

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ERICSSON INC.,
Petitioner,

v.

DALI WIRELESS INC.,
Patent Owner.

IPR2022-01345
Patent 11,006,343 B2

Before KARL D. EASTHOM, SHARON FENICK, and JOHN R. KENNY,
Administrative Patent Judges.

EASTHOM, *Administrative Patent Judge.*

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Ericsson Inc. (“Petitioner”) filed a (corrected) Petition pursuant to 35 U.S.C. §§ 311–319 to institute an *inter partes* review of claims 1–22 of U.S. Patent No. 11,006,343 B2 (Ex. 1001, the “’338 patent”), supported by the (corrected) Declaration of Henry Houh, Ph.D (Ex. 1012). Paper 11 (“Pet.”).¹ Dali Wireless, Inc. (“Patent Owner”) filed a (corrected) Preliminary Response supported by the Declaration of Douglass A. Chrissan, Ph.D (Ex. 2001). Paper 7 (“Prelim. Resp.”).² The parties also filed supplemental briefing authorized by the Board (Ex. 3001) to address a claim construction issue. See Paper 9 (Petitioner’s Reply (“Pet. Reply”)); Paper 10 (Patent Owner’s Sur-reply (“PO Sur-reply”)).

The Board’s authority to determine whether to institute an *inter partes* review is under 35 U.S.C. § 314. See also 37 C.F.R. § 42.4(a) (2020). To institute an *inter partes* review, the information presented in the Petition must show “a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a) (2018).

For the reasons set forth below, the information presented in the Petition establishes a reasonable likelihood that Petitioner will prevail with respect to at least one challenged claim. Accordingly, we institute an *inter partes* review of claims 1–22 of the ’343 patent.

¹ See Ex. 3002 (ordering Petitioner to file, *inter alia*, a corrected Petition and corrected Houh Declaration).

² See Ex. 3001 (authorizing Patent Owner to file a corrected Preliminary Response).

A. Real Party in Interest

Petitioner identifies itself, Ericsson, Inc., and its “corporate parent Telefonaktiebolaget LM Ericsson” as real parties in interest. Pet. 72. Patent Owner identifies itself as the real party in interest. Paper 3, 1.

B. Related Matters

The parties identify the following related district court matter: *Dali Wireless, Inc. v. Cellco Partnership d/b/a Verizon Wireless*, No. 22-cv-0104 (W.D. Tex.). Pet. 72; Paper 3, 1.

The parties assert that the following *inter partes* reviews involve related patents that include the same specification as the ’343 patent: *Commscope Tech. LLC v. Dali Wireless Inc.*, IPR2020-01473, Paper 18 (PTAB Mar. 12, 2021 (granting institution on challenged claims of U.S. Pat. No. 10,080,178 B2 (the “’178 patent”)) (the “1473-IPR”); *John Mezzalingua Ass’cs LLC v. Dali Wireless Inc.*, IPR2018-01430, Paper 15 (PTAB Feb. 9, 2021 (decision denying institution of U.S. Pat. No. 10,344,499 B2 (the “’499 patent”) (the “1430-IPR”). See Ex. 1004 (the 1473-IPR institution decision); Ex. 1019 (1430-IPR denial of institution); Pet. Reply 2 n.1 (asserting that “[t]he ’499 [p]atent, ’343 [p]atent and ’178 [p]atent share an identical specification”); Prelim. Resp. 14–15 (discussing the ’499 patent and 1430-IPR).

Other *inter partes* reviews relate to the instant proceeding: *Ericsson Inc. v. Dali Wireless Inc.*, IPR2022-01212, Paper 17 (PTAB Feb. 1, 2023) (granting institution of claims 1–12 of U.S. Pat. No. 8,682,338 B2 on similar prior art) (the “1212-IPR”); *John Mezzalingua Associates, LLC v. Dali Wireless Inc.*, IPR2020-01432, Paper 16 (PTAB Feb. 9, 2021) (institution denied for patent with similar technology) (the “1432-IPR”) (Ex. 2006);

Commscope Tech's LLC v. Dali Wireless Inc., IPR2018-00571, Paper 53
(PTAB Aug. 12, 2019) (final written decision) (the “571-IPR”) (Ex. 1006).

C. The '343 Patent (Ex. 1001)

The '343 patent describes a reconfigurable distributed antenna system (DAS) that provides flexibility to manage, control, re-configure, enhance, and facilitate the radio resource efficiency, usage, and performance of a distributed wireless network. Ex. 1001, 4:29–33.

Figure 1, reproduced below, shows an embodiment of the reconfigurable DAS:

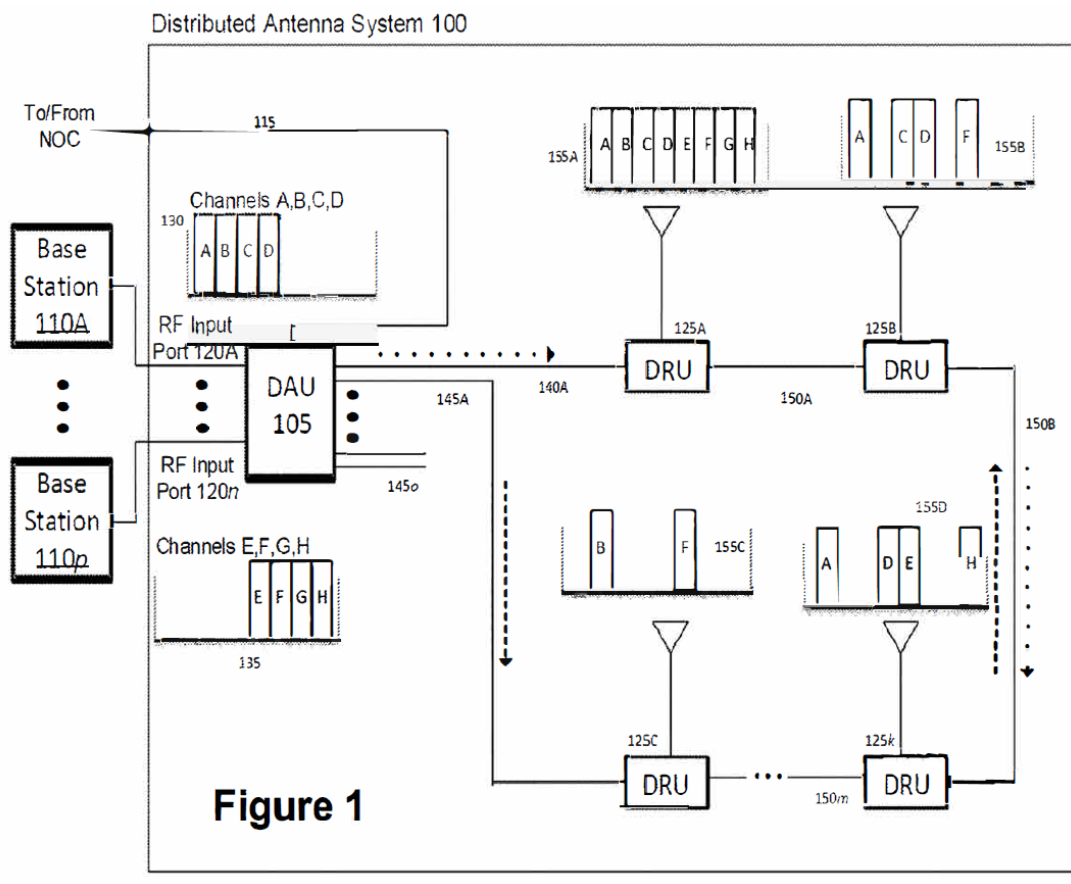


Figure 1 is a block diagram showing the basic structure of a reconfigurable distributed antenna system (DAS) 100. Ex. 1001, 4:33–37, code (57). Reconfigurable DAS system 100 employs remote radio units (DRUs, or “interchangeably” RRUs) and digital access units (DAUs). *Id.* at 4:42–55. DAUs serve as interfaces between one or more base stations (BTS) (not depicted) and the RRUs. *Id.* Software settings within DRU 125A and DRU 125B, for example, enable particular carriers to be present in each respective downlink output signal 155A, 155B (e.g., carriers A–H in DRU 125A, carriers A, C, D, and F in DRU 125B). *See id.* at 6:23–65.

The DAU communicates configuration information to set “the appropriate amount of radio resources (such as RF carriers, CDMA codes or TDMA time slots) assigned to a particular DRU or group of DRUs to meet desired capacity and throughput objectives.” Ex. 1001, 12:5–9. In other words, DAUs send configuration information and allocate radio resources as needed for the DRUs. *See id.* at 5:30–33, 8:14–35, 12:58–64 (“[T]he DAU Management Control module can adaptively modify the system configuration to begin to deploy . . . additional radio resources (such as RF carriers, CDMA codes and TDMA time slots) for use by a particular DRU which need those radio resources within its coverage area.”).

In one embodiment, a DAU detects which carriers and corresponding time slots for each carrier are active and determines if a particular downlink carrier exceeds a load by a percentage greater than a predetermined threshold. Ex. 1001, 12:50–64. If the latter occurs, the DAU adaptively modifies the system configuration to deploy additional radio resources for use by a particular DRU that needs those radio resources within its coverage area. *Id.* At the same time, the DAU management control module

adaptively modifies the system configuration to slowly remove certain radio resources for use by a particular DRU that no longer needs those radio resources within its coverage area. *Id.* at 12:63–13:2.

D. Illustrative Claim

Independent claims 1 and 12 are materially similar and illustrative of the claimed subject matter. Claim 1 follows (with bracketing information added to conform to Petitioner's nomenclature):

1. [pre] A system to transport wireless communications, comprising:

[1.a] a digital access unit;

[1.b] a plurality of signal sources, including at least a first signal source and a second signal source;

[1.c] a plurality of remote units, including at least a first remote unit and a second remote unit;

[1.d] wherein the digital access unit comprises a plurality of interfaces to communicatively couple the digital access unit to the plurality of signal sources;

[1.e] wherein the digital access unit is configured to receive a plurality of radio resources from the first signal source and the second signal source;

[1.f] wherein the digital access unit is configured to send a digital representation of a first set of radio resources to the first remote unit at a first point in time, the first set of radio resources for transmission at an antenna of the first remote unit;

[1.g] wherein the digital access unit is configured to send a digital representation of a second set of radio resources to the first remote unit at a second point in time, the second set of radio resources for transmission at the antenna of the first remote unit;

[1.h] wherein a number of radio resources in the first set of radio resources is different from a number of radio resources in the second set of radio resources at least based on dynamic load balancing and resource management; and

[1.i] wherein the digital access unit is configured to receive digital signals from each of the plurality of remote units.

E. Asserted Grounds of Unpatentability

Petitioner asserts that claims 1–22 are unpatentable as follows:

Claim(s) Challenged	35 U.S.C §	Reference(s)/Basis
1–3, 5–10, 12–14, 16–21	103(a) ³	Wu ⁴
4, 11, 15, 22	103(a)	Wu, Cannon ⁵

II. OBVIOUSNESS ANALYSIS

A. Level of Ordinary Skill in the Art

Relying on the Houh Declaration (Ex. 1012), Petitioner asserts that a person of ordinary skill in the art (POSA)

in February 7, 2011 would have been familiar with reconfiguring remote radio units in a DAS. EX-1012, ¶38. A POSA would have gained knowledge of these concepts through a mixture of training and work experience, such as by having a Bachelor’s degree in electrical engineering and four years of experience; or by obtaining a Master’s degree in electrical engineering, but having only one to two years of experience; or by having no formal education but experience in cellular communications of at least eight years. EX-1012, ¶38.

Pet. 16.

³ The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), amended 35 U.S.C. § 103, was effective on March 16, 2013. Petitioner “does not challenge the claimed priority of February 7, 2011” for purposes of the Petition. Pet. 16; *see also* Prelim. Resp. 4 (agreeing with the priority date of February 7, 2011). Because this priority date is before the effective date of the applicable AIA amendment, the pre-AIA version of § 103 applies for purposes of institution.

⁴ Wu et al., US Pub. No. 2010/0128676 A1, published May 27, 2010, filed Nov. 11, 2009. Ex. 1007).

⁵ Cannon et al., U.S. Pub. No. US 2010/0177760 A1, published July 15, 2010, filed Jan. 13, 2010. Ex. 1017.

Patent Owner agrees that

a POSA at the time of the '343 patent would have an educational background in electrical engineering and experience in the design of wireless communication systems. More particularly, a POSA would be person with a bachelor's degree in electrical engineering (or a similar technical degree or equivalent work experience) and at least 3 years of experience working with wireless communication systems.

Prelim. Resp. 14.

The two proposals are materially similar. Nevertheless, Patent Owner's proposed level of ordinary skill is more similar to the Board's adopted level of skill (as proposed by a different petitioner) in the 1432-IPR *See Ex. 2006* (1432-IPR institution decision).

Determining the level of ordinary skill in the art involves various factors, including the "type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field." *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (citation omitted). The prior art of record also reflects the level of ordinary skill in the art. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). For purposes of this Institution Decision, we adopt the assessment offered by Patent Owner, modified to insert "about" in place of the open-ended "at least," which provides no upper bound on the level of experience of one of ordinary skill in the art, as it is consistent with the '338 patent and the asserted prior art. Even if we were to adopt Petitioner's similar assessment, it would not alter our decision to institute.

B. Claim Construction

In *inter partes* reviews, the Board construes claims using the same claim construction standard employed in a civil action under 35 U.S.C. § 282(b). 37 C.F.R. § 42.100(b) (2020). Under the principles set forth by our reviewing court, the “words of a claim ‘are generally given their ordinary and customary meaning,’” as would have been understood by a person of ordinary skill in the art in question at the time of the invention. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc) (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)). “In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17).

1. Radio Resources

a. Arguments

Patent Owner proposes to construe “radio resources” as “RF carriers, CDMA codes, TDMA time slots, and other information defining or describing the way data is being transmitted by a remote unit but do not include the user payload data that is transmitted.” Prelim. Resp. 17. Petitioner asserts that in the 1430-IPR decision denying institution, the Board “(1) gives examples of radio resources as ‘RF carriers, CDMA codes and TDMA time slots’ and (2) provided no indication ‘that **the data** carried wirelessly using these over the interface to the DAU is, **itself**, a radio

resource.’” Pet. Reply 2 (citing Ex. 1019, 10).⁶ Patent Owner contends that “[t]o the extent that Petitioner intends its construction of ‘radio resources’ to **encompass the data being transmitted via RF**, we disagree that is a proper construction of the term.” PO Sur-reply 2 (citing Ex. 1019, 10) (alteration in original).

Patent Owner also argues that in the 1430-IPR, the Board agreed with Patent Owner’s construction of “radio resources” and determined that “the plain and ordinary meaning of ‘radio resources’ . . . (1) includes RF carriers, CDMA codes, and TDMA time slots; and (2) **excludes data that does not incorporate information used in the transmission** of the radio resource from an antenna of the remote unit”

Prelim. Resp. 17–18 (quoting Ex. 1019, 11–12).

Patent Owner further asserts that the ’343 patent specification supports its construction by describing “RF carriers, CDMA codes, or TDMA time slots” as examples of “radio resources.” See Prelim. Resp. 15–16 (quoting Ex. 1001, 12:6–7, 12:60–64, 12:67–13:2). Patent Owner also argues that in the 1430-IPR, the Board found that Oh (Ex. 2005) “failed to disclose sending ‘radio resources’ to the radio units,” based on a person of ordinary skill’s “understand[ing of] radio resources.” *Id.* at 19 (internal quotations omitted).

Finally, Patent Owner argues that “‘radio resources’ are RF carriers, CDMA codes, TDMA time slots, and other information defining or describing the way data is being transmitted by a remote radio unit, but do not include the user payload data that is transmitted by the radio unit.”

Prelim. Resp. 28.

⁶ We transpose the parties’ citations to “1430-IPR, Paper 15” to Ex. 1019. See Pet. Reply 2 (citing “1430-IPR, Paper 15 at 10”); PO Sur-reply 2 (same).

b. Analysis

Under Patent Owner’s proposed construction as summarized above, radio resources (i) encompass RF carriers, CDMA codes, and TDMA time slots and (ii) encompass other information defining or describing the way RRUs transmit data (iii) provided that the RF carriers, CDMA codes, and TDMA time slots or other information do not include the transmitted user payload data. *See* Prelim. Resp. 15–18, 28.

(a) RF Carriers, CDMA Codes, and TDMA Time Slots

We agree with the parties that “radio resources” encompass RF carriers, CDMA codes, and TDMA time slots. The specification identifies RF carriers, CDMA codes and TDMA time slots as examples of radio resources in several places. For example, a “key function is determining and/ or setting the appropriate amount of radio resources (*such as RF carriers, CDMA codes or TDMA time slots*) assigned to a particular DRU or group of DRUs to meet desired capacity and throughput objectives.” Ex. 1001, 12:5–10 (emphasis added). As another example, “the DAU Management Control module can adaptively modify the system configuration to begin to deploy, typically . . . slowly, additional radio resources (*such as RF carriers, CDMA codes or TDMA time slots*) for use by a particular DRU which need those radio resources within its coverage area. *Id.* at 12:59–64 (emphasis added); *see also id.* at 12:64–13:2 (describing “certain radio resources (*such as RF carriers, CDMA codes or TDMA time slots*)” (emphasis added)).

*(b) Other Information Defining or Describing the
Way Data Is Being Transmitted by a Wireless
Access Point*

There is no need to determine whether “radio resources” encompass other information defining or describing how an antenna transmits data, because Petitioner does not assert that the prior art teaches such a radio resource.⁷ See *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017).

*(c) Not Including the User Payload Data that Is
Transmitted*

Patent Owner’s proposed construction for “radio resources” requires that RF carriers, CDMA codes, TDMA time slots or other information do not include underlying user payload data. In isolation, the phrase “not includ[ing] the user payload data” is subject to different interpretations. It could simply mean that data itself is not a radio resource, but the RF carrier transmitting the data is a radio resource. Patent Owner makes clear, however, that this interpretation is not the intent of its construction by arguing that, under its construction, Wu’s RF carriers are not radio resources because they include payload data. Prelim. Resp. 32 (arguing that Wu discloses “user payload data combined with RF carrier channels” and this “does not meet the definition of ‘radio resources’ . . . since the definition of ‘radio resources’ must exclude such data”).

⁷ Patent Owner cites a patent to Oh as relevant to this point and the Board’s discussion of it in the 1430–IPR. Prelim. Resp. 19–20 (quoting the Board as stating that “Oh discloses only underlying data” (quoting Ex. 1019, 18)). Patent Owner’s arguments, which include the allegation that Wu “is similar to . . . Oh” (Prelim. Resp. 20), are not helpful to resolve the claim construction issue here, because Petitioner does not rely on underlying data as a radio resource in Wu.

Patent Owner, however, cites nothing from the specification that shows that RF carriers, CDMA codes, or TDMA time slots cease to be radio resources merely because RF carriers or other resources include payload data. See Prelim. Resp. 14–23; Sur-reply 1–5. As found above on this preliminary record, the specification describes RF carriers, CDMA codes, or TDMA time slots as *examples* of radio resources. There is no reasonable dispute on this preliminary record that RF carriers typically transport data (including packet traffic data) within “frequency bands.” See, e.g., Ex. 1001, 7:22–24 (describing “narrow frequency band or bands”), 11:45–63 (describing “frequency bands”); Prelim. Resp. 6 (arguing that “[t]he DAU of the invention coordinate[s] communications by ‘**control[ling] the packet traffic**’ of an associated plurality of Digital Remote Units” (quoting Ex. 1001, 2:26–27)) (second alteration in original). Moreover, Patent Owner refers to support for a construction of “radio resources” to the 1430-IPR (Ex. 1019), and the ’343 patent specification (Ex. 1001) and quotes each of them as indicating that radio resources include “*any specific narrow frequency band or bands*, RF carriers” “or RF channels.” Prelim. Resp. 15–16 (quoting Ex. 1019, 11; Ex. 1001, 7:22–24) (emphasis added).

Patent Owner relies on the claim construction in the Board’s institution decision in the 1430-IPR to exclude payload data from RF carriers, CDMA codes, or TDMA time slots. Prelim. Resp. 14–20. The panel’s construction in the 1430-IPR, however, does not provide the payload data exclusion argued by Patent Owner. Ex. 1019, 9–12. A pertinent issue in the 1430-IPR was whether data carried wirelessly using RF carriers, CDMA codes, and TDMA time slots is *by itself* a radio resource. *Id.* at 10 (“No indication is given that the data carried wirelessly . . . is, *itself*, a radio

resource.” (emphasis added)). The 1430-IPR panel determined that “‘radio resources’ . . . (1) includes RF carriers, CDMA codes, and TDMA time slots; and (2) excludes data that does not incorporate information used in the transmission of the radio resource from an antenna of the remote unit.” *Id.* at 12. However, the 1430-IPR panel did not decide that RF carriers, CDMA codes, and TDMA time slots are not radio resources when they carry or encapsulate data. *Id.* at 10–12. In other words, under the 1430-IPR panel’s reasoning, payload data *itself* is not a radio resource, but the panel did not decide that RF carriers, CDMA codes, and TDMA time slots that happen to include payload data are not radio resources. *See id.* at 11 (“We do not provide a specific construction for ‘radio resources.’”).

Therefore, on this preliminary record, radio resources include RF carriers, CDMA codes, and TDMA time slots, even if the carriers, codes, and/or slots include underlying transmitted payload data.⁸

2. Other Terms

At this stage, no need exists to construe any other claim terms expressly to resolve the parties’ disputes. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (“[W]e need only construe terms ‘that are in controversy, and only to the

⁸ This is consistent with the construction of the same term in the related ’499 patent or other patents in district court. *See* Ex. 2013 (Markman Order, Del.), 8; Ex. 2015 (Markman Transcript, W.D. Tex.), 2–3).

extent necessary to resolve the controversy.” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

C. Principles of Law

A patent claim is unpatentable under 35 U.S.C. § 103 “if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” 35 U.S.C. § 103 (2011); *accord KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007) (quoting similar language in pre-AIA version of 35 U.S.C. § 103). The question of obviousness involves resolving 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 ordinary skill in the art; and when in evidence (none on this preliminary record), (4) when in evidence, objective indicia of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

D. Analysis of the Grounds

Petitioner asserts that claims 1–3, 5–10, 12–14, and 16–21 would have been obvious under 35 U.S.C. § 103 based on Wu. Pet. 21–66. Petitioner also asserts that claims 4, 11, 15, and 22 would have been obvious under 35 U.S.C. § 103 based on Wu. Pet. 26–37. Patent Owner disagrees. Prelim. Resp. 31–39, 42–53.

1. Wu

Wu, titled “Carrier Channel Distribution System,” describes a system that communicates signals between base transceiver stations (BTSS) and remote transceiver units (RTUs), providing fine-grained control for this

communication, splitting carrier channels, and routing only some channels to RTUs according to a routing policy. Ex. 1007, codes (54), (57), ¶¶ 9, 11, 38–44. A BTS receives signals within a plurality of frequency bands, each of which may comprise multiple channels. *Id.* ¶¶ 11, 35, 37, 38. Figure 2 of Wu, reproduced below, is a schematic of a base transceiver station and associated host units.

Wu's Figure 2 follows:

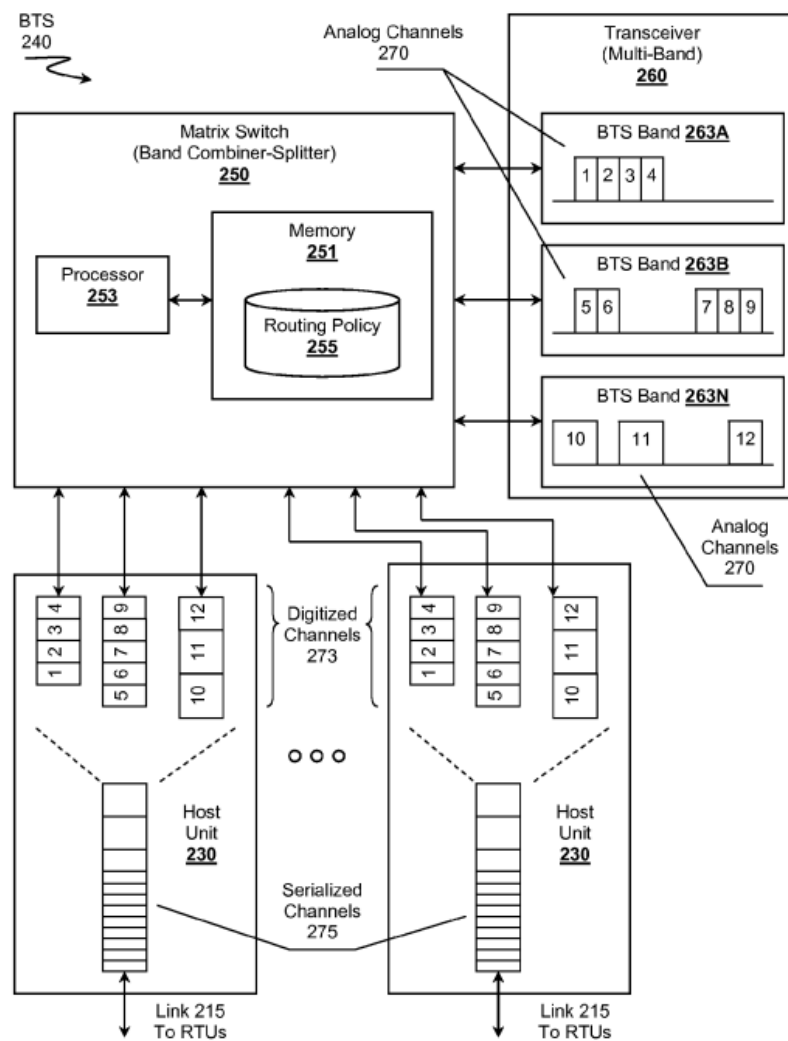


Figure 2

Figure 2 shows base transceiver station (BTS) 240 including transceiver 260, matrix switch 250, and host units 230. Ex. 1007 ¶¶ 15, 34–36. Transceiver 260 receives signals on BTS bands 263A through 263N, and each may include multiple channels 270, e.g., channels 270 labelled 5 through 9 in BTS band 263B. *Id.* ¶¶ 35, 37. Transceiver 260 forwards the received channels 270 to matrix switch 250 that routes them according to routing policy 255 to host unit 230, which further distributes them to RTUs over links 215. *Id.* ¶ 38. The system is bi-directional, and host units 230 receive carrier channel signals from RTUs and forward them to transceiver 260 for transmission within bands 263. *Id.* ¶¶ 36, 49. Wu also discloses that some signals may be received at an RTU with another RTU acting as intermediary. *Id.* at Figs. 1, 4, ¶¶ 33, 51.

The system reconfigures policy 255 in order to change the routing of channels to the various RTUs. Ex. 1007 ¶¶ 48, 49. The system routes, allocates, or distributes channels based on anticipated requirements of areas at a certain time of day or based on current traffic loads. *Id.* ¶¶ 43, 44. Transmissions between host units and RTUs preferably occur according to the CPRI Standard. *Id.* ¶¶ 31, 49.

2. Cannon⁹

Cannon, titled “Systems and Methods for Improved Digital RF Transport in Distributed Antenna Systems,” describes a DAS system with a

⁹ Certain portions of the original Petition and original Houh Declaration incorrectly cite to column and line numbers, instead of paragraph numbers, with respect to Cannon, U.S. Pub. No. 2010/0177760 A1 (Exhibit 1017). See Ex. 3002. Accordingly, as indicated above, the Board ordered Petitioner to file a corrected Petition and Houh Declaration (in red-line form). See

base station that transmits RF signals to remote units, which reconstruct the RF signals and transmits them via an antenna. Ex. 1017, codes (54), (57), ¶ 20.

supra note 1 (citing Ex. 3002). As noted in Exhibit 3002, “[t]he citations to [column] and line numbers appear to correspond to the corresponding patent to Cannon, U.S. Pat. No. 8,270,387 B2, which lists the same printed publication number [as Exhibit 1017], U.S. Pub. No. 2010/0177760 A1, as Prior Publication Data.” On this preliminary record, there is no material difference between the two Cannon documents, and both are prior art relative to the agreed-upon earliest effective filing date of the ’343 patent (Feb. 7, 2011) (*supra* note 3) for purposes of institution. *Compare* Ex. 1017 (filed Jan. 13, 2010, published July 15, 2010), *with* Ex. 1023 (filed Jan. 13, 2010, issued Sept. 18, 2012). Accordingly, on the present record, we deem the erroneous citations to be harmless error.

Cannon's Figure 1 follows:

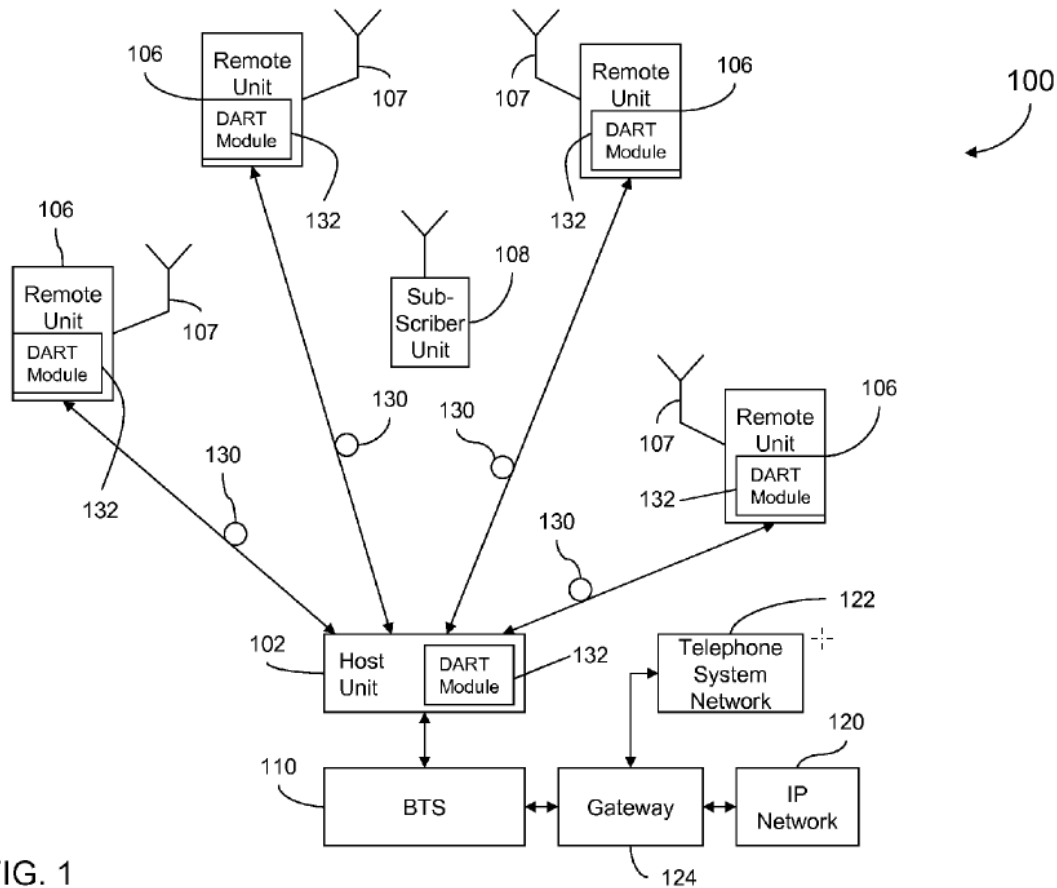


FIG. 1

Figure 1 above depicts DAS 100, including host unit 102 and remote units 106. Ex. 1017 ¶ 18. Host unit 102 communicatively couples to at least one base transceiver station (BTS) 110. *Id.* Host unit 102 receives downlink RF signals from BTS 110 and generates transport signals for transmitting to one or more remote units 106. *Id.* ¶ 20. “[T]he downlink and uplink transport signals transmitted between host unit 102 and remote units 106 over communication links 130 are generated by digitizing the downlink and uplink RF signals, respectively.” *Id.* ¶ 21. “In other words, the downlink and uplink transport signals are not analog RF signals but instead are digital data signals representing digital RF samples of a modulated RF signal.” *Id.*

“These digital data signals . . . may comprise digital representations of an RF, IF or baseband version of the original RF signal.” *Id.*

By way of example, “host unit 102 will generate baseband digital samples of [a] modulated 900 MHz RF signal from BTS 110” and then distribute it to remote units 106. Ex. 1017 ¶ 21. “At the remote units, the digital samples of the modulated RF signal are converted from digital into an analog RF signal to be wirelessly radiated from the antennas 107.” *Id.* For the uplink, “analog RF signals received at remote unit 106 [from the subscriber units] are digitally sampled to generate digital RF data samples for the uplink transport signals.” *Id.*

A digital to analog radio frequency transceiver (DART) module in each remote unit 106 and host unit 102 perform respective conversions for uplink and downlink signals. Ex. 1017 ¶¶ 22–23. DART modules in remote units are specific for a particular frequency band, but may be reprogrammed to meet the changing needs of the end user. *Id.* ¶¶ 22, 46. “DART Module 500 [in Figure 5] may operate as either a Host DART or a Remote DART module such as respective DART Modules 308 and 208.” *Id.* ¶ 36. The DART module includes FPGA 503 (field programmable gate array). *Id.* ¶ 36, Fig. 5.

Because FPGA 503 is a field programmable device, it can be adjusted to meet changing needs of the end user. For example, the center frequencies f_{c1} and f_{c2} can be reprogrammed into FPGA 503 in order to shift the locations of spectral regions 451 and 452 within spectrum 400. Similarly BW1 and BW2 may be adjusted to accommodate larger or narrower bandwidths. The number and/or position of timeslots within frame 460 provisioned for each discrete spectral region can also be reconfigured. As mentioned previously, the number of individual signal paths for handling additional spectral regions may be increased by configuring the FPGA with additional

digital up converters and digital down converters. In one embodiment, a plurality of predefined configuration builds are stored in a memory, for example within a SeRF Module. In such an embodiment, a DART Module's FPGA can be reconfigured by pushing a new build image onto the FPGA.

Ex. 1017 ¶ 46.

3. Claims 1 and 12

Petitioner generally asserts that Wu teaches independent claims 1 and 12. As indicated above, method claim 12 is materially similar to system claim 1.

Wu's Figure 1 follows:

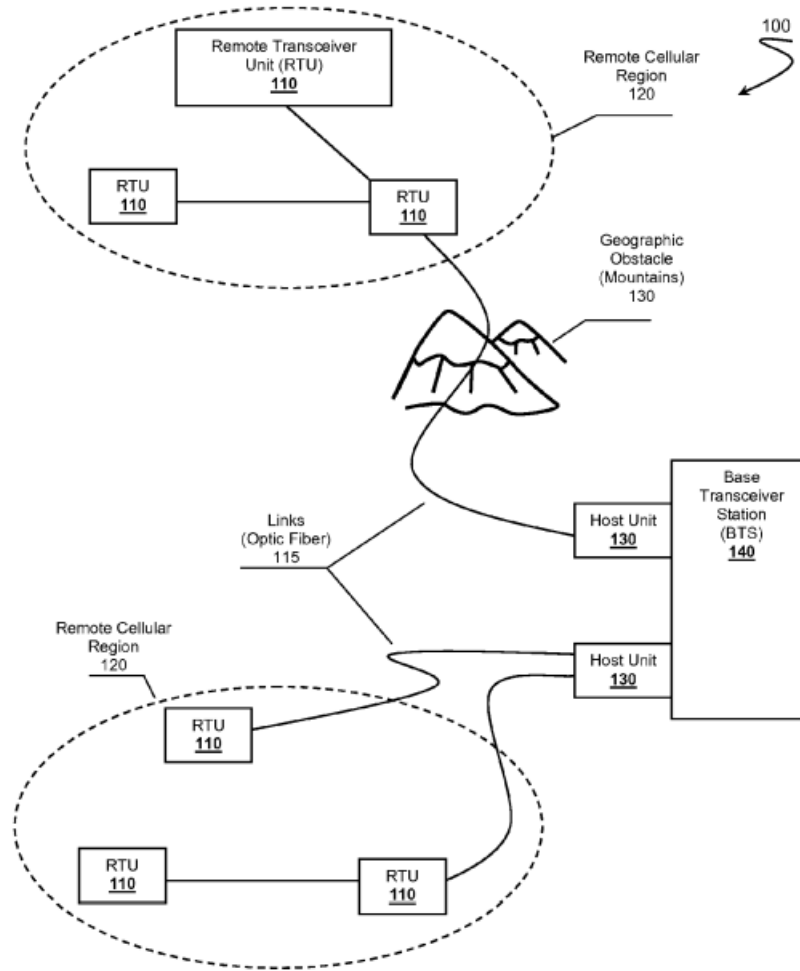


Figure 1

According to Petitioner, Wu’s “schematic of the system in Figure 1 show[s] how wireless communication signals are transported from BTS 140 and Host Unit 130 [*signal source and baseband unit*] to RTUs 110 [*remote units*].” Pet. 27 (citing Ex. 1007, Fig. 1; Ex. 1012 ¶ 55). In other words, as discussed further below, Petitioner reads the claimed “signal sources” and “baseband unit” on different modules in Wu’s Host Units 130, and the

claimed “remote units” on Wu’s RTUs. *Id.* Petitioner reads the claimed digital access unit on modules in Wu’s base transceiver station (BTS). *Id.*

Patent Owner primarily argues that Wu does not disclose the claimed “radio resources” or the claimed “digital access unit” (DAU). *See Prelim. Resp.* 35–43.

i. Preamble

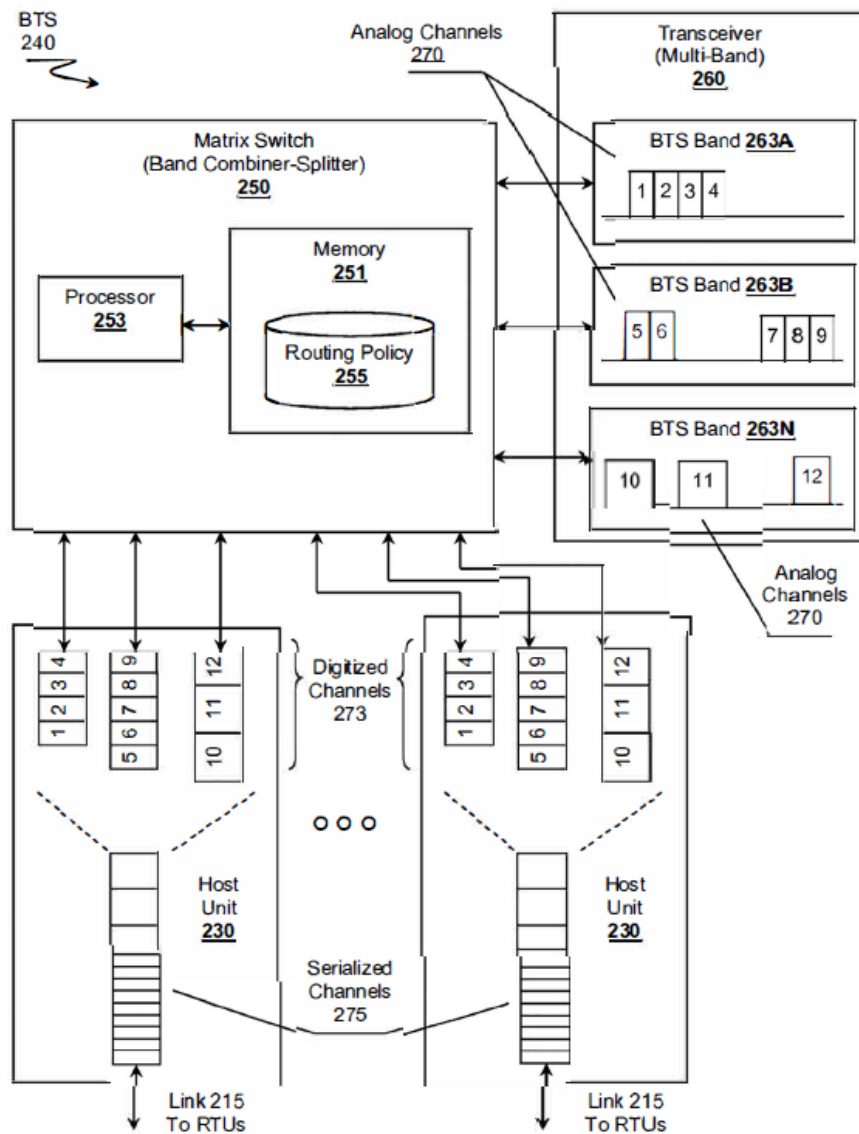
Claim 1’s preamble recites “[a] system to transport wireless communications, comprising.” Petitioner contends that Wu discloses the preamble. *Pet.* 27. Petitioner relies on Wu’s “wireless carrier channel technologies” including “apparatus, systems and methods in which a carrier channel distribution system can route individual carrier channels to Remote Transceiver Units (RTUs).” *Id.* (quoting Ex. 1007 ¶¶ 2, 11; citing Ex. 1012 ¶ 54).

Petitioner’s showing for the preamble is sufficient for purposes of institution. Patent Owner does not address Petitioner’s showing as to this limitation. *See generally Prelim. Resp.*

ii. Limitation 1.a

Limitation 1.a recites “a digital access unit” (DAU). Petitioner contends that “Wu discloses a digital access unit in the form of a matrix switch 250 and host units 230.” *Pet.* 28.

Wu's Figure 10 follows:



Wu's BTS 240 above, includes transceiver 260, matrix switch 250, and host units 230. As noted above, Petitioner reads the claimed DAU onto the combination of matrix switch 250 and host units 230. Pet. 28–29 (citing Ex. 1007 ¶¶ 15, 35–38, Fig. 2; Ex. 1012 ¶ 57). To support its showing, Petitioner notes that in the 571-IPR, the Board found that “Wu discloses the claimed host unit [digital access unit] as a combination of the matrix switch

and host units,” and that “it would have been obvious to place the functionality of both Wu’s matrix switch and host units in a single unit.” *Id.* at 29 (quoting Ex. 1006, 21, 22).

Petitioner’s annotated version of Wu’s Figure 2 follows:

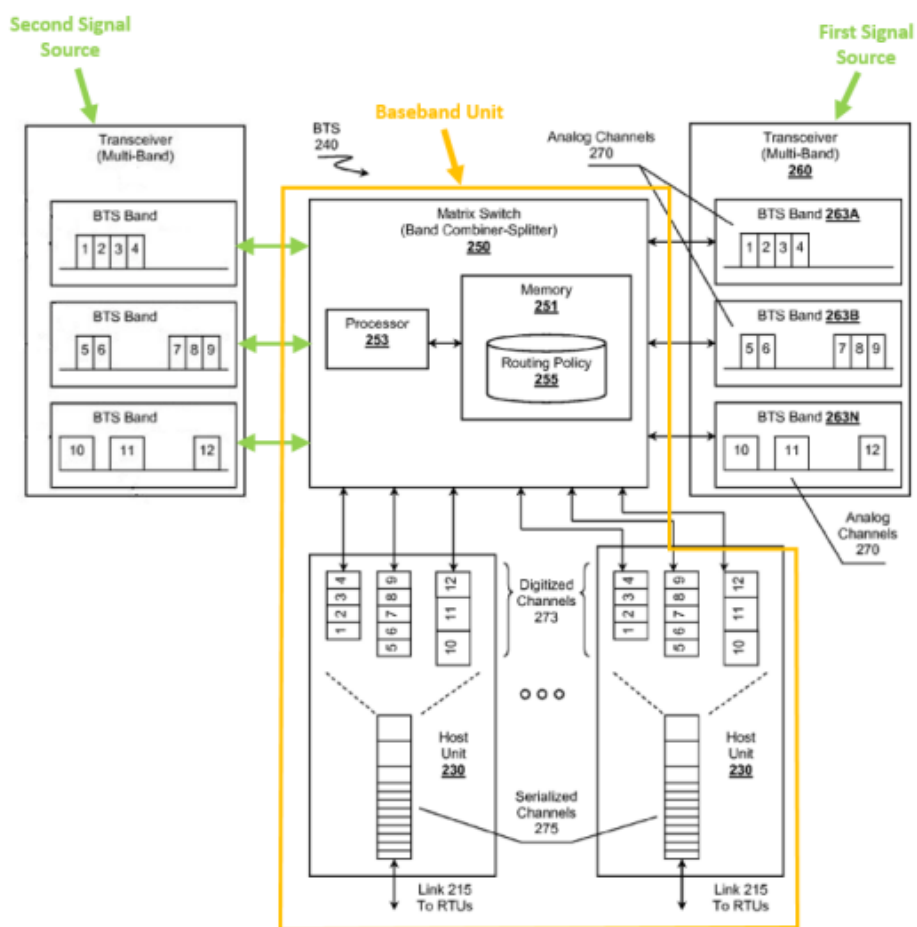


Figure 2

Pet. 28. Wu’s Figure 2, as annotated by Petitioner, illustrates how Petitioner reads the claimed digital access unit onto Wu’s matrix switch 250 and host units 230 (surrounded by a yellow box).¹⁰ *Id.*

¹⁰ As explained further below, Petitioner also adds another signal source on the left-hand side of Wu’s matrix switch 250 in Figure 2, which corresponds

Referring to annotated Figure 2, Patent Owner argues that Petitioner “draws an arbitrary box around Wu’s Matrix Switch 250 and multiple Host Units 230s as meeting the claimed [DAU].” Prelim. Resp. 39 (citing Pet. 27–28). Patent Owner explains that “in the ’343 patent, the signal source (e.g., base station) is separate from the baseband unit (e.g., Digital Access Unit or DAU).” *Id.* at 42 (citing Ex. 1001, 4:43–45 (“The DAU 105 serves as an interface between associated base stations (BTS) 110A-B and a plurality of digital remote units (DRU) 125A-n, although only four DRU’s are shown in FIG. 1.”)). Patent Owner contends that “Petitioner’s rearrangement of Wu’s components makes the transceiver 260 the ‘signal source,’ and then makes the Matrix Switch 250, which is already inside the base station 240, part of the Host Unit 230’s functionality.” *Id.* (citing Pet. 27–28) (emphasis omitted). Patent Owner summarizes that “[i]nterpreting Wu in this way requires *rearranging* the components in a way that is contrary to the ’343 patent’s claimed architecture where the base station is separate from the baseband unit.” *Id.* (emphasis added).

These arguments do not undermine Petitioner’s showing. Petitioner does not “rearrange” any components in Wu. Contrary to Patent Owner’s arguments, the ’343 patent does not require that “the signal source (e.g., base station) is separate from the baseband unit (e.g., Digital Access Unit or DAU).” Prelim. Resp. 42. Even if it does, Petitioner relies on separate components or modules as detailed above.

to Wu’s teaching of multiple signal sources (transceivers 260). Pet. 30 (citing Ex. 1007 ¶ 34). Consequently, annotated Figure 2 above shows two signal sources interfacing matrix switch 250 (a component of the claimed DAU according to Petitioner). *See id.* at 31–32.

Patent Owner also argues that Wu’s alleged DAU “could not satisfy the digital access unit of the ’343 patent which assigns specific radio resources to specific remote radio units.” Prelim. Resp. 40. Patent Owner explains that “Wu does not disclose assigning radio resources to the remote radio units, but rather discloses routing carrier channel signals (which are user payload data signals modulated onto carriers) to RTUs.” *Id.* This claim construction argument is unavailing. Under our adopted claim construction, “radio resources” include modulated carriers. *See supra* § II.B.1 (claim construction of radio resources).

Patent Owner also argues that “Wu does not disclose the ability to send specific downlink signals to specific remote units or assign specific radio resources to specific RTUs.” Prelim. Resp. 40. Patent Owner explains that

the system architecture of Wu is not capable of targeting or selecting specific RTUs because as shown in Wu’s Figure 1, there are multiple RTUs connected to each Host Unit such that the Host Unit sends all the signals it receives to all RTUs connected to it as there is no selective switch equipped in the Host Unit.

Id. (emphasis omitted).

Patent Owner’s argument fails to explain why the claimed DAU must be “capable of targeting or selecting specific RTUs.” *See* Prelim. Resp. 40. Moreover, the absence of a selective switch in Wu’s Figure 1 does not support Patent Owner’s argument that Wu’s “architecture . . . is not capable of targeting or selecting specific RTUs.” *See id.* As discussed further below, Petitioner relies on Wu’s matrix switch 250 as “configurable to route the digitized channels 273 [*digital representation of radio resources*] ‘individually, collectively . . . , or in arbitrary groups’ (*a first set*) to a first

RTU [*first remote unit*].” Pet. 33 (quoting Ex. 1007 ¶ 49 (alteration in original); citing Ex. 1004, 28; Ex. 1012 ¶ 64)).

Petitioner also raises collateral estoppel, asserting that the Board already found that Wu discloses or teaches materially the same DAU limitation as claimed here based on the final written decision in the 571-IPR, Paper 53 at 21–22 (Ex. 1006). See Pet. 28–29; *VirnetX Inc. v. Apple, Inc.*, 909 F.3d 1375, 1378 (Fed. Cir. 2018) (“Apple is correct that VirnetX is collaterally estopped by our Rule 36 judgment in *VirnetX I* from relitigating the question of whether RFC 2401 was a printed publication.”); *M2M Solutions LLC v. Amazon.com, Inc.*, Nos. 2022-1122, 2022-1124, slip op. at 8–9 (Fed. Cir. Feb. 22, 2023) (nonprecedential) (holding that collateral estoppel applies because “this same issue was actually litigated in the ’1892 IPR and agree[ing] with the Board that M2M is collaterally estopped from arguing that Kloba failed to disclose ‘consumer usage information’ as required by claims 1 and 20 of the ’477 patent”) (citing *Ohio Willow Wood Co. v. Alps South, LLC*, 735 F.3d 1333, 1342 (Fed. Cir. 2013) (“Our precedent does not limit collateral estoppel to patent claims that are identical.”)).

The final written decision in the 571-IPR supports Petitioner for purposes of institution. See Ex. 1006, 6–7 (final written decision reproducing claim 11 of the ’473 patent, revealing that the claimed “host unit” recited there is materially similar to the claimed “digital access unit” recited here in claims 1 and 12), 21 (holding that “Wu discloses the claimed host unit as a combination of the matrix switch and host units”). Patent Owner does not address Petitioner’s collateral estoppel argument with respect to this limitation. See Prelim. Resp. 39–42.

Based on the foregoing discussion, Petitioner's showing for this limitation is sufficient for purposes of institution.

iii. Limitations 1.b and 1.d

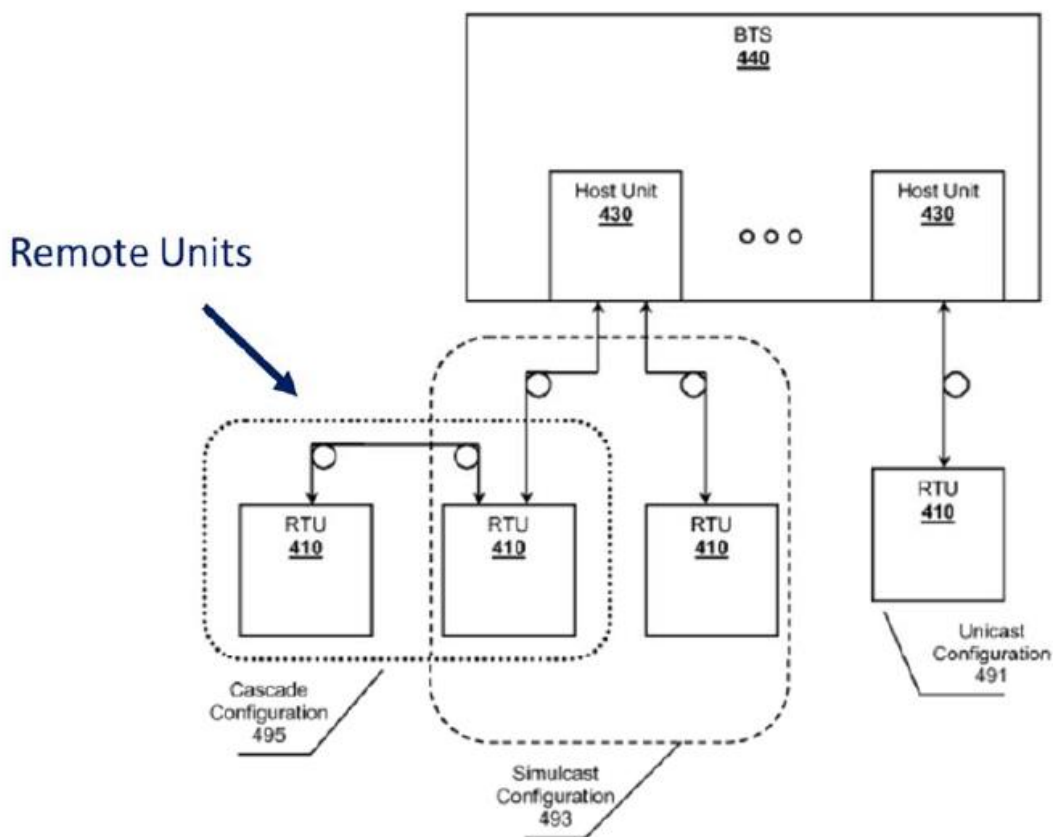
Limitation 1.b recites “a plurality of signal sources, including at least a first signal source and a second signal source,” and limitation 1.d recites “wherein the digital access unit comprises a plurality of interfaces to communicatively couple the digital access unit to the plurality of signal sources.” As indicated above in discussion Petitioner's annotated version of Wu's Figure 2, Petitioner relies on Wu's teaching of multiple signal sources (transceivers 260). *See supra* note 8 (noting that Petitioner shows two signal sources interfacing Wu's matrix switch 260 in annotated Figure 2); Pet. 30 (citing Ex. 1007 ¶ 34). Petitioner explains that Wu's “multi-band transceiver 260 is preferably configured to receiv[e] or to transmit wireless signals within a plurality of frequency bands as represented by bands 263A, 263B, through 263N” and that “[e]ach of bands 263 preferably comprises multiple channels.” Pet. 29–30 (quoting Ex. 1007 ¶ 35) (second alteration in original). Petitioner further explains that “Wu discloses that matrix switch 250 (a component of the digital access unit) is communicatively coupled to a plurality of BTS Bands 263A-263N from each of the first and second transceivers 260 and a [person of ordinary skill in the art] understood that each communication coupling includes an interface.” *Id.* at 31–32 (citing Ex. 1007 ¶ 42, Fig. 2).

Petitioner's showing for this limitation is sufficient for purposes of institution. Patent Owner does not address Petitioner's showing as to this limitation. *See generally* Prelim. Resp.

iv. Limitation 1.c

Limitation 1.c recites “a plurality of remote units, including at least a first remote unit and a second remote unit.” Petitioner contends that Wu’s Figures 1 and 4 illustrate Wu’s system, which comprises a plurality of RTUs 110 [*a first remote unit and a second remote unit*].” Pet. 30 (citing Ex. 1007, Fig. 1, ¶¶ 31–33; Ex. 1012 ¶ 61).

Petitioner relies on the following annotated version of Wu’s Figure 4:



As reproduced above, Petitioner modifies Wu’s Figure 4 to identify how the claimed “remote units” read on Wu’s RTUs 410. Pet. 31 (annotating Ex. 1007, Fig. 4; citing Ex. 1012 ¶ 61).

Petitioner's showing for this limitation is sufficient for purposes of institution. Patent Owner does not address Petitioner's showing as to this limitation. *See generally* Prelim. Resp.

v. Limitation 1.e

Claim 1 recites “wherein the digital access unit is configured to receive a plurality of radio resources from the first signal source and the second signal source.” Drawing attention to its annotated version of Wu’s Figure 2 above, Petitioner contends that “matrix switch 250 receives analog channels 270 [radio resources] including channels 1–12 from each of the BTS Bands 263 of the first and second transceivers 260.” Pet. 32 (citing Ex. 1007 ¶¶ 35–38, Fig. 2). Petitioner contends that a person of ordinary skill in the art “understood that the carrier channels 1–12 are radio resources as recited in the [c]hallenged [c]laims.” *Id.* (citing Ex. 1012 ¶ 63).

Patent Owner argues that Wu’s channels are not “radio resources” because “they are not bare RF carriers (or information relating to radio resources), but rather RF carriers modulated with user payload data.” Prelim. Resp. 35–36. Patent Owner advances similar arguments based on alleged similarities between a reference to Oh and Wu. *See id.* at 37–38. These arguments are unavailing.

The arguments rely on a claim construction that we do not adopt. Under our adopted claim construction, “radio resources” do not exclude carriers with payload data. *See supra* § II.B.1. In addition, or alternatively, as Petitioner contends, “Wu . . . describes that the number of channels routed to an RTU may change by means of a routing policy that includes rules for reacting to events and conditions such as usage, load, weather, etc.” Pet. 33 (citing Ex. 1007 ¶¶ 38–47; Ex. 1012 ¶ 65). At cited paragraph 39, Wu states

that its “approach provides for allocating *carrier channels* 270 to various remote regions to ensure proper coverage given various conditions.” Ex. 1007 ¶ 39 (emphasis added). That is, Wu does not describe these allocated carrier channels as necessarily carrying payload data. Rather, Wu describes allocating carrier channels under “[c]ontemplated conditions that could affect coverage include usage, load, weather, events, or other circumstances that could affect *how channels are used*.” *Id.* (emphasis added).

Patent Owner quotes Wu as disclosing that “[i]t should be appreciate[d] that digitizing or serializing carrier channels is considered to ***include digitizing or serializing data carried by the channels as desired.***” Prelim. Resp. 36 (quoting Ex. 1007 ¶ 49). Contrary to Patent Owner’s argument that “these carrier channel signals do not fit the definition of ‘radio resources’ as understood by a [person of ordinary skill in the art],” however, Wu’s channels fall within the claim construction of radio resources. Alternatively, Wu’s description of “*includ[ing] . . . data carried by the channels as desired*” (Ex. 1007 ¶ 49 (emphasis added)) and Wu’s other descriptions of allocating carrier channels as outlined above, in context indicate on this preliminary record that the inclusion of payload data is not a necessary condition, but rather an option in Wu. In other words, Wu contemplates not carrying data on the channels. Patent Owner’s related assertion that “[t]he Board in IPR2020-01430 also believed that such carrier channel signals with payload data are not ‘radio resources’” (Prelim. Resp. 36) mischaracterizes the Board’s holding in the 1430-IPR institution decision for the reasons explained above in the claim construction section. *See supra* § II.B.1; Ex. 1019, 11–12.

Based on the foregoing discussion, Petitioner’s showing for this limitation is sufficient for purposes of institution.

vi. Limitation 1.f

Limitation 1.f recites “wherein the digital access unit is configured to send a digital representation of a first set of radio resources to the first remote unit at a first point in time, the first set of radio resources for transmission at an antenna of the first remote unit.” Petitioner contends that Wu discloses “that the combination of matrix switch 250 and units 230 [*digital access unit*] digitize the carrier channels [*radio resources*] and send digital representations of the channels 273 to the RTUs.” Pet. 33 (quoting Ex. 1007 ¶ 49). Petitioner also explains that “Wu . . . describes that the number of channels routed to an RTU may change by means of a routing policy that includes rules for reacting to events and conditions such as usage, load, weather, etc.” *Id.* (citing Ex. 1007 ¶¶ 38–47; Ex. 1012 ¶ 65). Petitioner quotes Wu as teaching that “[t]he rules of policy 255 can include one or more criterion representing a trigger” and [w]hen the criteria are met, matrix switch 250 can take appropriate routing action.” *Id.* (quoting Ex. 1007 ¶ 41) (first alteration in original). Petitioner further contends that “Wu explains that the routing actions may include allocating more channels to a region to increase the bandwidth available at a first point in time.” *Id.* (citing Ex. 1007 ¶ 46; Ex. 1012 ¶ 66).

Petitioner’s showing for this limitation is sufficient for purposes of institution. Patent Owner does not address Petitioner’s showing as to this limitation. *See generally* Prelim. Resp.

vii. Limitation 1.g.

Limitation 1.g recites “wherein the digital access unit is configured to send a digital representation of a second set of radio resources to the first remote unit at a second point in time, the second set of radio resources for transmission at the antenna of the first remote unit.”

According to Petitioner,

Wu discloses a system where the digital access unit is configured to send a digital representation of a second set of radio resources to the first remote unit at a second point in time, the second set of radio resources for transmission at the antenna of the first remote unit. As set forth for element [1.f] above, Wu describes a routing policy that includes rules for reacting to various events and conditions. EX-1007, ¶¶0038-47. The routing actions may allocate more channels [*a second set of radio resources*] to an RTU to increase the bandwidth available in the region of the RTU at a time following the triggering event [*a second point in time*]. EX-1007, ¶0046; EX-1012, ¶68.

Petitioner’s showing for this limitation is sufficient for purposes of institution. Patent Owner does not address Petitioner’s showing as to this limitation. *See generally* Prelim. Resp.

viii. Limitation 1.h.

Limitation 1.h wherein a number of radio resources in the first set of radio resources is different from a number of radio resources in the second set of radio resources at least based on dynamic load balancing and resource management.” Petitioner asserts that “Wu discloses a system wherein a number of radio resources in the first set of radio resources is different from a number of radio resources in the second set of radio resources at least based on dynamic load balancing and resource management.” Pet. 35.

Petitioner's showing for this limitation is sufficient for purposes of institution. Patent Owner does not address Petitioner's showing with respect to this limitation. *See generally* Prelim. Resp.

ix. Limitation 1.i

Limitation 1.i recites "wherein the digital access unit is configured to receive digital signals from each of the plurality of remote units." Petitioner contends that Wu "explains that the system is bi-directional such that the units 230 (components of the digital access unit) may receive digital representations of uplink signals from each of the plurality of RTUs." Pet. 37 (citing Ex. 1007 ¶¶ 36, 49) (emphasis omitted). Petitioner also contends that "Wu discloses that the RTUs include analog-to-digital converters for digitizing received signals for digital transport to the host units 230." *Id.* citing (Ex. 1007 ¶ 56; Ex. 1012 ¶ 74).

Petitioner's showing for this limitation is sufficient for purposes of institution. Patent Owner does not address Petitioner's showing with respect to this limitation. *See generally* Prelim. Resp.

x. Summary

For purposes of institution, the preliminary record supports Petitioner's showing with respect to system claim 1. As noted above, claim 12 is materially similar to claim 1. Petitioner relies on its showing for claim 1 to address claim 1. Pet. 41. Patent Owner does not present separate arguments for claim 12. *See generally* Prelim. Resp. Accordingly, we determine that Petitioner shows a reasonable likelihood that it would prevail with respect to its contention that claims 1 and 12 would have been obvious over Wu.

4. Claims 2, 3, 5–10, 12–14, and 16–20

Claims 2, 3, 5–10, 12–14, and 16–20 depend directly from independent claims 1 or 12. Petitioner contends that these claims would have been obvious over the combined teachings of Wu. Pet. 38–53. In support, Petitioner relies on the testimony of Dr. Houh, and provides citations to teachings in Wu. *Id.* On this preliminary record, Petitioner sufficiently maps the added limitations of claims 2, 3, 5–10, 12–14, and 16–20 to Wu and provides sufficient reasons to modify Wu’s teachings for certain limitations with a reasonable expectation of success for purposes of institution.

Patent Owner does not address Petitioner’s showing for these claims. *See generally* Prelim. Resp.

Based on the foregoing discussion, we determine that Petitioner shows a reasonable likelihood that it would prevail with respect to its contention claims 2, 3, 5–10, 12–14, and 16–20 would have been obvious over Wu.

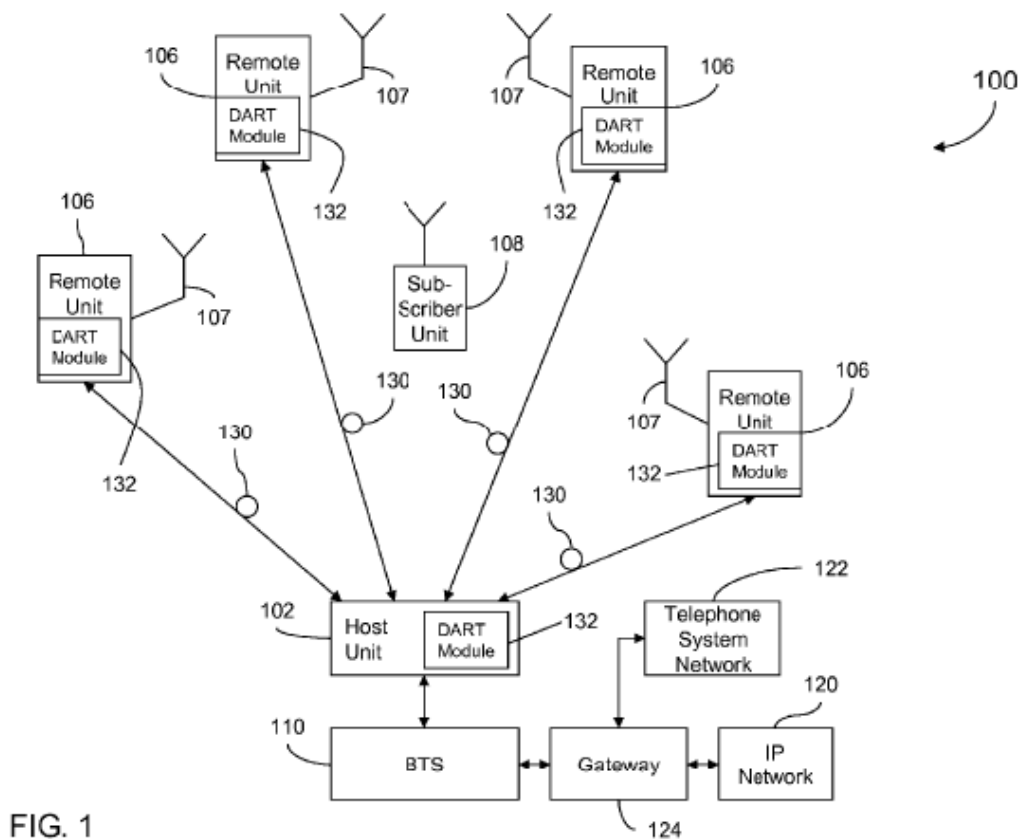
5. Claims 4, 11, 15, and 22

Petitioner asserts that claims 4, 11, 15, and 22, which depend from independent claims 1 or 12, would have been obvious over the combined teachings of Wu and Cannon. Pet. 61–66. In support, Petitioner relies on the testimony of Dr. Houh, and provides citations to teachings in Wu and Cannon. *Id.* Patent Owner generally argues these dependent claims together, focusing on claim 4 and noting claim 14’s “similar feature.” *See* Prelim. Resp. 50, 42–53.

Claim 4 is representative of these dependent claims for purposes of institution. Claim 4 recites “[t]he system of claim 1, wherein the dynamic load balancing and resource management dynamically adjusts a capacity of

at least the first remote unit.” Petitioner contends that the collective teachings of Wu and Cannon would have rendered claim 4 obvious. Pet. 61–63. Petitioner contends that Wu’s matrix switch 25 “may be configured using the routing policy, 255, to dynamically reroute or reallocate the radio resources [*adjust capacity*] to the RTUs [*of the first remote unit*] based on changing network conditions such as traffic rate, a consumed bandwidth, current traffic load, call rate, and load balancing.” *Id.* at 61–62 (citing Ex. 1007 ¶¶ 41–44). Petitioner also contends that Cannon’s system dynamically adjusts a capacity of a remote unit. *Id.* at 62 (citing Ex. 1012 ¶ 125).

Petitioner reproduces Cannon’s Figure 1, which follows:



Cannon’s Figure 1 above shows DART (digital to analog frequency transceiver) module 132 in each host 102 and remote unit 106. Petitioner explains that each DART module “contains a field programmable gate array (FPGA) 503.” Pet. 62–63. Petitioner also explains that “[e]ach FPGA is programmable to automatically configure the remote unit itself to alter both the bandwidths and the frequencies that are processed by the remote unit [*adjust a capacity of the at least the first remote unit*].” *Id.* at 63 (citing Ex. 1017 ¶ 46; Ex. 1012 ¶ 126). Petitioner also relies on Cannon’s “disclos[ure] that the FPGAs are adjusted ‘to meet changing needs of the end user.’” *Id.* (quoting Ex. 1017 ¶ 46; citing Ex. 1012 ¶ 126). Petitioner contends that it would have been obvious to combine Cannon and Wu, as both references “are . . . directed to dynamically allocating frequency spectrum in a DAS.” *Id.* at 58. Petitioner also contends that, like the ’343 patent, Wu and Cannon both “provide examples of mobile subscribers communicating with a remote radio unit of a DAS.” *Id.* (citing Ex. 1001, Fig. 1; Ex. 1007, Fig. 1; Ex. 1017, Fig. 1; Ex. 1012 ¶ 122).

Petitioner points out that the ’343 patent and Wu each describe reconfiguring remote units based on the load of each unit, and Cannon and the ’342 patent employ FPGAs, DUCs (digital up converters), and DDCs (digital down converters). Pet. 58–59 (citing Ex. 1001, 6:36–46, 7:32–46; 10:13–27; Ex. 1012 ¶ 122; Ex. 1007 ¶¶ 11, 39, 44; Ex. 1017, Fig. 6, ¶¶ 42, 34, 46–47). Petitioner contends that it would have been obvious to employ Cannon’s “beneficial” FPGA in Wu’s remote radio units because that allows for a simple programming adjustment to meet the changing needs of the end user, including to change the carriers, where Wu similarly teaches altering remote radio units by altering its carriers based on load. *See id.* (citing Ex.

1017 ¶¶ 34, 42, 46, 47, Fig. 6; Ex. 1012 ¶ 122), 62–63 (similar). Petitioner also contends that using an FPGA would have predictably enhanced Wu’s real-time load distribution technique by “improving the efficiency of the system” and “achieving reassignment on line without interrupting the service.” *Id.* at 61 (citing Ex. 1012 ¶ 124).

Petitioner also contends that Cannon’s teachings are similar to the ’343 patent, “which discloses dynamically adjusting a gain control parameter of integrated frequency selective DUCs and DDCs in the DRUs as well as reconfiguring a FPGA in each DRU to determine which carrier signals will be in the downlink.” Pet. 63 (citing Ex. 1001, 6:38–46, 7:32–46; Ex. 1012 ¶ 127). As indicated above, claims 11, 15, and 22 recite similar limitations, and Petitioner relies on similar teachings in Wu and Cannon to address these claims. *See id.* at 63–67.

Patent Owner contends that “Petitioner’s motivation to combine reasoning suffers from a fundamental misunderstanding.” Prelim. Resp. 44. Patent Owner contends that “Cannon[’s] invention is about optimizing the use of ***fiber bandwidth*** within a digital DAS rather than changing carriers transmitted or received at the air-interface.” *Id.* at 44–45. Patent Owner also argues that “Cannon’s *purpose* was not for changing or reconfiguring the radio capacity or number of carriers for over-the-air transmission at the radio unit antenna.” *Id.* at 47 (emphasis added) (citing Ex. 2001 ¶ 67). Patent Owner advances similar arguments based on its allegation that Petitioner relies on a misunderstanding of Cannon. *Id.* at 50–53.

This line of argument is unavailing. Cannon’s alleged purpose does not limit what Cannon teaches to one of ordinary skill in the art. As Patent Owner recognizes, “the overall digital RF spectrum *contemplated* in Cannon

is a representation of an uplink or downlink signal *intended for wireless reception or transmission by a radio unit.*” Prelim. Resp. 47 (emphasis added) (citing Ex. 1017 ¶ 29), 53 (same). Cannon specifically discloses reprogramming an FPGA with center frequencies f_{c1} and f_{c2} to shift the locations of spectral regions and meet the changing needs of the user. Ex. 1017 ¶ 46; *see also* Pet. 58 (arguing that a “POSA understood that Cannon teaches that each FPGA could be programmed with a set of carrier frequencies” (citing Ex. 1012 ¶¶ 120–121)). Cannon also teaches that “the number of individual signal paths for handling additional spectral regions may be increased by configuring the FPGA with additional digital up converters and digital down converters.” Ex. 1017 ¶ 46; *see also* Pet. 62–63 (citing Ex. 1017 ¶ 46).

Patent Owner also argues that using an FPGA in Wu’s system would “take too long for Wu’s dynamic timing needs, which require reassignments to occur with minimal delay time.” Prelim. Resp. 49 (citing Ex. 2001 ¶¶ 37, 42–46, 68). Patent Owner relies on Petitioner’s rationale that Wu teaches a “technique for dynamic reassignment of the DAS based on a real-time load distributing condition, improving the efficiency of the system, and achieving reassignment on line without interrupting the service.” *Id.* (quoting Pet. 61–62; citing Ex. 1007 ¶¶ 41–44). Patent Owner also relies on Petitioner’s rationale that Cannon’s “DART module’s FPGA can be **reconfigured by pushing a new build image onto the FPGA.**” *Id.* (citing Pet. 56; quoting Ex. 1017 ¶ 46).

As noted above, however, Petitioner also argues that an FPGA in a remote unit “is beneficial” because it allows for a simple programming adjustment to meet the changing needs of the end user. Pet. 59 (citing Ex.

1017 ¶¶ 42–43, 46, Fig. 6; Ex. 1012 ¶ 122). At one of the cited passages, Cannon states that

[b]ecause FPGA 503 is a field programmable device, it can be adjusted *to meet changing needs of the end user*. For example, the center frequencies f_{c1} and f_{c2} can be reprogrammed into FPGA 503 in order to shift the locations of spectral regions 451 and 452 within spectrum 400. Similarly BW1 and BW2 may be adjusted to accommodate larger or narrower bandwidths.

Ex. 1017 ¶ 46 (emphasis added). In other words, on this preliminary record, Cannon indicates that an FPGA is fast enough to shift center frequency carriers to meet the changing needs of the user’s remote unit and does not result in interrupting the service. Ex. 1012 ¶ 123 (“Cannon expressly teaches that the use of a FPGA allows each remote radio unit to be adjusted to meet the changing needs of the end user, and Wu teaches that the needs of the end user can be determined by the load of the remote radio units.”).

Patent Owner’s declarant, Dr. Chrissan, testifies that an FPGA restart time is “similar in manner to how a computer reboots.” Ex. 2001 ¶ 70. As Petitioner notes as discussed above, the ’343 patent discloses a similar system to that of Cannon, including use of an FPGA. See Pet. 58; Ex. 1001, 13:45 (“FGPA”). In addition, the ’343 patent states that “the DAU Management Control module can adaptively modify the system configuration to begin to deploy, *typically* although not necessarily *slowly*, additional radio resources.” Ex. 1001, 12:58–61 (emphasis added). In other words, the specification indicates that the disclosed and claimed invention do not require a maximum time to deploy additional resources.

Turning to the claim language, claim 4 recites “[t]he system of claim 1, wherein the dynamic load balancing and resource management dynamically adjusts a capacity of at least the first remote unit.” Claim 11

recites “[t]he system of claim 1, wherein the remote units are automatically configured by the system.” Claims 15 and 22 depend from independent claim 12 and are materially similar to claims 4 and 22, respectively. Like the specification, these claims do not indicate a maximum time required for dynamic balancing or adjustment or automatic configuration. Accordingly, Patent Owner’s arguments alleging slow times as a result of the combined teachings are not within the scope of the claimed invention. *See In re Zhang*, 654 F. App’x 488, 490 (Fed. Cir. 2016) (“While a prior art reference may indicate that a particular combination is undesirable for its own purposes, the reference can nevertheless teach that combination if it remains suitable *for the claimed invention*.”) (emphasis added); *Idemitsu Kosan Co. v. SFC Co.*, 870 F.3d 1376, 1381–82 (Fed. Cir. 2017) (“Evidence concerning whether the prior art teaches away from a given invention must relate to and be *commensurate in scope with the ultimate claims at issue*.”) (emphasis added) (citing *Zhang*, 654 F. App’x at 490).

For purposes of institution, based on the foregoing discussion, the preliminary record supports Petitioner’s showing. Accordingly, we determine that Petitioner shows a reasonable likelihood that it would prevail with respect to its contention claims 4, 11, 15, and 22 would have been obvious over the combined teachings of Wu and Cannon.

III. 37 C.F.R. § 42.73(d)(3)

Petitioner asserts that estoppel applies under 37 C.F.R. § 42.73(d)(3) as follows:

[P]ursuant to 37 C.F.R. §42.73(d)(3), because the Challenged Claims are not patentably distinct from the claims canceled by adverse judgment in the parent ’178 Patent, PO is estopped from taking any action before the Board that is inconsistent with its

cancellation of the claims in the parent '178 Patent. Specifically, PO is estopped from refuting that the Challenged Claims are obvious over Wu as asserted in Ground 1 of this Petition or that Wu discloses each limitation recited [in] independent Claims 1 and 12 as asserted in Ground 2 of this Petition.

Pet. 6; *see also id.* at 66–67 (similar assertions).

Patent Owner responds that “it is well settled by the Board that 37 C.F.R. § 42.73(d)(3) does not apply to a patent owner defending the validity of challenged claims in IPR proceedings.” Prelim. Resp. 26 (citing *Apple Inc. v. Contentguard Holdings, Inc.*, IPR2015-00458, Paper 9 at 7–8 (PTAB July 15, 2015)). Patent Owner reasons that “the Board has always held that patent owners are not barred from defending the patentability of an *issued patent* over prior art in an IPR” because “Patent Owner is not ‘*obtaining*’ a patent in this post-issuance proceeding, as the language of 37 C.F.R. § 42.73(d)(3) that introduces subsection (i) requires.” *Id.* at 27 (second quotation quoting *Illumina, Inc. v. The Trustees of Columbia University in the City of New York*, IPR2018-00291, Paper 67 at 68 (PTAB Jun 21, 2018)). Patent Owner also asserts that “[t]he '343 and '178 patents claim entirely different inventions—most notably because one invention is directed to the management of ‘radio resources’ and the other is directed to the transport of ‘downlink channel signals.’” *Id.* at 27–28.

Based on Petitioner’s sufficient showing of obviousness (and common law collateral estoppel with respect to the digital access unit limitation of the challenged claims) for purposes of institution as discussed above, we do not reach alleged estoppel under 37 C.F.R. § 42.73(d)(3).

IV. DISCRETIONARY INSTITUTION, 35 U.S.C. § 314(A)

Institution of *inter partes* review is discretionary. *See Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1367 (Fed. Cir. 2016) (“[T]he [U.S. Patent and Trademark Office] is permitted, but never compelled, to institute an IPR proceeding.”). Patent Owner urges the Board to exercise discretion to deny institution of *inter partes* review under § 314(a) based on the factors established in *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, 2020 WL 2126495, at 2–3 (PTAB Mar. 20, 2020) (precedential). Prelim. Resp. 50–54.

On June 21, 2022, the Director of the USPTO issued an Interim Procedure for Discretionary Denials in AIA Postgrant Proceedings with Parallel District Court Litigation, *available at* https://www.uspto.gov/sites/default/files/documents/interim_proc_discretionary_denials_aia_parallel_district_court_litigation_memo_20220621_.pdf (the “Interim Procedure”). The Interim Procedure explains that “[c]onsistent with *Sotera Wireless, Inc.*, the PTAB will not discretionarily deny institution in view of parallel district court litigation where a petitioner presents a stipulation not to pursue in a parallel proceeding the same grounds or any grounds that could have reasonably been raised before the PTAB.” Interim Procedure 3 (internal footnote omitted) (citing *Sotera Wireless, Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12 (PTAB Dec. 1, 2020) (precedential as to § II.A)). The Interim Procedure explains that such a *Sotera* stipulation “mitigates concerns of potentially conflicting decisions and duplicative efforts between the district court and the PTAB . . . [and] allows the PTAB to review grounds that the parallel district court litigation will not resolve.” *Id.* at 7–8.

Petitioner “adopts the identical stipulation from *Sotera*, namely, that if the IPR is instituted, . . . Petitioner will not pursue in the District Court

Litigation any ground raised or that could have been reasonably raised in an IPR for the challenged patent.” Pet. 70.

Patent Owner “acknowledges that the recent Interim Guidance notes that a petition should not ordinarily be denied in accordance with the *Fintiv* factors where (as here) Petitioner has stipulated” according to *Sotera*. Prelim. Resp. 54. Nevertheless, Patent Owner contends that the Petition “merits denial under a holistic analysis of the *Fintiv* factors due to the advanced stage of the parallel district court proceedings and the duplication of the invalidity grounds asserted therein.” *Id.*

Each party presents arguments and evidence regarding the *Fintiv* factors. Pet. 70–72; Prelim. Resp. 54–58. Given the *Sotera* stipulation and the guidance under the Interim Procedure, we decline to exercise discretion to deny institution. Notwithstanding Patent Owner’s contention that the Petition merely “should not ordinarily be denied” in view of the *Sotera* stipulation (PO Resp. 54), the Interim Guidance provides that the Board “will not discretionarily deny institution . . . where a petitioner presents a [*Sotera*] stipulation” (Interim Procedure 3).

V. CONCLUSION

For the foregoing reasons, we determine that the information presented in the Petition establishes a reasonable likelihood that Petitioner would prevail in showing at least one of claims 1–22 of the ’343 patent is unpatentable under 35 U.S.C. § 103.

VI. ORDER

Accordingly, it is

ORDERED that pursuant to 35 U.S.C. § 314(a), an *inter partes* review is hereby instituted as to claims 1–22 of the '343 patent on all the grounds set forth in the Petition; and,

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial; the trial will commence on the entry date of this decision.

For PETITIONER:

Patrick D. McPherson
Patrick C. Muldoon
D. Joseph English
DUANE MORRIS LLP
pdmcperson@duanemorris.com
pcmuldoon@duanemorris.com
djenglish@duanemorris.com

For PATENT OWNER:

David D. Schumann
Palani P. Rathinasamy
Moses Xie
Timothy Dewberry
FOLIO LAW GROUP PLLC
david.schumann@foliolaw.com
palani@foliolaw.com
moses.xie@foliolaw.com
timothy.dewberry@foliolaw.com