

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD. and
SAMSUNG ELECTRONICS AMERICA, INC.,
Petitioner,

v.

MAXELL, LTD.,
Patent Owner.

IPR2024-00907
Patent 10,129,590 C1

Before KEVIN C. TROCK, JOHN A. HUDALLA, and
FREDERICK C. LANEY, *Administrative Patent Judges*.

Opinion for the Board filed by *Administrative Patent Judge* LANEY.

Opinion Dissenting-in-part filed by *Administrative Patent Judge*
HUDALLA.

LANEY, *Administrative Patent Judge*.

JUDGMENT

Final Written Decision

Determining All Challenged Claims Unpatentable
Denying Patent Owner's Motion to Exclude
35 U.S.C. § 318(a); 37 C.F.R. § 42.64(c)

IPR2024-00907
Patent 10,129,590 C1

I. INTRODUCTION

Samsung Electronics Co. Ltd. and Samsung Electronics America, Inc. (collectively, “Petitioner”) and Maxell, Ltd. (“Patent Owner”) are the real parties in interest for this matter. Paper 3 (“Pet.” or “Petition”), 74; Paper 5, 1. Petitioner filed a Petition for *inter partes* review of claims 1, 4, 5, 8–12, and 14–25 (the “challenged claims”) of U.S. Patent No. 10,129,590 C1 (Ex. 1004, “the ’590 patent”), along with a supporting declaration from Dr. Charles D. Creusere. Pet. 1; Ex. 1002. According to the parties, the ’590 patent is the subject of the following action: *Maxell, Ltd. v. Samsung Electronics Co. Ltd. and Samsung Electronics America, Inc.*, No. 5:23-cv-00092-RWS (E.D. Tex.) (the “District Court Litigation”). Pet. 75; Paper 5, 1. The parties also identify the IPR petition in IPR2024-00906 that Petitioner has filed against U.S. Patent No. 11,445,241, which is related to the ’590 patent. Pet. 75; Paper 5, 1.

After institution (Paper 11), Patent Owner filed a Response to the Petition (Paper 22, “PO Resp.”), also including a supporting declaration from Bruce McNair (Ex. 2017). Petitioner filed a Reply (Paper 25 (“Pet. Reply”)), including an additional declaration from declarant Dr. Creusere (Ex. 1058), and Patent Owner filed a Sur-reply (Paper 31 (“PO Sur-reply”). An oral hearing was held on September 25, 2025, and the transcript is of record. Paper 43 (“Tr.”).

In addition, Patent Owner also filed a Motion to Exclude (Paper 32, “Exclude Mot.”) certain evidence submitted by Petitioner. Petitioner filed an Opposition (Paper 33, “Exclude Opp.”) and Patent Owner filed a Reply (Paper 34, “Exclude Reply”).

We have jurisdiction under 35 U.S.C. § 6. This is a Final Written Decision under 35 U.S.C. § 318(a) as to the patentability of the challenged

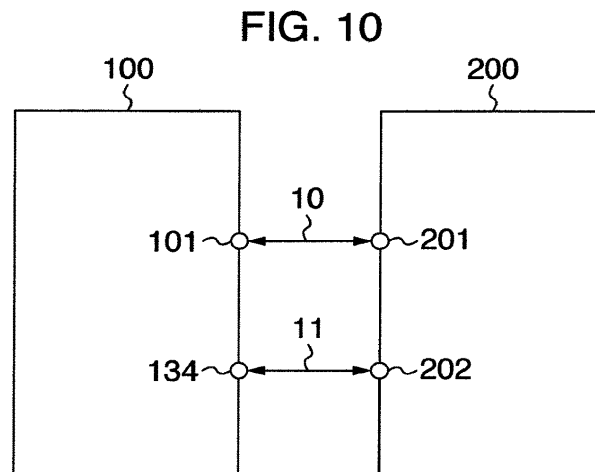
claims of the '590 patent. For the reasons discussed below, we determine that Petitioner has established by a preponderance of the evidence that the challenged claims are unpatentable.

II. BACKGROUND

A. The '590 Patent (*Ex. 1004*)¹

The '590 patent relates to “a technique to establish connections between a plurality of apparatuses and networks by radio.” *Ex. 1004*, 1:15–17. According to the '590 patent, “it is possible to communicate with a network while displaying videos of high picture quality obtained by a video processing apparatus.” *Id.* at 2:39–42.

Figure 10 of the '590 patent is reproduced below.



¹ The '590 patent was issued an *Ex Parte* Reexamination Certificate, which identifies amended claims that were determined to be patentable after reexamination. *Ex. 1004*. Those amended claims are now being challenged in this proceeding. Hereinafter, our citations to the specification of the '590 patent rely on the column and line numbers for the originally issued patent and our citations to the claims rely on the column and line numbers of the *Ex Parte* Reexamination Certificate.

Figure 10 depicts connections between video processing apparatus 100 and video display apparatus 200. Ex. 1004, 3:7–9. For example, video processing apparatus 100 is a portable video processing apparatus, such as “a digital camera, a video camera, a cellular phone, a game machine, or a personal media player.” *Id.* at 3:24–25, 3:44–46. According to the ’590 patent, video processing apparatus 100 and video display apparatus 200 are connected via bidirectional interface 10 and “a video signal of high picture quality and other information items and signals can be bidirectionally communicated therebetween.” *Id.* at 3:22–34. The ’590 patent further describes that “between a terminal 134 of the video processing apparatus 100 and a terminal 202 of the video display apparatus 200, signals from the internet and a home network are communicated by radio.” *Id.* at 3:34–38. According to the ’590 patent, “[t]he frequency bands used for the transmission between the terminals 134 and 202 are limited to predetermined frequency bands” in order to “increase[] the radio wave resource efficiency and prevent[] the problem of interference with other apparatuses.” *Id.* at 3:38–42.

Figure 1 of the ’590 patent is reproduced below.

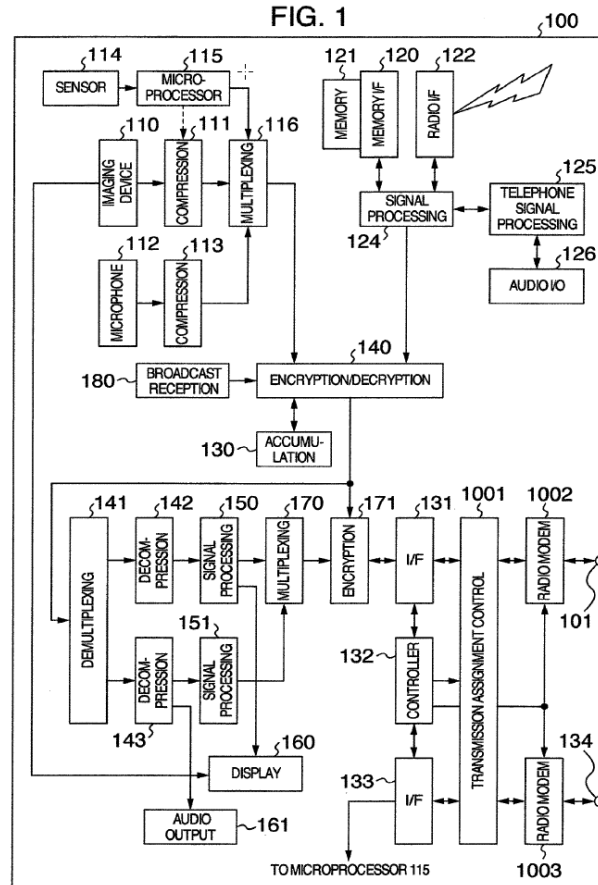


Figure 1 depicts an example of video processing apparatus 100. Ex. 1004, 3:47–49. According to the '590 patent, radio modem circuit 1002 “is a first radio communication unit which wirelessly sends video information and audio information to the external video display apparatus 200 and which receives data and information by radio therefrom.” *Id.* at 7:48–52. Radio modem circuit 1003 “is a second radio communication unit which connects to (accesses) a network, e.g., the Internet or a home network to wirelessly communicate various information including video signals, audio signals, and data therewith.” *Id.* at 7:55–59. The '590 patent explains that “controller 132 controls distribution of the radio transmission rate of each modem by controlling the transmission rate assignment controller 1001,” which “variably set[] the modulation/demodulation methods, the frequency bands, and the number of carriers respectively for the modems 1002 and 1003.” *Id.*

at 7:59–8:2.

According to the '590 patent, “controller 132 and the transmission rate assignment controller 1001 control the radio transmission assignment such that the radio transmission rate of the modem 1002 to send the video information of high picture quality by radio to the video display apparatus 200 takes precedence over the radio transmission rate of the modem 1003 to connect to a network for communication,” such that “the radio transmission rate of the modem 1002 is more than that of the modem 1003.” Ex. 1004, 8:7–15.

Figure 9 of the '590 patent is reproduced below.

FIG. 9

SCHEME	SCHEME 1	SCHEME 2
BANDWIDTH	6MHz	6MHz
CARRIER MODULATION SCHEME	64QAM	QPSK
CONVOLUTION CODE	3/4	2/3
GUARD INTERVAL	1/8	1/8
TRANSMISSION CAPACITY	17Mbps	5Mbps

Figure 9 shows an example of different transmission parameters of a radio modem. Ex. 1004, 3:5–6. For example, controller 132 sets the transmission scheme of modem 1002 to “scheme 1” and the transmission scheme of modem 1003 to “scheme 2” as shown in Figure 9 “in a situation wherein the modem 1002 transmits video information to the display apparatus 200 and the modem 1003 simultaneously connects to the Internet to receive Internet information.” *Id.* at 8:15–19. In this way, a higher transmission rate is assigned to the communication with the display apparatus 200, allowing the user to continuously view videos with high picture quality on the display apparatus. *Id.* at 8:24–32.

Figure 4 of the '590 patent is reproduced below.

FIG. 4

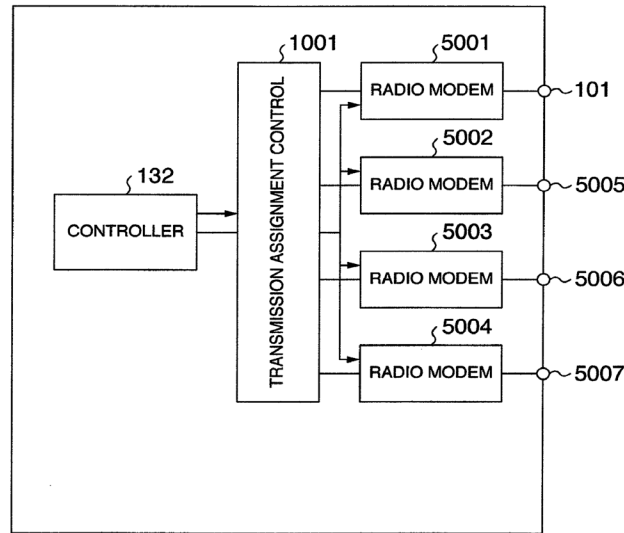


Figure 4 depicts a part of the system associated with the transmission rate assignment control in another example of the transmission rate assignment controller and the radio modem. Ex. 1004, 8:62–65. In Figure 4, “radio modem circuits 5001 to 5004 are modems having respective fixed transmission capacity values and differ from each other only in the frequency band for transmission.” *Id.* at 9:1–4. According to the ’590 patent, modems 5001 to 5004 may be appropriately combined in operation. *Id.* at 9:7–9. For example, when “a wide band is required to transmit video information of high picture quality (e.g., video information of HD resolution), the modems 5001 to 5003 are assigned to send video information and only the modem 5004 is assigned to communicate with the network such as the Internet,” such that “interface circuit 131 transmits video and audio information by radio via the modems 5001 to 5003 to the display apparatus 200, and the interface circuit 133 communicates with the network via the modem 5004.” *Id.* at 9:18–27. As a result, the ’590 patent explains, “video information of high picture quality can be continuously

transmitted and it is also possible to communicate with the Internet.” *Id.* at 9:28–30.

B. Challenged Claims

Petitioner challenges the patentability of claims 1, 4, 5, 8–12, and 14–25 of the ’590 patent. Pet. 1. Claims 1, 5, 9, 10, and 23 are independent. Claim 1 is directed to “[a] video processing apparatus”; claim 5 is directed to “[a] display apparatus”; claim 9 is directed to “[a] method for video processing”; claim 10 is directed to “[a] method”; and claim 23 is directed to “[a] cellular phone.” Ex. 1004, 1:23, 2:16, 3:1, 3:50, 5:18. Claim 1 is generally illustrative and reproduced below.

[1pre]² A video processing apparatus, comprising:

- [1a] a first radio communication circuit implementing a first transmission scheme having a first modulation scheme and a first transmission frequency band, the first radio communication circuit capable of transmitting video information by radio or receiving information by radio using the first transmission frequency band;
- [1b] a second radio communication circuit implementing a second transmission scheme having a second modulation scheme different from the first modulation scheme and a second transmission frequency band different from the first transmission frequency band, the second radio communication circuit capable of connecting by radio to an internet or a home network to transmit and receive information using the second transmission frequency band;
- [1c] a third radio communication circuit capable of transmitting information and using a third transmission frequency band;
- [1d] an imaging circuit capable of receiving video information and still picture information via an optical system;

² Alpha-numerical designations adopted by Petitioner. See Pet. vi–xii.

- [1e] a compression circuit compressing the still picture information using a first type of compression method and the video information using a second type of compression method;
- [1f] an input device capable of receiving a user indication;
- [1g] an accumulation circuit capable of accumulating video information received by the imaging circuit after the video information is compressed by the compression circuit; and
- [1h] a controller controlling assignment of connection of each of the first, second, and third radio communication circuits,
- [1i] wherein the first radio communication circuit can transmit video information accumulated in the accumulation circuit to an external device by radio,
- [1j] wherein the controller controls assignment of connection for each of the first and second radio communication circuit in response to receiving an indication from a user such that when an indication from a user indicates to transmit video information using the first radio communication circuit, the controller assigns a connection to the first radio communication circuit for transmitting the video information,
- [1k] wherein the controller controls each of the first and second radio communication circuit so that the first radio communication circuit transmits video information and the second radio communication circuit connects to the internet or the home network simultaneously, and
- [1l] wherein the first or third radio communication circuits receives a signal from the internet indicating that an update for an operating system of the video processing apparatus is available, and the video processing apparatus executes an update process such that an updated operating system of the video processing apparatus is stored in the video processing apparatus after execution of the update process.

Id. at 1:23–2:14.

C. Evidence

Petitioner relies upon the following evidence:

(1) U.S. Patent Application Publication No. US 2006/0258289 A1, published November 16, 2006 (“Dua”) (Ex. 1008);

(2) U.S. Patent No. 7,149,508 B2, issued December 12, 2006 (“Herle”) (Ex. 1009);

(3) Nokia N93 User Guide (“N93”) (Ex. 1010);

(4) U.S. Patent Application Publication No. US 2006/0128332 A1, published June 15, 2006 (“Rooyen”) (Ex. 1011);

(5) U.S. Patent Application Publication No. US 2006/0274704 A1, published December 7, 2006 (“Desai”) (Ex. 1012);

(6) Specification of the Bluetooth System, Master Table of Contents & Compliance Requirements, Covered Core Package version: 2.0 + EDR, Current Master TOC issued: November 4, 2004 (“BT-Spec”) (Ex. 1014);

(7) 3GPP TS 36.211 V0.2.1 (2006-11) Technical Specification (“3GPP-Spec”) (Ex. 1015); and

(8) U.S. Patent Application Publication No. US 2004/0264600 A1, published December 30, 2004 (“Kao”) (Ex. 1013).

D. Asserted Grounds of Unpatentability

Ground	Claims Challenged	35 U.S.C. §	References
1	1, 4, 5, 8–12, 14–25	103(a) ³	N93, Dua, Herle

³ The ’590 patent claims priority to several applications filed before the March 16, 2013 effective date of the §103 provisions in the Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29. Ex. 1004, code (63). Accordingly, we cite to pre-AIA § 103(a).

Ground	Claims Challenged	35 U.S.C. §	References
2	1, 4, 5, 8–12, 14–25	103(a)	N93, Dua, Herle, Rooyen, Desai, BT-Spec, 3GPP-Spec, Kao
3	1, 4, 5, 8–12, 14–25	103(a)	Dua, Herle
4	1, 4, 5, 8–12, 14–25	103(a)	Dua, Herle, N93
5	1, 4, 5, 8–12, 14–25	103(a)	Dua, Herle, N93, Rooyen, Desai, BT-Spec, 3GPP-Spec, Kao

Pet. 1.

III. ANALYSIS

Petitioner presents five inter-related grounds challenging the patentability of claims 1, 4, 5, 8–12, and 14–25, which are organized through a complex series of cross-references. *See* Pet. 9–73. Dua and Herle are central to each ground and, for Ground 3, Petitioner even contends that those combined references alone render the challenged claims unpatentable. *Id.* at 60–66. For Grounds 1 and 4, Petitioner contends N93 discloses a multi-radio cellular phone, like the one Dua is alleged to disclose, and provides further evidence of “normal” user indications that were known to skilled artisans to assign radios for video transfer. *See id.* at 7, 9–53, 66–73. For Grounds 2 and 5, Petitioner contends that Rooyen and Desai further demonstrate it was known that the standards-based radios disclosed in Dua “may be implemented as separate or combined radio circuits” and BT-Spec/Kao⁴ further demonstrate the different known “modulation schemes

⁴ Petitioner also identifies 3GPP-Spec (Ex. 1015) to evidence modulations and frequencies known to comply with standards and enable communications with a standard compliant device, but that reference has not

and frequencies” used by the standards-based radios disclosed in Dua and/or N93. *See id.* at 7–8, 53–59, 73. In the analysis below, each challenged claim is addressed in view of each ground.

A. Legal Standards

Petitioner bears the burden of establishing the unpatentability of the challenged claims by a preponderance of the evidence. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d). This burden of persuasion never shifts to Patent Owner except in limited circumstances not present here. *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

A claim is unpatentable under § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *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) when in evidence, objective indicia of non-obviousness (i.e., secondary considerations).⁵ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

been given any weight because, for the reasons discussed *infra*, we are not persuaded by Petitioner’s evidence and arguments that it is properly within the scope of available prior art. Nevertheless, we do not find this defect to be fatal to Petitioner’s unpatentability contentions of the challenged claims.

⁵ No evidence of objective indicia of nonobviousness has been presented.

The Supreme Court explained in *KSR International Co. v. Teleflex Inc.* that

[o]ften, it will be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; 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.

550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (“[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.” (alteration in original))). This search for answers about whether the claimed subject matter would have been obvious to a skilled artisan at the time of the invention applies “an expansive and flexible approach.” *Id.* at 415. Whether a patent claiming the combination of prior art elements would have been obvious is determined by whether the improvement is more than the predictable use of prior art elements according to their established functions. *Id.* at 417. Reaching this conclusion, however, requires more than a mere showing that the prior art includes separate references covering each separate limitation in a claim under examination. *Unigene Labs., Inc. v. Apotex, Inc.*, 655 F.3d 1352, 1360 (Fed. Cir. 2011). Rather, obviousness requires the additional showing that a person of ordinary skill at the time of the invention would have selected and combined those prior art elements in the normal course of research and development to yield the claimed invention. *Id.*

“Whether an ordinarily skilled artisan would have been motivated to modify the teachings of a reference is a question of fact.” *WBIP, LLC v.*

Kohler Co., 829 F.3d 1317, 1327 (Fed. Cir. 2016) (citations omitted). “[W]here a party argues a skilled artisan would have been motivated to combine references, it must show the artisan ‘would have had a reasonable expectation of success from doing so.’” *Arctic Cat Inc. v. Bombardier Recreational Prods. Inc.*, 876 F.3d 1350, 1360–61 (Fed. Cir. 2017) (quoting *In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Patent Litig.*, 676 F.3d 1063, 1068–69 (Fed. Cir. 2012)).

Reasonable expectation of success of the proposed combination is also a question of fact. *Intelligent Bio-Systems, Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1366 (Fed. Cir. 2016). “The reasonable expectation of success requirement refers to the likelihood of success in combining references to meet the limitations of the claimed invention.” *Id.* at 1367. In evaluating reasonable expectation of success, we must consider the appropriate scope of the “claimed invention.” *Id.* (emphasis omitted).

B. Level of Ordinary Skill

In determining whether an invention would have been obvious at the time it was made, we consider the level of ordinary skill in the pertinent art at the time of the invention. *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966). “The importance of resolving the level of ordinary skill in the art lies in the necessity of maintaining objectivity in the obviousness inquiry.” *Ryko Mfg. Co. v. Nu-Star, Inc.*, 950 F.2d 714, 718 (Fed. Cir. 1991).

Petitioner describes a person of ordinary skill in the art (“skilled artisan” or “POSITA”) as a person having “a bachelor’s degree in electrical engineering or equivalent with at least one year of experience in the field of wireless communications,” wherein “[a]dditional education or experience might substitute for the above requirements.” Pet. 3 (citing Ex. 1002 ¶ 28).

Patent Owner similarly describes a skilled artisan as having “at least a Bachelor’s degree in Electrical Engineering, Computer Engineering, Computer Networking, or a related technical field, with at least one year of experience in the field of wireless communications.” PO Resp. 3 (citing Ex. 2017 ¶ 60). Petitioner states that the “slight differences in the proposed definitions of a [skilled artisan] are not relevant.” Pet. Reply 1 (citing Ex. 1058 ¶ 7). And Patent Owner does not allege that the differences in the proposed backgrounds for a skilled artisan would have any meaningful impact on a proper obviousness analysis. *See generally* PO Resp.; PO Sur-reply.

We do not find any meaningful difference between Petitioner’s and Patent Owner’s descriptions of the backgrounds for a person of ordinary skill and we find that both are consistent with the subject matter of the ’590 patent. We, therefore, adopt Patent Owner’s assessment of a skilled artisan, but the outcome would have been the same under Petitioner’s definition.

C. Claim Construction

We construe each claim using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. § 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent. 37 C.F.R. § 42.100(b). Thus, we apply the claim construction standard as set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc).

Under *Phillips*, claim terms are generally given their ordinary and customary meaning as would be understood by one with ordinary skill in the art in the context of the specification, the prosecution history, other claims,

and even extrinsic evidence including expert and inventor testimony, dictionaries, and learned treatises, although extrinsic evidence is less significant than the intrinsic record. *Phillips*, 415 F.3d at 1312–17. Usually, the specification is dispositive, and it is the single best guide to the meaning of a disputed term. *Id.* at 1315.

Only terms that are in controversy need to be construed, and then only to the extent necessary to resolve the controversy. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co. Matal*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (in the context of an *inter partes* review, applying *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

Petitioner argues that “[b]ecause the prior art asserted herein discloses subject matter within the indisputable scope of the claims, the Board need not construe the outer bounds of the claims as part of these proceedings.” Pet. 3. Nonetheless, Petitioner asserts that the term “[c]ircuit” should be interpreted broadly as any circuitry,” which “need not be separate from another circuit,” and that the term “[v]ideo” is not limited to video of any quality, resolution, size, or transfer rate (e.g., real time).” *Id.*

Additionally, Petitioner makes reference to inconsistent positions that Patent Owner has allegedly taken in other proceedings regarding the scope of the phrase “when an indication from a user indicates to transmit video information using the first radio communication circuit [or ‘indicates to use the first radio communication circuit’], the controller assigns a connection to the first radio communication circuit for transmitting [or ‘for receiving’] the video information.” Pet. 4 (alterations in original). Petitioner contends an express construction of that phrase is still unnecessary because, regardless of

which position Patent Owner takes in this proceeding, the prior art discloses the recited subject matter. *Id.*

Patent Owner does not provide a direct response to Petitioner's assertions. *See* PO Resp. 3–4. Instead, Patent Owner simply states that the above phrase should be given the same meaning being applied in the District Court Litigation, which is the “plain and ordinary meaning” that “plainly requires the user to indicate two things: (1) to transmit video information, and (2) to use the first radio communication circuit in making that transmission.” *Id.* at 4 (citing Ex. 2018, 23).

In its Reply, Petitioner does not directly dispute Patent Owner's assertion. Pet. Reply 1. Instead, Petitioner argues that, because Patent Owner “does not apply th[e] construction [adopted in the District Court Litigation] to the prior art and does not dispute that the prior art discloses that portion of that limitation under any proposed construction,” no express construction is necessary in this proceeding. *Id.*

We determine that no claim term requires express construction in this proceeding and that the ordinary and customary meaning of the claim terms apply.

D. The Alleged Prior Art

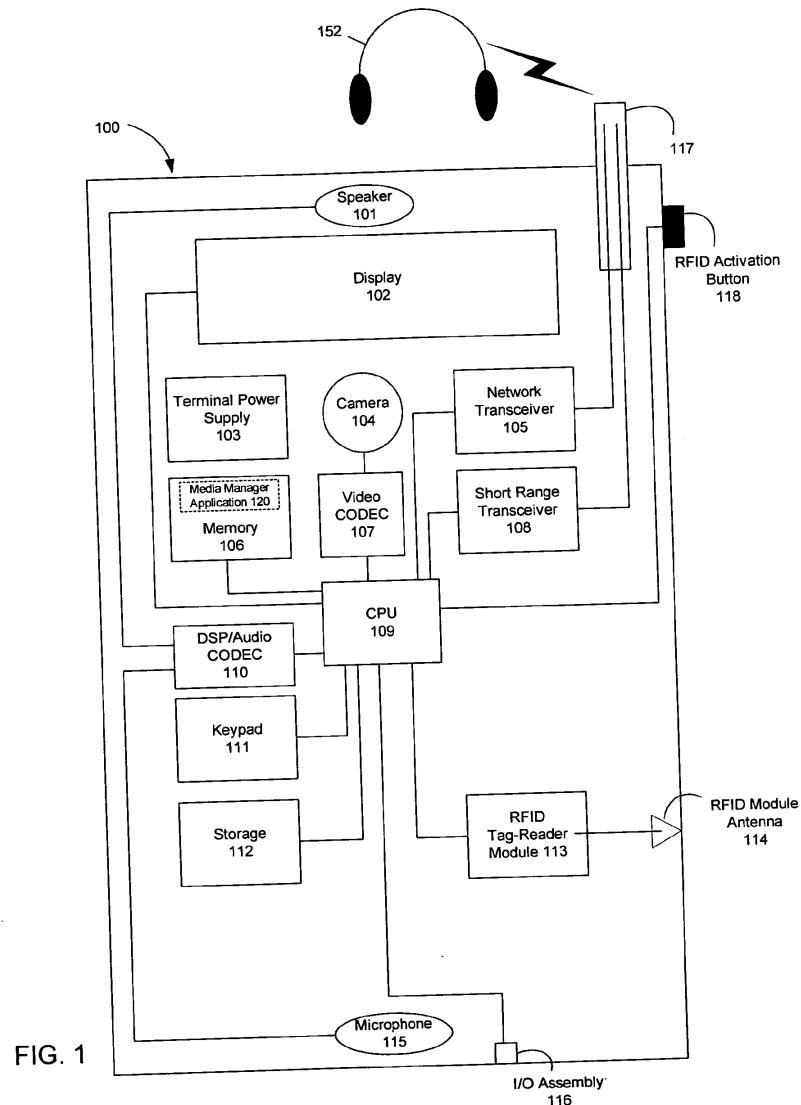
1. Dua (Ex. 1008)

Dua is a U.S. Patent Application Publication that published on November 16, 2006, more than one year before the earliest U.S. and foreign priority date of the '590 patent. Ex. 1004, codes (30), (63); Ex. 1008, code (43). Petitioner asserts that Dua is prior art under pre-AIA 35 U.S.C.

§§ 102(a), 102(b), 102(e). Pet. 4. Patent Owner does not dispute that Dua is properly within the scope of prior art. *See generally* PO Resp.

Dua relates to “a wireless media system and player having improved features for establishing wireless connectivity with various electronic devices.” Ex. 1008 ¶ 2. Dua describes a media player device using “integrated Radio Frequency Identification (RFID) technology to exchange communication settings, media capability, and other parameters with an external device that also has integrated RFID technology.” *Id.* at code (57). According to Dua, “[t]he automatic exchange of settings and other information via a proximity-based RFID data exchange allows a media player to quickly establish a secure communication link with another device via a commonly supported wireless protocol such as Ultra Wideband (UWB) or Bluetooth.” *Id.* According to Dua, the media player includes “an RFID Tag-Reader Module that is capable of functioning as both an RFID tag and an RFID reader” and that “allows interoperability with all RF 13.56 MHz readers and tags compatible with existing international standards, including ISO 14443 A/B, ISO 15693, FeliCa™, and NFC.” *Id.* ¶ 15.

Dua’s Figure 1 is reproduced below.



Dua's Figure 1 depicts components of a media player 100 with cellular phone capability. Ex. 1008 ¶ 57. Dua describes that “[a] short-range transceiver 108 and antenna 117 provide wireless connectivity with external devices or access points using supported communications protocols (e.g., Bluetooth, 802.11 a/b/g/n, Ultra Wideband, Wireless USB, 802.15.3/WiMedia, Wireless 1394, Wireless FireWire, WiMax, and 802.15.4/ZigBee).” *Id.* ¶ 62. According to Dua, “[s]hort-range transceiver 108 interacts with a CPU 109 for implementing short-range communications protocols and processing messages exchanged between other electronic

devices and the media player 100,” and “CPU 109 executes programs stored in a non-volatile or read only memory 106 and provides instructions for managing and controlling the operating of media player 100.” *Id.* ¶ 66. Dua describes that “CPU 109 is also connected to network transceiver 105 for interacting with a cellular network, such as a Global System Mobile (GSM) network and the like via antenna 117.” *Id.* According to Dua, “[m]edia player 100 is able to access the Internet through the cellular network, or through a wireless access point using short range transceiver 108 and a supported communications protocol (e.g., WiFi).” *Id.*

Dua also describes an RFID Tag-Reader Module 113 integrated into media player 100. Ex. 1008 ¶ 70. Dua provides RFID Tag-Reader Module 113 so that “media player 100 can rapidly exchange information with an electronic device that is in close proximity and which also has integrated RFID technology.” *Id.* According to Dua, “RFID Tag-Reader Module 113 also includes a reader component used for transmitting interrogation signals via its antenna to an external electronic device’s RFID tag when in close proximity, and receiving a response signal from the external device’s RFID tag.” *Id.* ¶ 71.

Dua’s Figure 10 is reproduced below:

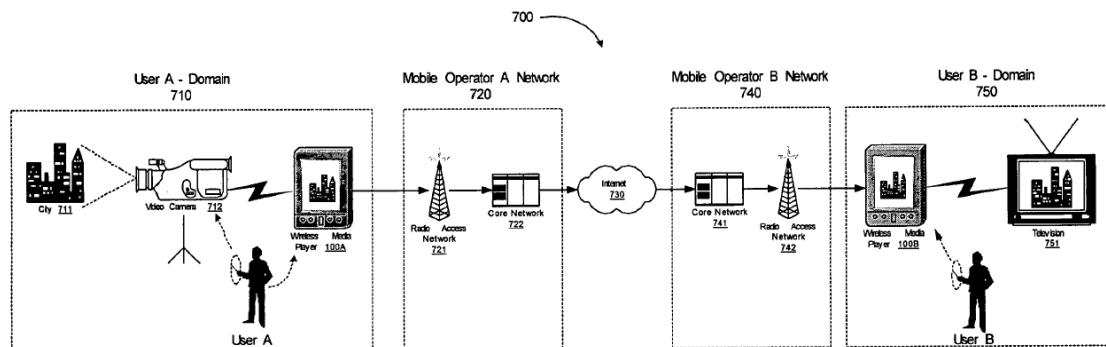


FIG. 10

Dua's Figure 10 shows "media player 100A wirelessly capturing a video feed from an external video recording device 712, and transmitting the same video content via a cellular network 720 and the Internet 730 to another media player 100B, which further transmits the content to a television 751." Ex. 1008 ¶ 190. Referring to Figure 10, Dua describes that video camera 712 "has an integrated RFID tag-reader module and a wireless interface for communication with other devices" and "is recording a city landscape 711 and simultaneously transmitting the video feed to the wireless media player 100A in User A's domain 710." *Id.* ¶¶ 191–192. User A uses the media manager application operating on the media player 100A to specify that the video feed be transmitted to User B's wireless device 100B. *Id.* ¶ 192. According to Dua, "User A's media player 100A is connected to Mobile Operator A's network 720 via RF signal to the radio access network 721" and when User A's connection attempt is accepted by User B, "a SIP [session initiation protocol] peer-to-peer connection is established between the two devices" and "[m]edia player 100A begins transmitting the video content to media player 100B." *Id.* ¶¶ 193–194. If User B wants to watch the video feed on his television, assuming television 751 has an integrated RFID module and a RF interface for communication with other devices, User B can press the RFID activation button 118 on the media player 100B and bring the media player in proximity to the RFID hot spot on the television so that the media content is automatically transmitted. *Id.* ¶¶ 195–196.

2. *Herle (Ex. 1009)*

Herle is a U.S. Patent that issued on December 12, 2006, more than one year before the earliest U.S. priority date of the '590 patent. Ex. 1004, codes (30), (63); Ex. 1009, codes (22), (45). Petitioner asserts that Herle is

prior art under pre-AIA 35 U.S.C. §§ 102(a), 102(b), 102(e). Pet. 5. Patent Owner does not dispute Herle is properly within the scope of the prior art. *See generally* PO Resp.

Herle relates to “an apparatus and method for upgrading the software in a wireless mobile station.” Ex. 1009, 1:7–10. Herle describes over-the-air (OTA) upgrading of wireless mobile stations, such as cell phones, wireless personal digital assistants (PDAs), wireless hand-held computers, and two-way pagers, which “enables a subscriber to download and install upgraded software containing patches, bug fixes, and newer versions of mobile station software, including the operating system.” *Id.* at 1:24–28, 1:39–43. Herle notes that because a wireless mobile station has limited resources, “there is a need in the art for systems and methods for performing over-the-air software upgrades that require only small upgrade file sizes.” *Id.* at 1:61–62, 2:25–28.

Herle describes the technique of “Internet protocol (IP)-based over-the-air (OTA) software download (i.e., IOTA-SD) using a minimum sized delta file-based software upgrade,” which comprises:

- 1) a utility application that generates the smallest possible binary difference (“delta file”) between two versions of mobile station executable firmware; and 2) a software algorithm running on the mobile station that receives the binary delta file as input and applies it to the existing image file on the mobile station to transform the existing image file into a new image file.

Ex. 1009, 2:32–42. Herle points to the advantage of downloading a small delta file over the air to the mobile station, rather than a large image file. *Id.*

at 2:57–59. Herle describes the mobile station using this technique, comprising:

- 1) a memory capable of storing an original image file and the delta file, wherein the delta file is suitable for upgrading the original image file; and
- 2) a controller capable of modifying the original image file according to instructions stored in the delta file to thereby generate an upgraded image file.

Id. at 2:65–3:4.

Figure 2 of Herle is reproduced below.

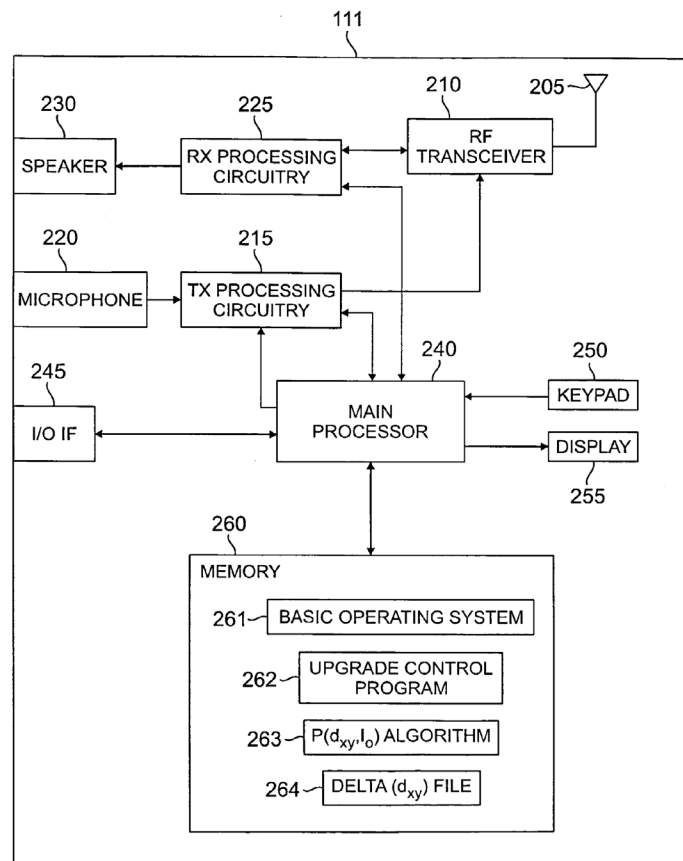


FIG. 2

Herle's Figure 2 depicts wireless mobile station 111. Ex. 1009, 6:20–30. According to Herle, main processor 240 in wireless mobile station 111 is “capable of receiving and installing software upgrades under the control of upgrade control program 262.” *Id.* at 7:19–22. In response to a triggering

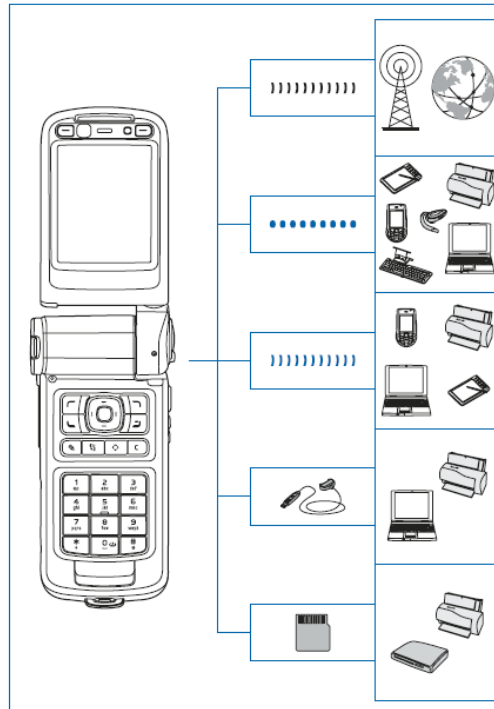
event, such as “an operator-initiated action, an automated periodic procedure (i.e., expiration or a timer in MS 111), or receipt of a notification message from upgrade server 300,” main processor 240 establishes a communication link to the wireless network and to the server via the Internet connection of the wireless network, and the upgraded software is sent to mobile station 111 in the form of delta (d_{xy}) file 264, which is stored in memory 264. *Id.* at 7:22–29, 7:37–39. Herle describes that “ $P(d_{xy}, I_O)$ algorithm program 263 takes delta file 264 as its input and applies it to an original image file, I_O , that is already installed on MS 111 to produce a new image file, I_N ,” which is the upgraded version of the original image file. *Id.* at 7:39–42.

3. N93 (*Ex. 1010*)

N93 is a user guide for Nokia’s N93 device. *Ex. 1010*, 1, 10, 11.⁶ Patent Owner disputes N93 is properly within the scope of prior art. *See generally* PO Resp. 4–9. For context and background, we first provide an overview of N93 and then address whether it qualifies as prior art.

N93’s figure on page 10 of the user manual is reproduced below.

⁶ The cited page numbers in Exhibit 1010 refer to page numbers added by Petitioner at the bottom right corner of the reference.



N93's page 10 figure depicts Nokia's N93 device and illustrates its connectivity to various networks and devices. Ex. 1010, 10. Nokia's N93 device may use, for example, the 2G and 3G networks; a wireless LAN to connect to the Internet and WLAN enabled devices; Bluetooth technology to transfer files and connect to compatible enhancements; and infrared to transfer and synchronize data between compatible devices. *Id.*; *see also id.* at 83 (discussing the device's Bluetooth connectivity). According to N93, Nokia's N93 device supports the following wireless LAN features: IEEE 802.11 b/g standard; operation at a frequency of 2.4 GHz; and wired equivalent privacy (WEP) with keys up to 128 bits, Wi-Fi protected access (WPA), and 802.1x encryption methods. *Id.* at 18.

Nokia's N93 device has "two cameras, a high-resolution camera on the side of the device (the main camera) and a lower-resolution camera on the top of the main display (the secondary camera)," both of which can be used to take still images and record video. Ex. 1010, 23. According to N93,

the recorded video clip may be played or sent by the device “using multimedia, e-mail, Bluetooth connectivity, or infrared.” *Id.* at 24.

N93 describes the video call feature, which allows “a real-time, two-way video between [a caller] and the recipient of the call.” Ex. 1010, 59. According to N93, to make a video call, the caller must be in the coverage of a UMTS network. *Id.* N93 also describes the video sharing feature “to send live video or a video clip from [the caller’s] mobile device to another compatible mobile device during a voice call.” *Id.* at 60. According to N93, the video sharing feature requires a 3G UMTS connection. *Id.*

According to N93, Nokia’s N93 device is compatible with UPnP. Ex. 1010, 88. N93 explains that a home network can be created using a wireless LAN access point device or a wireless LAN router and compatible UPnP devices that support wireless LAN, such as Nokia’s N93 device, can be connected to the home network. *Id.*

N93 qualifies as prior art. Because N93 is not a U.S. patent or published patent application, Petitioner must establish that it qualifies as a “printed publication” under 35 U.S.C. § 102. To do so, Petitioner must show N93 was sufficiently accessible to the interested public before the November 28, 2007 critical date. *See In re Klopfenstein*, 380 F.3d 1345, 1350 (Fed. Cir. 2004). The “ultimate question is whether the reference was available to the extent that persons interested and ordinarily skilled in the subject matter or art, exercising reasonable diligence, can locate it.” *Voter Verified, Inc. v. Premier Election Solutions*, 698 F.3d 1374, 1380 (Fed. Cir. 2012).

Petitioner asserts N93 “was publicly available on Nokia’s website at least as of April 23, 2007 when it was archived” and “is prior art under pre-AIA 35 U.S.C. §§ 102(a), 102(b).” Pet. 5 (citing Ex. 1007, 1–2). In support,

Petitioner relies on a declaration from a records request processor at the Internet Archive, attesting that the Nokia N93 User Guide was archived at the URL http://nds1.nokia.com/phones/files/guides/Nokia_N93-1_UG_en.pdf (“N93 URL”) as of April 23, 2007. Ex. 1007 ¶¶ 1–3, 7.

In its Reply, Petitioner provides additional evidence of public accessibility. Pet. Reply 2–3. Petitioner notes that Patent Owner does not dispute N93 was hosted on Nokia’s website at the N93 URL—only whether a person of ordinary skill could find it. *Id.* at 2.

To address accessibility, Petitioner points to the Nokia N93 Wikipedia page. Pet. Reply 2. The October 15, 2007 archived version of the N93 Wikipedia page included an “External links” section containing the N93 URL as “Online copy of the N93 Manual (PDF).” *Id.* (citing Ex. 1034 ¶ 2; Ex. 1033, 4–6; Ex. 1058 ¶ 9). In footnote 1, Petitioner presents two additional archived versions of the Wikipedia page—from August 18, 2007 (Ex. 1072) and October 12, 2007 (Ex. 1071)—each containing the same hyperlink to the N93 URL. *Id.* (citing Ex. 1058 ¶ 10).

Petitioner further relies on Patent Owner’s expert’s deposition testimony to confirm the link’s functionality. Pet. Reply 2–3. During his deposition, Patent Owner’s expert hovered his cursor over the Wikipedia link and testified that the N93 URL appeared in a pop-up. *Id.* at 2 (citing Ex. 1057, 64:20–65:9). When the link was clicked the link, he navigated to the N93 URL as archived on April 23, 2007. *Id.* (citing Ex. 1057, 65:15–68:13). Patent Owner’s expert also advanced to the next archived version of the N93 URL, from July 2011, which still pointed to the same version of N93. *Id.* at 2–3 (citing Ex. 1057, 68:14–69:17). Petitioner contends that this evidence demonstrates the N93 URL remained continuously available from

April 2007 through at least July 2011, and that the interested public could access N93 via the Wikipedia page during that period. *Id.* at 3.

Finally, Petitioner asserts that Patent Owner mischaracterizes the Wayback Machine affidavit as addressing only an HTML page, when it actually addresses the URL of the .pdf file itself. Pet. Reply 3 (citing Ex. 1007, 2).

Patent Owner raises several challenges to N93's public accessibility. PO Resp. 4–8.

First, Patent Owner notes that Petitioner's expert provided no opinion on the public accessibility of N93. PO Resp. 4 (citing Ex. 2030, 12:11–14).

Second, Patent Owner argues that Petitioner provides no evidence that N93 was disseminated to the interested public before the critical date. PO Resp. 4. Patent Owner argues that the Wayback Machine affidavit states only that the Wayback Machine is searchable by URL, but Petitioner fails to show a person of ordinary skill would know of N93 or its specific URL. *Id.* 4–5 (citing Ex. 1007 ¶¶ 3, 7). Patent Owner also argues that the Petition does not offer evidence that the N93 webpage was indexed by or otherwise locatable through a search engine. *Id.* at 5. Patent Owner contends “Petitioner offers speculation that a URL may have been momentarily available on April 23, 2007, and no evidence that this URL was available for more than a moment in time.” *Id.* (citing Ex. 1007).

Third, Patent Owner invokes *Samsung Electronics Co. v. Infobridge Pte. Ltd.*, 929 F.3d 1363, 1372 (Fed. Cir. 2019), for the proposition that “a work is not publicly accessible if the only people who know how to find it are the ones who created it.” PO Resp. 5. Patent Owner also cites *Acceleration Bay, LLC v. Activision Blizzard Inc.*, 908 F.3d 765, 774 (Fed. Cir. 2018), arguing that public accessibility requires the reference to be

“meaningfully indexed such that an interested artisan exercising reasonable diligence would have found it.” *Id.* at 5–6.

Fourth, Patent Owner relies on a Board decision in *First Solar, Inc. v. Rovshan Sade*, IPR2023-00881, Paper 13 at 19 (PTAB Nov. 16, 2023), in which the Board allegedly found a “nearly identical situation (including use of the same standard Wayback affidavit)” insufficient for showing public accessibility. PO Resp. 5.

Fifth, Patent Owner highlights the Wayback Machine affidavit’s caveat that a primary HTML file and embedded content (such as a .pdf) “may not have been archived on the same dates.” PO Resp. 6 (citing Ex. 1007 ¶ 5). Patent Owner argues this calls into question whether the .pdf user manual was archived on April 23, 2007, rather than merely the HTML page at nds1.nokia.com. *Id.* Patent Owner further notes a gap in the archival record—there is no evidence of the N93 URL being available between April 2007 and December 2011. *Id.*

Sixth, Patent Owner attacks Petitioner’s supplemental exhibits. PO Resp. 7. The Bhattarai declaration states that the Nokia website included an “inoperable link to pdf of N93.” *Id.* (citing Ex. 1034 at 2). Patent Owner contends this inoperable link indicates the user manual was not accessible via the Nokia website. *Id.* (citing Ex. 2017 ¶ 79).

Seventh, Patent Owner challenges Petitioner’s reliance on Wikipedia. Mr. McNair testifies:

One of the key aspects of Wikipedia is that it allows anyone with internet access to create and edit articles.... The dynamic nature of the site ensures that Wikipedia remains current, but it also means that some content may only be accessible for a brief period. Therefore, there is no evidence provided that this link was up for a more than a moment of time for a POSITA to be

able to locate the reference. Nor is there any evidence that it was publicly accessible prior to the critical date.

PO Resp. 7 (citing Ex. 2017 ¶ 80). Patent Owner further argues there is no evidence showing which link was embedded in the text “Online copy of the N93 Manual (PDF)” on the Wikipedia page. *Id.* (citing Ex. 1032, 5). And due to the “dynamic nature of webpages,” there is no evidence that the link on the Wikipedia page would lead to Exhibit 1010, rather than a different version or an inoperable link. *Id.* at 8 (citing Ex. 2017 ¶ 82).

In its Sur-reply, Patent Owner maintains that Petitioner’s Reply “fails to cure the evidentiary deficiencies identified in the [Patent Owner Response]” and “fails to demonstrate that N93 . . . qualif[ies] as [a] printed publication[] under prevailing Federal Circuit and PTAB precedent.”

PO Sur-reply 1. Patent Owner contends Petitioner “attempt[s] to rehabilitate its deficient petition based on [its expert’s] new declaration and the deposition testimony of [Patent Owner’s expert].” *Id.* at 2. Patent Owner argues its expert’s navigation “was conducted in 2025 using the Internet Archive, not in real-time from the actual live websites as they existed in 2007,” and that “[t]he reconstruction of a path using modern archival tools does not equate to public accessibility 15+ years ago.” *Id.* (citing *Samsung Elecs.*, 929 F.3d at 1370–72).

Patent Owner further contends that by attempting to supplement the record, “Petitioners in effect are conceding that the Petition did not present sufficient evidence” to establish N93 as a printed publication. PO Sur-reply 2. Patent Owner urges the Board to “disregard these new materials Petitioners present in their Reply because they are improper and untimely.” *Id.* Patent Owner argues that “even if the new materials are considered, public accessibility is evaluated based on whether a [skilled artisan] could

have located the document using tools available and customary at the time, not via hindsight navigation.” *Id.* (citing *Medtronic, Inc. v. Barry*, 891 F.3d 1368, 1380 (Fed. Cir. 2018)).

After weighing the evidence and considering both parties’ arguments, we find that Petitioner has demonstrated by a preponderance of the evidence that N93 was publicly accessible before the critical date.

As an initial matter, there is no dispute that N93 was hosted on Nokia’s website at the N93 URL. PO Resp. 4–8; Pet. Reply 2. The dispute centers on whether a person of ordinary skill, exercising reasonable diligence, could have located N93 at that URL.

We find the totality of the evidence demonstrates that such a person could have. The N93 Wikipedia page—a publicly accessible, well-known encyclopedia entry for the Nokia N93 device—contained a direct hyperlink to the N93 URL under the heading “Online copy of the N93 Manual (PDF).” Ex. 1034 ¶ 2; Ex. 1033, 4–6. Critically, this link appeared in multiple independently archived versions of the Wikipedia page: August 18, 2007 (Ex. 1072), October 12, 2007 (Ex. 1071), and October 15, 2007 (Ex. 1033, 4–6). The presence of the N93 URL on multiple archived snapshots over a two-month period undermines Patent Owner’s characterization of the link as merely “momentary.” A skilled artisan interested in the Nokia N93 device reasonably would have searched for information about it, and a Wikipedia article for the device—with a direct link to the user manual—is precisely the type of resource such a search would have located.

Patent Owner’s expert confirmed the link’s functionality during his deposition. He hovered his cursor over the Wikipedia link from the Wayback Machine and testified that the N93 URL appeared in a pop-up. Ex. 1057, 64:20–65:9. Upon clicking the link, he navigated to N93 as

archived on April 23, 2007. *Id.* at 65:15–68:13. Patent Owner’s expert also advanced to the next archived version of the N93 URL, from July 2011, which still pointed to the same version of N93. *Id.* at 68:14–69:17. This evidence indicates that the N93 URL linked to the N93 Manual from April 2007 through at least July 2011—a period spanning more than four years and encompassing the November 28, 2007 critical date.

We are not persuaded by Patent Owner’s remaining arguments. Patent Owner’s reliance on the Wayback Machine affidavit’s embedded-content caveat (Ex. 1007 ¶ 5) is misplaced because, as Petitioner notes, the affidavit addresses the URL of the .pdf file itself, not merely an HTML page. Pet. Reply 3 (citing Ex. 1007, 2). Patent Owner’s argument that the Bhattarai declaration references an “inoperable link to pdf of N93” on the Nokia website (Ex. 1034 ¶ 2) does not negate the Wikipedia pathway, which we find to be persuasive evidence of public accessibility. The possibility that other pathways might not have been functional does not detract from our finding.

We also reject Patent Owner’s broader argument that Petitioner’s Reply evidence constitutes improper rehabilitation of a deficient Petition. Petitioner’s Reply responds to Patent Owner’s specific challenges to public accessibility—challenges raised in the Patent Owner Response. Petitioner was entitled to address those challenges in its Reply. *See* 37 C.F.R. § 42.23(b); *see also Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1078 (Fed. Cir. 2015). The evidence Petitioner introduced—including deposition testimony from Patent Owner’s expert and archived versions of the Wikipedia page—is responsive to Patent Owner’s argument that a person of ordinary skill could not have found N93.

Patent Owner’s *First Solar* analogy is distinguishable. In *First Solar*, the petitioner relied solely on a Wayback Machine affidavit without any additional evidence of accessibility. IPR2023-00881, Paper 13 at 17–19. Here, by contrast, Petitioner has demonstrated a specific, publicly accessible pathway—the N93 Wikipedia page—through which a person of ordinary skill could navigate directly to N93. Multiple archived snapshots confirm the link’s presence over a sustained period, and Patent Owner’s expert confirmed the link functioned as intended.

Finally, Patent Owner’s contention that navigating the Wayback Machine in 2025 does not establish 2007 accessibility mischaracterizes Petitioner’s evidence. Petitioner does not rely on the Wayback Machine as the pathway a person of ordinary skill would have used. Rather, Petitioner relies on the Wayback Machine to prove what the Wikipedia page and Nokia website contained in 2007. The pathway itself—Wikipedia to Nokia’s website—was available to anyone with internet access in 2007.

For the foregoing reasons, we find N93 was publicly accessible before the critical date and qualifies as a printed publication under 35 U.S.C. § 102.

4. *Rooyen (Ex. 1011)*

Rooyen is a U.S. Patent Application Publication that published on June 15, 2006, more than one year before the earliest U.S. and foreign priority date of the ’590 patent. Ex. 1004, codes (30), (63); Ex. 1011, code (43). Petitioner asserts that Rooyen is prior art under pre-AIA 35 U.S.C. §§ 102(a), 102(b), 102(e). Pet. 5. Patent Owner does not dispute that Rooyen is properly within the scope of the prior art. *See generally* PO Resp.

Rooyen relates to “a method and system for a mobile receiver architecture for European (EU) band cellular and broadcasting.” Ex. 1011 ¶ 5. Rooyen explains that “[r]eceived channels may be processed in at least

one radio frequency front end (RFFE) in a mobile terminal and may comprise at least one of a VHF/UHF broadcast channel and EU band cellular channels capable of carrying voice and data,” wherein “[t]he cellular channels may be WCDMA 2100 MHz, GSM 1800 or 900 MHz channels.”

Id. ¶ 39. According to Rooyen,

[a] single cellular/broadcast radio frequency integrated circuit (RFIC) may be utilized for processing the received channels. In another embodiment, a cellular band RFIC may process the EU band cellular channels and a broadcast RFIC may process the broadcast channel. Moreover, a first RFIC may process the WCDMA channel, a second RFIC may process the GSM channels, and a broadcast RFIC may process the broadcast channel.

Id.; *see also id.* ¶¶ 80–89, Figs. 4a–4c. Tasks that an RFIC may perform include “modulation and/or demodulation, low pass filtering, and digital to analog (D/A) and/or analog to digital (A/D) conversion.” *Id.* ¶ 40.

5. *Desai (Ex. 1012)*

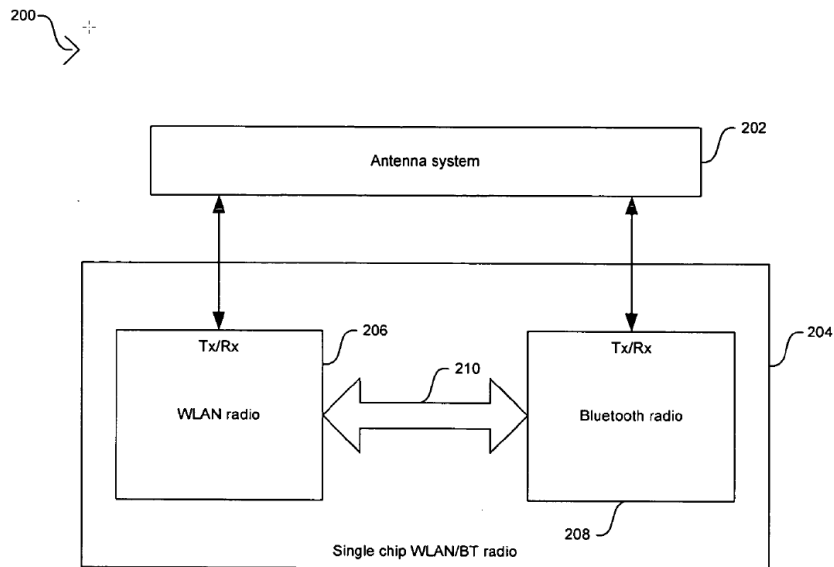
Desai is a U.S. Patent Application Publication that published on December 7, 2006, more than one year before the earliest U.S. priority date of the ’590 patent. Ex. 1004, codes (30), (63); Ex. 1012, code (43).

Petitioner asserts that Desai is prior art under pre-AIA 35 U.S.C. §§ 102(a), 102(b), 102(e). Pet. 5. Patent Owner does not dispute that Desai is properly within the scope of the prior art. *See generally* PO Resp.

Desai relates to “a method and apparatus for collaborative coexistence between Bluetooth and IEEE 802.11 g with both technologies integrated onto a system-on-a-chip (SOC) device.” Ex. 1012 ¶ 4. According to Desai, “[i]n a single integrated circuit (IC) that handles Bluetooth and WLAN technologies, a WLAN priority level may be selected for WLAN transmissions and a Bluetooth priority level may be selected for Bluetooth

transmissions” and “[t]he WLAN and Bluetooth priority levels may be selected from a plurality of priority levels.” *Id.* ¶ 28. Desai also describes a “packet transfer scheduler (PTS)” that “may schedule the transmission of WLAN and Bluetooth signals in accordance with the selected priority levels.” *Id.*; *see also id.* ¶¶ 45–50, Fig. 3.

Figure 2 of Desai is reproduced below.



Desai’s Figure 2 depicts “an exemplary single radio chip that supports WLAN and Bluetooth radio operations.” Ex. 1012 ¶ 38. Figure 2 shows “a WLAN/Bluetooth collaborative radio architecture 200 that may comprise a WLAN/Bluetooth coexistence antenna system 202 and a single chip WLAN/Bluetooth (WLAN/BT) radio device 204.” *Id.* Desai describes that “[t]he single chip WLAN/BT radio device 204 may be implemented based on a system-on-chip (SOC) architecture” and “may comprise a WLAN radio portion 206 and a Bluetooth radio portion 208.” *Id.*

According to Desai, “[t]he WLAN radio portion 206 may be adapted to transfer and/or receive WLAN protocol packets and/or information to the WLAN/Bluetooth coexistence antenna system 202 via a single

transmit/receive (Tx/Rx) port.” Ex. 1012 ¶ 40. According to Desai, “[t]he Bluetooth radio portion 208 may be adapted to transfer and/or receive Bluetooth protocol packets and/or information to the WLAN/Bluetooth coexistence antenna system 202 via a single transmit/receive (Tx/Rx) port.” *Id.* ¶ 42. Desai also describes that the WLAN radio portion 206 and the Bluetooth radio portion 208 may each be adapted to receive and/or transmit priority signals 210, which “may be utilized to schedule and/or control the collaborative operation of the WLAN radio portion 206 and the Bluetooth radio portion 208.” *Id.* ¶¶ 41–42.

6. BT-Spec (Ex. 1014)

BT-Spec is the Specification of the Bluetooth System. Ex. 1014, 1.⁷ Patent Owner disputes that BT-Spec is properly within the scope of prior art. *See generally* PO Resp. 4–9. For context and background, we first provide an overview of N93 and then address whether it qualifies as prior art.

According to BT-Spec, “Bluetooth devices operate in the unlicensed 2.4 GHz ISM (Industrial Scientific Medical) band.” Ex. 1014, 193. BT-Spec defines two modulation modes: a mandatory mode called “Basic Rate” and an optional mode called “Enhanced Data Rate.” *Id.* According to BT-Spec, the Basic Rate “uses a shaped, binary FM modulation to minimize transceiver complexity,” and the Enhanced Data Rate “uses PSK modulation and has two variants: $\pi/4$ -DQPSK and 8DPSK.” *Id.*

BT-Spec qualifies as prior art. Petitioner asserts that BT-Spec “was publicly available on the Bluetooth website at least as of February 24, 2006 when it was archived” and “is prior art under pre-AIA 35 U.S.C. §§ 102(a),

⁷ The cited page numbers in Exhibit 1014 refer to page numbers added by Petitioner at the bottom right corner of the reference.

102(b).” Pet. 5 (citing Ex. 1007, 1–2). And in its Reply, Petitioner demonstrates a specific, intuitive navigation path from the official Bluetooth technology website to BT-Spec, supported by archived snapshots of each intermediate page:

(1) Starting at <http://www.bluetooth.com/bluetooth/> (Ex. 1033, 19–20), click on “Learn;”

(2) On <http://www.bluetooth.com/Bluetooth/Learn/> (*id.* at 21–22), click on “Bluetooth Technology;”

(3) On <http://www.bluetooth.com/Bluetooth/Learn/Technology/> (*id.* at 23–24), click on “Specification Documents;”

(4) On <http://www.bluetooth.com/Bluetooth/Learn/Technology/Specifications/> (*Id.* at 25–26), click on “Core Specification v2.0+EDR” to download BT-Spec.

Pet. Reply 3; Ex. 1033, 19–27; Ex. 1007, 2, 194–1423; Ex. 1058 ¶ 11.

Patent Owner’s expert confirmed during his deposition that he could follow this four-step sequence to reach BT-Spec. Ex. 1057, 81:22–85:3.

Patent Owner raises several challenges to BT-Spec’s public accessibility. PO Resp. 4–8. First, Patent Owner notes that Petitioner’s expert “provided no opinion on the public accessibility of the documents.” *Id.* at 5 (citing Ex. 2030, 12:11–14).

Second, Patent Owner contends that Petitioner provides no evidence that BT-Spec were disseminated to the interested public before the critical date. PO Resp. 4 (citing Ex. 1007 ¶ 1). Patent Owner emphasizes that the Wayback Machine Affidavit “only states that the Wayback Machine is searchable by web address (or URL)” and that Petitioner fails to show a skilled artisan “would know of” BT-Spec “or its specific URL.” *Id.* at 4–5 (citing Ex. 1007 ¶¶ 3, 7).

Third, Patent Owner argues that the Petition “fails to offer any evidence or argument that the . . . BT-Spec . . . webpage[] [was] indexed through search engines or otherwise . . . locatable by a search engine.” PO Resp. 5.

After weighing the evidence and considering both parties’ arguments, we find that Petitioner has demonstrated by a preponderance of the evidence that BT-Spec was publicly accessible before the critical date.

As an initial matter, there is no dispute that BT-Spec was hosted on the official Bluetooth SIG website at bluetooth.com—the authoritative source for Bluetooth specifications. The dispute is whether a POSITA could have located it.

We find the evidence here particularly compelling. BT-Spec was accessible via a four-click navigation path from the bluetooth.com homepage through a logical sequence: “Learn” → “Bluetooth Technology” → “Specification Documents” → “Core Specification v2.0+EDR.” Pet. Reply 3; Ex. 1033, 19–27; Ex. 1058 ¶ 11. Each link uses plain, descriptive language that a skilled artisan interested in Bluetooth technology would have followed naturally. This is not a case where a skilled artisan would have needed preexisting knowledge of a specific URL or filename; the path is self-explanatory.

Patent Owner’s expert confirming during his deposition that he could follow this four-step navigation sequence to reach BT-Spec adds support to Petitioner’s position. Ex. 1057, 81:22–85:3. This confirmation by an adverse expert supports a finding that a skilled artisan exercising reasonable diligence could have located BT-Spec.

Patent Owner’s general challenges do not undermine this conclusion. Patent Owner’s argument that BT-Spec’s webpage was not shown to be

“indexed through search engines” (PO Resp. 5–6) conflates indexing with accessibility. A document hosted on the official standards body website, reachable through intuitive navigation from the homepage using the descriptive titles to the reference, is sufficient to demonstrate the BT-Spec was publicly accessible. *See M&K Holdings, Inc. v. Samsung Electronics Co.*, 985 F.3d 1376, 1381 (Fed. Cir. 2021) (“The law regarding public accessibility is not as restrictive as M&K suggests—a website’s landing page is not required to have search functionality. Instead, given the prominence of JCT-VC, the dispositive question is whether interested users of the JCT-VC website could have located Park and Zhou through reasonable diligence.”). The Bluetooth SIG website itself functioned as a well-known, organized repository that a skilled artisan would naturally consult when researching Bluetooth technology. *See id.* at 1382 (“The Board found that the documents in question on the meeting pages of the JCT-VC website were effectively indexed by subject matter in light of the title-search functionality and the fact that Park and Zhou featured descriptive titles. That finding supports the Board’s conclusion that Park and Zhou were publicly accessible.”).

For the foregoing reasons, we determine that BT-Spec qualifies as a printed publication and constitutes prior art under pre-AIA 35 U.S.C. §§ 102(a) and 102(b).

7. 3GPP-Spec (Ex. 1015)

3GPP-Spec is the Technical Specification of 3GPP TS 36.211 V0.2.1 (2006-11). Ex. 1015, 1.⁸ Patent Owner disputes N93 is properly within the

⁸ The cited page numbers in Exhibit 1015 refer to page numbers added by Petitioner at the bottom right corner of the reference.

scope of prior art. *See generally* PO Resp. 4–9. For context and background, we first provide an overview of N93 and then address whether it qualifies as prior art.

3GPP-Spec defines a modulation mapper as taking binary digits, 0 or 1, as input and producing complex-valued modulation symbols, $x=I+jQ$, as output. Ex. 1015, 21. 3GPP-Spec describes Quadrature Phase Shift Keying (QPSK) modulation mapping, 16QAM (Quadrature Amplitude Modulation) mapping, and 64QAM mapping. *Id.* at 21–23 (Tables 11–13).

3GPP-Spec does not qualify as prior art. Petitioner asserts that 3GPP-Spec “was publicly available on the 3GPP website at least as of January 7, 2007 when it was archived” and “is prior art under pre-AIA 35 U.S.C. §§ 102(a), 102(b).” Pet. 5–6 (citing Ex. 1007, 1–2). Petitioner relies on the same Wayback Machine affidavit (Ex. 1007) to establish that 3GPP-Spec was archived at its URL on the 3GPP website as of January 7, 2007. *Id.* at 6; Ex. 1007, 1–2.

In its Reply, Petitioner presents a four-step navigation path from the 3GPP homepage to 3GPP-Spec, which its expert describes as “the first place for the [skilled artisan] to learn about 3G (UMTS) technology”:

- (1) Starting at <https://www.3gpp.org/> (Ex. 1033, 7–8), click on “Specifications;”
- (2) On <http://www.3gpp.org/specs/specs.htm> (*id.* at 9–13), click on “specifications file server area;”
- (3) On <http://www.3gpp.org/ftp/Specs/> (*id.* at 14–15), click on “Latest-drafts;”
- (4) On <http://www.3gpp.org/ftp/Specs/Latest-drafts/> (*id.* at 16–18), click on the December 5, 2006 version of “36211-021.zip” to download the zip file containing both clean and redline versions of 3GPP-Spec.

Pet. Reply 4; Ex. 1007, 2, 141–164 (clean), 165–192 (redline); Ex. 1058 ¶ 13. Patent Owner’s expert could follow this sequence. Pet. Reply 4 (citing Ex. 1057, 69:18–73:8. Petitioner also identifies an alternate navigation path. *Id.* at 5 (citing Ex. 1058 ¶ 14 (explaining alternate path with Ex. 1059–1062); Ex. 1057, 73:22–77:20). Petitioner responds to Patent Owner’s assertion that the Wayback affidavit references a different document than Exhibit 1015 by explaining that the affidavit includes both the clean version of 3GPP-Spec (Ex. 1015) and a redline comparing it to the prior version. *Id.* (citing Ex. 1007, 141–164 (clean), 165–192 (redline)). Patent Owner’s expert confirmed that Exhibit 1015 is the clean version from Exhibit 1007. *Id.* (citing Ex. 1057, 81:4–9).

As a threshold matter, Patent Owner contends that Petitioner relies on a different document than the one authenticated by the Wayback affidavit. PO Resp. 7 (comparing Ex. 1007, 165 with Ex. 1015, 1).

Patent Owner then raises the document’s preliminary status as a fundamental obstacle to public accessibility. Patent Owner’s expert identifies numerous indications that the document is “very preliminary” and was never intended for dissemination to the general technical community:

[T]he document version is 0.2.1. The fact that it is a version 0 document means that (according to the Foreword on page 5 of the document) it has not even been presented to the Technical Specification Group (“TSG”) for information (that would be a version 1.x.x), let alone approval (2.x.x) or is under change control (3.x.x or greater). EX1015 at 5. The document is very preliminary. The bottom of the cover page says “The present document has not been subject to any approval process by the 3GPP Organization Partners and shall not be implemented. This Specification is for future development work within the 3GPP only. The Organization Partners accept no liability for any use of this Specification.” EX1015 at 1.

PO Resp. 8 (citing Ex. 2017 ¶ 84). He further testified that a skilled artisan would not have been able to locate the document:

Since this was a preliminary document at the time, a POSITA would need to know by other means that it existed to go looking for it. I saw no evidence that a POSITA would know of this document. Unless I was already familiar that this document existed and was looking specifically for the document, I probably would not be able to locate where it exactly was.

Typically, those working on such documents were senior researchers, fully engaged in developments in 3GPP and other standards. However, a POSITA based on the definition set forth by Dr. Creusere, would not have the inclination or skill to do the digging to find such a document. A POSITA in our case is an individual with a Bachelor of Science degree in Electrical Engineering, Computer Engineering, Computer Networking, or a related technical field, with at least one year of experience working in the field of wireless communications.

Without knowing of the document already, POSITA would not be able to locate the 3GPP-Spec on the 3GPP FTP server. There is a zip file under the name of “36211-021.zip” which is not descriptive in a way that an interested party could find it. The 3GPP-Spec is located in a zip file that is neither catalogued nor indexed. Thus, without knowing of the document already, the document lacks any other identifiers that would allow a POSITA to locate the document.

Id. at 8–9 (citing Ex. 2017 ¶¶ 85–88). Patent Owner argues that this situation is precisely the type contemplated by the Federal Circuit: “[A] work is not publicly accessible if the only people who know how to find it are the ones who created it.” *Id.* at 9 (quoting *Samsung Elecs.*, 929 F.3d at 1372).

Patent Owner argues that Petitioner’s alleged navigation pathways to 3GPP-Spec still would have required foreknowledge of 3GPP-Spec in order to locate it. PO Sur-reply 2–3 (citing Pet. Reply 4). Patent Owner directs attention to the 3GPP website itself, which states that the “specifications file

server area” is “*for those who know where they are going.*” *Id.* at 3 (citing Ex. 1033, 10). Similarly, the site instructs users to “find a *particular* spec quickly, go here and click on the links in the specs-series or use the links in the ‘further information’ section.” *Id.* (citing Ex. 1033, 10). Patent Owner argues these statements confirm that locating the specific document requires preexisting knowledge of it. *Id.* Patent Owner further contends that Petitioner presents no evidence that a person of ordinary skill in 2007 would have known to navigate to this specific 3GPP-Spec on the FTP server. *Id.*

After weighing the evidence and considering both parties’ arguments, we find that Petitioner has not established by a preponderance of the evidence that 3GPP-Spec was publicly accessible before the critical date of November 28, 2007. We reach this conclusion based on the totality of the factual record.

The navigation pathway posited by Petitioner would have required preexisting knowledge. Unlike BT-Spec, which was reachable through an intuitive four-click path from the Bluetooth SIG homepage using self-explanatory labels (Learn → Bluetooth Technology → Specification Documents → Core Specification v2.0+EDR), the path to 3GPP-Spec required the user to navigate to an FTP server and identify a non-descriptive zip file named “36211-021.zip” among numerous other files. Nothing in the file name identifies the document as relating to physical channels and modulation for Evolved UTRA. The 3GPP website describes the “specifications file server area” as “for those who know where they are going” (Ex. 1033, 10), and instructs users who wish to “find a particular spec quickly” to use pre-existing links. *Id.* These statements, drawn from Petitioner’s own exhibit, confirm that the FTP server was not designed for, and did not facilitate, the type of browsing that would have permitted a

person of ordinary skill, exercising reasonable diligence, to locate this document.

Moreover, 3PP-Spec was neither meaningfully catalogued nor indexed, and it resided in a zip file on an FTP server. *See* Ex. 1058 ¶ 13. The zip file’s name (36211-021.zip) is a numerical designation meaningful only to those already familiar with the 3GPP numbering system. *Id.* Patent Owner’s expert’s unrebutted testimony establishes that the file was “neither catalogued nor indexed” in a way that would permit a person of ordinary skill to locate it. Ex. 2017 ¶¶ 85–88. This situation is more akin to a book placed on a library shelf without being catalogued or indexed than to one properly catalogued and made available to the interested public. *See In re Cronyn*, 890 F.2d 1158, 1161 (Fed. Cir. 1989) (finding thesis not publicly accessible where it was shelved in the university library but not “cataloged or indexed in a meaningful way”); *see also Acceleration Bay*, 908 F.3d at 774. Just as a diligent researcher would be unlikely to find an uncatalogued book on a shelf without knowing its particular location, a person of ordinary skill would have been unlikely to locate the 3GPP-Spec without knowing of the document’s existence and its specific numerical designation or particular location.

In addition, Petitioner has not shown persuasively that a person of ordinary skill in the art—essentially an engineer with a Bachelor’s degree and one year of experience—would have known how to locate this document. Patent Owner’s expert credibly testifies that “[t]ypically, those working on such documents were senior researchers, fully engaged in developments in 3GPP and other standards” and that a person of ordinary skill as defined “would not have the inclination or skill to do the digging to find such a document.” Ex. 2017 ¶¶ 85–87. This testimony is consistent

with the document’s version 0.2.1 status that it had not even been presented to the Technical Specification Group for information, let alone approved. Ex. 1015, 5; Ex. 2017 ¶ 84. Petitioner offers no evidence that a person of ordinary skill—as distinguished from a senior 3GPP researcher—would have known this preliminary working document existed.

Petitioner’s evidence does not overcome these deficiencies. Petitioner demonstrates that Patent Owner’s expert “could follow” the four-step navigation sequence (Ex. 1057, 69:18–73:8) and an alternate path (*id.* at 73:22–77:20). The question, however, is not whether the document was theoretically reachable through a series of clicks, but whether a person of ordinary skill would have known to take that path to find this specific document. On this critical question, Petitioner offers no evidence beyond its expert’s assertion that the 3GPP website would be “the first place for the POSITA to learn about 3G (UMTS) technology” (Ex. 1058 ¶ 12). Even crediting this assertion, arriving at the 3GPP homepage does not establish that a person of ordinary skill would have navigated through the specifications file server area (described as “for those who know where they are going”) to an FTP directory, and then identified “36211-021.zip” as a document of interest.

We considered Petitioner’s argument that the Wayback affidavit addresses the correct document (Pet. Reply 5; Ex. 1057, 81:4–9) and credit McNair’s confirmation that Exhibit 1015 is the clean version from Exhibit 1007. This resolves Patent Owner’s authentication challenge. However, authentication and archival on the Wayback Machine are necessary, but not sufficient conditions for public accessibility. The question remains whether the document was meaningfully accessible such that a skilled artisan could have found it. Based on this record, we find that

3GPP-Spec has not been demonstrated to have been sufficiently accessible in a way that evidences a skilled artisan would have found it exercising reasonable diligence.

For the foregoing reasons, we find that Petitioner has not established by a preponderance of the evidence that 3GPP-Spec was publicly accessible before the critical date. Therefore, we determine that 3GPP-Spec does not qualify as prior art. This determination, however, is not fatal to Petitioner's unpatentability contentions, as we address the impact on each affected ground below.

8. *Kao (Ex. 1013)*

Kao is a U.S. Patent Application Publication that published on December 30, 2004, more than one year before the earliest U.S. and foreign priority date of the '590 patent. Ex. 1004, codes (30), (63); Ex. 1013, code (43). Petitioner asserts that Kao is prior art under pre-AIA 35 U.S.C. §§ 102(a), 102(b), 102(e). Pet. 6. Patent Owner does not dispute that Kao is properly within the scope of the prior art. *See generally* PO Resp.

Kao relates to “a radio receiver that is capable of supporting multiple modulation formats with a single pair of analog to digital converters (ADCs).” Ex. 1013 ¶ 3. Kao notes that “there is no universal standard for wireless modulation formats” and “there may be multiple modes within a standard.” *Id.* ¶ 5. Figure 1 of Kao is reproduced below.

Mode	Provided data rate(Mbps)	Sample rate(Mbps)	Carrier frequency (GHz)	Modulation
IEEE 802.11a	6, 9, 12, 18, 24, 36, 48, 54	20	5	OFDM
IEEE 802.11b		22	2.4	CCK/DSSS
IEEE 802.11g	6, 9, 12, 18, 24, 36, 48, 54	20, 22	2.4, 5	OFDM, CCK/DSSS

Fig. 1 Prior Art

Figure 1 illustrates data rates, sample rates, carrier frequencies and modulation types for various modes of IEEE 802.11 Wireless LAN (WLAN) standard. *Id.* ¶ 6. As shown in Figure 1, IEEE 802.11a is an extension of the IEEE 802.11 standard and defines requirements for a physical layer operating in the 5 GHz frequency and data rates ranging from 6 Mps to 54 Mps based on the orthogonal frequency division multiplexing (OFDM) modulation scheme. *Id.* According to Kao, “direct sequence spread spectrum/complementary code keying (DSSS/CCK) physical layer is one of the three physical layers supported in the IEEE 802.11 standard and uses the 2.4 GHz frequency band as the RF transmission media.” *Id.*

According to Kao, “[i]n a multiple mode standard, like IEEE 802.11g, signals of both the OFDM mode and the DSSS/CCK mode need to be dealt with, but only one mode can be performed at a time.” Ex. 1013 ¶ 8; *see also id.* ¶ 28 (“Taking IEEE 802.11g, which is a multi-mode standard, as an example, if we want a WLAN card to support the IEEE 802.11g standard, then we have to deal with a 64 QAM modulation format signal with a 20 MHz data rate for the OFDM mode, and a QPSK modulation format signal with a 22 MHz data rate for the DSSS/CCK mode, but only for one mode in a time.”). Kao notes that multiple ADC pairs of different sampling rates are

therefore needed for the IEEE 802.11g WLAN card according to the prior art because each mode needs to adopt an ADC pair having a predetermined sampling rate that matches the sampling rate of that mode. *Id.* ¶ 28.

E. Claim 1

We now consider the evidence and arguments of the parties directed to independent claim 1 under each of the asserted grounds. Petitioner contends that claim 1 is unpatentable under 35 U.S.C. § 103 as obvious over the combined teachings of: (1) Dua, and Herle (Ground 3); (2) N93, Dua, and Herle (Grounds 1 and 4); and (3) Dua, Herle, N93, Rooyen, Desai, BT-Spec, 3GPP-Spec, and Kao (Grounds 2 and 5). Pet. 1, 18–40, 57–59, 60–63, 70–71, 73. Petitioner submits the testimony of Dr. Creusere in support of its contentions. Ex. 1002 ¶¶ 84–142, 226–234, 238–246, 277–279, 300. Patent Owner disputes certain aspects of Petitioner’s evidence and arguments directed to claim 1, in particular limitations 1a–1c, 1h, and 1j–1l. PO Resp. 10–43. Patent Owner does not specifically contest Petitioner’s evidence and arguments directed to the other limitations of claim 1. *See id.* Patent Owner submits the testimony of Mr. McNair in support of its position. Ex. 2009 ¶¶ 89–301. We consider Petitioner’s evidence and arguments directed to claim 1 under each asserted ground below, including addressing more specifically Patent Owner’s arguments directed to contested limitations 1a–1c, 1h, and 1i–1l. We start with contested limitation 1a.

1. Contested Limitation 1a

Limitation 1a recites: “*a first radio communication circuit implementing a first transmission scheme having a first modulation scheme and a first transmission frequency band, the first radio communication*

circuit capable of transmitting video information by radio or receiving information by radio using the first transmission frequency band.”

Petitioner contends that Dua and N93, respectively, disclose or render obvious limitation 1a. Pet. 18–20, 57, 60, 70, 73. In Grounds 1 and 4, Petitioner identifies Dua and N93 as each separately disclosing or suggesting the first radio communication circuit that limitation 1a recites; in Ground 3, Petitioner only relies on Dua for the recited first communication circuit; and in Grounds 2 and 5, Petitioner adds BT-Spec to Ground 1 to further evidence the modulations and frequencies that were known to be standardized for the transmission scheme that Dua and N93 teach for the first communication circuit.⁹ *Id.*

Petitioner asserts that “N93 discloses the cellular phone comprises electronic circuits and includes a Bluetooth radio communication circuit” that uses “Bluetooth radio to send and receive video and still images.” Pet. 19 (citing Ex. 1010, 10, 14–16, 23–26, 31–33, 83–87, 125). According to Petitioner, “N93 teaches the user can record still pictures and video (with audio) using the imaging circuit in the camera and microphone, which is compressed and stored as a video file in the Gallery.” *Id.* (citing Ex. 1010, 23–26). N93, Petitioner asserts, “discloses that the users can select a video clip or image in the Gallery and send it via Bluetooth and receive the same from another user.” *Id.* (citing Ex. 1010, 23–26 (send/receive via Bluetooth), 31–33 (same), 83–87 (same), 88 (to PC); Ex. 1002 ¶ 86).

⁹ For Grounds 2 and 5, Petitioner also addresses Desai in the context of limitation 1a to show that a skilled artisan would have known to incorporate the first communication circuit as part of a combined circuit, but the “combined circuit” limitation only appears in dependent claim 22 and not in limitation 1a. Pet. 57, 73; *see also* Ex. 1004, 1:24–29, 5:14–17. Therefore, we do not address Desai in the context of limitation 1a.

Petitioner asserts that “Dua also discloses the cellular phone comprises ‘integrated circuit chips and circuitry’ including a short-range transceiver that comprises a Bluetooth radio communication circuit and provides additional implementation details.” Pet. 19 (citing Ex. 1008, Fig. 1 (transceiver 108), ¶¶ 59–62 (circuits and hardware components), 62–64 (combined circuit, short-range transceiver 108 supporting Bluetooth, Wi-Fi, etc.). Thus, Petitioner explains, “transceiver 108 is a ‘combined circuit’ that includes a Bluetooth radio circuit.” *Id.* (citing Ex. 1004, claim 22; Ex. 1002 ¶ 87).

According to Petitioner, “Dua also discloses the short-range transceiver sends and receives video using Bluetooth,” and that “video could be sent or received between media players using Bluetooth.” Pet. 20 (citing Ex. 1008, Fig. 7, ¶¶ 62, 137, 156, 172, 196, 203, 206–207). Petitioner asserts also that Dua discloses the video could be “received from a local video camera using Bluetooth,” and that “the video could be converted and stored first or buffered while being converted and relayed.” *Id.* (citing Ex. 1008, Figs. 7, 8B (stored content 542), 10, 18 (stored video 662), ¶¶ 172 (converting), 190–192, 194 (buffering)). Petitioner points out that “Dua discloses the user can select previously recorded video to send via Bluetooth.” *Id.* (citing Ex. 1008, Fig. 8B (stored content 542), Fig. 18 (stored video 662); Ex. 1002 ¶ 88).

Petitioner notes that “N93 and Dua’s disclosure of Bluetooth inherently discloses to a POSITA the modulation scheme ($\text{GFSK}/\frac{\pi}{4}$ -DQPSK/8DPSK) and frequencies (2402–2480 MHz) required by the Bluetooth standard.” Pet. 20 (citing Ex. 1014, 198–200 ($\text{GFSK}/\frac{\pi}{4}$ -DQPSK/8DPSK), 195 (2402–2480 MHz excluding guard bands); Ex. 1017, 4 (2402–2480

MHz)). “In the alternative,” Petitioner asserts, “the Bluetooth modulation schemes and frequencies would have been obvious based on the knowledge of a [skilled artisan] as evidenced by those same references.” *Id.* (citing Ex. 1002 ¶ 89).

Further, presented in Grounds 2 and 5, Petitioner contends BT-Spec is “as secondary references out of an abundance of caution to the extent the Board disagrees” Dua and/or N93 “inherently disclose[] the claimed modulation and transmission frequency limitations because they are required by the disclosed standards” or “rendered obvious by the knowledge of a [skilled artisan].” Pet. 56 (citing Ex. 1002 ¶ 223). Petitioner contends that a skilled artisan “would have had a reasonable expectation of success in making the combination because these are each known standards implemented with standard technologies and are a matter of routine skill.” *Id.* (citing Ex. 1002 ¶ 224).

Patent Owner argues that Petitioner incorrectly contends the “first modulation scheme and a first transmission frequency band” would have been either inherent or obvious to a skilled artisan based on the Bluetooth standard. PO Resp. 10. According to Patent Owner, the standard does not establish the inherency of that limitation because “[s]tandards for a wireless communication technology are associated with multiple **possible** modulation schemes and frequencies.” *Id.* (citing Ex. 2017 ¶¶ 183–184). Patent Owner notes regarding the Bluetooth standard that “ $\pi/4$ -DQPSK and 8DPSK are modulation schemes associated with Bluetooth 2.0+EDR and devices that did not support Bluetooth 2.0 + EDR would not have these modulation schemes,” therefore, $\pi/4$ -DQPSK and 8DPSK “cannot be inherent because they are only possibilities and not inevitabilities.” *Id.* at 11 (citing Ex. 2017 ¶¶ 184–185, 188; Ex. 1010 ¶ 84; Ex. 1014, 41, 48; Ex. 2029, 1).

Regarding obviousness, Patent Owner argues that Petitioner fails to provide any rationale for including different modulation schemes. PO Resp. 11 (citing Pet. 21; Ex. 2017 ¶ 186). Patent Owner states that “[i]t would not be obvious to use the knowledge of a [skilled artisan] with existing Bluetooth standards to modify or update devices to support different Bluetooth modulation schemes due to the technical limitations of the time.” *Id.* (citing Ex. 2017 ¶¶ 187–188). Patent Owner argues that “general knowledge of a standard will not disclose the specific frequencies and modulation schemes used for a specific hardware implementation of . . . Bluetooth,” moreover, the standards “do not disclose how to make a device compliant with the standards, particularly a device that must be compliant with multiple different standards while including the other alleged features.” *Id.* at 61 (citing Ex. 2017 ¶¶ 389–390).

In the Reply, Petitioner contends that, although Patent Owner may question whether using Bluetooth necessarily includes implementing the $\pi/4$ -DQPSK and 8DPSK modulation schemes, Patent Owner “does not dispute Bluetooth implemented [a] GFSK [modulation scheme], which alone satisfies [limitation 1a].” Pet. Reply 5 (citing PO Resp. 10–11, Pet. 18–20; Ex. 1057, 46:17–47:4). Regardless, Petitioner contends that Patent Owner is wrong to dispute that all three modulation schemes (GFSK, $\pi/4$ -DQPSK, and 8DPSK) were disclosed or suggested, “at least because Dua teaches the radio should implement ‘Bluetooth’ [to] ‘support the widest array of communication protocols and broadcast standards,’” which, as of November 2007, encompassed all three modulation schemes. *Id.* (citing Ex. 1008 ¶¶ 62–63).

In the Sur-reply, Patent Owner argues that Dua’s teaching to support the widest array of communication protocol and broadcast standards is

nothing more than “an aspirational statement” and “fails to disclose the specific combinations of technologies onto one device as alleged by Petitioners.” PO Sur-reply 4. Patent Owner argues that, as of November 2007, its unrebutted evidence “indicates that creating a device with multiple wireless communication technologies alleged by Petitioners presented various challenges including passing stringent FCC testing requirements and voiding warranty of the N93 device being modified.” *Id.* at 5 (citing PO Resp. 10–11; Ex. 2017 ¶¶ 184–187).

After studying and weighing the evidence, in view of both parties’ arguments, we find Petitioner’s positions regarding limitation 1a persuasive. As an initial matter, we note that there is no dispute that Dua and N93 each disclose a first radio communication circuit implementing a first transmission scheme that is capable of transmitting video information by radio or receiving information by radio using the first transmission frequency band. Put another way, there is no dispute that Dua and N93 each disclose or suggest a radio communication circuit implementing a Bluetooth transmission scheme to transmit video information by radio and receive information by radio using its transmission frequency band. And, for the reasons and evidence provided by Petitioner, we agree Dua and/or N93 provide such a disclosure.

The only dispute regarding limitation 1a that exists is whether the identified Bluetooth transmission scheme discloses or suggests a scheme “having a first modulation scheme and a first transmission frequency band.” PO Resp. 10. However, Patent Owner, and its expert, concede that the Bluetooth transmission scheme operates using a variety of different possible modulation schemes and frequencies. *Id.* (citing Ex. 2017 ¶¶ 183–184). And Exhibit 1017, at page 4, evidences clearly that the Bluetooth

transmission scheme used by N93 operated using a GFSK modulation scheme and a transmission frequency band of 2402–2480 MHz. And there is no evidence in this record that even suggests the Bluetooth transmission scheme could be implemented *without* using a modulation scheme or transmission frequency band. Therefore, because limitation 1a is not limited to any particular modulation scheme or any particular frequency, we are persuaded that the use of the Bluetooth transmission scheme by Dua and N93 for the first communication circuit includes “a scheme having a first modulation scheme and a first transmission frequency band.”

Patent Owner argues that the use of the Bluetooth transmission scheme by Dua and N93 does not inherently disclose the particular $\pi/4$ -DQPSK and 8DPSK modulation schemes, or render those schemes obvious. We agree with Petitioner, however, that the identification of the Bluetooth transmission scheme renders those modulation schemes obvious. Claim 1 does not require a particular modulation scheme, only that “a second modulation scheme [be] different from the first modulation scheme.” Ex. 1001, 20:55–56. Dua and N93’s use of the Bluetooth transmission scheme renders this obvious because the admitted standardization of the particular $\pi/4$ -DQPSK and 8DPSK modulation schemes as known workable options for implementing the Bluetooth transmission scheme (PO Resp. 11; Ex. 2017 ¶ 188), which persuasively demonstrates that using those particular modulation schemes in a Bluetooth-enabled device would have simply involved a skilled artisan arranging old elements. Each element furthermore would perform the same function it had been known to perform and yield nothing more than one would expect from such an arrangement, which establishes an obvious combination. *See KSR Int’l Co.*, 550 U.S. at 417 (“when a patent ‘simply arranges old elements with each performing the

same function it had been known to perform’ and yields no more than one would expect from such an arrangement, the combination is obvious”). And as the Federal Circuit has explained, “[t]here is a motivation to combine when a known technique ‘has been used to improve one device, and a [skilled artisan] would recognize that it would improve similar devices in the same way.’” *Intel Corp. v. PACT XPP Schweiz AG*, 61 F.4th 1373, 1380 (Fed. Cir. 2023). Therefore, we find that Dua’s and N93’s disclosure of multiple radio communication circuits, including a first communication circuit implementing a *Bluetooth* transmission scheme, teaches or suggests to a skilled artisan a first transmission scheme having a $\pi/4$ -DQPSK and/or 8DPSK modulation scheme(s).

Patent Owner’s argument that choosing a Bluetooth transmission scheme having $\pi/4$ -DQPSK and/or 8DPSK modulation scheme(s) would not have been obvious because it “present[s] various challenges including passing stringent FCC testing requirements and voiding warranty of the N93 device being modified” (PO Sur-reply, 5) has little weight. We find the concerns regarding FCC compliance and warranty to be directed more to economic reasons why a business person would not choose the $\pi/4$ -DQPSK and/or 8DPSK modulation scheme(s), rather than a technological reason. Technically, Patent Owner, and its expert, concede that the Bluetooth standards “reveal” what a skilled artisan knew to be acceptable “**possibilities** for Bluetooth modulation schemes” (Ex. 2017 ¶ 184; PO Resp. 10–11). As a result, we find the concerns alleged by Patent Owner to have little relevance regarding the obviousness of using the $\pi/4$ -DQPSK and/or 8DPSK modulation scheme(s) with the devices Dua and N93 disclose. *In re Farrenkopf*, 713 F.2d 714, 718 (Fed. Cir. 1983) (“That a given combination would not be made by businessmen for economic reasons does not mean that

persons skilled in the art would not make the combination because of some technological incompatibility. Only the latter fact would be relevant.”).

Regarding Grounds 2 and 5, we do not find the introduction of BT-Spec to present a meaningfully different ground than Ground 1. This is because we find the BT-Spec reference to be appropriately characterized as demonstrating background knowledge of a skilled artisan at the time of the invention; it simply is a document memorializing what was recognized in the field of art to be the standard protocols associated with Bluetooth technology. And because a skilled artisan is a person of ordinary creativity, not an automaton, we are persuaded that a skilled artisan would have had a reasonable expectation of success incorporating all of the standardized modulation schemes that BT-Spec teaches because they were known standards implemented with standard technologies and are a matter of routine skill. Ex. 1002 ¶ 224.

Therefore, for the foregoing reasons, we find Petitioner’s contentions persuasive in Grounds 1–5 that Dua and N93 each disclose or suggest limitation 1a to a skilled artisan.

2. Contested Limitation 1b

Limitation 1b recites: “*a second radio communication circuit implementing a second transmission scheme having a second modulation scheme different from the first modulation scheme and a second transmission frequency band different from the first transmission frequency band, the second radio communication circuit capable of connecting by radio to an internet or a home network to transmit and receive information using the second transmission frequency band.*”

Petitioner contends that Dua and N93, respectively, disclose or render obvious limitation 1b. Pet. 20–22, 58, 60, 70, 73. In Grounds 1 and 4,

Petitioner identifies Dua and N93 as each separately disclosing or suggesting the second radio communication circuit that limitation 1b recites; in Ground 3, Petitioner only relies on Dua for the recited second communication circuit; and in Grounds 2 and 5, Petitioner adds Rooyen to Ground 1 to further evidence known UMTS radio frequency integrated circuit transceiver operating at 2100 MHz, which can be a separate circuit or part of a combined circuit.¹⁰ *Id.*

Petitioner contends that “N93 discloses the cellular phone includes circuits and a UMTS radio communication circuit operating in the 2100 MHz band.” Pet. 21 (citing Ex. 1010, 8 (“UMTS 2100 networks”), 15, 59–62, 64, 92, 106, 110, 113, 125). Petitioner explains that “UMTS radio is a 3G radio that connects to the Internet to transmit and receive information such as video calls, web browsing, e-mail, MMS, video clips, etc.” *Id.* (citing Ex. 1010, 15 (3G packet data connection, available, active, on hold), 59 (video call), 60–61 (video calls and sharing video clips via SIP connections over UMTS), 64 (MMS over UMTS), 91–92 (connection manager), 106 (UMTS for MSS, Web browsing, email, and “connect to the Internet”), 113 (UMTS network mode); Ex. 1002 ¶ 91).

Petitioner asserts that “Dua also discloses the cellular phone includes a UMTS transceiver by disclosing a 3G radio that is fully compliant with all worldwide 3GPP standards and provides additional implementation details.” Pet. 21 (citing Ex. 1008 ¶ 69). According to Petitioner, “Dua discloses the

¹⁰ For Grounds 2 and 5, Petitioner also includes 3GPP-Spec as a secondary reference showing relevant modulation and frequencies for UMTS. Pet. 56. However, for the reasons discussed above (*supra* § III.D.7), Petitioner has failed to establish 3GPP-Spec is within the scope of available prior art and, therefore, we do not include its teachings in our analysis.

transceiver interacts with the CPU 109 to implement the radio communication protocols and higher level networking and application layer protocols (like TCP/IP, SIP, RTP, HTTP) to communicate over the radios and Internet.” *Id.* (citing Ex. 1008 ¶¶ 66–69). Petitioner asserts that “Dua also discloses the UMTS radio connects by radio to the Internet to transmit and receive video using SIP connections.” Pet. 22 (citing Ex. 1008 ¶¶ 68, 140, 183–189; Ex. 1002 ¶ 92).

According to Petitioner, “Dua’s disclosure of a radio to support ‘all worldwide 3GPP and 3GPP2 standards’ (Ex. 1008 ¶ 69) inherently discloses to a POSITA a UMTS radio using the UMTS modulation schemes (QPSK, 16QAM, and 64QAM) and the frequency (2100 MHz), as required by those standards.” Pet. 22 (citing Ex. 1010, 8 (UMTS 2100 MHz); Ex. 1011 ¶¶ 10, 19 (UMTS uses WCDMA at 2100 MHz)). Petitioner asserts that “Dua’s disclosure of ‘fully compliant’ radio also inherently discloses UMTS with TDD, such that information is transmitted and received on the same frequencies.” *Id.* (citing Ex. 1015, 7 (TDD)). “In the alternative,” Petitioner argues, “the UMTS modulation schemes and frequencies would have been obvious based on the knowledge of a POSITA, as evidenced by those same references.” *Id.* (citing Ex. 1002 ¶ 93).

Petitioner contends that the combination of Dua and N93 discloses or renders obvious

a second radio communication circuit implementing a second transmission scheme (UMTS) having a second modulation scheme (QPSK/QAM) different from the first modulation scheme ($\text{GFSK}/\frac{\pi}{4}$ -DQPSK/8DPSK) and a second transmission frequency band (2100MHz) different from the first transmission frequency band (2402-2480 MHz), the second radio communication circuit capable of connecting by radio to an internet or a home network to transmit and receive information

using the second transmission frequency band (Internet access through cellular network).

Pet. 20–21 (citing Ex. 1010, 8 (“UMTS 2100 networks”), 15 (3G data packet connection), 61–64 (SIP and MMS); Ex. 1008, Fig. 1 (network transceiver 105), ¶¶ 59–61 (circuits and hardware components), 67 (Internet access through cellular network), 68 (TCP/IP stack for IP-based networks), 69 (3G cellular networks); Ex. 1002 ¶ 90). Petitioner contends that it would have been obvious to skilled artisan to combine the teachings of N93 and Dua because both are directed to a cellular phone with multiple radio communication circuits and a skilled artisan would have been motivated to find Dua to learn about implementation details absent in N93. *See id.* at 9–11 (citing Ex. 1002 ¶¶ 67–71). Petitioner contends that a skilled artisan “would have had a reasonable expectation of success in implementing the features described in both references in the combination using Dua’s implementation details” because “Dua’s details were known techniques that would yield predictable results as taught by Dua and involve only routine skill.” *Id.* at 12 (citing Ex. 1002 ¶ 72).

In Grounds 2 and 5, Petitioner adds Rooyen to provide “further implementation details of Rooyen . . . to radio frequency integrated circuits,” such as UMTS radios like the ones Dua and N93 disclose. Pet. 54. Petitioner contends that a skilled artisan “would have been motivated to look for known implementations in the art and been led to Rooyen.” *Id.* (citing Ex. 1002 ¶ 219).

Patent Owner disputes Petitioner’s contention that the UMTS transmission scheme was known to utilize the QAM modulation scheme. PO Resp. 12–13. Patent Owner argues that the UMTS network is not associated with the QAM modulation scheme and that “Petitioner’s own

reference states that QAM is a modulation scheme associated with a **different** technology from UMTS—HSDPA [(high speed downlink packet access)].” *Id.* at 12 (citing Ex. 2017 ¶ 194; Ex. 1011 ¶ 10).

Regarding the addition of Rooyen in Ground 2, Patent Owner argues that a skilled artisan would not be motivated to use Rooyen’s implementation details and have a reasonable expectation of success in making the combinations. PO Resp. 58 (citing Ex. 2017 ¶ 377). As support, Patent Owner contends that Rooyen itself highlights the complexities of combining radio communication circuits and “Rooyen does not address Bluetooth communication or simultaneous use of two different radio circuits and therefore does not account for the complexities in integrating those features or having one controller control assignment in relation to Bluetooth, UMTS, and GSM/Wi-Fi connections.” *Id.* at 58–59 (citing Ex. 1011 ¶¶ 5, 17; Ex. 2017 ¶¶ 378–379).

Additionally, Patent Owner argues that “general knowledge of a standard will not disclose the specific frequencies and modulation schemes used for a specific hardware implementation of UMTS.” PO Resp. 61 (citing Ex. 2017 ¶ 390). Patent Owner alleges that “[s]tandards also do not disclose how to make a device compliant with the standards, particularly a device that must be compliant with multiple different standards while including the other alleged features.” *Id.* (citing Ex. 2017 ¶ 389). Patent Owner similarly argues that “general standards cannot disclose the inherent properties of a device” because “[d]evices are designed in consideration for specific standards and it would not be obvious to replace a device that had different capabilities.” *Id.* (citing Ex. 2017 ¶ 395).

Petitioner, in its Reply, states, “[Patent Owner] disputes whether the UMTS radio would implement QAM . . . , but does not dispute that it

implements QPSK, which alone satisfies [1b].” Pet. Reply 5–6 (citing Pet. 20–22; Ex. 1057, 59:10–21). And regarding “[Patent Owner]’s argument that industry standards are not enabling,” Petitioner contends that they “are not credible in light of Mr. McNair’s deposition testimony regarding QAM.” *Id.* at 25–26 (citing Ex. 1058 ¶ 40).

Patent Owner, in its Sur-reply, simply responds “Petitioners fail to rebut [Patent Owner]’s assertions that modulation schemes and frequencies are not inherent and improperly try to shift the burden onto PO because Petitioners failed to provide any evidence of inherency or properly establish a finding of obviousness in the Petition.” PO Sur-reply 5.

After studying and weighing the evidence, in view of both parties’ arguments, we find Petitioner’s positions regarding limitation 1b persuasive. First, we note that there is no dispute that Dua and N93 each disclose a second radio communication circuit implementing the UMTS transmission scheme that connects by radio to an internet or a home network to transmit and receive information using the second transmission frequency band. *See* PO Resp. 12–13; PO Sur-reply 5. Patent Owner likewise does not dispute that a skilled artisan recognized that the UMTS transmission scheme at the time of the invention utilized a second QPSK modulation scheme (*see* Ex. 1057, 59:19–21), which is different than the first GFSK, $\frac{\pi}{4}$ -DQPSK, and 8DPSK modulation schemes, and a second 2100 MHz transmission frequency band, which is different from the first 2402–2480 MHz transmission frequency band. *Id.* And, for the reasons and evidence provided by Petitioner, we agree that Dua and N93 each would have provided such a disclosure to a skilled artisan.

Petitioner demonstrates persuasively that, at the time of the invention, the known standard for a UMTS transmission scheme was to have QAM and QPSK modulation schemes with a 2100 MHz transmission frequency band. Ex. 1002 ¶¶ 90–93; Pet. 20–22. We disagree with Patent Owner that the UMTS network was not associated with the QAM modulation scheme. PO Resp. 12. In fact, Patent Owner’s own expert testified that Exhibit 2036 is a document that “describes the UMTS protocol, the physical layer,” and that it shows the UMTS transmission scheme “includes both QPSK and QAM modulation.” Ex. 1057, 59:1–21. By establishing QAM and QPSK modulation schemes with a 2100 MHz transmission frequency band were a known standard protocol for UMTS transmission schemes by a skilled artisan at the time of the invention, Petitioner has shown persuasively that incorporating such a configuration into the radio communication circuit implementing a UMTS transmission scheme, which both N93 and Dua teach, would have been nothing more than a predictable use of prior art elements according to their established (in fact, standardized) functions. As such, the configuration is an obvious combination of familiar elements according to known methods to accomplish a predictable result. *See KSR Int’l Co.*, 550 U.S. at 416 (“The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.”).

We find little credibility in Patent Owner’s argument that technical limitations at the time of the invention would have made it difficult to incorporate what was standardized at the time or that to do so would take more than ordinary skill to implement. *See* PO Resp. 13. To gain some perspective, we have considered the passages from the ’590 patent that Patent Owner cited during reexamination to show written description

support for the claimed transmission schemes and multiple radio communication circuits. Ex. 1006, 130 (citing Ex. 1004, Figs. 4, 8–11, 8:62–9:35, 13:31–14:9, 12:51–13:26). After considering those passages, we note that they lack any of the kinds of teachings that Patent Owner now appears to assert would be necessary to implement the different radio communication circuits having different modulation schemes and different transmission frequency bands. *See id.* Patent Owner’s previous representations undermine their arguments here because they indicate that the background knowledge of a skilled artisan is such that a broad general description of the claimed subject matter is enough to enable a skilled artisan to practice the claimed subject matter and that a skilled artisan possessed the ability to overcome the technical difficulties that Patent Owner now alleges may need to be overcome. *See Motorola, Inc. v. Interdigital Tech. Corp.*, 121 F.3d 1461, 1471 (Fed. Cir. 1997) (finding it appropriate to consider the level of detail used in the challenged patent when evaluating whether a prior art reference was enabling); *In re ThermoLife Int’l LLC*, 796 F. App’x 726, 733 (Fed. Cir. 2020) (“The amount of direction included in the [challenged] patent’s specification is evidence of the knowledge in the art, and therefore, is also evidence of what amount of disclosure is required from the prior art to be enabling.”). Patent Owner’s arguments to the contrary are, therefore, unavailing.

Regarding the addition of Rooyen in Grounds 2 and 5, we find that Rooyen confirms what both N93 and Dua already disclose, which is that radio communication circuits implementing a UMTS transmission scheme were known to a skilled artisan to operate at a 2100 MHz frequency band. Ex. 1011, code (57), ¶¶ 23–24. As a result, beyond providing additional evidence supporting the background knowledge of a skilled artisan, we do

not find the introduction of Rooyen to present a meaningfully different ground than Ground 1.¹¹

As a result of the foregoing, we find a preponderance of the evidence supports Petitioner’s contentions in Grounds 1–5 that Dua and N93 each disclose or suggest limitation 1b.

3. *Contested Limitation 1c*

Limitation 1c recites: “*a third radio communication circuit capable of transmitting information and using a third transmission frequency band.*”

Petitioner contends that Dua and N93, respectively, disclose or render obvious limitation 1c. Pet. 22–24, 58, 60, 70, 73. In Grounds 1 and 4, Petitioner identifies Dua and N93 as each separately disclosing or suggesting the third radio communication circuit that limitation 1c recites; in Ground 3, Petitioner only relies on Dua for the recited third communication circuit; and in Grounds 2 and 5, Petitioner adds Rooyen to Ground 1 to further evidence known GSM radio frequency integrated circuit transceiver operating at 900 and 1800 MHz, which can be a separate circuit or part of a combined circuit. *Id.*

Petitioner contends that Dua and N93, respectively, disclose or render obvious “a third radio communication circuit (GSM or Wi-Fi) capable of transmitting information and using a third transmission frequency band (GSM: 900, 1800, 1900 MHz; Wi-Fi: 2.4GHz or 5Ghz).” Pet. 22 (citing Ex.

¹¹ To the extent Petitioner relies on Rooyen for its disclosure of a combined GSM/UMTS radio communication circuit, we note that there is no such limitation in claim 1 and neither party has suggested an interpretation of any limitation in claim 1 that would require the second radio communication circuit to be part of a combined circuit.

1010, 8, 15–19, 30, 42–43, 53, 60, 78, 88–89, 91–92, 106–109, 112–113, 121, 125; Ex. 1008 ¶¶ 59–61, 66–69, 174; Ex. 1002 ¶ 94).

Petitioner provides two different radio mappings, Mapping A: GSM (Pet. 22–23), and Mapping B: Wi-Fi (*id.* at 23–24). For Mapping A, Petitioner asserts that “N93 discloses the cellular phone includes a GSM radio (third radio circuit) to connect to the internet and is capable of transmitting information (SMS or data over GPRS and EDGE) using the 900, 1800 and 1900 MHz transmission frequency bands.” *Id.* at 23 (citing Ex. 1010, 7, 15, 53, 91–92, 106–107, 113, 125; Ex. 1002 ¶ 95).

Petitioner asserts that Dua also “discloses the cellular phone includes a GSM radio communication circuit in network transceiver 105 for interfacing with the cellular network and connecting to the Internet and provides additional implementation details.” Pet. 23 (citing Ex. 1008, Fig. 1 (transceiver 105), ¶¶ 59 (integrated circuit chips and circuitry), 66 (GSM cellular network to access the Internet), 67–69).

For Mapping B (Wi-Fi), Petitioner asserts that “N93 and Dua each disclose an additional ‘third radio communication circuit,’ including a Wi-Fi radio circuit in short range radio transceiver 108 (802.11b or g at 2.4GHz or 802.11a at 5GHz), which can transmit media and connect to the internet on their respective third transmission frequency band.” Pet. 24 (citing Ex. 1010, 18, 125; Ex. 1008 ¶¶ 62, 66; Ex. 1002 ¶ 98).

Patent Owner, for Mapping A (GSM), does not dispute that Dua and N93 disclose a radio communication circuit implementing a GSM transmission scheme that uses a 900, 1800 and/or 1900 MHz transmission frequency band(s) and that is capable of transmitting information. *See* PO Resp. 13–15. Patent Owner asserts that “UMTS and GSM are types of cellular networks that a mobile device could connect to using a cellular radio

communication circuit” and that “[t]he functionality of a cellular radio communication circuit is to connect to a cellular network, and possibly switch between different cellular networks by changing modulation schemes.” *Id.* at 13 (citing Ex. 2017 ¶¶ 173–179). Therefore, Patent Owner argues, a skilled artisan “would not consider UMTS and GSM to be separate ‘radio communication circuits’ and thus ‘UMTS’ and ‘GSM’ each on its own is not a radio communication circuit.” *Id.* at 15.

For Mapping B (Wi-Fi), Patent Owner accepts that N93 and Dua, respectively, disclose a third radio communication circuit capable of making a connection to transmit information over a Wi-Fi network using a 2.4GHz frequency band. *See* PO Resp. 15–16 (citing Ex. 2017 ¶¶ 201–205). Patent Owner also acknowledges that “[t]he Wi-Fi standard is associated with both 2.4GHz and 5GHz frequency bands.” *Id.* at 15. Patent Owner, however, disputes whether Petitioner has shown that it would have been obvious to modify the radio communication circuit to transmit information over a Wi-Fi network using the 5GHz frequency band. *Id.* at 15–16.

Patent Owner argues that “[a]dding 5GHz functionality for Wi-Fi was beyond ordinary skill because it required different antennas, power management chip, and other considerations into a resource constrained device.” PO Resp. 16 (citing Ex. 2017 ¶¶ 202–203). Additionally, Patent Owner argues that “there would be no motivation to add additional frequency band support if the device already supported functionality on the 2.4GHz frequency band and all relevant devices at the time used this frequency band.” *Id.* (citing Ex. 2017 ¶ 204). According to Patent Owner, “[t]he disadvantages of adding 5GHz outweighed the benefits, because 2.4GHz was *widely* supported at the time while 5GHz was not.” *Id.* (emphasis added). Patent Owner argues that “Petitioners identify no

rationale for adding 5GHz support or using 5GHz instead of 2.4GHz.” *Id.* (citing Pet. 25).

In the Reply, for Mapping A, Petitioner criticizes Patent Owner’s suggestion that the GSM radio communication circuit cannot be combined with the UMTS radio communication circuit as being misplaced because there is no such restriction in limitation 1c. Pet. Reply 6. Petitioner asserts that “[t]here is no dispute that UMTS/GSM implement different transmission frequencies and modulation schemes, so there would be at least some different circuitry.” *Id.* Moreover, Petitioner asserts a skilled artisan understood that different radio communication circuits are used for communicating with their respective GSM or UMTS network and that those circuits may be on separate chipsets. *Id.* at 6–7 (citing Ex. 1013 ¶¶ 10, 31, Fig. 2; Ex. 1011 ¶ 39, Fig. 4a; Ex. 2026, 99; Ex. 1057, 55:22–56:4).

For Mapping B, Petitioner simply states, “[Patent Owner] does not dispute that the Wi-Fi radio is implemented as a ‘separate’ radio with a transmission scheme at 2.4 GHz, which is sufficient.” Pet. Reply 7 (citing Pet. 23–24; PO Resp. 15–16).

In the Sur-reply, for Mapping A, Patent Owner states, “[p]ointing to a network protocol alone does not necessitate presence of multiple radio communication circuits.” PO Sur-reply 6 (citing Ex. 2017 ¶¶ 171–177, 191–196; PO Resp. 13–15). Patent Owner accuses Petitioner of “speculat[ing] that there is probably some different circuitry involved but fail to identify any alleged radio communication circuits or define the metes and bounds of which components would satisfy the claim language of radio communication circuit.” *Id.* (citing Pet. Reply 6–7). Patent Owner highlights that the cited Exhibit 2026 not only states, “[e]arly 3G [(UMTS)] handsets contained two discrete radio chipsets – one for 2G [(GSM)] and another for 3G,” but it also

states, “[c]ontemporary 3G handsets contain a radio chipset that supports both 3G and 2G.” *Id.* at 7 (citing Ex. 2026, 99) (emphasis omitted). Patent Owner states that a skilled artisan “would not understand UMTS and GSM capabilities to necessarily require or suggest separate radio communication circuits” and that Petitioner does not dispute that the operation of the cellular radio communication circuit is to connect to a cellular network, and possibly switch between different cellular networks by changing modulation schemes. *Id.* (citing Pet. Reply 6–7; PO Resp. 13–14).

For Mapping B, Patent Owner simply states, “Petitioners’ Reply fails to rebut that it would not be obvious to include both 2.4 GHz and 5 GHz frequency band support for Wi-Fi on a mobile device or even whether such frequency band support would function properly in N93 or Dua’s architecture and obtain appropriate regulatory approvals.” PO Sur-reply 8.

After studying and weighing the evidence, in view of both parties’ arguments, we find Petitioner’s positions regarding limitation 1c persuasive. In fact, there is no dispute that both Dua and N93, under Mapping B, disclose a device that includes radio communication circuitry capable of transmitting over a Wi-Fi network using the 2.4 GHz transmission frequency band. We agree with Petitioner that limitation 1c only requires as much because the Wi-Fi radio communication circuit enables a separate connection to a different network than the respective first (Bluetooth) and second (UMTS) radio communication circuits and because it uses a 2.4 GHz frequency band that is also different than the frequency bands used by the respective first and second radio communication circuits (2100, 2400 MHz). Pet. 24; Ex. 1010, 18, 125; Ex. 1008 ¶¶ 62, 66; Ex. 1002 ¶ 98.

Regarding Mapping A, we find that the GSM radio communication circuit that Dua and N93 disclose similarly satisfies limitation 1c because

that circuit connects to a network (GSM), which is a different network than the ones that the respective first and second radio communication circuits connect to transmit information and it is a circuit that uses a frequency band (900, 1800, 1900 MHz) that is different than those used by the respective first and second communication circuits (2100, 2400 MHz). Pet. 23 (citing Ex. 1010, 7, 15, 53, 91–92, 106–107, 113, 125; Ex. 1002 ¶ 95).

Patent Owner’s arguments to the contrary are unavailing because they are premised on alleged distinctions that are not commensurate with the scope of limitation 1c. In particular, Patent Owner’s expert opines that because a “**cellular** radio communication circuit” functions “to connect to a cellular network, a [skilled artisan] would not consider UMTS and GSM to be separate ‘radio communication circuits.’” Ex. 2017 ¶ 179 (emphasis added). The reasons supporting that opinion are as follows:

At the base of cellular communications, a mobile device transmits and receives information via connecting with **a** cellular network. While a mobile device may be able to connect to different cellular networks, the objective of a cellular radio in a mobile device is to establish connection to **a** cellular network.

For example, depending on its design, the cellular radio communication circuit could change modulation schemes to switch **between** certain types of cellular networks, such as between the GSM networks and UMTS networks. But mobile devices are not designed to steadily maintain connections with **multiple** cellular networks (such as a GSM and UMTS network at the same time), and instead only maintain one active connection with a cellular network at the time. The functionality of cellular chipsets in mobile devices thus supports that a POSITA would consider the cellular radio communication circuit as **one** radio communication circuit because its function is to establish an active connection with **a** cellular network (either GSM or UMTS).

Id. ¶¶ 174–175. That reasoning appears to be based on the premise that the respective GSM and UMTS radio communication circuitry Dua and N93 disclose, which enables a device to separately interact with different networks using different operating frequencies, cannot be the recited second and third radio communication circuits because that circuitry can only maintain one active connection with one of the cellular networks at a time. But limitation 1c only requires the third radio communication circuit to be “capable of transmitting information . . . using a third transmission frequency band,” without any requirement that the circuit is also capable of transmitting information while the second radio communication circuit is also actively connected to its network.

Moreover, to the extent Patent Owner is arguing the GSM and UMTS radio communication circuitry in Dua and N93 is combined into a single chipset and, therefore, it cannot disclose both the recited second and third radio communication circuits, we again find limitation 1c does not warrant such a restriction. In fact, the specification of ’590 patent expressly teaches that, in operation, *all* of the radio communication circuits “may be appropriately combined with each other.” Ex. 1004, 9:7–9. And implementing the third radio communication circuit “as a combined circuit” with another radio communication circuit is expressly recited in *dependent* claim 22, which is presumptively narrower than independent claim 1. *Id.* at 5:14–17.

As a result of the foregoing, we find the evidence to persuasively support Petitioner’s contentions in Grounds 1–5 that Dua and N93 each disclose or suggest limitation 1c, under both Mapping A and Mapping B.

4. *Uncontested Limitation 1d*

Limitation 1d recites: “*an imaging circuit capable of receiving video information and still picture information via an optical system.*”

Petitioner contends that Dua and N93, respectively, disclose or render obvious limitation 1d. Pet. 24–25. Petitioner relies on the same evidence and arguments in all of Grounds 1–5. *Id.* at 24–25, 59, 60, 70, 73. In particular, Petitioner contends that limitation 1d is shown by N93’s disclosure of camera incorporated into the cellular phone for taking still images and video. *Id.* at 24 (citing Ex. 1010, 23–29; Ex. 1002 ¶ 101). Petitioner contends that Dua’s disclosure of a cellular phone that also includes a camera to record videos and take pictures likewise satisfies limitation 1d. *Id.* at 25 (citing Ex. 1008 ¶¶ 57–58, 61, 85, 142, 166, Figs. 1, 3B; Ex. 1002 ¶ 102). Patent Owner does not dispute these contentions. *See generally* PO Resp.

After studying and weighing the evidence, we find Petitioner’s positions regarding limitation 1d persuasive. We find the evidence persuasively supports Petitioner’s contentions in Grounds 1–5 that Dua and N93, respectively, disclose or suggest limitation 1d.

5. *Uncontested Limitation 1e*

Limitation 1e recites: “*a compression circuit compressing the still picture information using a first type of compression method and the video information using a second type of compression method.*”

Petitioner contends that Dua and N93, respectively, disclose or render obvious limitation 1e. Pet. 25–27. Petitioner relies on the same evidence and arguments in Grounds 1–5. *Id.* at 25–27, 59, 60, 70, 73. In particular, for N93’s disclosure of limitation 1e, Petitioner argues,

N93 renders obvious that the phone compresses the still pictures using one type (JPEG) and video using a different type (.3gp-QCIF/MPEG) of compression. A [skilled artisan] would have understood that a .3gp file format was developed by 3GPP for MMS video sharing and 3G networks and required MPEG-4 compression. Conversion to QCIF, which is a lower resolution, also results in a smaller (i.e., compressed) file size.

Id. at 26 (citing Ex. 1010, 2, 23–25, 35, 42, 125; Ex. 1002 ¶¶ 103–104).

And for Dua’s disclosure of limitation 1e, Petitioner argues,

Dua also discloses a camera (Camera 104) is connected to Video CODEC 107 supporting MPEG and JPEG compression and provides additional implementation details. Dua discloses the media player may convert the files into formats supported by the receiving device or storage in the media player. Dua discloses MPEG and JPEG digital formats, which a POSITA would have known were the most common digital formats for video and still picture information. It would have been obvious to a POSITA from the portions of Dua cited above that Video CODEC 107 would have been a compression circuit because that is its purpose among the other circuits illustrated in Figure 1, and it is more efficient than software-based compression. Dua also discloses the CPU 109 is a compression circuit because it runs the media manager application which performs conversion and compression. *Id.*, [0058] (media manager application on CPU).

Id. at 26–27 (citing Ex. 1008 ¶¶ 58, 61, 142–143, 172, 198, 205, Figs. 1, 7; Ex. 1002 ¶ 105). Patent Owner does not dispute these contentions. *See generally* PO Resp.

After studying and weighing the evidence, we find Petitioner’s evidence regarding limitation 1e to persuasively support Petitioner’s contentions in Grounds 1–5 that Dua and N93, respectively, disclose or suggest limitation 1e.

6. *Uncontested Limitation 1f*

Limitation 1f recites: “*an input device capable of receiving a user indication.*”

Petitioner contends that Dua and N93, respectively, disclose or render obvious limitation 1f. Pet. 27. Petitioner relies on the same evidence and arguments in all of Grounds 1–5. *Id.* at 27, 59, 60, 70, 73. For N93, Petitioner identifies the operation and disclosure of a phone that includes “a keypad to receive user key presses as user indication.” *Id.* at 27 (citing Ex. 1010, 10, 12, 19, 48, 52–54, 84, 91–92, 106, 121; Ex. 1002 ¶ 107). For Dua, Petitioner similarly identifies the operation and disclosure of a phone with “a keypad, keypad interface, and RFID activation button.” *Id.* (citing Ex. 1008 ¶¶ 72–73, 76, 78, 82, 196, 227, Figs. 2A–2C; Ex. 1002 ¶ 108). Patent Owner does not dispute these contentions. *See generally* PO Resp.

After studying and weighing the evidence, we find Petitioner’s evidence regarding limitation 1f to persuasively support Petitioner’s contentions in Grounds 1–5 that Dua and N93, respectively, disclose or suggest limitation 1f.

7. *Uncontested Limitation 1g*

Limitation 1g recites: “*an accumulation circuit capable of accumulating video information received by the imaging circuit after the video information is compressed by the compression circuit.*”

Petitioner contends that Dua and N93, respectively, disclose or render obvious limitation 1g. Pet. 28–29. Petitioner relies on the same evidence and arguments in all of Grounds 1–5. *Id.* at 28–29, 59, 60, 70, 73.

In particular, Petitioner points to N93’s disclosure of a memory card and memory device for the accumulation circuit in the phone described and its ability to store “video captured locally, or received over a radio, for later

playback or transmission,” and contends it naturally follows that the stored video files were compressed using MPEG. Pet. 28 (citing Ex. 1010, 2, 14, 20–25, 30–33, 78–79; Ex. 1002 ¶ 110). Petitioner points to Dua’s disclosure of a cellular phone comprising various memories “for storing video captured locally, or received over a radio, for later playback or transmission” and description of a Video CODEC 107 between the camera and memories such that the video is stored after being compressed by the Video CODEC 107. *Id.* at 28–29 (citing Ex. 1008 ¶¶ 59, 142, 166, 194, 198, 205–207, Fig. 1; Ex. 1002 ¶ 111). Patent Owner does not dispute these contentions. *See generally* PO Resp.

After studying and weighing the evidence, we find Petitioner’s evidence regarding limitation 1g to persuasively support Petitioner’s contentions in Grounds 1–5 that Dua and N93, respectively, disclose or suggest limitation 1g.

8. *Contested Limitation 1h*

Limitation 1h recites: “*a controller controlling assignment of connection of each of the first, second, and third radio communication circuits.*”

Petitioner contends that Dua and N93, respectively, disclose or render obvious limitation 1h. Pet. 29–32. In Grounds 1–5, Petitioner relies on the same evidence and arguments for this limitation. *Id.* at 29–32, 59, 60, 70, 73.

Petitioner contends that its proposed combination “discloses or renders obvious ‘a controller (CPU 109) controlling assignment of connection of each of the first, second, and third radio communication circuits.’” Pet. 29 (citing Ex. 1010, 2, 98, 111, 114; Ex. 1008, Fig. 1 (CPU 109), ¶¶ 59, 66; Ex. 1002 ¶ 112). Petitioner asserts that “N93 discloses the

phone is a computing device running the Symbian operating system with a [user input] for presenting the user with options on the display and responding to the user's input and selection of radios to transmit or receive video or connect to the Internet or home network.” *Id.* (citing Ex. 1010, 2, 98, 111, 114; Ex. 1002 ¶ 113). According to Petitioner, “N93 discloses the controller running the Symbian OS controls the [user input] and assignment of each of the Bluetooth, UMTS, GSM, and Wi-Fi radios.” *Id.* (citing Ex. 1002 ¶ 114).

For Bluetooth, Petitioner relies on N93's disclosure of an operating system running on a controller (i.e., CPU) with a user interface whereby the controller receives a user indication that causes the controller to establish a connection with an external device specifically through the Bluetooth network and an indication causing a user selected video to be transmitted using that Bluetooth network specifically. Pet. 29 (incorporating evidence and analysis provided for limitation 1j), 34–35 (citing Ex. 1010, 33, 48–49, 59, 63, 84–87, 106; Ex. 1002 ¶¶ 127–129).

Petitioner explains that for UMTS and GSM,

N93 discloses the operating system running on the controller has a user interface whereby the controller receives user indications to assign the UMTS or GSM radio to transmit or receive video as follows: (1) user exits the “Offline profile” (“Tools>Profiles”) to indicate to the controller to activate or turn on the UMTS or GSM radio, (2) user indicates the controller should assign only UMTS or only GSM using the “Network Mode” setting, (3) user indicates whether the controller should automatically search for and select an available network, or whether it should be manual, (4) user indicates the controller should define a packet data access point, and (5) user indicates whether the controller should connect

“When available” or “When needed,” which will only connect when the user manually starts an application that requires it. Pet. 29–30 (citing Ex. 1010, 101, 107–109, 113; Ex. 1002 ¶ 116).

According to Petitioner, “[a] user can then indicate to the controller to assign a connection via the specified UMTS or GSM radio to transmit video by defining the specified network as an access point for multimedia messages, or e-mail, and then going into Gallery and selecting Send>Via Multimedia or Send>Via e-mail.” Pet. 30 (citing Ex. 1010, 32–33, 48, 53–55, 106; Ex. 1002 ¶ 117).

For Wi-Fi, Petitioner explains, “N93 discloses the controller displaying a prompt to the user to turn Wi-Fi scanning on to scan for a network, join the network, and create an IP or other connection to send/receive data over the Wi-Fi network, for example, using home share to send/receive videos.” Pet. 31 (citing Ex. 1010, 15, 17–19, 30–31, 53, 88–92, 106–109, 121; Ex. 1002 ¶ 119).

Petitioner also explains that Dua explicitly identifies microprocessor (CPU 109), “which controls assignment of connection of each of Dua’s radios.” Pet. 31 (citing Ex. 1008, Fig. 1 (showing CPU 109 with lines connecting each component), 59, 66). According to Petitioner, “Dua discloses CPU 109 runs the operating system and media player and receives the indications from the user via the user interface,” where “CPU 109 controls each assignment of each connection of each of its radios . . . because the CPU 109 implements the radio communication protocols with the transceivers and higher-level networking and application layer protocols (SIP, TCP/IP, SIP, RTP, HTTP) to communicate media over the radios and Internet.” *Id.* (citing Ex. 1008 ¶¶ 59–60, 66–69; Ex. 1002 ¶¶ 120–121).

According to Petitioner, “Dua discloses CPU 109 controls assignment of the short-range radios (Bluetooth and Wi-Fi) to connect to a source/target based on profile information received via one of 1) the NFC radio, 2) from a user’s selection of a stored profile, or 3) a user’s manual configuration.” Pet. 31–32. Petitioner explains that “Dua discloses CPU 109 controls assignment of the cellular radios (UMTS, GSM) based on the SIP protocol and target information stored in a buddy list for the buddy indicated by the user.” *Id.* at 32 (citing Ex. 1008 ¶¶ 66–69, 178–185, 192–194). Petitioner also explains that “Dua discloses the CPU 109 controls assignment of connection of the NFC radio based on the user pressing an activation button.” *Id.* (citing Ex. 1008 ¶¶ 70–74, 90, 95–98, Fig. 1; Ex. 1002 ¶ 121).

Addressing N93 first, Patent Owner responds by attacking the sufficiency of N93’s “details on how components, such as a ‘controller,’ would respond to these user indications to execute actions like ‘controlling the assignment of connections for the first, second, and third radio communication circuits.’” PO Resp. 17 (citing Ex. 2017 ¶¶ 210–212; *In re Kumar*, 418 F.3d 1361, 1368 (Fed. Cir. 2005)). Patent Owner posits that “[b]ecause N93 is a user manual for a closed-system, proprietary device, it lacks information on how to enable the device it describes and does not provide implementation details to understand its internal workings (e.g., controller in relation to radio communication circuits).” *Id.* (citing Ex. 2017 ¶ 211). Patent Owner asserts that “it is unlikely a mobile device like the N93, prior to November 2007, would have had a controller such as a CPU controlling assignment of connections related to Bluetooth, UMTS, and GSM or Wi-Fi” and a skilled artisan “would understand that modems typically handled cellular processing independently from a CPU.” *Id.* (citing Ex. 2017 ¶ 212).

Addressing Dua next, Patent Owner argues that the figures and description are too vague to describe the actual processes executed by CPU 109 to control the assignment of Bluetooth, Wi-Fi, GSM/UMTS, or NFC functions. PO Resp. 18–22. Although Dua states that CPU 109 connects to network transceiver 105 for interacting with a cellular network, Patent Owner asserts that “[t]his general statement does not provide details about the CPU’s processing to control the assignment of cellular radio connections to specific networks, such as GSM or UMTS networks.” *Id.* at 20–21 (citing Ex. 1008 ¶ 66; Ex. 2017 ¶ 218).

Petitioner states in the Reply that Patent Owner “does not dispute N93 discloses user indications to control the Bluetooth/Wi-Fi/GSM/UMTS radios—[Patent Owner] just refuses to acknowledge that Dua is an example of a smartphone with a CPU for assigning radios based on such indications.” Pet. Reply 7. The suggestion by Patent Owner’s expert that “CPU’s do not control assignment of cellular radios,” Petitioner argues, “is not credible in light of Dua and the other [secondary] references.” *Id.* (citing Ex. 1009, 6:62–7:3; Ex. 1006, 424 (the Tee reference), 426 (Fig. 2), 430, 435–436 (Figs. 1, 2) (the Honkanen reference), 440–441). Petitioner argues, although Patent Owner states “modems typically handled cellular functionality” at some unspecified level, Patent Owner “fails to show that individual modems/radios could perform the relevant functionality in N93/Dua without the CPU.” *Id.* at 8. Petitioner states, “[n]o radio can bypass the CPU and ‘assign itself’ as there is no way for an individual radio to even know they had been indicated by the N93/Dua user indications (e.g., selection of UMTS/GSM, SIP connection, selection of profile for Bluetooth or WiFi, etc.).” *Id.*

In the Sur-reply, Patent Owner counters that Petitioner “fail[s] to rebut evidence that shows specific detail of how mobile devices that could connect to multiple cellular networks including a baseband processor and CPU that split processing/control.” PO Sur-reply 8. According to Patent Owner, “Dua fails to provide specific detail on cellular connections, such as how a CPU would operate to control alleged GSM and UMTS radios,” and it “fails to disclose the operation of its CPU in relation to connecting to both ‘GSM’ and ‘UMTS’ networks.” *Id.* at 9. Patent Owner argues that “[b]ased on Petitioner’s own articulated theory that the processor makes a decision to assign any alleged radio in response to a series of user indications, Petitioner failed to establish that a CPU would process the identified user indications to assign alleged GSM or UMTS radios.” *Id.* at 10.

After studying and weighing the evidence, in view of both parties’ arguments, we find Petitioner’s positions regarding limitation 1h persuasive. Petitioner presents compelling evidence that N93 and Dua both disclose devices having a CPU that controls the allocation of circuits, from among the Bluetooth, UMTS, and GSM/Wi-Fi radio (both Mapping A and Mapping B) communication circuits, to transmit information—which is “a controller controlling assignment of connection of each of the first, second, and third radio communication circuits.” Pet. 29–32. It naturally follows that if N93’s and Dua’s CPU enables a user to select a particular network (e.g., Bluetooth, Wi-Fi, UMTS, and/or GSM) to be used to transmit information, then the CPU must be capable of controlling the assignment of connection to the respective Bluetooth, Wi-Fi, UMTS, and/or GSM radio communication circuit that is needed to communicate over the network defined.

We have given little credible weight to Patent Owner’s argument that Petitioner’s evidence lacks the necessary detail to enable the device it

describes. During reexamination, Patent Owner represented the level of detail needed by a skilled artisan to enable limitation 1h by identifying how the '590 patent's own written description supports limitation 1h—namely, column 8, line 62, through column 9, line 35, as well as, column 13, line 31 through column 14, line 9, of the '590 patent. Ex. 1006, 130. Those identified passages do not provide the kind of detail that Patent Owner now argues is necessary for a skilled artisan to enable a controller that controls the assignment of a connection to a radio communication circuit. *See* Ex. 1058 ¶ 20. They do, however, suggest that N93 and Dua provide sufficient enabling detail because of the level of background knowledge a skilled artisan possessed at the time of the invention. *See ThermoLife*, 796 F. App'x at 733. Furthermore, limitation 1h merely requires the recited controller to control the *assignment* of connection of a radio communication circuit and, at the time of the invention, it was common practice to use a CPU to control system operations, such as allocating resources to perform a defined task (i.e., allocate the particular radio communication circuit needed to execute the user indicated function). *See* Ex. 1058 ¶ 18.

Therefore, for the foregoing reasons, we find the evidence supports more persuasively Petitioner's contentions in Grounds 1–5 that Dua and N93 each disclose or suggest limitation 1h, under both Mapping A and Mapping B.

9. Uncontested Limitation 1i

Limitation 1i recites: “*wherein the first radio communication circuit can transmit video information accumulated in the accumulation circuit to an external device by radio.*”

Petitioner contends that Dua and N93, respectively, disclose or render obvious limitation 1i. Pet. 32–33. Petitioner relies on the same evidence

and arguments in all of Grounds 1–5. *Id.* at 32–33, 59, 60, 70, 73. In particular, Petitioner points to N93’s disclosure a “Bluetooth circuit [that] can transmit video information accumulated in memory (Gallery) to an external device by Bluetooth and receive video via Bluetooth and store same in the Gallery.” Pet. 32 (citing Ex. 1010, 24, 33, 83–87; Ex. 1002 ¶ 123). Petitioner points to Dua’s disclosure of Bluetooth being used to transmit/receive video saved in memory to/from an external device. *Id.* at 32–33 (citing Ex. 1008 ¶¶ 166–167, 177, 194, 225, Figs. 8B, 18; Ex. 1002 ¶ 124). Patent Owner does not dispute these contentions. *See generally* PO Resp.

After studying and weighing the evidence, we find Petitioner’s evidence regarding limitation 1i to persuasively support Petitioner’s contentions in Grounds 1–5 that Dua and N93, respectively, disclose or suggest limitation 1i.

10. Contested Limitation 1j

Limitation 1j recites: “*wherein the controller controls assignment of connection for each of the first and second radio communication circuit in response to receiving an indication from a user such that when an indication from the user indicates to transmit video information using the first radio communication circuit, the controller assigns a connection to the first radio communication circuit for transmitting the video information.*”

In Ground 1, Petitioner contends that N93 alone, or N93 combined with Dua, discloses or suggests limitation 1j, and Ground 2 relies on Ground 1 for this limitation. Pet. 33–35, 59. For Ground 3, Petitioner contends that Dua independently discloses or suggests limitation 1j. *Id.* at

60–63. Lastly, Grounds 4 and 5 rely on the same evidence and arguments presented in Grounds 1 and 3. *Id.* at 70–71.

Petitioner contends,

The combination discloses or renders obvious “wherein the controller controls assignment of connection for each of the first (Bluetooth) and second radio communication circuit (UMTS) in response to receiving an indication from a user such that when an indication from the user indicates to transmit video information using the first radio communication circuit (Bluetooth video transfer), the controller assigns a connection to the first radio communication circuit for transmitting the video information.”

Pet. 33 (citing Ex. 1010, 31, 33, 83–87; Ex. 1008, Figs. 8A–8B, ¶¶ 9, 160, 147, 196, 215; Ex. 1002 ¶ 125).

For the first Bluetooth radio communication circuit, Petitioner relies on N93’s disclosure of an operating system running on a controller (i.e., CPU) with a user interface. Through this interface, the controller receives a user indication that establishes a connection with an external device via the Bluetooth network, along with an indication to transmit a user-selected video using that specific network. Pet. 34–35 (citing Ex. 1010, 33, 48–49, 59, 63, 83–87, 106; Ex. 1002 ¶¶ 127–129). Petitioner explains that N93 discloses a sequence of user indications in which (1) the user navigates to the Gallery, selects a video, and chooses “Send>Via Bluetooth,” and (2) the controller assigns a Bluetooth connection to transmit the selected video to the external device. *Id.*

For the second UMTS radio communication circuit, Petitioner explains,

N93 discloses the operating system running on the controller has a user interface whereby the controller receives user indications to assign the UMTS or GSM radio to transmit or

receive video as follows: (1) user exits the “Offline profile” (“Tools>Profiles”) to indicate to the controller to activate or turn on the UMTS or GSM radio, (2) user indicates the controller should assign only UMTS or only GSM using the “Network Mode” setting, (3) user indicates whether the controller should automatically search for and select an available network, or whether it should be manual, (4) user indicates the controller should define a packet data access point, and (5) user indicates whether the controller should connect “When available” or “When needed,” which will only connect when the user manually starts an application that requires it.

Pet. 33 (referring to limitation [1h]), 29–30 (limitation [1h]) (citing Ex. 1010, 101, 107–109, 113; Ex. 1002 ¶ 116). Petitioner asserts that “[a] user can then indicate to the controller to assign a connection via the specified UMTS or GSM radio to transmit video by defining the specified network as an access point for multimedia messages, or e-mail, and then going into Gallery and selecting Send>Via Multimedia or Send>Via e-mail.” *Id.* at 30 (citing Ex. 1010, 32–33, 48, 53–55, 106; Ex. 1002 ¶ 117). N93 also discloses that a user indication of “Options>Share video>Live” causes an SIP connection over the UMTS radio to send and receive video. *Id.* (citing Ex. 1010, 60–62).

Petitioner also relies on Dua’s disclosure that CPU 109 “controls assignment of connection of each of Dua’s radios” based on indications received from the user via the user interface. Pet. 31 (citing Ex. 1008, Fig. 1 (showing CPU 109 with lines connecting each component), 59, 66). “Dua discloses CPU 109 runs the operating system and media player and receives the indications from the user via the user interface,” where “CPU 109 controls each assignment of each connection of each of its radios . . . because the CPU 109 implements the radio communication protocols with the transceivers and higher-level networking and application layer protocols

(SIP, TCP/IP, SIP, RTP, HTTP) to communicate media over the radios and Internet.” *Id.* (citing Ex. 1008 ¶¶ 59–60, 66–69; Ex. 1002 ¶¶ 120–121). Specifically, “Dua discloses CPU 109 controls assignment of the short-range radios (Bluetooth and Wi-Fi) to connect to a source/target based on profile information received via one of 1) the NFC radio, 2) from a user’s selection of a stored profile, or 3) a user’s manual configuration.” *Id.* at 31–32. As to the cellular radios, “Dua discloses CPU 109 controls assignment of the cellular radios (UMTS, GSM) based on the SIP protocol and target information stored in a buddy list for the buddy indicated by the user.” *Id.* at 32 (citing Ex. 1008 ¶¶ 66–69, 178–185, 192–194). Finally, “Dua discloses the CPU 109 controls assignment of connection of the NFC radio based on the user pressing an activation button.” *Id.* (citing Ex. 1008 ¶¶ 70–74, 90, 95–98, Fig. 1; Ex. 1002 ¶ 121).

Petitioner also details how Dua independently (i.e., Ground 3) discloses limitation 1j through at least three user-indication pathways. Pet. 60–63. First, Dua discloses receiving an indication when the user presses NFC activation button 118 while holding the device near a target device, signaling the controller to assign a connection to the radio identified in the target device’s profile. *Id.* at 60–61 (citing Ex. 1008, Fig. 8A (502), Fig. 8B, paragraphs 160, 165, 196). The NFC radio communicates with the target device to obtain its profile, provides that information to CPU 109, and the CPU assigns a connection to the relevant short-range radio (Bluetooth) to transmit or receive the video. *Id.* (citing Ex. 1008 ¶¶ 128, 144–155, 147, 196; Ex. 1002 ¶ 240).

Second, Dua discloses receiving an indication when the user manually selects a previously stored target device profile, instructing the controller to assign a connection to the short-range radio in that target device’s profile.

Pet. 61–62 (citing Ex. 1008, Figs. 13–14, ¶¶ 20, 147, 163, 173, 215–220; Ex. 1002 ¶ 241). In the example illustrated in Figure 13, if the user desires to transmit video to a target TV and selects device profile entry 611, CPU 109 assigns a connection to the radio in TV 611’s stored profile (e.g., Bluetooth). This establishes a connection and transfers the video to that TV; conversely, if the user had indicated TV 612, the controller would not have assigned the connection to the Bluetooth radio for TV 611. *Id.* (citing Ex. 1008 ¶ 215; Ex. 1002 ¶ 241). Petitioner notes that Dua’s teachings regarding these first two methods include the use case where the target device supports only a single radio (e.g., Bluetooth), “such that the user’s indication (through the user’s use of NFC or selection of a stored profile) is determinative of the radio to assign.” *Id.* at 62 (citing Ex. 1008 ¶ 137; Ex. 1002 ¶ 242). In such cases, “Dua discloses support for the use case where the controller has no discretion to choose between radios, since the user’s indication has dictated the radio that must be assigned by the controller.” *Id.*

Anticipating a potential argument that Dua’s “improved” indications are merely “implicit” indications of the radio, Petitioner notes that “Dua does not disclose that the radio (e.g., Bluetooth) is explicitly displayed to the user.” Pet. 62. Petitioner argues, however, that Patent Owner accuses “implicit” user indications in the Litigation, where the user selects “Quick Share” for “nearby” sharing without explicitly indicating which radio to use. *Id.* (citing Ex. 1024, 288–291; Ex. 1002 ¶ 243). Under Patent Owner’s broad interpretation, some target devices and stored profiles can support multiple radios in a preferred order, in which case “the user indication only indicates the device and CPU 109 automatically assigns a radio connection

in the preferred order based on operating conditions.” *Id.* at 62–63 (citing Ex. 1008 ¶ 137; Ex. 1024, 310–313; Ex. 1002 ¶ 244).

Third, Dua discloses the prior art “normal” technique requiring the user to manually configure the radio for transmission. Pet. 63 (citing Ex. 1008 ¶¶ 9, 123–124; Ex. 1002 ¶ 245). This technique “requires the user to manually input the configuration commands through the user interface, which commands will be received by the CPU, and the CPU will assign the radio connection as directed by the manually entered configuration settings to transmit/receive the video.” *Id.* A skilled artisan would have understood that a target device might not support Dua’s improved methods, thus requiring the “normal” technique, and that “such manual configuration would require the user to ‘explicitly’ indicate the radio.” *Id.*

Patent Owner argues that limitation 1j “depends on the same ‘controller’ mentioned in limitation [1h], and therefore fails for at least the same reasons asserted in relation to limitation [1h].” PO Resp. 23 (citing Ex. 2017 ¶ 227). Patent Owner contends that “[t]here is no evidence that shows how any alleged controller operates in response to user indications to control connection assignments of Bluetooth, UMTS, and GSM/Wi-Fi” and that “[b]oth N93 and Dua are too high-level to reveal the internal workings when a user inputs a user indication.” *Id.* (citing Ex. 2017 ¶ 227). Additionally, “Dua does not address the user indications of N93 related to cellular radios that connect to GSM and UMTS networks, and thus cannot disclose N93’s specific implementation details.” *Id.* (citing Ex. 2017 ¶ 227). Patent Owner concludes that “[n]one of the cited references enable this limitation.” *Id.* (citing Ex. 2017 ¶¶ 156–167, 227).

Patent Owner further attacks the sufficiency of N93’s “details on how components, such as a ‘controller,’ would respond to these user indications

to execute actions like ‘controlling the assignment of connections for the first, second, and third radio communication circuits.’” PO Resp. 17 (citing Ex. 2017 ¶ 210–212; *In re Kumar*, 418 F.3d at 1368). Patent Owner posits that “[b]ecause N93 is a user manual for a closed-system, proprietary device, it lacks information on how to enable the device it describes and does not provide implementation details to understand its internal workings (e.g., controller in relation to radio communication circuits).” *Id.* (citing Ex. 2017 ¶ 211). Furthermore, “it is unlikely a mobile device like the N93, prior to November 2007, would have had a controller such as a CPU controlling assignment of connections related to Bluetooth, UMTS, and GSM or Wi-Fi,” and a skilled artisan “would understand that modems typically handled cellular processing independently from a CPU.” *Id.* (citing Ex. 2017 ¶ 212).

Addressing Dua specifically, Patent Owner argues that the figures and description are too vague to describe the actual processes executed by CPU 109 to control the assignment of Bluetooth, Wi-Fi, GSM/UMTS, or NFC functions. PO Resp. 18–22. Although Dua states that CPU 109 connects to network transceiver 105 for interacting with a cellular network, Patent Owner asserts “[t]his general statement does not provide details about the CPU’s processing to control the assignment of cellular radio connections to specific networks, such as GSM or UMTS networks.” *Id.* at 20–21 (citing Ex. 1008 ¶ 66; Ex. 2017 ¶ 218).

Patent Owner challenges Petitioner’s reliance on the “Options>Share video>Live” user indication. PO Resp. 23–24. Patent Owner argues that “Petitioners fail to provide that there is ‘controlling assignment of connection’ to the UMTS network in response to the alleged indication” because “[t]he N93 user manual explicitly states that video sharing options are only available when there is **already an active connection** to the UMTS

network.” *Id.* at 23 (citing Ex. 1010, 61; Ex. 2017 ¶ 232). Consequently, “N93 indicates that the N93 device has already assigned a connection to the UMTS network, and therefore the user indications can initiate a video link based on this existing connection.” *Id.* at 23–24 (citing Ex. 2017 ¶ 232). Furthermore, “if the receiving device is ‘not within UMTS network coverage,’ it will ‘not know’ that it received a video share invitation,” which “further indicates that user indications are only relevant after a connection to the UMTS network . . . has been established.” *Id.* at 24 (citing Ex. 1010, 62; Ex. 2017 ¶ 232).

Patent Owner disputes Petitioner’s additional user indications, arguing they “also appear to occur after a connection to the UMTS network has already been assigned, rather than assigning a connection in response to the user indications.” PO Resp. 24–25. For example, “a connection to the UMTS network must already be assigned for N93 to receive a video call.” *Id.* at 25 (citing Ex. 2017 ¶ 233). Similarly, “N93 states that ‘Send MMS’ can occur ‘in UMTS networks only,’ indicating that sending MMS requires an existing UMTS connection.” *Id.* (citing Ex. 2017 ¶ 235; Ex. 1010, 64). Finally, “N93 also contains no explanation of how a specific component (such as a CPU) operates in response to user actions to control the assignment of a specific radio communication circuit.” *Id.* (citing Ex. 2017 ¶ 235; Ex. 1010, 48, 59, 63, 106).

In its Reply, addressing the incorporated contentions from limitation 1h, Petitioner states that Patent Owner “does not dispute N93 discloses user indications to control the Bluetooth/Wi-Fi/GSM/UMTS radios—[Patent Owner] just refuses to acknowledge that Dua is an example of a smartphone with a CPU for assigning radios based on such indications.” Pet. Reply 7. The suggestion by Patent Owner’s expert that “CPU’s do not

control assignment of cellular radios,” Petitioner argues, “is not credible in light of Dua and the other [secondary] references.” *Id.* (citing Ex. 1009, 6:62–7:3; Ex. 1006, 424 (the Tee reference), 426 (Fig. 2), 430, 435–436 (Figs. 1, 2) (the Honkanen reference), 440–441). Furthermore, although Patent Owner states “modems typically handled cellular functionality” at some unspecified level, it “fails to show that individual modems/radios could perform the relevant functionality in N93/Dua without the CPU.” *Id.* at 8. Petitioner notes, “[n]o radio can bypass the CPU and ‘assign itself’ as there is no way for an individual radio to even know they had been indicated by the N93/Dua user indications (e.g., selection of UMTS/GSM, SIP connection, selection of profile for Bluetooth or WiFi, etc.).” *Id.*

Petitioner argues further that Patent Owner “does not address the showing in the Petition that in the combination, the CPU runs the software (UI, OS, media application) that receives all the N93/Dua user indications and controls assignment of all the radios.” Pet. Reply 9–10 (citing Pet. 14–15, 33–35). The CPU controls radio assignment through various user indication pathways: “NFC based on user indication of button; Bluetooth or Wi-Fi based on normal or improved indications; UMTS or GSM based on user indications.” *Id.* Petitioner maintains that “[n]othing else is required by this limitation.” *Id.* at 10.

Petitioner also asserts that Patent Owner’s “single, conclusory sentence about enablement (POR, 23), is insufficient to preserve this issue and its attempt to incorporate twelve paragraphs of its expert’s declaration is improper.” Pet. Reply 10 (citing Ex. 1058 ¶¶ 16–26, 33).

Responding to Patent Owner’s “Live” function argument, Petitioner contends that the “Live” function is “a good example wherein the CPU in the combination ‘assigns a connection’ (a SIP connection) to the UMTS

radio.” Pet. Reply 10. “N93 discloses that a user indication of ‘Live’ causes a SIP connection over the UMTS radio to send/receive video,” and “Dua discloses that its CPU controls assignment of SIP connections because the CPU runs the SIP and TCP/IP stack that controls multimedia communications over all the various radios, including the cellular radios.” *Id.* (citing Pet. 30–31; Ex. 1010, 60–62; Ex. 1008 ¶¶ 66–69, 184–202). Thus, “in the combination, based on the ‘Live’ user indication the CPU assigns the SIP connection to the UMTS radio to send/receive video.” *Id.* Turning Patent Owner’s argument against it, Petitioner states that Patent Owner’s “argument that there must already be a lower-level connection over UMTS radio to send/receive a Live or video call invitation just confirms that the CPU is assigning the SIP connection to the UMTS radio as claimed.” *Id.* (citing PO Resp. 24)

In the Sur-reply, Patent Owner raises several arguments. PO Sur-reply 11–12. First, Patent Owner asserts that, “[a]s stated with respect to limitation [1h], Petitioners fail to establish causality between its user indications and alleged assignment of radio,” and “fail to meaningfully rebut that another component could be controlling assignment of alleged GSM and UMTS radio communication circuits by using the lack of detail in Dua.” *Id.* at 11.

Second, Patent Owner challenges Petitioner’s SIP-connection theory. Patent Owner notes that Petitioner’s expert stated he believes assignment occurs when the processor “‘make[s] a decision to assign the radio.’” PO Sur-reply 11 (citing Ex. 2030, 28:22–24). Yet Petitioner “concede[s] that a connection must be already assigned to the alleged UMTS radio for the user indication to cause any action.” *Id.* (citing Pet. Reply 10). Patent Owner argues that if the UMTS radio is already assigned, “Petitioners fail to

provide how assigning a ‘SIP’ connection meets the language of the claim, because there is no assignment of the alleged UMTS radio, which is how Petitioner’s expert analyzed assignment.” *Id.* at 11–12.

Third, Patent Owner reiterates that Petitioner’s identified user indications “do not cause assignment of the alleged UMTS radio in the N93.” PO Sur-reply 12 (citing PO Resp. 24–25). For example, “the alleged UMTS radio must already be assigned in relation to the ‘Live’ function,” and Petitioner “fail[s] to rebut this testimony and in fact concede[s] that a connection to the UMTS radio is assigned.” *Id.* (citing Pet. Reply 10).

Fourth, Patent Owner invokes the reexamination record, arguing that “[t]he Patent Office rejected similar arguments during reexamination in stating that user indications in Tee did not cause assignment because the user indications occur after a connection is already assigned.” PO Sur-reply 12 (citing Ex. 2006 ¶ 137 (“Importantly, Tee’s user input relates to whether or not to relay a streaming video signal; and that input occurs after control processor 210 has already assigned a connection to the communication circuits.”)). Patent Owner concludes that “Petitioners do not otherwise establish assignment of connection.” *Id.*

Patent Owner also raises broader arguments in its Sur-reply that overlap with limitation 1h. Patent Owner contends that Petitioner “fail[s] to rebut evidence that shows specific detail of how mobile devices that could connect to multiple cellular networks including a baseband processor and CPU that split processing/control.” PO Sur-reply 8. Patent Owner asserts “Dua fails to provide specific detail on cellular connections, such as how a CPU would operate to control alleged GSM and UMTS radios,” and “fails to disclose the operation of its CPU in relation to connecting to both ‘GSM’ and ‘UMTS’ networks.” *Id.* at 9. Furthermore, “[b]ased on Petitioner’s own

articulated theory that the processor makes a decision to assign any alleged radio in response to a series of user indications, Petitioner failed to establish that a CPU would process the identified user indications to assign alleged GSM or UMTS radios.” *Id.* at 10.

After studying and weighing the evidence in view of both parties’ arguments, we find Petitioner’s positions regarding limitation 1j persuasive. Turning to the merits, Petitioner persuasively demonstrates that N93 discloses a user interface through which the user provides indications causing the controller to assign a connection to the Bluetooth radio communication circuit to transmit video. N93 teaches that a user can navigate to the Gallery, select a video clip, and choose to send that video via Bluetooth. This constitutes a user indication both to transmit video information and to use the first radio communication circuit (Bluetooth) for that transmission. Pet. 34–35 (citing Ex. 1010, 33, 48–49, 59, 63, 84–87, 106; Ex. 1002 ¶¶ 127–129). In response, the controller running the Symbian operating system assigns a connection to the Bluetooth radio communication circuit and transmits the selected video to the external device. *Id.* This disclosure satisfies limitation 1j regarding the first radio communication circuit because it shows the controller controlling the assignment of a connection for the first radio communication circuit after receiving a user indication to transmit video using that circuit.

For the UMTS second radio circuit, Petitioner similarly shows that N93 discloses a series of user indications—including network selection, access point definition, and selection of a video in the Gallery for transmission via multimedia or e-mail—that cause the controller to assign a connection via the specified UMTS radio circuit to transmit video. Pet. 29–

30 (citing Ex. 1010, 32–33, 48, 53–55, 101, 106–109, 113; Ex. 1002 ¶¶ 116–117).

We find further support in Petitioner’s Dua-only analysis (Ground 3) demonstrating that Dua independently discloses limitation 1j through three distinct user-indication pathways. Pet. 60–63. First, Dua discloses a user pressing the NFC activation button while holding the device near a target device. The NFC radio obtains the target device’s profile, provides it to CPU 109, and the CPU assigns a connection to the relevant short-range radio (e.g., Bluetooth) to transmit the video. *Id.* at 60–61 (citing Ex. 1008, Figs. 8A–8B, ¶¶ 128, 144–155, 160, 165, 196; Ex. 1002 ¶ 240). Second, Dua discloses a user selecting a previously stored target device profile, causing CPU 109 to assign a connection to the radio identified in that profile. *Id.* at 61–62 (citing Ex. 1008, Figs. 13–14, ¶¶ 20, 147, 163, 173, 215–220; Ex. 1002 ¶ 241). In both cases, when the target device supports only a single radio (e.g., Bluetooth), “the user’s indication . . . is determinative of the radio to assign” and “the controller has no discretion to choose between radios, since the user’s indication has dictated the radio that must be assigned.” *Id.* at 62 (citing Ex. 1008 ¶ 137; Ex. 1002 ¶ 242). Third, Dua discloses the prior art “normal” technique requiring the user to manually configure the radio for transmission through the user interface, with the CPU assigning the radio connection as directed by those settings. *Id.* at 63 (citing Ex. 1008 ¶¶ 9, 123–124; Ex. 1002 ¶ 245). Each pathway demonstrates the controller assigning a connection in response to a user indication to transmit video using a particular radio, satisfying limitation 1j.

We agree with Petitioner that Patent Owner fails to address the Petition’s showing that in the combination, the CPU runs the software (UI, OS, media application) receiving all the N93/Dua user indications and

controlling assignment of all radios. Pet. Reply 9–10 (citing Pet. 14–15, 33–35). Instead, Patent Owner focuses on whether individual user indications independently trigger assignment of a pre-existing connection, without disputing the underlying disclosure that the CPU mediates between user indications and radio assignment. *See* PO Resp. 23–25.

Regarding the “Live” function, we find Petitioner’s response persuasive. Patent Owner contends that because the N93 user manual states video sharing options require “an active UMTS connection,” the “Options>Share video>Live” user indication does not assign a connection but merely initiates video over an already-assigned connection. PO Resp. 23–24 (citing Ex. 1010, 61; Ex. 2017 ¶ 232). We agree with Petitioner, however, that the “Live” function is a good example of the CPU assigning a connection—specifically, a SIP connection—to the UMTS radio in response to a user indication. Pet. Reply 10. N93 discloses that a user indication of “Live” causes a SIP connection over the UMTS radio to send and receive video. Pet. 30; Ex. 1010, 60–62. And Dua discloses that its CPU controls assignment of SIP connections because the CPU runs the SIP and TCP/IP stack that controls multimedia communications over all the various radios, including the cellular radios. Pet. 31; Ex. 1008 ¶¶ 66–69, 184–202. Thus, in the combination, the “Live” user indication causes the CPU to assign the SIP connection to the UMTS radio to send and receive video. As Petitioner observes, Patent Owner’s own argument that there must already be a lower-level connection over the UMTS radio to send or receive a Live or video call invitation “just confirms that the CPU is assigning the SIP connection to the UMTS radio as claimed.” Pet. Reply 10.

We turn now to Patent Owner’s Sur-reply arguments specific to limitation 1j. PO Sur-reply 11–12. Patent Owner’s central contention is that

assigning a “SIP connection” to the UMTS radio does not satisfy the claim because the UMTS radio itself is already assigned, and thus Petitioner’s theory does not establish “assignment” of the radio as that term was understood by Petitioner’s own expert. *Id.* (citing Ex. 2030, 28:22–24). We are not persuaded. The claim language requires that “the controller assigns a connection to the first radio communication circuit for transmitting the video information.” The claim recites assigning “a connection to” the radio circuit—not assigning “the radio” itself in the abstract. A SIP connection assigned to the UMTS radio for transmitting video is a “connection to” the UMTS radio “for transmitting the video information” within the meaning of the claim. Petitioner’s expert’s general statement about “assign[ing] the radio” does not limit the claim to exclude the assignment of application-layer connections such as SIP.

Patent Owner further argues that Petitioner’s identified user indications do not cause assignment of the UMTS radio because the UMTS radio must already be assigned for the “Live” function to operate. PO Sur-reply 12. The claim does not require that the radio be entirely dormant before the user indication; it requires that the controller “assigns a connection to” the radio “for transmitting the video information” in response to a user indication. The “Live” user indication causes precisely that: the CPU assigns a SIP connection to the UMTS radio for the purpose of transmitting video. That the UMTS radio may have already been registered on the network at a lower protocol layer does not negate the controller’s assignment of a video-transmission connection at the application layer.

Patent Owner’s reliance on the reexamination record is also unavailing. Patent Owner cites the Patent Office’s rejection of arguments based on Tee, in which the examiner found that “Tee’s user input relates to

whether or not to relay a streaming video signal; and that input occurs after control processor 210 has already assigned a connection to the communication circuits.” PO Sur-reply 12 (citing Ex. 1006, 137).¹² We find this citation inapposite. In Tee, the user input occurred after the control processor had already assigned a connection to the communication circuits for the same purpose (relaying video). Here, by contrast, the “Live” user indication triggers the CPU’s assignment of a new SIP connection to the UMTS radio specifically for transmitting video—an assignment that had not previously been made. Ex. 1002 ¶ 118. The UMTS radio’s pre-existing network registration is a lower-level connection for a different purpose (general cellular service), not the video-transmission connection that the user indication causes the controller to assign.

Patent Owner’s broader arguments to the contrary are unavailing for the same reasons discussed regarding limitation 1h. We agree with Petitioner that Patent Owner does not dispute N93 discloses user indications to control each of the Bluetooth, Wi-Fi, GSM, and UMTS radios, and instead focuses its attack on whether Dua’s CPU controls the assignment of those radios in response to such indications. *See* Pet. Reply 7. We find Petitioner’s position persuasive that a CPU necessarily mediates between user indications and radio assignment because, as Petitioner explains, “[n]o radio can bypass the CPU and ‘assign itself’ as there is no way for an individual radio to even know they had been indicated by the N93/Dua user indications.” *Id.* at 8. Patent Owner’s assertion that “another component could be controlling assignment of alleged GSM and UMTS radio

¹² Patent Owner mistakenly cites “Ex. 2006 ¶ 137,” but the context makes clear that Patent Owner intended to cite page 137 of Exhibit 1006.

communication circuits” (PO Sur-reply 11) is speculative and not consistent with any record evidence.

We have also considered Petitioner’s argument that Patent Owner’s “single, conclusory sentence about enablement, is insufficient to preserve this issue and its attempt to incorporate twelve paragraphs of its expert’s declaration is improper.” Pet. Reply 10 (citing Ex. 1058 ¶¶ 16–26, 33; PO Resp. 23). Even assuming Patent Owner’s enablement argument is properly preserved, Patent Owner’s contention that N93 lacks enabling detail is undermined by Patent Owner’s own representations during reexamination, in which Patent Owner identified the ’590 patent’s written description passages supporting similar controller functionality—passages that themselves lack the kind of detailed implementation information that Patent Owner now demands from the prior art. Ex. 1006, 130; Ex. 1058 ¶ 20. Moreover, at the time of the invention, it was common practice to use a CPU to control system operations, including allocating radio communication circuits in response to user input. *See* Ex. 1058 ¶ 18. Patent Owner’s assertion that modems operated independently from a CPU is inconsistent with the evidence in the record, including Dua and the secondary references identified by Petitioner. Pet. Reply 7 (citing Ex. 1009, 6:62–7:3; Ex. 1006, 424, 426, 430, 435–436, 440–441). Petitioner’s evidence demonstrates that N93’s and Dua’s controller (CPU) received user indications through the operating system’s interface and controlled assignment of the respective radios accordingly. Pet. 29–32; Ex. 1010, 2, 98, 111, 114; Ex. 1008, Fig. 1, ¶¶ 59, 66; Ex. 1002 ¶¶ 112–114.

We have also considered Patent Owner’s Sur-reply arguments that Petitioner failed to rebut evidence regarding baseband processors splitting processing and control with the CPU. PO Sur-reply 8–10. We find those

arguments unpersuasive. It naturally follows that if N93's and Dua's CPU enables a user to define a particular network (e.g., Bluetooth, Wi-Fi, UMTS, and/or GSM) to be used to transmit information, then the CPU must be capable of controlling the assignment of connection to the respective radio communication circuit that is needed to communicate over the network defined. Pet. 29–32.

For the foregoing reasons, we find the evidence to more persuasively support Petitioner's contentions in Grounds 1–5 that Dua and N93 each disclose or suggest limitation 1j.

11. Contested Limitation 1k

Limitation [1k] recites: “*wherein the controller controls each of the first and second radio communication circuit so that the first radio communication circuit transmits video information and the second radio communication circuit connects to the internet or the home network simultaneously.*”

Petitioner contends that Dua and N93, respectively, disclose or render obvious limitation 1k. Pet. 36–38. Petitioner relies on the same evidence and arguments in all of Grounds 1–5. *Id.* at 36–38, 59, 63, 71, 73.

Petitioner contends that its proposed combination discloses or renders obvious “wherein the controller (CPU) controls each of the first and second radio communication circuit so that the first radio communication circuit (e.g., Bluetooth) transmits video information and the second radio communication circuit (e.g., UMTS) connects to the internet or the home network simultaneously.” Pet. 36–38 (citing Pet. at Sec. VII.B.2.[1a] (first radio), VII.B.3.[1b] (second radio), VII.B.9.1[h] (controller), VII.B.10.1[i] (video), VII.B.11.1[j] (controller assigning first radio); Ex. 1010, 18, 83; Ex. 1008, Figs. 10, 11, ¶¶ 190, 195–196, 203; Ex. 1002 ¶ 132).

Petitioner's case for limitation 1k rests on two independent evidentiary bases: N93's disclosure of simultaneous Bluetooth and UMTS data connections, and Dua's explicit teaching of simultaneous video transfer over Bluetooth while connected to the Internet via UMTS.

N93. Petitioner identifies three disclosures in N93 that, individually or collectively, disclose or suggest simultaneous operation. First, N93 “explicitly teaches the phone can be used as a modem for a PC by simultaneously using a Bluetooth connection to the PC and a UMTS connection to the Internet.” Pet. 36 (citing Ex. 1010, 83). A PC can also serve as “a target Bluetooth external device for video transfer.” *Id.* (citing Ex. 1010, 86). Second, “N93 also explicitly teaches there can be simultaneous Wi-Fi and UMTS data packet connections.” *Id.* (citing Ex. 1010, 18). Third, while N93 states that its Camera application does not support a Send option during a “voice call,” N93 “does not disclose any similar limitation related to data connections, which are explicitly supported as described above, or the Gallery application.” *Id.* (citing Ex. 1010, 24). Petitioner also notes that “N93 discloses Bluetooth can be used while running other applications.” *Id.* (citing Ex. 1010, 84). Based on these disclosures, Petitioner concludes that “a POSITA would have understood N93 discloses simultaneous Bluetooth video transfers and data packet connections over UMTS.” *Id.*; Ex. 1002 ¶ 133.

Dua. Petitioner asserts that “Dua also discloses the controller controls the Bluetooth and UMTS radios (*see* [1h]–[1j]) so that video can be transmitted and received over the Bluetooth transceiver with local devices simultaneously with the UMTS radio connecting to the Internet to transmit and receive the video with remote devices.” Pet. 36–37 (citing Ex. 1008, Fig. 10, ¶¶ 191–200 (player 100A receiving video via Bluetooth and

transmitting via UMTS to Internet 730; player 100B receiving video via UMTS and transmitting via Bluetooth to television 751); Fig. 11, ¶¶ 201–208 (media player 100B receiving video through Internet 730 using cellular and transmitting the received video through Bluetooth to television 851)). Petitioner further contends that “Dua explicitly teaches the video transmission/reception over the first radio (Bluetooth) can be ‘simultaneous’ with the internet connection via the second radio (UMTS) for video transmission/reception.” *Id.* at 37 (citing Ex. 1008, Figs. 8a–8b, ¶¶ 155–172; Fig. 9, ¶¶ 173–189; Fig. 16, ¶ 223; Fig. 17, ¶ 224; ¶¶ 14, 63, 176, 184, 192). For example, “Dua’s cellular phone receives incoming media such as real-time video from a local source using Bluetooth and/or a remote source over the Internet using UMTS and simultaneously transmits the real-time video to multiple target devices over the Internet.” *Id.* (citing Ex. 1008, ¶¶ 155–156, 176, 184); Ex. 1002 ¶ 134.

Obviousness. In the Petition’s “Simultaneous” section, Petitioner further contends that a skilled artisan “would have known Bluetooth could stream video” and that “Bluetooth’s transfer rate was similar to 3G (UMTS) transfer rates at the time.” Pet. 13–14 (citing Ex. 1014, 103, 200, 1005; Ex. 1019, 6; Ex. 1022, 8, 11–12; Ex. 1023 ¶¶ 8, 14, 108; Ex. 1002 ¶ 75). Petitioner also notes that during reexamination, “the examiner found—and PO did not dispute—that ‘simultaneously’ performing these claimed functions was ‘well known’ in the prior art.” *Id.* at 14 (citing Ex. 1006, 194–195). Additionally, Petitioner contends there is “no teaching in either of Dua or N93 that simultaneous data connections over the Bluetooth and UMTS radios should be prohibited,” and, given the explicit teachings that such operation should be supported, “a POSITA would have had no

motivation to create a prohibition against simultaneous data connections in the combination.” *Id.* (citing Ex. 1002 ¶ 77).

Patent Owner raises several technical objections to Petitioner’s simultaneous-operation theory, arguing that neither N93 nor Dua, alone or combined, discloses or renders obvious limitation 1k. PO Resp. 25–35.

N93. Patent Owner contends that N93’s discussion of using the phone as a modem for a PC “does not disclose or make obvious limitation [1k]” because “[t]here is no discussion of video information in this section of N93 or any indication that N93 supports or enables video information transfer to a computer over a Bluetooth connection while using the N93 as a modem.” PO Resp. 25 (citing Ex. 1010, 83; Ex. 2017 ¶ 241). Patent Owner further argues that using a mobile device as a modem “implies that the N93 would first connect to the internet via the UMTS network, and any information transfer would occur after this connection is established, using the N93 as a pass-through device.” *Id.* Patent Owner asserts that “N93 explicitly excludes the Bluetooth profile (video distribution profile) needed to support video streaming.” *Id.* at 25–26 (citing Ex. 1010, 84; Ex. 2017 ¶ 263).

Technical limitations. Patent Owner advances several technical arguments, supported by the declaration of its expert (Ex. 2017 ¶¶ 241–250), as to why simultaneous Bluetooth video transfer and UMTS Internet connectivity was non-obvious prior to November 2007:

- “Mobile devices had limited hardware resources and were not optimized for simultaneous communication across multiple wireless interfaces.” PO Resp. 26.
- “Many UMTS-capable devices handled Bluetooth data and UMTS/GPRS traffic in a time-multiplexed fashion, switching between the two rather than running them simultaneously.” *Id.*

- “Even when used as a modem, Bluetooth data transfers were typically paused or deprioritized when UMTS/GPRS was actively transmitting.” *Id.*
- “[R]adio frequency coexistence between Bluetooth and UMTS technologies was a major issue” because “UMTS operates at 1900/2100 MHz and Bluetooth at 2.4 GHz” and “[w]ithout sophisticated RF filtering, simultaneous use of UMTS and Bluetooth could cause significant interference.” *Id.* at 26–27 (citing Ex. 2017 ¶ 244).
- The N93 “did not support” the higher data rates of Bluetooth 2.0+EDR, “instead being linked to Bluetooth 1.1, 1.2, or 2.0.” *Id.* at 27 (citing Ex. 2017 ¶¶ 246–247; Ex. 1010, 84; Ex. 2035, 1).
- “Even if the N93 could theoretically act as a modem over Bluetooth, the connection would not have been true simultaneous operation—it would have been alternating or heavily constrained.” *Id.* at 27 (citing Ex. 2017 ¶ 248).

Other N93 arguments. Patent Owner contends that Petitioner’s remaining N93 evidence similarly fails. The fact that “[a] PC can be a target Bluetooth external device for video transfer” describes only “an isolated action” and “does not disclose the simultaneous transfer of video information over Bluetooth while connecting to the internet using a cellular radio.” PO Resp. 28 (citing Ex. 2017 ¶ 251). Patent Owner argues that Dr. Creusere’s statement regarding simultaneous Wi-Fi and UMTS data packet connections “bears no relevance to the simultaneous transfer of video information via Bluetooth.” *Id.* (citing Ex. 2017 ¶ 252). Additionally, Petitioner’s reliance on the absence of a prohibition against simultaneous operation amounts to “an alleged combination of different embodiments with no explanation or rationale on how to combine them except for the fact that there is nothing explicitly prohibiting it.” *Id.* (citing Ex. 2017 ¶ 254).

Dua. Patent Owner argues that Dua also fails to disclose or render obvious limitation 1k. PO Resp. 30–35. Specifically, “Petitioners fail to map these actions to a controller controlling each of the first and second radio communication circuits” and “Dua does not explain how its CPU would control any alleged circuits within the network transceiver to control connections to GSM or UMTS networks.” *Id.* at 31 (citing Ex. 2017 ¶ 260). Patent Owner further contends that Petitioner “assume[s] that Dua discloses or renders obvious video streaming occurs over Bluetooth, instead of a different wireless protocol, without evidence” and that Figure 10 depicts a streaming scenario for which Bluetooth was not suited. *Id.* (citing Ex. 2017 ¶ 261). Patent Owner asserts that “Dua itself fails to suggest that Bluetooth can be used to stream live video” because Dua mentions Bluetooth “only for audio streaming” and, “[w]hen discussing video streaming, Dua discusses use of a broadcast technology instead of Bluetooth.” *Id.* at 32 (citing Ex. 2017 ¶¶ 262–263). Patent Owner adds that “neither expert is aware of any product, then or now, that has enabled streaming video over Bluetooth.” *Id.* at 33 (citing Ex. 2017 ¶ 266; Ex. 2030, 56:7–21).

The Combination. Patent Owner argues that the combination of N93 and Dua fares no better because Petitioner “relies on the fact that there is no explicit prohibition in N93 and Dua against simultaneous transfer of video information via Bluetooth while connecting to the Internet via UMTS to positively disclose that this was in fact possible.” PO Resp. 35 (citing Pet. 14). Patent Owner’s expert characterizes this as “circular reasoning” that “cannot be enough to establish a finding of obviousness,” particularly because “neither N93 nor Dua disclose or render obvious simultaneous technology” and “given technological limitations at the time, Petitioner’s and Dr. Creusere’s arguments of what was possible during the time of the

invention were not technically possible, beyond the level of ordinary skill, and/or not enabled by the prior art.” *Id.* (citing Ex. 2017 ¶ 272).

Reply. In its Reply, Petitioner addresses Patent Owner’s simultaneous-operation arguments at length. Pet. Reply 10–13. Petitioner’s primary argument is that Patent Owner’s “simultaneous” arguments “are not commensurate with the scope of the claims.” *Id.* at 11. Petitioner explains that “[t]he claims require a first ongoing process (transmission of video) occur ‘simultaneously’ with a second ongoing process (connecting to a home network or internet)” and that “[e]ach of those processes consists of many, many packets separated over time.” *Id.* (citing Ex. 1058 ¶ 34). Because the claims “only require the overall process occur ‘simultaneously’ with the other process, the claims do not require instantaneous ‘simultaneous’ transmission of individual packets or ‘full duplex’ operation as asserted by [Patent Owner].” *Id.* at 10–11 (citing Ex. 1012 ¶¶ 51, 63; Ex. 1075, 1:38–43).

Regarding N93 specifically, Petitioner contends that “there is no legitimate dispute that N93 teaches the functionality of serving as a modem for a PC by simultaneously using a Bluetooth connection to the PC and a UMTS connection to the Internet.” Pet. Reply 11 (citing Pet. 12–14, 36). Petitioner asserts “[t]hese teachings are sufficient to render obvious simultaneous operation of the two processes as a whole, for example, when a user is browsing the web or transferring a video file.” *Id.* Petitioner further contends that Patent Owner’s, and its expert’s, “arguments that a theoretical device could be implemented to use time-division multiplexing is irrelevant because it addresses a device, not the publication, and is not commensurate with the scope of the claims which encompass simultaneous, TDM processes.” *Id.*

Turning to Dua, Petitioner notes that Patent Owner “first hypothesizes that an undisclosed modem could perform certain low-level tasks related to timing requirements (POR, 31), but that is irrelevant because Dua’s CPU would control assignment of UMTS radio based on the user indications to establish the connection.” Pet. Reply 12 (citing Pet. 29–32, 33–35, 36–38). Petitioner also notes that “[Patent Owner] then agrees Dua discloses video file transfer (POR, 31), and [Patent Owner] does not dispute that it would have been obvious to use that functionality simultaneously with the UMTS radio connecting to the Internet.” *Id.* Petitioner further argues that Patent Owner’s argument regarding video streaming over Bluetooth “fails to address that Dua explicitly teaches its CPU will assign the appropriate radio, which Dua explicitly teaches could be the Bluetooth radio ‘designed to support the widest array of communication protocols.’” *Id.* (citing Pet. 19–20, 24; Ex. 1008, Fig. 7, ¶¶ 62–63). Petitioner contends that “[t]his teaching includes all Bluetooth modulation schemes (including EDR) and the Bluetooth Video Distribution Profile that [Patent Owner and its expert] admit supports video streaming.” *Id.* at 12 (citing PO Resp. 32). Petitioner notes that Patent Owner “does not address the fact that Dua repeatedly and explicitly teaches a [skilled artisan] that the short-range radios (e.g., Bluetooth/Wi-Fi) and cellular radios (e.g., 3G/UMTS) operate ‘simultaneously,’ explicitly teaching this limitation to a [skilled artisan] under the narrowest of possible constructions.” *Id.* at 12–13 (citing Pet. 37). Additionally, Patent Owner’s expert “cites a single document to support his opinions—which document also confirms many prior art examples of streaming video over Bluetooth.” *Id.* at 13 (citing Ex. 2010, 6; Ex. 1073; Ex. 1074). Finally, Petitioner argues that the unsubstantiated discussions by Patent Owner’s expert about “‘limited hardware’ (277), ‘time division’ (278)

and ‘adjacent frequency bands (which they are not)’ (279) are not credible in light of the disclosures of Dua, the intrinsic record (Tee, Honkanen) and the fact that the specification simply states four-adjacent radios can operate simultaneously.” *Id.* (citing Ex. 1004, Fig. 11; Ex. 1058 ¶¶ 27–32).

Sur-reply. Patent Owner responds that Petitioner “fail[s] to rebut whether there would be a reasonable expectation of success in relation to this limitation or motivation to combine.” PO Sur-reply 12. Patent Owner reiterates that N93 “does not disclose the transmission of video over an alleged Bluetooth radio while simultaneously connecting to the Internet over an alleged UMTS radio, whether through its modem description or any other description.” *Id.* at 12–13. Patent Owner challenges Petitioner’s reliance on Dua’s “widest array of communication protocols” statement as “vague and speculative” and disputes “whether such statement can be read to incorporate any combination of technology in the way alleged by Petitioners, particularly considering the state of the art at the time of the invention.” *Id.* at 13. Patent Owner argues that Petitioner “fail[s] to address how implementation of the technology in these research articles would be within the level of skill of a [skilled artisan]” and that the research paper relied on by Patent Owner’s expert (Ex. 2010) “confirms the lack of suitability of Bluetooth to stream video.” *Id.* at 13–14. Patent Owner also notes that even Petitioner’s cited references reveal limitations, pointing to a passage in the intrinsic record stating that “[i]f it is impossible to create another connection . . . without blocking the usage of another radio connection, the process moves to 414, where one radio connection is either put on a standby state or even terminated.” *Id.* at 14–15 (citing Ex. 1006, 444). Patent Owner concludes that “Petitioners speculate with conclusory assertions without

providing any evidence of the specific simultaneous communications required to meet the claim language.” *Id.* at 15.

After studying and weighing the evidence, in view of both parties’ arguments, we find Petitioner’s positions regarding limitation 1k persuasive.

As an initial matter, we agree with Petitioner that “simultaneously” in limitation 1k does not require instantaneous packet-level transmission or full-duplex operation. Limitation 1k requires the controller to control the first and second radio communication circuits “so that” the first “transmits video information” and the second “connects to the internet or the home network simultaneously.” The claim thus requires two ongoing processes—video transmission over one radio and Internet connectivity over another—to occur during an overlapping time period. Nothing in the claim language mandates that individual packets be transmitted at the same instant or that the radios operate in full duplex. As Petitioner’s expert explains, each process “consists of many, many packets separated over time,” and the claims require only that the overall processes occur “simultaneously.” Ex. 1058 ¶ 34. This is consistent with the specification, which describes simultaneous operation of radios without prescribing any particular packet-level timing. Ex. 1004, 8:15–19 (modem 1002 transmits video “and the modem 1003 simultaneously connects to the Internet”). We are persuaded that time-division multiplexing of the two processes satisfies “simultaneously” because both processes are ongoing even if individual packets alternate.

We find that both N93 and Dua each disclose or suggest the simultaneous operation recited in limitation 1k. N93 explicitly teaches that the phone can be used as a modem for a personal computer by simultaneously using a Bluetooth connection to the computer and a UMTS

connection to the Internet. Ex. 1010, 83. N93 also discloses that a PC can be a target Bluetooth external device for video transfer. *Id.* at 86. A skilled artisan would have understood from these disclosures that the N93 could simultaneously maintain a Bluetooth connection—over which video could be transferred—and a UMTS Internet connection. Ex. 1002 ¶¶ 73, 75–76, 133. This understanding is reinforced by N93’s teaching that Bluetooth can be used while running other applications and that there can be simultaneous UMTS data packet connections. Ex. 1010, 18, 84.

Dua independently provides support. Dua repeatedly and explicitly teaches that its short-range radios (e.g., Bluetooth) and cellular radios (e.g., UMTS) operate “simultaneously.” Ex. 1008 ¶¶ 14, 63, 155–156, 176, 184, 192. For example, Dua’s Figures 10 and 11 depict scenarios in which media player 100A receives video via Bluetooth from a local source and transmits that video via UMTS to the Internet, or vice versa—all simultaneously. *Id.* at Figs. 10–11, ¶¶ 191–208. Dua thus explicitly teaches a controller controlling two radios so that one transmits video information while the other connects to the Internet simultaneously.

Patent Owner’s technical objections, while extensive, are unavailing. Patent Owner’s primary argument is that simultaneous Bluetooth video transfer and UMTS Internet connectivity was beyond ordinary skill due to hardware limitations, time-division multiplexing, RF coexistence issues, and Bluetooth bandwidth constraints. PO Resp. 26–28; Ex. 2017 ¶¶ 241–250. These arguments are not commensurate with the scope of limitation 1k, which, as discussed, does not require full-duplex, packet-level simultaneous transmission. Many of Patent Owner’s arguments address theoretical product implementation constraints rather than what the prior art publications teach a skilled artisan. Moreover, Petitioner has shown that the

reexamination examiner found—and Patent Owner did not dispute—that “simultaneously” performing these claimed functions was “well known” in the prior art. Pet. 14 (citing Ex. 1006, 194–195).

Patent Owner’s argument that Dua does not disclose or suggest Bluetooth video streaming is also unpersuasive. Patent Owner contends that Dua discusses Bluetooth only for audio streaming and does not suggest video. PO Resp. 32. However, as Petitioner demonstrates, Dua explicitly teaches that its Bluetooth radio is “designed to support the widest array of communication protocols.” Ex. 1008 ¶ 63. Patent Owner’s own expert concedes that the Video Distribution Profile—which supports video streaming—is a Bluetooth profile. PO Resp. 32. Moreover, Dua’s Figures 8A–8B, 9, 10, 11, and 15–17, together with their accompanying descriptions, depict video being received and transmitted via short-range transceivers (which include Bluetooth) simultaneously with Internet connections via cellular radios. Ex. 1008 ¶¶ 155–172, 173–189, 191–208, 221, 223–224. Additionally, contemporaneous references confirm that streaming video over Bluetooth was known before November 2007. Ex. 1073 (streaming video over Bluetooth in 2003); Ex. 1074 (streaming video over Bluetooth in 2006 with EDR); Ex. 2010, 6 (confirming prior art examples of streaming video over Bluetooth, while seeking to improve quality). We find the opinions of Patent Owner’s expert to the contrary not credible in light of this objective evidence.

Patent Owner’s argument that the absence of a prohibition in N93 and Dua against simultaneous operation is insufficient to establish a disclosure or suggestion is also unavailing. The combination does not rest solely on the absence of a prohibition. Rather, as discussed above, both N93 and Dua affirmatively teach simultaneous operation of their short-range and cellular

radios. Given this affirmative teaching, the additional absence of any prohibition reinforces that a skilled artisan would have understood N93 and Dua to support simultaneous operation.

We have also considered Patent Owner’s Sur-reply arguments that Petitioner has not established a reasonable expectation of success or motivation to combine. PO Sur-reply 12–15. These arguments are unpersuasive for the reasons discussed in our analysis of limitation 1h. Dua’s CPU controls assignment of connections to all radios, and a skilled artisan would have understood how to implement the simultaneous operation that both N93 and Dua teach. The cited passage from the intrinsic record regarding blocking or terminating radio connections (Ex. 1006, 444) does not undermine Petitioner’s position because it merely describes one possible scenario in a multi-radio device—it does not undermine Petitioner’s showing of expected success in having simultaneous Bluetooth and UMTS connections in certain cases. Ex. 1002 ¶¶ 75–77, 134.

Therefore, for the foregoing reasons, we find the evidence more persuasively supports Petitioner’s contentions in Grounds 1–5 that Dua and N93 each disclose or suggest limitation 1k.

12. Contested Limitation 1l

Limitation 1l recites: “*wherein the second or third radio communication circuits receive a signal from the internet indicating that an update for an operating system of the video processing apparatus is available, and the video processing apparatus executes an update process such that an updated operating system of the video processing apparatus is stored in the video processing apparatus after execution of the update process.*”

Petitioner contends that the combination of N93, Dua, and Herle discloses or renders obvious limitation 11. Pet. 38–40, 59, 63, 71, 73. Petitioner relies on the same evidence and arguments for this limitation across Grounds 1–5. *Id.*

Petitioner asserts that N93 discloses a cellular phone running software, including a Symbian operating system and applications. Pet. 38 (citing Ex. 1010, 2, 72, 98, 111, 114–116). N93 allows users to download applications, and Petitioner contends a skilled artisan would understand such downloads use the cellular radio and an Internet connection. *Id.* (citing Ex. 1002 ¶ 136). Additionally, N93 discloses that its cellular radios connect to the Internet. *Id.*

Petitioner further asserts Dua discloses a cellular phone running an operating system and applications with software that can be updated, although Dua does not explicitly describe how. Pet. 39 (citing Ex. 1008 ¶¶ 58, 60, 141, 143, 151, 154). Dua similarly discloses that its UMTS and GSM radios connect to the Internet. *Id.* (citing Ex. 1002 ¶ 138).

According to Petitioner, Herle discloses a cellular phone running software and updating that software—including both the operating system and applications—over the air. Pet. 39–40 (citing Ex. 1009, Figs. 1–4, 1:14–3:30, 6:9–7:18, 7:25–36, 7:66, 8:3–38; Ex. 1002 ¶¶ 139–140). Petitioner identifies three types of “signals” transmitted during Herle’s over-the-air (“OTA”) process, which Petitioner contends each satisfies the claimed “signal from the internet indicating that an update for an operating system . . . is available.” *Id.*

First, Herle discloses mobile station 111 receives a notification message via its cellular radio from upgrade server 300 over the Internet indicating a new software upgrade is available. Pet. 39. Second, when MS

111 contacts upgrade server 300, it receives a list of available upgrades or an upgrade notice. *Id.* Third, MS 111 receives a delta file—a compact representation of the differences between the current and updated software image. *Id.* Petitioner asserts each of these signals satisfies the claim because each “is received from the internet . . . and indicates that an update for the operating system is available.” *Id.* at 40.

Petitioner contends that Herle’s MS 111 stores and verifies the delta file, executes a program to convert the original image into the new image file using the delta file, and then reboots to execute the new image file. Pet. 40 (citing Ex. 1009, 8:34–48; Ex. 1002 ¶ 141). This satisfies the claimed “update process such that an updated operating system . . . is stored in the video processing apparatus after execution of the update process.” *Id.*

Petitioner contends it would have been obvious to implement Herle’s OTA upgrade process in the combination using the UMTS or GSM radios. Pet. 40 (citing Section VII.A; Ex. 1002 ¶ 132).

Regarding motivation, Petitioner notes Herle provides express motivation to combine: Herle teaches that OTA updates eliminate the need for users to “visit service centers.” Pet. 16 (citing Ex. 1009, 1:24–38). A skilled artisan would have recognized this benefit as applicable to the smartphones described in N93 and Dua. *Id.* (citing Ex. 1002 ¶ 81). Petitioner further notes Herle identifies the challenge that mobile devices possess fewer resources than a personal computer, and teaches an improved process using a “delta file” to minimize transmission and storage requirements. Pet. 16–17 (citing Ex. 1009, 1:46–2:11, 2:32–3:67).

Petitioner asserts the smartphones described in N93 and Dua are “precisely the type of cellular phone Herle teaches should be improved by its upgrade process,” and Dua already discloses the hardware components Herle

requires—including a CPU 109 (processor), memory 107 (flash memory), and radios. Pet. 17 (citing Ex. 1008, Fig. 1; Ex. 1002 ¶ 83). Moreover, N93 and Dua disclose the phones are already capable of responding to OTA inquiries regarding software version information, making Herle’s process a natural extension of existing functionality. *Id.* (citing Ex. 1010, 115; Ex. 1008 ¶ 141, Fig. 7; Ex. 1002 ¶¶ 82–83).

Patent Owner argues N93, Dua, and Herle fail to disclose or render obvious limitation 11, whether taken alone or in reasonable combination. PO Resp. 35–43 (citing Ex. 2017 ¶¶ 141–149, 275–282, 286).

Patent Owner breaks limitation 11 into three sub-elements: (i) the first or third radio communication circuit receives a signal from the Internet indicating an OS update is available; (ii) the video processing apparatus executes an update process; and (iii) the updated OS is stored after execution of the update process. PO Resp. 35.

Patent Owner argues N93 fails to disclose any of these three sub-elements. First, Patent Owner asserts N93 discloses application downloads using a “pull type system” through Nokia PC Suite, but fails to disclose operating system updates. PO Resp. 36 (citing Ex. 1010, 115; Ex. 2017 ¶ 278). Patent Owner explains that Nokia PC Suite is a tethered, desktop-based system where the user initiates downloads—not the device receiving a signal from the Internet. *Id.* at 36–37 (citing Ex. 2017 ¶ 278). Patent Owner further contends N93 discloses memory and security concerns with updates, and tethered updates using Nokia PC Suite offered a more reliable and secure path than OTA updates given the limitations of cellular networks at the time. *Id.* (citing Ex. 1010, 22, 72; Ex. 2017 ¶ 278). Thus, in Patent Owner’s view, N93 only discloses pulling updates for applications—not

“receiving a signal from the internet indicating that an update” is available—and does not address the operating system at all. *Id.*

Patent Owner adds “implementing OTA operating system updates on devices like the N93 was challenging and beyond ordinary skill during the time of the invention” because the N93 was “inherently unstable.” PO Resp. 37 (citing Ex. 2036, 1; Ex. 2017 ¶¶ 279–280). Patent Owner argues Petitioner’s expert failed to meaningfully evaluate the relative strengths and weaknesses of delta-based vs. non-delta based mechanisms as they would specifically apply to the Symbian-based N93. *Id.* (citing Ex. 2030, 63:21–64:1).

Patent Owner also notes that N93 “wholly lacks any mention of **operating system** updates” and, unlike applications, “the operating system is crucial” to device functionality—meaning a failed OS update could render the device inoperable. PO Resp. 37 (citing Ex. 2017 ¶ 282).

Patent Owner argues Dua “is completely silent regarding receiving any indication over the internet or updating the operating system,” and only discloses updating media capabilities, RFID tags, and data stored in a “device profile.” PO Resp. 38 (citing Ex. 2008 ¶¶ 143, 151, 154). Patent Owner further notes Dua teaches “[k]nown over-the-air techniques are generally insecure” and that Dua’s updates occur in a “secure” environment. *Id.* at 39 (citing Ex. 1008 ¶ 9; Ex. 2017 ¶ 283).

Patent Owner raises several arguments against the motivation to combine N93 and Dua with Herle. First, Patent Owner contends the Petition “fails to map the rationale towards actual claim elements, which are directed to updates to an operating system” rather than applications, and “there is no disclosure or any suggestion in N93 or Dua of **updating an operating system.**” PO Resp. 38. Patent Owner maintains N93 and Dua “in fact,

teach away from providing OTA updates to an operating system.” *Id.* (citing Ex. 1008 ¶ 9; Ex. 1010, 72).

Second, Patent Owner asserts Herle discusses a device “much less complex” than those in N93 and Dua; thus, “it is unclear why a [skilled artisan] would look to Herle to incorporate delta-based over-the-air updates for operating systems for two devices that do not support updates for operating systems.” PO Resp. 28–39 (citing Ex. 2017 ¶ 142).

Third, Patent Owner argues Herle’s OTA delta update system requires a complex, purpose-built infrastructure—including a specially designed upgrade server with specific software, an upgrade database, and an upgrade controller on the server side, plus a specially programmed upgrade control program and algorithm on the device side. PO Resp. 39–40 (citing Ex. 2017 ¶ 142). Patent Owner contends there would have been no motivation to overhaul the smartphone and related cellular infrastructure of N93 or Dua for OTA operating system updates because implementing such a system would require worldwide development and implementation. *Id.* at 40 (citing Ex. 2017 ¶ 143).

Fourth, Patent Owner argues N93’s proprietary Symbian operating system posed particular obstacles. “Symbian was not an open source operating system until after 2009”—it was “a proprietary operating system with a very complex file structure and features.” PO Resp. 40–41 (citing Ex. 2017 ¶ 144; Ex. 2011; Ex. 2012). Server-side resources and UMTS/GSM bandwidth limitations add further difficulty; Patent Owner asserts “significant computing resources would be needed on the devices of N93 and Dua” to implement delta updates. *Id.* at 41 (citing Ex. 2017 ¶ 146).

Fifth, Patent Owner relies on historical evidence. Patent Owner notes other specialized devices “also had delays in implementing OTA operating

system updates, even in light of delta-based update technology of Herle,” and Apple “did not support OTA operating system updates until the release of iOS 5.0 in 2011.” PO Resp. 41–42 (citing Ex. 2014; Ex. 2015; Ex. 2017 ¶ 148). Patent Owner argues this demonstrates the “state of the art of this time shows that updates to closed and proprietary operating systems were not supported at that time in view of memory constraints, network bandwidth concerns, and the desire of entities to limit access to their proprietary operating systems.” *Id.* at 42 (citing Ex. 2017 ¶ 149).

Sixth, Patent Owner concludes “a POSITA would not find implementing OTA updates to operating system of Herle into N93 or Dua to be a matter of routine skill.” PO Resp. 42 (citing Ex. 2017 ¶ 149). Patent Owner’s expert further opines that Herle’s system “would need to be designed from the start to comply with all of Herle’s requirements, which is not something that can be achieved retroactively in a proprietary and closed-ended device like N93 or Dua.” *Id.* at 43 (citing Ex. 2017 ¶ 149).

In its Reply, Petitioner first observes that Patent Owner “only argues it would not have been obvious to combine N93 and Dua with Herle” and does not dispute the combination, once made, teaches limitation 11. Pet. Reply 14. Thus, Patent Owner’s arguments are directed solely to motivation and reasonable expectation of success.

Petitioner argues that Patent Owner’s assertion that N93 uses a “pull type system” is “irrelevant” because the claimed signal can be received “in response to the user’s request.” Pet. Reply 14 (citing Ex. 1009, 7:19–36; Pet. 39–40). Petitioner further argues Patent Owner “presents a false choice between OTA and tethered updates,” noting “Herle teaches both should be used, again, making Herle a perfect match for N93.” *Id.* at 14–15 (citing Ex. 1009, 9:1–6).

Petitioner contends that N93’s memory and security concerns are actually “a perfect match for Herle,” which teaches cryptographic verification and “very small” delta files that minimize storage and bandwidth needs—exactly the features that address N93’s concerns about limited memory and security. Pet. Reply 14–15 (citing Ex. 1009, 2:3–29, 8:36–38, 8:52–54, 9:1–6; Ex. 1058 ¶ 38). The potential for failed OS updates and security issues “was a known risk that Herle addresses” through its cryptographic verification of delta files—making Herle complementary to, not inconsistent with, N93. *Id.* at 15 (citing Ex. 1009, 2:3–29).

Petitioner contends that Patent Owner’s individual attacks on N93 and Dua for not independently disclosing OS updates are misplaced in an obviousness analysis involving multiple references. Pet. Reply 15 (citing PO Resp. 38–39; Paper 11, 64–65).

Regarding Patent Owner’s infrastructure arguments, Petitioner asserts that whether a particular businessperson would have made the investment required to commercially deploy the OTA system does not matter to the obviousness analysis. Pet. Reply 15 (citing *Orthopedic Equip. Co. v. United States*, 702 F.2d 1005, 1013 (Fed. Cir. 1983)). Nevertheless, Petitioner notes that Nokia itself already had update servers. *Id.* (citing Ex. 1063).

On Symbian, Petitioner responds by asserting “PO’s attack on Symbian improperly shifts the focus to the product as opposed to the publication” and “it was known that Symbian could be updated over the air.” Pet. Reply 16 (citing Ex. 1064 ¶¶ 1, 42; Ex. 1058 ¶ 35).

Petitioner asserts that Patent Owner and its expert’s speculation about network bandwidth limitations “is not credible” given that the same cellular networks could stream video and “Herle teaches ‘very small’ delta update files for this very reason.” Pet. Reply 16 (citing Pet. 15–17). Petitioner

states Patent Owner “ignores Herle’s explicit teaching that its ‘very small’ delta file updates are design for devices with ‘far fewer resources available than a PC.’” *Id.* (citing Ex. 1009, 1:61–2:2, 8:36–38). Petitioner further contends Patent Owner and its expert “lack credibility by simultaneously asserting the Herle devices are ‘less complex’ and that N93 and Dua could not handle Herle’s ‘very small’ updates.” *Id.* (citing PO Resp. 39).

Petitioner states that Patent Owner’s only arguments relate to the same Symbian discussion above (which is updatable OTA) and memory/bandwidth/security (all addressed by Herle), noting that Patent Owner’s cited evidence (Ex. 2014; Ex. 2015) “just shows implementation, not ‘delay.’” Pet. Reply 16–17. Moreover, commercial launch timing is legally irrelevant to a prior art-based obviousness analysis. *Id.*

Finally, Petitioner argues that Patent Owner’s assertion that a skilled artisan “lacked the skill” to implement OTA updates “improperly focuses on bodily incorporation” of Herle’s upgrade process into completed N93 or Dua products, rather than the knowledge and capabilities of a skilled artisan. Pet. Reply 17 (citing PO Resp. 42–43). Petitioner notes the ’590 patent’s specification merely states the program of the OS is downloaded via the Internet, and the program is updated, without any explanation of how to perform the update or any of PO’s alleged concerns (security, memory, etc.). *Id.* (citing Ex. 1004, 6:54–58, 11:48–51; Ex. 1058 ¶ 36). Petitioner concludes “OTA updates of an OS is clearly a known solution in the prior art, as demonstrated by Herle and Skan (including Symbian).” *Id.*

In its Sur-reply, Patent Owner counters that Petitioner fails to rebut its evidence demonstrating a lack of motivation and reasonable expectation of success. PO Sur-reply 15. Patent Owner contends that Petitioner

“overstate[s] the problem-solving ability of Herle in relation to specialized devices such as N93.” *Id.* at 15–16.

Patent Owner contends “[t]he fact that there was difficulty in implementing over-the-air updates reflects the technical issues, disadvantages, and the like made incorporating Herle’s over-the-air updates with specialized devices based on Petitioners’ mapping of N93 and Dua was non-obvious.” PO Sur-reply 16. Patent Owner asserts that this evidence “is un rebutted by Petitioners.” *Id.*

Patent Owner further maintains Petitioner “fail[s] to rebut that N93 repeatedly teaches against modification,” citing N93’s warnings that unauthorized modifications can void the warranty and damage the device. PO Sur-reply 16 (citing Ex. 1010, 7, 9, 125; Ex. 2017 ¶¶ 110, 125). And regarding Petitioner’s characterization of Patent Owner’s arguments as seeking “bodily incorporation,” Patent Owner responds that its arguments “address whether there was adequate motivation to combine or a reasonable expectation of success in light of the art at the time.” *Id.*

Lastly, Patent Owner reiterates Dua is silent on operating system updates and Dua teaches OTA is insecure, and that the state of the art evidence shows OTA OS updates for the claimed devices were non-obvious. PO Sur-reply 25.

After weighing the evidence and considering both parties’ arguments, we find Petitioner’s positions regarding limitation 11 persuasive.

As an initial matter, there is no dispute the combination of N93, Dua, and Herle teaches the elements of limitation 11, if properly combined. Patent Owner’s challenge is directed exclusively to whether it would have been obvious to combine these references—not to whether the combination, once made, satisfies the claim.

Turning to the combination's teachings, we find Herle discloses an OTA update process in which MS 111 receives notification of available software upgrades from upgrade server 300, downloads a delta file representing the differences between the current and updated software, executes a program to apply the delta file and generate the updated software image, and stores the updated image. Ex. 1009, Figs. 1–4, 1:14–3:30, 6:9–7:18, 7:25–8:48; Ex. 1002 ¶¶ 139–140. The three types of signals identified in Herle's process—messages related to the upgrade notification, the upgrade list or notice, and the delta file itself—each satisfy the claimed “signal from the internet indicating that an update for an operating system . . . is available.” Pet. 39–40; Ex. 1009, 7:25–8:33, Figs. 1, 3, 4; Ex. 1002 ¶¶ 139–140. We further find Herle's update process, including the storage of the updated operating system after execution, satisfies the remaining elements of limitation 11. Pet. 40; Ex. 1009, 8:14–48; Ex. 1002 ¶¶ 139–140.

Regarding motivation to combine, we find that Petitioner has demonstrated sufficient motivation to combine N93 and/or Dua with Herle, along with a reasonable expectation of success. Ex. 1002 ¶¶ 80–83. Both N93 and Dua disclose smartphones running operating systems and applications, and both disclose software on such devices can be updated. Pet. 38–39; Ex. 1010, 2, 72, 98; Ex. 1008 ¶¶ 58, 60, 141, 143. These are precisely the type of devices that Herle identifies as beneficiaries of its OTA update process. Ex. 1009, 1:24–2:11, 2:32–3:67; Ex. 1002 ¶ 81.

We have considered Patent Owner's contrary arguments but find that they do not outweigh the evidence supporting obviousness.

First, Patent Owner's arguments that N93 and Dua individually fail to disclose OS updates are unpersuasive because that is precisely the gap Herle fills. The entire purpose of relying on Herle in the combination is to supply

the OTA update functionality that N93 and Dua lack. Patent Owner’s contention that N93 uses a pull type system through Nokia PC Suite does not undermine the combination because Herle itself teaches that the update process can be initiated in response to a user request. Ex. 1009, 7:19–36. Moreover, Nokia PC Suite’s tethered approach makes Herle’s wireless alternative all the more complementary—making Herle complementary to—not inconsistent with—N93’s existing update capabilities.

Second, we do not find the references teach away from the combination. Patent Owner’s reliance on N93’s memory and security concerns and Dua’s statement that OTA techniques are generally insecure reflect general caution about security—caution Herle directly addresses through cryptographic verification of delta files. Ex. 1009, 1:61–2:28, 2:57–3:4; Ex. 1058 ¶ 36. These warnings identify a problem that Herle solves rather than discouraging a skilled artisan from pursuing the combination. Additionally, Herle’s use of “very small” delta files directly addresses N93’s memory constraints.

Third, we are unpersuaded by Patent Owner’s arguments that implementing Herle’s process in N93 or Dua would have been beyond ordinary skill. Many of Patent Owner’s arguments—server infrastructure costs, worldwide deployment challenges, Symbian’s proprietary nature—relate to the practical challenges of modifying the N93 or Dua products—not to the teachings of the prior art publications. The fact that the motivating benefit comes at the expense of a disadvantage is not sufficient to undermine Petitioner’s posited motivation to combine. We agree with Petitioner that there is an inconsistency with Patent Owner and its expert simultaneously asserting Herle’s target devices are “less complex” than N93 and Dua while

arguing N93 and Dua cannot handle Herle’s “very small” updates. *See* Pet. Reply 16.

Fourth, the timing of commercial deployment of OTA updates by Apple or others does not matter to the obviousness analysis because it conflates market decisions with technical capability. *See Orthopedic Equip.*, 702 F.2d at 1013. Record evidence demonstrates Symbian—the very operating system running on the N93—could be updated over the air. Ex. 1064 ¶¶ 1, 42. Patent Owner’s warranty-voiding warnings in N93 (Ex. 1010, 7, 9, 125) speak to consumer-facing disclaimers, not technical incapability, and do not constitute teaching away from the combination.

Fifth, we find it significant that the ’590 patent’s specification merely states that the program of the OS is downloaded via the Internet, and the program is updated, without any explanation of how to perform the update or any of PO’s alleged concerns (security, memory, etc.). Pet. Reply 17 (citing Ex. 1004, 6:54–58, 11:48–51). The specification’s silence on the very challenges Patent Owner raises undermines the contention that the claimed subject matter was beyond ordinary skill.

Regarding reasonable expectation of success, we find Dua already discloses the hardware components Herle requires for its update process—including radios, a processor, and memory—and both N93 and Dua already disclose the capability to respond to OTA inquiries regarding software version information. Ex. 1058 ¶¶ 35–36. Herle was specifically designed for mobile devices with far fewer resources than a PC and limited flash memory, providing a skilled artisan with reasonable confidence the process could be implemented in the smartphones described in N93 and Dua. *Id.*

For the foregoing reasons, we find a preponderance of the evidence supports Petitioner's contentions in Grounds 1–5 that the combination of N93, Dua, and Herle discloses or suggests limitation 11.

13. Conclusion

Based on the complete record, we find more persuasive Petitioner's evidence demonstrating that claim 1 is unpatentable under 35 U.S.C. § 103 as obvious over the combined teachings of: (1) Dua, and Herle (Ground 3); (2) N93, Dua, and Herle (Grounds 1 and 4); and (3) Dua, Herle, N93, Rooyen, Desai, BT-Spec, and Kao (Grounds 2 and 5).

F. Claim 5

Independent claims 1 and 5 recite substantially the same subject matter, except limitation 5d adds “*a compression circuit capable of implementing a plurality of compression schemes including a first compression scheme, the compression circuit compressing the video information received by the first communication circuit using the first compression scheme,*” limitation 5e adds “*a display capable of displaying the information received by the first radio communication circuit or the second radio communication circuit,*” and limitation 5g recites the controller assigning a connection to the first radio communication circuit “*for receiving the video information or transmitting the information by radio.*” See Ex. 1004, 1:23–2:64 (emphasis added). As a result, Petitioner relies on the same contentions provided for claim 1 to support the unpatentability of claim 5, except for limitations 5d and 5e for which Petitioner provides additional evidence from N93 and Dua to show that those limitations are also disclosed by the prior art. Pet. 42–45.

Correspondingly, Patent Owner argues that Petitioner failed to establish claim 5 is unpatentable “for at least the same reasons asserted above in relation to claim 1.” PO Resp. 44. Patent Owner additionally disputes the sufficiency of Petitioner’s evidence to show N93 and/or Dua discloses limitations 5d and 5g. *Id.* at 44–46. We address each of Patent Owner’s arguments in turn below.

1. Limitation 5d

Limitation 5d recites: “*a compression circuit capable of implementing a plurality of compression schemes including a first compression scheme, the compression circuit compressing the video information received by the first radio communication circuit using the first compression scheme.*”

Unlike claim 1’s limitation 1e—which addresses compressing locally captured video from the imaging circuit—limitation 5d requires compressing video received by the first radio communication circuit (i.e., Bluetooth as applied here). Because claim 5 is directed to a “display apparatus” that receives video from the video processing apparatus, the dispute centers on whether the prior art discloses or suggests compressing video after it has been received over Bluetooth.

Petitioner contends the combination discloses or renders obvious a compression circuit capable of implementing a plurality of compression schemes, including MPEG and JPEG, and that the compression circuit compresses video received by the first radio (Bluetooth) using MPEG compression. Pet. 42–43; Ex. 1002 ¶¶ 148–152.

N93. N93 imposes no size or format requirement on videos received via Bluetooth, but requires a maximum file size of 300KB in .3gp-QCIF format for sharing video via MMS over the UMTS radio. Pet. 42 (citing Ex. 1010, 25, 61–62). A skilled artisan would therefore understand that a video

received via Bluetooth in one format would need to be converted to .3gp-QCIF—a format that includes MPEG compression—for video sharing over UMTS. *Id.* at 42–43 (citing Ex. 1002 ¶ 150).

Dua. Dua teaches that the compression circuit (Video CODEC 107 in Figure 1) converts files received via radio (e.g., Bluetooth) into a compression format supported by the target device or for storage. Pet. 43 (citing Ex. 1008 ¶¶ 58, 142–143, 172, 198, 205; Ex. 1002 ¶ 151). This includes converting video into MPEG or JPEG formats using the MPEG/JPEG codec. Ex. 1008 ¶¶ 58, 142, Fig. 7.

Patent Owner raises three arguments against Petitioner’s showing on limitation 5d. PO Resp. 44–45. First, Patent Owner argues that conversion is not compression, and Petitioner only provides evidence of conversion. PO Resp. 44. Patent Owner’s expert explains that “[w]hile compression requires conversion, conversion does not require compression. In fact, conversion could result in a new file that requires more bandwidth than the original file.” Ex. 2017 ¶ 309. Furthermore, Petitioner “fail[s] to provide any evidence that compression would occur for a video received via Bluetooth.” PO Resp. 44.

Second, Patent Owner argues that N93’s conversion addresses transmitting, not receiving. The N93 disclosure that a video “might need to be converted **prior** to sharing” (Pet. 62) is directed to transmitting video and there is no description of converting a video that has been received via Bluetooth. PO Resp. 44–45; Ex. 2017 ¶ 308. If the video was already converted prior to being received by the N93 device, “it is unclear why the N93 would need to convert the video again once the video was received by the N93 device.” PO Resp. 45.

Third, Patent Owner argues that Dua teaches against post-receipt conversion. Dua “explicitly teaches against converting video filed received” because Dua’s compatibility exchange ensures that devices communicate only media assets in supported formats. PO Resp. 45 (citing Ex. 1008 ¶¶ 142–143; Ex. 2017 ¶ 310). Additionally, Dua states conversion occurs before transmission, negating a necessity to convert after receipt. *Id.*

In its Reply, Petitioner contends that Dua discloses the video can be received by radio and converted into a format supported by the target device. Pet. Reply 18 (citing Ex. 1008 ¶¶ 168 (Internet movie source and television target), 172 (conversion before transmission to target), 197–198 (convert incoming into format for target), 205 (same)). Dua’s conversion can occur between any formats, including formats that constitute compression—for example, from MPEG2 to MPEG4. *Id.* (citing Ex. 1008, Fig. 7). Petitioner asserts that Patent Owner’s expert admitted during his deposition that converting from MPEG2 to MPEG4 would result in smaller file size. *Id.* (citing Ex. 1057, 33:15–34:14). Furthermore, according to Petitioner, “N93 is the same” and discloses that a received file over Bluetooth could be in any format but would have to be compressed to 300KB in .3gp-QCIF format for video sharing over UMTS. *Id.* (citing Pet. 42).

In its Sur-reply, Patent Owner asserts that Petitioner merely restate the arguments made in the Petition and fail to meaningfully rebut Patent Owner’s response. PO Sur-reply 17. The addition of its expert’s deposition testimony “merely discusses compression techniques” and “fail[s] to cure the deficiencies highlighted” by Patent Owner. *Id.*

Weighing the evidence and considering both parties’ arguments, we find a preponderance of the evidence supports Petitioner’s contentions that N93 and Dua discloses or suggests limitation 5d.

As an initial matter, there is no dispute that N93 and Dua each disclose a compression circuit capable of implementing a plurality of compression schemes, including MPEG and JPEG. The sole dispute is whether the prior art discloses or suggests compressing video after it has been received by the first radio (Bluetooth).

We find that Petitioner has the better position. The claim does not specify when or why the compression occurs—only that video received by the first radio is compressed using the first compression scheme. The specific conversion at issue here—from an arbitrary format to a 300KB .3gp-QCIF/MPEG format—necessarily results in compression, because the .3gp-QCIF format imposes both a file-size ceiling (300KB) and a compression standard (MPEG). This is not mere “conversion” in the abstract; it is conversion that, by definition, compresses.

Patent Owner’s argument that “conversion does not require compression” (PO Resp. 44) is correct as a general proposition but does not account for the specific conversion the Petition identifies. Patent Owner’s expert concedes that converting from MPEG2 to MPEG4 would result in smaller file size (Ex. 1057, 33:15–34:14) confirming that conversion between these formats, such as MPEG2 to MPEG4, constitutes compression. This concession directly undermines Patent Owner’s categorical distinction between conversion and compression.

Patent Owner’s “teaching against” argument regarding Dua’s compatibility exchange is unpersuasive. Dua expressly discloses the capability to convert received media files into supported formats. Ex. 1008 ¶¶ 197–198, 205. That Dua also discloses a mechanism to avoid the need for conversion in some scenarios does not negate Dua’s disclosure that conversion—including compression—is available in scenarios in which

conversion is needed; otherwise, there would be no reason for Dua to disclose the capability at all.

Finally, we are not persuaded by Patent Owner’s argument that the claim requires compression to occur at a specific point in a transmission sequence. It requires only that the compression circuit compresses video information received by the first radio using the first compression scheme. Both N93 and Dua disclose scenarios in which video received over Bluetooth is converted into a format that necessarily involves compression, satisfying this limitation.

For the foregoing reasons, we find a preponderance of the evidence supports Petitioner's contentions in Grounds 1–5 that N93 and Dua, individually and in combination, disclose or suggest limitation 5d.

2. Limitation 5h

Limitation 5h recites: “wherein the controller controls each of the first and second radio communication circuits so that the first radio communication circuit receives video information and the second radio communication circuit connects to the internet or the home network simultaneously.”

Limitation 5h closely parallels claim 1’s limitation 1k but with one critical difference: whereas limitation 1k requires the first radio communication circuit to *transmit* video information simultaneously with the second radio connecting to the internet, limitation 5h requires the first radio communication circuit to *receive* video information simultaneously. This directional distinction—receiving rather than transmitting—frames the parties’ dispute.

Petitioner contends that the combination discloses or renders obvious limitation 5h, cross-referencing the evidence and arguments presented for

limitation 1k. Pet. 45 (“See 1[k] (receives video via Bluetooth and connects to internet via UMTS simultaneously).”). As discussed in for limitation 1k, Petitioner identifies N93’s disclosure of simultaneous Bluetooth and UMTS operation through its modem functionality. *Id.* at 36; Ex. 1010, 18, 24, 83–84, 86; Ex. 1002 ¶ 133. Petitioner also relies on Dua’s explicit and repeated teachings of simultaneous Bluetooth video transfer and UMTS Internet connectivity. Pet. 36–38; Ex. 1008, Figs. 8A–8B, 10–11, 16–17, ¶¶ 14, 63, 155–189, 192, 223–224; Ex. 1002 ¶ 1002.

As to Dua, Petitioner notes the “player 100A receiving video via Bluetooth and transmitting the video via UMTS to internet 730,” as depicted in Dua’s Figure 10. Pet. 37 (citing Ex. 1008 ¶¶ 191–200, Fig. 10). To the extent limitation 5h requires the display apparatus to receive rather than transmit video via Bluetooth, Petitioner contends the Petition’s limitation 1k analysis ‘explicitly discusses receipt of video over Bluetooth for the combination based on many disclosures in Dua, which PO does not address.’ Pet. Reply 18 (citing Pet. 36–37). Petitioner cites Dua’s disclosure that a media player can receive video from a video camera via Bluetooth, display video received from local devices over short-range radios, and receive Internet content via cellular radios. *See* Pet. 36–37.

Patent Owner responds that limitation 5h is non-obvious for the same reasons argued for limitation 1k. PO Resp. 45. Patent Owner further argues limitation 5h presents an additional obstacle that Petitioner fails to address. *Id.* at 45–46.

Patent Owner contends that limitation 5h “specifically recites that ‘the first radio communication circuit receives video information,’ which is different from limitation [1k] (where the first radio communication circuit transmits video information).” PO Resp. 46 (citing Ex. 2017 ¶ 314).

According to Patent Owner, “[t]hese differences are not appropriately addressed by Petitioners” because Petitioner does “not establish that its proposed examples would work for both transmitting and receiving video information via Bluetooth.” *Id.*

Patent Owner targets Petitioner’s N93 modem example, arguing that Petitioner “provide[s] no explanation of how using N93 as a modem would allow for the N93 device to **receive** video information from the PC via Bluetooth.” PO Resp. 46 (citing Ex. 2017 ¶ 315). Patent Owner asserts: “The use of the N93 modem is directed to flow of information using the N93 device as a pass-through device towards the PC and does not explain how video information would be transmitted over Bluetooth to the N93 device.” *Id.*

Petitioner replies that Patent Owner’s argument fails to address the breadth of the evidence. The incorporated limitation 1k analysis “explicitly discusses receipt of video over Bluetooth for the combination based on many disclosures in Dua.” Pet. Reply 18. As to N93 specifically, “since the Bluetooth link is how the PC connects to the Internet through the N93, this would be a bi-directional connection for all data, including video transfers.” *Id.* (citing Pet. 10, 12, 36). The Petition’s limitation 1k analysis also incorporated limitation 1a, “which discloses receipt of video over Bluetooth for N93.” *Id.*; *see also* Pet. 18–20; Ex. 1010, 23–26, 31–33, 83–87; Ex. 1002 ¶¶ 85–87.

In its Sur-reply, Patent Owner argues that Petitioner’s bidirectionality assertion is “conclusory” and insufficient. PO Sur-reply 17. Patent Owner argues: “Merely stating Bluetooth can be used to receive video fails to establish that a reference discloses or renders obvious receiving video via

Bluetooth while a second radio communication circuit connects to the internet or the home network simultaneously.” *Id.*

Weighing the evidence and the parties’ arguments, we find Petitioner’s positions regarding limitation 5h persuasive.

As an initial matter, limitation 5h shares the “simultaneously” requirement of limitation 1k, and Patent Owner incorporates its limitation 1k arguments by reference. PO Resp. 45. For the reasons discussed in our analysis of limitation 1k, we find that the combination satisfies the simultaneous operation requirement. The only additional issue raised here is whether the evidence sufficiently addresses receiving—rather than transmitting—video via the first radio communication circuit while the second radio simultaneously connects to the internet.

We find that it does, for several independent reasons. First, Dua expressly discloses a media player receiving video from a video camera via Bluetooth while simultaneously connected to the internet via UMTS. Ex. 1008, Figs. 10–11, ¶¶ 191–208. Dua’s Figure 10 depicts player 100A receiving video via Bluetooth from a video camera while UMTS maintains an Internet connection—precisely the configuration limitation 5h requires. Pet. 36–37; Ex. 1002 ¶ 134. Patent Owner does not substantively dispute these Dua teachings in its limitation 5h arguments. See PO Resp. 45–46 (focusing exclusively on N93’s modem example).

Second, as to N93, we find Petitioner’s bidirectionality argument persuasive. N93 discloses using Bluetooth as a modem connection to enable a PC to access the Internet through the N93’s UMTS radio. Ex. 1010, 83; Pet. 36. A Bluetooth modem connection is inherently bidirectional—data must flow in both directions for the PC to send requests and receive Internet content. Pet. Reply 18. A skilled artisan would have understood that this

same Bluetooth link could carry video data in the receiving direction (from PC to N93) simultaneously with the UMTS Internet connection. Ex. 1002 ¶ 132. Moreover, N93 separately discloses receiving video clips over Bluetooth and storing them for playback. Ex. 1010, 31, 84–87; Pet. 18–20.

Patent Owner’s Sur-reply characterizes Petitioner’s bidirectionality assertion as “conclusory.” PO Sur-reply 17. We disagree. The bidirectional nature of a Bluetooth modem connection is not a conclusory assertion but a technical reality—a modem connection necessarily transmits data in both directions. Patent Owner offers no technical basis for concluding that a Bluetooth modem connection capable of carrying Internet traffic in both directions could not also carry video data.

We find no meaningful distinction between the “transmitting” and “receiving” directions for purposes of this limitation. Both N93 and Dua disclose Bluetooth as a radio capable of transmitting and receiving video, and Dua’s Figure 10 expressly depicts the receiving configuration at issue here. The same evidence and analysis discussed for limitation 1k supports the addition of simultaneous UMTS Internet connectivity.

For the foregoing reasons, we find that a preponderance of the evidence supports Petitioner’s contentions in Grounds 1–5 that Dua and N93, individually and combined, disclose or suggest limitation 5h.

3. Conclusion

Having now considered the evidence and arguments of the parties directed to independent claim 5 under each of the asserted grounds. We find a preponderance of the evidence demonstrates that claim 5 is unpatentable under 35 U.S.C. § 103 as obvious over the combined teachings of: (1) Dua, and Herle (Ground 3); (2) N93, Dua, and Herle (Grounds 1 and 4); and (3) Dua, Herle, N93, Rooyen, Desai, BT-Spec, and Kao (Grounds 2 and 5).

G. *Claim 11*

Claim 11 depends from claim 1 and recites: “*further comprising a fourth radio communication circuit capable of transmitting information and using a fourth transmission frequency band that is different from the first, second, and third transmission frequency bands, wherein the controller controls assignment of connection of each of the first, second, third, and fourth radio communication circuits.*”

Claim 11 thus adds two requirements beyond claim 1: (1) a fourth radio communication circuit operating on a different frequency band, and (2) the controller controls assignment of connection for all four radio communication circuits. Petitioner offers two mappings for the fourth radio—NFC and GSM—and Patent Owner disputes both.

Petitioner contends the combination discloses or renders obvious a fourth radio communication circuit capable of transmitting information on a fourth frequency band different from the first three bands, with the controller controlling assignment of connection for all four circuits. Pet. 47–48; Ex. 1002 ¶¶ 185–188.

“For Mappings A and B/NFC,” Petitioner contends that “Dua discloses the cellular phone includes an NFC radio (transceiver 113).” Pet. 48 (citing Ex. 1008, Fig. 1, ¶¶ 70–74). The NFC radio transmits on the 13.56 MHz frequency band, differing from the Bluetooth, UMTS, and Wi-Fi/GSM bands identified for limitations [1a]–[1c]. *Id.* (citing Ex. 1008 ¶¶ 52–55; Pet. Sections VII.B.2–4). The NFC radio transmits several types of information, including interrogation signals, electronic payments, and secure key access. *Id.* (citing Ex. 1008 ¶¶ 70–71, 129). “The CPU 109 controls assignment of all the radios, including the NFC radio.” *Id.* (citing Pet. Section VII.B.9 (limitation 1h); Ex. 1002 ¶ 186). Petitioner further

contends that it would have been obvious to a person of ordinary skill to implement Dua's NFC radio in the combination. *Id.* (citing Pet. Section VII.A).

For Mapping B/GSM, Petitioner contends N93 and Dua each disclose that the cellular phone includes a GSM radio transmitting information on a frequency band different from the other three bands. Pet. 48 (citing Pet. Sections VII.B.2–4). “The CPU 109 controls assignment of all radios, including the GSM radio.” *Id.* (citing Pet. Section VII.B.9 (limitation 1h); Ex. 1002 ¶ 188).

Patent Owner first argues that claim 11 depends from claim 1 and is thus non-obvious for at least the same reasons. PO Resp. 47.

Additionally, Patent Owner disputes Petitioner's NFC and GSM mappings for claim 11. PO Resp. 47–48.

First, Patent Owner contends that the specific capability combinations in one mobile device during the relevant timeframe were non-obvious according to Petitioner's mappings: Bluetooth + UMTS + GSM + NFC (Mapping A), or Bluetooth + UMTS + Wi-Fi + NFC (Mapping B). PO Resp. 47 (citing Ex. 2017 ¶ 327). Patent Owner argues that Dua does not disclose or render obvious a device with all these capabilities. According to Patent Owner, Dua was drafted broadly to cover potential combinations and future technologies but does not enable a device with the specific technology combination Petitioner alleges. *Id.* at 48 (citing Ex. 2017 ¶ 328). In support, Patent Owner cites the development history of mobile devices, asserting that Samsung did not release a product with four radio communication circuits including NFC support until 2011. *Id.* Patent Owner further argues that any mobile device including NFC capability lacked the other specific capabilities Petitioner alleges, such as Wi-Fi or UMTS network connections. *Id.*

Patent Owner also argues that the N93-Dua-Herle combination fails to disclose or render obvious that a controller controls assignment of all four circuits, for the reasons argued regarding limitation 1h. PO Resp. 48 (citing Ex. 2017 ¶ 329).

Second, Patent Owner contends that the specific combination of capabilities in one mobile device was non-obvious under Mapping B: Bluetooth + UMTS + Wi-Fi + GSM. PO Resp. 48 (citing Ex. 2017 ¶ 330). Patent Owner further argues that the N93-Dua-Herle combination fails to disclose or render obvious that a controller controls assignment of all four circuits for the same reasons argued for limitation 1h. *Id.* (citing Ex. 2017 ¶ 330).

In its Reply, Petitioner responds that Dua explicitly discloses a cellular phone with each radio controlled by the CPU. Pet. Reply 19 (citing Pet. 47–48).

Regarding NFC, Petitioner notes that Dua describes NFC radios as standard. Pet. Reply 19 (citing Ex. 1008 ¶¶ 53–54). Petitioner contends that Patent Owner's, and its expert's, only support for their non-enablement argument is that Petitioner did not commercially launch a four-radio cellphone with NFC until 2011. *Id.* (citing PO Resp. 47–48; Ex. 2017 ¶¶ 327–328). Petitioner asserts that this is not a legally cognizable basis to argue lack of enablement. *Id.*

Petitioner further argues that the testimony of Patent Owner's expert lacks credibility and is conclusory because the '590 patent and cited references describe standard multi-radio devices and rely on an ordinarily skilled artisan's knowledge to implement them. Pet. Reply 19 (citing Ex. 1057, 22:11–17; Ex. 1004; Ex. 1006, 436, 440–441; Ex. 1058 ¶ 20).

In its Sur-reply, Patent Owner responds that its evidence showing the absence of any device with Petitioner's alleged combination of NFC and other radio communication circuits establishes the state of the art during the relevant period and addresses whether an ordinarily skilled artisan would have had a reasonable expectation of success or motivation to combine in light of various tradeoffs. PO Sur-reply 17.

Patent Owner argues that the '590 Patent supports its expert's testimony regarding multiple radios. PO Sur-reply 17–18 (citing Ex. 1004, Figs. 4–6, 13:37–14:9). Patent Owner contends that Petitioner's mapping requires combining Bluetooth, GSM, UMTS, Wi-Fi, and NFC technologies with other claimed features, creating a “hodge podge device” based on disparate teachings across multiple references. *Id.* at 18 (citing Pet. 8–9). Regarding the disclosure of this subject matter in the '590 patent, Patent Owner further argues that Petitioner ignores the diagrams, descriptions, and action types detailing radio-controller implementation pervading the '590 patent. *Id.* (citing Ex. 1004, Figs. 4–6, 13:37–14:9).

Weighing the evidence and considering both parties' arguments, we find that Petitioner establishes by a preponderance of the evidence that claim 11 is unpatentable.

Initially, the parties do not dispute Dua discloses an NFC radio operating at 13.56 MHz and a GSM radio operating at 900/1800/1900 MHz, and that these frequency bands differ from the Bluetooth, UMTS, and Wi-Fi/GSM bands identified for limitations 1a–1c. The dispute centers on whether an ordinarily skilled artisan would have been motivated to combine these radios into a single device with a controller managing all four circuits, and whether there was a reasonable expectation of success.

Regarding the NFC mapping, Patent Owner principally argues no commercial device combined four radios including NFC until 2011. This argument is not persuasive for two reasons. First, a commercial product launch date is not dispositive of whether a claimed combination would have been obvious. *See Orthopedic Equip.*, 702 F.2d at 1013. Second, Dua itself suggests a cellular phone with Bluetooth, UMTS, Wi-Fi, GSM, and NFC radios, describing NFC as a standard radio technology. Ex. 1008 ¶¶ 52–55, 70–74; Ex. 1002 ¶ 186. Patent Owner does not identify any technical barrier to combining NFC with the other radios; rather, Patent Owner’s argument rests entirely on commercial timing in which a commercial embodiment was introduced.

Regarding Patent Owner’s enablement argument, the ’590 patent claims a device with four radio communication circuits without disclosing practical implementation details for integrating them. Ex. 1004, *passim*. In fact, Patent Owner the cited portions of the ’590 patent specification represented during reexamination as providing written description support for the subject matter of claim 11 lacks the kind of details Patent Owner now criticizes Petitioner for not providing. Ex. 1006, 131 (citing Ex. 1004, 8:62–9:35, 12:51–13:26, 13:31–14:9, Figs. 4, 8, 9, 10). Patent Owner cannot credibly argue four radios in Petitioner’s mapping create an impractical combination when the patent-in-suit claims a four-radio device without addressing any of the same alleged concerns. *See Motorola*, 121 F.3d at 1471; *ThermoLife*, 796 F.App’x at 733. Patent Owner’s argument that the ’590 patent’s diagrams and descriptions provide implementation details for radio-controller interaction does not alter this analysis. The patent describes functional relationships between radios and a controller at a similar level of

abstraction to Dua. Neither Dua nor the '590 patent provides the granular implementation details Patent Owner demands from the prior art.

Regarding the GSM mapping, Patent Owner offers no arguments beyond those addressed in limitation 1h, which we found satisfied for the reasons stated above.

Regarding the controller controlling assignment of connection of all four circuits, Patent Owner's arguments rely entirely on its limitation 1h position, which we addressed and found unpersuasive. Patent Owner raises no additional arguments regarding controlling a fourth radio.

For the foregoing reasons, we find the evidence to more persuasively support Petitioner's contentions that N93 and Dua each disclose or suggest the additional limitations of claim 11 under each instituted ground.

H. Claim 16

Claim 16 depends from claim 1 and recites: "*wherein one of the first, second, and third radio communication circuits receives a signal from the Internet indicating that an update to an application of the video processing apparatus is available, and the video processing apparatus executes an application update process such that the updated application of the video processing apparatus is stored in the video processing apparatus after execution of the application update process.*"

As Patent Owner observes, claim 16 recites an application update rather than the operating system update recited in limitation 11.

PO Resp. 50. The Petition relies on the same combination of references — N93, Dua, and Herle—and expressly cross-references its analysis for limitation 11. Pet. 49 (citing Ex. 1002 ¶ 193). Petitioner contends that Herle teaches software updates for applications and cross-references its analysis

for limitation 11. *Id.* Patent Owner raises arguments specific to claim 16 beyond its claim 1 challenge. PO Resp. 49–51.

Regarding N93, Patent Owner contends “N93 only discloses ‘install[ing] a file that contains an update or repair to an existing application’ using the Nokia Application Installer on a PC.” PO Resp. 50 (citing Ex. 2017 ¶ 343; Ex. 1010, 115). Patent Owner identifies two deficiencies. First, “N93 only discloses pulling a file with an update to an application rather than receiving a signal from the internet indicating an update is available.” *Id.* Second, another device executes the installation—“You can use Nokia Application Installer in Nokia PC Suite to install an application to your device”—rather than the N93 device executing the application update process. *Id.* (citing Ex. 2017 ¶ 343; Ex. 1010, 115).

As for Dua, Patent Owner contends that Petitioner only asserts Dua discusses that “devices may be ‘updated’ with new [media processing] capabilities.” PO Resp. 50 (citing Pet. 15–16). Patent Owner argues that Dua is silent regarding receiving any indication over the internet about an application update. *Id.* (citing Ex. 1008 ¶¶ 143, 151, 154; Ex. 2017 ¶ 344). Dua also fails to disclose any details about the application update process, such as whether the updated application is stored in the video processing apparatus after execution or whether the multimedia player executes the application update process. PO Resp. 50–51 (citing Ex. 2017 ¶ 344; Ex. 1008 ¶¶ 143, 151, 154). Patent Owner’s expert further states that Dua does not disclose the media device executing an update process rather than using another device to flash it. *Id.* at 51 (citing Ex. 2017 ¶ 344; Ex. 1008 ¶¶ 143, 151, 154).

Finally, Patent Owner asserts that combining N93, Dua, and Herle to implement application updates would have been non-obvious because

implementing updates in complex devices is difficult. PO Resp. 51 (citing Ex. 2017 ¶ 345).

Weighing the evidence and considering both parties' arguments, we find Petitioner has established by a preponderance of the evidence that the combination of N93, Dua, and Herle discloses or renders obvious claim 16.

As an initial matter, claim 16's application-update requirement structurally parallels limitation 11's operating-system-update requirement. The only distinction is the type of software being updated. Both require: (1) receiving a signal from the internet indicating an update is available, (2) executing an update process, and (3) storing the updated software after execution. For the reasons discussed in our analysis of limitation 11, we find the combination of N93, Dua, and Herle satisfies each of these elements.

We address Patent Owner's arguments specific to claim 16 in turn.

Patent Owner's contention that N93 only discloses a pull-type application update using the Nokia Application Installer does not undermine the obviousness of the combination. Herle — not N93 — provides the OTA update mechanism. Herle discloses that in response to a triggering event, such as receipt of a notification message from an upgrade server, the mobile station establishes a communication link and receives an update in the form of a delta file. Ex. 1009, 7:22–49. This satisfies the requirement of receiving a signal from the internet indicating an update is available. Herle's process executes on the mobile station itself—not on a PC or external device—thereby addressing Patent Owner's concern about which device performs the update. *Id.* at 7:19–8:48.

Patent Owner's contention that Dua is silent on application updates does not defeat the combination. Petitioner does not rely on Dua alone for the application update functionality. Dua establishes that the cellular phone

runs updatable software, including a media player with media processing capabilities that can be updated. Ex. 1008 ¶¶ 143, 151, 154. Herle provides the specific OTA mechanism for delivering and executing such updates. The combination of a device with updatable applications (Dua) and a reference teaching OTA delivery and execution of software updates (Herle) renders obvious the claimed application update process.

Patent Owner's assertion that implementing application updates in complex devices would have been non-obvious is conclusory and unsupported. Ex. 2017 ¶ 345. Patent Owner's expert offers no technical explanation for why application updates would be more difficult to implement than operating system updates; indeed, common sense suggests that updating an individual application is generally less complex than updating an entire operating system. Moreover, as discussed in our analysis of limitation 11, Herle was specifically designed for resource-constrained mobile devices and addresses the very concerns Patent Owner raises, including security (cryptographic verification), memory constraints (delta files), and over-the-air delivery. Ex. 1009, 7:19–8:48.

For the foregoing reasons, we find a preponderance of the evidence supports Petitioner's contention that the combination of Herle with N93 or Dua discloses or renders obvious claim 16.

I. Claim 18

Claim 18 depends from claim 1 and adds: “*wherein the second modulation scheme comprises quadrature amplitude modulation (QAM).*”

Claim 18 requires the second radio communication circuit, which Petitioner maps to UMTS, to use QAM as one of its modulation schemes. Because Petitioner's mapping of the second radio to UMTS is the same as in

limitation 1b, the central dispute is whether QAM is properly associated with UMTS.

Petitioner cross-references its limitation 1b analysis, contending that “UMTS uses QAM.” Pet. 50 (citing Ex. 1002 ¶ 195). As discussed in our analysis of limitation 1b, Petitioner relies on the Petition and Dr. Creusere’s testimony to show that by November 2007, UMTS included QAM and QPSK. *Id.* at 8–9, 20–22.

In its Reply, Petitioner presents additional evidence. First, Petitioner references how Patent Owner’s expert agreed that Exhibit 2036—which he described as “the 3GPP UMTS physical map . . . that describes the UMTS protocol, the physical layer”—confirms that UMTS includes both QPSK and QAM modulation. Ex. 1057, 59:1–21. Patent Owner and its expert rely on Exhibit 2036 to describe UMTS, and Exhibit 2036 itself discloses that UMTS uses QAM and QPSK. Pet. Reply 20; PO Resp. 52 (citing Ex. 2017 ¶ 351, which relies on Ex. 2036); Ex. 2036, 19–21.

Second, Petitioner references the cross-examination testimony of Patent Owner’s expert where he agreed that a person of ordinary skill would have been knowledgeable about QAM and QPSK and how to implement them, consistent with the conclusory reference to them in the specification. Pet. Reply 20 (citing Ex. 1057, 13:2–14:16; Ex. 1004, 14:66–15:3 (QAM), 15:2–4, 15:28–44 (QPSK)).

Third, Petitioner references cross-examination testimony where Patent Owner’s expert agreed that HSDPA implements QAM and that HSDPA is a 3GPP standard. Pet. Reply 20 (citing Ex. 1057, 48:5–17). Petitioner notes that Patent Owner’s expert offers no opinion on whether Dua’s teaching to be fully compliant with the 3GPP standards includes using UMTS with

QAM. *Id.* at 21 (citing Ex. 1057, 41:19–42:25). According to Petitioner, therefore, “the showing in the Petition at page 22 is uncontested.” *Id.*

Fourth, responding to Patent Owner’s assertion that HSDPA and UMTS are different technologies, Petitioner notes how Patent Owner’s expert clarified at his deposition that he offered no opinion on their relationship. Pet. Reply 21 (citing Ex. 1057, 41:4–13). Petitioner contends that HSDPA is in fact part of UMTS. *Id.* (citing Ex. 2036, 1 (“Universal Mobile Telecommunications System (UMTS)”), 54 (“HSDPA”). UMTS also included UTRAN. *Id.* (citing Ex. 2036, 9 (“UTRAN: UMTS Terrestrial Radio Access Network”); Ex. 1006, 429 (Tee ¶ 20). And UMTS included Evolved UMTS Terrestrial Radio Access Network (EUTRAN). *Id.* (citing Ex. 1006, 429 (Tee ¶ 20) (“3GPP EUTRAN”). Petitioner contends that Patent Owner’s expert agrees EUTRAN is a 3GPP standard but did not opine on whether Dua’s teaching to implement all 3GPP standards included EUTRAN. *Id.* (citing Ex. 1057, 41:14–18, 41:19–42:25).

Fifth, Petitioner’s expert confirmed at his deposition that UMTS referred to all 3G capabilities, including many variations. Pet. Reply 21 (citing Ex. 2030, 13:7–16, 24:8–18 (all worldwide 3GPP standards), 44:23–24 (“3GPP refers to the UMTS”)).

Patent Owner first incorporates its arguments for claim 1. PO Resp. 51–52.

Additionally, Patent Owner argues that N93, Dua, and Herle do not disclose or render obvious that a mobile device with all the claimed capabilities would use a QAM modulation scheme. PO Resp. 52. Patent Owner contends the references cited by Petitioner confirm that QAM is a modulation scheme associated with a different technology from UMTS—HSDPA. *Id.* (citing Ex. 1011 ¶ 10; Ex. 2017 ¶ 351). Patent Owner contends

that Petitioner has not asserted a combination involving modifications to implement other wireless communication technology (such as HSDPA support) or accounting for the integration of hardware supporting other wireless communication technology with other claimed features. *Id.* (citing Ex. 2017 ¶ 351).

Patent Owner further contends that N93 discusses an ability to connect to UMTS networks but does not discuss HSPA (HSDPA or HSUPA) capability. PO Resp. 52 (citing Ex. 1010, 8). The SAR report, according to Patent Owner, further supports that N93 did not have HSPA capability. *Id.* (citing Ex. 1017, 4). Patent Owner argues that a modulation scheme's general availability does not mean a specific device could implement it, particularly when combined with numerous other features on a mobile device with limited capabilities at the time of the invention. *Id.* at 52–53 (citing Ex. 2017 ¶ 352).

Patent Owner also contends that Dua does not disclose HSPA capability and that HSPA networks are different from UMTS networks. PO Resp. 53 (citing Ex. 2017 ¶ 353). Dua only discloses that in a preferred embodiment, a multimedia device would be compliant with all 3GPP and 3GPP2 standards. *Id.* (citing Ex. 1008 ¶ 69). Patent Owner characterizes Dua as forward-looking, attempting to account for future technology possibilities, but failing to enable actual implementation of a device with that technology, particularly integrated with other features. *Id.* (citing Ex. 2017 ¶ 353).

In its Sur-reply, Patent Owner responds that Petitioner's arguments regarding claim 18 merely restate its Petition's arguments and fail to meaningfully rebut the points made in the Response. PO Sur-reply 18. Patent Owner notes that its expert has explicitly questioned the capability to

make certain modifications in combination based on the state of the art prior to November 28, 2007. *Id.* at 19 (citing Ex. 2017 ¶¶ 87–102). Patent Owner contends Petitioner’s arguments regarding the capability to incorporate a single modulation scheme ignore Patent Owner’s arguments regarding the motivation to combine and incorporate the modulation scheme with other features. *Id.* Patent Owner cites *Provisur Techs., Inc. v. Weber, Inc.*, No. 2021-1851, 2022 WL 17688071, at *5 (Fed. Cir. 2022) (nonprecedential), for the proposition that even if a person of skill would have had the knowledge, it does not necessarily follow that such an artisan would have any motivation to combine the prior art in this manner. *Id.*

Patent Owner also contends that Petitioner misrepresents its expert’s testimony. PO Sur-reply 19. His testimony reflected that he did not specifically opine on whether UMTS is an enhancement to UMTS, according to Patent Owner. *Id.* (citing Ex. 1057, 41:14–18). Patent Owner asserts that its expert has clearly established in his declaration that HSDPA is different from UMTS networks. *Id.* (citing Ex. 2017 ¶ 194).

Patent Owner further argues that Petitioner appears to acknowledge the limiting nature of how it accused UMTS in the Petition and seeks to expand UMTS to include all 3GPP references. PO Sur-reply 19 (citing Pet. Reply 20–21). Petitioner’s argument that 3GPP encompasses EUTRAN and other supposed networks is irrelevant, Patent Owner asserts, because Petitioner specifically accused UMTS as the radio communication circuit, not 3GPP. *Id.* Patent Owner contends that Petitioner fails to establish equivalency between 3GPP and UMTS in the Petition or Reply. *Id.* at 19–20. Patent Owner asserts that 3GPP itself describes association with GSM (a network Petitioner distinguishes from UMTS), and also distinguishes between UTRAN, UMTS, and FOMA networks. *Id.* at 20 (citing Ex. 1033,

10). Patent Owner argues that the metes and bounds of how Petitioner alleges radio communication circuits lack clarity and therefore conflict with its own references. *Id.*

Additionally, Patent Owner contends Dua describes compliance with existing 3GPP standards, but ways exist to comply without incorporating all standard features. PO Sur-reply 20 (citing Ex. 1008 ¶ 69). Patent Owner argues that Petitioner asks the Board, based on a single statement in Dua, to incorporate by reference every standards document associated with 3GPP, and that such an inference is improper under *Paice LLC v. Ford Motor Co.*, 881 F.3d 894, 906–07 (Fed. Cir. 2018). *Id.*

Finally, Patent Owner contends that Petitioner fails to establish its references were part of the 3GPP standard, providing only 3GPP-Spec as evidence—a working document that is not part of the standard and explicitly teaches against implementation. PO Sur-reply 20; PO Resp. 60–61; Ex. 1015, 1.

Weighing the evidence and considering both parties' arguments, we find that Petitioner has shown by a preponderance of the evidence that claim 18 is unpatentable.

As an initial matter, this analysis is substantially governed by our finding in limitation 1b. There, we found Patent Owner's expert testified that Exhibit 2036—the document he stated describes the UMTS protocol and physical layer—shows the UMTS transmission scheme includes both QPSK and QAM modulation. Ex. 1057, 59:1–21. That testimony is dispositive of the core dispute in claim 18: whether QAM is associated with UMTS. We adopt and incorporate our full limitation 1b analysis here.

We are not persuaded by Patent Owner's argument that QAM is associated with HSDPA rather than UMTS. The record establishes that

HSDPA is part of UMTS, not a separate technology. Exhibit 2036—Patent Owner’s own exhibit—is titled “Universal Mobile Telecommunications System (UMTS)” and includes HSDPA within its scope. Ex. 2036, 1, 54. Patent Owner’s expert did not opine on the relationship between UMTS and HSDPA. Ex. 1057, 41:4–13. His declaration statement that HSDPA is different from UMTS networks (Ex. 2017 ¶ 194) is inconsistent with the very document he relies on to describe UMTS, which includes HSDPA. We credit more the contemporaneous technical documentation over a conclusory characterization.

Patent Owner’s argument that N93 lacked HSPA capability and that Dua did not disclose HSPA does not undermine Petitioner’s showing. The claim requires only that the second modulation scheme comprises QAM, not a device that implements HSDPA. Because QAM was a known modulation scheme within the UMTS standard, Petitioner need not show that any particular device had HSDPA capability. Incorporating a known, standardized modulation scheme into a UMTS radio communication circuit amounts to nothing more than a predictable use of prior art elements according to their established functions. *KSR Int’l Co.*, 550 U.S. at 416.

We also find unavailing Patent Owner’s contention that Petitioner improperly expands UMTS to encompass all of 3GPP. Petitioner’s showing does not depend on equating UMTS with the entirety of 3GPP. The record independently establishes—through Exhibit 2036 and the testimony of Patent Owner’s expert—that QAM is a modulation scheme used in UMTS. Whether EUTRAN or other 3GPP evolutions also use QAM provides additional confirmation but is not necessary to Petitioner’s showing.

Patent Owner’s reliance on *Provisur* is misplaced. *Provisur* addressed a situation where the movant failed to show motivation to combine. *See*

Provisur, 2022 WL 17688071, at *5. Here, no combination is needed to arrive at QAM for UMTS—it was already part of the standard. The question is not whether a skilled artisan would have been motivated to add QAM to UMTS, but whether a skilled artisan implementing a UMTS radio would have used QAM. The answer, as the testimony of Patent Owner’s expert supports, is yes.

Patent Owner’s argument under *Paice*—that reliance on Dua’s 3GPP compliance statement constitutes improper incorporation by reference—does not change our analysis. We do not incorporate every 3GPP standards document by reference. Instead, we rely on direct evidence establishing QAM as a known part of UMTS, as confirmed by Exhibit 2036 and both experts.

Finally, Patent Owner’s observation that 3GPP-Spec is a working document that teaches against implementation is noted but does not affect our finding. As discussed in our analysis of 3GPP-Spec’s public accessibility (*supra* § III.D.7), we do not rely on it for our claim 18 finding. The record evidence, independent of 3GPP-Spec, sufficiently establishes that QAM was part of the UMTS standard.

For the foregoing reasons, we find a preponderance of the evidence supports Petitioner’s contentions that Herle with N93 or Dua disclose or render obvious claim 18.

J. Claim 21

Claim 21 depends from claim 1 and recites: “*wherein the second and third radio communication circuits conduct demodulation through Orthogonal Frequency Division Multiplexing (OFDM).*”

Claim 21 requires both the second and third radio communication circuits to use OFDM demodulation. Under Mapping B, the second radio is UMTS and the third radio is Wi-Fi. Pet. 8–9. Petitioner concedes that this claim applies only under Mapping B. *Id.* at 50.

Petitioner cross-references limitations 1b and 1c, contending that under Mapping B, both UMTS and Wi-Fi (specifically 802.11a and 802.11g) use OFDM demodulation. Pet. 50 (citing Ex. 1002 ¶ 198). For the third radio (Wi-Fi), Petitioner relies on its showing that OFDM is the modulation scheme for the 802.11a and 802.11g standards. *Id.* at 24.

For the second radio (UMTS), Petitioner contends that by November 2007, UMTS included OFDM. Pet. Reply 22–24. UMTS is a trademark of ETSI, the organization that publishes the 3GPP standards, and Petitioner’s expert confirmed at his deposition that it was a “reasonable characterization” to use “UMTS” to refer to all 3G capabilities, including “many variations” over time. *Id.* at 22 (citing Ex. 2030, 13:7–16, 24:8–18, 44:23–24). According to Petitioner, Patent Owner gets their expert’s testimony “precisely backwards.” *Id.*

Petitioner further contends that UMTS includes enhancements over time, including the 3GPP-Spec, which itself confirms it describes UMTS. Pet. Reply 22 (citing Ex. 1015, 2, 5; Ex. 1006, 429 (Tee ¶ 20)). Ground 1, Petitioner argues, includes the teaching in the N93 User Guide to use a UMTS radio and Dua’s teaching to use all 3GPP standards, making UMTS inclusive of OFDM. *Id.* at 23 (citing Pet. 21–22). Petitioner contends that Ground 2, which relies on combining the N93 and Dua teachings with the 3GPP-Spec, would remain unaffected even if we were to accept Patent Owner’s narrow interpretation of UMTS based on the N93 product. *Id.* (citing Pet. 55–57).

Petitioner also points to Patent Owner's deposition testimony that OFDM was known to a POSITA, an artisan would have known how to implement it, and the patent merely states "OFDM" and relies on the skilled artisan's knowledge and skill. Pet. Reply 23–24 (citing Ex. 1057, 6:2–15, 7:16–8:17, 8:21–9:8). Indeed, he testified that one of less than ordinary skill could implement OFDM. *Id.* at 24 (citing Ex. 1057, 11:12–12:14).

Finally, Petitioner contends Patent Owner improperly focuses on the N93 product and commercially implemented base stations because the art renders features like OFDM obvious long before widespread commercialization. Pet. Reply 24. Tee taught 3GPP EUTRAN should be used when filed on September 27, 2005, and Dua taught 802.11n should be used when filed on May 12, 2005. *Id.*

Patent Owner raises several claim 21-specific arguments. First, Patent Owner notes Petitioner concedes N93, Dua, and Herle do not disclose or render obvious claim 21 under Mapping A, instead providing a rationale only under Mapping B. PO Resp. 55 (citing Pet. 50). Petitioner previously excluded OFDM as a modulation scheme for UMTS but now asserts that theory for this dependent claim. *Id.* (citing Pet. 8).

Second, Patent Owner contends it would not have been obvious to implement OFDM modulation schemes during the time of the invention in the asserted combination. PO Resp. 55 (citing Ex. 2017 ¶ 363). OFDM is associated with LTE, a wireless communication standard not finalized until late 2008, and actual LTE base stations and mobile devices were not released until years later. *Id.* A skilled artisan would have lacked motivation to create mobile devices for an unfinalized standard based only on modulation schemes disclosed in a preliminary working document. *Id.*

Third, Patent Owner emphasizes that Petitioner explicitly mapped the second radio communication circuit to UMTS, not LTE. PO Resp. 55 (citing Pet. 8). Patent Owner points to Petitioner’s expert’s deposition stating UMTS does not refer to all 3G network capabilities; he testified it would only be “approximately correct” to do so because “[t]here were many variations as the standard progressed from, say, GSM, which is often thought of as 2G to UMTS, which is often thought of as 3G.” *Id.* at 55–56 (citing Ex. 2030, 13:7–16). Patent Owner argues that if there is a distinction between GSM and UMTS from other enhancements made, such as EDGE, there is also a distinction between UMTS and LTE. *Id.* at 56 (citing Ex. 2017 ¶ 364). LTE is even thought of as a different generation than 3G. *Id.* N93 discloses connecting only to GSM and UMTS networks; Dua does not contemplate LTE capabilities or OFDM modulation schemes because it refers only to 3G standards without enabling such changes; and Herle is completely silent regarding LTE. *Id.* (citing Ex. 2017 ¶ 364).

Fourth, Patent Owner presents its expert’s testimony that UMTS and LTE are completely different radio access technologies—OFDM in downlink plus SC-FDMA in uplink for LTE versus DS-CDMA for UMTS/W-CDMA—with different frame structures, slot structures, and signal processing. PO Resp. 56–57 (citing Ex. 2017 ¶¶ 365–367). Patent Owner’s expert opined that based on the asserted references, adding an OFDM mapper or OFDM signal generation from LTE into a UMTS device would not have been obvious. *Id.* He further testified the references fail to enable these features and a POSITA would have lacked a reasonable expectation of success in combining the N93 UMTS system with the TS 36.211 OFDM modulation scheme. *Id.*

Petitioner replies that Patent Owner disputes only whether UMTS includes OFDM, not whether Wi-Fi (the third radio under Mapping B) includes OFDM. Pet. Reply 22. For UMTS, Petitioner asserts Patent Owner takes an incorrectly narrow interpretation to exclude OFDM. *Id.* The relevant legal test, Petitioner argues, is whether the N93 publication teaching UMTS and Dua's teaching to use all 3GPP standards taught or rendered obvious OFDM, which they clearly do. *Id.* at 23. Patent Owner's argument, Petitioner asserts, is incorrectly premised on using extrinsic evidence to assert that actual mobile devices implemented only a subset of UMTS that did not include OFDM. *Id.* (citing PO Resp. 55). Petitioner asserts further that Patent Owner's expert agreed EUTRAN is a 3GPP standard but did not opine on whether Dua's teaching to implement all 3GPP standards included EUTRAN, and the 3GPP website itself listed 3GPP-Spec under Evolved UTRAN. *Id.* (citing Ex. 1057, 41:14–18, 41:19–42:25).

In its Sur-reply, Patent Owner responds that Petitioner fails to meaningfully rebut that OFDM is not a modulation scheme associated with UMTS. PO Sur-reply 21. Petitioner accused UMTS as the second radio communication circuit in its Petition and now seeks to modify that UMTS radio to implement OFDM. *Id.* (citing Pet. 8–9, 20–22). Patent Owner argues that Petitioner's assertion that Dua's teaching to use all 3GPP standards renders OFDM obvious ignores Petitioner's explicit mapping of UMTS, rather than all 3GPP cellular technologies, to the second radio. *Id.* (citing Pet. 8–9). Patent Owner states that Petitioner even carves out specific parts of the 3GPP standard and allocates them to a different alleged radio communication circuit (e.g., GSM) but now alleges 3GPP and UMTS are equivalent without establishing such equivalency. *Id.*

Patent Owner argues that even if Dua incorporates all 3GPP standards, it would not incorporate 3GPP-Spec, a working document excluded from the standard that explicitly teaches against implementation. PO Sur-reply 21. Additionally, Petitioner's EUTRAN arguments fail to address that the asserted mapping is based on UMTS, not 3GPP and not EUTRAN, and EUTRAN is LTE, not UMTS. *Id.* at 21–22. The fact that the 3GPP website listed 3GPP-Spec under Evolved UTRAN further supports Patent Owner's position that 3GPP-Spec was not part of UMTS, as the 3GPP organization itself distinguishes between UTRAN and UMTS. *Id.* at 22 (citing Ex. 1033, 10).

Patent Owner contends that Petitioner fails to rebut that OFDM modulation schemes were never used to connect to UMTS networks, which use a completely different infrastructure based on code division multiple access. PO Sur-reply 23; PO Resp. 54–57. A skilled artisan therefore would have lacked motivation to add OFDM to a UMTS system because, not being an established part of the standard, the combination would be inoperable. *Id.* There was no LTE infrastructure before November 28, 2007, nor any agreement to incorporate OFDM as part of UMTS. *Id.* Petitioner articulated no reason such a combined system would function properly. *Id.* Patent Owner states that incorporating OFDM modulation into an alleged UMTS radio would serve no purpose given that OFDM was not part of UMTS. *Id.*

Weighing the evidence and considering both parties' arguments, we find that a preponderance of the evidence supports Petitioner's contentions that claim 21 is unpatentable.

As an initial matter, there is no dispute regarding the third radio communication circuit. Under Mapping B, the third radio is Wi-Fi, and Patent Owner does not dispute that the 802.11a and 802.11g standards use

OFDM demodulation. Pet. Reply 22; PO Resp. 54–57. We find the evidence establishes that Wi-Fi satisfies the OFDM requirement for the third radio. Pet. 22–24; Ex. 1002 ¶ 198.

The dispute centers on the second radio—specifically, whether UMTS encompasses OFDM. This analysis parallels and builds upon our analysis of QAM in claim 18. There, we found Patent Owner’s expert’s own testimony—relying on Exhibit 2036, which he described as the document that “describes the UMTS protocol”—established that UMTS included both QPSK and QAM. The same reasoning applies here. The question is whether UMTS, as used in the prior art publications, encompasses OFDM-based technologies under the 3GPP standards umbrella by November 2007.

We find the record evidence supports Petitioner’s broader reading. Petitioner’s expert testified it was a “reasonable characterization” to use “UMTS” to refer to all 3G capabilities, including “many variations” over time. Ex. 2030, 13:7–16, 24:8–18, 44:23–24. Patent Owner contends his testimony actually supports its narrow reading because he said it was only “approximately correct.” PO Resp. 55–56. We disagree. The full context of the testimony confirms that UMTS was understood to encompass the family of 3GPP technologies, including progressive enhancements. That he qualified the characterization as “approximately” correct reflects the breadth of the term—not a limitation to any single release.

Moreover, Tee, a patent application filed September 27, 2005, taught using 3GPP EUTRAN, which belongs to the UMTS family as reflected by Exhibit 2036’s title (“Universal Mobile Telecommunications System (UMTS)”) and its inclusion of EUTRAN. Ex. 1006, 429 (Tee ¶ 20); Ex. 2036, 1, 9. Patent Owner’s expert agreed EUTRAN is a 3GPP standard

but offered no opinion on whether Dua’s teaching to implement all 3GPP standards included EUTRAN. Ex. 1057, 41:14–18, 41:19–42:25.

We acknowledge Patent Owner’s argument that UMTS and LTE employ fundamentally different radio access technologies and that adding OFDM to a traditional UMTS device would require substantial redesign. Ex. 2017 ¶¶ 365–367. However, the claim does not require modifying a DS-CDMA device to add OFDM. The claim requires only that the second radio communication circuit “conduct demodulation through” OFDM. A radio communication circuit that implements an OFDM-based 3GPP standard (such as EUTRAN) satisfies this requirement. The prior art teaches that UMTS-family devices would use such standards. Pet. 21–22; Ex. 1008 ¶ 69 (Dua’s teaching to comply with all 3GPP standards).

Unlike a scenario where an artisan must combine unrelated features, here Dua expressly teaches compliance with all 3GPP standards, and EUTRAN is a 3GPP standard. The motivation comes from the prior art itself: Dua’s express teaching to support the 3GPP standard family, which by November 2007 included EUTRAN with OFDM. Rather than a combination of unrelated technologies, this constitutes a predictable application of a known standard belonging to the same family the prior art taught to support.

We also find it persuasive that the ‘590 patent merely states “OFDM” without discussing implementation details, relying entirely on a skilled artisan’s knowledge and skill. Ex. 1057, 8:21–9:8. Patent Owner’s expert agreed OFDM was known to a skilled artisan and that that artisan would have known how to implement it; indeed, Patent Owner’s expert testified that even one of less than ordinary skill could implement OFDM. *Id.* at 6:2–15, 7:16–8:17, 11:12–12:14. Patent Owner cannot demand from the prior art

a level of implementation detail that the ‘590 patent’s own specification does not provide.

Patent Owner’s arguments regarding commercialization timing (i.e., that LTE was not finalized until late 2008 and actual LTE devices were not released until years later) are not dispositive of obviousness. The relevant inquiry is what the prior art publications taught, not when commercial products implementing those teachings became available. Tee taught 3GPP EUTRAN in September 2005, and Dua taught compliance with all 3GPP standards in May 2005—both well before the November 2007 critical date.

We note our finding that 3GPP-Spec (Ex. 1015) did not qualify as prior art. This finding, however, does not alter our claim 21 analysis because we do not rely on 3GPP-Spec as an independent prior art reference. Rather, our finding rests on the broader record evidence, including the testimony from both parties’ expert, Exhibit 2036, and the Tee reference, establishing that UMTS encompassed OFDM-based technologies by the critical date.

For the foregoing reasons, we find the evidence more persuasively supports Petitioner’s contentions in Grounds 1–5 that Dua or N93 with Herle disclose or render obvious claim 21 under Mapping B.

K. Claims 4, 8–10, 12, 14, 15, 17, 19, 20, and 22–25

In Grounds 1–5, Petitioner argues that the combination of references (in particular, N93, Dua, and Herle) teaches or suggests the recited limitations of claims 4, 8–10, 12, 14, 15, 17, 19, 20, and 22–25. Pet. 40–41, 45–47, 49–53, 64–66. Patent Owner does not independently contest Petitioner’s evidence and arguments with respect to claims 4, 8–10, 12, 14, 15, 17, 19, 20, and 22–25. *See* PO Resp. 43, 46–47, 49, 51, 53–54, 57–58.

Instead, for those claims, Patent Owner only dispute Petitioner's contentions in as much as they incorporate the deficiencies Patent Owner contends to exist with claims 1 and 5. *See id.*

We have considered Petitioner's and Patent Owner's evidence and arguments with respect to claims 4, 8–10, 12, 14, 15, 17, 19, 20, and 22–25. Based upon the complete record, we are persuaded that Petitioner has shown by a preponderance of the evidence that the combined teachings of the cited art meet the recited limitations of claims 4, 8–10, 12, 14, 15, 17, 19, 20, and 22–25, and that a person of ordinary skill in the art at the time of the invention would have combined the references in the manner proffered and would have had a reasonable expectation of success in that endeavor. Therefore, we find claims 4, 8–10, 12, 14, 15, 17, 19, 20, and 22–25 are unpatentable under 35 U.S.C. § 103 as obvious over the combined teachings of: (1) Dua and Herle (Ground 3); (2) N93, Dua, and Herle (Grounds 1 and 4); and (3) Dua, Herle, N93, Rooyen, Desai, BT-Spec, and Kao (Grounds 2 and 5).

IV. PATENT OWNER'S MOTION TO EXCLUDE

The party moving to exclude evidence bears the burden of proof to establish that the material sought to be excluded is inadmissible under the Federal Rules of Evidence. *See* 37 C.F.R. §§ 42.20(c), 42.62(a). Patent Owner moves to exclude Exhibits 1002, 1007, 1010, 1014, 1015, 1017, 1018, and 1032–1033. Exclude Mot. 1. First, Patent Owner asserts “Petitioner has failed to show by a preponderance of the evidence that Exhibits 1010, 1014, and 1015 were publicly accessible in 2007 and therefore the exhibits should be excluded because they lack foundation, are inauthentic, and irrelevant.” *Id.* at 5. In addition, regarding Exhibit 1015,

Patent Owner asserts that “Exhibit 1015 was never used as part of the UMTS standard and therefore Exhibit 1015 and all related exhibits that purportedly show the ‘public accessibility’ of Exhibit 1015 should be excluded (*i.e.*, Exhibits 1007, and 1032-1033).” *Id.* at 7. Patent Owner asserts that “Exhibits 1007 1032, and 1033 are Internet Archive declarations that are irrelevant and hearsay because they do not purport to prove that Exhibits 1010, 1014, and 1015 were publicly accessible to a POSITA in 2007.” *Id.* at 7. And lastly, Patent Owner asserts that specific paragraphs of Exhibit 1002, “relating to N93, BT-Spec, and 3GPP-Spec, in Dr. Creusere’s declaration, should be excluded from evidence” because “Dr. Creusere fails to provide evidence of public accessibility of Exhibits 1010, 1014, and 1015, nor did he offer any testimony of his personal knowledge of Exhibits 1010, 1014, and 1015 in 2007.” *Id.* at 8.

Petitioner responds by identifying that Patent Owner’s “motion merely disputes whether there is sufficient evidence on the merits to establish that the references were publicly accessible,” which “is not an evidentiary objection.” Exclude Opp. 1. Petitioner argues that Patent Owner’s motion should be denied because “[t]here is no legitimate dispute that the evidence is admissible and that the Board should determine, on the merits, whether the evidence is sufficient to show the references were publicly accessible.” *Id.* Patent Owner replies with arguments regarding the accessibility of Exhibits 1010, 1014, and 1015, and how Exhibits 1002, 1007, 1017, 1018, 1032, and 1033 fail to show they were accessible. *See* Exclude Reply 1–5.

We agree with Petitioner. Patent Owner’s arguments are directed to the evidence’s weight, rather than its admissibility. Patent Owner has not persuasively argued or shown any valid evidentiary basis for excluding the

identified exhibits. Whether Exhibits 1010, 1014, and 1015 were publicly accessible in 2007 are disputed issues in this case and we find all of the information Patent Owner seeks to exclude to have at least some probative value regarding those disputed issues. Therefore, on this record, we deny Patent Owner's Motion to Exclude.

V. CONCLUSION¹³

Based on the fully developed trial record, Petitioner has demonstrated by a preponderance of the evidence that claims 1, 4, 5, 8–12, and 14–25 of the '590 patent are unpatentable.

In summary:

Claim(s)	35 U.S.C. §	Reference(s)/ Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
1, 4–5, 8–12, 14–25	103(a)	N93, Dua, Herle	1, 4–5, 8–12, 14–25	
1, 4–5, 8–12, 14–25	103(a)	N93, Dua, Herle, Rooyen, Desai, BT-Spec, 3GPP-Spec ¹⁴ , Kao	1, 4–5, 8–12, 14–25	
1, 4–5, 8–12, 14–25	103(a)	Dua, Herle	1, 4–5, 8–12, 14–25	
1, 4–5, 8–12, 14–25	103(a)	Dua, Herle, N93	1, 4–5, 8–12, 14–25	
1, 4–5, 8–12, 14–25	103(a)	Dua, Herle, N93, Rooyen, Desai, BT-Spec, 3GPP-Spec, Kao	1, 4–5, 8–12, 14–25	
Overall Outcome			1, 4–5, 8–12, 14–25	

¹³ 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).

¹⁴ Petitioner includes 3GPP-Spec as a secondary reference showing relevant modulation and frequencies for UMTS. However, for the reasons discussed

above (*supra* § III.D.7), Petitioner has failed to establish 3GPP-Spec is within the scope of available prior art and, therefore, was not part our analysis. Nevertheless, the absence of 3GPP-Spec from Grounds 2 and 5 was not dispositive of those grounds in view of the record developed during the course of this proceeding. In this case, Petitioner's Grounds 2 and 3 do not rely on 3GPP-Spec to actually modify either N93 or Dua; instead, 3GPP-Spec is relied upon as evidence about what N93 and Dua suggests to a skilled artisan through its disclosure of a device configured with a radio circuit that communicates video using a UMTS network. 3GPP-Spec is relied on by Petitioner to *add* secondary evidentiary support regarding the knowledge of a skilled artisan at the time of the invention regarding what modulation schemes and frequencies were used by the standards-based radios disclosed in Dua and N93 (i.e., UMTS). Pet. 7. More specifically, 3GPP-Spec was offered to support Dr. Creusere's testimony that a skilled artisan would have known that the disclosure of a UMTS radio communication circuit suggests a circuit with a modulation scheme different from Bluetooth's modulation scheme and a transmission frequency band different from Bluetooth's transmission frequency band, which is capable of connecting by radio to an internet or a home network to transmit and receive information. *See* Ex. 1002 ¶¶ 66, 93; Pet. 8–9, 22, 51–52. Although the absence of 3GPP-Spec took some supportive weight from Dr. Creusere's testimony, Petitioner developed a record through the course of the proceeding that further substantiated the creditability of Dr. Creusere's opinion. In view of Patent Owner's challenge to the availability of 3GPP-Spec as prior art, procedural fairness allows Petitioner to respond to that challenge by pointing to other record evidence (regardless of which stage of the proceeding it was developed) to bolster its original contention—to a skilled artisan, a UMTS radio communication circuit (as disclosed by N93 and Dua) *suggests* a circuit with a modulation scheme different from Bluetooth's modulation scheme and a transmission frequency band different from Bluetooth's transmission frequency band, which is capable of connecting by radio to an internet or a home network to transmit and receive information. *See Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1079–81 (Fed. Cir. 2015). The exclusion of 3GPP-Spec from the available prior art is not dispositive of Grounds 2 and 5, therefore, because the prior art remaining in those grounds, based on a complete record, demonstrates the unpatentability of the challenged claims.

ORDER

In consideration of the foregoing, it is

ORDERED that claims 1, 4, 5, 8–12, and 14–25 of the '590 patent have been shown to be unpatentable; 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.

HUDALLA, *Administrative Patent Judge*, concurring-in-part and dissenting-in-part,

I respectfully dissent from my colleagues' conclusion as to claim 21. I concur with my colleagues' conclusions as to claims 1, 4, 5, 8–12, 14–20, and 22–25. I explain my reasoning below.

A. Grounds 2 and 5

Regarding Grounds 2 and 5, I agree with my colleagues that Petitioner has not established that 3GPP-Spec qualifies as prior art. I note that 3GPP-Spec is an integral part of Grounds 2 and 5. *See, e.g.*, Pet. 56 (rationale incorporating 3GPP-Spec for Ground 2), 73 (same for Ground 5). In my opinion, Petitioner's failure to qualify 3GPP-Spec as prior art represents a fatal flaw in these grounds even if Petitioner has successfully shown unpatentability without 3GPP-Spec for other grounds. Put differently, I disagree with my colleagues' decision to excise 3GPP-Spec from Grounds 2 and 5 as a means to cure Petitioner's failure to qualify 3GPP-Spec as prior art. *Cf. SAS Inst., Inc. v. Iancu*, 584 U.S. 357, 363 (2018) (“[I]n an inter partes review the petitioner is master of its complaint and normally entitled to judgment on all of the claims it raises, not just those the decisionmaker might wish to address.”). Accordingly, I would determine that Petitioner has not shown by a preponderance of the evidence that claims 1, 4, 5, 8–12, and 14–25 would have been obvious over the asserted references in Grounds 2 and 5.

B. Grounds 1 and 4

Regarding Grounds 1 and 4, I join in my colleagues' determination that Petitioner has shown by a preponderance of the evidence that claims 1, 4, 5, 8–12, 14–20, and 22–25 would have been obvious over the combination of N93, Dua,

and Herle. As part of that determination, I agree with my colleagues that N93 and Dua do not inherently disclose the modulation schemes and frequencies required by Bluetooth and UMTS. I also agree with my colleagues that the modulation schemes and frequencies required by Bluetooth and UMTS would have been obvious based on the evidence of record. Nevertheless, I reach my conclusions in a slightly different manner than my colleagues.

For limitation 1a, Petitioner cites Dua's and N93's many references to the Bluetooth standard. *See* Pet. 18–20. I agree with my colleagues that it would have been obvious to an ordinarily skilled artisan that Bluetooth was associated with GFSK/ $\frac{\pi}{4}$ -DQPSK/8DPSK modulation and frequencies of 2402–2480 MHz. *See* Ex. 1002 ¶ 89; Ex. 1014, 195, 198–200. Still, I would not credit evidence in this regard from Exhibit 1017, which appears to be a test report associated with the device described in N93. Petitioner has not laid any evidentiary foundation to support this test report and its alleged pertinence to the knowledge of a person of ordinary skill in the art.

For limitation 1b, Petitioner cites N93's teaching of using the described device with "UMTS 2100 networks." Pet. 21 (citing Ex. 1010, 8). I agree with Petitioner that this suggests the use of a 2100 MHz frequency for UMTS. *Id.* at 22 (citing Ex. 1002 ¶ 93). During the course of trial, Patent Owner introduced Exhibit 2036, which Patent Owner's own declarant, Mr. McNair, stated was "the document that describes the UMTS protocol, the physical layer." Ex. 1057, 59:1–9. He went on to confirm that the UMTS protocol includes both QPSK and QAM modulation. *Id.* at 59:10–21. I agree with my colleagues that this is compelling evidence of how an ordinarily skilled artisan would have interpreted the reference to "UMTS 2100 networks" in N93 and supports Dr. Creusere's testimony that an ordinarily skilled artisan would have known UMTS to be associated with QPSK an

QAM modulation. *See* Ex. 1002 ¶ 93. The same reasoning supports Petitioner’s showing for claim 18.

Notwithstanding, I do not ascribe significance to Dua’s disclosure of a radio to support “all worldwide 3GPP and 3GPP2 standards.” Pet. 22 (quoting Ex. 1008 ¶ 69). This disclosure is too general to teach the specific modulation scheme asserted by Petitioner, UMTS. Further, Petitioner links this statement to 3GPP-Spec (*see id.* (citing Ex. 1015, 2, 15, 21–23)), which we determine does not qualify as prior art.

Regarding the combination of N93 and Dua, I am persuaded that an ordinarily skilled artisan would have combined Dua with N93 to provide implementation details regarding certain features described in N93. *See* Ex. 1002 ¶ 71. The fact that Dua may not describe every implementation detail (*see* PO Resp. 22) does not detract from Petitioner’s persuasive rationale. As discussed in the majority opinion, Petitioner also persuasively addresses what an ordinarily skilled artisan would have understood from the N93–Dua combination with respect to, for example, a CPU’s control of multiple radios. *See, e.g.*, Pet. Reply 8–9. The majority opinion also describes Petitioner’s persuasive reasons for combining Herle with N93 and Dua.

Regarding claim 21, I do not agree with my colleagues that Petitioner has established that the combination of N93, Dua, and Herle teaches a “second . . . radio communication circuit[that] conduct[s] demodulation through Orthogonal Frequency Division Multiplexing (OFDM).” Petitioner’s contentions for this limitation refer back to Petitioner’s contentions for limitation 1b (*see* Pet. 50), which do not address OFDM modulation. Therefore, in my view, Petitioner has not shown by a preponderance of the evidence that claim 21 would have been obvious over the combination of N93, Dua, and Herle.

C. Ground 3

Ground 3 differs from Grounds 1 and 4 insofar as it does not include N93. My analysis for limitation 1b in Grounds 1 and 4, as discussed above, relies on N93 for teaching the UMTS modulation scheme at 2100 MHz. Without this teaching, Petitioner has not shown the same based on just Dua and Herle. Thus, I would determine that Petitioner has not shown by a preponderance of the evidence that claims 1, 4, 5, 8–12, and 14–25 would have been obvious over the combination of Dua and Herle.

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