

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ERICSSON INC.,
Petitioner,

v.

DALI WIRELESS INC.,
Patent Owner.

IPR2022-01212
Patent 8,682,338 B2

Before KARL D. EASTHOM, BARBARA A. BENOIT, and
SHARON FENICK, *Administrative Patent Judges*.

Opinion for the Board filed by Administrative Patent Judge EASTHOM.

Opinion Concurring filed by Administrative Patent Judge FENICK.

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 1–12 of U.S. Patent No. 8,682,338 B2 (“the ’338 patent”), supported by the Declaration of Henry Houh, Ph.D. Paper 6 (“Pet.”); Ex. 1003. Dali Wireless, Inc. (“Patent Owner”) filed a Preliminary Response supported by the Declaration of Douglass A. Chrissan, Ph.D. Paper 8 (“Prelim. Resp.”); Ex. 2008. The parties also filed supplemental briefing authorized by the Board to address a claim construction issue. *See* Paper 11 (Petitioner’s Reply (“Pet. Reply”)); Paper 15 (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).

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 1–12 of the ’338 patent.

A. Real Party in Interest

Petitioner identifies itself, Ericsson, Inc., and its “corporate parent Telefonaktiebolaget LM Ericsson” as real parties in interest. Pet. 83 Patent Owner identifies itself as the real party in interest. Paper 3, 1.

B. Related Matters

Petitioner identifies the following *inter partes* review as involving the '338 patent. *CommScope, Inc. v. Dali Wireless, Inc.*, IPR2020-01466, Paper 16 (PTAB Feb. 9, 2021) (institution denied). Pet. 83.

Petitioner identifies the following related district court matters involving the '338 patent: *Dali Wireless, Inc. v. AT&T Corp., et al.*, No. 2:22-cv-12 (E.D. Texas); *Dali Wireless, Inc. v. Cellco Partnership*, No. 6:22-cv-00104 (W.D. Texas). Pet. 83.

Patent Owner refers to another district court matter that involves the '338 patent but does not involve Petitioner: *Dali Wireless, Inc. v. CommScope Techs.*, No. 19-952 (Del.), on appeal *Dali Wireless Inc. v. CommScope Techs LLC*, No. 22-1699 (Fed. Cir.). Paper 3, 1; *see also* Prelim. Resp. 15 (citing Ex. 2009).

C. The '338 Patent (Ex. 1001)

The '338 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, 5:52–56.

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

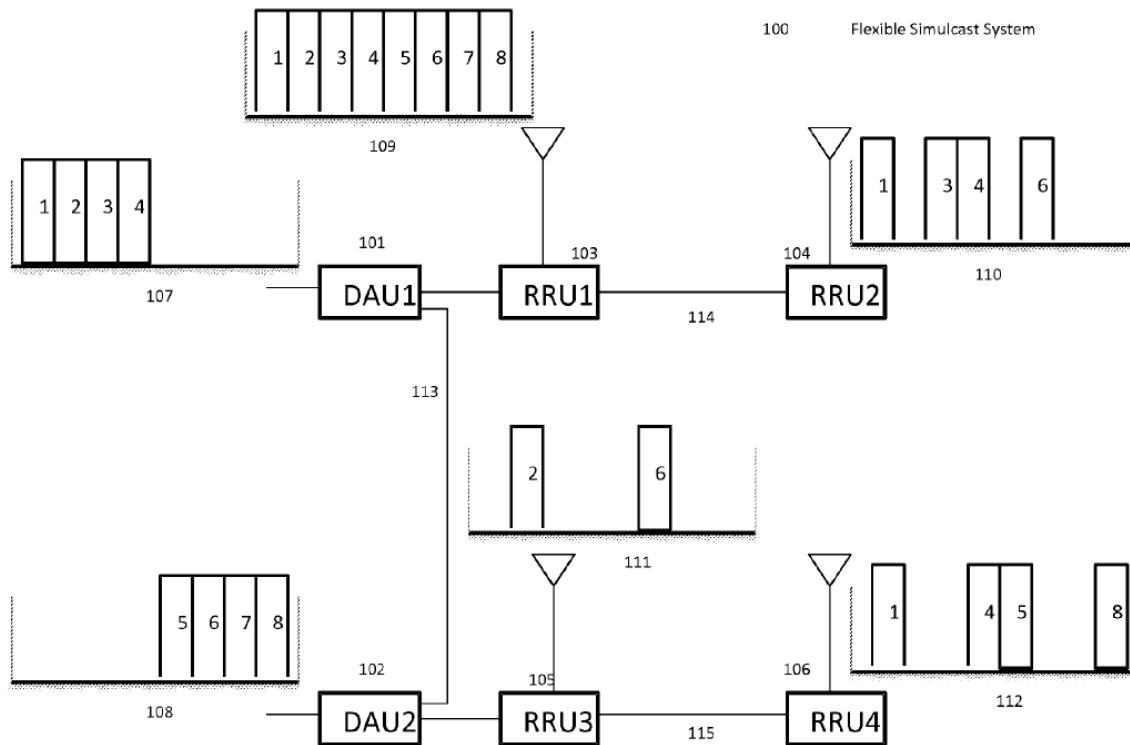


Figure 1 is a block diagram showing the basic structure and an example of a flexible simulcast downlink transport scenario. Ex. 1001, 5:25–28, 5:59–60. Flexible simulcast system 100 system employs digital access units (DAUs) that serve as interfaces to a base station (BTS). *Id.* at 5:60–63. The DAUs (e.g., DAU1, DAU2) connect to the BTS on one end and to multiple radio head units (RRUs) on the other end. *Id.* at 5:63–64, Fig. 1. Software settings within RRU1, RRU2, RRU3, and RRU4 enable particular carriers to be present in each respective downlink output signal 109, 110, 111, 112 (e.g., carriers 1–8 in RRU1, carriers 2 and 6 in RRU3). *See id.* at 6:31–65.

A DAU software control module manages key functions of the DAU and RRU. Figure 7, which follows, illustrates a DAU software control module (Ex. 1001, 11:18–21):

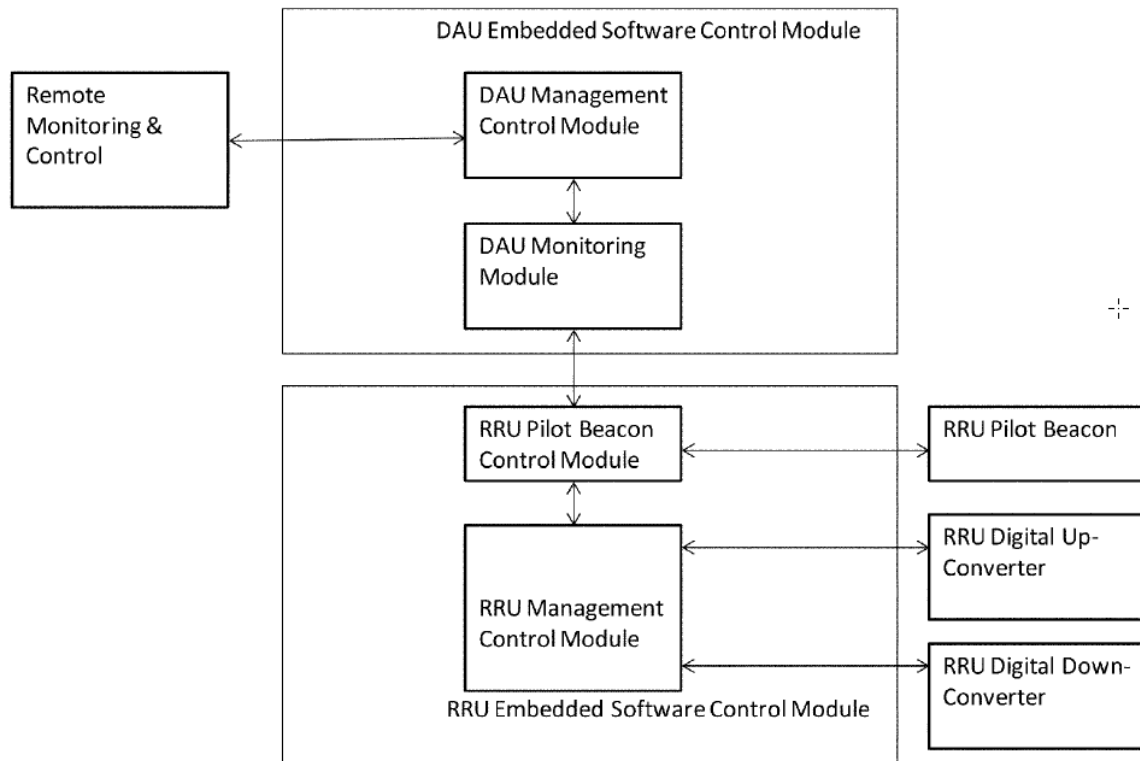


Figure 7: Embedded Software Control Modules

Figure 7 is a block diagram of an embodiment of a DAU software control module, which includes other modules. The modules determine and/or set the appropriate number of radio resources (such as RF carriers, CDMA codes or TDMA time slots) assigned to a particular RRU or group of RRUs to meet desired capacity and throughput objectives. Ex. 1001, 11:21–25. The DAU software control module comprises a DAU monitoring module that detects which carriers and corresponding time slots are active for each RRU. *Id.* at 11:25–28. The DAU embedded software control module also comprises a DAU management control module that communicates with the RRUs over a fiber optic link control channel. *Id.* at

11:28–32. The RRU management control module sets the individual parameters of all the RRU digital up-converters to enable or disable transmission of specific radio resources by a particular RRU or group of RRUs, and also sets the individual parameters of all the RRU digital down-converters to enable or disable processing of specific uplink radio resources by a particular RRU or group of RRUs. *Id.* at 11:32–39.

In one embodiment, an algorithm operating within the DAU monitoring module detects which carriers and corresponding time slots for each carrier are active for each RRU and provides information to the DAU management control module to help determine if a particular downlink carrier exceeds a load by a percentage greater than a predetermined threshold. *Id.* at 11:40–46. If that occurs, the DAU management control module adaptively modifies the system configuration to deploy additional radio resources for use by a particular RRU that needs those radio resources within its coverage area. *Id.* at 11:48–53. At the same time, the DAU management control module adaptively modifies the system configuration to remove certain radio resources for use by a particular RRU that no longer needs those radio resources within its coverage area. *Id.* at 11:53–58.

The '338 patent states that “[t]he present invention overcomes . . . limitations of the prior art,” describing “the present invention” as providing “automatic load balancing,” among other goals, as follows:

The advanced system architecture of the present invention provides a high degree of flexibility to manage, control, enhance and facilitate radio resource efficiency, usage and overall performance of the distributed wireless network. This advanced system architecture enables specialized applications and enhancements including flexible simulcast, *automatic traffic load-balancing*, network and radio resource optimization, network calibration, autonomous/assisted commissioning,

carrier pooling, automatic frequency selection, radio frequency carrier placement, traffic monitoring, traffic tagging, and indoor location determination using pilot beacons.

Ex. 1001, 3:51–62 (emphasis added).

D. Illustrative Claim

Illustrative independent claim 1, the sole independent claim, follows (with bracketing information added to conform to Petitioner's nomenclature):

1. [i.] A method for routing and switching RF signals comprising:

[ii.] providing one or more remote radio units, each remote radio unit configured to transmit one or more downlink RF signals and to receive one or more uplink RF signals;

[iii.] providing at least one digital access unit configured to communicate with the one or more remote radio units;

[iv.] translating the uplink and downlink signals between RF and base band as appropriate;

[v.] packetizing the uplink and downlink base band signals, wherein the packetized signals correspond to a plurality of carriers;

[vi.] configuring each remote radio unit to receive or transmit a respective subset of the plurality of carriers, each respective subset of the plurality of carriers including a number of carriers;

[vii.] reconfiguring each remote radio unit by:

[a.] determining a load percentage for each remote radio unit; and

[b.] increasing or decreasing the number of carriers in the respective subset of the plurality of carriers based on the load percentage; and

[viii.] routing and switching the packetized signals among the one or more remote radio units via the at least one

digital access unit according to a result of the reconfiguring.

E. Asserted Grounds of Unpatentability

Petitioner asserts that claims 1–12 are unpatentable as follows:

Claim(s) Challenged	35 U.S.C §	Reference(s)/Basis
1–3	103 ¹	Leng ²
1–3	103	Leng, Cannon ³
4–12	103	Leng, Gupta ⁴
4–12	103	Leng, Cannon, Gupta

¹ 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. Because the ’338 patent’s claims the filing benefit of a provisional application filed on September 14, 2010, Petitioner “assumes the priority date is September 14, 2010” “[s]olely for the purposes of this [*inter partes* review].” Pet. 18. Because this date is before the effective date of the applicable AIA amendment, the pre-AIA version of § 103 applies for purposes of institution.

² Leng et al., Pub. No. WO 2009/021359 A1, published Feb. 19, 2009. Ex. 1004. Petitioner filed an English translation of Leng et al. with its Petition as Exhibit 1005. Thereafter, with our permission, Petitioner filed another English translation of Leng et al., also filed as Exhibit 1005. Petitioner filed this later version with a corrected declaration that certifies under penalties of perjury that the translation is correct. *See id.* This later version appears to be the same as the previous version. We refer to this later version as “Leng.”

³ Cannon et al., U.S. Patent No. 8,270,387 B2, issued Sept. 18, 2012, filed Jan. 13, 2010. Ex. 1006.

⁴ Gupta et al., U.S. Pub. No. US 2008/0045254 A1, issued Feb. 21, 2008. Ex. 1008.

II. OBVIOUSNESS ANALYSIS

A. Level of Ordinary Skill in the Art

Relying on the Houh Declaration (Ex. 1003), Petitioner asserts that a person of ordinary skill in the art (POSA)

in September 2010 would have been familiar with reconfiguring remote radio units in a DAS. EX-1003 ¶44. 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-1003 ¶44.

Pet. 18.

Patent Owner

submits that the above POSA at the time of the '338 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 *John Mezzalingua Associates, LLC v. Dali Wireless Inc.*, IPR2020-01432, Paper 16 at 8 (PTAB Feb. 9, 2021) (institution denied), which involves similar technology, a similar patent (which shares the same specification as the '338 patent), and similar claims. *See* Ex. 2002 (IPR2020-01432 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 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. Determining Load Percentage

The parties dispute the claim construction of “determining a load percentage for each remote radio unit.” Citing a prior claim construction in a Delaware District Court proceeding, the parties agree that “load percentage” is “a value representing the portion of available capacity that is in use.” *See* Prelim. Resp. 14–16 (citing Ex. 2009, 1, 9); Pet. Reply 1; PO Sur-reply 1; Ex. 2009 (Delaware District Court claim construction order), 1 (“load percentage” shall mean “a value representing the portion of available capacity that is in use”).⁵ The parties disagree as to the interpretation of the term “available capacity,” which appears in the District Court’s claim construction of “load percentage,” but which is not a claim term. *See* Prelim. Resp. 14–15; Pet. Reply 1–2; PO Sur-reply 1; Ex. 2001, 3; Ex. 2009, 1. The District Court in its Memorandum Order construing “load percentage” did not interpret the meaning of “available capacity.” *See* Ex. 2009, 9–10.

Patent Owner contends that “‘available capacity’ refers to the capacity available *to a particular* RRU, not to the entire DAS.” PO Sur-reply 1 (citing Ex. 2008 ¶ 34); *see also* Prelim. Resp. 17 (asserting how a skilled artisan would understand load capacity). Petitioner characterizes Patent

⁵ Petitioner was not a party to the Delaware District Court litigation, but proposed the claim construction from that litigation in Texas District Court litigation. *See* Pet. Reply 1 n.1 (asserting it “was not a party to the Delaware litigation); Ex. 2001, 3 (Petitioner in Texas District Court proposing that “load percentage” means “‘a value representing the portion of available capacity that is in use’, according to the construction and reasoning of the Delaware district court”).

Owner's construction as follows: "PO improperly applies this agreed construction by interpreting 'available capacity' to mean the available capacity of a carrier being used by a[n] RRU, asserting that *load percentage* means 'an amount of active capacity utilized by a remote radio unit relative to the maximum amount of active capacity allocated to the remote radio unit.'" Pet. Reply 1–2 (citing Prelim. Resp. 17).

Petitioner contends that a skilled artisan "would instead understand that the 'available capacity' in the agreed construction [of the recited load percentage] can include the available capacity of a single radio, a group of radios or the entire DAS system, and can be determined using throughput, number of connections, number of users, number of carriers, or power." Pet. Reply 3. Petitioner argues that "nothing in the agreed claim construction, or in the [s]pecification of the '338 Patent limits the available capacity of a carrier to a single radio unit." Pet. Reply 2 (analyzing Fig. 2 "downlink example" of the '338 patent). Petitioner contends that "available capacity can be the capacity used by the entire DAS system, *e.g., the amount of load used by RRH compared to the total load on the network.*" Pet. Reply 4 (emphasis added) (citing Pet. 59).

Petitioner explains its position as follows:

[T]he claims require ***reconfiguring each radio*** by *determining a load percentage for each remote radio*, and then increasing or decreasing the number of carriers for a radio based on the determined load percentages for each radio. Thus, a POSA understood that the available capacity can be the capacity used by the entire DAS system, *e.g., the amount of load used by RRH compared to the total load on the network.* Pet. 59. In other words, for a given capacity of a network, the relative loading of each of the RRHs could be determined by determining whether the number of carriers could be increased or decreased for each RRH.

Pet. Reply 4.

Turning to the claim language, limitation *vii* recites “reconfiguring each remote radio unit by: determining a load percentage for each remote radio unit.” Claim 1 simply does not specify how to determine the load percentage for each remote radio unit and “load percentage” is a broad term. Stated differently, claim 1 does not specify the numerator or denominator to be used in determining the load percentage, but the parties agree that the numerator is the amount of load used in an RRU, as indicated above. On this preliminary record, Petitioner’s interpretation of “available capacity” as including “a single radio, a group of radios or the entire DAS system, [able to] be determined using throughput, number of connections, number of users, number of carriers, or power,” is sufficient for purposes of institution. *See* Pet. Reply 3 (citing Ex. 1005, 4:24–27; 5:13–15; 6:1–4; Ex. 1003 ¶¶ 104–06). On this preliminary record, as Petitioner argues (Pet. Reply 2) and contrary to Patent Owner’s construction, the claim language and the specification do not support limiting available capacity to a single RRU, or similarly, limiting the scope of “load percentage” to a load consumed by a remote radio unit divided by the assigned available capacity *for that remote radio unit*.⁶

Turning to the ’338 patent specification, as indicated above (§ I.C), the “invention” includes several stated goals, including “automatic load balancing,” “network and radio resource optimization,” “radio frequency

⁶ The prosecution history does not clarify the issue. *See* Ex. 1002, 89–95 (amending claim 1 to recite “determining a load percentage of each remote radio unit” among other features without further clarifying load percentage); Prelim. Resp. 11–12 (summarizing prosecution history without explaining how it supports Patent Owner’s claim construction).

carrier placement,” “traffic monitoring,” and others to “overcome[] limitations in the prior art.” Ex. 1001, 3:51–59. In addition, the ’338 patent refers to a “key function [a]s determining and/or setting radio resources (such as RF carriers, CDMA codes or TDMA time slots) assigned to a particular RRU *or group of RRUs* to meet desired capacity and throughput objectives.” Ex. 1001, 11:21–25; *see, e.g.*, Pet. 11. Therefore, the ’338 patent indicates that the disclosed system is able to assign radio resources to a group of remote radio units to meet capacity and throughput objectives.

Petitioner essentially argues that its claim construction of “load percentage” allows for effectively distributing network resources using information from all RRUs of a system. *See* Pet. 59 (asserting that the disputed limitation reads on Leng’s automatic load balancing that “most efficiently distributes network resources using the combination of load information of the RRHs”) (citing Ex. 1003 ¶¶ 104–106), 65 (arguing that “a POSA understood that Leng’s disclosure of the relative loading of each RRH can be converted to a load percentage”) (citing Ex. 1003 ¶ 118); Pet. Reply 3 (asserting the recited “load capacity” determination for each RRU can be made based on available capacity of RRU, a group of RRUs, or total system, and can be determined using throughput, number of connections, number of users, number of carriers, or power). Petitioner’s construction is consistent with the claim language and desired goals of the “invention,” namely automatic load balancing, network and radio resource optimization, radio frequency (RF) carrier placement, and traffic monitoring.

In other words, under one plain meaning, balancing a load in a circuit involves equalizing the load—i.e., attempting to render each load to be an

approximately equal proportion of the total load consumed.⁷ Determining the amount of load consumed by each RRU (e.g., carriers used on that RRU) as a proportion of the total load of carriers used in the system, effectively allows the system to determine how to balance loads by redistributing carriers from higher loaded RRUs to lower loaded RRUs in a group. *See* Ex. 2009, 10 (“[T]here there are other definitions of percentage including ‘proportion.’”). For example, attempting to balance the load where all the RRUs are in a group and covering the same large room of mobile telephones (e.g., cafeteria, concert hall) minimizes the power handled by higher loaded RRUs, while still covering the same mobile telephones. *See* Ex. 1001, 11:21–25 (describing assigning RF carriers to “a particular RRU or a group of RRUs”), 8:63–9:10 (describing different RRUs handling the same carrier and merging the signal from one carrier at two RRUs, signifying the two RRUs cover the same approximate area), Figs. 4–5 (illustrating overlapping antenna coverage for two RRUs and three RRUs).

Patent Owner focuses on a non-limiting disclosed embodiment. In particular, Patent Owner relies on a disclosed embodiment which describes determining “*when, e.g., a particular downlink carrier is loaded by a percentage greater than a predetermined threshold*” whose value is

⁷ According to one trade dictionary, “balanced circuit” is “[a] circuit in which there are substantially equal currents, either alternating or direct, in all main wires and substantially equal voltages between main wires and between each main wire and neutral (if one exists).” THE AUTHORITATIVE DICTIONARY OF IEEE STANDARDS TERMS, 7th Ed., IEEE Std. 100-2000, pp. 81–82, 11 Dec. 2000, doi: 10.1109/IEEESTD.2000.322230, *available at* <https://ieeexplore.ieee.org/document/4116787>. Ex. 3002. Another trade dictionary defines “balance” as follows: “To equalize loads, voltages, or signals between two circuits or components.” THE ILLUSTRATED DICTIONARY OF ELECTRONICS, Gibilisco, Stan (2001). Ex. 3003.

communicated to the DAU Management Control module by the DAU's Remote Monitoring and Control function.” *Id.* at 16–17 (emphasis in original) (quoting Ex. 1001, 11:41–48). Relying on this embodiment, Patent Owner argues that “[b]y comparing the load to a predetermined threshold, the DAU Management Control Module can determine the active capacity used (how the radio unit is loaded) relative to the maximum active capacity allocated for that radio unit.” PO Sur-reply 17. But this disclosed allocation of resources, which the specification introduces with “e.g.” (Ex. 1001, 11:44), is merely an example of comparing an RRU's load percentage with a threshold. The challenged claims do not recite a threshold or any comparison thereto. Moreover, the relied-upon example is “[i]n an embodiment” (Ex. 1001, 11:40) of the more generic Figure 7 embodiment (*id.* at 11:18–21), which more broadly includes the above-discussed “key function” of transferring resources to a “group of RRUs” (*id.* at 11:21–25). *See* Ex. 1001, 11:18–48. Therefore, as Petitioner argues, nothing in the specification indicates that the claims *require* incorporating the disclosed example of load percentage into the claim construction as urged by Patent Owner. *See* Reply 1–4.

Patent Owner also argues that “Petitioner fails to reconcile the contrasting constructions that it proposes in the district court and in this IPR.” Prelim. Resp. 15. As indicated above however, however, Petitioner's position is not inconsistent with the Delaware District Court's claim construction, because the District Court's claim construction leaves open what the numerator and denominator of “load percentage” is and what “available capacity” is. *See* Ex. 2009, 9–10.

As Petitioner also argues, in the Delaware District Court (Ex. 2009), Patent Owner initially proposed “its restrictive construction of ‘load percentage’ as ‘[t]he amount of active capacity utilized by a remote radio unit relative to the maximum amount of active capacity allocated to the remote radio unit.’” Pet. Reply 4 (citing Ex. 2009, 9). Petitioner asserts that Patent Owner “then abandoned its proposed construction in favor of the agreed construction that ‘load percentage’ means ‘a value representing the portion of available capacity that is in use’ that does not limit the available capacity to only the capacity allocated to the RRU.” *Id.* In response, Patent Owner argues that “[t]he Delaware court’s construction . . . was primarily concerned with the parties’ dispute over the meaning of ‘percentage’ as expressed in ‘hundredths.’” PO Sur-reply 5 (citing Ex. 2009, 9); *see* Prelim. Resp. 17 (Patent Owner indicating “‘load percentage’—*i.e.*, an amount of active capacity utilized by a remote radio unit relative to the maximum amount of active capacity allocated to the remote radio unit”).

However, the Delaware District Court did not adopt Patent Owner’s initial (more restrictive) proposal (which it proposes here), finding that Patent Owner “has proposed a number of constructions” and “agreed” that “a value representing the portion of available capacity that is in use” “is appropriate” as the meaning of “load percentage.” Ex. 2009, 9. The issue of whether to express percentage in terms of hundredths was a separate issue. *See id.* at 9–10. In essence, by not specifying the numerator or denominator involved in load percentage or load “proportion,” the District Court’s claim construction does not preclude either parties’ proposed constructions here. *See id.*

As discussed above, Petitioner asserts that “load percentage” in Leng is “the amount of load used by RRH compared to the total load on the network. To the extent the interpretation of “available capacity” is relevant in this proceeding, Petitioner’s arguments that a skilled artisan would have understood that it “can be determined using throughput, number of connections, number of users, number of carriers, or power” sufficiently ties the Petition’s arguments regarding Leng’s disclosure of “load percentage” to “available capacity” in the adopted construction of “load percentage” for purposes of institution. *See* Pet. Reply 3 (citing Ex. 1005, 4:24–27; 5:13–15; 6:1–4; Ex. 1003 ¶¶ 104–06).

Based on the foregoing discussion, for purposes of this Institution Decision, we adopt the proposal agreed upon by the parties here, which is the same construction of “load percentage” adopted in the District Court. Prelim. Resp. 16–17; Pet. Reply 1; PO Sur-reply 1; Ex. 2009, 9. Accordingly, “load percentage” is “a value representing the portion of available capacity that is in use.” We further determine, on the preliminary record, that “load percentage” encompasses, but does not require, “an amount of load used by a remote radio unit relative to the total active capacity allocated to the remote radio unit or a group of remote radio units” or “the amount of load used by a remote radio unit compared to the total load on the network.”

2. Reconfiguring Limitation

The parties agree that “reconfiguring each remote radio unit” means “changing the configuration of each remote unit.” Pet. 17 (citing the

decision denying institution in IPR2020-01466, Ex. 1007); Prelim. Resp. 14 (same). We adopt this construction as supported by the record.

3. 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 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

1. Leng, Canon

Petitioner asserts that claims 1–3 would have been obvious under 35 U.S.C. § 103 based on Leng alone or on the combined teachings of Leng and Cannon. Pet. 23, 24–65. Patent Owner disagrees. *See generally* Prelim. Resp.

a. Leng

i. Translation and Certification

Leng et al. is a WIPO (World Intellectual Property Organization) international application published under the PCT (Patent Cooperation Treaty, published in Chinese. Ex. 1004 (“Leng et al.”). Petitioner provides a certified English translation of Leng et al. with its Petition. Ex. 1005 (“Leng”). Patent Owner asserts that Petitioner’s translation of Leng et al. “suffers from several critical defects,” including that “the accompanying affidavit fails to comply with the rules of the PTAB, including failure to comply with 37 C.F.R. § 42.63(b), failure to translate the entire original document, failure to provide any information on how the translation was generated and by whom.” Prelim. Resp. 1.

After hearing from the parties on this issue during a teleconference, the Board granted Petitioner’s request “to file a substitute exhibit to correct the affidavit or declaration submitted in Exhibit 1005,” noting that “we have not yet decided whether to institute and the form of the oath goes to weight.” Paper 10 (“Order”), 2 (citing *Comcast Cable Communications, LLC v. Rovi Guides, Inc.*, IPR2021-00807, Paper 9 at 3 (PTAB Aug. 7, 2020) (“If we institute an *inter partes* review, Patent Owner will have an opportunity after institution to address any issues regarding the substance and accuracy of the

. . . translation.”). Petitioner subsequently filed another translation of Leng et al. with a corrected oath. Ex. 1005, 37.⁸

The Order explains that with respect to the original translation, “all pages appear to be translated,” contrary to Patent Owner’s assertion above. Order 2 n.1. The oath as subsequently filed also appears to be in proper form for purposes of institution. Ex. 1005, 37. During trial, Patent Owner will have the opportunity to revisit any translation and oath issues with respect to Leng.

Patent Owner also asserts that Petitioner’s translation of Leng “raises several questions as to its accuracy in regards to material statements contained in the foreign language prior art that are likely to be a focal point in this [*inter partes* review]” Prelim. Resp. 19. Patent Owner lists several examples of alleged misstatements in translation, including that the title of Leng et al. refers to a “REEASSIGNMENT” method, but Petitioner’s translation refers to a “**reconfiguration** method.” *Id.* at 20 (quoting Ex. 1004, 1; Ex. 1005, 1). Patent Owner lists other alleged errors that largely pertain to interchanging a form of the word “reassignment” with “reconfiguration.” *See id.*

Accordingly, “[d]ue to these elementary facial discrepancies, Patent Owner retained a translator to provide a sworn check-translation of Petitioner’s foreign language translation for the Leng reference.” Prelim. Resp. 21 (citing Ex. 2005). Patent Owner asserts that its translation (Ex. 2005) includes red-line markings to show how its translation differs from

⁸ Petitioner filed both versions of Leng as Exhibit 1005. Other than the oath, the two documents are identical.

Petitioner's translation and "identifies corrected translations of several words and phrases in the Leng reference." *See id.* at 21–22 & n.1; Ex. 2005.

According further to Patent Owner, a person of ordinary skill in the art "would appreciate the importance of the distinction between the word 'reconfigure,' on one hand, and 'reassign' or 'reallocate,' on the other, in the context of the prior art and the issues raised in this [*inter partes* review]." Prelim. Resp. 23–24. Patent Owner also asserts that "material errors in the translation of critical phrasing in the original document highly relevant to central issues in the Petition" exist, such that "the Board should deny institution of the Petition." *Id.* at 25–26.

We decline to deny institution on this basis. A comparison of Patent Owner's translation and Petitioner's translation reveals no material differences for purposes of institution. *Compare* Ex. 1005, *with* Ex. 2005. As one example, the translation by Petitioner states that Leng relates to "a reassignment method of the distributed antenna system." Ex. 1005, code (57). On this record, the differences between the two translations are not material, and we would reach the same conclusion based on either translation. A critical issue with respect to the differences between translations is whether Leng teaches or suggests "reconfiguring each remote radio unit," which we construe as "changing the configuration of each remote unit." *See supra* § II.B.2; *infra* § II.D.1.c.vii. As indicated below, our determination does not turn on whether the word "reconfiguration" appears in Petitioner's Leng translation.⁹ Rather, we rely on the substance of the disclosure in Leng.

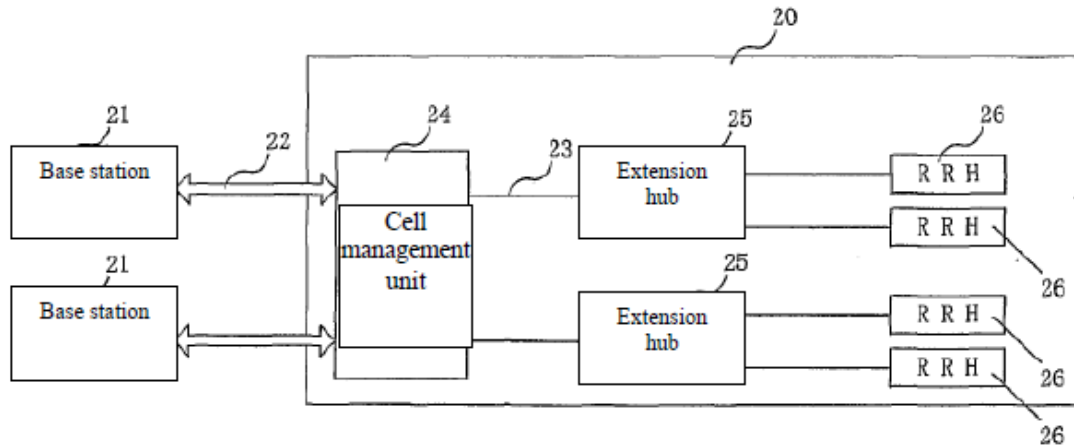
⁹ Patent Owner's red-line of Petitioner's translation does not uniformly change Petitioner's "reconfiguration" to "reassignment." *See, e.g.,* Ex.

Where appropriate, this Institution Decision cites to Patent Owner's translation (Ex. 2005) and Petitioner's translation (Ex. 1005). Patent Owner will have the opportunity to raise this issue again during trial.

ii. Leng's Disclosure

Leng's system relates to a DAS that reassigns carriers to remote radio heads based on real-time load conditions, in order to "balance the load in time and improve the efficiency of the system." Ex. 1005, code (57); Ex. 2005, code (57).

Leng's Figure 2 follows:



In the embodiment of Figure 2 above, "the cell management unit (CMU) 24 is the control center of the distributed antenna system 20, and the cell management unit 24 is connected to the base station 21 and connected to the remote radio heads 26 via the extension hub 25." Ex. 1005, 3:26–28; Ex. 2005, 3:26–28.

2005, Fig. 8. Both parties' translations include a "[t]opology reconfiguration module" and a "[t]outing reconfiguration module." *Compare* Ex. 1005, 27, Fig. 8, *with* Ex. 2005, Fig. 8. (Page numbers refer to the original page numbers of the translation document (i.e., not the Bates numbers added by Petitioner or Patent Owner)).

Leng's base station switches high-load remote radio heads so that they receive different carriers from low-load remote radio heads to balance the loads across the remote radio heads and mitigate problems in "hot spots." See Ex. 1005, 9:1–33; Ex. 2005, 9:1–33.

b. Canon

Cannon, titled "Systems and Methods for Improved Digital RF Transport in Distributed Antenna Systems," describes a DAS system with a base station that transmits RF signals to remote units, which reconstruct the RF signals and transmits them via an antenna. Ex. 1006, codes (54), (57), ¶ 20.

Cannon's Figure 1 follows:

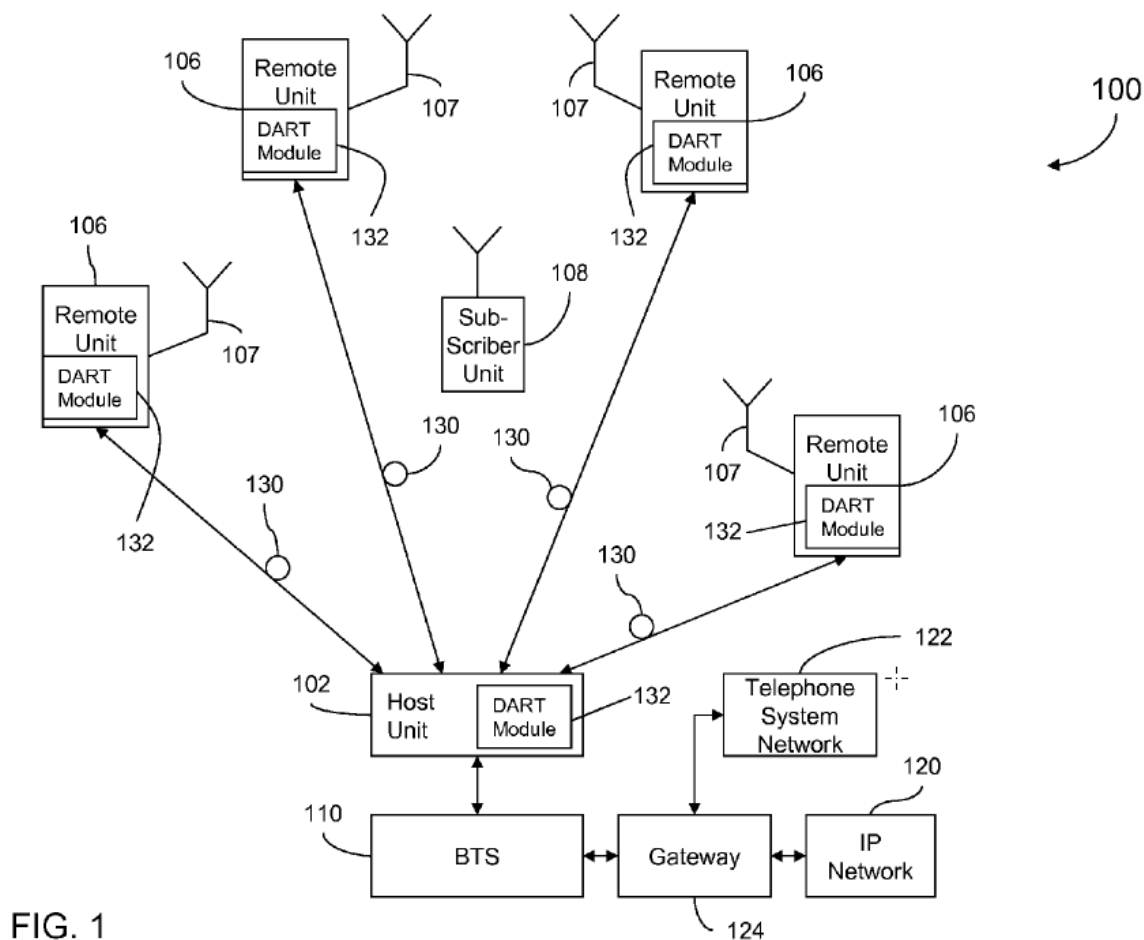


Figure 1 depicts DAS 100, including host unit 102 and remote units 106. Ex. 1006, 2:59–60. Host unit 102 communicatively couples to at least one base transceiver station (BTS) 110. *Id.* at 3:13–14. Host unit 102 receives downlink signals from BTS 110 and generates transport signals for transmitting to one or more remote units 106. *Id.* at 3:27–30. “[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.* at 3:46–49. “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.* at 3:49–53. “These digital data signals . . . may comprise digital representations of an RF, IF or baseband version of the original RF signal.” *Id.* at 3:52–56.

“For example, if a particular communication signal destined for transmission to subscriber unit 108 is a modulated RF signal in the 900 MHz band, then host unit 102 will generate baseband digital samples of the modulated 900 MHz RF signal from BTS 110, which are then distributed by host unit 102 to the remote units 106.” *Id.* at 3:58–63. “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.* at 3:65–67. 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.* at 3:67–4:3.

A digital to analog radio frequency transceiver (DART) module in each remote unit 106 performs this conversion. Ex. 1006, 4:14–22. 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.* at 4:46–52, 5:39–63, 8:50–57. “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.* at 7:13–15. The DART module includes FPGA 503 (field programmable gate array). *Id.* at 7:15–19, 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. 1006, 9:45–61.

c. Claim 1

Petitioner generally characterizes Leng as describing “the same structure and method for managing resources, including a DAS that reconfigures remote radios based on the load of the radios” and Cannon as describing “the specific details of reconfiguring an RRU in a DAS.” Pet. 2.

i. Preamble

Claim 1’s preamble recites “a method for routing and switching RF signals comprising.” Petitioner contends that to the extent the preamble is

limiting, Leng discloses distributing, routing, and switching RF signals from cell management unit 24 to remote radio heads 25.

Petitioner relies on the following in Leng:

[T]he cell management unit 24 is connected to the base station 21 and connected to the remote radio heads 26 via the extension hub 25 **for distributing downlink radio signals to the remote radio heads 26, collecting uplink radio signals and transmitting them to the base station 21**, and collecting the load information of the distributed antenna system 20 **and reconfiguring the distributed antenna system 20 according to the load information**.

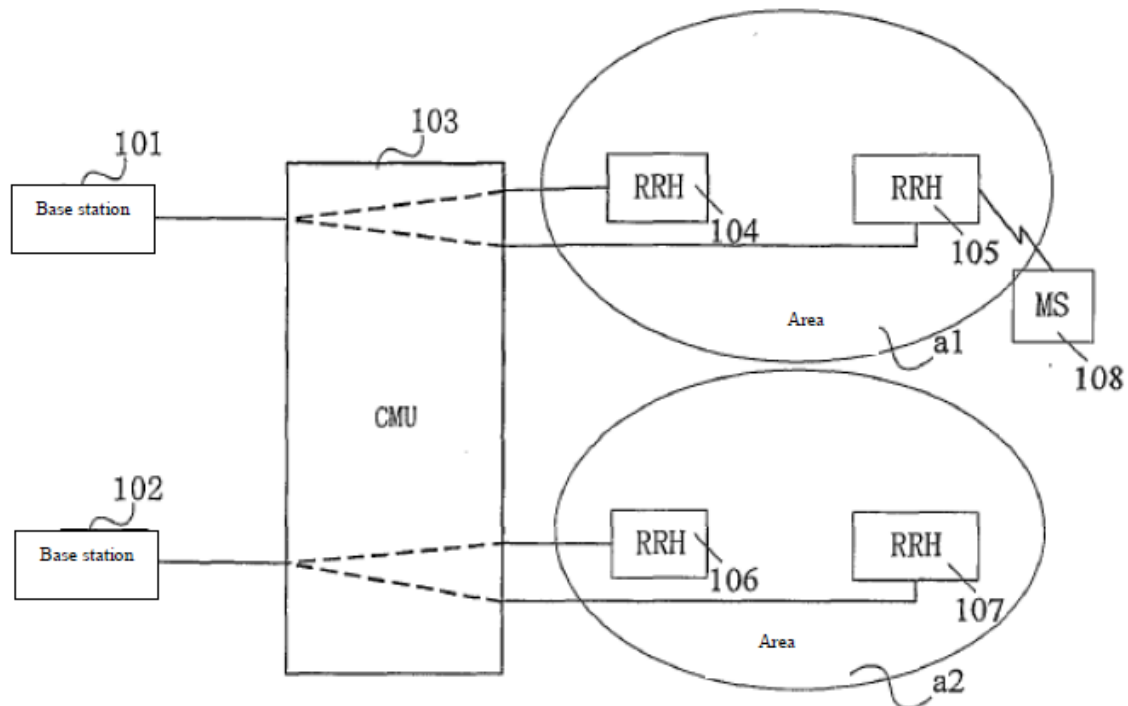
Pet. 39–40 (quoting Ex. 1005, 3:22–25).

Regardless of whether the preamble is limiting, 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 ii

Claim 1 recites “providing one or more remote radio units, each remote radio unit configured to transmit one or more downlink RF signals and to receive one or more uplink RF signals.” Relying on Leng’s Figure 2, Petitioner asserts that Leng discloses providing one or more RRHs 105 (i.e., remote radio units (RRUs) as recited), wherein each RRU/RRH transmits downlink RF signals to, and receives uplink RF signals from, mobile stations such as MS 108. Pet. 40–41. In support, Petitioner quotes Leng as disclosing that “[t]he cell management unit 24 is . . . configured to **distribute downlink radio signals to the remote radio head 26, collect uplink radio signals and transmit them to the base station 21.**” *Id.* at 40 (quoting Ex. 1005, 3:22–24; citing Ex. 1003 ¶ 78).

Leng’s Figure 10 follows:



Addressing Leng’s Figure 10, Petitioner quotes Leng as disclosing that “**base station 101 transmits carriers C1 and C2, and assigns them to RRH 104 and RRH 105.** The base station 102 transmits carriers C3 and C4, and assigns them to RRH 106 and RRH 107. **The mobile station (MS) 108 is in the area a1 and uses carrier C2.**” Pet. 40–41 (citing Ex. 1005, 9:11–14).

Based on the above disclosures, Petitioner contends that a person of ordinary skill would have

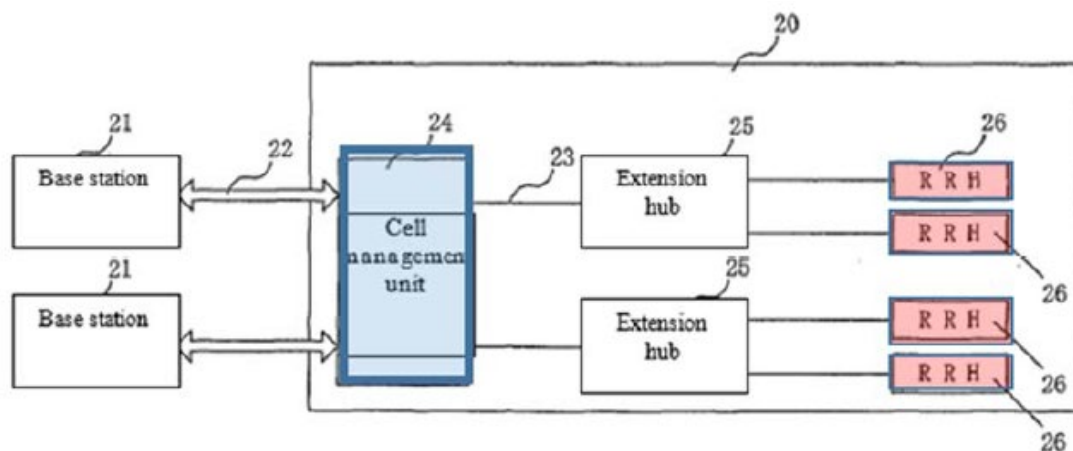
understood from Leng and an understanding of the function of radio heads that the RRHs form the last leg of the downlink to the mobile stations and the first leg of the uplink from the mobile stations, in which the downlink and uplink radio signals are transmitted to the mobile station and received from the mobile station respectively via the carriers. EX-1003 ¶79.

Pet. 41.

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.

iii. Limitation iii

Claim 1 recites "providing at least one [DAS] unit configured to communicate with the one or more [RRUs]." Petitioner relies on the following annotated version of Leng's Figure 2:



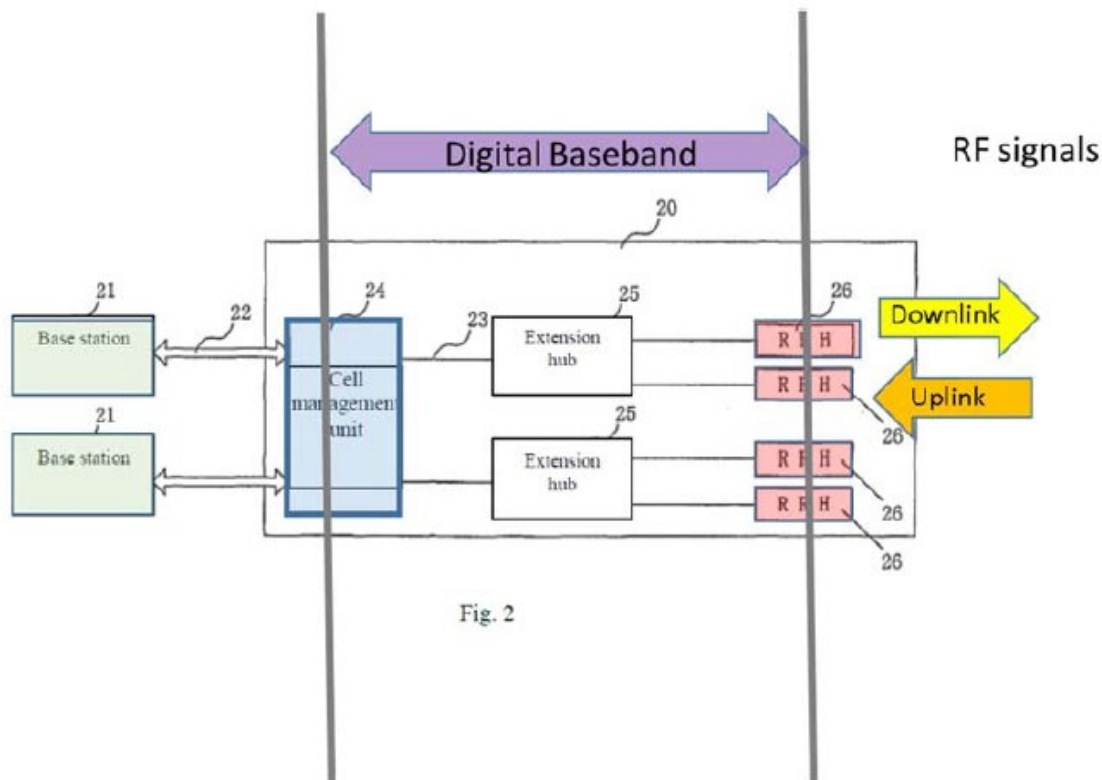
As annotated by Petitioner, Leng's Figure 2 above shows cell management unit 24 (blue, DAS), connected to one more remote radio heads 26 (pink, RRUs). Pet. 42 (citing Ex. 1005, Fig. 2; Ex. 1003 ¶ 80).

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 iv

Claim 1 recites "translating the uplink and downlink signals between RF and base band as appropriate." Petitioner explains that "Leng discloses the RRH converts the downlink digital baseband signals from the transmission medium to an RF signal and the uplink from an RF signal to a

digital baseband signal on the transmission medium.” Pet. 42. Petitioner relies on the following annotated version of Leng’s Figure 2.



Petitioner annotates Leng’s Figure 2 to show uplink (orange), downlink (yellow), and digital baseband (purple) signals. Pet. 43. Petitioner quotes Leng’s description of its RRHs:

The remote radio heads (RRHs) 26 are used for **digital filtering, analog/digital-to-analog conversion**, and analog front-end functions. The transmission medium 23 of the distributed antenna system 20 may be an optical fiber or a UTP/STP cable, etc., the transmission network may be Gigabit Ethernet, and the **transmitted radio signals are digital baseband signals**.

Pet. 43 (quoting Ex. 1005, 3:34–38; citing Ex. 1003 ¶ 81).

Petitioner alternatively contends that Cannon teaches converting between RF and baseband, and it would have been obvious to employ in Leng’s system because sampling baseband signals minimizes the sampling

rate needed to digitize the full band as compared to the original RF signal. Pet. 46 (citing Ex. 1006, Fig. 1; Ex. 1003 ¶¶ 85–86).

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 v

Claim 1 also recites “packetizing the uplink and downlink base band signals, wherein the packetized signals correspond to a plurality of carriers.” Petitioner quotes Leng as disclosing that “**cell management unit 24 updates the radio signal route by reconfiguring the I/Q packet addresses and updating the routing table** stored in the cell management unit 24 and the extension hub 25 according to the new topology determined” to create packets out of a plurality of carriers. Pet. 47 (quoting Ex. 1005, 6:19–21; citing Ex. 1003 ¶ 88). Petitioner also quotes Leng as disclosing “**multiple carriers** and multiple base stations, of which the RRHs can also support multiple carriers.” *Id.* (quoting Ex. 1005, 3:39–43; citing Ex. 1003 ¶ 87). Petitioner also quotes Leng as describing an example of a “Gigabit Ethernet link . . . support[ing] five carriers” and as disclosing that “[t]he number of carriers supported depends on the wireless technology used and its operating bandwidth.” *Id.* at 48 (quoting Ex. 1005, 3:40–43; citing Ex. 1003 ¶ 89).

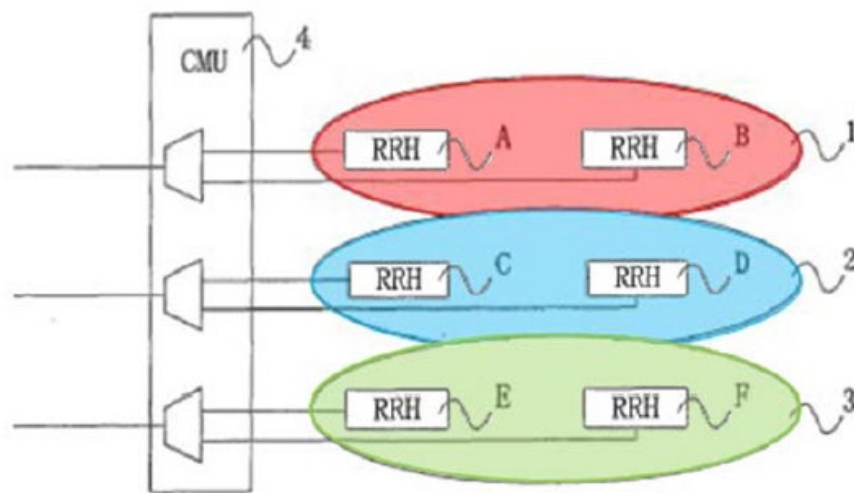
Petitioner’s showing for this limitation is sufficient for purposes of institution. Patent Owner does not address Petitioner’s showing as to this limitation. *See generally* Prelim. Resp.

vi. Limitation vi

Claim 1 also recites “configuring each remote radio unit to receive or transmit a respective subset of the plurality of carriers, each respective

subset of the plurality of carriers including a number of carriers.” Petitioner contends that Leng’s RRHs (i.e., RRU) receive a subset of one or more carriers of available carriers. Pet. 48. As indicated above with respect to limitation *v*, Petitioner relies on several statements in Leng to show that each RRU supports multiple carriers.

Petitioner provides an annotated version of Leng’s Figure 4, which follows:



Leng’s Figure 4, as annotated with different colors by Petitioner, illustrates RRHA and RRHB supporting carrier 1 (red), RRHC and RRHD supporting carrier 2 (blue), and RRHE and RRHF supporting carrier 3 (green). Pet. 49 (citing Ex. 1005, 3:19–20; Ex. 1003 ¶ 91).

Petitioner explains as follows:

Although the example in FIG 4 shows each RRH using one carrier, Leng discloses that “the RRHs can also support multiple carriers.” EX-1005 3:39–40. Thus, a POSA understood that each RRH can be configured with a subset of the plurality of carriers 1–3, where the subset includes a number of carriers, e.g., carriers 1–2. EX-1003 ¶ 92.

Pet. 49.

Petitioner alternatively adds that it would have been obvious to employ multiple carriers in Leng, based on teachings in Cannon. Pet. 49–50. Petitioner relies on Cannon’s disclosure that each FPGA in a DART module (stored in Cannon’s remote units) can be programmed to handle multiple carriers, reading on a subset of the plurality of carriers. *Id.* (citing Ex. 1006, 6:47–55, 7:47–64; Ex. 1003 ¶ 93). Petitioner relies on reasons to combine Cannon with Leng as including the following: Cannon teaches that FPGAs are adjustable by using simple programming to meet the changing needs of a user, with dynamic reassignment of a DAS with multiple carriers allowing for real-time load distribution without interrupting the service, where the modification of Leng could be achieved predictably with a reasonable likelihood of success. *See id.* at 35–38 (citing Ex. 1006, 6:47–55, 7:47–64, 9:45–47, Fig. 6; Ex. 1003 ¶¶ 72–74). As indicated above in discussing limitation *iv*, Petitioner also asserts that Cannon’s method of digitizing the baseband to alter carrier frequencies minimizes the sampling rate. *See id.* at 46 (citing Ex. 1006, Fig. 1; Ex. 1003 ¶ 86).

Petitioner’s showing for this limitation is sufficient for purposes of institution. Patent Owner does not address Petitioner’s showing specifically as to this limitation. *See generally* Prelim. Resp. To the extent Patent Owner generally argues a lack of sufficient reasons to combine Leng and Cannon with a reasonable expectation of success, and asserts Leng does not disclose a plurality of carriers, these arguments overlap with or repackage arguments that we address in the next subsection.

vii. Limitation vii

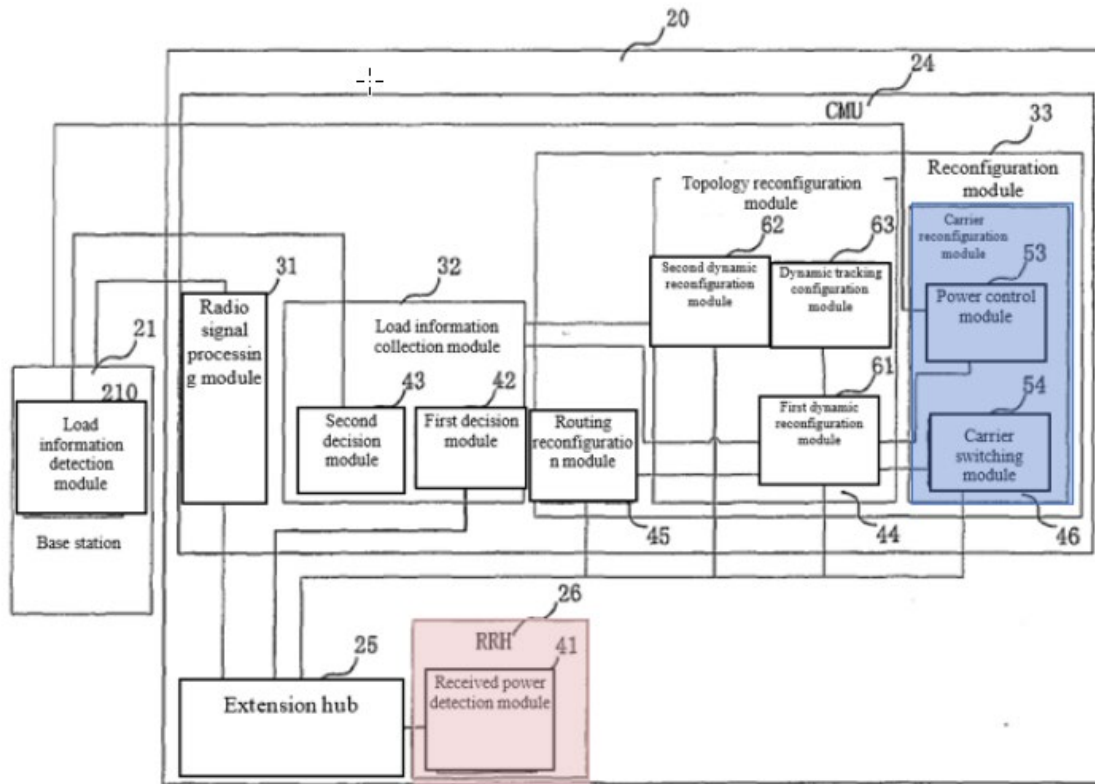
Limitation *vii* recites “reconfiguring each remote radio unit by: [a] determining a load percentage for each [RRU]; and [b] increasing or

decreasing the number of carriers in the respective subset of the plurality of carriers based on the load percentage.” As indicated above, Petitioner reads the claimed RRUs onto Leng’s RRHs and asserts that Leng discloses reconfiguring the RRUs. Pet. 51–52. According to Petitioner, “Leng discloses the RRHs are notified to switch carrier frequencies *and the RRHs switch their carriers* quicker than the base station reassigns the mobile stations to the switched carriers.” Pet. 50 (emphasis added). Petitioner quotes the following passage of Leng for support:

The carriers of the corresponding low-load remote radio heads may be a neighboring available carrier. If there is no neighboring available carrier, the base station switches the mobile station to a specific target carrier after a predetermined delay time, with the target carrier being a low-load target carrier *to which the RRH corresponding to the mobile station should be switched according to the determined new topology*. Obviously, the delay time should be greater than the time for *the RRH to switch carriers* in order to switch the mobile station to the target carrier *after the RRH has switched to the target carrier*.

Pet. 50–51 (emphasis added) (quoting Ex. 1005, 9:6–10)¹⁰; citing Ex. 1003 ¶ 95). Petitioner annotates Leng’s Figure 15 (with coloring) to support its showing, as follows:

¹⁰ Patent Owner’s translator substitutes “predefined delay time” for “predetermined delay time” in this portion of Leng. See Ex. 2005, 9:7. This difference does not affect our analysis, which would be the same under either translation.



According to Petitioner, Leng’s Figure 15 illustrates how carrier switching module 54 (blue) notifies high-load RRH 26 (pink) to switch to another carrier corresponding to a low-load RRH according to topology module 62. Pet. 51 (citing Ex. 1005, 10:21–27, Fig. 15; Ex. 1003 ¶ 96).

Relying on its translation of Leng (Ex. 2005), Patent Owner argues that Leng discloses reassigning, not reconfiguring, “because Leng does not teach changing any settings or parameters of the radio units themselves.” Prelim. Resp. 39. Patent Owner agrees that “Petitioner’s translation of Leng suggests that *the CMU notifies the RRHs to switch carrier frequencies.*” Prelim. Resp. 39 (emphasis added) (citing Pet. 50–51). But Patent Owner’s translation states that

cell management set 24 updates the radio signal route by reassigning the I/Q packet addresses and updating the routing table stored in the cell management set 24 and the extension hub

25 according to the new topology determined, and switch[ing]
the carrier of the corresponding remote radio heads 26 according
to the new topology determined.

Ex. 2005, 6:19–22 (emphasis added). In other words, both translations show that element 24 causes the remote radio heads to switch the carriers according to the new topology determined based on load conditions. *See id.* at 6:18–22. Patent Owner argues that “this does not disclose the change of any specific parameters or settings inside the RRH,” and “[i]t is unclear whether this merely suggests that the RRHs are subject to carrier reassignments by the CMU.” *Id.* at 39–40. Nevertheless, on this preliminary record, *notifying the RRHs to switch carriers* shows that the RRHs respond by performing a switching action. This satisfies the agreed-upon claim construction of “reconfiguring each remote radio unit,” namely “changing the configuration [i.e., by switching] of each remote unit.” *See supra* § II.B.2 (Claim Construction of the reconfiguring limitation).

Petitioner also argues that “[t]o the extent PO argues that Leng does not expressly disclose how the carrier frequency is reconfigured at an RRH, Cannon discloses reconfiguring the carrier frequency of a remote radio unit using the same method described in the ’338 Patent.” Pet. 51 (citing Ex. 1003 ¶ 98).

Petitioner annotates (with coloring) Cannon's Figure 1 as follows:

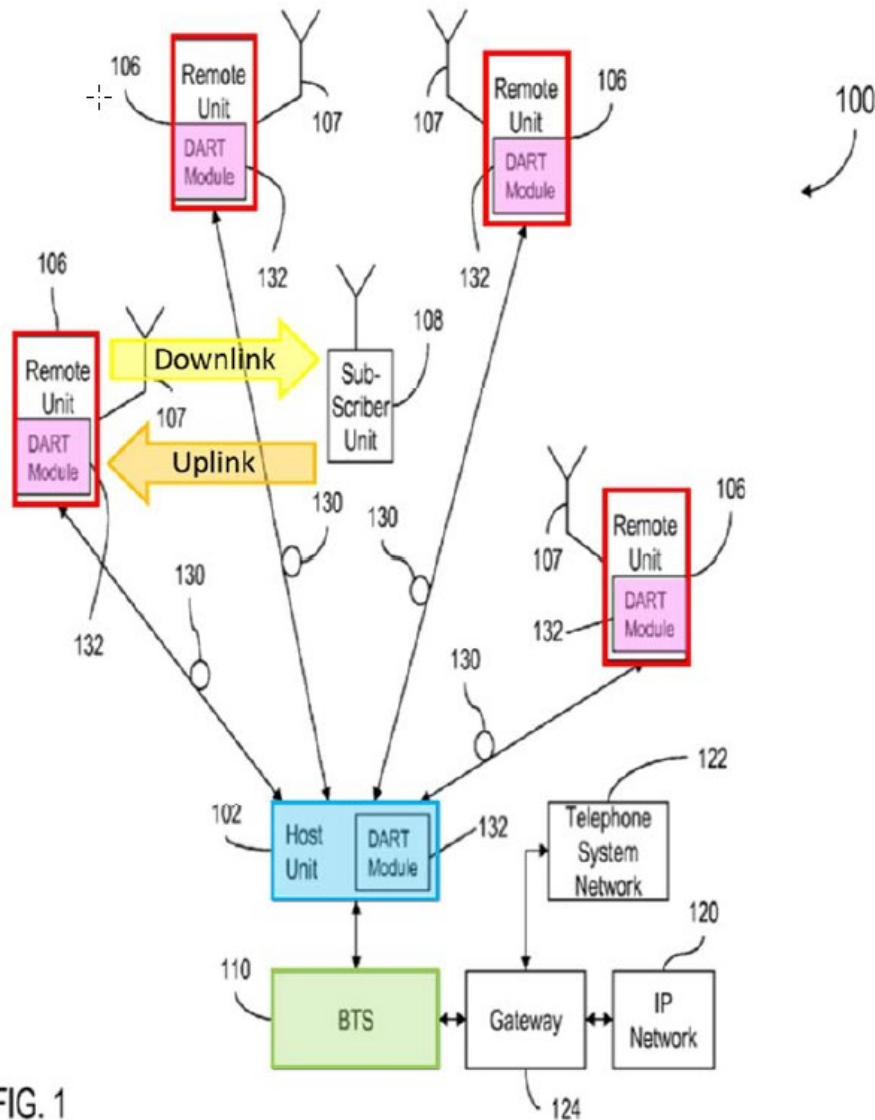


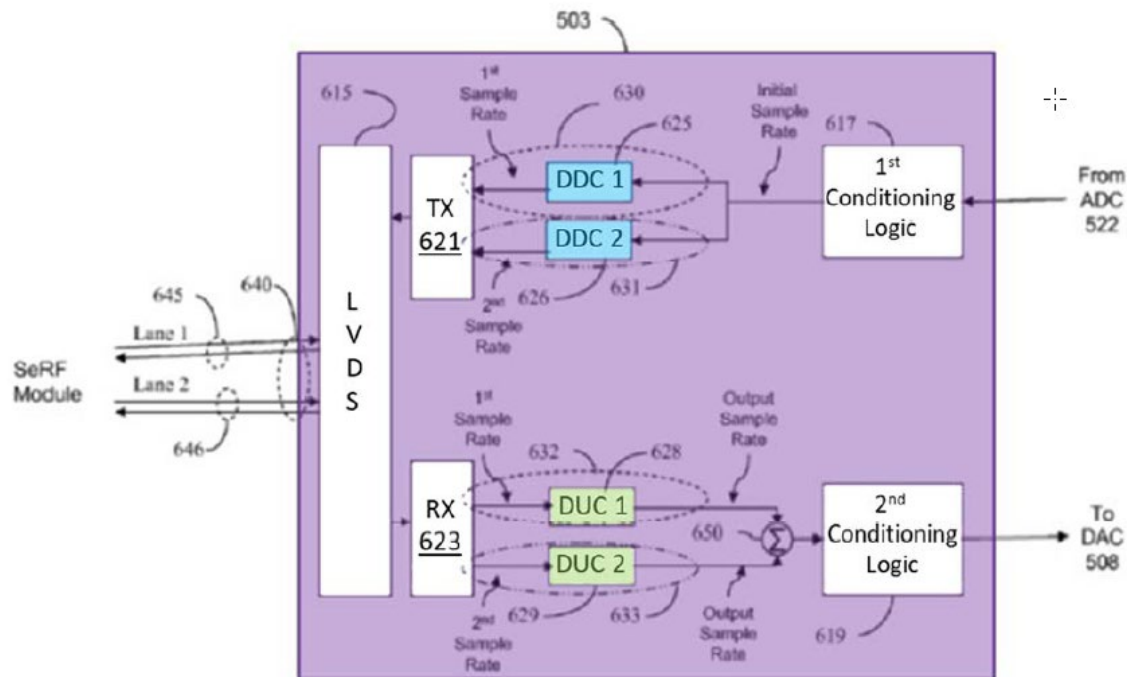
FIG. 1

Cannon discloses that

[i]n the embodiment shown in FIG. 1, **each remote unit 106 and host unit 102 comprises a digital to analog radio frequency transceiver (DART) module 132 configured to conserve the available bandwidth of the communication links 130 by separating and individually processing spectral regions of interest from a larger RF spectrum.**

Pet. 53–54 (quoting Ex. 1006, 4:4–11); citing Ex. 1003 ¶ 99).

Petitioner annotates (with coloring) Cannon's Fig. 6 as follows:



According to Petitioner, Figure 6 illustrates Cannon's a remote unit FPGA 503, which includes DUCs (digital up converters) 632 and DDCs (digital down converters) 630 "that can be programmed with a center frequency and bandwidth *to reconfigure the carrier* of the remote radio unit." Pet. 54 (emphasis added) (citing Ex. 1006, Fig. 6; 8:45–9:10; Ex. 1003 ¶ 100).

Petitioner contends that a person of ordinary skill in the art

would be motivated to modify the teachings of Leng to include a FPGA in the remote radio unit as taught by Cannon because 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 Leng teaches that the needs of the end user can be determined by the load of the remote radios. Specifically, a POSA understood that Leng teaches to reconfigure a remote radio unit in a DAS by changing the carriers of the remote radio unit based on the relative load of the remote radio unit, and that there are only a few finite ways to reconfigure a radio by changing its carrier frequency. Cannon discloses one such

suitable way to reconfigure the carrier frequency of the remote radio is the use of a FPGA and requires only a programming change. EX-1003 ¶75.

Pet. 37–38.

Petitioner also explains that Leng “does not provide the details of how the frequency of the RRH is changed,” so that an artisan of ordinary skill would have turned to Cannon’s FPGA details to implement such changes with a beneficial method of programming to shift carrier frequencies to reallocate loads according to the changing needs of a user as Cannon suggests. *See* Pet. 37. As noted above in discussing limitation *vi*, Petitioner provides other reasons for combining these references. For example, Petitioner notes that Cannon teaches that FPGAs are adjustable by using simple programming to meet the changing needs of a user, with dynamic reassignment of a DAS with multiple carriers allowing for real-time load distribution without interrupting the service, where the modification of Leng could be achieved predictably with a reasonable likelihood of success. *See id.* at 35–38 (citing Ex. 1006, 6:47–55; 7:47–64, 9:45–47, Fig. 6; Ex. 1003 ¶¶ 72–74). As indicated above in discussing limitations *iv* and *vi*, Petitioner also asserts that Cannon’s method of digitizing the baseband to alter carrier frequencies minimizes the sampling rate. *See id.* at 46 (citing Ex. 1006, Fig. 1; Ex. 1003 ¶ 86).

Patent Owner responds that Petitioner provides a “flawed motivation” to combine Cannon and Leng, because “even if Leng disclosed reconfiguration of radio units (which it does not), Cannon does not disclose reconfiguring the remote radio unit to change the carriers transmitted or received by the radio unit.” Prelim. Resp. 28. Patent Owner supports this argument by contending that Petitioner

miscomprehends Cannon's invention, which is directed to optimizing the use of *fiber bandwidth* within a digital DAS by configuring and/or reconfiguring the DART modules inside each respective host unit and remote radio unit that are responsible for processing the digitized signals transported *over optical cables* between the two components.

Prelim. Resp. 28 (citing Ex. 1006, Figs. 1–3, 4:14–5:38, 8:34–9:44).

Patent Owner explains further that “Cannon’s invention is concerned with selectively processing only certain spectral regions (that contain signals of interest) of an RF spectrum to optimize the transport of digitized RF signals over optical fiber between the host unit and the remote radio unit within the system.” Prelim. Resp. 47 (citing Ex. 1006, 8:34–9:44). Therefore, Patent Owner contends that a person of ordinary skill “would understand that the purpose of Cannon’s invention was not directed to alteration of the radio capacity or number of carriers for over-the-air transmission and reception at the radio unit antenna.” *Id.* at 48 (citing Ex. 2008 ¶ 41).

The record does not support Patent Owner’s arguments in a manner that undermines Petitioner’s showing at this stage in the proceeding. As Petitioner sufficiently shows for purposes of institution, Leng discloses reconfiguring and Cannon provides details as to how to accomplish reconfiguring using simple programming techniques to shift carriers according to the needs of a user. Even if Cannon describes a method for processing certain spectral regions at baseband over optical fiber as Patent Owner argues, Cannon’s method reallocates RF carrier frequencies using that method, as Petitioner shows as summarized above. For example, as Petitioner contends, Cannon teaches 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.

Ex. 1006, 9:45–47; *see* Pet. 37 (citing Ex. 1006, 8:45–9; 9:45–47). These center frequencies processed in base band ultimately are RF carrier frequencies. *See, e.g.*, Ex. 1006, 7:65–67 (“FPGA 503 provides a first path for processing digital signals associated with the radio frequency signals in a first spectral region . . .”). As Petitioner also argues, for example, Cannon’s upconverters process baseband and convert it to convey RF frequency. Pet. 45 (“For processing the downlink signal, the FPGA includes a DUC to convert the digital baseband signal to an RF signal for transmission.” (citing Ex. 1006, 8:6–16; Ex. 1003 ¶ 85)).

Moreover, Patent Owner acknowledges that “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. 48 (emphasis added) (citing Ex. 1006, 5:39–46). Additionally, Petitioner asserts that Cannon’s method is similar to that of the ’338 patent. Pet. 52 (citing Ex. 1003 ¶ 98). On this preliminary record, it appears that the two methods are similar. *See* Ex. 1001, 4:20–35 (describing converting only narrow bandwidths of useful information for efficient use of “available optical fiber transport bandwidths”), 7:5–24 (same).

Patent Owner also argues that “Petitioner *only* alleges that ‘Leng teaches to reconfigure a remote radio unit,’ and since ‘Cannon discloses one suitable way to reconfigure the carrier frequency of the remote radio,’ a POSA would have modified Leng accordingly.” Prelim. Resp. 38 (emphasis added) (quoting Pet. 37–39). Patent Owner also asserts that Cannon’s system is decentralized, Leng’s is decentralized, so Petitioner’s motivation is

faulty and based on similar reasoning in IPR2020-01432, where the Board denied institution in that case because the petitioner there unpersuasively relied on “design choice” as a reason to combine the references. Prelim. Resp. 33–34 (citing Ex. 2002 (IPR2020-01432 (denying institution))). Patent Owner conflates the showing in that case with Petitioner’s showing here and asserts that the latter showing “amounts to nothing more than calling the modification a ‘conventional design choice,’ which was rejected by the board in IPR2020-01432.” *Id.* at 38 (citing Ex. 2002, 20–21).

Patent Owner’s arguments mischaracterize Petitioner’s showing. As summarized above, Petitioner does not rely on design choice.¹¹ Rather, Petitioner provides numerous reasons to combine the references in addition to alleging that Cannon suggests a suitable method to reconfigure Leng’s RRHs. For example, as indicated above, Petitioner argues that using Cannon’s adjustable FPGAs in Leng’s RRHs allows for simple programming of the FPGA to meet the changing needs of users, provide better sampling of desired spectrum, and provide dynamic reassignment of multiple carriers, thereby allowing for real-time load distribution without interrupting the service. *See* Pet. 35–38, 46.

¹¹ Patent Owner also argues that “Petitioner proposes replacing Leng’s centralized CMU configuration/reconfiguration data with Cannon’s concept of using decentralized configuration data 53 stored at each radio unit,” and this “suggests upending the functionality of Leng by decentralizing its centralized system.” Prelim. Resp. 38. Patent Owner provides no citation to show where Petitioner advances this argument. In addition, it is not clear what Patent Owner argues by stating that “Leng’s . . . *data*” is “replace[d] . . . Cannon’s *concept*.” *See id.* (emphasis added). And it is not clear how using data from two locations (even if the proposed modification somehow requires it) upends or even decentralizes Leng’s centralized system.

Patent Owner also argues that Petitioner’s proposed modification lacks “any regard or explanation as to whether the modification is compatible with Leng’s objectives.” Prelim. Resp. 31. Patent Owner submits that because of Leng’s timing constraints, a person of ordinary skill would not expect a reasonable likelihood of success with such a modification.” *Id.* (citing Ex. 1005, code (57)). To support this argument, Patent Owner quotes Leng as stating that its “disclosure is capable of dynamically reconfiguring the distributed antenna system in ***a timely and effective manner according to the real-time load distribution situation***, balancing the load and improve the system efficiency ***in a timely manner***, and at the same . . . realizing ***on line reconfiguration without the interruption of services, ensuring the continuity of services.***” *Id.* at 37 (quoting Ex. 1005, code (57)). Patent Owner explains that in contemplating Cannon’s system, a person of ordinary skill “would understand that loading a new FPGA image in a radio unit every time a carrier reassignment occurs would take too long for Leng’s timing needs, which require such carrier switching to occur with minimal delay time.” *Id.* at 32 (citing Ex. 2008 ¶¶ 37, 42–46).

Contrary to Patent Owner’s arguments, Petitioner addresses Leng’s purposes of balancing and distributing the load in light of Cannon’s similar purpose of meeting the changing needs of the user by implementing software changes in an FPGA in a predictable manner with a reasonable expectation of success. *See* Pet. 36–39, 56–60. As to timing, Leng describes its DAS system as an improvement of prior art DAS “*manual* reconfiguration [systems] based on the expected load distribution.” Ex. 1005, 3:26–30 (emphasis added). Leng characterizes these prior art manual reconfiguration

systems as too slow: “Obviously, this [prior art] reconfiguration approach does not allow for dynamic reconfiguration in a timely and efficient manner based on real-time traffic assignment, and does not allow for service continuity during reconfiguration.” *Id.* Petitioner similarly quotes Leng as characterizing its system as allowing reconfiguration via dynamic reconfiguration “in a timely and efficient manner” “instead of via manual configuration during service interruption by the administrator based on the expected situation as based on the prior art.” *See* Pet. 56–57 (emphasis omitted) (quoting Ex. 1005, 4:5–10).

On the other hand, Patent Owner’s expert, Dr. Chrissan, testifies that an FPGA restarts as fast as a computer reboots. Ex. 2008 ¶ 44 (“[T]he FPGA restarts . . . similar in manner to how a computer reboots.”). Cannon states that its FPGA system “meet[s] the changing needs of the end user” in a DAS system operating with cellular phone networks to provide bi-directional communications, similar to the system of Leng. Ex. 1006, 1:25–36, 9:46. Therefore, contrary to Patent Owner’s arguments, using Cannon’s FPGA reconfiguration system in Leng’s reassignment system at least satisfies Leng’s goal of improving reconfiguration of radio resources in relation to prior art manual systems. Moreover, as Petitioner argues, the ’338 patent describes “*slowly* deploy[ing] additional radio resources (such as RF carriers, CDMA codes or TDMA time slots).” Pet. 12 (emphasis added); *see also* Ex. 1001, 11:47–51 (stating that “the DAU . . . adaptively modifies the system configuration *to slowly begin to deploy additional radio resources*” (emphasis added)). And the challenged claims do not preclude an FPGA or require a specific speed for reconfiguration. Accordingly, Patent Owner’s arguments regarding a reasonable expectation of success

based on an alleged speed constraint are not commensurate with the claim scope.

Limitation *vii.a* recites reconfiguring each remote radio unit “by: determining a load percentage for each remote radio unit.” Petitioner relies on numerous teachings in Leng that relate to determining the load distribution and load balancing as teaching or suggesting using a load percentage to balance or distribute the load. *See* Pet. 56–60, 64–65 (arguing that “[t]o the extent [Patent Owner] argues that Leng does not disclose determining a load percentage for each remote radio unit, a POSA understood that Leng’s disclosure of the relative loading of each RRH can be converted to a load percentage using well-known simple mathematical conversions” (citing Ex. 1003 ¶ 118)).¹²

As examples for load balancing and distribution to show a load percentage, Petitioner provides the following quotations from Leng:

The distributed antenna system 20 is reconfigured the CMU 24 based on the collected load information, instead of via manual configuration during service interruption by the administrator based on the expected situation as based on the prior art. This thus allows the distributed antenna system 20 to be **dynamically reconfigured in a timely and efficient manner based on the real-time load distribution, balancing the load and improving the system efficiency in a timely manner**, while greatly improving the convenience, real-time nature and accuracy of the configuration, and without service interruption, ensuring the continuity of services.

¹² This particular quotation and others discussed below are in a Petition section that addresses claim 3, which depends from claim 1, and which refers back to the “load percentage” introduced in claim 1 and so is relevant to “load percentage” recited in claim 1.

Pet. 56–57 (quoting Ex. 1005, 4:5–10).

Clearly, by using the distributed antenna system provided by this embodiment, for areas where communication traffic varies greatly, such as auditoriums, conference halls, etc., **it is possible to dynamically allocate radio frequency resources according to the current traffic condition, and greatly balance the traffic load** and improve system efficiency.

Pet. 57 (quoting Ex. 1005, 4:24–27).

“The remote radio heads 26 comprise a received **power detection module 41 configured to detect the total broadband power received by the remote radio heads 26** and transmit the detected power value to the load information collection module 32.” Pet. 57 (quoting Ex. 1005, 5:13–15).

Based on these teachings and other teachings in Leng, Petitioner argues that a person of ordinary skill in the art

understood using a load percentage (i.e. the amount of load used by RRH compared to the total load on the network) to determine a new network topology to most efficiently distribute network resources for load balancing using the combination of load information of the RRHs as is one disclosed purpose of Leng.

Pet. 59 (citing Ex. 1003 ¶ 106).

Patent Owner responds that Petitioner fails to show a load percentage under either of the parties’ claim construction. *See* Prelim. Resp. 41–42. Citing Petitioner’s statement equating load percentage with “the amount of load used by RRH compared to the total load on the network” (Pet. 59), Patent Owner argues that “[n]one of these passages in Leng that Petitioner cites discloses ‘an amount of load used by the RRH compared to the total load on the network.’” Prelim. Resp. 42. Patent Owner also argues that “nothing in Leng’s disclosure would have made suggested ‘load percentage’ under [either] construction to be obvious to a [person of ordinary skill in the

art.” *See id.* at 41–42. Patent Owner additionally argues that Leng’s “[r]eal-time load distribution” means how the load is distributed across the system, e.g., how much load is distributed to each of the various RRHs; not the amount of load used by an RRH compared to the total load on the network.” *Id.* at 43 (emphasis omitted).

Patent Owner’s argument that “[r]eal-time load distribution” means how the load is distributed across the system, e.g., how much load is distributed to each of the various RRHs” appears correct on this preliminary record. *See* Prelim. Resp. 43.¹³ On this preliminary record, however Leng teaches or suggests that its real-time load distribution occurs via the evaluation of current RRH loads in the context of a current carrier assignment so that the system can change carrier assignments to balance the load more efficiently, as Petitioner sufficiently shows for institution purposes. Pet. 27–31, 56–69 (citing Ex. 1005, 2:14–17, 4:5–10, 4:18–27, 5:13–15, 10:21–27, 11:17–21; Ex. 1003 ¶¶ 59–61, 64). Petitioner shows that Leng’s “remote radio heads 26 comprise a received power detection module 41 configured to detect **the total broadband power received by the remote**

¹³ “[D]istribute” means “[t]o divide and dispense in portions; parcel out.” Synonyms include “distribute, divide, dispense, dole, deal, ration.” THE AMERICAN HERITAGE DICTIONARY OF THE ENGLISH LANGUAGE (1976), 383 (stating that “[t]hese verbs [i.e., synonyms] mean to give something as a portion or share”). Ex. 3004. According to another source, the words “distributed; distributing” mean “to divide among several or many : APPORTION.” MERRIAM-WEBSTER ONLINE DICTIONARY AND THESAURUS, available at www.merriam-webster.com/dictionary/distribute. The words “apportioned; apportioning” mean “to divide and share out according to a plan *especially*: to make a proportionate division or distribution of. Representatives are *apportioned* among the states.” *Id.*, available at www.merriam-webster.com/dictionary/distribute. Ex. 3005.

radio heads 26 and transmit the detected power value to the load information collection module.” *Id.* at 62 (quoting Ex. 1005, 5:13–15). Petitioner also shows that “Leng . . . discloses collecting various other types of information and data and using it to dynamically determine if the carriers need to be reallocated to other RRHs to balance load and to increase the availability of resources where there are ‘hot spots.’” *Id.* (quoting Ex. 1005, 11:22–26; citing Ex. 1003 ¶ 116). Petitioner also shows that Leng discloses that **“for areas where communication traffic varies greatly, such as auditoriums, conference halls, etc., it is possible to dynamically allocate radio frequency resources according to the and greatly balance the traffic load and improve system efficiency.”** *Id.* at 64–65 (quoting Ex. 1005, 4:18–27).

While Petitioner does, as Patent Owner argues (Prelim. Resp. 42), equate load percentage in some instances with “the amount of load used by RRH compared to the total load on the network,” Petitioner explains that “[t]o the extent [Patent Owner] argues that Leng does not disclose determining a load percentage for each remote radio unit, a POSA understood that Leng’s disclosure of the relative loading of each RRH can be converted to a load percentage using well-known simple mathematical conversions.” Pet. 59, 65.

In light of Leng’s teachings and the knowledge of an artisan of ordinary skill, on this preliminary record, Petitioner sufficiently shows for purposes of institution that one of ordinary skill in the art would have understood that Leng discloses or suggests determining the load consumed (e.g., carriers used) by each device compared to the total load (e.g., carriers used) or compared to assigned carriers in order to efficiently distribute

resources equally. *See* Pet. 56–65. Petitioner also sufficiently shows for purposes of institution that it would have been obvious to employ a load portion for each RRH relative to the total load or assigned carriers in order to efficiently balance and/or distribute a load, because using a percentage is simply using a known mathematical way to efficiently balance and distribute load resources according to Leng’s purposes. *Id.* at 59–60, 63–65.

Limitation *vii.b* recites “reconfiguring each remote radio unit by . . . increasing or decreasing the number of carriers in the respective subset of the plurality of carriers based on the load percentage.” Petitioner contends that Leng discloses this limitation or that the combined teachings of Leng and Cannon would have rendered it obvious. Pet. 59–60.

Petitioner quotes Leng as describing (with respect to Figure 3) “**a reconfiguration module 33, configured to determine a new topology, reassign carriers among the corresponding remote radio heads, and reconfigure the routing of radio signals according to the load information collected by the load information collection module 32.**” Pet. 60 (quoting Ex. 1005, 4:11–17).

Petitioner also relies on Leng’s “example of switching carriers between each RRH in Figures 4 and 5 based on the load information.” Pet. 60 (citing Ex. 1005, 3:18–22). Petitioner concedes that Figures 4 and 5 depict only one carrier per RRH, but notes that “Leng discloses that ‘the RRHs can also support multiple carriers.’” *Id.* (citing Ex. 1005, 3:31–32). Therefore, according to Petitioner, a person of ordinary skill “understood that each RRH can be configured to use more than one carrier and thus the number of carriers in the subset assigned to each RRH may be decreased or increased as appropriate based upon load.” Pet. 60 (citing Ex. 1003 ¶ 108).

As noted above, Petitioner generally addresses multiple carriers for RRUs in addressing limitations *v* and *vi*.

Petitioner alternatively asserts that even if Leng does not disclose limitation *vii.b*,

Cannon expressly discloses that each FPGA in a DART module could be programmed to handle multiple carriers which would include a subset of the plurality of carriers that can either be increased or decreased. EX-1006 6:47[–]55; 7:47–64; EX-1003 ¶110. A POSA would be motivated to combine the teachings of Leng with the teachings of Cannon as discussed above to increase or decrease number of carriers used by a remote radio unit based on the load percentage. EX-1003 ¶110.

Pet. 60. In other words, Petitioner relies on reasons to combine the two references as summarized above in several places. *See, e.g., supra* § II.D.c.vi (addressing limitation *vi* reciting multiple carriers).

Patent Owner relies on its argument that Leng does not disclose a load percentage to support its showing that Leng discloses limitation *vii.b*.

Prelim. Resp. 44. However, for the reasons addressed above in connection with limitation *vii.a*, Petitioner sufficiently shows for institution purposes that Leng discloses or suggests the claimed load percentage.

Patent Owner also argues that “Leng does not disclose its carrier reassignment scheme in which more than one carrier is assigned to an RRH at a time, and thus does not disclose increasing or decreasing the number of carriers.” Prelim. Resp. 44. Patent Owner acknowledges that Leng discloses that “*RRHs can . . . support multiple carriers.*” Prelim. Resp. 44–45 & n.3 (quoting Ex. 1005, 3:39–43). According to Patent Owner,

[b]ased on this sentence alone, however, it is unclear whether Leng discloses that each RRH can be assigned multiple carriers concurrently and whether Leng’s carrier reassignment scheme can be applied to multiple carriers in a manner that results in

“increasing or decreasing the number of carriers in the respective subset of the plurality of carriers” for an RRH. Ex. 2008 ¶ 50.

Prelim. Resp. 45.

Patent Owner’s arguments do not undermine Petitioner’s sufficient showing for purposes of institution. Claim 1 does not recite “*assign[ing]* multiple carriers concurrently.” Related limitation *vi* recites “configuring each [RRU] to receive or transmit a respective subset of the plurality of carriers, each respective subset of the plurality of carriers including a number of carriers.” This limitation does not require assigning the subset of carriers at one time, it only requires that each RRU is configured to support a subset of carriers. Leng meets this limitation at least by disclosing what Patent Owner concedes, i.e., that “*RRHs can . . . support multiple carriers.*” See Prelim. Resp. 44. In addition, this limitation does not specify that a “number” is greater than 1, so a subset is not necessarily a number greater than 1. In any event, even if the subset is greater than 1, for the reasons noted, Petitioner sufficiently shows that Leng and the combined teachings of Leng and Cannon meet(s) the limitation. See also *supra* § II.D.c.vi (addressing limitation *vi*, relying on Leng, or the combined teachings of Leng and Cannon). Patent Owner does not address the combined teachings as relied upon by Petitioner.

Also, as summarized above, Petitioner sufficiently shows that Leng discloses, or the combined teachings of Leng and Cannon suggest, applying Leng’s reassignment/reconfiguration scheme in a manner that includes “increasing or decreasing the number of carriers in the respective subset of the plurality of carriers.” See Pet. 59–60. Increasing or decreasing the number of carriers only involves an increase or decrease of one carrier.

Patent Owner also argues that Petitioner fails to show that limitation *vii.b* is obvious, because “Cannon’s alleged handling of carriers is not directed to carriers transmitted or received by the radio unit as in the ’338 patent,” but instead, “Cannon is directed to optimizing the use of fiber bandwidth within a digital DAS.” Prelim. Resp. 45–46 (emphasis omitted). For the reasons set forth above in connection with the “reconfiguring” aspect of limitation *vii*, the preliminary record does not support this argument in a manner that undermines Petitioner’s showing.

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

viii. Limitation viii

Limitation *viii* recites “routing and switching the packetized signals among the one or more remote radio units via the at least one digital access unit according to a result of the reconfiguring.” Petitioner asserts that Leng discloses this limitation, reading the recited “one or more [RRUs]” and “at least one [DAU]” onto Leng’s CMUs and RRHs, respectively. Pet. 61 (citing Ex. 4:11–17; Ex. 1003 ¶ 111). Petitioner quotes Leng as disclosing that “cell management unit 24” comprises “reconfiguration module 33,” configured to determine a new topology, reassign carriers among the corresponding remote radio heads, and reconfigure the routing of radio signals according to the load information collected by the load information collection module 32.” *Id.* (quoting Ex. 1005, 4:11–17). Petitioner explains that Leng’s “reconfiguration module of the CMU (DAU) 33 . . . updates the signal packet address to route the packetized digital base carrier signal to the appropriate RRH (routing and switching the packetized signals).” *Id.* (emphases omitted) (citing Ex. 1003 ¶ 112).

To support its showing regarding “routing and switching the packetized signals” as limitation *viii* recites, Petitioner quotes Leng as follows:

The reconfiguration module 33 comprises: a topology reconfiguration module 44, configured to determine a corresponding new topology according to the load information collected by the load information collection module 32; a routing reconfiguration module 45, **configured to update the radio signal route by reconfiguring the I/Q packet addresses and updating the routing table stored in the cell management unit 24.**

Pet. 62 (quoting Ex. 1005, 5:20–23; citing Ex. 1003 ¶ 112).

Based on the foregoing discussion, 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.

xi. Summary

For purposes of institution, 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 that claim 1 would have been obvious over Leng alone or the combined teachings of Leng and Cannon.

d. Claims 2 and 3

Claims 2 and 3 depend directly from independent claim 1. Petitioner contends that these claims would have been obvious over the combined teachings of Leng and Cannon. Pet. 62–65. In support, Petitioner relies on the testimony of Dr. Houh, and provides citations to teachings in Leng and Cannon. *Id.* On this preliminary record, Petitioner sufficiently maps the added limitations of 2 and 3 to the asserted prior art and provides sufficient

reasons to combine the references with a reasonable expectation of success for purposes of institution.

Patent Owner relies on arguments it presents with respect to claim 1. Prelim. Resp. 48. For the reasons stated above, these arguments do not undermine Petitioner's showing at this stage.

Based on the foregoing discussion, we determine that Petitioner shows a reasonable likelihood that it would prevail with respect to its contention claims 2 and 3 would have been obvious over Leng alone or the combined teachings of Leng and Cannon.

2. Leng, Cannon, and Gupta

Petitioner asserts that claims 4–12, which depend from claim 1, would have been obvious over the combined teachings of Leng and Gupta, or Leng, Cannon, and Gupta. Pet. 65–78. In support, Petitioner relies on the testimony of Dr. Houh, and provides citations to teachings in Leng, Cannon, and Gupta. *Id.*

On this preliminary record, Petitioner sufficiently maps the added limitations of claims 4–12 to the asserted prior art and provides sufficient reasons with a reasonable expectation of success for the combination. *See id.* Patent Owner relies on the alleged deficiencies addressed above in connection with claim 1. Prelim. Resp. 49.

For purposes of institution, 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 4–12 would have been obvious over the combined teachings of Leng and Gupta, and Leng, Cannon, and Gupta.

III. 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. 81.

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. 49. 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.* at 49–50.

Each party presents arguments and evidence regarding the *Fintiv* factors. Pet. 80–83; Prelim. Resp. 49–54. 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. 49), the Interim Guidance provides that the Board “will not discretionarily deny institution . . . where a petitioner presents a [*Sotera*] stipulation” (Interim Procedure 3).

IV. 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 1–12 of the ’338 patent is unpatentable under 35 U.S.C. § 103.

V. ORDER

Accordingly, it is

ORDERED that pursuant to 35 U.S.C. § 314(a), an *inter partes* review is hereby instituted as to claims 1–12 of the '338 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.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ERICSSON INC.,
Petitioner,

v.

DALI WIRELESS INC.,
Patent Owner.

IPR2022-01212
Patent 8,682,338 B2

FENICK, *Administrative Patent Judge, concurring.*

I concur with the majority’s decision to institute. I write separately because I differ from the majority’s decision with respect to the claim construction of “determining load percentage” and with respect to how I arrive at the conclusion that Petitioner is reasonably likely to prevail in its showing that Leng teaches or suggests the subject matter of limitation *vii* of claim 1.

The majority finds that the proper construction of “load percentage” in the limitation “determining a load percentage for each remote unit” encompasses “the amount of load used by a remote radio unit compared to the total load on the network.” *Supra* § II.B.1. I disagree.

I agree with the majority that we should use the claim construction for “load percentage” of “a value representing a portion of available capacity” in

the context of claim 1 (“determining a load percentage for each remote radio unit”). Substituting in this construction results in the requirement, in claim 1, of determining a value representing the portion of available capacity that is in use for each remote radio unit. In discussing what this might mean, the majority writes, with respect to the ’338 patent’s stated goal of automatic load balancing that:

[B]alancing a load in a circuit involves equalizing the load—i.e., attempting to render each load to be an approximately equal proportion of the total load consumed. Determining the amount of load consumed by each RRU (e.g., carriers used on that RRU) as a proportion of the total load of carriers used in the system, effectively allows the system to determine how to balance loads by redistributing carriers from higher loaded RRUs to lower loaded RRUs in a group. *See* Ex. 2009, 10 (“[T]here there are other definitions of percentage including ‘proportion.’”). For example, attempting to balance the load where all the RRUs are in a group and covering the same large room of mobile telephones (e.g., cafeteria, concert hall) minimizes the power handled by higher loaded RRUs, while still covering the same mobile telephones. *See* Ex. 1001, 11:21–25 (describing assigning RF carriers to “a particular RRU or a group of RRUs”), 8:63–9:10 (describing different RRUs handling the same carrier and merging the signal from one carrier at two RRUs, signifying the two RRUs cover the same approximate area), Figs. 4–5 (illustrating overlapping antenna coverage for two RRUs and three RRUs).

Dec. 14–15. But, aside from the example given of all RRUs serving the same area, which might not even be considered a distributed wireless network that would benefit from operation according to the disclosure of the ’338 patent, no redistribution of capacity among the RRUs could make each RRU’s consumed load an equal proportion of the total consumed load in the system. The RRUs are described as having fixed coverage zones, with the load on an RRU based on the wireless subscribers proximate to it. Ex. 1001,

1:29–46, 6:66–7:4, 8:21–24. Additionally, redistributing carriers away from higher-loaded RRUs towards lower-loaded RRUs would not have an effect on the consumed load of any RRU, and, without knowing more about the capacity of the RRUs, could throw relative loads further out of balance. As we adopt the construction that load percentage represents a portion of *available capacity*, without more and on the present record, I do not accept that it encompasses a calculation that does not appear to relate in any way to available capacity. Thus, on the present record and preliminarily, I disagree that “determining load percentage” encompasses determining “the amount of load used by a remote radio unit compared to the total load on the network.”

With respect to whether Leng teaches or suggests the subject matter of claim limitation 1.vii, I agree with the majority that Leng does teach or suggest this for largely the same reasons presented in the majority opinion. *Supra* § II.D.1.c.vii. However, as I do not agree that load percentage encompasses the calculation of an amount of load used by an RRH compared to the total load on the network (“real-time load distribution” in Leng), I rely on the showing that Leng teaches or suggests its real-time load distribution occurs via the evaluation of current RRH loads in the context of a current carrier assignment, as the Petition sets forth. *See* Pet. 29–30, 56–59, 65 (citing Ex. 1005 4:5–10, 4:15–16, 4:24–27 (describing dynamically allocating frequency resources occurring to current traffic conditions to balance the traffic load and improve system efficiency), 5:27–30; Ex. 1003 ¶¶ 62, 104–106, 118). Thus, I reach the same conclusion as the majority with respect to this claim limitation.

I join the majority’s opinion in all other respects.

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