

Patent Owner's Preliminary Response
IPR2021-00492 (U.S. Patent No. 9,197,358)

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CORNING OPTICAL COMMUNICATIONS LLC,
Petitioner,

v.

DALI WIRELESS, INC.,
Patent Owner.

Case IPR2021-00492
Patent 9,197,358

**PATENT OWNER'S PRELIMINARY RESPONSE
UNDER 35 U.S.C. §§ 311-19 AND 37 C.F.R. § 41.100, ET SEQ.**

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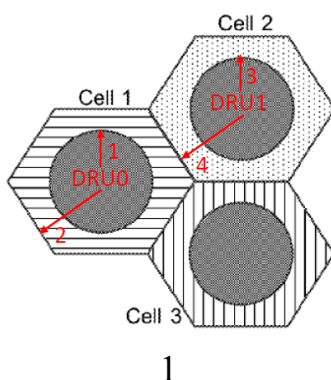
EXHIBIT LIST

Exhibit No.	Exhibit Description
2002	U.S. Provisional Appl. No. 61/649,143 (“’143 Provisional”)
2003	U.S. Patent Appl. Publ. No. 2005/0239403 to <i>Karabinis</i> (“ <i>Karabinis</i> ”)
2004	U.S. Patent No. 10,506,454 (“’454 Patent”)
2005	U.S. Patent No. 10,433,261 (“’261 Patent”)
2006	Dali’s Disclosure of Proposed Terms for Construction (“Dali’s Proposed Terms”)
2007	Corning’s Disclosure of Proposed Terms for Construction (“Corning’s Proposed Terms”)
2008	Joint Claim Construction and Prehearing Statement (Case No.: 20-cv-6469-EMC (N.D. Cal.)) (“Joint Claim Construction Statement”)
2009	Exhibit A to Joint Claim Construction Statement
2010	Dali Wireless, Inc.’s Opening Claim Construction Brief (Case No.: 20-cv-6469-EMC (N.D. Cal.)) (“Dali’s Opening Brief”)
2011	Exhibit 11 (Deposition Transcript of James Proctor) to Dali’s Opening Claim Construction Brief (“Proctor Dep Tr.”)
2012	Exhibit 7 (Declaration of James Proctor) to Dali’s Opening Claim Construction Brief (“Proctor Decl.”)
2013	Corning’s Responsive Claim Construction Brief (Case No. 3:20-cv-06469-EMC (N.D. Cal.)) (“Corning’s Responsive Brief”)
2014	Dali’s Wireless, Inc.’s Reply Claim Construction Brief (Case No.: 20-cv-6469-EMC (N.D. Cal.)) (“Dali’s Reply Brief”)
2015	Memorandum Order on Claim Construction in <i>Dali Wireless, Inc. v. CommScope Techs. LLC & CommScope Holding Co., Inc.</i> (Case No.: 19-952-MN (D. Del.)).

I. INTRODUCTION

Petitioner has failed to demonstrate a reasonable likelihood that it will prevail in showing unpatentability of any challenged claims 1-21 of U.S. Patent No. 9,197,358 ('358 Patent) (Ex. 1001) under 35 U.S.C. § 314(a). Grounds 1-2 are defective on their face and do not support a *prima facie* case of obviousness under 35 U.S.C. § 103 based on the combination of *Fujii* (Ex. 1005) and *Cannon* (Ex. 1006).

1. The '358 Patent discloses a *unique* cell architecture with an *individual* digital remote unit (DRU) per cell that mitigates interference of cell-edge users using Soft and Fractional Frequency Reuse techniques while improving system data rates and performance. Ex. 1001 at 1:39-4:62, 5:39-43, 6:44-48, 7:51-8:45, 9:5-34, Figs. 1B, 1C. For example, referring to Figs. 1B, 1C of the '358 Patent, a first DRU (e.g., DRU 0) in Cell 1 transmits and receives data in a first area (geographical footprint 1) and first frequency band and transmits and receives data in a second area (geographical footprint 2) and second frequency band. *Id.* at 1:50-2:58; 9:41-47; Figs. 8-9.

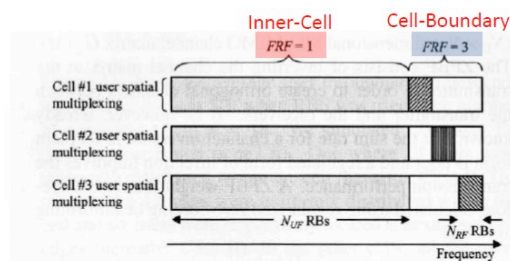
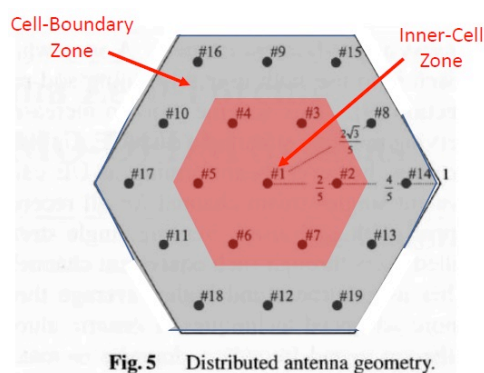


'358 Patent Figs. 1B, 1C (Annotated)

And a second DRU (e.g., DRU 1) in an adjacent Cell 2 transmits and receives data in a third area (geographical footprint 3) using the first frequency band of Cell 1 and transmits and receives data in a fourth area (geographical footprint 4) and third frequency band. Ex. 1001 at 1:39-4:62, 9:41-47; Figs. 1B, 1C, 8-9. Geographical footprints 2 and 4 can surround or partially surround geographical footprints 1 and 3, respectively. *Id.* The first and second frequency bands **are different from each other**, and the third frequency band is different from the second frequency band to mitigate interference for cell-edge users, e.g., in geographical footprints 2 and 4. *Id.* Claims 1-21 cover these embodiments using an individual DRU per cell.

2. Grounds 1-2 do not comply with the requirements of 37 C.F.R. § 42.104(b)(4)-(5). Petitioner fails to specify or articulate a teaching in *Fujii*, either alone or in combination with *Cannon*, of an **individual DRU** that uses **different frequency bands** over surrounding geographical footprints that meets the claims. *Fujii* discloses a base station (BS) (Fig. 1) scheduling digitized resource blocks RBs (Fig. 4) directly to user equipment (UE) of K users (Fig. 2) in cell clusters (Fig. 3) having a distributed antenna geometry (Fig. 5) with antennas #1-#19. Ex. 1005 at 2371-72. Petitioner identifies in *Fujii* antenna #1 at the center of the distributed antenna geometry (Fig. 5) located in the inner-cell zone of a cell as a DRU of the

claims. Pet. at 37-38. *Fujii* describes antennas #1-#8 located in the inner-cell zone and antennas #9-#19 located in the outer-cell zone. Ex. 1005 at 2372, Figs. 5, 9.



Antenna #1 is located at Inner-Cell Zone

Regarding Fig. 10, *Fujii* teaches only that the inner-cell zone (having antennas #1-#8) is allocated resource blocks (RBs) using the $FRF=1$ frequencies, and that the cell-boundary zone (having antennas #9-#19) is allocated RBs using $FRF=3$ frequencies. Ex. 1005 at 2374 (Section 3); Figs. 8-10. Petitioner fails to specify any teaching in *Fujii* showing **antenna #1 located in the inner-cell zone** using $FRF=3$ frequencies **allocated for the cell-boundary zone**, and thus fails to meet its burden that *Fujii* teaches the claimed DRUs. See *Synopsys v. Mentor Graphics Corp.*, IPR2012-00041, Paper 16 at 14 (PTAB Feb. 2013) (denying institution because Petitioner failed to at least identify portions of the evidence to support an obviousness challenge). Nor does Petitioner rely on *Cannon* to teach a single DRU using different frequency bands in surrounding geographical footprints. The evidentiary record thus fails to support Grounds 1-2.

3. Petitioner's motivation to combine *Cannon* with *Fujii* is inadequate.

There is no Digital Access Unit (DAU) or host unit in the DAS of *Fujii*. *Cannon* teaches a host unit or remote unit digitizing an analog RF spectrum in a DAS and then discards "non-relevant region" of the digitized RF spectrum to improve RF transport. Ex. 1005 at Abstract, [0029]; Fig. 4A. Petitioner makes a conclusory statement that *Fujii* would "find it useful to employ the DAS of *Cannon*" that discards non-relevant regions. Pet. at 24. But Petitioner fails to explain how *Fujii* could be modified to add a DAU or host unit, and how those units and a distributed antenna in the cell cluster of *Fujii* would then discard non-relevant regions of a digitized RF spectrum, such as resource blocks (RBs), to achieve the claimed invention. And, importantly, Petitioner fails to explain how a POSA would have a reasonable expectation of success in doing so. See, e.g., *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367–68 (Fed. Cir. 2016). Accordingly, Petitioner has not met its burden to show a *prima facie* case of obviousness for Grounds 1-2.

II. THE '358 PATENT

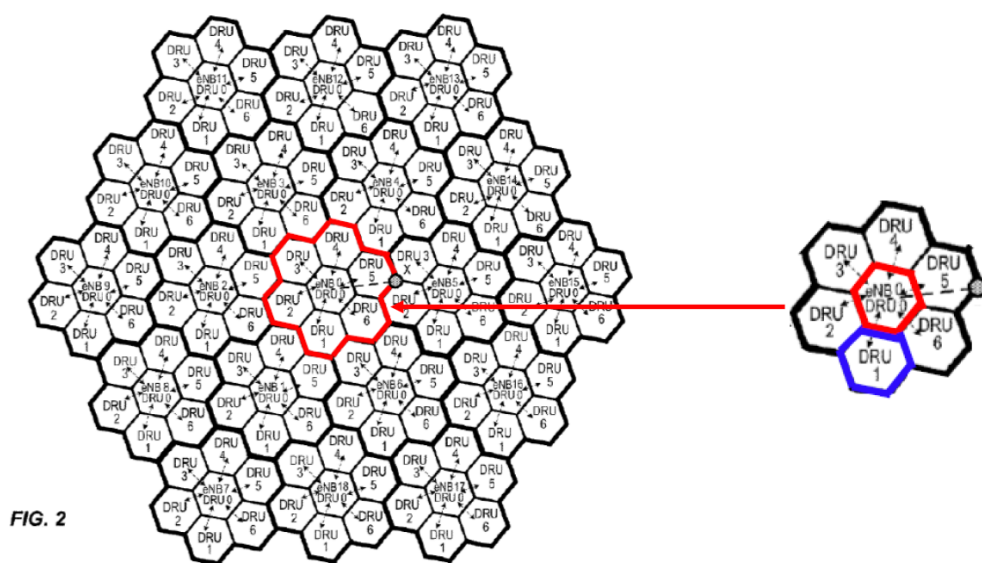
A. Overview

The '358 Patent claims priority to U.S. Provisional Appl. No. 51/649,143 (Method and System for Soft Frequency Reuse in a Distributed Antenna System) ('143 Provisional, Ex. 2002) filed on May 18, 2012. Ex. 1001 at 1:8-12. The '358

Patent discloses a new cell architecture by combining a Distributed Antenna System (DAS) with Soft and Fractional Frequency Reuse techniques to mitigate inter-cell interference. Ex. 1001 at 1:39-49, 5:39-43, 6:44-48, 7:51-8:45, 9:5-34; Ex. 2002 at [0001], [0002], [0013].

For one embodiment, the '358 Patent discloses a DAS architecture such that radio resources are allocated to a digital remote unit (DRU) for users in certain cell areas (e.g., outer cell regions) so that no users in adjoining cells are using the same frequency band. Ex. 1001 at 6:4-9, 7:51-67. And radio resources are allocated to the DRU for users in other areas (e.g., inner cell regions) that can utilize multiple frequency bands or the **entire frequency spectrum** thereby increasing system data rates and capacity. *Id.* at 7:65-57; 8:1-22; 9:5-34.

Referring to Fig. 2 of the '358 Patent (reproduced below with the DRUs surrounding eNB0 blown up), the new DAS architecture includes a central cell referenced as eNB0 including DRUs 0-6 communicating with the base station eNB0 through a digital access unit (DAU)—not shown. Ex. 1001 at 9:42-44.



The DAUs are interconnected and connected to multiple sectors of DRUs that allows for virtualization of eNB radio resources at the DRUs. *Id.* at 9:55-57. DRUs are sectorized such that each DRU allocated to a given eNB base sector is simulcast. *Id.* at 11:59-60. The DAUs assign RBs of the various sectors to the independent DRUs. According to the '358 Patent, for one embodiment, individual DRUs can be considered cells:

DRU0 can be considered to be Cell 1 in FIGS. 1A-1C, DRU1 can be considered Cell 2 in FIGS.1A-1C, and DRU2 can be considered to be Cell 3 in FIGS.1A-1C.

Ex. 1001 at 9:45-47 (emphasis added). Figs. 1B, 1E and 1C, 1F (annotated below) show individual DRU cell architectures implementing fractional frequency reuse (FFR) and software frequency reuse (SFR) techniques, respectively.

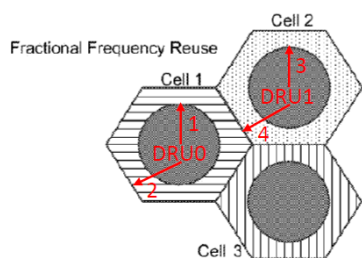


FIG. 1B

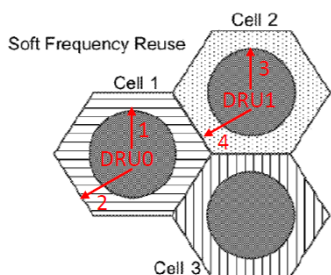


FIG. 1C

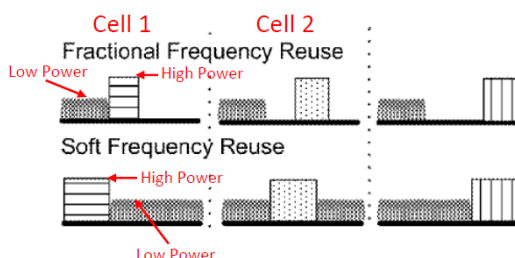


FIG. 1E

FIG. 1F

For one embodiment, referring to Figs. 1B, 1E, to implement FFR, each DRU (e.g., DRU0 and DRU1 in Cells 1 and 2) transmits and receives data at a first low-power level using frequencies in the grey frequency bands and a second high-power level using frequencies in the horizontal striped/shaded/vertical striped bands. *Id.* at 10:33-39. For FFR, the entire frequency spectrum is not used.

For another embodiment, referring to Figs. 1C, 1F, to implement SFR, each DRU (e.g., DRU0 and DRU1 in Cells 1 and 2) transmits and receives data at the low-power level frequency band and at the high-power level frequency band. Ex. 1001 at 10:56-61. According to the '358 Patent, “a **single DRU** in Cell 1 **broadcasts** at **low power** over grey band and at a **higher power** over the horizontal stripe spectrum.” *Id.* at 10:57-59 (emphasis added). In contrast to FFR, for SFR, the **entire**

allocated frequency spectrum is used that increases data rate and capacity. *Id.* at 10:55-66.

For FFR and SFR, the low-power frequency bands are used in the inner cell region (grey areas 1 and 3) and the high-power frequency bands are used in the outer cell region (horizontal striped/shaded/vertical striped areas 2 and 4). *Id.* at 7:33-67. Outer cell regions (2 and 4) of adjacent Cells 1-3 use different high-power frequency bands to mitigate interference for cell-edge users.¹ *Id.* Figs. 1B, 1E, 1C, 1F and 2 for a single DRU in a cell using low- and high-power levels to receive and transmit data in inner and outer cell regions (areas 1, 2 in Cell 1 and areas 3, 4 in Cell 2 shown above) embody claims 1-21.

B. Claims

Petitioner challenges claims 1-21 of the '358 Patent, which includes three independent claims 1, 7 and 15. Claim 1 is representative and recites:

A method for routing and switching operator RF signals, the method comprising:

¹ In describing the '358 Patent, the embodiments of using a **single DRU** per cell to implement FFR and SFR techniques by using high-power frequency band in an outer cell region and low-power frequency band in an inner cell region were ignored by the Petitioner and its expert Mr. Proctor. Pet at 15-18; Ex. 1003 at 25-28.

providing one or more Digital Remote Units (DRUs), each configured to receive one or more downlink radio frequencies and to transmit one or more uplink radio frequencies; providing at least one Digital Access Unit (DAU) configured to communicate with at least one of the one or more DRUs; wherein a first DRU in a first cell is operable to communicate using: a first set of frequencies characterized by a first frequency band over a first geographic footprint; and a second set of frequencies characterized by a second frequency band different from the first frequency band over a second geographic footprint including and surrounding the first geographic footprint; wherein a second DRU in a second cell is operable to communicate using: the first set of frequencies over a third geographical footprint; and a third set of frequencies characterized by a third frequency band different from the first frequency band and the second frequency band over a fourth geographic footprint including and surrounding the third geographic footprint.

Ex. 1001 at 21:12-38.

C. Prosecution History

In the 12/31/14 first Office Action, the Examiner alleged claims 1-21 were anticipated by U.S. Patent Appl. Publ. No. 2005/0239403 to *Karabinis* (Ex. 2003).

Ex. 1002 ('358 File History) at 237-43. In the 5/27/15 Response, Patent Owner

made no amendments to the claims, but instead argued successfully that *Karabinis* did not disclose the first, second, third, and fourth geographic footprints recited in claims 1-21. Ex. 1002 at 255. Patent Owner further argued that *Karabinis* did not disclose at least the third set of frequencies being different from the first and second set of frequencies—i.e., to avoid inter-cell interference. *Id.* In view of these distinctions over *Karabinis*, the Examiner allowed claims 1-21 in the 7/17/15 Notice of Allowance. Ex. 1002 at 266.

III. CLAIM CONSTRUCTION

Under 37 C.F.R. § 42.104(b)(3), Petitioner has an affirmative burden to set forth how the challenged claims should be construed. *See, e.g., Orthopediatrics Corp. v. K2M, Inc.*, IPR2018-01548, Paper 9 at 10 (PTAB Mar. 1, 2019). In construing challenged claims, the Board follows the standard set by *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (*en banc*). *See also* 37 C.F.R. § 42.100(b). Petitioner must therefore advance a rationale for its proposed claim constructions under *Phillips* to satisfy the requirements of 37 C.F.R. § 42.104(b)(3). Petitioner has failed to do so.

Petitioner alleges that “Digital Remote Unit (DRU)” and “Digital Access Unit (DAU)” have a plain and ordinary meaning, but Petitioner offers a meaning that imports additional limitations such as “a unit of a DAS” and “transport of radio resource signals,” which are not part of the claims and, importantly, without any

evidentiary support. Pet. at 20. By importing these additional limitations, Petitioner eviscerates the plain and ordinary meaning of those terms. The Board should therefore adopt Patent Owner's proposed constructions for "DRU" and "DAS," as set forth below, consistent with the intrinsic evidence.

A. Person of Ordinary Skill in the Art (POSA)

Petitioner identifies a POSA at the time of the claimed invention would have (1) a bachelor's degree in electrical engineering and (2) a minimum of 3-4 years of industry experience in wireless communications networks and engineering. Pet. at 19. Because the '358 Patent involves combining a distributed antenna system (DAS) with frequency reuse techniques (Ex. 1001 at 5:39-43, Figs. 1-2), Patent Owner submits that a POSA would have industry experience including knowledge and experience with DAS. Petitioner's expert Mr. Proctor acknowledges that a POSA would have knowledge and experience with DAS. Ex. 2011 (Proctor Dep Tr.) at 101:7-102:8. Accordingly, for prong (2), Patent Owner submits that a POSA should also have a minimum of 3-4 years of industry experience in wireless communications networks and engineering including knowledge and experience with DAS.

B. “Digital Remote Unit (DRU)” (Claims 1, 2, 5 and 16)

1. Petitioner’s construction for “DRU” improperly adds limitations with no evidentiary support

Claim 1 recites, *inter alia*, “providing one or more Digital Remote Units (DRUs), each configured to receive one or more downlink radio frequencies and to transmit one or more uplink radio frequencies.” Ex. 1001 at 21:14-17. Petitioner makes a conclusory statement that the plain and ordinary meaning of DRU is “a unit of a Distributed Antenna System (DAS) that supports the transport of radio resource signals between users and a central facility and/or one or more Digital Access Units (DAUs).” Pet. at 20. The Board should reject this construction for multiple reasons.

First, Petitioner fails to provide any evidentiary support that would allow importing “a unit of a DAS” and “transport of radio resource signals” into the claim limitations when they are **not** part of the claims. Pet. at 20. Indeed, the ’358 Patent does not use or contain the term “radio resource signals.” Petitioner fails to cite any intrinsic evidence as a basis for importing these additional limitations. Moreover, because the claims do not recite “a unit of a DAS” and “transport of radio resource signals,” Petitioner’s construction should be rejected outright. *See SuperGuide Corp. v. DirecTV Enters., Inc.*, 358 F.3d 870, 875 (Fed. Cir. 2004) (when construing claim terms, “it is important not to import into a claim limitations that are not a part of the claim”); *see also Cont’l Circuits LLC v. Intel Corp.*, 915 F.3d 788, 796 (Fed.

Cir. 2019) (the court rejected importing “repeated desmear process” from the specification into the claims because it was not recited in any of the claims).

Second, Petitioner's inclusion of “a unit of a DAS” apparently entails even further limitations outside the recited claim language, such as requiring transporting radio resource signals to a “central facility”—i.e., a base transceiver station (BTS). Pet. at 20. But Claim 1 does not actually require this, and in fact dependent claim 3 separately recites communication with a BTS, thus demonstrating that DRU in independent claim 1 should not be construed to require those additional limitations. i.e., Petitioner's construction violates the principle of claim differentiation that independent claims should not be construed to include claim features added by dependent claims. *See Liebel-Flarsheim v. Medrad, Inc.*, 358 F.3d 898, 910 (Fed. Circ. 2004) (“As this court has frequently stated, the presence of a dependent claim that adds a particular limitation raises a presumption that the limitation in question is not found in the independent claim.”). As such, the Board should reject Petitioner's construction for “DRU.”

2. Patent Owner's construction for DRU should be adopted as consistent with the intrinsic evidence

In a related District Court proceeding (Case No. 3:20-cv-06469-EMC (N.D. Cal.)), the term “DRU” was disputed for U.S. Patent Nos. 10,506,454 (Ex. 2004, '454 Patent) and 10,433,261 (Ex. 2005, '261 Patent). *See* Ex. 2006 (Dali's Proposed

Terms) at 1; Ex. 2007 (Corning's Proposed Terms) at 1-2; Ex. 2008 (Joint Claim Construction Statement) at 1; Ex. 2009 (Exhibit A to Joint Claim Construction Statement) at 1, 7. For the '454 and '261 Patents, Patent Owner proposed "DRU" to mean **"a unit in communication with a digital access unit for providing communications to and from user devices."** DRU was fully briefed by the parties for both the '454 and '261 Patents. Ex. 2010 (Dali's Opening Brief) at 9-10; Ex. 2013 (Corning's Responsive Brief) at 8-10; Ex. 2014 (Dali's Reply Brief) at 4.

Patent Owner submits that the Board should adopt the same construction here for the '358 Patent consistent with the intrinsic evidence. For example, in the embodiment of Fig. 2, the '358 Patent describes DRUs connected to a digital access unit (DAU). Ex. 1001 at 11:53-55; Fig. 2. The DAU assigns resource blocks (RBs) to sectors of DRUs that can simulcast to users. *Id.* at 11:59-64; Table 1. Figs. 1B, 1E and 1C, 1F and corresponding description describe how individual DRUs implement frequency reuse techniques for users in different geographic footprints consistent with the claims. Accordingly, consistent with the intrinsic evidence, a POSA would understand "DRU" to simply mean "a unit in communication with a digital access unit for providing communications to and from user devices."

C. “Digital Access Unit (DAU)” (Claims 1, 4, 16)

1. Petitioner's construction for “DAU” improperly adds limitations with no evidentiary support

Claim 1 recites, *inter alia*, “providing at least one Digital Access Unit (DAU) configured to communicate with at least one of the one or more DRUs.” Ex. 1001 at 21:18-20. Petitioner makes a conclusory statement that the plain and ordinary meaning of DAU is “a unit of a Distributed Antenna System (DAS) that supports the transport of radio resource signals between at least one signal source and the one or more Digital Remote Units (DRUs)”—without any evidentiary support. Pet. at 20.

For the same reasons as above for “DRU,” the Board should reject importing “a unit of a DAS” and “transport of radio resource signals” into the claim limitations for DAU when they are **not** part of the claims. Pet. at 20. As above, the '358 Patent does not use or contain the term “radio resource signals.” Likewise, Petitioner's inclusion of “a unit of a DAS” apparently entails even further limitations outside the recited claim language, such as requiring transporting radio resource signals to a “signal source”—i.e., a base transceiver station (BTS). Pet at 20. But Claim 1 does not actually require this, and in fact dependent claim 3 separately recites communication with a BTS, thus demonstrating that DAU in independent claim 1 should not be construed to require the additional limitation of a “signal source,” which violates the principle of claim differentiation that independent claims should

not be construed to include claim features added by dependent claims. *See Liebel-Flarsheim*, 358 F.3d at 910. As a result, the Board should reject Petitioner's construction for "DAU" that fails to follow the *Phillips* standard.

2. Patent Owner's construction for "DAU" should be adopted as consistent with the intrinsic evidence

In the related District Court proceeding (Case No. 3:20-cv-06469-EMC (N.D. Cal.)), the term "DAU" was disputed for the '454 Patent (Exs. 2006-14). For the '454 Patent, Patent Owner proposed that "DAU" means **"a unit that manages communications between an operator network and one or more radio remote units."** Patent Owner submits that the Board should adopt the same construction here for the '358 Patent consistent with the intrinsic evidence.²

For example, in the embodiment of Fig. 2, the '358 Patent describes that DRUs communicate with a base station (eNB) through a DAU. Ex. 1001 at 9:42-45. That is, the DRUs are connected to an eNB via a DAU which is connected to multiple sectors of DRUs for simulcast. *Id.* at 11:52-55. This capability enables the virtualization of the eNB resources at the independent DRUs. *Id.* at 11:56-57. The

² In *Dali Wireless, Inc. v. CommScope Holding Co.*, No. 19-952-MN, Dkt #122 (D. Del. Jan. 4, 2021) (Ex. 2015) at 5, the Court construed "digital access unit" as "a unit that manages communications between an operator network and one or more radio remote units"—i.e., Patent Owner's proposed construction here.

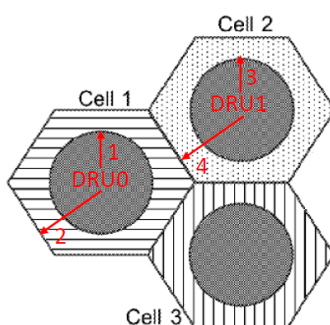
eNBs in Fig. 2 are linked to operator networks such as a “public switched telephone network or a mobile switching center.” *Id.* at 11:58-59. Consistent with the intrinsic evidence, a POSA would understand “DAU” to mean “a unit that manages communications between an operator network and one or more radio remote units.”

D. “Geographic Footprint” (Claims 1, 7, 9-15, and 18)

Petitioner did not offer this term for construction, but this term is disputed in the related District Court proceeding for the '358 Patent (Exs. 2006-14) and should be construed in reviewing the challenged claims. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (noting that “we need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy’”). Patent Owner submits that a POSA reviewing the '358 Patent would understand “geographical footprint” to mean “an area or region near one or more DRUs.”

Consistent with Patent Owner's construction, the '358 Patent describes “geographic footprints” defined by reference to the areas or regions of intended coverage near the DRU transmitting the signal. For example, referring to Figs. 1B and 1C, the '358 Patent describes a “first geographic footprint [which] *can* be centered on the first communications unit [DRU0]” and a “second geographic footprint [which] *can be a peripheral footprint* centered on the first communications unit [DRU0].” Ex. 1001 at 3:19-33 (emphasis added). Similar footprints can be

based on DRU1 in Cell 2 for third and fourth geographical footprints. And for Cell 3 there can be “a sixth geographical footprint *surrounding* the fifth geographical footprint.” *Id.* (emphasis added).



'358 Patent Figs. 1B, 1C (Annotated)

The '358 Patent describes geographic footprints that “can abut” other geographic footprints and describes the antenna system for the different frequency ranges with respect to a “geographic area.” Ex. 1001 at 3:60-67; 4:54-62; Figs. 1B, 1C. The '358 Patent also describes using different frequencies in a “region”:

. . . a second communications unit operable to transmit and receive communications using one or more of the first set of frequencies in a region associated with a third geographical footprint.

Id. at 3:41-45. Accordingly, consistent with the intrinsic evidence of the '358 Patent, “geographic footprint” should mean “an area or region near one or more DRUs.”

IV. THE ASSERTED REFERENCES

A. *Fujii* (Ex. 1005)

Fujii (1005) is the primary reference relied upon in Grounds 1-2. *Fujii* discloses a base station (BS) (Fig. 1 below) scheduling resource blocks RBs (Fig. 4) to user equipment (UE) of K users (Fig. 2) in cell clusters (Fig. 3 below). Ex. 1005 at 2371-72. The BS is equipped with $\#1\text{-}\#N_D$ antennas to transmit cell-specific downlink resource signals (RSs) **directly** to user equipment (UE) of K users in a cell. Ex. 1005 at 2371-72, Section 2. Based on the cell-specific downlink RSs from the BS, the UEs transmit RS back to the BS that uses it to schedule the RBs to the UEs in each cell. *Id.* at 2373. There is no host unit or DAU disclosed in *Fujii*.

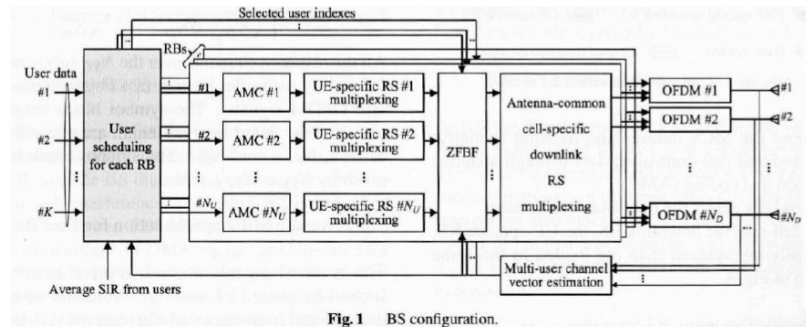


Fig. 1 BS configuration.

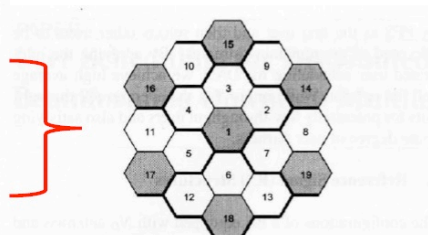
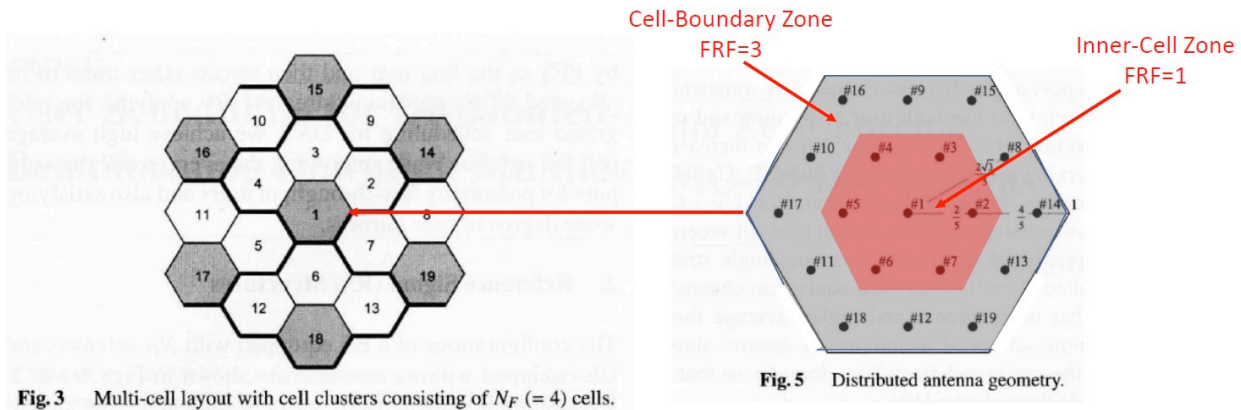


Fig. 3 Multi-cell layout with cell clusters consisting of $N_F (= 4)$ cells.

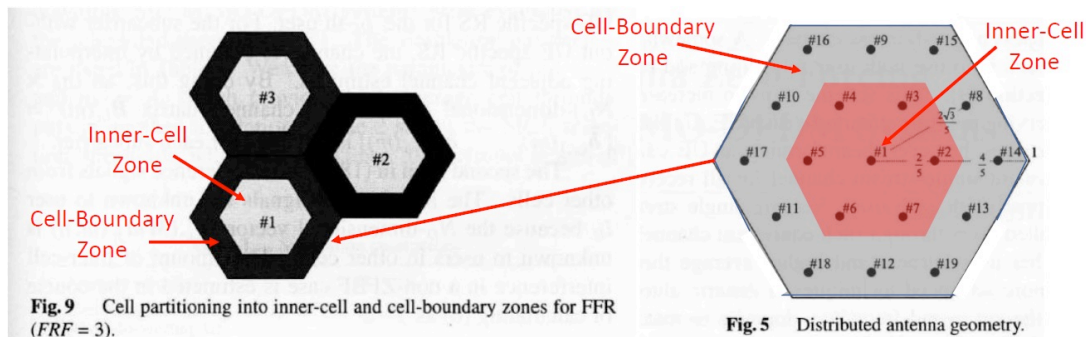
Each cell in the cell cluster (Fig. 3) is configured with a distributed antenna geometry (Fig. 5 below) having antennas $\#1\text{-}\#19$. Ex. 1005 at 2372; Pet. at 34. *Fujii* teaches that that cell-specific downlink RSs are allocated to the distributed antennas $\#1\text{-}\#19$ in Fig. 5. *Id.* at 2372. *Fujii* teaches that a sounding RS is transmitted from each UE to the BS so that the BS knows what channel has been established between each UE and distributed antennas. *Id.* at 2373, Section 2.3 (first sentence). This

implies the BS knows which distributed antenna in the inner-cell zone or in the cell-boundary zone has established a channel with a UE.

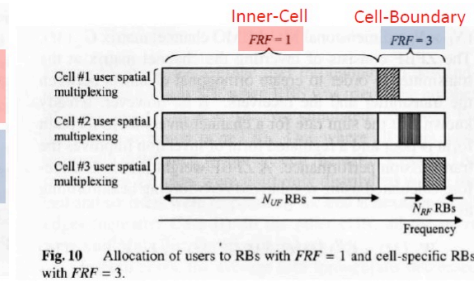
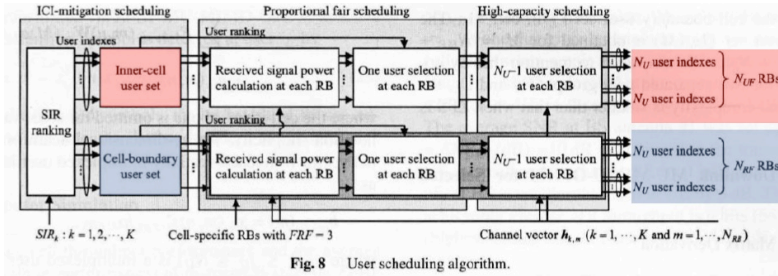
For each cell in cell clusters (Fig. 3), *Fujii* describes an “inner-cell zone” and a “cell-boundary zone.” *Id.* at 2374, Fig. 9. Fig. 5 (annotated below) is configured such that antennas #9-#19 are located at the cell-boundary region and antennas #1-#8 are located at the inner-cell region for each cell in the cell cluster (Fig. 3).



Referring to Figs. 9 and 5 (annotated below), Cells #1-#3 are shown adjacent to each other where the black regions represent the cell-boundary zone and light grey regions represent the inner-cell zone for each cell with FFR=3 configuration. Ex. 1005 at 2372, 2375; Figs. 9 and 5.



Fujii, in Figs. 8 and 10, describes user scheduling and allocation of RBs by the BS to users within different zones of a cell such as the inner-cell zone and cell-boundary zone having the distributed antenna geometry of Fig. 5. *Id.* at 2374; Figs. 8 and 5. Specifically, to mitigate interference, *Fujii* teaches a BS implementing a user scheduling algorithm to allocate N_{UF} RBs to K_H users in the inner-cell zone with $FRF=1$ frequencies and N_{RF} RBs to K_L users in the cell-boundary zones with $FRF=3$ frequencies. *Id.* at 2374; Figs. 8, 10.



To determine the inner-cell and cell-boundary user sets, *Fujii* ranks users by signal-to-interference (SIR) information fed back to UEs from the inner-cell zone (antennas #1-#8) and cell-boundary zones (antennas #9-#19) to the BS. *Id.* at 2374 (Section 3); Fig. 5, 10. Based on the SIR information, the BS ranks K UEs or users and classifies them as K_H users for the inner-cell zone and K_L users for the cell-boundary zone. *Id.*

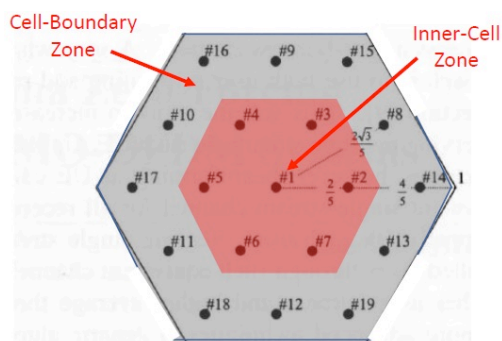


Fig. 5 Distributed antenna geometry.

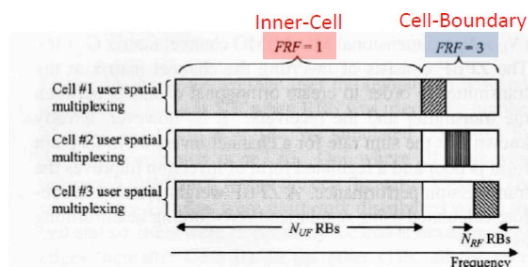


Fig. 10 Allocation of users to RBs with $FRF = 1$ and cell-specific RBs with $FRF = 3$.

Antenna #1 is located at Inner-Cell Zone

In this way, users in the inner-cell zone (antennas #1-#8) are allocated resource blocks (RBs) using only the $FRF=1$ frequencies. Ex. 1005 at 2374 (Section 3); Figs. 8-10. And users in the cell-boundary zone (antennas #9-#19) are allocated RBs using $FRF=3$ frequencies. *Id.* Because $FRF=3$ frequencies are allocated to the cell-boundary zone (antennas #9-#19), the center antenna #1 in the inner-cell zone would not communicate the $FRF=3$ frequencies allocated to the cell-boundary zone.

B. Cannon (Ex. 1006)

Cannon (1006) is a secondary reference relied upon in Grounds 1-2. *Cannon*, in Fig. 1 (below), discloses a DAS 100 having a host unit 102 with a DART module 132 that communicates with a DART module 132 in remote units 106 over communication links 130. Ex. 1006 at [0021]. Each DART module 132 is specific for a particular frequency band such that frequency band adjustments in a remote unit can be made by replacing a DART module covering one frequency band with a DART module covering a different frequency band. Ex. 1006 at [0025].

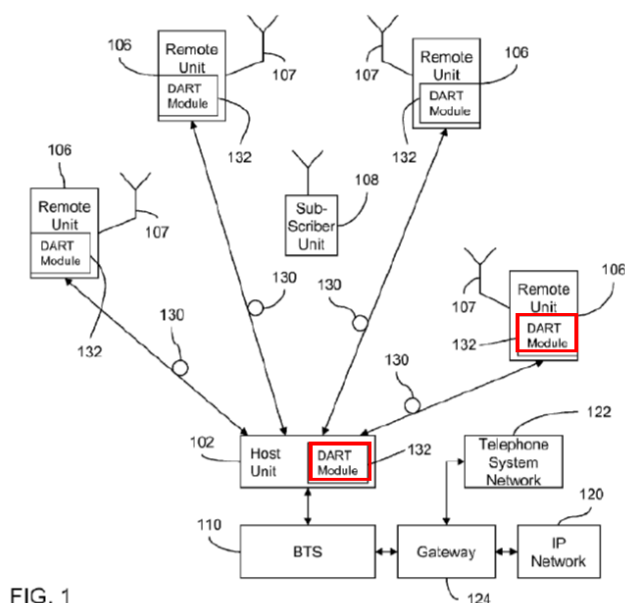


FIG. 1

Cannon teaches a host unit or remote unit digitizing an analog RF spectrum in a DAS and then discarding “non-relevant region” of the digitized RF spectrum to improve RF transport. Ex. 1006 at Abstract, [0029]; Fig. 4A (below).

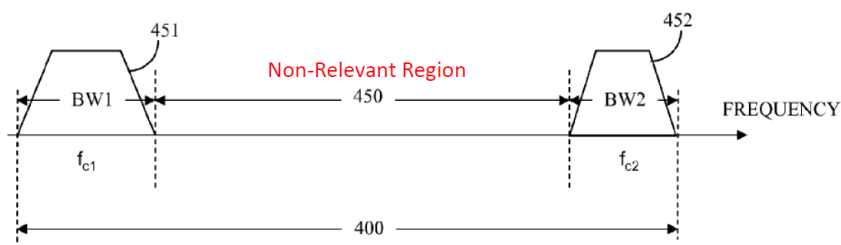


Fig. 4A

Specifically, referring to Fig. 4A, the **digitized RF spectrum 400** contains non-relevant region 450 and relevant regions 451 and 452. *Id.* at [0029]. *Cannon* teaches not to transmit or receive non-relevant regions 450 of a digitized RF spectrum 400 at a remote unit or host unit. *Id.* at Abstract, [0029]. That is, *Cannon* describes more efficient bandwidth use of communications between the remote units 106 and host

unit 102 by suppressing transmission of unused regions in a **digitized RF spectrum**.

Cannon, however, does not teach frequency reuse techniques such as Soft Frequency Reuse (SFR) or Fractional Frequency Reuse (FFR) at any of remote units 106, or that remote unit 106 uses different frequencies over surrounding geographical footprints.

C. *Oren* (Ex. 1007)

Oren (Ex. 1007) is a secondary reference relied upon in Ground 2. *Oren* discloses a DAS that transmits spatial streams over the same RF frequencies. Ex. 1007 at Abstract, [0004]. Like *Cannon*, *Oren* is unrelated to implementing frequency reuse techniques in surrounding geographical footprints.

V. PETITIONER FAILS TO SHOW ANY OF THE CHALLENGED CLAIMS 1-21 ARE OBVIOUS OVER *FUJII*, *CANNON*, AND *OREN*

Petitioner has failed to carry its burden to show a *prima facie* case of obviousness under 35 U.S.C. § 103 by not properly addressing the *Graham* factors: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) objective evidence of non-obviousness, i.e., secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). First, Petitioner fails to explain the differences between *Fujii* and the subject matter of claims 1-21 that would require a modification by *Cannon*. In a hindsight exercise, Petitioner makes an inexplicable and conclusory

statement that “*Fujii* would find it useful to employ a DAS as shown in *Cannon*.” Pet. at 24. But Petitioner fails to explain how *Fujii* could be modified to achieve the claimed invention and whether a POSA would have a reasonable expectation of success in doing so. *See, e.g., Intelligent Bio-Sys.*, 821 F.3d at 1367–68. And the combination of *Fujii* and *Cannon* still fails to teach or suggest at least the first and second DRUs or communication units, among other claim elements.

A. Ground 1: Petitioner fails to show a *prima facie* case of obviousness over claims 1-21 in view of *Fujii* alone or in combination with *Cannon*

1. Petitioner's motivation to combine *Cannon* with *Fujii* is inadequate

Petitioner has not met its burden to show that a POSA would combine *Fujii* with *Cannon*. “Obviousness . . . requires ‘a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does.’” *Johns Manville Corp. v. Knauf Insulation, Inc.*, IPR2018-00827, Paper 9 at 13 (PTAB Oct. 18, 2018) (quoting *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007)) (informative). Petitioner posits a motivation to combine *Cannon* with *Fujii* that is inadequate on multiple grounds.

First, Petitioner fails to acknowledge any differences in the scope of *Fujii* with specific claim elements that would prompt a combination with *Cannon* under the *Graham* factors. Pet at 22-26. Claims 1-6 recite a “Digital Access Unit (DAU)”

and claims 15-21 recite a “host.” Ex. 1001 at 21:18-20, 22:36-50. But **both “DAU” and “host” are missing from *Fujii***. Ex. 1005 at Figs. 1, 2. A DAU or host unit in the '358 Patent is interconnected and connected to multiple sectors or clusters of DRUs that allows for virtualization of radio resources to simulcast RBs to the DRUs. *Id.* at 9:55-57, 11:59-60; Fig. 2. Petitioner fails to acknowledge that these elements are missing in *Fujii*, ignoring *Graham* factors (1) and (2).

Fig. 1 of *Fujii* discloses a BS that directly communicates individual RBs (Fig. 4) with UEs in cell clusters (Fig. 3 below) via #1-#N_D antennas by way of OFDM #1-#N_D signals, respectively. **There is no host unit or DAU disclosed in *Fujii*** to simulcast RBs to sectors of DRUs, in contrast to the '358 Patent. *Cannon*, in Fig. 1, discloses a host unit 102 that communicates with remote units 106, but the remote units 106 are not grouped in sectors and *Cannon* does not teach host unit 102 to simulcast RBs to the remote units 106. As such, there is no suggestion or motivation to a POSA to modify *Fujii* by combining with the host unit in *Cannon*.

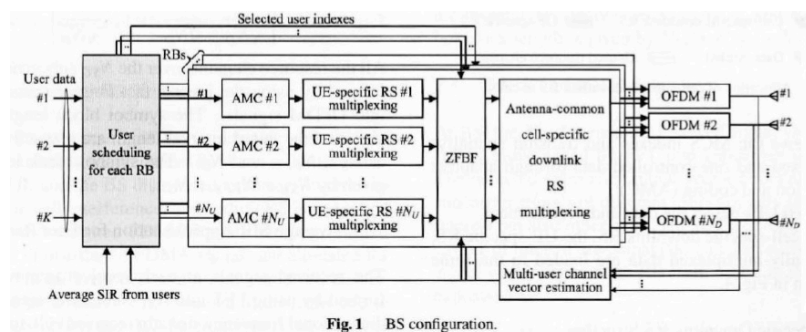


Fig. 1 BS configuration.

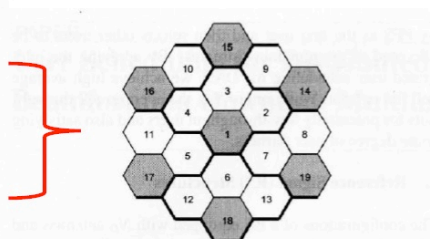


Fig. 3 Multi-cell layout with cell clusters consisting of N_F (= 4) cells.

Second, Petitioner makes a conclusory and factually unsupported statement that *Fujii* would “find it **useful** to employ the DAS of Cannon” (Pet. at 24 (emphasis added)) that discards non-relevant regions in a digitized RF spectrum, relying on Mr. Proctor who cites no underpinnings in *Fujii* or *Cannon*. Ex. 1003 at ¶ 90. *Fujii* uses a BS that schedules RBs allocated to users in an inner-cell zone with FRF=1 frequencies and cell-boundary with FRF=3 frequencies. *Cannon* is not concerned with using any RF frequencies in cell boundaries, but only that unused **digitized RF spectrum** is discarded. Petitioner continues to rely on the factually unsupported statements by Mr. Proctor for a motivation to combine:

Therefore, a POSA, realizing that there are **portions of the spectrum not being used** in each of *Fujii*'s cells, would have been motivated to use Cannon's implementation of a DAS, which **discards digitized representations of RF spectrum** that is not being used by remote antennas within a particular cell, because Cannon's implementation of a DAS in *Fujii* would result in a more efficient use of the **fiber bandwidth between** the host unit and remote units. *Id.*, ¶93.

Pet. at 26 (emphasis added).

This conclusory statement for a motivation to combine *Cannon* with *Fujii* is insufficient to meet Petitioner's burden with respect to obviousness. “To satisfy its burden of proving obviousness, a petitioner cannot employ **mere conclusory statements.**” *In re Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir.

2016) (emphasis added). Moreover, the statement “Cannon’s implementation of **DAS in Fujii** would result in a more efficient use of the fiber bandwidth between the host unit and remote units” (Pet. at 26, Ex. 1003 at ¶ 93) is “generic” and “**bears no relation to any specific combination of prior art elements.**” *ActiveVideo Networks, Inc. v. Verizon Commc’ns, Inc.*, 694 F.3d 1312, 1328 (Fed. Cir. 2012) (emphasis added). Indeed, in *Fujii*, there are **no optical fiber connections** at the base station (BS) or between a DAU and DRUs or antenna units, and therefore there is no need to reduce the bandwidth on those links, as *Cannon* teaches. *See, e.g., Hulu, LLC v. Sound View Innovations, LLC*, IPR2018-00582, Paper 34 at 17 (PTAB Aug. 5, 2019) (rejecting motivation to combine references when there was no need for “tight timing requirements”).

Third, Petitioner fails to explain how *Fujii* is modified to use the host unit 102 or remote unit 106 in *Cannon* that discards “digitized representations of the RF spectrum” such as resource blocks (RBs) to achieve the claimed invention. For instance, referring to RBs in Fig. 4 of *Fujii* that are allocated to UEs in a distributed antenna geometry (Fig. 5), Petitioner fails to explain what information in the RBs is not being used that can be discarded to motivate a POSA to use of the host unit 102 or remote unit 106 in *Cannon* with *Fujii*. Indeed, Petitioner fails to address whether a POSA could reasonably expect success from incorporating the host unit 102 or remote unit 106 into *Fujii* to achieve the claimed invention. *Intelligent Bio-Sys.*,

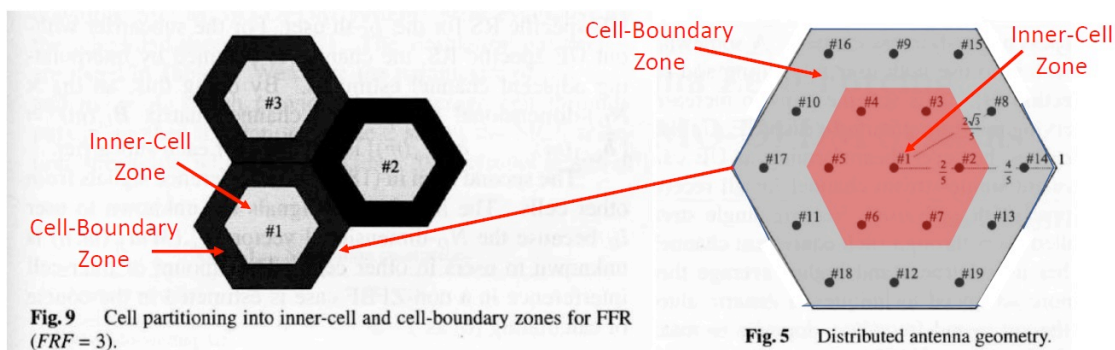
Inc., 821 F.3d at 1367–68 (obviousness determination requires “both that a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a **reasonable expectation of success in doing so**”) (emphasis added; internal quotation marks omitted). Accordingly, Petitioner has not met its burden to prove that a POSA would combine *Fujii* with *Cannon* to achieve the claimed invention with a reasonable expectation of success.

2. *Fujii* alone or in combination with *Cannon* fails to teach or suggest the first and second DRUs of claims 1-6

Claim 1 recites, *inter alia*, the first DRU in a first cell operable to communicate as follows:

wherein a first DRU in a first cell is operable to communicate using:
a first set of frequencies characterized by a first frequency band over a first geographic footprint; and
a second set of frequencies characterized by a second frequency band different from the first frequency band over a second geographic footprint including and surrounding the first geographic footprint;

Ex. 1001 at 21:21-29 (emphasis added). Petitioner identifies antenna #1 within the distributed antenna geometry (Fig. 5) in *Fujii* to be in Cell #1 as the first DRU. Pet. at 37. A POSA reviewing Figs. 5 and 9 (below) would recognize that antenna #1 is located at the inner-cell zone (grey area)—**not** at the cell-boundary zone (black area).



Ex. 1005 at 2372 (Section 2.1), 2374 (Section 3), Figs. 5, 9. To meet the claim limitations for the first DRU, Petitioner alleges that antenna #1 communicates both FRF=1 frequencies allocated for RBs in the inner-cell zone and FRF=3 frequencies allocated for RBs in the cell-boundary zone as the first and second sets of frequencies. Pet at 37.

In doing so, Petitioner fails to comply with 37 C.F.R. § 42.104(b)(4)-(5). The citations in *Fujii* to which Petitioner refers do not specify any teachings in which frequency sets or frequency bands are used specifically by antenna #1 located at the inner-cell zone. Pet. at 37. *Fujii* teaches only a BS implementing a user scheduling algorithm to allocate N_{UF} RBs to K_H users in the inner-cell zone with FRF=1 frequencies and N_{RF} RBs to K_L users in the cell-boundary zones with FRF=3 frequencies. *Id.* at 2374 (Section 3); Figs. 5, 8, 10. Because FRF=3 frequencies are allocated to the cell-boundary zone (antennas #9-#19), a POSA would understand that the center antenna #1 in the inner-cell zone **would not communicate the FRF=3 frequencies allocated to the cell-boundary zone.**

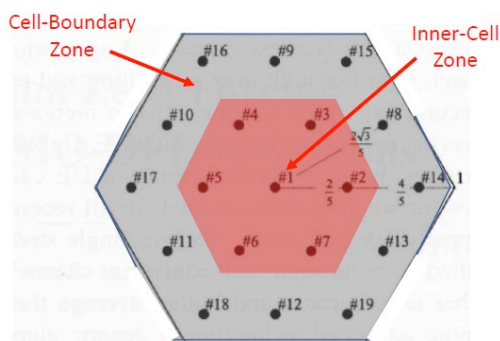


Fig. 5 Distributed antenna geometry.

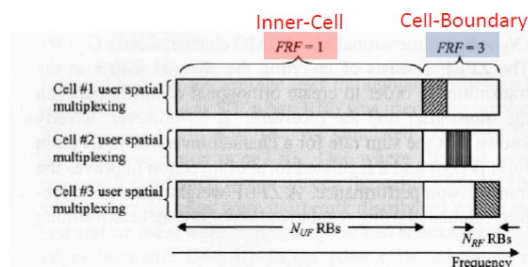


Fig. 10 Allocation of users to RBs with $FRF = 1$ and cell-specific RBs with $FRF = 3$.

Antenna #1 is located at Inner-Cell Zone

There is simply no teaching in *Fujii* that antenna #1 located at an inner-cell zone of Cell #1 communicates both $FRF=1$ frequencies allocated for that zone, as well as $FRF=3$ frequencies allocated for the cell-boundary zone. Here, Petitioner fails to include “the specific portions of the evidence that support the challenge.” *Synopsys*, IPR2012-00041, Paper 16 at 14; 37 C.F.R. § 42.104(b)(5). And Petitioner does not rely on *Cannon* to show any remote unit communicating different frequencies over geographical footprints. Pet. at 37. Accordingly, Petitioner fails to meet its burden that *Fujii* alone or in combination with *Cannon* teaches or suggests the first DRU.

By way of contrast, according to the '358 Patent, for one embodiment, individual DRUs can be considered cells: “**DRU0 can be considered to be Cell 1** in FIGS. 1A-1C, **DRU1 can be considered Cell 2** in FIGS.1A-1C, and DRU2 can be considered to be Cell 3 in FIGS.1A-1C.” Ex. 1001 at 9:45-47 (emphasis added). Figs. 1B, 1E and 1C, 1F (below) show individual DRU cell architectures

implementing fractional frequency reuse (FFR) and software frequency reuse (SFR) techniques, respectively, in different geographical footprints:

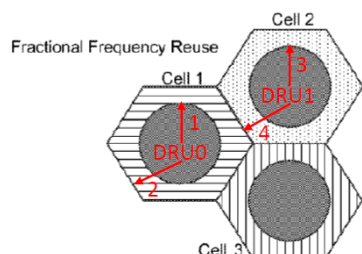


FIG. 1B

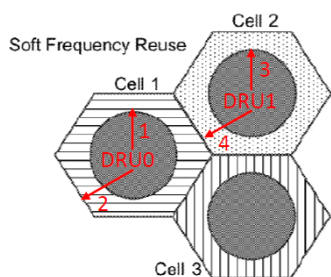


FIG. 1C

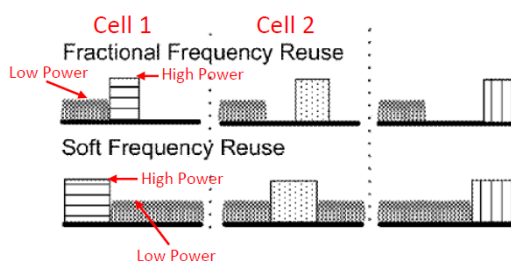


FIG. 1E

FIG. 1F

For one embodiment, referring to Figs. 1B, 1E, to implement FFR each DRU (e.g., DRU0 and DRU1 in Cells 1 and 2) transmits and receives data at a first low-power level using frequencies in the grey frequency bands and a second high-power level using frequencies in the horizontal striped/shaded/vertical striped bands. Ex. 1001 at 10:33-39. For FFR, the entire frequency spectrum is not used. For another embodiment, referring to Figs. 1C, 1F, to implement SFR, each DRU (e.g., DRU0 and DRU1 in Cells 1 and 2) transmits and receives data at the low-power level frequency band and at the high-power level frequency band. Ex. 1001 at 10:56-61. According to the '358 Patent, “a **single DRU** in Cell 1 **broadcasts at low power**

over grey band and at a **higher power** over the horizontal stripe spectrum.” *Id.* at 10:57-59 (emphasis added).

For FFR and SFR, the low-power frequency bands are used in the inner cell region (grey areas 1 and 3) and the high-power frequency bands are used in the outer cell region (horizontal striped/shaded/vertical striped areas 2 and 4). *Id.* at 7:33-67. Outer cell regions (2 and 4) of adjacent Cells 1-3 use different high-power frequency bands to mitigate interference for cell-edge users. *Id.* Figs. 1B, 1E, 1C, 1F and 2 for a single DRU in a cell using low- and high-power levels to receive and transmit data in inner and outer cell regions (areas 1, 2 in Cell 1 and areas 3, 4 in Cell 2) embody claims 1-21. Petitioner has failed to show with particularity the first DRU as disclosed and claimed using different first and second frequency sets and bands over first and second geographical footprints. Such a single DRU per cell is not taught or suggested by *Fujii* and *Cannon*.

Claim 1 also recites, *inter alia*, a second DRU in a second cell operable to communicate as follows:

wherein a second DRU in a second cell is operable to communicate using:
the first set of frequencies over a third geographical footprint; and
a third set of frequencies characterized by a third frequency band different from the first frequency band and the second frequency band over a fourth geographic footprint including and surrounding the third geographic footprint.

Ex. 1001 at 21:30-38 (emphasis added). Petitioner identifies antenna #1 in Cell #2 as the second DRU. Pet. at 39. As with the first DRU, Petitioner fails to comply with 37 C.F.R. § 42.104(b)(4)-(5) for the second DRU. *Fujii* teaches only a BS implementing a user scheduling algorithm to allocate N_{UF} RBs to K_H users in the inner-cell zone with FRF=1 frequencies and N_{RF} RBs to K_L users in the cell-boundary zones with FRF=3 frequencies. *Id.* at 2374 (Section 3); Figs. 5, 8, 10. Because FRF=3 frequencies are allocated to the cell-boundary zone (antennas #9-#19), a POSA would understand that the center antenna #1 in the inner-cell zone would not communicate the FRF=3 frequencies allocated to the cell-boundary zone.

There is simply no teaching in *Fujii* that antenna #1 located at an inner-cell zone of Cell #2 communicates both FRF=1 frequencies allocated for that zone, as well as FRF=3 frequencies allocated for the cell-boundary zone. Petitioner thus fails to include “the specific portions of the evidence that support the challenge.” *Synopsys*, IPR2012-00041, Paper 16 at 14; 37 C.F.R. § 42.104(b)(5). Accordingly, Petitioner fails to meet its burden that *Fujii* alone or in combination with *Cannon* teaches or suggests the second DRU.

3. There is no motivation to combine the host unit of *Cannon* with *Fujii* as the “DAU” of claims 1-7

Claims 1 recites, *inter alia*, “providing at least one Digital Access Unit (DAU) configured to communicate with at least one of the one or more DRUs.” Ex. 1001

at 21:18-20. Petitioner does **not** identify a DAU in *Fujii*, but only refers to host unit 102 in *Cannon*. Pet. at 33. As set forth in Section V.A.1, Petitioner's motivation to combine *Cannon* with *Fujii* is inadequate.

For instance, in the '358 Patent, a DAU or host unit is interconnected and connected to multiple sectors or clusters of DRUs that allows for virtualization of radio resources to simulcast RBs to the DRUs. Ex. 1001 at 9:55-57, 11:59-60; Fig. 2. *Fujii*, however, discloses only a base station BS that directly communicates individual RBs (Fig. 4) with UEs in cell clusters (Fig. 3 below) via #1-#N_D antennas by way of OFDM #1-#N_D signals, respectively. In *Fujii*, the BS does not simulcast RBs to sectors of DRUs in contrast to the '358 Patent. *Cannon*, in Fig. 1, discloses a host unit 102 that communicates with remote units 106, but the remote units 106 are not grouped in sectors, and *Cannon* does not teach host unit 102 to simulcast RBs to the remote units 106.

Moreover, in *Fujii*, there are no optical fiber connections at the base station (BS or between a DAU and DRUs or antenna units, and therefore there is no need to reduce the bandwidth on those links in view of *Cannon*'s teaching to discard unused portions of a digitized RF spectrum. See, e.g., *Hulu*, IPR2018-00582, Paper 34 at 17 (rejecting motivation to combine references when there was no need for "tight timing requirements"). As such, there is no suggestion or motivation to a POSA to modify *Fujii* with the host unit in *Cannon*.

Petitioner also fails to explain how *Fujii* is modified to use the host unit 102 of *Cannon* that discards “digitized representations of the RF spectrum” such as resource blocks (RBs) to achieve the claimed invention. Referring to RBs in Fig. 4, Petitioner fails to explain what information in those RBs—digitized representations of the RF spectrum—would be discarded if host 102 could be implemented in *Fujii*. And Petitioner fails to address whether a POSA could reasonably expect success from incorporating the host unit 102 into *Fujii* to achieve the claimed invention. *Intelligent Bio-Sys., Inc.*, 821 F.3d at 1367–68.

4. *Fujii* alone or in combination with *Cannon* fails to teach or suggest steps of the first and second communications units of claims 7-14

Claim 7 recites a method providing, *inter alia*, transmitting and receiving, from a first communications unit of the set of communications units the following:

transmitting and receiving, from a first communications unit of the set of communications units:
a first set of frequencies characterized by a first frequency band and a first geographic footprint; and
a second set of frequencies characterized by a second frequency band different from the first frequency band and a second geographic footprint larger than and at least partially surrounding the first geographic footprint; and

Ex. 1001 at 21:57-65 (emphasis added). As with claims 1-6, Petitioner identifies antenna #1 in Cell #1 of *Fujii* as the first communications unit. Pet. at 45. For the same reasons as in Section V.A.2, antenna #1 in Cell #1 cannot be the first

communications unit. There is simply no teaching in *Fujii* that antenna #1 located at an inner-cell zone of Cell #1 communicates both FRF=1 frequencies allocated for that zone, as well as FRF=3 frequencies allocated for the cell-boundary zone in Cell #1.

That is, because FRF=3 frequencies are allocated to the cell-boundary zone (antennas #9-#19), a POSA would understand that the center antenna #1 in the inner-cell zone would not communicate the FRF=3 frequencies allocated to the cell-boundary zone. Petitioner thus fails to include “the specific portions of the evidence that support the challenge.” *Synopsys*, IPR2012-00041, Paper 16 at 14; 37 C.F.R. § 42.104(b)(5). And Petitioner does not rely on *Cannon* to show any remote unit communicating different sets of frequencies and bands over first and second geographical footprints. Pet. at 45. Petitioner again thus fails to include “the specific portions of the evidence that support the challenge.” *Synopsys*, IPR2012-00041, Paper 16 at 14; 37 C.F.R. § 42.104(b)(5). Accordingly, Petitioner fails to meet its burden that *Fujii* alone or in combination with *Cannon* teaches or suggests the transmitting and receiving of the first communications unit.

Claim 7 recites a method providing, *inter alia*, transmitting and receiving, from a second communications unit of the set of communications units the following:

transmitting, and receiving, from a second communications unit of the set of communications units:
a third set of frequencies including one or more frequencies in the first frequency band and a third geographical footprint; and
a fourth set of frequencies including one or more frequencies in a third frequency band and a fourth geographical footprint larger than and at least partially surrounding the third geographical footprint.

Ex. 1001 at 21:66-22:7 (emphasis added). Petitioner identifies antenna #1 in Cell #2 as the second communications unit. Pet. at 47. As with the first communications unit, Petitioner fails to comply with 37 C.F.R. § 42.104(b)(4)-(5) for the second communications unit. *Fujii* teaches only a BS implementing a user scheduling algorithm to allocate N_{UF} RBs to K_H users in the inner-cell zone with FRF=1 frequencies and N_{RF} RBs to K_L users in the cell-boundary zones with FRF=3 frequencies. *Id.* at 2374 (Section 3); Figs. 5, 8, 10. There is simply no teaching in *Fujii* that antenna #1 located at an inner-cell zone of Cell #2 communicates both FRF=1 frequencies allocated for that zone, as well as FRF=3 frequencies allocated for the cell-boundary zone. Petitioner thus fails to include “the specific portions of the evidence that support the challenge.” *Synopsys*, IPR2012-00041, Paper 16 at 14; 37 C.F.R. § 42.104(b)(5).

That is, because FRF=3 frequencies are allocated to the cell-boundary zone (antennas #9-#19), a POSA would understand that the center antenna #1 in the inner-cell zone would not communicate the FRF=3 frequencies allocated to the cell-

boundary zone. And Petitioner does not rely on *Cannon* to show any remote unit communicating different sets of frequencies and bands over first and second geographical footprints. Pet. at 47. Accordingly, Petitioner fails to meet its burden that *Fujii* alone or in combination with *Cannon* teaches or suggests the transmitting and receiving of the second communications unit.

5. There is no motivation to combine the host unit of *Cannon* with *Fujii* as the “host unit” for claims 15-21

Claim 15 recites a “host unit,” “a first communications unit coupled to the host unit,” and a “a second communications unit coupled to the host unit.” Ex. 1001 at 22:35-50. For the same reasons as set forth in Section V.A.1 and V.A.3, Petitioner’s motivation to combine the host unit 102 in *Cannon* with *Fujii* is inadequate here. Petitioner fails to explain how *Fujii* is modified to use the host unit 102 of *Cannon* that discards “digitized representations of the RF spectrum” such as resource blocks (RBs) to achieve the claimed invention. Referring to RBs in Fig. 4, Petitioner fails to explain what information in those RBs—digitized representations of the RF spectrum—would be discarded if host 102 could be implemented in *Fujii* or why *Cannon*’s discarding would be helpful to *Fujii*. In *Fujii*, there are no optical fiber connections at the base station (BS) or between a DAU and DRUs or antenna units, and therefore there is no need to reduce the bandwidth on those links, as *Cannon* teaches. See, e.g., *Hulu, LLC v. Sound View Innovations, LLC*, IPR2018-

00582, Paper 34 at 17 (PTAB Aug. 5, 2019) (rejecting motivation to combine references when there was no need for “tight timing requirements”). And Petitioner fails to address whether a POSA could reasonably expect success adding the host unit 102 with the base station BS) into *Fujii* to achieve the claimed invention. *Intelligent Bio-Sys., Inc.*, 821 F.3d at 1367–68.

6. *Fujii* alone or in combination with *Cannon* fails to teach or suggest the first and second communications units of claims 15-21

Claim 15 recites, *inter alia*, a first communications unit coupled to the host unit and operable as follows:

a first communications unit coupled to the host unit and operable to transmit and receive communications using a first set of frequencies in a first frequency range and associated with a first geographical footprint and a second set of frequencies in a second frequency range and associated with a second geographical footprint larger than the first geographical footprint; and

Ex. 1001 at 22:37-43 (emphasis added). Petitioner identifies antenna #1 in Cell #1 of *Fujii* as the first communications unit. Pet. at 56. For the same reasons as in Section V.A.2, antenna #1 in Cell #1 cannot be the first communications unit. There is simply no teaching in *Fujii* that antenna #1 located at an inner-cell zone of Cell #1 communicates both FRF=1 frequencies allocated for that zone, as well as FRF=3 frequencies allocated for the cell-boundary zone in Cell #1. Petitioner thus fails to include “the specific portions of the evidence that support the challenge.” *Synopsis*,

IPR2012-00041, Paper 16 at 14; 37 C.F.R. § 42.104(b)(5). Moreover, because FRF=3 frequencies are allocated to the cell-boundary zone (antennas #9-#19), a POSA would understand that the center antenna #1 in the inner-cell zone would not communicate the FRF=3 frequencies allocated to the cell-boundary zone. And Petitioner does not rely on *Cannon* to show any remote unit communicating different sets of frequencies and bands over first and second geographical footprints. Pet. at 56-57. Accordingly, Petitioner fails to meet its burden that *Fujii* alone or in combination with *Cannon* teaches or suggests the first communications unit.

Claim 15 recites, *inter alia*, a second communications unit coupled to the host unit and operable as follows:

a second communications unit coupled to the host unit and operable to transmit and receive communications using one or more of the first set of frequencies in a region associated with a third geographical footprint and a third set of frequencies in a third frequency range and associated with a fourth geographical footprint larger than the third geographical footprint.

Ex. 1001 at 22:44-50 (emphasis added). Petitioner identifies antenna #1 in Cell #2 of *Fujii* as the second communications unit. Pet. at 58-59. For the same reasons as in Section V.A.2, antenna #2 in Cell #2 cannot be the first communications unit. There is simply no teaching in *Fujii* that antenna #1 located at an inner-cell zone of Cell #2 communicates both FRF=1 frequencies allocated for that zone, as well as FRF=3 frequencies allocated for the cell-boundary zone in Cell #2. Petitioner thus

fails to include “the specific portions of the evidence that support the challenge.” *Synopsys*, IPR2012-00041, Paper 16 at 14; 37 C.F.R. § 42.104(b)(5). That is, because FRF=3 frequencies are allocated to the cell-boundary zone (antennas #9-#19), a POSA would understand that the center antenna #1 in the inner-cell zone would not communicate the FRF=3 frequencies allocated to the cell-boundary zone. And Petitioner does not rely on *Cannon* to show any remote unit communicating different sets of frequencies and bands over first and second geographical footprints. Pet. at 56-57. Accordingly, Petitioner fails to meet its burden that *Fujii* alone or in combination with *Cannon* teaches or suggests the second communications unit.

7. *Fujii* alone or in combination with *Cannon* fails to teach or suggest the first and second power levels of claim 17

Claim 17 recites, *inter alia*, “the first set of frequencies in the first frequency range are associated with a **first power level** and the communications using the second set of frequencies in the second frequency range are associated with a **second power level greater than the first power level.**” Ex. 1001 at 22:55-60 (emphasis added). Referring to Figs. 1B, 1E and 1C, 1F, for example, the '358 Patent shows individual DRU cell architectures implementing fractional frequency reuse (FFR) and software frequency reuse (SFR) techniques, respectively. For one embodiment, referring to Figs. 1B, 1E, to implement FFR each DRU (e.g., DRU0 and DRU1 in Cells 1 and 2) transmits and receives data at a **first low-power level** using

frequencies in the grey frequency bands and a **second high-power level** using frequencies in the horizontal striped/shaded/vertical striped bands. '358 Patent at 10:33-39. For FFR, the entire frequency spectrum is not used.

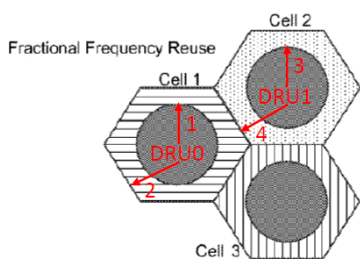


FIG. 1B

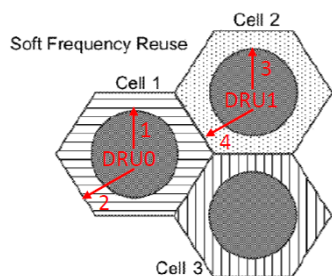


FIG. 1C

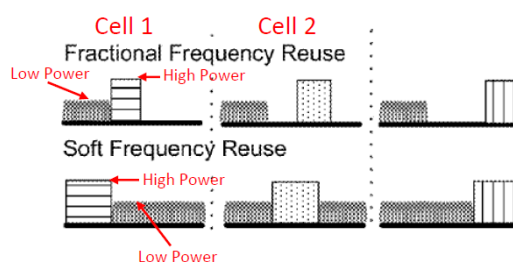


FIG. 1E

FIG. 1F

For another embodiment, referring to Figs. 1C, 1F, to implement SFR, each DRU transmits and receives data at both the low-power level and the high-power level frequency bands. '358 Patent at 10:56-61. According to the '358 Patent, “a **single DRU** in Cell 1 **broadcasts** at **low power** over grey band and at a **higher power** over the horizontal stripe spectrum.” *Id.* at 10:57-59 (emphasis added).

For claim 17, Petitioner fails to show any teachings in *Fujii* and *Cannon* of differing power levels for FRF=1 and FRF=3 frequencies, but rather relies on a conclusory statement by Mr. Proctor. Pet at 61-62; Ex. 1003 at 77-78. There is

simply no teaching, figure, or evidentiary support for disclosure of differing power levels in *Fujii* and *Cannon*. Petitioner thus fails to include “the specific portions of the evidence that support the challenge.” *Synopsys*, IPR2012-00041, Paper 16 at 14; 37 C.F.R. § 42.104(b)(5). Accordingly, Petitioner fails to meet its burden that claim 17 is rendered obvious in view of *Fujii* alone or in combination with *Cannon*.

8. *Fujii* alone or in combination with *Cannon* fails to teach or suggest the first and second power levels of claim 18

Claim 18 recites, *inter alia*, “the first set of frequencies in the region associated with a third geographical footprint are associated with a **first power level** and the communications using the third set of frequencies in the third frequency range are associated with a **second power level greater than the first power level.**” Ex. 1001 at 22:61-67 (emphasis added). For the same reasons as with claim 17, *Fujii* and *Cannon* fail to show the first and second power levels as recited in claim 18. Petitioner therefore fails to meet its burden to show claim 18 is rendered obvious in view of *Fujii* alone or in combination with *Cannon*.

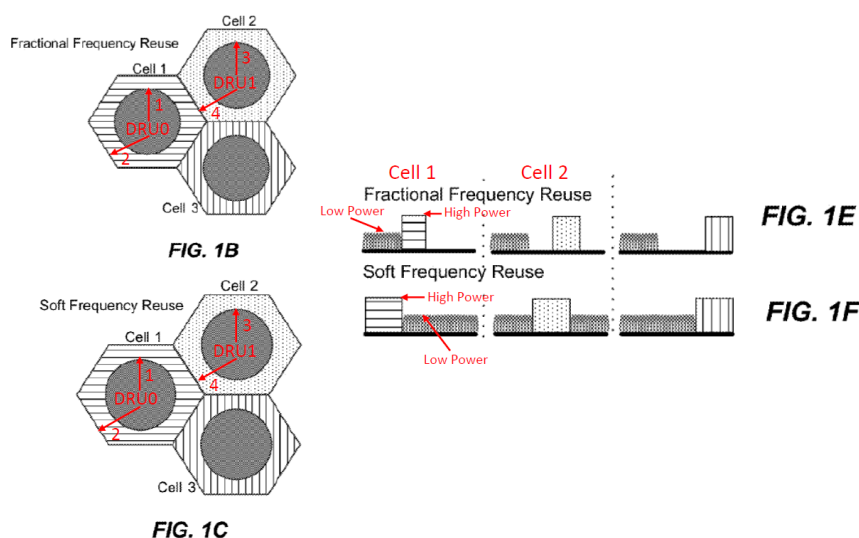
B. Ground 2: Petitioner fails to show a *prima facie* case of obviousness over claim 4 in view of *Fujii* alone or in combination with *Cannon* in view of *Oren*

Oren is not relied upon to cure the deficiencies in *Fujii* and *Cannon* as discussed in Sections V.A.1-2 regarding claim 1, and therefore this combination cannot render claim 4 obvious for the same reasons as claim 1. *Oren* discloses a

DAS that transmits spatial streams over the same RF frequencies. Ex. 1007 at Abstract, [0004]. Like *Cannon*, *Oren* is unrelated to implementing frequency reuse techniques in geographical footprints. As such, because *Oren* does not cure the deficiencies of *Fujii* and *Cannon*, there is no motivation to combine *Oren* with *Fujii* and *Cannon* to achieve the claimed invention. Accordingly, *Fujii* alone or in combination with *Cannon* in view of *Oren* does not render claim 4 obvious.

VI. PETITIONER'S EXPERT DECLARATION SHOULD BE REJECTED AS UNRELIABLE AND GIVEN NO WEIGHT

In describing the '358 Patent, Mr. Proctor fails to recognize an individual DRU per cell embodiment embodied by the claims. Ex. 1003 at 25-28. For example, according to the '358 Patent, for one embodiment, individual DRUs can be considered cells: **"DRU0 can be considered to be Cell 1 in FIGS. 1A-1C, DRU1 can be considered Cell 2 in FIGS.1A-1C, and DRU2 can be considered to be Cell 3 in FIGS.1A-1C."** '358 Patent at 9:45-47 (emphasis added).

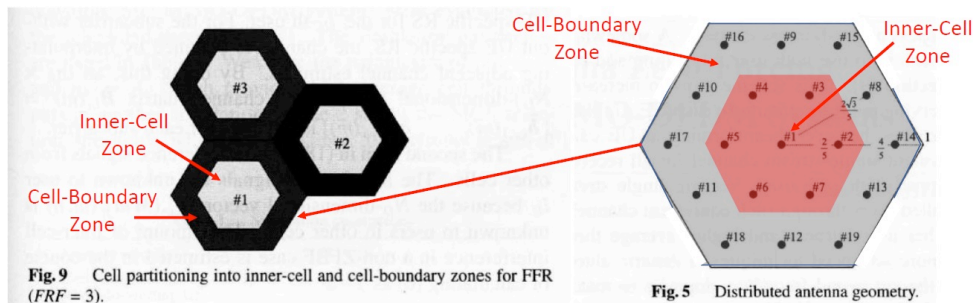


Referring to Figs. 1B, 1E and 1C, 1F, the '358 Patent shows individual DRU cell architectures implementing fractional frequency reuse (FFR) and software frequency reuse (SFR) techniques, respectively. For example, referring to Figs. 1C, 1F, to implement SFR each DRU (e.g., DRU0 and DRU1 in Cells 1 and 2) transmits and receives data at the low-power level frequency band and at the high-power level frequency band. '358 Patent at 10:56-61. According to the 358 Patent, “a **single DRU in Cell 1 broadcasts at low power** over grey band and at a **higher power** over the horizontal stripe spectrum.” *Id.* at 10:57-59 (emphasis added). This single DRU per cell embodiment was ignored by Mr. Proctor. Ex. 1003 at 25-28.

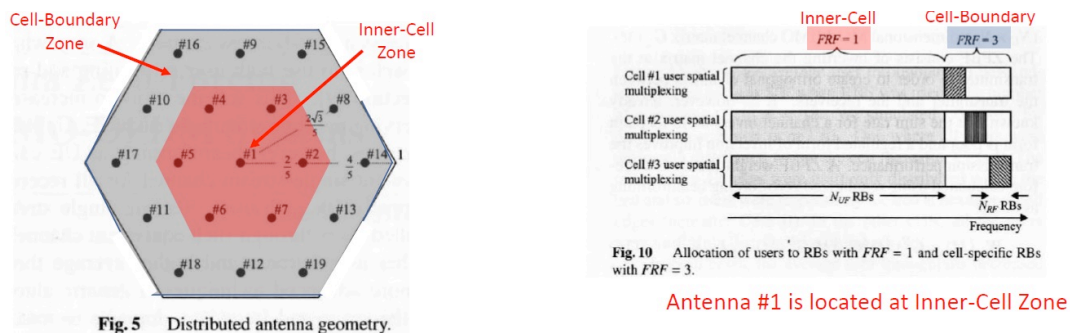
Mr. Proctor's attempt to read antenna #1 in *Fujii* located at the inner-cell zone as the single DRU embodiment of the '358 Patent should be rejected as not based on underlying facts. *See* 37 C.F.R. § 42.65(a) (“Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.”); *see also Rohm & Haas Co. v. Brotech Corp.*, 127 F.3d 1089, 1092 (Fed. Cir. 1997) (fact finder not required to credit expert's unsupported assertions).

For example, at ¶ 113 of his Declaration (Ex. 1003), Mr. Proctor cites Pages 2374-75, Sections 3 and 3.1, and Figs. 9 and 10 of *Fujii* and alleges those cites support antenna #1 reading on the first DRU of the claims. Ex. 1003 at 54. Specifically, Mr. Proctor alleges that antenna #1 located at the inner-cell zone of

Figs. 5 and 9 (below) communicate both FRF=1 frequencies allocated for the inner-cell zone and FRF=3 frequencies allocated for the cell-boundary zone.



A careful review of Pages 2374-75, Sections 3 and 3.1, and Figs. 9 and 10 of *Fujii*, however, reveal that there is no teaching in *Fujii* to support Mr. Proctor's allegation. Based on those sections and figures, *Fujii* teaches only a BS implementing a user scheduling algorithm to allocate N_{UF} RBs to K_H users in the inner-cell zone with FRF=1 frequencies and N_{RF} RBs to K_L users in the cell-boundary zones with FRF=3 frequencies. *Id.* at 2374-75, Sections 3, 3.1 Figs. 5, 9, 10.



A POSA would not agree with Mr. Proctor because FRF=3 frequencies are allocated to the cell-boundary zone (antennas #9-#19), and that POSA would understand that the center antenna #1 in the inner-cell zone would not communicate

the FRF=3 frequencies allocated to the cell-boundary zone. As such, Petitioner fails to include “the specific portions of the evidence that support the challenge.” *Synopsys*, IPR2012-00041, Paper 16 at 14; 37 C.F.R. § 42.104(b)(5). Mr. Proctor's entire Declaration is based on this unsupported allegation and should be disregarded.

VII. CONCLUSION

Petitioner has not established a reasonable likelihood that it will prevail on Grounds 1-2 to establish unpatentability of claims 1-21 of the '358 Patent, and therefore the Board should deny institution of *inter partes* review of the '358 Patent.

Respectfully Submitted,

Dated: June 9, 2021

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CERTIFICATE OF SERVICE

As authorized by Patent Owner's Mandatory Notice, I hereby certify that on June 9, 2021, a copy of this document has been served in its entirety by electronic mail on Petitioner's lead and backup counsel.

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