from claim 1, and further requires logic channels having different priorities to be imaged on exactly one transport channel. Ex. 1001, 14:55–57. Petitioner demonstrates how R2-010182 teaches this limitation. *See* Pet. 36–37 (citing Ex. 1008, 2, 3; Ex. 1002 ¶¶ 145–148). For example, R2-010182 teaches “2 logical channels are . . . mapped on two different transport channels,” and the two logical channels have different MLPs or priorities. Ex. 1008, 2. That is, logic channel LC1 has an MLP of 1 and is mapped onto transport channel TrCH1 and logic channel LC2 has an MLP of 2 and is mapped onto transport channel TrCH2. *Id.* Patent Owner does not dispute Petitioner’s contentions regarding this limitation. *See* PO Resp. 14–21.

Claim 3 further requires the network to carry out the allocation of the packet units in order of logic channel priority. Ex. 1001, 14:57–59. Petitioner demonstrates how R2-010182 teaches this limitation. *See* Pet. 38–

39 (quoting Ex. 1008, 2; citing Ex. 1002 ¶ 152). For example, according to the uncontested testimony of Dr. Buehrer, a person of skill in the art would have known that the MAC layer allocates RLC-PDUs to transport channels, where RLC-PDUs are “RLC layer packet units that are exchanged with the MAC layer over logical channels.” Ex. 1002 ¶ 152. R2-010182 teaches the MAC layer allocates RLC PDUs from logical channels to transport channels based on logical channel priority using a TFC selection algorithm that tries “to reach the MinGBr for each logical channel in the descending order of priority.” Ex. 1008, 2. Patent Owner does not dispute Petitioner’s contentions regarding this limitation. See PO Resp. 14–21.

For the reasons discussed above and in §§ II.F.4 and II.F.5, *supra*, we find Petitioner has demonstrated by a preponderance of evidence that the combination of TS 25.321, TS 25.302, and R2-010182 teaches all the limitations of claim 3, and that a person of ordinary skill in the art would have combined the teachings of these references in the manner suggested. Therefore, Petitioner has demonstrated that claim 3 is unpatentable over the combination of TS25.321, R2-010182, and TS25.302.

8. Claim 4

Claim 4 depends from claim 1, and further requires the network to be a wireless network having a radio network controller and a plurality of associated terminals. Ex. 1001, 14:60–62. Petitioner demonstrates how TS 25.321 teaches this limitation. See Pet. 21–23, 39–40 (citing Ex. 1007 §§ 1–6.1; Ex. 1002 ¶¶ 104–107, 153–154). For example, according to the uncontested testimony of Dr. Buehrer, TS 25.321 is a technical specification “for standards which define the radio access *network* of the UMTS cellular radio standard.” Ex. 1002 ¶ 105. TS 25.321 teaches the UMTS network

includes a plurality of UEs or mobile terminals having MAC entities and a radio network controller (RNC) having corresponding MAC entities such that “each UE [] that is associated with a particular cell may be associated with that cell’s MAC-c/sh located in the controlling RNC.” Ex. 1007 §§ 3.2, 4.2.4. Patent Owner does not dispute Petitioner’s contentions regarding this limitation. *See* PO Resp. 14–21.

Claim 4 further requires the radio network controller and plurality of terminals to be designed for transmitting transport blocks formed from packet units of a logic channel over a transport channel. Ex. 1001, 14:62–64. Petitioner demonstrates where TS 25.321 teaches this limitation. *See* Pet. 40–41 (citing/quoting Ex. 1007 §§ 4.2.3.1–4.2.4.1). For example, TS 25.321 teaches that RLC layers in both the UE (mobile) and RNC “provide[] RLC-PDUs to the MAC, which fit into the available transport blocks on the transport channels.” Ex. 1007 §§ 4.2.3.1, 4.2.4.1. Patent Owner does not dispute Petitioner’s contentions regarding this limitation. *See* PO Resp. 14–21.

Lastly, claim 4 requires the transport channel to have a transmission time interval of at least one radio frame, and to be active when the start of the transmission time interval coincides with that of a radio frame. Ex. 1001, 14:65–67. Petitioner demonstrates where TS 25.302 teaches these limitations. *See* Pet. 41–43 (citing/quoting Ex. 1009 §§ 5.1–7.1.5, Fig. 6). For example, TS 25.302 defines “transmission time interval” as “the inter-arrival time of Transport Block Sets,” which is “always a multiple of the minimum interleaving period (e.g., 10 ms, the length of one Radio Frame).” Ex. 1009 § 7.1.5. That is, a transmission time interval is at least as long as one radio frame as required by claim 4. TS 25.302 further teaches that

transport channels (e.g., DCH1–DCH3) transmit transport blocks at the start of TTI intervals because “[t]he physical layer operates exactly according to the L1 radio frame timing” and “[t]he transmission block timing is . . . tied exactly to this L1 frame timing, e.g., every transmission block is generated precisely every 10 ms, or a multiple of 10 ms.” *Id.* §§ 5.1, 7.1.5, Fig. 6.

Patent Owner does not dispute Petitioner’s contentions regarding this limitation. *See* PO Resp. 14–21.

For the reasons discussed above and in §§ II.F.4 and II.F.5, *supra*, we find Petitioner has demonstrated by a preponderance of evidence that the combination of TS 25.321, TS 25.302, and R2-010182 teaches all the limitations of claim 4, and that a person of ordinary skill in the art would have combined the teachings of these references in the manner suggested. Therefore, Petitioner has demonstrated that claim 4 is unpatentable over the combination of TS25.321, R2-010182, and TS25.302.

9. Claim 5

Claim 5 depends from claim 4, and further requires the MAC layer of the radio network controller or of a terminal to select respective transport formats. Ex. 1001, 15:1–4. Petitioner demonstrates where TS 25.321 teaches this limitation. *See* Pet. 43–44 (quoting Ex. 1007 § 4.2.3.1). For example, TS 25.321 teaches the MAC-c/sh on the UE or mobile terminal performs “transport format and transport format combination selection.” Ex. 1007 § 4.2.3.1. Patent Owner does not dispute Petitioner’s contentions regarding this limitation. *See* PO Resp. 14–21.

For the reasons discussed above and in §§ II.F.4 and II.F.5, *supra*, we find Petitioner has demonstrated by a preponderance of evidence that the combination of TS 25.321, TS 25.302, and R2-010182 teaches all the

limitations of claim 5, and that a person of ordinary skill in the art would have combined the teachings of these references in the manner suggested. Therefore, Petitioner has demonstrated that claim 5 is unpatentable over the combination of TS25.321, R2-010182, and TS25.302.

10. Claim 6

Claim 6 depends from claim 4, and further requires a radio link layer of the radio network controller or associated terminal to be designed to store packets provided for transmission. Ex. 1001, 15:5–8. Petitioner demonstrates where TS 25.321 teaches this limitation. See Pet. 45–46 (quoting Ex. 1007 §§ 4.2.3.1, 8.2.2). For example, TS 25.321 teaches the RLC layer of a UE (mobile terminal) “provides RLC-PDUs to the MAC, which fit into the available transport blocks on the transport channels” and includes a Buffer Occupancy (BO) parameter that indicates “the amount of data that is currently queued for transmission (or retransmission) in [the] RLC layer.” Ex. 1007 §§ 4.2.3.1, 8.2.2. Patent Owner does not dispute Petitioner’s contentions regarding this limitation. See PO Resp. 14–21.

Claim 6 further requires the MAC layer to be designed to form a transport block from a packet unit supplied through a logic channel. Ex. 1001, 15:8–10. Petitioner demonstrates where TS 25.321 teaches this limitation. See Pet. 46–47 (quoting Ex. 1007 §§ 4.2.3.1, 6.1). For example, TS 25.321 teaches “[t]he RLC provides RLC-PDUs to the MAC, which fit into the available transport blocks on the transport channels” and the MAC “maps between logical channels and transport channels” by performing the “multiplexing/demultiplexing of higher layer PDUs into/from transport blocks delivered . . . on common transport channels.” Ex. 1007 §§ 4.2.3.1,

6.1. Patent Owner does not dispute Petitioner's contentions regarding this limitation. *See* PO Resp. 14–21.

For the reasons discussed above and in §§ II.F.4 and II.F.5, *supra*, we find Petitioner has demonstrated by a preponderance of evidence that the combination of TS 25.321, TS 25.302, and R2-010182 teaches all the limitations of claim 5, and that a person of ordinary skill in the art would have combined the teachings of these references in the manner suggested. Therefore, Petitioner has demonstrated that claim 5 is unpatentable over the combination of TS25.321, R2-010182, and TS25.302.

G. The Peisa challenge

Petitioner argues claims 1 and 2 are unpatentable as obvious over Peisa. Pet. 47–64; Pet. Reply 21–26. Patent Owner disputes this. PO Resp. 22–25; PO Sur-Reply 16–18. For the reasons discussed below, Petitioner demonstrates by a preponderance of evidence that claims 1 and 2 are unpatentable over Peisa.

1. Peisa

Peisa discloses a UMTS network that includes a number of RNCs and a number of UEs, such as mobile terminals. Ex. 1013, 1:66–2:17. “User and signaling data may be carried between an RNC 140 and a UE 110 using Radio Access Bearers (RABs).” *Id.* at 4:28–30. UEs may be “allocated one or more RABs, each of which is capable of carrying a flow of user or signaling data” and each of which is “mapped onto respective logical channels.” *Id.* at 4:31–34. The UE includes a MAC layer that maps “a set of logical channels . . . onto a transport channel.” *Id.* at 4:34–36. The transport channel is then “mapped at the physical layer onto a [physical channel] for transmission over the air interface.” *Id.* at 4:43–47.

Figure 3 of Peisa, which is reproduced below, discloses the layer 2 or MAC protocol layer of Peisa's UMTS network.

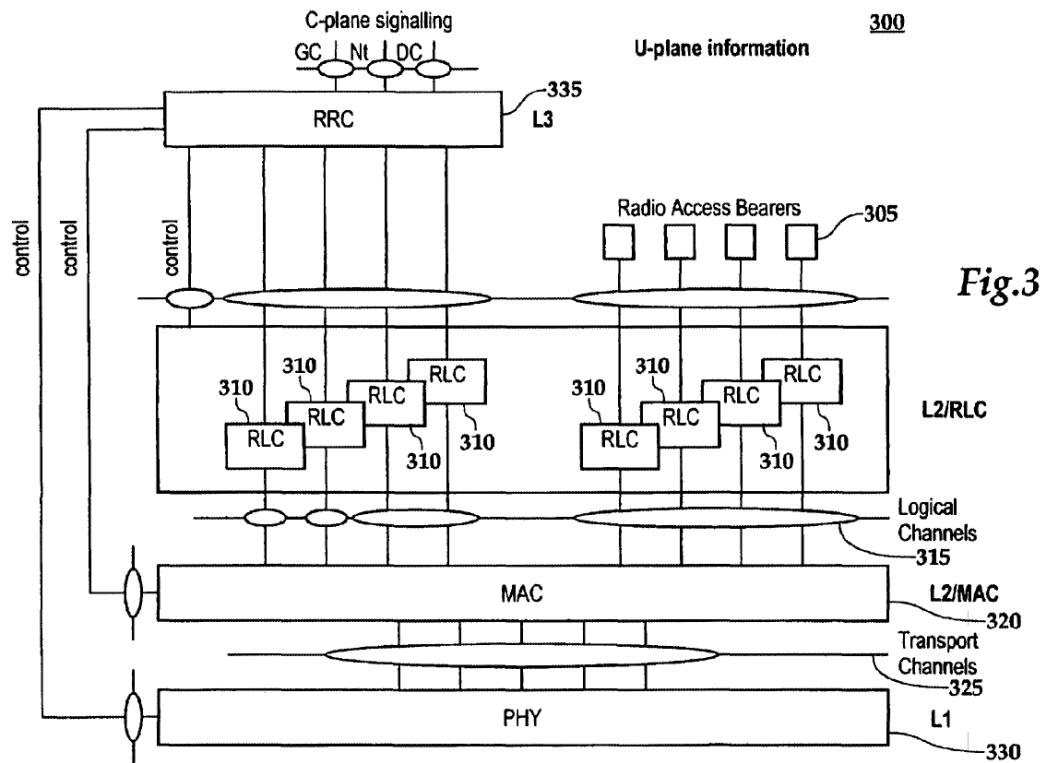


Figure 3 of Peisa “illustrates a simplified UMTS layer 2 protocol structure which is involved in the communication between mobile stations . . . or more broadly UEs 110, and Radio Network Controllers (RNCs) 140.” *Id.* at 6:31–37. The protocol structure “includes a set of Radio Access Bearers (RABs) 305 that make available radio resources (and services) to user applications.” *Id.* at 6:41–44. Data flowing from RABs 305 “are passed to respective Radio Link Control (RLC) entities 310 . . . [that] buffer the received data” and map RABs 305 “onto respective logical channels 315.” *Id.* at 6:45–50. MAC 320 “receives data transmitted in the logical channels 315 and further maps the data from the logical channels 315 onto a set of transport channels 325.” *Id.* at 6:50–54. “The transport channels 325 are

finally mapped to a single physical transport channel 330, which has a total bandwidth . . . allocated to it by the network.” *Id.* at 6:54–57.

Although MAC 320 “performs scheduling of outgoing data packets” buffered by RLCs 310, a Radio Resource Controller (RRC) “sets a limit on the maximum amount of data that can be transmitted from each flow by assigning a set of allowed Transport Format Combinations” to MAC 320. *Id.* at 10:19–25. A Transport Format Combination is a set of “all possible TFs [transport formats] for a given transport channel.” *Id.* at 7:17–20. RRC 335 defines the set of all possible TFs for a transport channel in terms of TB (Transport Block) sizes and TBS (Transport Block Set) sizes. *Id.* at 7:2–13. The TB size “tells the MAC entity what packet sizes it can use to transport data to the physical layer,” and the TBS size tells the MAC entity “the total number of bits [it] can transmit to the physical layer in a single transmission time interval (TTI).” *Id.* at 7:4–11. MAC 320 “independently decide[s] how much data is transmitted from each flow by choosing the best available Transport Format Combination (TFC) from the TFCS.” *Id.* at 10:25–28.

Peisa discloses a number of algorithms MAC 320 can use to select the best available TFC from a set of TFCs to schedule data transmissions. For example, Figure 4 is a “method in flowchart form for allocating bandwidth resources to data flow streams between entities in the exemplary second layer architecture of FIG. 3.” *Id.* at 3:49–54. Figures 6 and 8 are similarly “method[s] in flowchart form for scheduling data flows.” *Id.* at 3:55–57, 3:61–63. Figure 8 of Peisa is reproduced below.

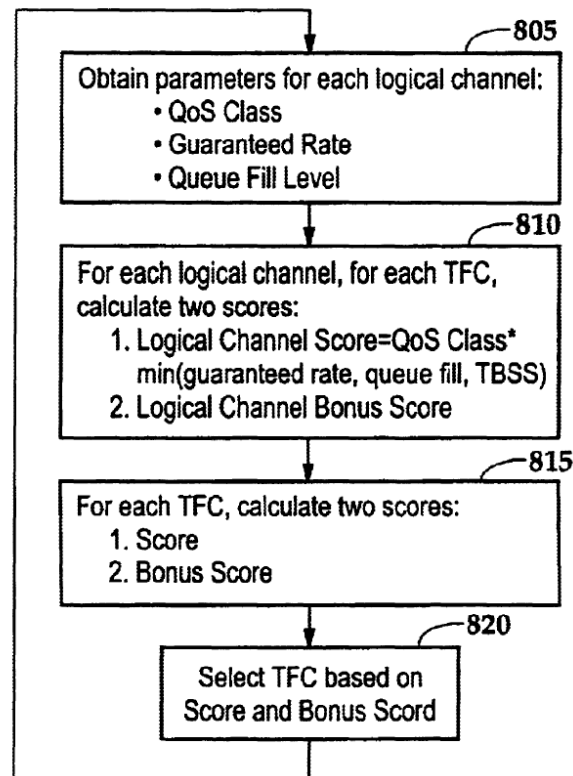


Fig.8

Figure 8 is an illustration of “the scheduling process in the MAC layer [that] includes the selection of a TFC from a TFCS using a two-step scoring process.” *Id.* at 18:29–34. At step 805, “several parameters are obtained for each logical channel.” *Id.* at 18:35–36, Fig. 8. For example, “[t]he QoS Class for each logical channel may be obtained from the corresponding RAB parameter” and “[t]he Guaranteed Rate for each logical channel may also be obtained from the corresponding RAB parameter.” *Id.* at 18:36–43. At step 810, a logical channel score and a logical channel bonus score are calculated for each logical channel. *Id.* at 18:60–67, Fig. 8. At step 815, for each TFC in the TFCS, a score is calculated by summing all of the logical channel scores and a bonus score is calculated by summing all of the logical channel bonus scores for all of the logical channels in the TFC. *Id.* at 19:1–6, Fig. 8.

At step 820, the MAC selects the TFC with the largest score, or the TFC with the largest bonus score if two or more TFCs have the same score. *Id.* at 19:7–10, Fig. 8. This algorithm “ensures that if there is a TFC that transmits at least the guaranteed rate for each flow, then that TFC is chosen.” *Id.* at 19:10–13.

2. *Claim 1*

Claim 1 recites a network with a first plurality of logic channels associated with a second plurality of transport channels. Ex. 1001, 14:40–41. Petitioner demonstrates how Peisa teaches this limitation. See Pet. 48–49 (citing/quoting Ex. 1013, 1:64–2:17, 6:41–65, Fig. 1). For example, Peisa discloses a UMTS network having a plurality of RNCs and UEs. Ex. 1013, 1:64–2:17, Fig. 1. The UEs and RNCs include a MAC layer that “receives data transmitted in the logical channels 315 and further maps the data from the logical channels 315 onto a set of transport channels 325.” *Id.* at 6:41–65. Patent Owner does not dispute Petitioner’s contentions regarding this limitation. See PO Resp. 22–25.

Claim 1 recites the transport channels are provided for transmitting blocks formed from packet units of the logic channels. Ex. 1001, 14:42–43. Petitioner demonstrates how Peisa teaches this limitation. See Pet. 51, 53 (quoting/citing Ex. 1013, 6:41–55, 7:2–11, 10:29–56, Fig. 3). For example, Peisa teaches the UEs and RNCs include “Radio Access Bearers (RABs) 305 that make available radio resources . . . to user applications.” Ex. 1013, 6:41–44, Fig. 3. Application “data flows . . . from the RABs 305 are passed to respective Radio Link Control (RLC) entities 310,” which buffer the data and map RABs 305 “onto respective logical channels 315.” *Id.* at 6:45–50. RLCs 310 deliver buffered data as “packets to [a] MAC entity.” *Id.* at

10:47–49. MAC entity 320 “receives data transmitted in the logical channels 315 and further maps the data from the logical channels 315 onto a set of transport channels 325.” *Id.* at 6:50–54. “For each transport channel 325, [an] RRC entity 335 defines one of several Transport Block (TB) sizes. Each Transport Block Size . . . tells the MAC entity what packet sizes it can use to transmit data to the physical layer.” *Id.* at 7:2–7. Patent Owner does not dispute Petitioner’s contentions regarding this limitation. *See* PO Resp. 22–25.

Claim 1 further recites a plurality of valid transport format combinations allocated to the transport channels that indicate the transport blocks provided for transmission on each transport channel. Ex. 1001, 14:44–47. Petitioner demonstrates how Peisa teaches this limitation. *See* Pet. 55–57 (quoting Ex. 1013, 7:11–13, 7:25–26, 7:30–35, 7:57–59). For example, Peisa teaches RRC 335 defines a Transport Block (TB) and Transport Block Set (TBS) size for each transport channel 325, and “[t]he TB size and TBS size, together with some additional information . . . form a TF [Transport Format].” Ex. 1013, 7:2–13. The “combination of [all possible] TFs is called a Transport Format Combination.” *Id.* at 7:17–20. RRC 335 then ensures “the total transmission capacity on all transport channels 325 does not exceed the transmission capacity of physical channel 330” by giving “MAC entity 320 a Transport Format Combination Set (TFCS), which contains the *allowed* Transport Format Combinations [TFCs] for all transport channels.” *Id.* at 7:30–35 (emphasis added). The *allowed* TFCs are the *valid* TFCs required by claim 1. Patent Owner does not dispute Petitioner’s contentions regarding this limitation. *See* PO Resp. 22–25.

Claim 1 further recites a selection algorithm for selecting the transport format combinations. Ex. 1001, 14:47–48. Petitioner demonstrates how Peisa teaches this limitation. See Pet. 58–59 (quoting Ex. 1013, 9:9–16, 11:43–47, 18:29–34). For example, Peisa teaches “a method of allocating transmission resources at a Media Access Control (MAC) entity” by “computing for each input flow to the MAC entity a fair share of the available output bandwidth of the MAC entity [and] selecting a Transport Format Combination (TFC) from a TFC Set (TFCS) on the basis of the bandwidth share computed.” Ex. 1013, 9:9–17. Peisa provides detailed disclosure of several algorithms for selecting a TFC from a TFCS, including a Figure 4 process described as an “exemplary algorithm for implementing . . . TFC selection,” and a Figure 8 process described as a flow chart for “the selection of a TFC from a TFCS using a two-step scoring process.” *Id.* at 11:43–47, 18:29–34. Patent Owner does not dispute Petitioner’s contentions regarding this limitation. See PO Resp. 22–25.

Lastly, claim 1 requires the selection algorithm to use a minimum bit rate criteria applicable to the respective logic channel. Ex. 1001, 14:49–50. The parties dispute whether this limitation is met. See Pet. 60–63; Pet. Reply 23–26; PO Resp. 22–25; PO Sur-Reply 16–18. Petitioner argues Peisa teaches this limitation because the TFC selection algorithm shown in Figure 4 “[s]chedules packets by optimizing the throughput while still keeping the fairness (i.e., guaranteed rates).” Pet. 61 (quoting/citing Ex. 1013, 11:43–49, Fig. 4) (emphasis omitted) (alteration in original). Petitioner further argues Peisa teaches this limitation because the TFC selection algorithm shown in Figure 8 “uses a two-step scoring process, relying on logical channel parameters that include the ‘Guaranteed Rate for

each logical channel.”” *Id.* (quoting Ex. 1013, 18:29–57) (emphasis omitted). Relying on the testimony of Dr. Beuhrer, Petitioner argues a person skilled in the art “would have understood that Peisa’s FIG. 8 flowchart corresponds to a selection algorithm that uses a minimum bit rate criteria” because it “selects a TFC that satisfies ‘at least the guaranteed rate for each flow,’ where a flow corresponds to a logical channel.” *Id.* at 63 (citing Ex. 1002 ¶¶ 257–260; Ex. 1013, 19:10–13).

Patent Owner argues that Petitioner has failed to establish that the TFC selection algorithms shown in Figures 4 and 8 of Peisa use “a minimum bit rate criteria.” See PO Resp. 22–25. Regarding Figure 4, Patent Owner argues Petitioner fails to explain how (a) “maintaining so-called ‘fairness (i.e. guaranteed rates),” (b) “calculating a fair MAC bandwidth share for each input flow,” or (c) selecting a TFC that “most closely matches the adjusted fair shares” teaches or suggests using a minimum bit rate criteria. *Id.* at 23. Moreover, Patent Owner argues, rather than teaching a *minimum* bit rate criteria, “Peisa describes the ‘fairness’ calculation of Figure 4 as applying ‘the *maximum* allowed rate for any logical channel.’” *Id.* (quoting Ex. 1013, 11:9–10) (emphasis added). Regarding Figure 8, Patent Owner argues Petitioner “fails to explain *why* the ‘Guaranteed Rate’ . . . necessarily constitutes” a minimum bit rate criteria, and further argues that a TFC selection that “meets or exceeds a guaranteed rate . . . does not necessarily mean that a different minimum rate is not also applicable.” *Id.* at 24–25.

Petitioner, again relying on the testimony of Dr. Buehrer, responds that a person skilled in the art “would have understood that Peisa teaches . . . selecting TFCs based on a minimum bit rate criteria.” Pet. Reply 23 (citing Ex. 1002 ¶¶ 95–98, 257–260). Petitioner further argues that the term

“guaranteed rate” is a term of art “well known in the context of QoS constraints of data flows to reflect a minimum resource requirement for the data flows.” *Id.* at 23–24 (citing Ex. 1019 ¶¶ 22–23). Petitioner argues the ’487 patent itself recognizes this by defining “minimum bit rate” in terms of 3GPP’s QoS specification, TS23.107, which “does not mention a ‘minimum bit rate,’ but only defines a ‘guaranteed bitrate’ QoS attribute” as a “[m]inimum resource requirement.” *Id.* at 24 (citing Ex. 1001, 2:1–6; quoting Ex. 1020 § 6.4.3.2) (alteration in original, emphasis omitted).

Regarding Peisa’s Figure 4 algorithm, Petitioner argues it “achieves the fair rate over time, thus providing a minimum rate over time” by providing each flow “at least their determined fair rate.” *Id.* at 25 (quoting Ex. 1013, 11:29–32) (emphasis omitted). Petitioner further argues the inclusion and use of a maximum rate as an upper limit in the Figure 4 algorithm “does not conflict with the understanding that the fair rate corresponds to a minimum rate or lower limit over time.” *Id.* (citing Ex. 1019 ¶ 26). Regarding Peisa’s Figure 8 algorithm, Petitioner reiterates that a person skilled in the art would have understood that a “guaranteed rate corresponds to a minimum bit rate” because the algorithm selects “a TFC that satisfies ‘at least the guaranteed rate’ for each flow (logical channel), where the phrase ‘at least’ indicates a lower limit (i.e., minimum) requirement.” *Id.* (quoting Ex. 1013, 19:10–13; citing Ex. 1002 ¶¶ 259–260). Moreover, Peisa teaches the Figure 8 algorithm “provide[s] the guaranteed rate transfer rate to all service classes” by “providing a minimum level of service to all flows.” *Id.* (quoting Ex. 1013, 20:9–32) (emphases omitted).

In its Sur-Reply, Patent Owner argues “Petitioner[] seek[s] to introduce evidence that Peisa would have used the terms ‘fairness’ and ‘guaranteed rate[]’ to mean a guaranteed bit rate as used in TS 23.107” but should have presented this information in the Petition rather than in the Reply. PO Sur-Reply 17. Patent Owner further argues that Petitioner’s explanation of the “fairness” of Peisa’s Figure 4 algorithm and of the “guaranteed bit rate” of Peisa’s Figure 8 algorithm fails to demonstrate how either algorithm teaches using a “minimum bit rate criteria.” *Id.* at 17–18.

Upon consideration of the evidence and arguments presented by the parties, summarized above, we find Peisa teaches a TFC selection algorithm that “uses a minimum bit rate criteria applicable to the respective logical channel.” Peisa teaches each logical channel is assigned its own or *respective* guaranteed bit rate. For example, the Figure 4 TFC selection algorithm “[s]chedules packets by optimizing the throughput . . . while still keeping the fairness (i.e., guaranteed rates).” Ex. 1013, 11:47–49. The Figure 8 algorithm, which is reproduced below, schedules packets based on scores calculated using `GuarRateVect[lch]`, an array indexed by the logical channel variable “`lch`.” *Id.* at 19:18–20:8.

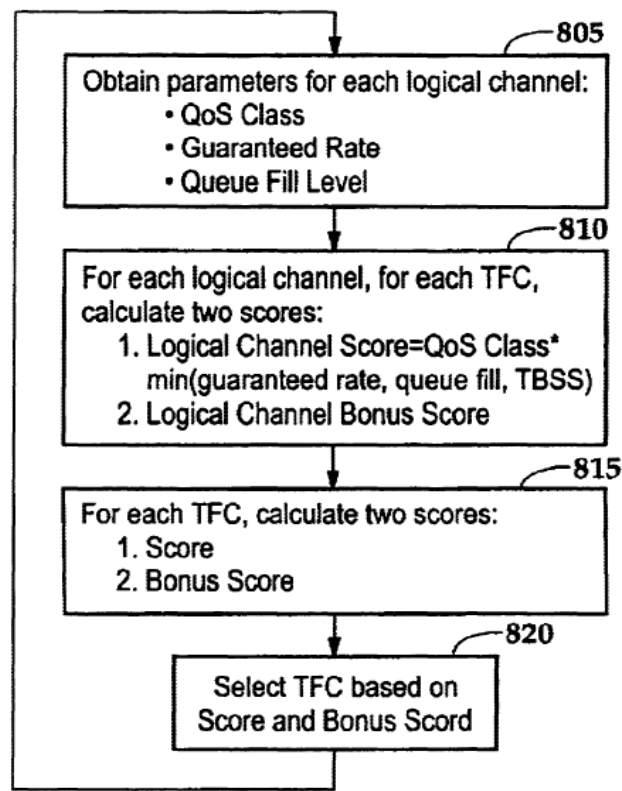


Fig.8

Figure 8 of Peisa, is a flowchart “for scheduling data flows.” *Id.* at 18:29–31. The scheduling algorithm obtains “several parameters . . . for each logical channel,” including a guaranteed rate “obtained from [a] corresponding RAB parameter.” *Id.* at 18:35–43. The algorithm then calculates (a) two scores for each logical channel using that logical channel’s guaranteed rate (step 810), (b) two scores for each TFC in a set of TFCs, where each TFC score adds one of the logical channels scores for all of the logical channels in the TFC (step 815), and selects (c) one of the TFCs in the set of TFCs based on the two TFC scores calculated for each TFC.²³ *See id.* at 18:29–19:10.

²³ The TFC selection is based on the Score and Bonus_score calculated for

According to the un rebutted testimony of Dr. Beuhrer, a person skilled in the art would have understood “Peisa’s TFC selection algorithm uses a minimum bit rate criteria . . . that corresponds to the guaranteed rate of the logical channel, since the algorithm of FIG. 8 selects a TFC that satisfies ‘at least the guaranteed rate for each flow,’ where a flow corresponds to a logical channel.” Ex. 1002 ¶ 260 (quoting Ex. 1013, 19:10–13). That is, a person skilled in the art would have understood Peisa’s algorithm uses “a minimum bit rate criteria of logical channels in performing TFC selection, since the algorithm attempts to satisfy at least (i.e., lower limit requirement) the guaranteed rate for each logical channel.” *Id.*

Although Patent Owner disputes Petitioner’s contention that Peisa’s fair or guaranteed rates are minimum bit rates, Patent Owner offers no evidence to counter Dr. Beuhrer’s opinion that a person skilled in the art would have understood that they are. *See* PO Resp. 24–25; *see also Johnston v. IVAC Corp.*, 885 F.2d 1574, 1581 (Fed. Cir. 1989) (“Attorneys’ argument is no substitute for evidence.”). Moreover, Petitioner’s Reply provides additional evidence supporting Dr. Beuhrer’s opinion. *See* Pet. Reply 23–24 (citing Ex. 1021 § 6.4.3.2; Ex. 1019 ¶¶ 22–24). For example, in a section entitled “UMTS Bearer Service Attributes” and a subsection entitled “Attributes discussed per traffic class,” TS 23.107 teaches the guaranteed bitrate is “used for resource allocation in UMTS” and that a

each TFC. *See* Ex. 1013, 19:7–10. Score is the sum of the scores (Score_lch), and Bonus_score is the sum of the bonus scores (Bonus_score_lch) calculated for each of the logical channels in the TFC. *Id.* at 18:60–19:6. Score_lch and Bonus_score_lch are calculated for each logical channel, and are a function of each logical channel’s Guaranteed Rate. *Id.* at 18:35–43, 18:60–57; FIG 8.

“*[m]inimum* resource requirement is determined by [the] guaranteed bitrate.”
Ex. 1021 §§ 6.4.3, 6.4.3.2 (emphasis added).

Although Patent Owner argues that we should not consider this additional evidence because it could have been presented in the Petition, we find it has been properly presented in response to Patent Owner’s argument that Peisa’s “fair rate” or “guaranteed rate” is not a minimum bitrate. See PO Resp. 24–25. The Petition cites Peisa for equating a “fair rate” with a “guaranteed rate,” and cites Dr. Buerher’s declaration for testimonial evidence that a person skilled in the art would have understood Peisa’s “guaranteed rate” to be a “minimum bit rate.” See Pet. 61, 63 (quoting Ex. 1013, 11:43–49; citing Ex. 1002 ¶¶ 257–260). Thus, the evidence presented in Petitioner’s Reply that “guaranteed rates” were known to be “minimum bit rates” or “minimum resource requirements” are (a) consistent with arguments raised in the Petition, and (b) responsive to arguments raised in Patent Owner’s Response. Accordingly, they are appropriately made in Petitioner’s Reply. See 37 C.F.R. § 42.23(b); see also *Chamberlain Grp.*, 944 F.3d at 925 (finding a party is “not barred from elaborating on arguments on issues previously raised.”).

For the reasons discussed above, we find Petitioner has demonstrated by a preponderance of evidence that a person skilled in the art would have understood Peisa to teach or suggest all the limitations of claim 1. Therefore, Petitioner has demonstrated by a preponderance of evidence that claim 1 is unpatentable over Peisa.

3. *Claim 2*

Claim 2 depends from claim 1, and further requires the network to carry out selection of the transport format combinations while taking into

account a maximum bit rate obtaining for the respective logic channel.
Ex. 1001, 14:51–54. Petitioner demonstrates how Peisa teaches this limitation. For example, Figure 4 of Peisa teaches a TFC selection algorithm that “achieve[s] optimal throughput as well as fairness” for each logical channel by reducing each logical channel’s fair share distribution “so as to not exceed . . . the maximum allowed rate for any logical channel.” Pet. 64 (quoting Ex. 1013, 11:5–10; citing Ex. 1002 ¶¶ 261–263) (emphasis omitted). According to Dr. Buehrer, a person skilled in the art would have understood this disclosure to mean Peisa’s Figure 4 TFC selection algorithm selects TFCs while taking into account each logical channel’s maximum allowed bit rate. See Ex. 1002 ¶¶ 261–263. Patent Owner does not dispute Petitioner’s contentions regarding this limitation. See PO Resp. 22–24.

For the reasons discussed above, we find Petitioner has demonstrated by a preponderance of evidence that a person skilled in the art would have understood Peisa to teach or suggest all the limitations of claim 2. Therefore, Petitioner has demonstrated by a preponderance of evidence that claim 2 is unpatentable over Peisa.

H. The Peisa and TS 25.302 challenge

Petitioner argues claims 4–6 are unpatentable as obvious over the combination of Peisa and TS 25.302. Pet. 64–74; Pet. Reply 21–26. Patent Owner disputes this for the same reasons discussed above with respect to claim 1. PO Resp. 22–25; PO Sur-Reply 16–18. For the reasons discussed below, Petitioner demonstrates by a preponderance of evidence that claims 4–6 are unpatentable over Peisa and TS 25.302

1. The Peisa and TS 25.302 combination

Petitioner argues “Peisa relies heavily on UMTS physical layer concepts,” including “transport channels, transport format, transport block size, transport block set size, TFC, [and] transmission time interval (TTI).” Pet. 20 (citing Ex. 1013, 2:48–57, 4:20–48, 6:66–7:36). Relying on the testimony of Dr. Buehrer, Petitioner argues a person skilled in the art wanting “to understand these UMTS physical layer concepts in greater detail” would have looked to “UMTS standards that described the physical layer attributes” and, therefore, “would have considered TS 25.302, which is the technical specification for UMTS physical layer services that provide[s] definitions of the UMTS physical layer attributes relied upon by Peisa.” *Id.* (citing Ex. 1009 § 7; Ex. 1002 ¶ 100). Patent Owner does not dispute this contention. See PO Resp. 22–25.

We find Petitioner has articulated sufficient reasoning with rational underpinning to combine the teachings of Peisa and TS 25.302. Peisa is concerned with data transfer between the MAC and PHY layers of the UMTS protocol stack, and TS 25.302 is a technical specification for the PHY layer that defines various terms in Peisa that are involved in that data transfer. See Ex. 1002 ¶ 100; Ex. 1009 § 7; Ex. 1013, 2:48–57, 4:20–47, 6:66–7:36.

2. Claim 4

Claim 4 depends from claim 1, and further requires the network to be a wireless network having a radio network controller and a plurality of associated terminals. Ex. 1001, 14:60–62. Petitioner demonstrates how Peisa teaches this limitation. See Pet. 65 (citing/quoting Ex. 1013, 1:54–2:5, 2:12–16, Fig. 1). For example, Peisa describes “an exemplary wireless

communications system . . . referred to as a UMTS network 100” that includes “a number of Radio Network Controllers (RNCs 140)” and “multiple user equipments (UEs) 110” that may be “mobile stations [or] mobile terminals.” Ex. 1013, 1:64–2:5, 2:12–16, Fig. 1. Patent Owner does not dispute Petitioner’s contentions regarding this limitation. See PO Resp. 22–25.

Claim 4 further requires the radio network controller and plurality of terminals to be designed for transmitting transport blocks formed from packet units of a logic channel over a transport channel. Ex. 1001, 14:62–64. Petitioner, relying on its previous analysis of claim 1, demonstrates how Peisa teaches this limitation. See Pet. 66; see also *id.* at 51–54 (citing Ex. 1013, 2:53–60, 4:11–47, 6:25–7:16, 10:29–56, Fig. 3; Ex. 1002 ¶¶ 240–244); § II.G.2, *supra*. For example, Peisa teaches both the UE and RNC contain a MAC layer. See Ex. 1013, 17:62–65, Fig. 3 (“The MAC-c, MAC-d, and RLC layers of UMTS may be located . . . in a Radio Network Controller (RNC) 140 (of FIG. 1) of the UTRAN [or] a User Equipment (UE) 110.”). Peisa further teaches the MAC layer transmits transport blocks formed from packet units of a logic channel over a transport channel. See *id.* at 2:53–60 (teaching the MAC layer “schedules packet transmission of various data flows”), 4:34–36 (teaching the MAC layer maps “a set of logical channels . . . onto a transport channel”), 7:2–16 (teaching the transport channel is defined by “one or several Transport Block (TB) sizes,” where each TB size “tells the MAC entity what packet sizes it can use to transmit data”). Patent Owner does not dispute Petitioner’s contentions regarding this limitation. See PO Resp. 22–25.

Lastly, claim 4 requires the transport channel to have a transmission time interval of at least one radio frame, and to be active when the start of the transmission time interval coincides with that of a radio frame.

Ex. 1001, 14:65–67. Petitioner demonstrates how the combination of Peisa and TS 25.302 teaches this limitation. *See* Pet. 66–67 (quoting Ex. 1013, 7:2–24; quoting/citing Ex. 1009 §§ 5.1, 7.1.5, Fig. 6). For example, Peisa teaches the MAC layer transmits data in transport channels based on a Transport Block Set size that indicates “the total number of bits the MAC entity can transmit to the physical layer in a single transmission time interval (TTI).” Ex. 1013, 7:7–11. TS 25.302 teaches the transmission time interval is “a multiple of the minimum interleaving period (e.g., 10 ms, the length of one Radio Frame),” that physical layer transport channels (e.g., DCH1–DCH3) operate “exactly according to the L1 radio frame timing,” and that “transmission block timing is [] tied exactly to this L1 frame timing e.g. every transmission block is generated precisely every 10ms, or a multiple of 10 ms.” Ex. 1009 §§ 5.1, 7.1.5, Fig. 6. Patent Owner does not dispute Petitioner’s contentions regarding this limitation. *See* PO Resp. 22–25.

For the reasons discussed above and in §§ II.G.2 and II.H.1, *supra*, we find Petitioner has demonstrated by a preponderance of evidence that the combination of Peisa and TS 25.302 teaches all the limitations of claim 4, and that a person of ordinary skill in the art would have combined the teachings of these references in the manner suggested. Therefore, Petitioner has demonstrated that claim 4 is unpatentable over the combination of Peisa and TS25.302.

3. Claim 5

Claim 5 depends from claim 4, and further requires the MAC layer of the radio network controller or associated terminal to select respective transport formats. Ex. 1001, 15:1–4. Petitioner, relying on its analysis of claim 1, demonstrates how the combination of Peisa and TS 25.302 teaches this limitation. See Pet. 69–71 (quoting Ex. 1013, 6:20–65, 10:25–28; citing Ex. 1002 ¶¶ 274–276); see also *id.* at 54–56, § II.G.2, *supra*. For example, Peisa teaches “there is preferably one MAC-d entity for each mobile station,” and “there is preferably one MAC-c entity for each cell [i.e., RNC].” Ex. 1013, 6:60–65. Peisa further teaches the MAC entity selects “the best available Transport Format Combination (TFC) from the TFCS [Transport Format Combination Set].” *Id.* at 10:25–28. Peisa further teaches “the TFC includes a Transport Format allocated to each input flow.” *Id.* at 9:8–24. Patent Owner does not dispute Petitioner’s contentions regarding this limitation. See PO Resp. 22–25.

For the reasons discussed above and in §§ II.G.2 and II.H.1, *supra*, we find Petitioner has demonstrated by a preponderance of evidence that the combination of Peisa and TS 25.302 teaches all the limitations of claim 5, and that a person of ordinary skill in the art would have combined the teachings of these references in the manner suggested. Therefore, Petitioner has demonstrated that claim 5 is unpatentable over the combination of Peisa and TS25.302.

4. Claim 6

Claim 6 depends from claim 4, and further requires a radio link layer of the radio network controller or associated terminal to be designed to store packets provided for transmission. Ex. 1001, 15:5–8. Petitioner

demonstrates how the combination of Peisa and TS 25.302 teaches this limitation. *See* Pet. 71–72 (quoting Ex. 1013, 10:15–21, 17:48–65). For example, Peisa teaches that Radio Link Control or “RLC layers of UMTS may be located . . . in a Radio Network Controller (RNC) 140 (of Fig. 1) of the UTRAN 130 [or] a User Equipment (UE) 110.” Ex. 1013, 17:62–65. Peisa further teaches “RLC entities provide buffers for respective input flows” into the MAC layers. *Id.* at 10:19–21. Patent Owner does not dispute Petitioner’s contentions regarding this limitation. *See* PO Resp. 22–25.

Claim 6 further requires the MAC layer to be designed to form a transport block from a packet unit supplied through a logic channel. Ex. 1001, 15:8–10. Petitioner, relying on its analysis of claim 1, demonstrates how the combination of Peisa and TS 25.302 teaches this limitation. *See* Pet. 73–74 (quoting/citing Ex. 1013, 6:49–65, 17:50–18:2, Figs. 3, 7; Ex. 1002 ¶¶ 280–282); *see also id.* at 51–54; § II.G.2, *supra*. For example, Peisa teaches both the UE and RNC contain a MAC layer. *See* Ex. 1013, 17:62–65, Fig. 3 (“The MAC-c, MAC-d, and RLC layers of UMTS may be located . . . in a Radio Network Controller (RNC) 140 (of FIG. 1) of the UTRAN [or] a User Equipment (UE) 110.”). Peisa further teaches the MAC layer transmits transport blocks formed from packet units of a logic channel over a transport channel. *See id.* at 2:53–60 (teaching the MAC layer “schedules packet transmission of various data flows”), 4:34–36 (teaching the MAC layer maps “a set of logical channels . . . onto a transport channel”), 7:2–16 (teaching the transport channel is defined by “one or several Transport Block (TB) sizes,” where each TB size “tells the MAC entity what packet sizes it can use to transmit data”). Patent Owner does not

dispute Petitioner's contentions regarding this limitation. See PO Resp. 22–25.

For the reasons discussed above and in §§ II.G.2 and II.H.1, *supra*, we find Petitioner has demonstrated by a preponderance of evidence that the combination of Peisa and TS 25.302 teaches all the limitations of claim 6, and that a person of ordinary skill in the art would have combined the teachings of these references in the manner suggested. Therefore, Petitioner has demonstrated that claim 6 is unpatentable over the combination of Peisa and TS25.302.

III. CONCLUSION

We have reviewed the Petition, Patent Owner Response, Petitioner Reply, and Patent Owner Sur-Reply. We have considered all of the evidence and arguments presented by Petitioner and Patent Owner, and have weighed and assessed the entirety of this evidence as a whole.

We determine, on this record, that Petitioner has demonstrated by a preponderance of evidence that claims 1–6 of the '487 patent are unpatentable over TS 25.321, TS 25.302, and R2-010182.²⁴ We further

²⁴ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

determine that Petitioner has demonstrated by a preponderance of evidence that claims 1 and 2 of the '487 patent are unpatentable over Peisa, and that claims 4–6 are unpatentable over Peisa and TS 25.302.

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–6	103	TS 25.321, TS 25.302, R2-010182	1–6	
1, 2	103	Peisa	1, 2	
4–6	103	Peisa, TS 25.302	4–6	
Overall Outcome			1–6	

IV. ORDER

It is hereby:

ORDERED that claims 1–6 of the '487 patent are unpatentable under 35 U.S.C. § 103(a) as obvious over TS 25.321, TS 25.302 and R2-010182;

FURTHER ORDERED that claims 1 and 2 of the '487 patent are unpatentable under 35 U.S.C. § 103(a) as obvious over Peisa;

FURTHER ORDERED that claims 4–6 of the '487 patent are unpatentable under 35 U.S.C. § 103(a) as obvious over Peisa and TS 25.302; and

FURTHER ORDERED that this Decision is final, and a party to this proceeding seeking judicial review of the Decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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