

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

COMMSCOPE, INC.,
Petitioner,

v.

TQ DELTA, LLC,
Patent Owner.

IPR2022-00809
Patent 9,094,348 B2

Before JEAN R. HOMERE, ROBERT J. WEINSCHENK, and
KARA L. SZPONDOWSKI, *Administrative Patent Judges*.

Opinion for the Board filed by SZPONDOWSKI, *Administrative Patent Judge*.

Opinion Dissenting filed by HOMERE, *Administrative Patent Judge*.

SZPONDOWSKI, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining No Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

We instituted *inter partes* review of claims 1–4, 6, 7, 9–12, 14, 15, 17–20, 22–24, 26, and 28 of U.S. Patent 9,094,348 B2, issued on July 28, 2015 (Ex. 1001, “the ’348 patent”) in response to a Petition (Paper 2, “Pet.”) filed by CommScope, Inc. (“Petitioner”). Paper 9 (“Inst. Dec.”). During the trial, TQ Delta, LLC (“Patent Owner”) filed a Response to the Petition (Paper 15, “Resp.”), Petitioner filed a Reply (Paper 17, “Reply”), and Patent Owner filed a Sur-reply (Paper 23, “Sur-reply”).

An oral hearing was held on August 22, 2023, and a copy of the transcript was entered into the record. Paper 30 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6. This Decision is a Final Written Decision under 35 U.S.C. § 318(a) as to the patentability of the claims on which we instituted trial. Petitioner has the burden of proving unpatentability of the challenged claims by a preponderance of the evidence. 35 U.S.C. § 316(e). Having reviewed the parties’ arguments and cited evidence, for the reasons discussed below, we find that Petitioner has not demonstrated by a preponderance of the evidence that claims 1–4, 6, 7, 9–12, 14, 15, 17–20, 22–24, 26, and 28 of the ’348 patent are unpatentable.

II. BACKGROUND

A. *Related Matters*

The parties advise that the ’348 patent is the subject of *TQ Delta, LLC v. CommScope Holding Company, Inc.*, Case No. 2:21-cv-00310 (E.D. Tex.) and *TQ Delta, LLC v. Nokia, Inc. et al*, Case No. 2:21-cv-00309 (E.D. Tex.) (“the Texas litigation”). Pet. 61; Paper 5, 2.

B. The '348 Patent (Ex. 1001)

The '348 patent is titled “Packet Retransmission” and is generally directed to “retransmission of packets in a communication environment.” Ex. 1001, code (54), 1:25–27. The '348 patent generally describes that “packets can be handled based on an assigned packet handling identifier . . . [and] optionally in conjunction with retransmission protocols including a packet handling identifier, a memory used for retransmission of packets can be shared with other transceiver functionality such as, coding, decoding, interleaving, deinterleaving, error connection, and the like.” *Id.* at code (57).

Figure 1 of the '348 patent, reproduced below, shows transceivers 200 and 300 that communicate over communications channel 10.

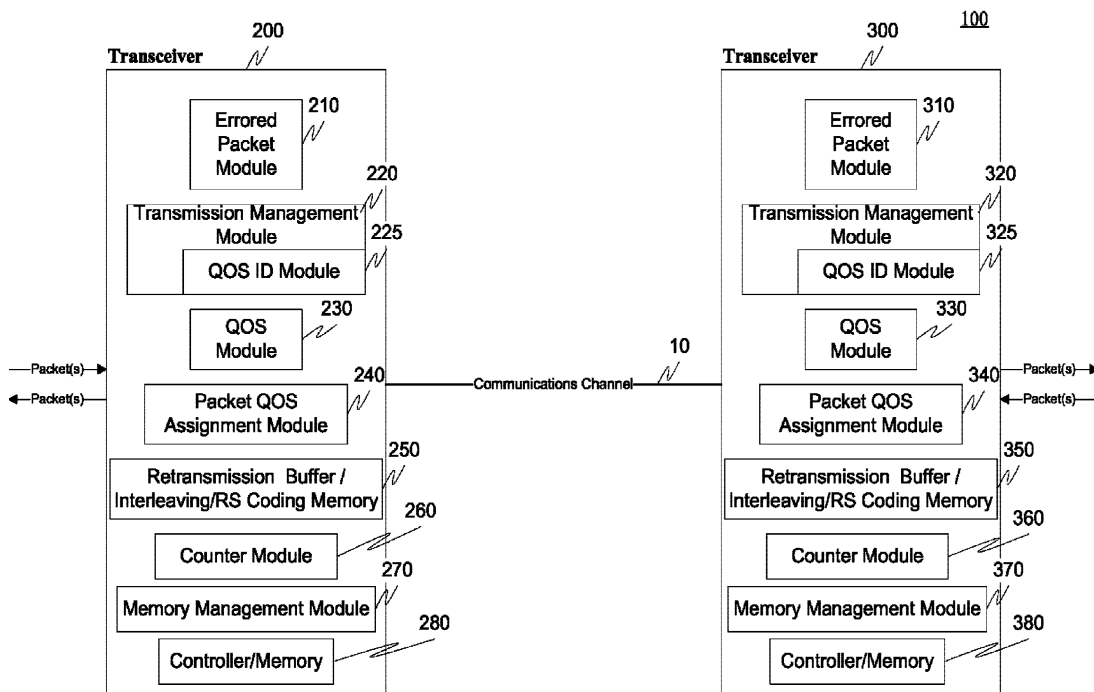


Fig. 1

Figure 1, above, depicts transceiver 200 and transceiver 300 that contain certain componentry, such as Errored Packet Modules 210 and 310, Transmission Management Modules 220 and 320, quality of service (QOS) Modules 230 and 330, Packet QOS Assignment Modules 240 and 340, Retransmission Buffer/Interleaving/RS Coding Memories 250 and 350, Counter Modules 260 and 360, Memory Management Modules 270 and 370, and Controllers/Memories 280 and 380. *Id.* at 9:50–67.

As described in the '348 patent, “transceiver 200, in cooperation with QOS module 230, receives packets from a higher-layer. In cooperation with the packet QOS assignment module 240, a packet Sequence ID (SID) is appended to the received packets.” *Id.* at 11:54–57. The SID is a counter value indicating the place of each packet in a stream of packets and may be appended in a number of places, including at the beginning or end of the packet header. *Id.* at 12:19–30. The packets received may also already have information in a header or data field. *Id.* at 12:31–33. “The packets, in cooperation with the transmission management module 220, can then be transmitted in the order in which they were received.” *Id.* at 11:57–60.

Transceiver 300 receives packets from the transmitting modem, e.g., transceiver 200. *Id.* at 13:6–10. The received packet may be passed to a higher-layer if it is identified as low-latency by QOS ID module 325, or may be forwarded to the retransmission buffer 350 for a minimum amount of time before passing to a higher-layer if it is identified as a low-PER (Packet Error Rate) packet by QOS ID module 325. *Id.* at 13:10–16. In addition, in cooperation with retransmission buffer 350 and errored packet module 310, missing or errored packets can be detected in a number of ways. *Id.* at 13:66–14:23. If a packet is found to be in error, there are different ways in

which transceiver 300 can communicate information to transceiver 200 indicating that retransmission of one or more packets is required. *Id.* at 14:24–15:6. For example, transceiver 300, in cooperation with errored packet module 310, can send an acknowledgment (ACK) message to transceiver 200 for every correctly received message, or can send a negative acknowledgment (NAK) message to transceiver 200 when a packet is detected as errored or missing. *Id.* at 14:27–32, 14:59–61.

The ACK and NAK messages can be transmitted over the same physical channel as the received packets. *Id.* at 15:18–20. However, the '348 patent states that it is important to minimize latency requirements for the message channel. *Id.* at 15:26–28. One way to do this is to send the messages “such that each message is repeated a number of times and each repeated message is sent in a different discrete multi-tone DMT [discrete multi-tone] symbol. For example, the message can be repeated x times and each message sent in one of x DMT symbols. This way, even if $x - 1$ DMT symbols were corrupted by the channel, at least one message could be received correctly.” *Id.* at 15:39–45.

The '348 patent also describes that memory may be shared between the retransmission function and one or more of the interleaving, deinterleaving, RS coding, and RS decoding functions. *Id.* at 17:36–19:3. For example, under some conditions the retransmission protocol may provide better error correction with less delay and overhead than the interleaving/RS coding, and vice versa. *Id.* at 17:45–54.

C. Illustrative Claims

Among the challenged claims, claims 1, 9, 17, and 23 are independent. Independent claim 1 is representative and is reproduced below with Petitioner's identifiers.

1. **[1.pre]** An apparatus comprising:

[1.a] a multicarrier transceiver including a processor and memory operable to:

[1.b] transmit a packet using a forward error correction encoder and an interleaver, **[1.b.1]** wherein the packet comprises a header field and a plurality of PTM-TC codewords, a plurality of ATM cells or a plurality of Reed-Solomon codewords, and **[1.b.2]** wherein the header field comprises a sequence identifier (SID); and

[1.c] receive a plurality of messages using a forward error correction decoder and without using a deinterleaver, **[1.c.1]** wherein each message of the plurality of messages is received in a different DMT symbol and **[1.c.2]** wherein at least one message of the plurality of messages includes an acknowledgement (ACK) or a negative acknowledgement (NACK) of the transmitted packet.

Ex. 1001, 23:30–45.

D. Prior Art and Asserted Grounds to Patentability

Petitioner asserts that claims 1–4, 6, 7, 9–12, 14, 15, 17–20, 22–24, 26, and 28 are unpatentable based on the following two grounds (Pet. 2):

Claims Challenged	35 U.S.C. § ¹	Basis/References
1–4, 6, 7, 9–12, 14, 15, 17–20, 22– 24, 26, 28	§ 103(a)	G.993.2, ² Mitlin, ³ Fukushima ⁴
1–4, 6, 7, 9–12, 14, 15, 17–20, 22– 24, 26, 28	§ 103(a)	G.993.2, Mitlin, Reynders ⁵

In addition, Petitioner relies on the Declaration of Bruce McNair (Ex. 1003). A deposition transcript for Mr. McNair has been entered into the record. *See* Ex. 2020.

III. ANALYSIS

A. Legal Standards

A claim is unpatentable under 35 U.S.C. § 103(a) if “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said

¹ Because the ’348 patent issued from a patent application that was filed before March 16, 2013, patentability is governed by the version of 35 U.S.C. § 103 preceding the Leahy-Smith America Invents Act (“AIA”), Pub L. No. 112–29, 125 Stat. 284 (2011).

² ITU-T Recommendation G.993.2, *Series G: Transmission Systems and Media, Digital Systems and Networks, Digital Sections and Digital Line System – Access Networks, Very High Speed Digital Subscriber Line Transceivers 2 (VDSL2)*, Telecommunication Standardization Sector of ITU (February 2006) (“G.993.2” or “VDSL2,” Ex. 1004).

³ Mitlin et al., US Patent No. 7,103,096 B2, issued Sep. 5, 2006 (“Mitlin,” Ex. 1005).

⁴ Fukushima et al., US Patent No. 7,124,333 B2, issued Oct. 17, 2006 (“Fukushima,” Ex. 1006).

⁵ Deon Reynders & Edwin Wright, *Practical TCP/IP and Ethernet Networking* (Newnes 2003) (“Reynders,” Ex. 1007).

subject matter pertains.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) if in evidence, objective evidence of nonobviousness, i.e., secondary considerations.⁶ *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

A patent claim “is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *KSR*, 550 U.S. at 418. An obviousness determination requires finding “both ‘that a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so.’” *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367–68 (Fed. Cir. 2016) (citation omitted); *see KSR*, 550 U.S. at 418. Further, an assertion of obviousness “cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *KSR*, 550 U.S. at 418; *In re NuVasive, Inc.*, 842 F.3d 1376, 1383 (Fed. Cir. 2016) (a finding of a motivation to combine “must be supported by a ‘reasoned explanation’” (citation omitted)).

“In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed.

⁶ Neither party presented objective evidence of nonobviousness.

Cir. 2016) (citing 35 U.S.C. § 312(a)(3)); *see also Intelligent Bio-Sys.*, 821 F.3d at 1369. Therefore, to prevail in an *inter partes* review, Petitioner must explain how the proposed combinations of prior art would have rendered the challenged claims unpatentable.

B. Level of Ordinary Skill in the Art

Petitioner asserts a person of ordinary skill in the art would have possessed a Bachelor's degree in electrical or computer engineering, or the equivalent, and at least 5–6 years of experience; a Master's degree in electrical or computer engineering, or the equivalent, and at least 2–3 years of experience; or a Doctor of Philosophy (Ph.D.) in electrical or computer engineering, or the equivalent, with at least 1–2 years of experience.

Pet. 10 (citing Ex. 1003 ¶¶ 31–33).

In our Institution Decision, we preliminarily adopted Petitioner's unopposed⁷ proposed level of ordinary skill in the art. Inst. Dec. 13. In the Response, Patent Owner does not challenge Petitioner's characterization of the level of ordinary skill in the art. Nothing in the full record persuades us that our preliminary finding as to the level of ordinary skill in the art was incorrect. Accordingly, we maintain our adoption of Petitioner's proposed level of ordinary skill in the art, as consistent with the level of ordinary skill in the art reflected by the prior art of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001).

⁷ Patent Owner did not challenge the proposed level of ordinary skill in the art in the Preliminary Response.

C. Claim Construction

Petitioner asserts that “claim terms should be given their plain and ordinary meaning” and “[t]o the extent certain terms are subject to multiple interpretations, those questions do not affect the grounds advanced here.” Pet. 11 (citing Ex. 1003 ¶¶ 18–24, 116–118). Patent Owner “does not believe that the Board[] needs to expressly construe any claim limitation to find that the claims have not been proven unpatentable.” Resp. 13–14.

There are no claim terms in dispute, so we need not expressly construe any term for purposes of this Decision. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

D. Ground 1: Alleged Obviousness Over G.993.2, Mitlin, and Fukushima

Petitioner contends claims 1–4, 6, 7, 9–12, 14, 15, 17–20, 22–24, 26, and 28 would have been obvious over the combination of G.993.2, Mitlin, and Fukushima. Pet. 15–43. Patent Owner disputes Petitioner’s contentions. Resp. 14–30. Having considered the arguments and evidence before us, we determine that Petitioner has not shown, by a preponderance of the evidence, that claims 1–4, 6, 7, 9–12, 14, 15, 17–20, 22–24, 26, and 28 would have been obvious over the combination of G.993.2, Mitlin, and Fukushima.

1. G.993.2 (Ex. 1004)

G.993.2 (VDSL2) is an enhancement to the G.993.1 (VDSL) standard that specifies requirements for VDSL transceivers located at the central

office (VTU-O transceiver) and at the subscriber's premises (VTU-R transceiver). Ex. 1004, §§ 1, 4, 5.1, Fig. 5-1.

Figure 5-1, reproduced below, depicts the functional blocks and interfaces of the VTU-O and VTU-R.

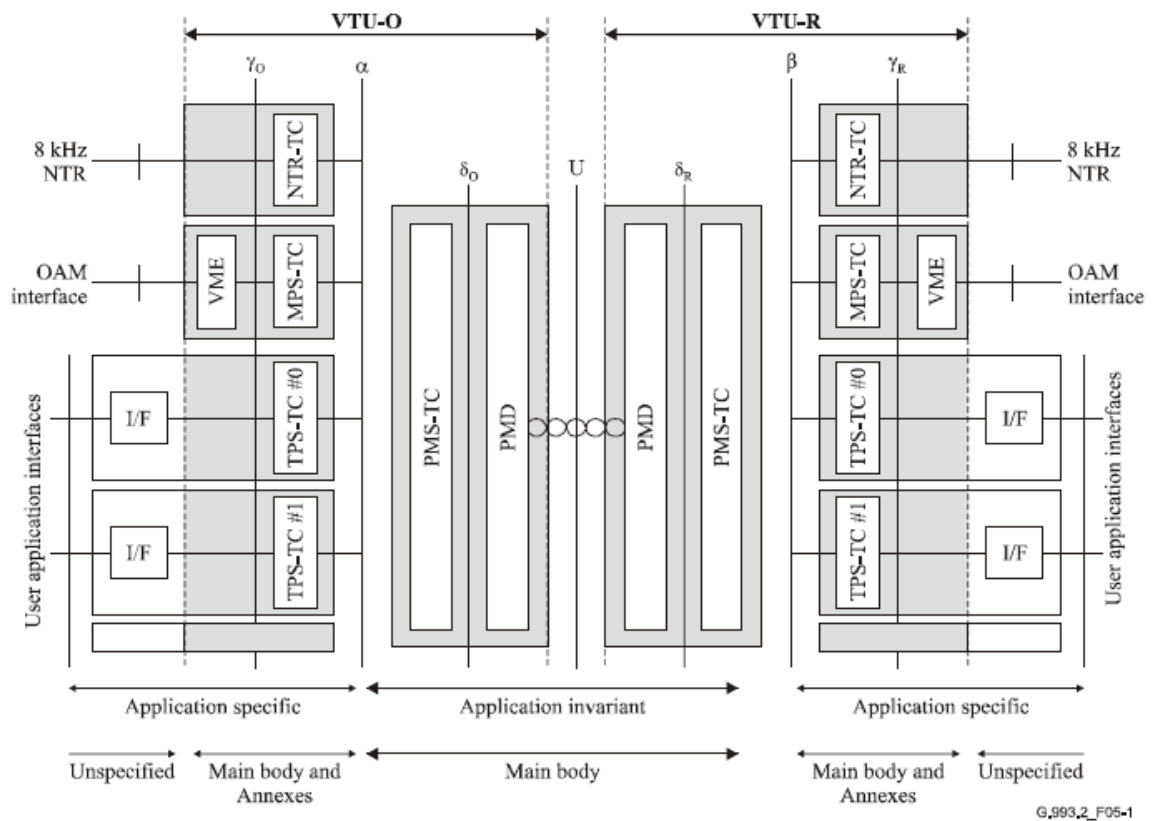


Figure 5-1/G.993.2 – VDSL2 and VTU functional model

Figure 5-1, above, depicts identical functionality for VTU-O (on the left) and VTU-R (on the right). Specifically, for each of VTU-O and VTU-R, Figure 5-1 depicts an application-invariant section that consists of the physical medium dependent (PMD) sub-layer and physical media specific part of the transmission convergence sub-layer (PMS-TC), and an application specific section, consisting of the transport protocol specific transmission convergence (TPS-TC) sub-layer and application interfaces.

Id. § 5.1. The management protocol specific TC (MPS-TC) is intended for management data transport, and the VDSL2 management entity (VME) supports management data communication protocols. *Id.*

G.993.2 describes that “[t]he PMS-TC sub-layer contains framing and frame synchronization functions, as well as forward error correction (FEC), error detection, interleaving and de-interleaving, scrambling, and descrambling functions.” *Id.* In addition, “the PMS-TC sub-layer provides an overhead channel that is used to transport management data (control messages generated by the VME).” *Id.*

According to G.993.2, “[t]he VME function facilitates the management of the VTU,” so “[m]anagement information is exchanged between the VME functions of the VTU-O and VTU-R through the overhead channel provided by the PMS-TC. The MPS-TC converts the incoming management data into the unified format required . . . to be multiplexed into the PMS-TC.” *Id.*

The TPS-TC sub-layer contains “one or more TPS-TCs providing transport of user data utilizing different transport protocols, a management TPS-TC (MPS-TC) providing eoc [Embedded Operations Channel] transport over the VDSL2 link, and an NTR-TC providing transport of the network timing reference.” *Id.* § 8. The user data includes ATM transport (ATM-TC). *Id.* § 8.1.

The MPS-TC “is intended to facilitate transport of eoc data between the VDSL2 management entities.” *Id.* § 8.2. “In the transmit direction, the MPS-TC gets the eoc message from the VME over the application interface . . . encapsulates it using the HDLC frame format, and submits it to the . . . interface to be transported via the VDSL2 link using the PMS-TC overhead

messaging channel.” *Id.* § 8.2.1. “In the receive direction, the MPS-TC delineates the HDLC frames, runs the FCS check, and extracts the encapsulated eoc message from the correctly received HDLC frames. The received eoc messages are submitted to the VME.” *Id.*

PMS-TC “provides transmission medium specific TC functions, such as scrambling, framing, forward error correction (FEC), and interleaving.” *Id.* § 9. The PMS-TC functional model is shown in Figure 9-1, reproduced below:

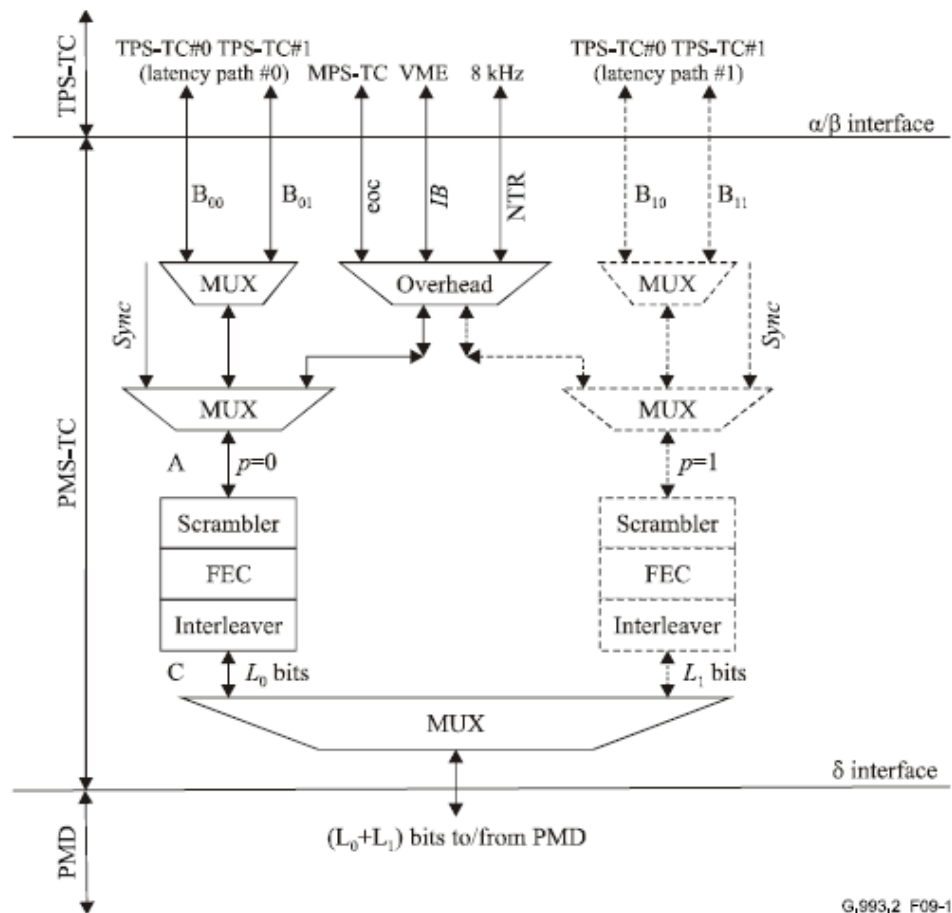


Figure 9-1/G.993.2 – PMS-TC functional model

Figure 9-1, above, depicts that “[u]p to two bearer channels of transmit user data originated by various TPS-TCs, management data

originated by the MPS-TC, and NTR data are incoming [to the PMS-TC sub-layer] via the . . . interface in a uniform format.” *Id.* § 9.1. “The incoming user data and the overhead data are multiplexed into one or two latency paths.” *Id.* “The multiplexed data in each latency path is scrambled, encoded using Reed-Solomon forward error correction coding, and interleaved.” *Id.* “The interleaved buffers of data of both latency paths are multiplexed into a bit stream to be submitted to the PMD sub-layer.” *Id.*

Regarding interleaving, G.993.2 states that “[i]nterleaving shall be provided in all supported latency paths to protect the data against bursts of errors by spreading the errors over a number of Reed-Solomon codewords.” *Id.* § 9.4. “The interleaver depth shall be set to meet the requirements for error-burst protection and latency,” but “[a]t any data rate, the minimum latency occurs when the interleaver is turned off.” *Id.*; *see also id.* § 9.7 (“[w]hen the interleaver is disabled (interleaver depth = 1) . . .”).

Regarding the PMD, G.993.2 states

the transmit PMD function receives a symbol encoder input data frame (containing L bits) from the transmit PMS-TC function. The data frame shall then be symbol encoded . . . [and] will generate a complex value for each sub-carrier . . . These complex values shall be modulated into data symbols . . . to produce an analog signal for transmission across the digital subscriber line.

Id. § 10.

Regarding the eoc messages, G.993.2 states “[t]o communicate management data, the VME uses eoc messages.” *Id.* § 11.1. G.993.2 explains:

A VTU invokes eoc communication with the VTU at the other end of the link by sending an eoc command message. The

responding VTU, acting as a slave, shall acknowledge a command it has received correctly by sending a response. Furthermore, it shall perform the requested management function. Both VTUs shall be capable of sending eoc commands and responding to received eoc commands. The same eoc protocol format shall be used in both transmission directions. To send commands and responses over the line, the VME originates eoc messages. Each eoc message is a command, a command segment, a response, or a response segment. The VME sends each eoc message to the MPS-TC.

...

The VME shall send the eoc command only once and wait for a response. No more than one command of each priority level shall be awaiting a response at any time. Upon reception of the response, a new command of the same priority level may be sent . . . If a response to a particular message is not received within a specific time period . . . , or is received incorrectly, a time-out occurs. After a time-out, the VME may either re-send the message or abandon it.

Id. § 11.2.2.

2. *Mitlin (Ex. 1005)*

Mitlin is titled “Performance Evaluation of Multicarrier Channels with Forward Error Correction and Automatic Retransmission Request” and is generally directed to multi-carrier data communications, in particular to “evaluating the performance of multi-carrier channels to select transmission parameters including forward error correction (FEC) and automatic retransmission request (ARQ) parameters.” Ex. 1005, code (54), 1:22–27.

Figure 1, reproduced below, depicts an exemplary discrete multi-tone communications system.

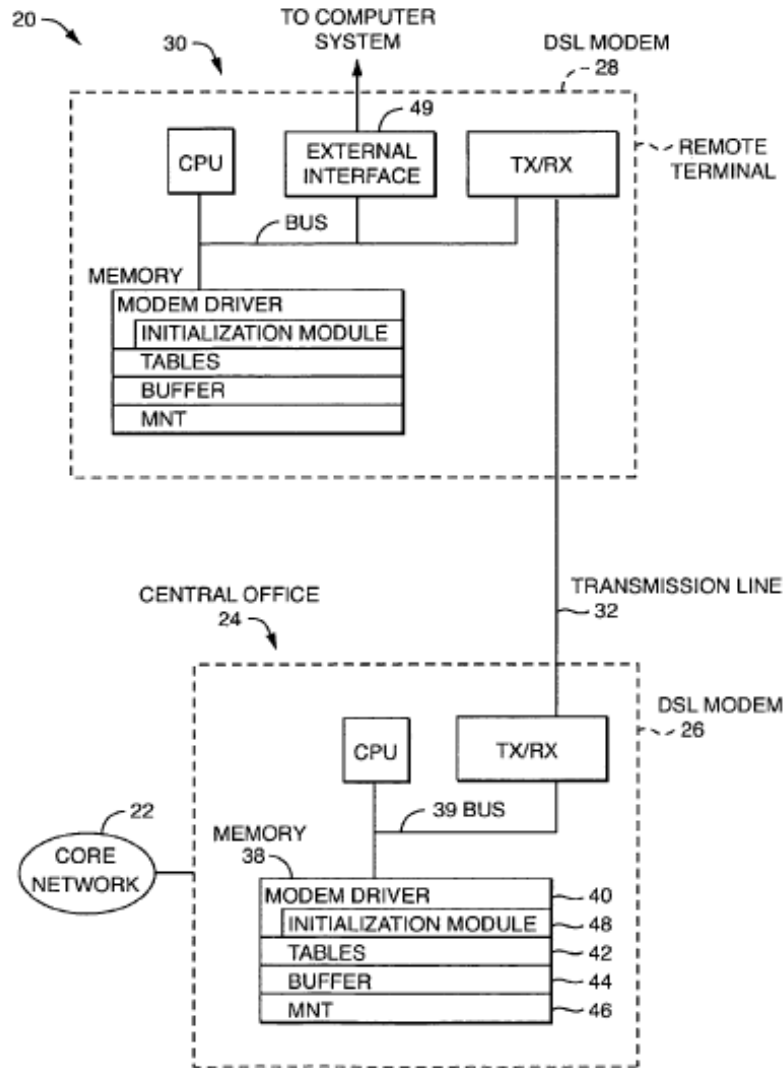


FIG. 1

Figure 1, above, shows modem 26 at central office 24 and modem 28 at remote terminal 30 that are interconnected with transmission line 32. *Id.* at 3:47–54. Modem 26 includes a processor (CPU) 34, a transmitter/receiver (Tx/Rx) 36, and a memory 38, which are interconnected by a bus 39. *Id.* at 3:52–54. Modem 28 includes the same components. *Id.* at 4:6–7.

Mitlin describes data transmission between two stations, where both upstream and downstream stations 62 and 64, respectively, send information

and acknowledgment frames. *Id.* at 26:61–65. Upstream and downstream stations 62 and 64 have a transmitter and a receiver. *Id.* at 26:64–66. “The error-controlling algorithm may be a combination of forward error correction and a cyclic redundancy check.” *Id.* at 26:66–27:1. “In one embodiment, a multilevel Reed-Solomon type of code is used for FEC.” *Id.* at 27:1–2. Mitlin describes that “[f]orward error correction allows the station to correct and accept an information frame with a number of errors less than or equal to the maximum number of correctable errors.” *Id.* at 27:16–18. When an information frame has more than the maximum number of correctable errors, a negative acknowledgment frame is sent back to the peer station. *Id.* at 27:19–23. A positive acknowledgment frame is sent after frames were received with no or correctable errors. *Id.* at 27:23–26.

3. *Fukushima (Ex. 1006)*

Fukushima is titled “Retransmission Packet Structure Having Multiple Sequence Numbers” and is generally directed to data transmission performed in packet units. Ex. 1006, code (54), 1:14–17. Fukushima describes that “[e]ach packet . . . is composed of a data section containing digital data such as video data, audio data, and text data, and a header section containing additional information other than these digital data.” *Id.* at 15:3–7. “[T]he header section of each packet contains additional information relating to its sequence number, priority, and date reproduction time at the receiving end.” *Id.* at 15:7–10.

4. *Analysis of Independent Claim 1*

Petitioner contends that the combination of G.993.2, Mitlin, and Fukushima teaches the limitations of independent claim 1, and that one of

ordinary skill in the art would have been motivated to combine the references. Pet. 15–32. Petitioner relies on G993.2 to teach the preamble and limitations 1.b and 1.c.1; G993.2 or G993.2 combined with Fukushima to teach limitation 1.b.1; G993.2 or Mitlin to teach limitation 1.a; G993.2 or G993.2 combined with Mitlin to teach limitations 1.c, and 1.c.2; and Fukushima to teach limitation 1.b.2. *Id.* In our discussion below, we generally focus our attention on Petitioner’s contentions as to G993.2 and Fukushima.

a) Petitioner’s Proposed Combination

Petitioner contends that G993.2’s VTU (i.e., VTU-R or VTU-O) or Mitlin’s modems 26 and 28 teach the recited “multicarrier transceiver” recited in limitation 1.a. Pet. 20–21.

With respect to limitation 1.b, Petitioner states that a person of ordinary skill in the art would understand that a frame (e.g., as disclosed in G993.2, § 3.20) “constitutes or is equivalent to the claimed ‘packet.’” Pet. 23 (citing Ex. 1003 ¶ 166). Relying on Figure 9-1 of G993.2, Petitioner then argues, *inter alia*, that “[t]he incoming user data and the overhead data [from TPS-TC sub-layer] are multiplexed into one or two latency paths [in the PMS-TC sub-layer].” *Id.* at 24 (citing Ex. 1004, § 9.1). Petitioner further contends that this multiplexed data “is scrambled, [and] encoded using Reed-Solomon forward error correction coding,” and “may or may not be interleaved.” *Id.* Petitioner states that a person of ordinary skill in the art would understand that “G.993.2 discloses a VTU (e.g., a VTU-O) that includes a TPS-TC sub-layer *for receiving (from a higher layer) user data as packets*, and a PMS-TC-sub-layer for applying error correction in the form of FEC and/or interleaving techniques *to those packets* to prepare *the packet*

for transmission to another VTU (e.g., a VTU-R) via the PMD.” *Id.* at 25 (citing Ex. 1003 ¶ 181) (emphasis added).

With respect to limitation 1.b.1, Petitioner contends that a person of ordinary skill in the art “would have understood that a packet includes a header with one or more header fields,” and that G993.2 discloses one example of a “packet.” Pet. 25 (citing Ex. 1003 ¶ 183; Ex. 1025⁸ § N.1). Petitioner also contends that Fukushima’s disclosure that “[e]ach packet transmitted from the transmitting end is composed of a data section containing digital data such as video data, audio data, and text data, and a **header section containing additional information other than these digital data**” teaches limitation 1.b.1. Pet. 25–26 (citing Ex. 1006, 15:2–10). Petitioner also argues that G.993.2 teaches “a plurality of PTM-TC codewords, a plurality of ATM cells or a plurality of Reed-Solomon codewords.” *Id.* at 25–27.

With respect to limitation 1.b.2, Petitioner argues Fukushima’s disclosure that “the header section of each packet contains additional information relating to its sequence number, priority, and data reproduction time at the receiving end” teaches “wherein the header field comprises a sequence identifier (SID).” Pet. 27 (citing Ex. 1006, 15:2–10; Ex. 1003 ¶ 195). Petitioner contends that Fukushima’s “sequence number” teaches the recited “sequence identifier (SID).” *Id.* (citing Ex. 1003 ¶ 196).

⁸ ITU-T Recommendation G.992.3, Amendment 1, *Series G: Transmission Systems and Media, Digital Systems and Networks, Digital Sections and Digital Line System – Access Networks, Asymmetric Digital Subscriber Line Transceivers 2 (ADSL2)*, Telecommunication Standardization Sector of ITU (September 2005).

With respect to limitation 1.c, Petitioner argues that in G993.2, “the VTUs exchange embedded operations channel (‘eoc’) messages that are encoded by the FEC module,” and that “G993.2 discloses interleaving.” Pet. 27 (citing Ex. 1003 ¶ 197). According to Petitioner, these “eoc messages are multiplexed with user data prior to transmission,” and “encoded using FEC before it is provided to the PMD for transmission.” *Id.* at 28 (citing Ex. 1003 ¶¶ 205–206). Petitioner also contends that “Mitlin additionally discloses the exchange of acknowledgement and negative acknowledgement messages.” Pet. 30 (citing Ex. 1003 ¶¶ 211–212).

With respect to limitation 1.c.1, Petitioner asserts that G993.2’s VTU can transmit or receive messages (which may be the eoc messages of G993.2 or the acknowledgement messages of Mitlin), and “at a transmitting VTU, no eoc message is sent before an acknowledgement is received [from] the previously sent message, or a timeout occurs,” so “all eoc messages [will] be distinct in time.” Pet. 31 (citing Ex. 1003 ¶ 223).

With respect to limitation 1.c.2, Petitioner reiterates that “a transmitting VTU sends only one eoc message at a time and waits for a response.” Pet. 31–32 (citing Ex. 1003 ¶ 226). Petitioner states that a person of ordinary skill in the art would understand that (1) “a VTU-R would accordingly acknowledge such an eoc message by sending a response and may also send an eoc message to the VTU in the other direction” and (2) “each such eoc command [would] include an encoded and modulated data symbol and would therefore be a packet as described in connection with claim element 1.b.” *Id.* at 32 (citing Ex. 1003 ¶ 227). According to Petitioner, “a receiving VTU must send an acknowledgement of receipt of the eoc message which would constitute an acknowledgement (ACK) of the

transmitted packet as recited by this claim element.” *Id.* (citing Ex. 1003 ¶ 228). Petitioner also states that “Mitlin discloses ‘a general case of data transmission between two stations where both upstream and downstream stations, 62 and 64, respectively, send information and acknowledgement frames’ also disclosing the acknowledgement (ACK) or negative acknowledgement (NACK) set forth by this claim limitation.” *Id.* (citing Ex. 1003 ¶¶ 229–230).

Petitioner argues the motivation to combine G993.2 with Mitlin and Fukushima together. Pet. 15–18. Petitioner contends that G.993.2, Mitlin, and Fukushima are in the same or closely related fields, in that they disclose similar data communication techniques and also systems for data communications. *Id.* at 15–17. Petitioner argues “G993.2 discloses that user data can be in the form of ‘ethernet and generic packet transport,’” and a person of ordinary skill in the art “would understand that ‘generic packet[s]’ include a header and a payload.” *Id.* at 16 (citing Ex. 1003 ¶ 143).

Petitioner contends a person of ordinary skill in the art would have been motivated to combine G.993.2 with Mitlin and Fukushima “to improve G.993.2’s communication protocol.” Pet. 15 (citing Ex. 1003 ¶ 138). Petitioner describes these improvements as “use of user data acknowledgements, and packets with message counts and/or sequence IDs.” *Id.* at 17 (citing McNair ¶ 144). Petitioner contends that a person of ordinary skill in the art “would have understood that G.993.2’s communication protocol could be improved using Mitlin’s acknowledgements.” *Id.* Petitioner contends that the combination “would have been nothing more than combining prior art elements according to known methods (information transmission using acknowledgement messages and packets) to obtain the

predictable results described above.” *Id.* (citing Ex. 1003 ¶ 145). Petitioner also contends that a person of ordinary skill in the art would have been successful in combining G.993.2, Mitlin, and Fukushima. *Id.* at 18 (citing McNair ¶ 146).

b) Patent Owner’s Response

Patent Owner argues, *inter alia*,⁹ that the Petition fails to establish a motivation to combine the references. Resp. 26; Sur-reply 4. According to Patent Owner, Petitioner’s arguments “do[] not provide an explanation of motivation or even explain why the techniques are related to combine them.” Resp. 27; Sur-reply 4–6. Patent Owner argues that there is “insufficient evidence that it would have been obvious to modify the eoc commands in VDSL2 to include a header with a sequence number,” and “[t]he Petition does not explain why such a modification would be appropriate.” Resp. 20. Patent Owner also argues that there is “no identification in the Petition of a reason that eoc commands would even need a sequence identifier [in] order to track the ordering of commands,” because “there is no evidence that eoc messages—which contain a command or response to a command—need to be reordered or have their sequence tracked.” *Id.* at 21; Sur-reply 17–18.

c) Analysis

For the reasons set forth below, we agree with Patent Owner that Petitioner has not provided sufficient rationale why one of ordinary skill in the art, absent hindsight, would have had reason to combine G993.2 and

⁹ Patent Owner raises additional arguments in the Response and Sur-reply, which we need not address because our determination as to the combination of G993.2 and Fukushima is dispositive.

Fukushima in the manner proposed.¹⁰ See Resp. 26; Sur-reply 17; see *In re Fritch*, 972 F.2d 1260, 1266 (Fed. Cir. 1992) (citing *In re Gorman*, 933 F.2d 982, 987 (Fed. Cir. 1991)) (“It is impermissible to use the claimed invention as an instruction manual or ‘template’ to piece together the teachings of the prior art so that the claimed invention is rendered obvious.”). Specifically, we determine that Petitioner has not provided sufficient rationale establishing why a person of ordinary skill in the art would have modified G993.2’s “packet”¹¹ with Fukushima’s packet with a header including a sequence number. See *KSR*, 550 U.S. at 418 (establishing that an invention would have been obvious requires “a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements *in the way* the claimed new invention does”) (emphasis added).

¹⁰ We take no position on whether Petitioner has sufficiently established a reason to combine G993.2 with Mitlin.

¹¹ There is some ambiguity over what, specifically, Petitioner identified as teaching the “packet” recited in limitations 1.b, 1.b.1, 1.b.2, and 1.c.2. As set forth above, Petitioner’s contentions identified various data in G993.2 in connection with the “packet” — e.g., a frame (Pet. 23), user data (Pet. 25), multiplexed data (e.g., Pet. 24, 26, 27), eoc message (Pet. 32), and eoc command (Pet. 32). Patent Owner’s Response addressed both the “user data” and “eoc commands” as the “packet.” Resp. 15–22. In the Reply, Petitioner identifies both the “user data” and the “eoc command” as the “packet.” Reply 8, 10, 12, 14–16. At oral argument, Petitioner’s counsel stated “the packet is ultimately the data that is transmitted through this process” shown at Figure 9-1 of G993.2. Tr. 12:1–2. Petitioner’s counsel stated “Petitioner’s position is not that the EOC command in isolation is the packet, but that the ultimate payload is data that includes the EOC command, the other overhead, and the other user data that’s multiplexed through the process depicted in Figure 9[-]1, that data that flows from that process is in fact the packet.” Tr. 12:9–14.

There is no dispute that Fukushima teaches a packet that includes a header with a sequence number. *See* Pet. 27; Resp. 20–21. Petitioner asserts that a person of ordinary skill in the art would have been motivated to combine G993.2 with Fukushima “to improve G993.2’s communication protocol,” (Pet. 15), but does not further explain what improvement to G993.2’s communication protocol would result from the combination. Rather, Petitioner describes these improvements as “use of packets with message counts and/or sequence IDs,” (Pet. 17), which provides nothing more than a statement of what claim 1 recites and what Fukushima discloses without any explanation as to what improvement is provided to G993.2’s communication protocol or why the use of packets with sequence IDs would improve G993.2’s communication protocol.

Petitioner’s asserted rationale for combining the references includes additional generic statements, e.g., by referring to “predictable results described above” and “*these* predictable, beneficial results” which are never specifically explained. *See* Pet. 17 (emphasis added). For example, Petitioner does not articulate why Fukushima’s sequence numbers would be an improvement or beneficial to G993.2’s “packets.” We recognize that Petitioner does not need to show “improvement” in a “categorical sense,” and need only show that Fukushima’s sequence numbers were a “suitable option,” *see Intel Corp. v. PACT KPP Schwiez AG*, 61 F. 4th 1373, 1381 (Fed. Cir. 2023), but in generically relying on “improvement” and “predictable, beneficial results” without further explanation, Petitioner has not established that Fukushima’s sequence numbers were a “suitable option” for G993.2’s “packets.” None of Petitioner’s assertions provide a sufficient *reason* that would have prompted a person of ordinary skill in the art to

combine G993.2 with Fukushima as proposed. *See KSR*, 550 U.S. at 418 (in an obviousness analysis, one must “determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue”); *In re Van Os*, 844 F.3d 1359, 1361 (Fed. Cir. 2017) (stating that “a conclusory assertion with no explanation is inadequate to support a finding that there would have been a motivation to combine”).

Moreover, we disagree with Petitioner that Mr. McNair “explained in detail why a [person of ordinary skill in the art] would have recognized the value of modifying VDSL2 by the disclosures of Fukushima.” Reply 19 (Ex. 1003 ¶¶ 140–148, 301–305, 314); *see also* Reply 28. Mr. McNair’s testimony is not only largely repetitive of the Petition, but similarly does not (1) provide any explanation as to what “improvements,” “predictable benefits,” or “value,” arises from the combination, or (2) even directly address the combination of G993.2’s “packet” with Fukushima’s sequence number. Ex. 1003 ¶¶ 144, 145, 146; *see ActiveVideo Networks, Inc. v. Verizon Comms., Inc.*, 694 F.3d 1312, 1328 (2012) (describing expert testimony that “motivation to combine would be because you wanted to build something better . . . a system that was more efficient, cheaper, or you wanted a system that had more features” as “generic and bears no relation to any specific combination of the prior art elements”).

For the same reasons, we find insufficient Mr. McNair’s testimony that a person of ordinary skill in the art

would have also understood this combination to be the use of a known technique (multi-carrier DMT transmission) to improve a similar process (G.993.2’s) in the same way as Mitlin and Fukushima describe, or applying a known technique (e.g., use of acknowledgement messages that Mitlin discloses and use of packets that Fukushima discloses) to a known process

(G.993.2's) that is ready for improvement, or a simple substitution (of G.993.2's generic packets, to the extent they lack headers, with Fukushima's packets having headers), to yield predictable results described above.

Ex. 1003 ¶ 145. For example, the cited testimony in paragraph 145 does not refer to Fukushima's sequence number or explain what improvement is provided to G993.2. The fact that a person of ordinary skill in the art "could" make these changes does not inform us that a person of ordinary skill in the art "would" make these changes, and Petitioner has not provided sufficient rationale why they would. *See Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1073 (Fed. Cir. 2015) ("obviousness concerns whether a skilled artisan not only *could have made* but *would have been motivated to make* the combinations or modifications of prior art to arrive at the claimed invention").

In the Reply, Petitioner argues that "[t]he motivation to combine is further supported by Mr. McNair's testimony that in order to implement retransmission (a common DLS error control technique addressed throughout Mr. McNair's declaration and the '348 patent itself . . .), a [person of ordinary skill in the art] would need to use SIDs." Reply 28–29 (internal citations omitted) (citing Ex. 1003 ¶¶ 135, 274, 277–278). We do not find support in the cited paragraphs of Mr. McNair's Declaration (i.e., paragraphs 135, 274, 277–278) that SIDs are *needed* to implement retransmission. Moreover, we agree with Patent Owner that a "SID is not necessary is conclusively proven by the fact that Petitioner's primary reference in all combinations, [G993.2], does not include an SID in its EOC command 'packets' to perform retransmission . . . This is the very reason

why Petitioner had to include Fukushima...in its combinations.” Sur-reply 16. Indeed, Petitioner’s analysis of limitation 1.b.2 does not mention G993.2 and focuses only on Fukushima’s disclosures. *See* Pet. 27. Nor does Petitioner’s analysis of the combination with Fukushima discuss sequence numbers in G993.2’s packets. *Id.* at 16.

At the hearing, Petitioner also relied on deposition testimony of Mr. McNair that G993.2 *inherently* discloses a sequence ID (Tr. 16:15–16), but this appears inconsistent with Petitioner’s position in the Reply, where Petitioner states that “the Petition does not cite to VDSL2 as the source for the header field with a SID. The Petition indicates that for Ground 1, that requirement is satisfied by Fukushima.” Reply 16. However, this testimony from Mr. McNair was cited in the Reply, stating that “VDSL2 ‘implicitly’ uses ‘some numbering of packets,’ such that there ‘has to be some kind of an indicator and the sequence number is one.’” *Id.* at 18 (citing Ex. 2020, 91:10–22); *see also id.* (citing Ex. 2020, 91:23–25 (Mr. McNair testifying that “there’s got to be some kind of marker, whether you call it a sequence number or you call it some other kind of marker....”)). This theory of inherency is not argued in the Petition, and is therefore a new theory raised for the first time in Petitioner’s Reply, so we will not consider it. *See* 37 C.F.R. § 42.23(b) (“A reply may only respond to arguments raised in the corresponding opposition, patent owner preliminary response, patent owner response, or decision on institution.”); Consolidated Trial Practice Guide 73-74 (Nov. 2019)¹² (explaining that “[r]espond,’ in the context of 37 C.F.R. § 42.23(b), does not mean proceed in a new direction with a new approach

¹² Available at <https://www.uspto.gov/TrialPracticeGuideConsolidated>.

as compared to the positions taken in a prior filing,”). However, even assuming this is not an improper new argument, Petitioner has not established that G993.2’s “packet” *inherently* teaches a header field comprises a sequence identifier (SID), or addressed how this might affect the combination with Fukushima. *PAR Pharmaceutical, Inc. v. TWI Pharmaceuticals, Inc.*, 773 F.3d 1186, 1195–1196 (Fed. Cir. 2014) (“A party must . . . meet a high standard in order to rely on inherency . . . —the limitation at issue necessarily must be present, or the natural result of the combination of elements explicitly disclosed by the prior art.”). That is, we do not find that Mr. McNair’s testimony that “there has to be some kind of an indicator and the sequence number is one” supports that a sequence number is necessarily present in G993.2. Moreover, Petitioner’s inherency theory seems to be in tension with Petitioner’s contentions that the combination with Fukushima provides an improvement or benefit to G993.2.

We, therefore, find Mr. McNair’s testimony on the motivation to combine G993.2 and Fukushima to be conclusory and inadequate to support Petitioner’s contentions. *See TQ Delta, LLC v. Cisco Sys., Inc.*, 942 F.3d 1352, 1359–60 (Fed. Cir. 2019); *Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9, 15 (PTAB August 24, 2022) (precedential) (declaration that “merely repeats, *verbatim*, the conclusory assertion for which it is offered to support” is “conclusory and unsupported, adds little to the conclusory assertion for which it is offered to support, and is entitled to little weight”); 37 C.F.R. § 42.65(a) (“Expert testimony that does not disclose the

underlying facts or data on which the opinion is based is entitled to little or no weight.”).¹³

Petitioner also argues that *Intel Corp. v. PACT* supports that the provided motivation to combine is sufficient. Tr. 14:17–15:10, 39:18–23; Reply 26–29. However, we find the facts here distinguishable from those in *Intel*. Although “any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed,” *Intel*, 61 F 4th at 1379 (citing *KSR*, 550 U.S. at 420), unlike in *Intel*, Petitioner *has not* identified a need or problem known in the field of endeavor at the time of invention or explained how Fukushima helped address that problem. *See id.* at 1380 (describing that Intel asserted that the references “address the same problem: maintaining cache coherency” and the secondary reference “was known to address the same cache-coherency issue . . . through a different mechanism”); *see also id.* at 1381. In the Reply, Petitioner argues that “because Petitioner has established that there was a known problem of error correction in the art, and the asserted combinations help address that issue in a manner within the skill of a [person of ordinary skill in the art], Petitioner has established motivation to combine.” Reply 29. However, aside from this statement, Petitioner does not discuss the “problem of error correction” or explain what the problem is in the Petition or Reply, nor does Petitioner address how the combination with Fukushima would address this problem.

¹³ Patent Owner argues that Mr. McNair lacks the expertise to know the difficulty in modifying DSL standards, such as G993.2. Resp. 21. However, because we do not find Mr. McNair’s testimony to be sufficient, we need not address these arguments.

See Sur-reply 19–20. This is again a conclusory statement from Petitioner regarding the rationale to combine that is not sufficiently supported or explained. *See Intel*, 61 F.4th at 1381 (stating that “It’s enough for Intel to show that there was a known problem of cache coherency in the art, that Bauman’s secondary cache helped address that issue, and that combining the teachings . . . wasn’t beyond the skill of an ordinary artisan”). We also find this case distinguishable from *Intel Corp. v. Qualcomm*, 21 F.4th 784 (Fed. Cir. 2021) (determining that the Board’s rejection of “increasing energy efficiency” in electronics, as a motivation to combine because it was a “generic concern” lacked substantial evidence). In *Qualcomm*, unlike here, “Intel’s expert indicated precisely how and why a skilled artisan would have combined the references,” in a way that was not “remotely conclusory.” *Id.* at 797–798.

We are also not persuaded by Petitioner’s arguments that Patent Owner’s arguments are based solely on attorney argument, and that Patent Owner does not cite to any evidence.¹⁴ Reply 5, 11, 16–17, 28–29. Petitioner argues that Mr. McNair’s testimony is unrebutted (e.g., Reply 5, 18), however, the burden of proving invalidity in an *inter partes* review remains on the petitioner throughout the proceeding. *See* 35 U.S.C. § 316(e); *Fanduel, Inc. v. Interactive Games, LLC*, 966 F.3d 1334 (Fed. Cir. 2020) (stating that “[r]equiring further post-institution record development on whether these references indeed rendered claim 6 obvious in order for the

¹⁴ Patent Owner presents various arguments relating to the differences between G993.2 and Fukushima, specifically, that the sequence number in Fukushima operates at a higher layer than where the eoc commands reside. Resp. 20.

Board to reach that question in its final decision would effectively and impermissibly shift the burden to the patent owner to defend its claim's patentability"); *In re Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364, 1376 (Fed. Cir. 2016) ("[I]t is inappropriate to shift the burden to the patentee after institution to prove that the patent is patentable."). Indeed, Patent Owner is not required to submit any response to the petition. *See Fanduel*, 966 F.3d at 1342 (citing 37 C.F.R. §§ 42.107(a), 42.120(a), *Magnum Oil*, 829 F.3d at 1376) (internal citations omitted)). Moreover, the Federal Circuit has been clear that "[w]hile the Board may appreciate receiving expert opinion from both sides to help it do so, no expert submissions are required." *Fanduel*, 966 F.3d at 1344. As in *Fanduel*, "there is no merit to [Petitioner's] suggestion that the Board was somehow obligated to defer to [Petitioner's] expert opinion of [the claims'] unpatentability just because the patent owner in this case did not supply expert guidance." *Id.*

"[T]here must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006); *see also KSR*, 550 U.S. 398, 401 ("To facilitate review, this analysis should be made explicit."). It is Petitioner's burden to establish a rationale to combine G993.2 and Fukushima by a preponderance of the evidence, and Petitioner has not done so here, for the reasons stated above.

Finally, Petitioner argued at the hearing that Patent Owner raised new arguments in the Sur-reply relating to its arguments against the rationale to combine. Tr. 39:4–14. We disagree. Patent Owner's arguments in the Sur-reply either respond to Petitioner's arguments raised in the Reply, or provide further explanation to Patent Owner's arguments raised in the Response that

Petitioner had not established a reason to combine. *See, e.g.*, Sur-reply 16 (“the Reply makes the new argument that . . .”); *see Rembrandt Diagnostics, LP v. Alere, Inc.*, 76 F4th 1376, 1384 (stating that “a reply may be proper if it is responsive and simply expands on previously raised arguments”).

Accordingly, for the foregoing reasons, we determine that Petitioner has not established that claim 1 is unpatentable over G993.2, Mitlin, and Fukushima.

5. *Independent Claims 9, 17, and 23 and Dependent Claims 2–4, 6, 7, 10–12, 14, 15, 18–20, 22, 24, 26, and 28*

For essentially the same reasons as independent claim 1, Petitioner contends that independent claims 9, 17, and 23 would have been obvious over G.993.2, Mitlin, and Fukushima, and provides explanation as to how the references teach each claim limitation. Pet. 32–37. Petitioner also contends that dependent claims 2–4, 6, 7, 10–12, 14, 15, 18–20, 22, 24, 26, and 28, which depend directly or indirectly from independent claims 1, 9, 17, and 23, would have been obvious over G.993.2, Mitlin, and Fukushima, and provides explanation as to how the prior art teaches each claim limitation. *Id.* at 37–43. Petitioner provides the same motivation for the combination as for independent claim 1. *Id.* at 15–18.

Accordingly, for the same reasons as set forth above for independent claim 1, we determine that Petitioner has not established that claims 2–4, 6, 7, 9–12, 14, 15, 17–20, 22–24, 26, and 28 are unpatentable over G993.2, Mitlin, and Fukushima.

E. Ground 2: Alleged Obviousness Over G.993.2, Mitlin, and Reynders

Petitioner contends claims 1–4, 6, 7, 9–12, 14, 15, 17–20, 22–24, 26, and 28 would have been obvious over the combination of G.993.2, Mitlin,

and Reynders. Pet. 43–54. Patent Owner disputes Petitioner’s contentions. Resp. 14–30. Having considered the arguments and evidence before us, we determine that Petitioner has not shown, by a preponderance of the evidence, that claims 1–4, 6, 7, 9–12, 14, 15, 17–20, 22–24, 26, and 28 would have been obvious over the combination of G.993.2, Mitlin, and Reynders.

1. Reynders (Exhibit 1007)

Reynders describes that when a node transmits data, “it sends the data within a packet (or frame), which includes, in its header, the addresses of both the source and the destination.” Ex. 1007 at 16 (§ 2.1). “Packet switched messages are broken into a series of packets of certain maximum size, each containing the destination and source addresses and a packet sequence number.” *Id.* at 17 (§ 2.2.2).

2. Analysis

Petitioner’s contentions as to this ground largely track its contentions for the combination of G.993.2, Mitlin, and Fukushima in the first ground, except that Petitioner relies on Reynders, rather than Fukushima. Pet. 45–54. Specifically, Petitioner contends that Reynders teaches a “packet compris[ing] a header field” as recited in limitation 1.b.1 and “wherein the header field comprises a sequence identifier (SID)” as recited in limitation 1.b.2. *Id.* at 46–48.

Petitioner also provides a near identical rationale to combine the references as with the first ground. Pet. 43–45; Reply 28–29. Petitioner contends that Reynders is in the same field as G993.2 and Mitlin. Pet. 44 (citing Ex. 1003 ¶ 301). Petitioner contends a person of ordinary skill in the art would have been motivated to combine G.993.2 with Mitlin and Reynders “to provide improvements to G.993.2’s communication protocol

such as the use of user data acknowledgements, and packets with message counts or sequence IDs.” *Id.* (citing Ex. 1003 ¶ 303).

Petitioner contends that the combination “would have been nothing more than combining prior art elements according to known methods (information transmission using packets having headers and sequence numbers in the headers) to obtain the predictable results described above.” *Id.* (citing Ex. 1003 ¶ 304). Petitioner further contends that a person of ordinary skill in the art

would have also understood this combination to be the use of a known technique (data communication using packets) to improve a similar process (G.993.2’s) in the same way as Reynders describes, or applying a known technique (e.g., use of packets that Reynders discloses) to a known process (G.993.2’s) that is ready for improvement, or a simple substitution (of G.993.2’s generic packets, to the extent they lack headers, with Reynders’ packets having headers), to yield predictable results described above.

Id. at 44–45 (citing Ex. 1003 ¶ 304). Petitioner also contends that a person of ordinary skill in the art would have been successful in combining G.993.2, Mitlin, and Reynders. *Id.* at 45 (citing Ex. 1003 ¶ 305).

Patent Owner argues, *inter alia*,¹⁵ that the Petition fails to establish a motivation to combine the references, for the same reasons as set forth above for the first ground. Resp. 29. For example, Patent Owner contends that Petitioner’s contentions are conclusory and “do[] not explain why or how a [person of ordinary skill in the art] would have found Reynders and been

¹⁵ Patent Owner raises additional arguments in the Response and Sur-reply, which we need not address because our determination as to the combination of G993.2 and Reynders is dispositive.

motivated to combine it with the other references.” *Id.*; *see also* Sur-reply 4–5.

For the same reasons explained above for the first ground, we determine that Petitioner has not provided sufficient rationale why one of ordinary skill in the art, absent hindsight, would have had reason to combine G993.2 and Reynders in the manner proposed. That is, Petitioner has not provided sufficient rationale establishing why a person of ordinary skill in the art would have modified G993.2’s “packet” with Reynders’ packet with a header including a sequence number.

For example, Petitioner asserts that a person of ordinary skill in the art would have been motivated to combine G993.2 with Reynders “to provide improvements to G993.2’s communication protocol,” (Pet. 44), but does not further explain what improvement to G993.2’s communication protocol would be provided by the combination. Rather, Petitioner describes these improvements as “use of . . . packets with message counts or sequence IDs,” (*id.*), which provides nothing more than a statement of what claim 1 recites and what Reynders discloses without any explanation as to what improvement is provided to G993.2’s communication protocol or why the use of packets with sequence IDs would improve or be beneficial to G993.2’s communication protocol.

Similarly, and as set forth in connection with the first ground, Mr. McNair’s testimony is insufficient in that it likewise provides no further explanation or rationale. *See* Ex. 1003 ¶ 303 (stating that a person of ordinary skill in the art “would have readily recognized the predictable benefits of the combination, such as providing improvements to the communication protocol of G993.2 such as use of user data

acknowledgements, and packets with message counts or sequence IDs”); ¶ 304 (stating that a person of ordinary skill in the art would have “understood this combination to be the use of a known technique (data communication using packets) to improve a similar process (G.993.2’s) in the same way as Reynders describes, or applying a known technique (e.g., use of packets that Reynders discloses) to a known process (G.993.2’s) that is ready for improvement, or a simple substitution (of G.993.2’s generic packets, to the extent they lack headers, with Reynders’ packets having headers), to yield predictable results described above”). Mr. McNair’s testimony is not only largely repetitive of the Petition, but as in the combination with Fukushima, does not (1) provide any explanation as to what “improvements,” “predictable benefits,” or “value,” arises from the combination, or (2) even directly address the combination of G993.2’s “packet” with Reynders’ sequence number. Moreover, as discussed above, Petitioner has not identified a need or problem known in the field of endeavor at the time of invention or explained how Reynders helped solve that problem. In summary, for the same reasons as set forth above for the first ground, Petitioner’s contentions and Mr. McNair’s supporting testimony is conclusory and does not sufficiently establish an apparent reason to combine the references.

Accordingly, Petitioner has not demonstrated that claims 1–4, 6, 7, 9–12, 14, 15, 17–20, 22–24, 26, 28 of the ’348 patent are unpatentable over G993.2, Mitlin, and Reynders.

IV. CONCLUSION

For the foregoing reasons, we are not persuaded that Petitioner has established by a preponderance of the evidence that 1–4, 6, 7, 9–12, 14, 15, 17–20, 22–24, 26, and 28 of the '348 patent are unpatentable. In summary:

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not shown Unpatentable
1–4, 6, 7, 9–12, 14, 15, 17– 20, 22– 24, 26, 28	103(a)	G993.2, Mitlin, Fukushima		1–4, 6, 7, 9– 12, 14, 15, 17–20, 22–24, 26, 28
1–4, 6, 7, 9–12, 14, 15, 17– 20, 22– 24, 26, 28	103(a)	G993.2, Mitlin, Reynders		1–4, 6, 7, 9– 12, 14, 15, 17–20, 22–24, 26, 28
Overall Outcome				1–4, 6, 7, 9– 12, 14, 15, 17–20, 22–24, 26, 28

V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1–4, 6, 7, 9–12, 14, 15, 17–20, 22–24, 26, 28 of the '348 patent have not been shown to be unpatentable under 35 U.S.C. § 103(a); and

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

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

COMMSCOPE, INC.,
Petitioner,

v.

TQ DELTA, LLC,
Patent Owner.

IPR2022-00809
Patent 9,094,348 B2

HOMERE, *Administrative Patent Judge*, dissenting.

I write separately to voice my disagreement with the majority's determination that Petitioner had not provided sufficient rationale to establish why a person of ordinary skill in the art (POSITA) would have modified G993.2's packet with Fukushima's packet with a header including a sequence number. Dec. 22–23. In particular, the majority concludes that Petitioner's articulated rationale for combining the references includes generic statements, (e.g., predictable results), without articulating what improvement Fukushima's sequence numbers would have provided to be G993.2's packets, and why such an improvement would be beneficial to G993.2's packets. *Id.* at 24–25. For those reasons, the majority determines

that Petitioner had not established that claim 1 is unpatentable over G993.2, Mitlin, and Fukushima. *Id.* at 32. From that decision, I respectfully dissent.

As an initial matter, disputed claim limitation 1.b relates to a packet exchanged between two transceivers, wherein the packet comprises, *inter alia*, a header field including a sequence ID (SID). *Id.* at 6. Simply put, the disputed claim limitation requires a packet having a header field including an SID. *Id.* Petitioner contends that a POSITA would readily be apprised that a frame (e.g., as disclosed in G993.2, § 3.20) “constitutes or is equivalent to the claimed ‘packet.’” Pet. 23 (citing Ex. 1003 ¶ 166).

Petitioner further contends that a POSITA “would have understood that a packet includes a header with one or more header fields,” and that G993.2 discloses one example of a “packet.” *Id.* at 25 (citing Ex. 1003 ¶ 183; Ex. 1025¹⁶ § N.1). Furthermore, Petitioner contends Fukushima’s disclosure that “the header section of each packet contains additional information relating to its sequence number, priority, and data reproduction time at the receiving end” teaches “wherein the header field comprises a sequence identifier (SID).” Pet. 27 (citing Ex. 1006, 15:2–10; Ex. 1003 ¶ 195).

Petitioner therefore contends that Fukushima’s “sequence number” teaches the recited “sequence identifier (SID).” *Id.* (citing Ex. 1003 ¶ 196). As correctly noted by the majority, “[t]here is no dispute that Fukushima teaches a packet that includes a header with a sequence number.” Dec. 24 (citing Pet. 27; Resp. 20–21) (emphasis added). As further correctly noted by the majority, Petitioner provides the following rationales in support of the proposed combination of references:

¹⁶ See *supra* note 7.

Petitioner contends a person of ordinary skill in the art would have been motivated to combine G.993.2 with Mitlin and Fukushima “to improve G.993.2’s communication protocol.” Pet. 15 (citing Ex. 1003 ¶ 138). Petitioner describes these improvements as “use of user data acknowledgements, and packets with message counts and/or sequence IDs.” *Id.* at 17 (citing McNair ¶ 144). Petitioner contends that a person of ordinary skill in the art “would have understood that G.993.2’s communication protocol could be improved using Mitlin’s acknowledgements.” *Id.* Petitioner contends that the combination “would have been nothing more than combining prior art elements according to known methods (information transmission using acknowledgement messages and packets) to obtain the predictable results described above.” *Id.* (citing Ex. 1003 ¶ 145).
Dec. 21–22.

The U.S. Supreme Court has held “[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.” *KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398, 416 (2007). The Court further instructs that:

Often, it will be necessary for a court to look to interrelated teachings of multiple patents;[] and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.
Id. at 418. “[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (cited by *KSR*, 550 U.S. at 418). However, the Court also instructs that “the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and

creative steps that a person of ordinary skill in the art would employ.” *KSR*, 550 U.S. at 418.

In addition, the Court instructs, “if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.” *Id.* at 417.

This precedent controls, and the application of the cited legal principles to the facts of this proceeding provide me with the necessary guidance to find sufficient rationale to support Petitioner’s proposed combination of references. While it may be necessary for Petitioner to identify a rationale for modifying the familiar elements obtained from the prior art in establishing that a claim is unpatentable over the proposed combination of references, the identification of such a rationale does not impose an unreasonable burden upon the moving party. So long as Petitioner articulates a reasoning with some rational underpinning to substantiate the proposed combination of references, such a conclusion is proper. As noted above, Petitioner not only articulates that the proposed combination of these known elements would predictably result in an improved communication protocol, but Petitioner also relies upon McNair’s testimony of using a known DMT technique to buttress that the proposed combination would predictably result in an improved protocol, which can help address the problem of error correction in the art. Reply 19 (Ex. 1003 ¶¶ 140–148, 301–305, 314); *see also* Reply 28–29.

As noted above, the case law allows Petitioner to look to the state of the prior art, including the knowledge of the POSITA, to arrive at such a reason for combining the known elements of the prior art. Consequently,

Petitioner's reliance upon widely available knowledge in order to arrive at an articulated reason with a rational underpinning to support the proffered combination is proper. I agree with Petitioner that the proposed combination of the teachings of G.993.2 and Fukushima is supported by a preponderance of the evidence, and the ensuing conclusion of obviousness is consistent with controlling authorities. I find Petitioner's proposed combination of the cited teachings of G.993.2, Mitlin, and Fukushima is no more than a simple arrangement of old elements with each performing the same function it had been known to perform, yielding no more than what one would expect from such an arrangement. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 416 (2007). Therefore, the ordinarily skilled artisan, being "a person of ordinary creativity, not an automaton," would have been able to fit the teachings of the cited references together like pieces of a puzzle to predictably result in transceivers exchanging a packet containing a header field including an SID. *Id.* at 420–21. Because Patent Owner has not demonstrated that Petitioner's proffered combination would have been "uniquely challenging or difficult for one of ordinary skill in the art," I agree with Petitioner that the proposed modification would have been within the purview of the ordinarily skilled artisan. *See Leapfrog Enters., Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1162 (Fed. Cir. 2007) (citing *KSR*, 550 U.S. at 418). Consequently, I am satisfied that, on the record before me, Petitioner has established by a preponderance of the evidence that the combination of G.993.2 and Fukushima teaches the disputed claim limitation.

The majority also determined that Petitioner had likewise failed to provide sufficient rationale to establish why a POSITA would have modified G993.2's packet with Reynders' packet with a header including a sequence

number. Dec. 33. Because the majority’s analysis and conclusion are premised on substantially the same reasoning as set forth above for the G993.2 and Fukushima combination, I similarly take exception from the majority’s decision. *Id.* at 33–36. I am satisfied that, on this record, Petitioner has provided sufficient rationale to support the proposed combination of G993.2 and Reynders. More particularly, as noted by the majority, and reproduced below, I agree with Petitioner that:

[T]he combination “would have been nothing more than combining prior art elements according to known methods (information transmission using packets having headers and sequence numbers in the headers) to obtain the predictable results described above.” *Id.* (citing Ex. 1003 ¶ 304).

a person of ordinary skill in the art “would have also understood this combination to be the use of a known technique (data communication using packets) to improve a similar process (G.993.2’s) in the same way as Reynders describes, or applying a known technique (e.g., use of packets that Reynders discloses) to a known process (G.993.2’s) that is ready for improvement, or a simple substitution (of G.993.2’s generic packets, to the extent they lack headers, with Reynders’ packets having headers), to yield predictable results described above.” *Id.* at 44–45 (citing Ex. 1003 ¶ 304).
Id. at 34.

Consequently, I am satisfied that, on the record before me, Petitioner has established by a preponderance of the evidence that the combination of G.993.2 and Reynders teaches the disputed claim limitation.

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