

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

COMMSCOPE TECHNOLOGIES, LLC,¹
Petitioner,

v.

DALI WIRELESS, INC.,
Patent Owner.

IPR2022-01293
U.S. Patent No. 10,334,499

PETITIONER REPLY

¹ Previous co-petitioner Corning Optical Communications LLC was terminated as a party by PTAB order dated February 6, 2023.

Table of Contents

I.	CLAIM CONSTRUCTION.....	1
A.	“send a digital representation of a [first/second] set of radio resources to the first remote unit”	1
B.	“Packetize”	5
II.	COLLATERAL ESTOPPEL	6
III.	PATENT OWNER’S ARGUMENTS FAIL TO DISTINGUISH THE PRIOR ART	7
A.	GROUND 1: Patent Owner Fails to Distinguish Wu	7
1.	Wu discloses sending “digital representations of radio resources”	7
2.	Wu discloses sending “at a [first/second] point in time ...a [first/second] set of radio resources for transmission at [an/the] antenna of a first remote unit”	10
3.	Wu discloses a baseband unit.	17
4.	Wu discloses “packetizing” and “destination information” (claims 2-3, 9-10, 15, 19).....	20
5.	Wu discloses destination information identifying the remote unit (claims 3, 10, 15).	24
6.	Wu discloses a subset having some resources from two signal sources (claims 4, 11, 16).	25
7.	Wu discloses composite signals from each signal source (claims 13 and 18).....	27
B.	GROUND 2: Wu and Sabat ‘426.....	27
C.	GROUND 3: Wu and Sabat ‘552.....	28
D.	GROUND 4: Wu and OBSAI.....	28
E.	GROUND 5: Hettstedt	28
1.	Hettstedt discloses that the CMU is “configured to send a digital representation of a [first/second] set of radio resources...”	28
2.	Hettstedt discloses “a [first/second] set of radio resources for transmission at an antenna of a first remote unit”	30
3.	Dependent claims 4, 11, and 16	31
4.	Dependent claims 13 and 18	32
F.	GROUND 6: Hettstedt in view of Wu	32
G.	GROUND 7: Hettstedt plus Sabat-552	33

Table of Authorities

<i>Baldwin Graphic Sys., Inc. v. Siebert, Inc.</i> , 512 F.3d 1338 (Fed. Cir. 2008)	10
<i>Caterpillar Inc. v. Wirtgen America, Inc.</i> , IPR2018-01091, Paper #49, 2019 Pat. App. LEXIS 13605 (P.T.A.B. November 27, 2019)	14

I. CLAIM CONSTRUCTION

A. “send a digital representation of a [first/second] set of radio resources to the first remote unit”

PO seeks construction of “send a digital representation of a [first/second] set of radio resources to the first remote unit.” PO says this phrase “includes sending digital information defining or describing a set of radio resources to be used for transmitting data over the air via the antenna of a remote radio unit.” PO Response 13.

There is no need for construction because Wu and Hettstedt meet even PO’s claim construction, which Section III explains. PO’s only argument to distinguish Wu relies on new limitations not stated in PO’s actual construction. PO argues Wu does not disclose digital representation of radio resources that describe “*how the DRU should be configured to transmit RF signals.*” PO Response at 33.² But “how the DRU should be configured” is not part of PO’s construction. PO also argues “Wu’s system is not designed to send digital representation of radio resources, *i.e., configuration information* related to radio resources.” PO Response 35. “Configuration information” is not part of PO’s construction.

² All emphasis, highlighting, annotations throughout are added.

If the PTAB construes the term, the PTAB should (1) adopt the plain and ordinary meaning and (2) reject PO's argument that the term states a requirement about additional "configuration information" or "how the DRU is configured."

First, the plain and ordinary meaning applies because there is no lexicography or disavowal. The specification never uses (much less redefines) the phrase "digital representation," and PO never used a special meaning of "digital representation" to distinguish the art during prosecution. Multiple judges have determined the plain and ordinary meaning applies when construing the same concept in the family members of the '499 patent. EX1062 10-11; EX1064 2. PO's expert agreed the plain and ordinary meaning controls. EX1061 146:3-22.

Second, the plain and ordinary meaning of "digital representation" does not require the DAU send "configuration information" or state any requirement for "how a DRU is configured." EX1071 ¶¶6-9. The ordinary meaning of "digital" refers to data expressed in digits (i.e., 0s and 1s) as opposed to analog. EX1065 3, 6, 9. The ordinary meaning of "representation" is simply "something that represents" which itself is broadly defined as to indicate, describe, communicate by signs or symbols, depict, represent, delineate. EX1065 12-13; EX1071 ¶6.

PO also ignored a relevant teaching in the specification. The specification explains that the DAU is configured to send the "digitized" form of the exemplary radio resources (RF input signals) to the DRUs: "The RF input signals are

separately down-converted, **digitized**, and converted to baseband (using a Digital Down-Converter) by the DAU. ...The independently serialized, parallel data streams are ***then delivered to different DRU's*** 125A-125k..." '499 4:63-5:6. Here, the digital representation of the radio resources is simply the "digitized" form of the radio resources (RF input signals).

PO's reliance on the PTAB's discussion of the phrase "radio resources" in a separate case is misplaced. PO's Response at 15 (citing IPR2020-01430 Paper 15 at 11). The PTAB there was not addressing whether a digital representation of a set of radio resources must include ***more*** than a digital version of the radio resource signal. The Board in the present proceeding has already explained that its discussion of radio resources in IPR2020-01430 addressed "whether data to be carried wirelessly using RF carriers, CDMA codes, and TDMA time slots was *by itself* a radio resource." IPR2022-01293 Paper 18 at 25 (emphasis original).

PO argues its position is "consistent" with the intrinsic record. This fails for two reasons.

First, PO's position that the baseband unit must send "configuration information" is actually inconsistent with the primary intrinsic evidence (the claim language). The claims say the baseband unit is configured to send a digital representation "of" the first and second set of "*radio resources*." Thus, the proper construction must align with the underlying meaning of "radio resources."

Critically, the PTAB’s preliminary construction of radio resources includes, for example, “RF carriers” without any additional requirement about “configuration information.” Paper 18 at 26. PO’s response provides no argument against the preliminary construction of “radio resources.” Two district courts have found “radio resources” includes, for example, “RF carrier” without any additional requirement about “configuration information.” EX1066 8-11, 20; EX1059 3. Further, the district court to most recently examine the issue determined radio resources is “*fundamentally different*” from “configuration information” and that “power settings, gain settings, resource block information, and RF carrier information (e.g., which carriers to use, the center frequency, the number of resource blocks, etc.) *are not ‘radio resources.’*” EX1066 9-11. Even PO’s expert conceded software settings are not radio resources. EX1061 154:14-21. Thus, PO’s argument conflicts with the underlying meaning of “radio resources.”

Second, PO’s quotations are off point. PO quotes where the specification teaches that the DAU can configure “gain control parameters” or “software settings” using a “control” channel. The specification, however, never says these parameters/settings are (a) radio resources or (b) redefine the meaning of “digital representation.” Rather, the specification explains that these settings/parameters control frequency selective digital up and down converters (DDCs/DUCs), which

is irrelevant because the claims do not recite DDCs/DUCs. PO's expert admitted the software settings PO relies on are not radio resources. EX1061 154:14-21.

PO's only other argument is: "digital representation of a radio resource is not merely the digitized form of a radio resource." This is wrong. First, PO's implication that the claim requires sending more—i.e., the digitized form of a radio resource **and** some additional configuration information—has no basis in the claim. Second, the specification, as quoted above, expressly teaches that the DAU is configured to receive RF signals from the base station, digitize them, and then send these digital versions to the remotes. PO points to nothing that excludes this example from the claim. Third, PO is incorrect to assert: "it would not make sense for the claim term to refer to digitized forms of CDMA codes or TDMA time slots... a time slot cannot simply be 'digitized'..." PO Response at 18. A POSA would easily recognize that applying an analog to digital converter to a signal *during a specified timeslot* is an example of creating a digital representation of that timeslot radio resource. EX1071 ¶9.

B. "Packetize"

"Packetize" means to create packets. EX1003 ¶153, ¶156. Dictionaries define "packet" as a "unit of data which is sent over a network," or equivalent phrasings. EX1062 4, 10, 17, 23. PO asserts that a packet must also include "destination information." PO relies on the discussion at 10:47-54 of the '499

patent. This passage distinguishes the data packet from information identifying a respective DRU that might be included in a header “along with” the data packet. EX1001 10:52. Regardless, this term does not need to be construed because the references relied on disclose the use of packets that include destination addresses (e.g., by disclosing use of the OBSAI protocol).

II. COLLATERAL ESTOPPEL

The petition showed that (1) the ‘499 patent claims are not patentably distinct from the already-canceled ‘178 patent claims, and (2) there is a final, unappealable adverse judgment against the ‘178 patent claims. EX1014.

PO’s only distinction is that the ‘178 patent claims use the terminology “downlink channel signals” whereas the ‘499 patent claims use the terminology “radio resources.” PO’s expert, however, expressly admitted that a “downlink channel signal” *is* an example of a “radio resource.” EX1061 10:1-3. PO’s expert further acknowledged that the change in terminology means the ‘499 claims are *broader* than the invalidated ‘178 claims in this respect, not narrower and, therefore, cannot be patentably distinct on this basis. EX1061 10:4-10.

This is a classic case where a final judgment for a first patent applies to a second patent: (1) the two patents are directly related with the same specification, (2) the examiner recognized the claims overlapped and issued a double patenting rejection (EX1002 at A122-A126), (3) the applicant terminally disclaimed the ‘499

patent to the ‘178 patent (EX1002 at A176, A163-164), (4) the only distinction between the claims fails by the PO’s own admission, and (5) the new claims are in fact broader—i.e., more invalid—than the already-canceled ‘178 patent claims.

III. PATENT OWNER’S ARGUMENTS FAIL TO DISTINGUISH THE PRIOR ART

A. GROUND 1: Patent Owner Fails to Distinguish Wu

1. Wu discloses sending “digital representations of radio resources”

PO fails to distinguish Wu’s teaching of these limitations for three reasons.

First, PO relies entirely on its incorrect, narrowing construction. Once the PTAB rejects PO’s narrowing construction, PO has no argument for these limitations.

Second, PO’s expert made multiple concessions. For context, Wu teaches that its matrix switch receives analog channels (270), and its host units send “digitized” channels (273) to the RTUs. EX1005 Fig. 2, ¶0035, ¶0037, ¶0049. Wu uses analog-to-digital converters (ADCs) to convert the analog channels to digitized channels. EX1005 ¶0049. PO’s expert conceded that (a) Wu’s analog channels are “radio resources” and (b) the digitized channels “represent” the converted analog channels. EX1061 11:14-12:20, 92:11-14. Further, PO’s expert repeatedly conceded the output of an analog-to-digital converter is “representative” of the analog inputs and will “preserve” the characteristics of the analog input signal. EX1061 18:20-19:5, 19:20-21:9. This is fatal to PO’s argument.

If PO tries to argue that Wu performs a down conversion step, that does not distinguish Wu. PO's expert conceded "nothing" in the patent excludes systems that "employ down-conversion." EX1061 149:4-9. The preferred embodiment, for example, employs down conversion. EX1001 5:1-3. PO's expert conceded that, regardless of a down converter, an analog-to-digital converter still converts from analog to digital and that the down conversion process will "preserve" the characterizes of the original signal, i.e., it still represents the signal. EX1061 93:12-20, 153:18-154:12, 21:3-9; *see also* EX1003 ¶104, ¶111.

Third, Wu's digitized channels sent by Wu's host units (which form part of the baseband unit in Wu) to the RTU satisfies even PO's construction. PO's construction refers to the digital representations "describing" the radio resources: "information defining or describing a set of radio resources to be used for transmitting data over the air via the antenna of a remote radio unit." As mentioned above, Wu discloses that analog carrier channel signals received from the transceiver are digitized by analog-to-digital converters in units 230 and that the carrier channels are sent in digital form to the remotes. EX1005 ¶0030, ¶0054, Fig. 6-2 ("ADC"); EX1003 ¶111. This well-known process of digitization using analog-to-digital converters produces a set of digital samples that accurately describe an input signal. EX1003 ¶104, ¶111; EX1071 ¶¶7-8. The digital samples describe and preserve the shape of the radio carriers (how the carriers have been

modulated in phase, frequency and amplitude) so that after transmission over long distance fibers, the modulated analog signal can be recreated at the remote units (by corresponding digital-to-analog converters) prior to transmission over the air by an antenna. EX1003 ¶104, ¶111. PO's expert repeatedly agreed that the digitization process using an analog-to-digital converter will preserve the characteristics of the original signal, i.e., still describe the original signal. EX1061 19:20-21:9, 93:12-20, 153:18-154:12. Notably, Wu sends the digitized channels to the RTU as digital baseband signals according to the OBSAI or CPRI standards, which is the same example (digital baseband) taught for the preferred embodiment of the '499 patent. *Compare* EX1005 (Wu) ¶0031 (use OBSAI or CPRI); EX1007 (CPRI standard) 26 ("in the form of in-phase and quadrature modulation data (digital baseband signals)"), EX1008 (OBSAI standard) 55 ("I&Q data format"), EX1003 ¶88, ¶98, ¶103, ¶104 (expert confirming) *with* EX1001 ('499 Patent) 4:66-67 ("down-converted, digitized, and converted to baseband..."); 10:47-49 (use CPRI). Wu teaches that the RTUs—that receive the digitized channels—are able to "reverse" the process and convert the digital channels "back into analog channels" for transmission over the air via antennas, which logically means Wu's digitized channels *did* describe the original analog carrier channels. EX1005 ¶0050. PO's expert conceded Wu's RTUs—that receive the digitized channels—

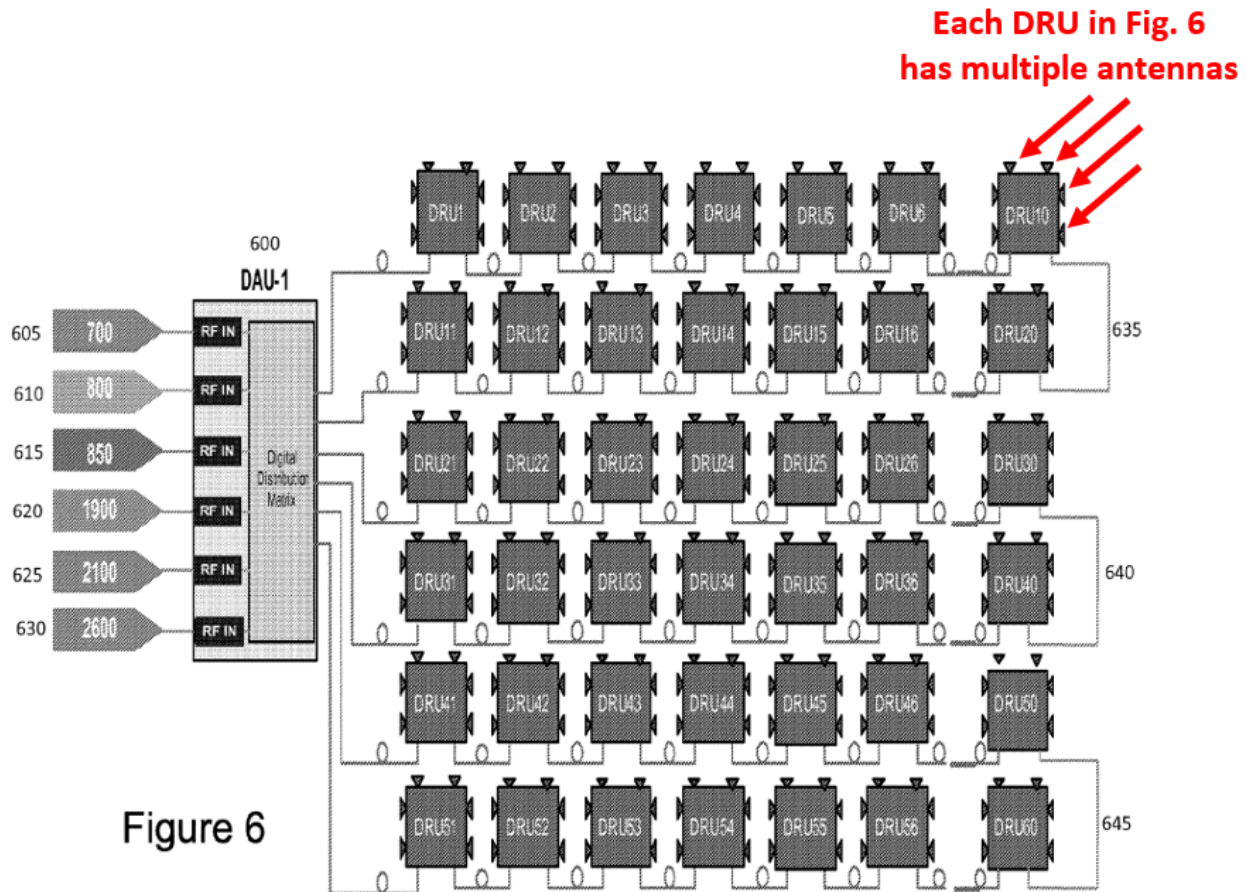
are able to “re-create” the original analog signals (radio resources). EX1061 88:3-10, 69:5-8. Thus, PO’s claim construction does not distinguish Wu.

2. Wu discloses sending “at a [first/second] point in time ...a [first/second] set of radio resources for transmission at [an/the] antenna of a first remote unit”

i. The claims are not limited to a single antenna

No construction of these terms is necessary other than to reject PO’s suggestion that the claims are limited to a “single” antenna. PO Response 36, 38. The claim recites “an antenna,” and the term “an” means “one or more.” *Baldwin Graphic Sys., Inc. v. Siebert, Inc.*, 512 F.3d 1338, 1342 (Fed. Cir. 2008). The follow-on phrase “the antenna” simply reinvokes that non-singular meaning. *Id.*

PO argues that a figure in an appendix to the provisional patent application illustrates an embodiment with a single antenna. The specification, however, never limits the alleged invention to this drawing. Rather, PO’s expert concedes the specification also covers an embodiment (Fig. 6) with six DRU antennas:



EX1001 Fig. 6; EX1061 52:1-17; EX1071 ¶44.

- ii. **Wu discloses sending the second set of radio resources for transmission over the same antennas as the first set of radio resources**

PO does **not** dispute that Wu discloses sending different sets of channels (radio resources) to an RTU at different times. PO also does **not** dispute that Wu's carrier channels are for transmission by at least some antenna of the remote unit. PO's expert conceded a transceiver (which Wu discloses) provides wireless coverage via an "antenna." EX1061 46:7-20; see also EX1071 ¶¶13-27.

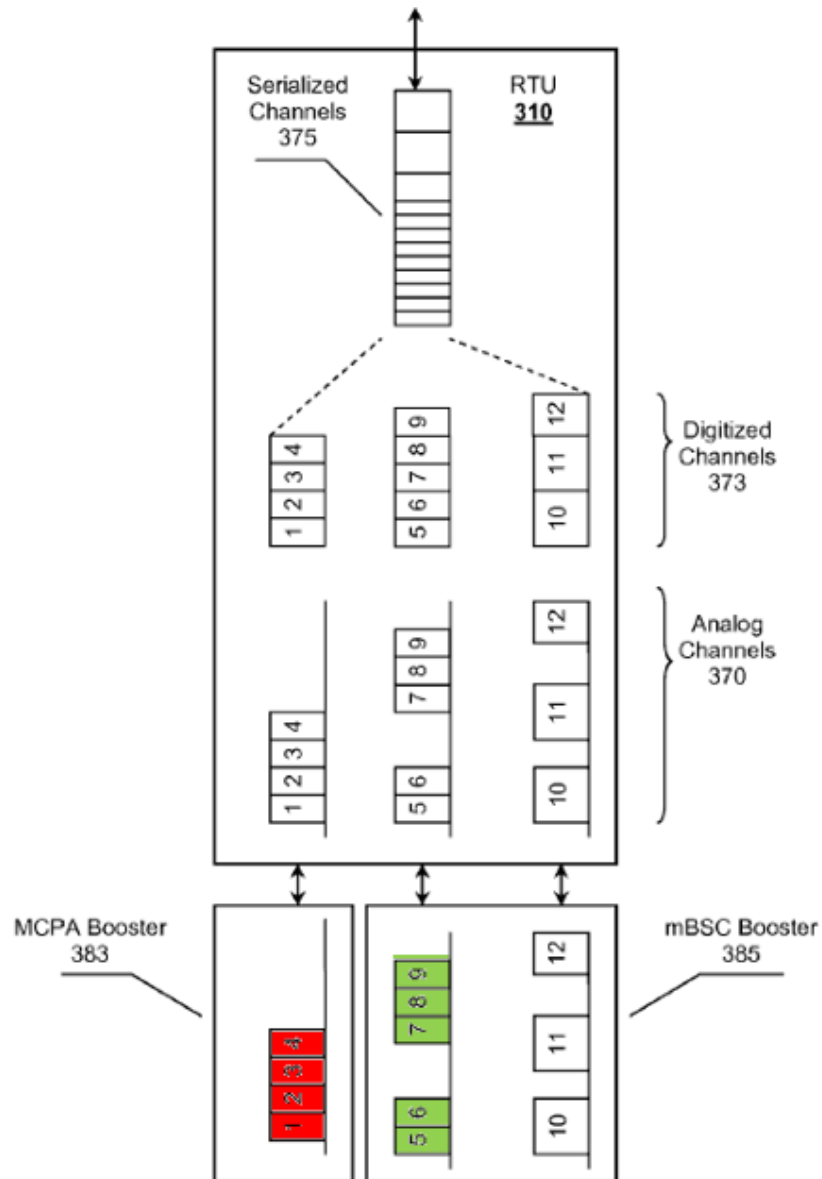
PO disputes whether Wu discloses sending different sets of channels to a “single” or “same” antenna.

PO’s argument does not distinguish Wu. First, as already discussed, the claims do not require a “single” antenna. EX1061 49:19-50:1 (PO’s expert agreeing). The claims recite “an” antenna, which allows for any configuration of one or more antennas.

Second, PO’s argument about the “same” antenna does not distinguish Wu. Notably, PO refutes its own argument. PO elsewhere expressly argues: “RTUs are **not** reconfigured as part of the reallocation of carrier channels.” PO Response 2. If the RTUs are not reconfigured, that means the RTUs and their inherent antennas remain the **same**, which defeats PO’s argument.³

PO only gives one reason why Wu supposedly cannot transmit a first and second set of channels from the same set of one or more antennas. PO says Wu’s Figure 3 shows some of Wu’s channels are sent to “different boosters”:

³ To be clear, the process at the RTUs to reverse the digitization process can be reconfigured, but PO is correct that the RTUs are not reconfigured by adding/removing new antennas.



For context, a “booster” boosts the signal before retransmission by an antenna and is “connected” to “the antenna,” which confirms Wu’s channels are for transmission by an antenna. EX1068 80 (“connected...the antenna”); EX1071 ¶¶17-26. Wu teaches the booster can be the “mBSC booster” from Bravo Tech. EX1005 ¶0050. Bravo Tech.’s mBSC booster corroborates that a booster connects to an “antenna”:

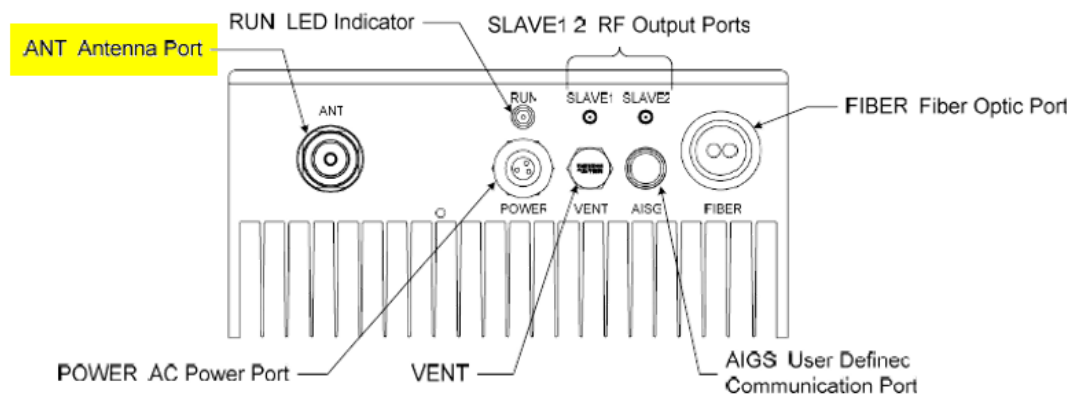


Figure 2-6. User Interface of Remote Unit

Table 2-2. Remote Unit User Interface

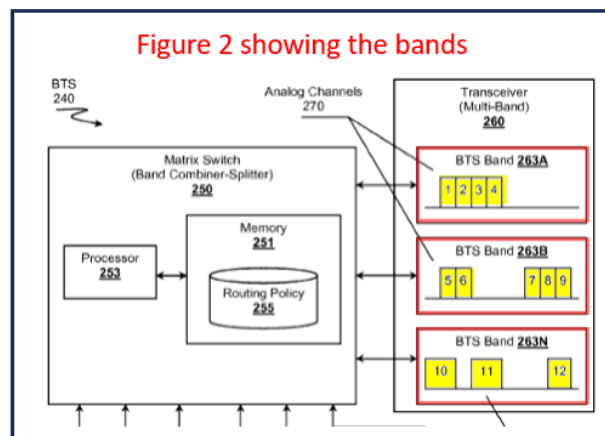
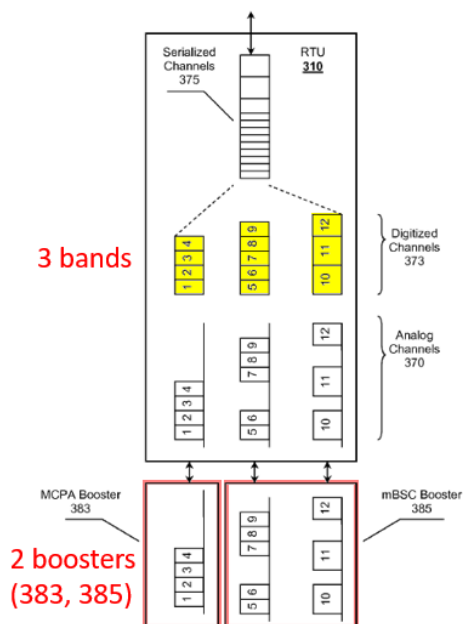
Label Name	Description
ANT	Interface port for Antenna Feed line
RUN	LED indicator for normal or critical fault status of RU. Normal: Green ON, Critical fault: Red ON
SLAVE 1, 2	RF output port to provide the input signal to Slave Remote unit when Dual or Triple Band application
FIBER	Fiber Optic Cable interface port for combined downlink and uplink signal
POWER	Interface port for the AC 220V power cable
AISG	User Defined Interface port for External Alarm. (Debug port for the default)
VENT	Port for the balance of the pressure inside and outside of the enclosure

EX1070 9;⁴ EX1071 ¶¶17-26.

PO’s “different boosters” argument fails. First, Wu teaches there could be just **one** booster, which moots PO whole argument. EX1005 ¶0050 (“one or more boosters”), EX1071 ¶30. PO’s expert conceded Wu teaches there could be just one booster and that he did not offer an opinion to distinguish that case. EX1061

⁴ This manual was publicly available during the prior art period. EX1071 ¶¶18-26. Such manuals are relevant as corroboration even if PO disputes its prior art status. *Caterpillar Inc. v. Wirtgen America, Inc.*, IPR2018-01091, Paper #49, 2019 Pat. App. LEXIS 13605, *58 n.15 (P.T.A.B. November 27, 2019).

53:10-20, 56:13-18. Figure 3 is just an example where there are three bands (1-4, 5-9, 10-12) per to two boosters (383, 385).

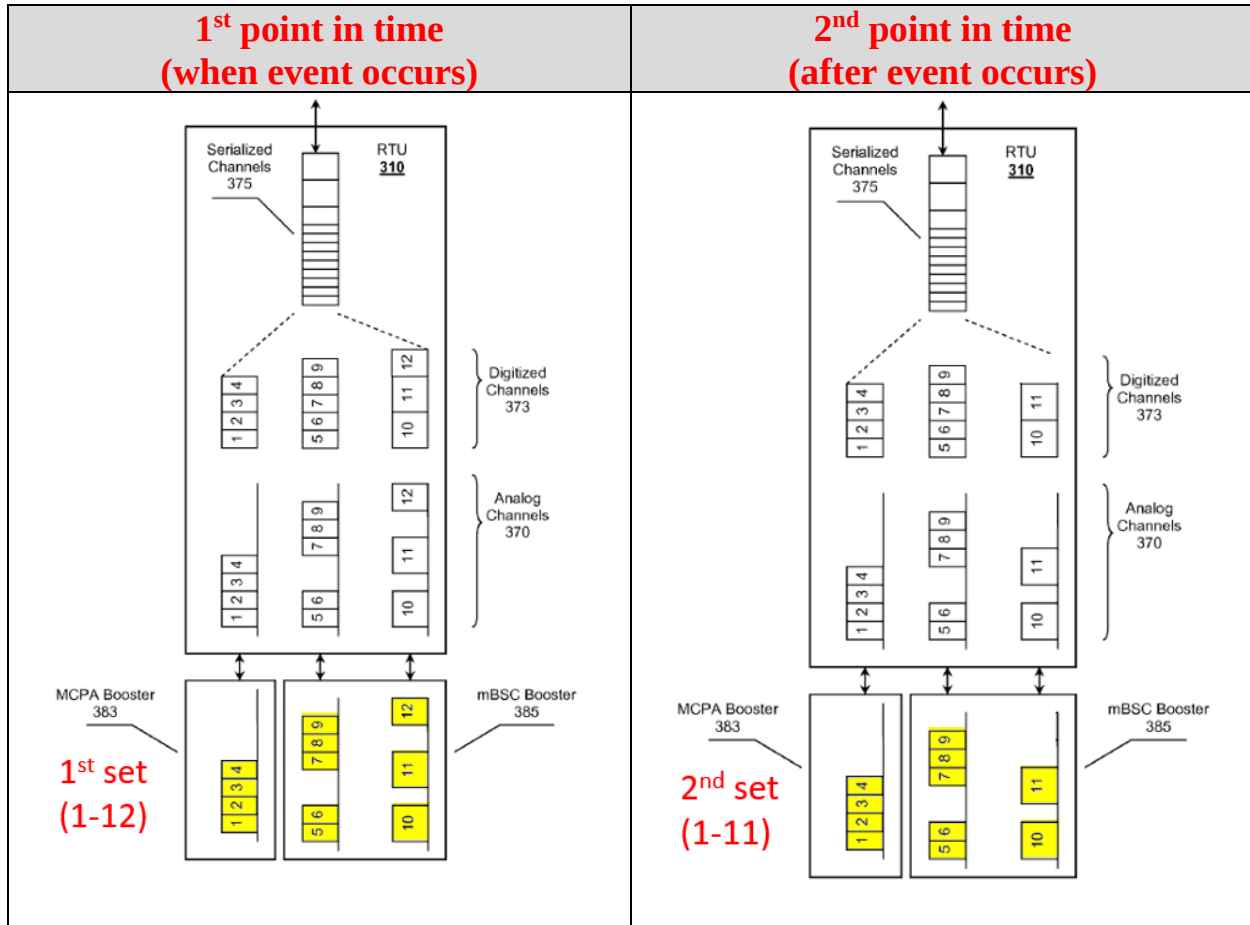


Wu further teaches: “channels 370 can be allocated to the boosters as desired: one band per booster, two bands per booster, *etc.*” EX1005 ¶0050. The “etc.” means Wu also covers three bands per booster, i.e., all channels 1-12 per one booster. EX1061 53:21-54:16 (PO expert conceding this). When there is only one booster, necessarily, every set of channels is transmitted by the same booster (and through it to the same inherent antenna). EX1071 ¶30. Whether that single, same booster for both sets connects to one or more than one antenna is irrelevant—“an antenna” includes both.

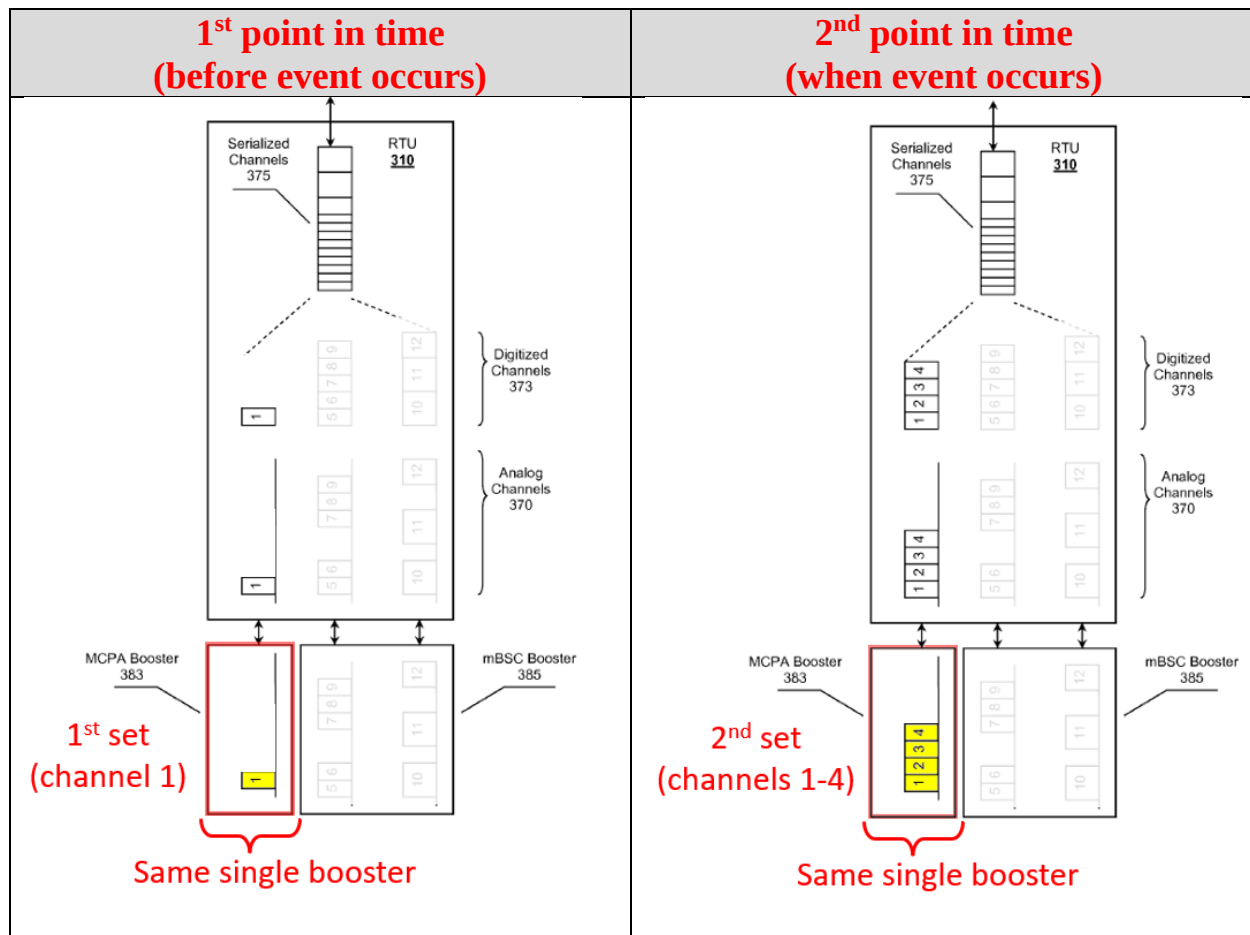
There are additional examples in Wu that PO fails to address, such as: (A) in Fig. 2 when the signal sets change from channels 1-12 to only channels 1-11 as

shown below and admitted by PO's expert (EX1061 33:22-34:15), (B) or when there is only one band. EX1071 ¶¶31-40.

Example A:



Example B (only one band):



3. Wu discloses a baseband unit.

The Board already determined in an earlier final written decision that it is proper to group Wu's matrix switch and hosts together as a unit. EX1017 20-22.

PO's expert conceded Wu teaches the matrix switch and host units can be part of the "same larger unit." EX1061 80:2-6.

PO argues that Wu does not disclose a “baseband unit” because allegedly its host units and matrix switch are “not capable of targeting or selecting specific RTUs.” PO response 39-40.

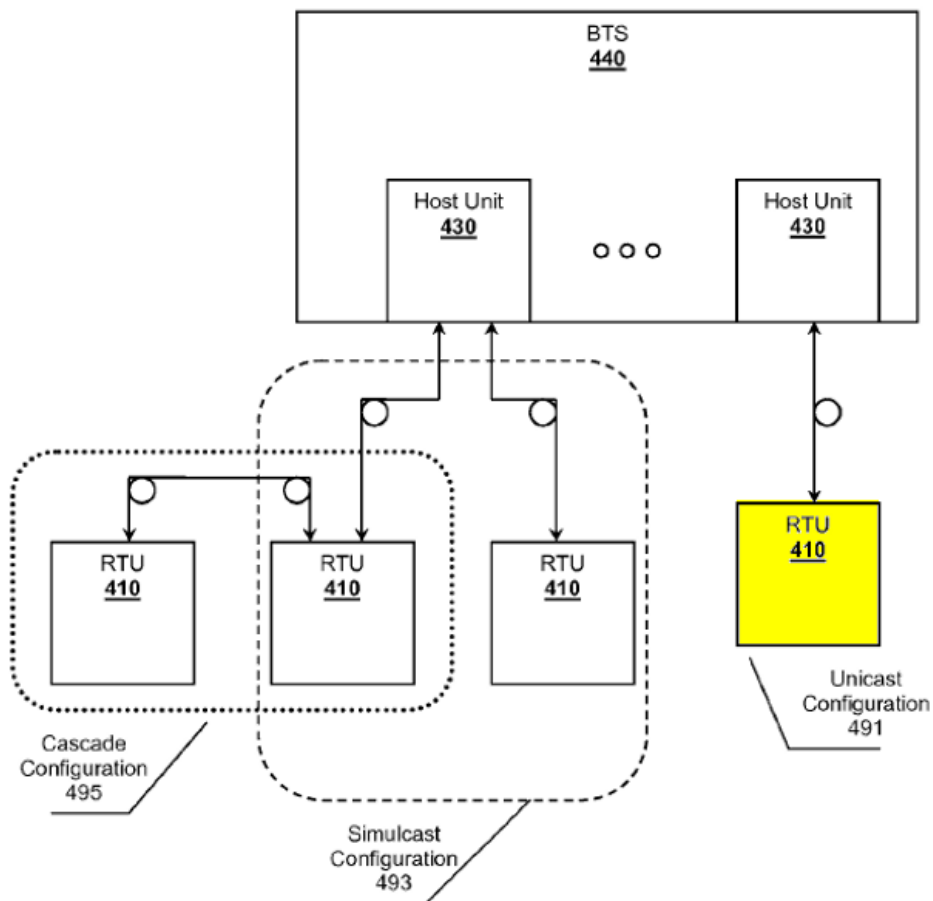
First, the plain language “baseband unit” says nothing about targeting/selecting specific RTUs.

Second, the specification does not define “baseband unit” to require specialized “targeting or selecting” functionality. Rather, the structure that corresponds to a baseband unit in the specification is the Digital Access Unit, which refers to an interface that converts incoming downlink signals to baseband. EX1001, 4:40-43, 4:63-5:1. Likewise, Wu’s baseband unit (units 230 in combination with the matrix switch) are the interface between Wu’s RTUs and the transceivers of the base stations. PO’s expert conceded this. EX1061 81:18-82:5. There is no dispute that Wu’s units 230 convert those analog channel signals to digital baseband. Both OBSAI and CPRI protocols used by Wu transport carrier signals as digital baseband. EX1003 ¶103.

Third, Wu does teach the capability to target specific RTUs. The PTAB already determined in an earlier FWD: “Wu’s matrix switch allows individual carrier channels to be routed, via host units, to *specific* connected remote units.” EX1017 23. Again, under issue preclusion, the PTAB has already resolved this issue. Wu’s Paragraph 47 gives an express example of targeting specific RTUs

such as a “first RTU” or “second RTU.” EX1005 ¶0047 (“first carrier channel *to a first RTU*...a second carrier channel ... *to a second RTU*”). Wu’s Paragraph 43 and 46 give further examples (e.g., the RTUs in “victim”, “residential”, or “first” region).

Fourth, PO’s only explanation for why Wu supposedly cannot target specific RTUs is Wu’s Figure 1 shows “there are multiple RTUs connected to each Host Unit.” Figure 1 is merely an example. Wu also teaches each of Wu’s host units can be connected to a specific one RTU. 0051 (“to a single RTU 410...one-to-one configuration.”) Figure 4 shows this:



EX1005 Figure 4.

Fifth, PO's whole argument has no basis in the claim. Nothing in the phrase "baseband unit" or anything else in the claim forbids the baseband unit from sending its first/second sets of radio resources to multiple (or all) remote units. The claims only require the baseband transmit a first/second set to at least one remote unit (the first remote unit). The claims are agnostic as to what the baseband unit transmits to other remote units. EX1061 105:5-106:19.

Finally, PO incorrectly says Petitioner's argument requires a "rearrangement" of Wu. Petitioner circled Wu's existing components. Wu already describes these components as functioning and coupled together (Fig. 2), located together (Fig. 1), and within the same unit (Fig. 4). PO says that the claimed signal source must be "separate" from the baseband unit. The claims do not say this. Regardless, Wu discloses that the transceiver 260 (the signal source) can be "remotely coupled" to the BTS 240 containing the matrix switch and host units, which is an example where the signal source is separate from the baseband unit. EX1005 ¶0034. PO's expert conceded this. EX1061 84:17-85:3.

4. Wu discloses "packetizing" and "destination information" (claims 2-3, 9-10, 15, 19)

Even if "packetizing" requires "to create digital data packets that include destination information," PO fails to distinguish Wu's teaching to use the OBSAI protocol. OBSAI is expressly based on transporting communications as packets.

EX1008 at 24 (“The protocol stack is based on a *packet* concept...”). The petition incorporated the exact figure from the OBSAI standard that illustrates the packet format for the relevant RP3-01 interface (used for remote radio units) which expressly shows a header with an address field and then a payload field after the header. Petition at 44, EX1008 at 26 (Figure 11 below). Petitioner’s expert explained that the address in the address field identifies the intended remote unit and noted where the OBSAI standard discloses that “The address field is used to route the data to its destination point.” EX1008 39:12-15; EX1003 ¶¶139, ¶¶137-140, 136-144.

7 4.2.1 Message Overview

8 A fixed message format is used for all data that is transferred over the
 9 RP3 or RP3-01 (see Section 6) bus. Figure 11 shows the message
 10 structure including partitioning of the message into bytes. Each byte of
 11 a message is first 8b10b encoded as shown in the figure and then
 12 transmitted to a link. 8b10b encoding is part of Physical layer
 13 functionality. The leftmost byte of the address field is first transmitted to
 14 the link while the rightmost byte of payload is last sent to the link. If
 15 data from other busses is transferred over the RP3 or RP3-01, it must
 16 be realigned such that MSB is transmitted first as defined in Figure 11.

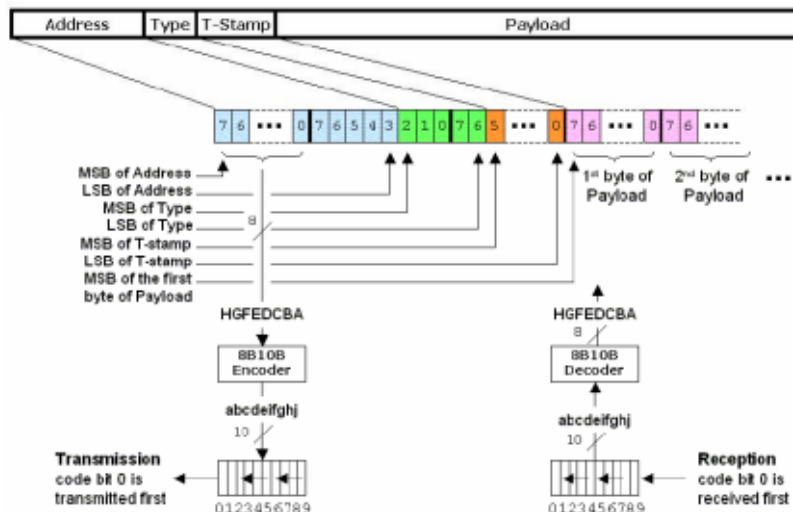


Figure 11: Message format of RP3 protocol stack.

EX1008 26; EX1003 ¶¶138-140.

The address field is divided into two sub-addresses, the node address and the sub-node address as illustrated in Figure 25.

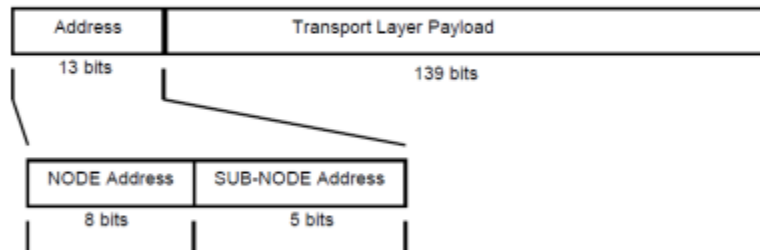


Figure 25: Address sub-fields.

EX1008 42; EX1003 ¶137. PO fails to explain why this OBSAI message protocol does not define a packet with an address. EX1061 120:12-17, 122:18-123:4 (PO expert admitting he never addressed the OBSAI message).

PO incorrectly says Petitioner fails to cite any page of the OBSAI standard. PO Response at 46. The petition extensively cited the OBSAI standard (EX1008). See Petition 43-44 (copying entire Figure 11 of EX1008 (illustrating the OBSAI packet), citing EX1008 at pp. 24, 42-44, 77-78, and citing Figures 25 and 49-50 from EX1008).

PO asserts OBSAI only defines a point-to-point serial link and cannot be used for selectively sending digital representations of radio resources to specific DRUs. First, as cited in the petition at the top of page 44, Figure 49 of OBSAI (EX1008) shows that the OBSAI interface supports multiple topologies including “chain, ring, and tree-and-branch topologies.” EX1008 Figure 49 (at p. 77):

6 RP3-01 Interface for Remote RF Unit

There exist base station configurations where remote RF units are used. This chapter specifies an extension of the Reference Point 3 protocol for remote RF unit use.

Section 6.1 defines architecture for RP3-01 interface while protocol stack for data transfer is defined in Section 6.2.

6.1 Architecture

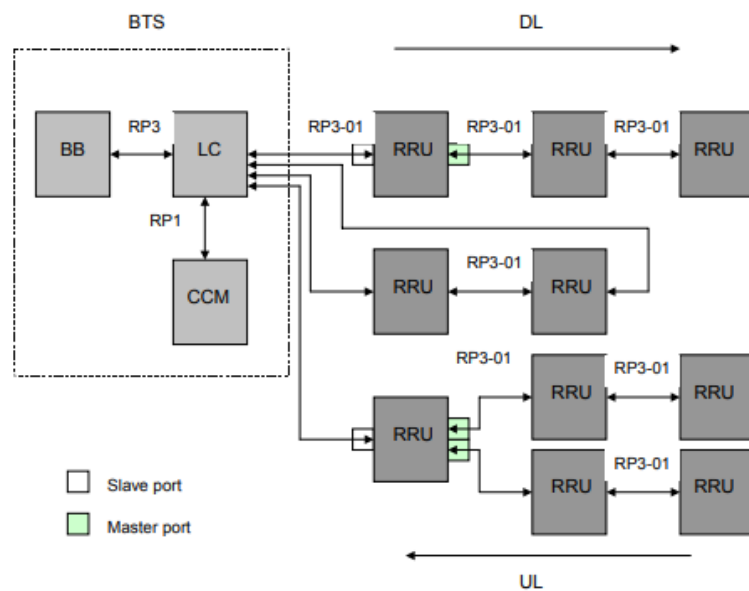


Figure 49: RP3-01 example architecture. Base station with remote RF units (RRUs). RRUs in chain, ring, and tree-and-branch topologies. Examples of RP3-01 master and slave ports of RRUs are also shown.

Figure 49 shows an example architecture of a BTS with remote RF units (RRUs). The figure provides a logical architecture and does not

OBSAI also explains “The RP3-01 protocol shall support several RRU topologies, including point-to-point connection between a BTS and an RRU as well as chain, tree-and-branch....” EX1008 78:6-8. These are the same topologies (chain, tree-and-branch) shown in Wu. EX1005 Figs. 1 and 4. Second, regardless, PO’s

argument has no basis in the plain language of the claim because the claim does not exclude point-to-point links or require a specific type of link.

Additionally, the Petition also identified the packets and addressing taught in the CPRI standard, Section 6.3. CPRI teaches the use of addressing when remote units are arranged in more complex topologies such as a chain topology. EX1003 ¶¶154-155; EX1007 at 84 (6.3.2. and 6.3.3) (“address table...used for switching... addresses to all REs”).

None of PO’s arguments against Wu’s use of the CPRI standard are directed to the claim limitation at issue, which only recites packetizing. The claims do not recite “selectively targeting” different signal sets to *different* remote units. The claims only require the baseband unit to send radio resources to one remote unit.

Further, PO failed to respond to the fact that the Board has already determined that CPRI teaches packetizing including the use of addresses when it issued its final written decision canceling claims 14 and 16 of the ‘473 patent. Petition, 45; EX1017 32-34 (“We are persuaded...the CPRI standard provides for addresses.”). Therefore, PO is precluded by that final decision from re-arguing that CPRI does not disclose packetizing.

5. Wu discloses destination information identifying the remote unit (claims 3, 10, 15).

For the reasons discussed above, Wu’s teaching to use OBSAI to communicate channels to RTUs satisfies this limitation. PO fails to make even a

prima facie case for non-enablement. As a published patent application, Wu's disclosure of the use of OBSAI is presumed to be enabling. As discussed above, the OBSAI standard mandates the use of a packet with address fields. PO fails to show a POSA would not know how to use the address fields of the OBSAI RP3-01 messages. PO's response fails to even allege (much less show) any undue experimentation. That the OBSAI standard was a public, standardized protocol is evidence that a POSA would know how to implement the packets defined by that standard. Any other arguments by PO are based on limitations (e.g., "selectively targeting") that are not found in the claims.

6. Wu discloses a subset having some resources from two signal sources (claims 4, 11, 16).

Wu teaches that the frequency bands input to the matrix switch could be from more than one transceiver (i.e., more than one signal source) and that the transceivers can supply "one" or more bands. EX1005 ¶0034 ("more than one" transceiver); ¶0011 (each transceiver for "one or more" bands). This means Wu teaches the input band signals shown in Figure 2 could alternatively be from multiple transceivers, not just one. EX1061 102:17-103:12, 99:7-9 (PO expert admitting this).

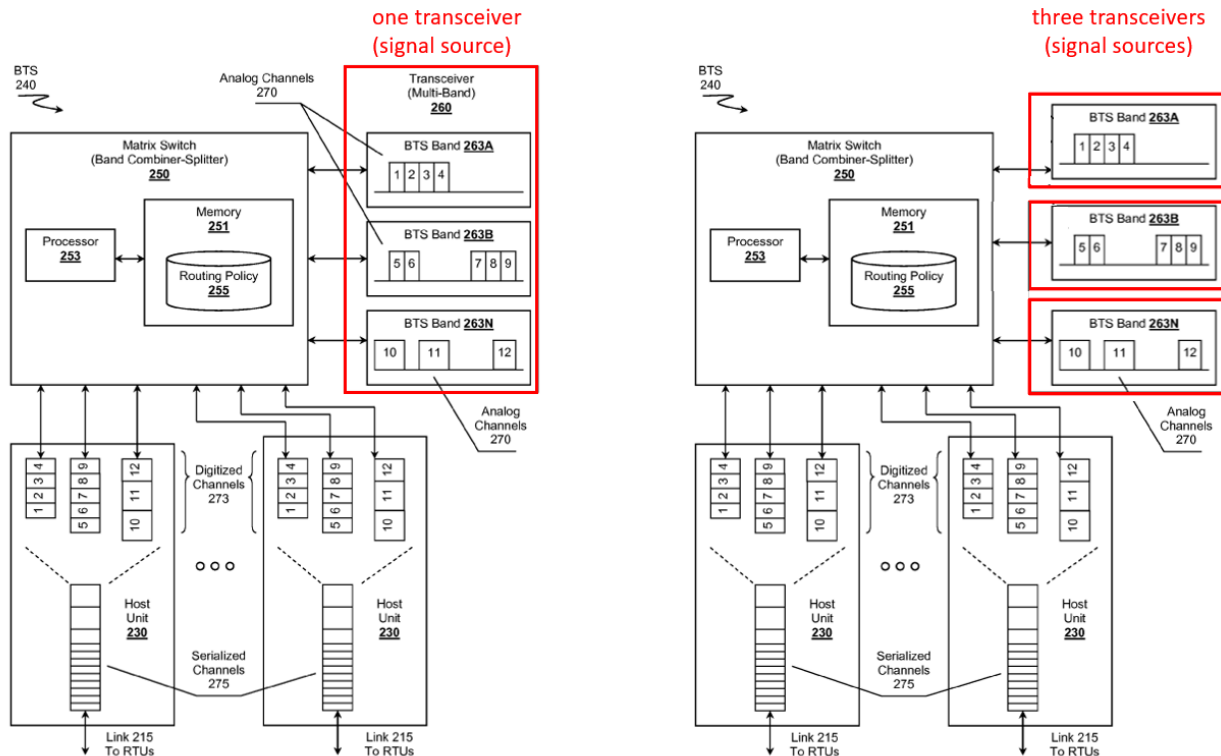


Figure 2

Therefore, Wu’s teaching in ¶10047 that “individual channels from different bands could be split from their bands and combined together” means that some radio resources from multiple different signal sources can be combined into a set to be sent to a remote unit, satisfying this claim limitation. Wu also teaches the channels can be routed “collectively” (i.e., all together) which necessarily results in some resources from multiple signal sources being routed to a remote unit. EX1005 ¶10047; EX1061 30:18-31:2.

In addition, the Petition asserted that Wu’s disclosure rendered these limitations obvious. Petition at 52-53. PO had no response.

7. Wu discloses composite signals from each signal source (claims 13 and 18).

There are no signal sources disclosed in Wu that do not provide “composite” signals (i.e., signals containing multiple radio resources). EX1005 ¶0011. Wu’s Fig. 2 shows each input defines a band that includes multiple carrier channels. For the reasons discussed above with respect to the limitation reciting multiple signal sources, Wu teaches that the channel signals from two different bands from two different signal sources can be split from their respective composite signals (i.e., their respective bands) and combined to be sent to an RTU. In addition, the Petition asserted that Wu’s disclosure rendered these limitations obvious. Petition at 52-53. PO had no response.

B. GROUND 2: Wu and Sabat ‘426

First, PO incorrectly asserts that the Petition did not address why a POSA would have a reasonable expectation of success in modifying Wu in light of Sabat-426. The Petition at page 51-52, in discussing modifying Wu alone, stated, “A POSITA would have had a reasonable expectation of success because no new functionality is required, merely grouping Wu’s already-disclosed components into a single unit or housing.” The very next paragraph asserted this same reasoning applies for making this modification of Wu in light of Sabat-426. Petition 52 (“...apply this teaching from Sabat-426 to Wu’s system *for the same reasons given above...*”).

Second, PO incorrectly asserts that the Petition did not provide reasoning for modifying Wu based on Sabat-426. At page 52 the Petition identified that a POSITA would have been motivated “to reduce the system complexity and installation costs and minimize errors in coupling separate components.” These benefits flow from combining two separate components into one unit (eliminating the expense of assembly during installation). PO provides no argument why reducing installation costs is insufficient.

C. GROUND 3: Wu and Sabat ‘552

See Section III.A.1 above.

D. GROUND 4: Wu and OBSAI

PO’s response does not make any argument other than to refer to the arguments already addressed above.

E. GROUND 5: Hettstedt

1. Hettstedt discloses that the CMU is “configured to send a digital representation of a [first/second] set of radio resources...”

PO only disputes the “digital representation” part of these limitations. PO concedes that Hettstedt’s baseband unit is configured to send “radio resources.” PO Response 55 (“Petitioner only shows that Hettstedt’s baseband unit sends user payload data that has been modulated onto *radio resources*.”). The claims introduce “radio resources” in the earlier limitation “wherein the baseband unit is configured to receive a plurality of radio resources from the first signal source...”

The Petition showed Hettstedt's CMU receives carriers (*radio resources*) from the base stations (*signal sources*). Petition 65-66. PO's response did not dispute this showing or that Hettstedt meets the earlier limitation that introduces the "radio resources." PO's expert conceded this. EX1061 133:5-137:3. Hettstedt discloses the "digital representation" part for three reasons.

First, PO's expert conceded that Hettstedt's baseband unit (the CMU) is configured to send the carriers it received from the base stations "in *digital* form in *digital* packets over *digital* connection to the remote radio heads." EX1061 139:1-7, EX1006 ¶0040. Further, PO's expert did not dispute that these digital packets contain the "*same* carriers" that the CMU originally received from the base station. EX1061 153:5-17. Thus, the digital version of the carriers in the digital packets must at least "represent" the radio resources from the base stations because they are the same underlying carriers.

Second, Hettstedt's CMU is configured to send its radio resources using the same digital format as the preferred embodiment in the '499 patent. The preferred embodiment sends the base station carriers to the remote units using digital "baseband" signals. EX1001 4:63-5:9. Likewise, Hettstedt sends the base station carriers to the remote units in "digital base-band." EX1006 ¶0030.

Third, Hettstedt satisfies even PO's construction. The digital baseband information in Hettstedt packets must at least "describe" the carriers from the base

stations because, as discussed above, the digital packets contain the *same* carriers. Further, Petitioner's expert explained that baseband signals "represent and preserve the amplitude and phase modulation characteristics of the RF signals to be used according to the chosen air-interface scheme to communicate over the air." EX1003 ¶104; EX1071 ¶¶7-8. PO's expert confirmed he did not provide any opinion disputing this. EX1061 21:19-23:14. Further, logically, the digital information in Hettstedt packets must at least "describe" the original carriers because Hettstedt's RHs are able to transmit the carriers over the RF bandwidth based on packets they receive from the CMU. EX1006 ¶¶0050, ¶0053. Nor could PO argue Hettstedt's CMU somehow distorts the base station carriers it receives because Hettstedt's CMU "provides *transparent* operation of the radio heads RH1 to RH5 from the base station." EX1006 ¶0042.

Finally, PO's counterargument has no basis in the claim. PO argues there is "a fundamental difference between the radio units in Hettstedt and Wu and the radio units in the '499 patent." PO response at 30. The claim does not specify any particular type of radio unit. It simply recites: "a plurality of remote units, including at least a first remote unit and a second remote unit."

2. Hettstedt discloses "a [first/second] set of radio resources for transmission at an antenna of a first remote unit"

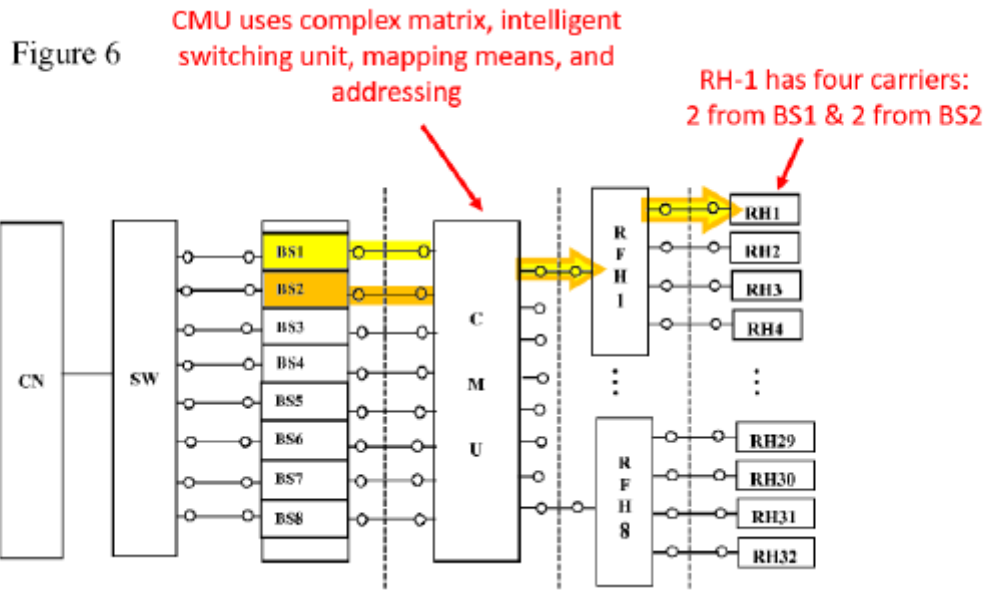
PO only disputes whether Hettstedt discloses the "antenna" part of these limitations. PO's expert conceded that Hettstedt's RRHs have antennas. EX1061

142:18-143:16; *see also* PO's Response 58 (PO conceding: "Hettstedt's radio heads...over its *antennas*."). PO only makes one distinction: Hettstedt does not say "whether a single or multiple antennas are used." PO Response at 60. The claims, however, cover both a single antenna and multiple antennas because "an antenna" means "one or more antennas." Notably, Hettstedt never teaches to change antennas, which moots any issue about the "same" antenna. PO itself says that "Hettstedt's radio heads are not reconfigurable," which means the radio heads and their antennas remain the same. PO Response 57.

3. Dependent claims 4, 11, and 16

PO's only new counterargument is asserting Hettstedt does not describe "*combining* carriers from one base station with carriers from another base station." PO Response 62. Not true. Hettstedt teaches that the CMU can "*combine* different base stations" (and each base station provides carriers). EX1006 ¶0042, ¶0052.

Notably, PO left undisputed much of Petitioner's expert analysis. The petition cited Paragraphs 271-275 of Dr. Acampora's analysis. Paragraph 271 explained and illustrated a specific example of Hettstedt meeting this claim:



EX1003. Paragraph 272, citing further evidence, corroborated that Hettstedt’s switch/matrix functionality allows a unit to send any combination of inputs (here the base stations’ carriers). PO left both points undisputed.

4. Dependent claims 13 and 18

PO merely repeats the “same reasons” from claims 4, 11, and 16, which the prior section rebuts.

F. GROUND 6: Hettstedt in view of Wu

PO does not dispute Petitioner’s motivation to combine or expectation of success. PO’s only counterargument is non-responsive: PO merely lists claim language that PO says Wu *itself* does not disclose. This does not respond to the *result of combining* features from *both* Hettstedt and Wu. Petition at 84 (explaining the result of combining Hettstedt’s CMU with “with Wu’s routing policy” renders obvious claims 1, 8, 14), 88 (explaining the result of combining

Hettstedt’s ability to “combine different base stations” with Wu’s routing policy’s ability to route channels in “arbitrary groups” would cover groups that comprise some radio resources from Hettstedt’s different base stations and render obvious claims 4, 11, and 16), 89-90 (combining features for claims 5, 13, and 18).

G. GROUND 7: Hettstedt plus Sabat-552

PO makes one counterargument. PO wrongly says Petitioner failed to include “any” discussion of expectation of success.

Petitioner specifically identified that the “same” reasoning for expectation of success from Ground 3 (which is undisputed) applied to this ground. Petition, 91. Both grounds look to the same reference (Sabbat-552) for the same teaching (coupling the baseband unit to another baseband unit directly/indirectly). Further, the same reasoning applies. Ground 3 explained that there is a reasonable expectation of success for “duplicating an already disclosed structure” and “providing a cabled interface between them.” Petition, 55. This is the *same* modification in this ground. Petition, 91-92 (duplicating “additional CMUs” and “provide a cable interface” between them).

Respectfully submitted,

Dated: August 28, 2023

By: /Samuel A. Hamer/
Samuel A. Hamer, Reg. No. 46,754
Philip P. Caspers, Reg. No. 33,227
225 South Sixth Street, Ste.4200
Minneapolis, MN 55402
shamer@carlsoncaspers.com
Phone: 612.436.9615
Fax: 612.436.9605

Petitioner's Exhibit List

Exhibit No.	Description
1001	U.S. Patent No. 10,334,499
1002	Prosecution History of U.S. Patent No. 10,334,499
1003	Declaration of Dr. Anthony Acampora
1004	Curriculum Vitae of Dr. Anthony Acampora
1005	U.S. Patent Application Publication No. 2010/0128676 A1 to Wu ("Wu")
1006	U.S. Patent Application Publication No. 2008/0119198 A1 to Hettstedt ("Hettstedt")
1007	Common Public Radio Interface (CPRI) Specification version 4.0 (2008-06-30)
1008	OBSAI "Reference Point 3 Specification Version 3.1" (November 13, 2006)
1009	OBSAI "BTS System Reference Document Version 2.0" (April 27, 2006)
1010	U.S. Patent Application Pub. No. 2009/0180426 A1 to Sabat et al. ("Sabat-426")
1011	U.S. Patent No. 6,963,552 B2 to Sabat et al. ("Sabat-552")
1012	U.S. Patent No. 10,080,178 ("the '178 patent")
1013	IPR2020-01473 Institution Decision ('178 patent IPR)
1014	IPR2020-01473 Judgment ('178 patent IPR)
1015	IPR2020-01473 Petition ('178 patent IPR)
1016	U.S. Patent No. 9,531,473 ("the '473 patent")
1017	IPR2018-00571 Final Written Decision ('473 patent IPR)
1018	Declaration of Dr. Peter Kenington
1019	Interim Procedure for Discretionary Denials in AIA Post grant Proceedings with Parallel District Court Litigation
1020	Claim construction order (also filed as Exhibit 1028)
1021	Provisional patent application number 61/439,940
1022	SKIPPED
1023	Complaint in Civil Action No. 2:22-cv-00012-RWS-RSP (E.D. Tex.)
1024	Preliminary infringement contentions by Patent Owner (Dali) in Civil Action No. 6:22-CV-00104-ADA (W.D. Tex.)
1025	U.S. Patent Application Pub. No. 2006/0094470 ("Wake")
1026	U.S. Patent No. 7,286,507 ("Oh") A7
1027	Patent Owner's preliminary response in IPR2020-01466

1028	Claim construction order
1029	Patent Owner's Preliminary response in IPR2020-01430
1030	U.S. Patent Number 6,785,558 ("Stratford")
1031	U.S. Patent Number 8,737,454 ("Wala")
1032	U.S. Patent Number 8,346,091 ("Kummetz")
1033	U.S. Patent Publication No. 2010/0296816 ("Larsen").
1034	U.S. Patent Number 7,848,747 ("Wala-747")
1035	U.S. Patent Number 8,204,544 ("Beaudin")
1036	U.S. Patent Publication No. 2005/0157675 ("Feder")
1037	Prosecution History of U.S. Patent No. 10,080,178
1038	Patent Owner's preliminary response in IPR2020-01473
1039	Patent Owner's power of attorney in IPR2020-01473
1040	ECF 174 in Dali Wireless, Inc. v. CommScope Technologies LLC, et al., Case No. 1:19-cv-00952-MN (Attachment to Stipulation of dismissal of Certain Claims)
1041	Final Written Decision in IPR2018-01178
1042	U.S. Patent Application Publication No. 2007/0177552 A1
1043	Ethernet The Definitive Guide, Spurgeon, (O'Reilly & Associates, Inc. 2000), Chapters 1-6.
1044	Hargraves Communications Dictionary, Hargrave, F., IEEE Press p. 169
1045	Ex1045
1046	Complaint, <i>Dali Wireless Inc. v. T-Mobile US, Inc. et al</i> , No. 2:22-cv-414 (E.D. Texas)
1047	Complaint, <i>Dali Wireless Inc. v. AT&T Corp. et al</i> , No. 2:22-cv-12 (E.D. Texas)
1048	Docket History, Dali Wireless Inc. v. T-Mobile US, Inc. et al, No. 2:22-cv-414 (E.D. Texas)
1049	Complaint, <i>Dali Wireless Inc. v. Cellco Partnership d/b/a Verizon Wireless et al</i> , No. 6:22-cv-104 (W.D. Texas)
1050	Median Time to Trial – US District Courts – National Judicial Caseload Profile
1051	Docket Text re transfer to E.D. Texas, <i>Dali Wireless Inc. v. Cellco Partnership d/b/a Verizon Wireless et al</i> , No. 6:22-cv-104 (W.D. Texas)
1052	Order re Sever and Transfer, <i>Dali Wireless Inc. v. Cellco Partnership d/b/a Verizon Wireless et al</i> , No. 6:22-cv-104 (W.D. Texas).

1053	Agreed Joint Motion to Transfer, <i>Dali Wireless Inc. v. Cellco Partnership d/b/a Verizon Wireless et al</i> , No. 6:22-cv-104 (W.D. Texas).
1054	Stipulation re Narrowing of Issues, <i>Dali Wireless Inc. v. AT&T Corp. et al</i> , Case No. 2:22-cv-12 (E.D. Texas).
1055	Order (ECF94), <i>Dali Wireless Inc. v. AT&T Corp. et al</i> , No. 2:22-12 (E.D. Texas)
1056	Joint Stipulation of Dismissal with Prejudice (ECF22), <i>Dali Wireless v. Cellco Partnership d/b/a Verizon Wireless et al</i> , No. 6:22-cv-01314 (W.D. Texas)
1057	Standing Order Governing Proceedings (OGP) 4.2 – Patent Cases – W.D. Texas Waco Division
1058	Correspondence in <i>Dali Wireless Inc. v. Cellco Partnership et al</i> , No. 2:23-cv-00002 (E.D. Texas)
1059	Claim Construction Order, <i>Dali Wireless Inc. v. Cellco Partnership d/b/a Verizon Wireless et al</i> , No. 6:22-cv-01313 (W.D. Texas)
1060	Declaration of William Bullard re Motion for Pro Hac Vice Admission
1061	Deposition Transcript of PO’s expert, Dr. Chrissan, dated August 23, 2023
1062	Dictionary excerpts defining <i>packet</i>
1063	Memorandum Order re Claim Construction, <i>Dali Wireless Inc. v. CommScope Technologies LLC</i> , No. 1-19-cv-00952 (D. Del.) Dkt122
1064	Claim Construction Order DDE-1-19-cv-02367-82
1065	Dictionary excerpts defining <i>digital, representation, represent, version</i>
1066	Claim Construction Memorandum Opinion and Order, <i>Dali Wireless Inc. v. AT&T Corp et al</i> , No. 2:22-cv-00012 (E.D. Texas)
1067	PTAB Institution Decision IPR2022-01345
1068	Definition of “booster” from Rudolf F. Graf, <i>Modern Dictionary of Electronics</i> (7th ed. 1999).
1069	US Pat. App. Pub. No. 2010/0177760A1 (“Cannon”), Publication Date of July 15, 2010
1070	BTI mBSC081921-12 Operation Manual Issue 2, from FCC website, date available May 19, 2010
1071	Supplemental Declaration of Dr. Anthony Acampora

CERTIFICATION UNDER 37 CFR § 42.24(d)

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Petitioner Reply totals 5,588 words per Microsoft Word word count tool, which complies with requirement of 5,600 words allowed under 37 CFR § 42.24(c)(1).

Dated: August 28, 2023

By: /Samuel A. Hamer/
Samuel A. Hamer, Reg. No. 46,754
Philip P. Caspers, Reg. No. 33,227
225 South Sixth Street, Ste.4200
Minneapolis, MN 55402
shamer@carlsoncaspers.com
Phone: 612.436.9615
Fax: 612.436.9605

CERTIFICATE OF SERVICE

Pursuant to 37 CFR §§ 42.6(e)(4)(i) et seq. and 42.105(b), the undersigned certifies that on August 28, 2023 a complete and entire copy of this Petitioner Reply and all supporting exhibits were served by electronic mail to the Patent Owner's counsel at the following addresses:

david.schumann@foliolaw.com
palani@foliolaw.com
moses.xie@foliolaw.com
timothy.dewberry@foliolaw.com

Dated: August 28, 2023

By: /Samuel A. Hamer/
Samuel A. Hamer, Reg. No. 46,754
Philip P. Caspers, Reg. No. 33,227
225 South Sixth Street, Ste.4200
Minneapolis, MN 55402
shamer@carlsoncaspers.com
Phone: 612.436.9615
Fax: 612.436.9605