

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

AT&T CORP., AT&T COMMUNICATIONS LLC, AT&T SERVICES, INC.,
AT&T MOBILITY LLC, AND AT&T MOBILITY II LLC
Petitioners,

v.

DALI WIRELESS INC.,
Patent Owner.

U.S. Patent No. 10,334,499

Title: DISTRIBUTED ANTENNA SYSTEM

Inter Partes Review No.: IPR2023-00818

**PETITION FOR *INTER PARTES* REVIEW OF U.S. PAT. NO. 10,334,499
UNDER 35 U.S.C. §§ 311-319 and 37 C.F.R. §§ 42.1-.80, 42.100-.107**

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Petitioners' Exhibit List

Exhibit No.	Description
1001	U.S. Patent No. 10,334,499 (the "'499 Patent"), Provisional filing date of February 7, 2011.
1002	U.S. Patent No. 10,080,178 ("178 Patent") to Stapleton et al., Provisional filing date of February 7, 2011.
1003	U.S. Patent No. 9,531,473 ("473 Patent") to Lemson et al., Provisional filing date of September 14, 2010.
1004	Decision Granting Institution of <i>Inter Partes Review</i> for the '178 Patent (Case IPR2020-01473, Paper 18), Entered: March 12, 2021.
1005	Judgement Granting Request for Adverse Judgment After Institution of Trial for the '178 Patent (Case IPR2020-01473, Paper 21), Entered: June 30, 2021.
1006	Final Written Decision for the '473 Patent (Case IPR2018-00571, Paper 53), Entered: August 12, 2019.
1007	U.S. Patent Pub. No. 2010/0128676 ("Wu") to Dong Wu et al., Publication Date of May 27, 2010.
1008	U.S. Patent No. 6,963,552 ("Sabat-552") to Sabat et al., Patent Issue Date of November 8, 2005.
1009	U.S. Patent Pub. No. 2009/0180426 ("Sabat-426") to Sabat et al., Publication Date of July 16, 2009.
1010	ERICSSON AB ET AL., <i>CPRI Specification V4.0; Interface Specification</i> , June 30, 2008.
1011	U.S. Patent No. 7,286,507 ("Oh") to Oh et al., Patent Issue Date of October 23, 2007.
1012	Declaration of Petitioners' Expert Dr. Henry H. Houh ("Dr. Houh")
1013	Selected Portions of the 10,334,499 File History

1014	Intentionally Left Blank.
1015	International Application Publication WO 2009/021359 A1 published on February 19, 2009 (“Leng”)
1016	Certified Translation of Leng (EX-1015)
1017	U.S. Patent Pub. No. 2010/0177760 A1 (“Cannon”) to Cannon et al., Patent Publication Date of July 15, 2010.
1018	Intentionally Left Blank.
1019	Decision Denying Institution of <i>Inter Partes Review</i> for the 10,334,499 Patent (“’499 Patent”) (Case IPR2020-01430, Paper 15), Entered: February 9, 2021.
1020	Intentionally Left Blank.
1021	Related Patents.
1022	OBSAI Reference Point 3 Specification V 4.2 (2010)
1023	Decision Granting Institution of <i>Inter Partes Review</i> for the 10,334,499 Patent (“’499 Patent”) (Case IPR2022-01419, Paper 11), Entered: March 9, 2023.

I. INTRODUCTION

Pursuant to 35 U.S.C. §§311 *et seq.* and 37 C.F.R. §§42.1 *et seq.*, AT&T CORP., AT&T COMMUNICATIONS LLC, AT&T SERVICES, INC., AT&T MOBILITY LLC, AND AT&T MOBILITY II LLC(“Petitioners”) petition for *inter partes* review of Patent No. 10,334,499 (the “’499 Patent”) (EX-1001).

Petitioners submits that Claims 1-19 (the “Challenged Claims”) of the ’499 Patent are unpatentable under 35 U.S.C. § 103 in view of the prior art discussed herein.

The ’499 Patent is a continuation of, and shares an identical specification with Patent No. 10,080,178 (the “’178 Patent”) (EX-1002). The ’499 Patent also shares an overlapping specification with Patent No. 9,531,473 (the “’473 Patent”) (EX-1003). This Petition demonstrates that the Challenged Claims are unpatentable for the same reasons and based on the same prior art that formed the bases of the Board’s institution of *inter partes* review of the ’178 Patent (IPR2020-01473, Paper 18 (EX-1004)), resulting in an adverse judgment against Patent Owner (“PO”) canceling all claims of the parent ’178 Patent (IPR2020-01473, Paper 21 (EX-1005)). This Petition also demonstrates that the Challenged Claims are unpatentable for the same reasons and based on the same prior art that formed the basis of the Board’s determination of unpatentability of all challenged claims by final written decision in an *inter partes* review of the related ’473 Patent (IPR2018-

00571, Paper 53 (EX-1006)).¹ This Petition demonstrates by a preponderance of the evidence that there is a reasonable likelihood that Petitioners will prevail with respect to at least one of the Challenged Claims. This Petition also demonstrates that the Challenged Claims are not patentably distinct from the claims canceled by adverse judgment in the '178 Patent such that PO is estopped under 37 C.F.R. §42.73(d)(3) from taking any action before the Office inconsistent therewith. Accordingly, Petitioners request that the Board grant institution of the Petition and grant joinder to IPR2022-01419 pursuant to the motion for joinder filed concurrently herewith.

II. OVERVIEW

The Challenged Claims are unpatentable as obvious over the following prior art references that formed the bases for the cancellation of all claims in the parent '178 Patent:

- Wu: Patent Application Pub. No. 2010/0128676 (EX-1007)
- Sabat-552: Patent No. 6,963,552 (EX-1008)

Specifically, in a decision to institute *inter partes* review of the parent '178 Patent, the Board found:

¹ Currently on appeal at the CAFC (Dali Wireless Inc. v. CommScope Technologies LLC CAFC-20-1045).

We determine that Petitioner has shown a reasonable likelihood of success in demonstrating that claims 1–25 are anticipated by Wu, obvious over Wu, ... and that claims 26–30 are obvious over Wu and Sabat-552.

EX-1004, 46.

The canceled claims of the parent '178 Patent are directed to distributed antenna systems (DASs) that include one or more digital access units (DAUs) (host units), each connected to one or more base stations (signal sources) and one or more digital remote units (DRUs). More specifically, the canceled claims are directed to a DAU (host unit) (independent Claims 1, 21, and 26), system (independent Claim 10), and method (independent Claim 15) for use in transport of wireless communications wherein:

- a. the host unit (DAU) receives a plurality downlink channel signals from at least one signal source (base station);
- b. the host unit (DAU) is configured to send digital representations of the plurality of downlink channel signals to a plurality of digital remote units (DRUs);
- c. the host unit sends digital representations of a first set of downlink channel signals to a first DRU;
- d. the host unit sends digital representations of a second set of downlink channel signals to the first DRU;

e. wherein the number of downlink channel signals in the first set is different from the number of downlink channel signals in the second set.

Independent Claim 26 additionally specifies that the host unit (DAU) comprises an interface to communicatively couple to one or more additional host units, and Claim 28 further specifies that the host unit is directly connected to a second host unit and indirectly connected to a third host unit.

The Challenged Claims of the '499 Patent are substantially the same as the canceled claims of the parent '178 Patent.² The Challenged Claims refer to the “host unit” (DAU) as a “*baseband unit*” and to the “downlink channel signals” received from the signal source as “*radio resources*.”

The Challenged Claims are directed to a DAU controller (baseband controller)(independent Claim 8), system (independent Claim 1), and method (independent Claim 15) for use in transport of wireless communications. The substantially similar scope of the canceled claims of the '178 Patent and the Challenged Claims of the '499 Patent is illustrated by a side-by-side comparison of the independent system claim from each patent:

² To gain allowance, PO submitted a Terminal Disclaimer to overcome a double patenting rejection of the Challenged Claims over the subsequently canceled claims of the '178 Patent. (EX-1013, p. 10-11)

'178 Patent – Claim 10	'499 Patent – Claim 1
10. A system for transporting wireless communications, comprising:	1. A system for transporting wireless communications, comprising:
a host unit (<i>i.e. baseband unit</i>);	a baseband unit;
a plurality of remote units, including at least a first remote unit and a second remote unit;	a plurality of remote units, including at least a first remote unit and a second remote unit;
wherein the host unit comprises at least one interface to communicatively couple the host unit to at least one signal source;	a plurality of signal sources, including at least a first signal source and a second signal source; wherein the baseband unit comprises a plurality of interfaces to communicatively couple the baseband unit to the plurality of signal sources;
wherein the host unit is configured to receive a plurality of downlink channel signals (<i>i.e. radio resources</i>) from the at least one signal source;	wherein the baseband unit is configured to receive a plurality of radio resources from the first signal source and the second signal source;
wherein the host unit is configured to send digital representations of the plurality of downlink channel signals to the plurality of remote units;	
wherein the host unit is configurable to send digital representations of a first set of downlink channel signals to the first remote unit at a first point in time, the first set of downlink channel signals for	wherein the baseband unit is configured to send a digital representation of a first set of radio resources to the first remote unit at a first point in time, the first set of radio resources for transmission at an antenna of the first remote unit;

'178 Patent – Claim 10	'499 Patent – Claim 1
transmission at an antenna of the first remote unit;	
wherein the host unit is configurable to send digital representations of a second set of downlink channel signals to the first remote unit at a second point in time, the second set of downlink channel signals for transmission at the antenna of the first remote unit;	wherein the baseband unit is configured to send a digital representation of a second set of radio resources to the first remote unit at a second point in time, the second set of radio resources for transmission at the antenna of the first remote unit;
wherein a number of downlink channel signals in the first set of downlink channel signals is different from a number of downlink channel signals in the second set of downlink channel signals; and	wherein a number of radio resources in the first set of radio resources is different from a number of radio resources in the second set of radio resources; and
wherein the host unit is configured to receive digital signals from each of the plurality of remote units.	wherein the baseband unit is configured to receive digital signals from each of the plurality of remote units.

Claims 6 and 7 of the Challenged Claims, dependent from Claim 1, specify the additional limitations recited in Claims 26 and 28 of the canceled claims of the '178 Patent – that the DAU may transmit/receive signals from other DAUs:

'178 Patent	'499 Patent
26. [A host unit ... comprising] at least one interface to communicatively couple the host unit to one or more additional host units;	6. The system of claim 1 wherein the baseband unit further comprises at least one interface to communicatively

	couple the baseband unit to one or more additional baseband units;
28. The host unit of claim 26 wherein the one of more additional host units includes a plurality of additional host units, and the host unit is connected to at least one of the plurality of additional host units through a direct connection and at least one of the plurality of additional host units through an indirect connection.	7. The system of claim 6 wherein the one of more additional baseband units includes a plurality of additional baseband units, and the baseband unit is connected to at least one of the plurality of additional baseband units through a direct connection and at least one of the plurality of additional baseband units through an indirect connection.

The Challenged Claims are also unpatentable over the above-cited prior art for the same reasons the Board determined in a final written decision that the claims challenged in the related '473 Patent were unpatentable:

Petitioner has shown by a preponderance of the evidence that claims 6–8, 11–13, and 18–21 of the '473 patent are unpatentable as anticipated by and obvious over Wu.

EX-1006, 37.

The substantially similar scope of the unpatentable claims and the Challenged Claims is illustrated by a side-by-side comparison of the independent system claim from each patent:

'473 Patent – Claim 11	'499 Patent – Claim 1
11. A system for transporting wireless communications, comprising:	1. A system for transporting wireless communications, comprising:
a host unit (<i>i.e. baseband unit</i>);	a baseband unit;

a plurality of remote units, including at least a first remote unit and a second remote unit;	a plurality of remote units, including at least a first remote unit and a second remote unit;
wherein the host unit comprises at least one interface to communicatively couple the host unit to at least one signal source;	a plurality of signal sources, including at least a first signal source and a second signal source; wherein the baseband unit comprises a plurality of interfaces to communicatively couple the baseband unit to the plurality of signal sources;
wherein the host unit is capable of receiving a plurality of downlink signals (<i>i.e. radio resources</i>) from the at least one signal source;	wherein the baseband unit is configured to receive a plurality of radio resources from the first signal source and the second signal source;
wherein the host unit further comprises at least one interface to communicatively couple the host unit to the plurality of remote units;	
wherein the host unit is capable of sending a digital representation of any downlink signal it receives to any of the plurality of remote units;	
wherein the host unit is configurable to transmit a digital representation of a first subset of the plurality of downlink signals to the first remote unit and	wherein the baseband unit is configured to send a digital representation of a first set of radio resources to the first remote unit at a first point in time, the first set of radio resources for transmission at an antenna of the first remote unit;
[wherein the host unit is configurable to transmit]	wherein the baseband unit is configured to send a digital representation of a second set of radio resources to the first remote

a digital representation of a second subset of the plurality of downlink signals to the second remote unit,	unit at a second point in time, the second set of radio resources for transmission at the antenna of the first remote unit;
the second subset being different than the first subset;	wherein a number of radio resources in the first set of radio resources is different from a number of radio resources in the second set of radio resources; and
wherein the host unit is capable of receiving a digital representation of at least one uplink signal from the each of the plurality of remote units.	wherein the baseband unit is configured to receive digital signals from each of the plurality of remote units.

The chart below shows the grounds that resulted in the cancellation of claims in the parent '178 Patent and the determination of unpatentability of claims in the related '473 Patent in a side-by-side comparison with the grounds of unpatentability asserted herein against the Challenged Claims:

<u>References</u>	<u>Basis</u>	<u>'178 Patent</u> Canceled Claims	<u>'473 Patent</u> Unpatentable Claims	<u>'499 Patent</u> Challenged Claims
Wu	§ 102	1 – 25	6-8, 11-13,	-
	§ 103	-	18-21	1-5, 8-11, 13-16, and 18-19
Wu + Sabat-552	§ 103	26-30	-	6, 7, 12, 17

In view of the substantial similarity in scope between the Challenged Claims and (i) the canceled claims of the parent '178 Patent, and (ii) the unpatentable claims of the '473 Patent, the Challenged Claims are unpatentable for the same reasons and based on the same prior art.

Moreover, the Challenged Claims are not patentably distinct from the claims canceled by adverse judgment in the parent '178 Patent thus estopping PO from taking any action before the Board that is inconsistent with its cancellation of the '178 Patent claims. Specifically, PO is estopped from refuting the grounds asserted in this Petition:

Ground 1 – that Claims 1-5, 8-11, 13-16, and 18-19 are obvious over Wu; and

Ground 2 – that Claims 6, 7, 12, and 17 are obvious over Wu and Sabat-552.

III. GROUNDS FOR STANDING (37 C.F.R. § 42.104(a))

Petitioners certify that the '499 Patent for which review is sought is available for *inter partes* review and that Petitioner is not barred or estopped from requesting an *inter partes* review of the Challenged Claims on the grounds identified herein. 37 C.F.R. § 42.104(a). This Petition is filed pursuant to 37 C.F.R. § 42.106(a).

IV. RELIEF REQUESTED (37 C.F.R. § 42.22(a))

Petitioners respectfully request institution of an *inter partes* review pursuant to 37 C.F.R. § 42.108 and cancellation of the Challenged Claims of the '499 Patent.

V. REASONS FOR THE RELIEF REQUESTED

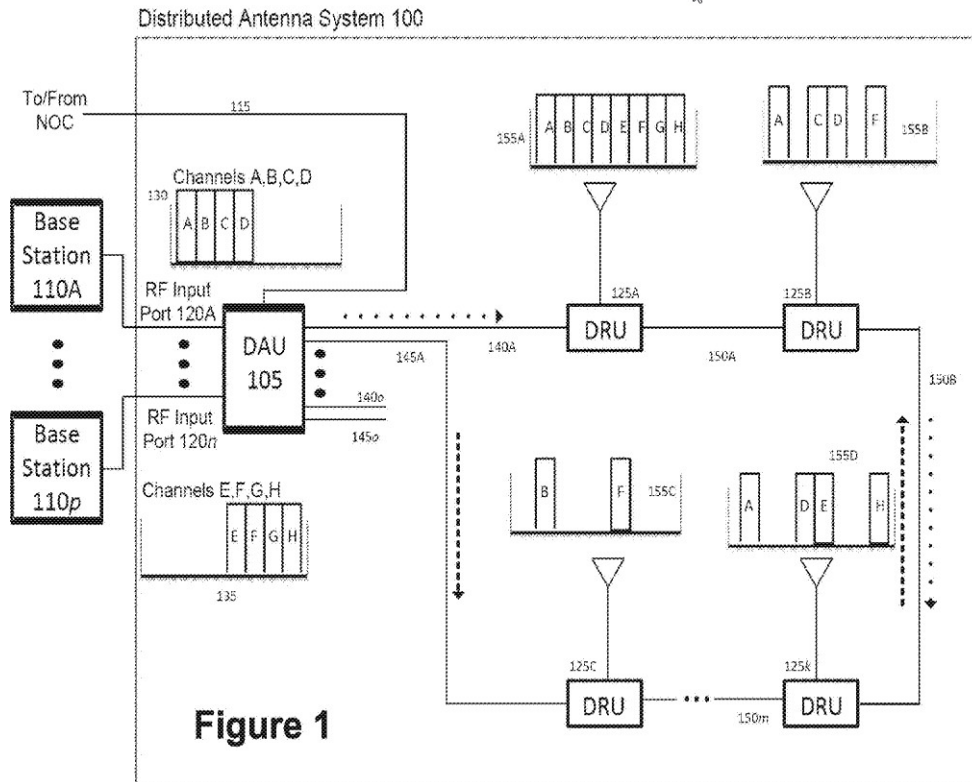
As set forth in Sections II and VI-VIII of this Petition and in the Declaration of Petitioners' Expert, Dr. Houh (EX-1012)—and for the same reasons and based on the same prior art that resulted in the cancellation of all claims in the parent '178 Patent and the determination of unpatentability of the challenged claims in the related '473 Patent—the systems and methods recited in the Challenged Claims are anticipated and/or obvious over the prior art in view of the knowledge, skill and creativity of a POSA at the time of the invention.

A. Summary of the '499 Patent

The '499 Patent is titled “Distributed Antenna System” and describes wireless communication systems employing a distributed antenna system (DAS) that is “field reconfigurable” and purportedly “enables a high degree of flexibility to manage, control, enhance, [and] facilitate the usage and performance of a distributed wireless network.” EX-1001, Title, Abstract. According to one embodiment of the described DAS, the system includes “one or more remotely monitored and controlled digital access units configured to assign particular packet

transmissions to selected one of a plurality of remote units” which can be “configured in a daisy-chained rings.” EX-1001, 1:24-29; EX-1012, ¶29.

The digital access units (DAUs or “baseband units”) connect to associated base stations and serve as an interface between the base stations and digital remote units (DRUs). EX-1001, 4:40-44. The DAS receives downlink data via radio frequency (RF) signals from the base stations. EX-1001, 4:63-65. After down-conversion, digitization, and conversion to baseband, the DAUs provide these received signals to DRUs. EX-1001, 4:66-5:6. Figure 1 of the ’499 Patent, reproduced below, illustrates in block diagram form the basic structure of an embodiment and an example of a downlink transport in the illustrated embodiment. EX-1001, 3:57-61; EX-1012, ¶30.



EX-1001, Fig. 1; EX-1012, ¶30.

Figure 1 illustrates an embodiment of DAS 100. EX-1001, 4:31-33. DAU 105 (i.e., a baseband unit) serves as an interface between associated base stations (110A through 110p) and a plurality of DRUs (125A through 125k). EX-1001, 4:41-44. The DRUs are connected to the DAU 105 in a ring configuration over optical fiber cable indicated at connection pairs 140A-145A and each DAU can support a plurality of rings through fiber optic pairs 140o-145o. EX-1001, 5:4-12; EX-1012, ¶31.

As shown in Figure 1, DAU 105 receives composite downlink signal 130, comprising carriers A–D from first base station 110A. EX-1001, 5:62-66. DAU

105 also receives composite signal 135, comprising carriers E–H from *p*th base station 110*p*. EX-1001, 5:66-6:2. A first optical output is directed to DRU 125A via bidirectional optical cable 140A, and a second optical output is directed to DRU 125C via bidirectional optical cable 145A. EX-1001, 6:9-12. The DRUs 125A-n are connected in a ring configuration such that all Carriers A-H are available to transport data to all DRUs within the ring. EX-1001, 6:12-20. The antenna ports of the DRUs receive uplink signals and transmit them to the base station via the DAUs. EX-1001, 5:32-45, 10:40-11:25; EX-1012, ¶32.

Software settings within each DRU are configured to control which carrier signals are present in the downlink output signal at the antenna port of a DRU. EX-1001, 6:22-39, 6:46-59. Figure 7, reproduced below, illustrates in block diagram form the interaction between the DAU embedded software module and the DRU embedded software module. EX-1001, 4:17-19; EX-1012, ¶33.

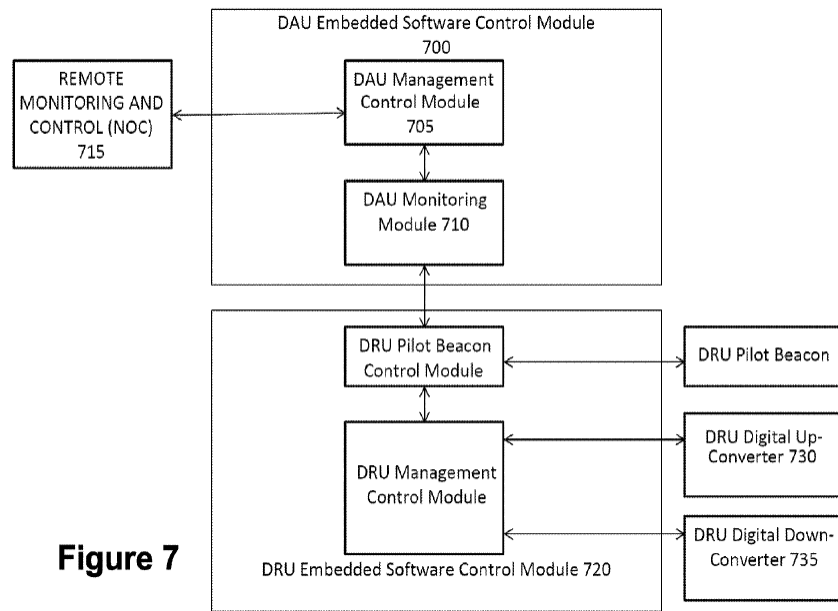


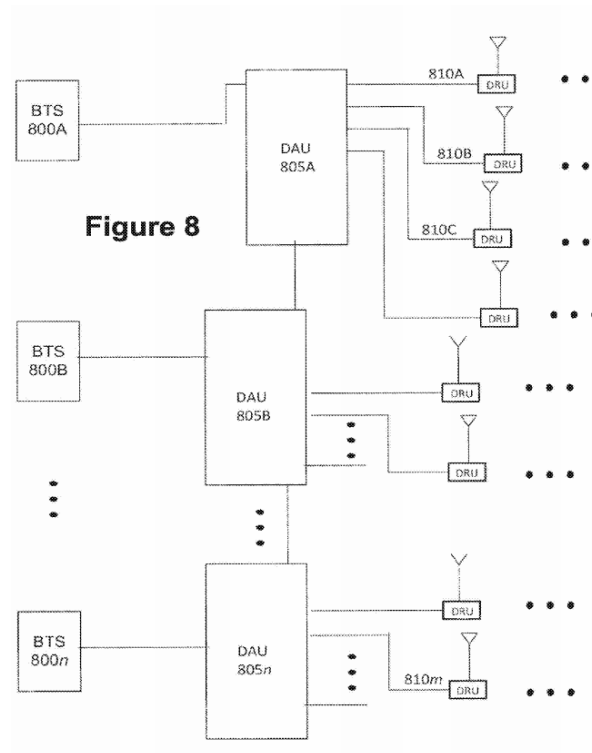
Figure 7

EX-1001, Fig. 7; EX-1012, ¶33.

With reference to Figure 7, an embedded software control module in a DAU, the DAU Management Control Module 705, “determin[es] and/or set[s] the appropriate amount of radio resources (such as RF carriers, CDMA codes or TDMA time slots) assigned to a particular DRU or group of DRUs to meet desired capacity and throughput objectives.” EX-1001, 12:1-9. Another embedded software control module, the DAU monitoring module 710, “detects which carriers and corresponding time slots for each carrier are active for each DRU.” EX-1001, 12:15-17. The DAU monitoring module 710 also provides information to the DAU Management Control Module 705 to help identify when a particular downlink carrier is loaded by a percentage greater than a predetermined threshold. EX-1001, 12:50-58. If the threshold is exceeded, “the DAU Management Control

Module can adaptively modify the system configuration” to deploy additional radio resources for use by a particular DRU needing those resources, and to remove resources from a DRU if it no longer needs the radio resources assigned to it. EX-1001, 12:58-13:2. The DAU Management Control Module 705 communicates with a DRU Embedded Software Control Module 720 which, in turn, by a DRU Management Control Module 725, sets individual parameters within the DRU to enable or disable specific radio resources from being transmitted by that DRU. EX-1001, 12:17-37; EX-1012, ¶34.

Figure 8, reproduced below, illustrates an embodiment of the DAS wherein DAU 805A (baseband unit) is coupled to one or more DAUs 805B-805 n . EX-1001, 4:20-22; EX-1012, ¶35.



EX-1001, Fig. 8; EX-1012, ¶35.

As illustrated in Figure 8, the plurality of DAUs 805A-805 n are connected in a daisy-chained configuration. EX-1001, 12. The plurality of base stations BTS 800A-800 n are each associated with one of the DAUs which are daisy-chained, and each DAU communicates with one or more daisy-chains 810A-810 m of DRUs which may be arranged in a ring configuration. EX-1001, 12:40-47. The DAUs may also be configured in a ring configuration. EX-1001, 12:48-49; EX-1012, ¶36.

B. Summary of the Challenged Claims

The Challenged Claims are directed to a system (independent Claim 1), a baseband controller (independent Claim 8), and a method (independent Claim 14) for use in transport of wireless communications wherein:

- a. a baseband unit (DAU) receives a plurality of radio resources from a first and a second signal source (base stations);
- b. the baseband unit (DAU) is configured to send digital representations of a first and a second set of the radio resources to remote units (DRUs);
- c. wherein the number of radio resources in the first set is different from the number of radio resources in the second set; and
- d. wherein the baseband unit is configured to receive digital signals from each of the remote units.

Claim 1 is directed to the system and is representative of the claimed subject matter (bracketed notations added):

1. [pre] *A system for transporting wireless communications, comprising:*
 - [1.a] *a baseband unit;*
 - [1.b] *a plurality of signal sources, including at least a first signal source and a second signal source;*
 - [1.c] *a plurality of remote units, including at least a first remote unit and a second remote unit;*
 - [1.d] *wherein the baseband unit comprises a plurality of interfaces to communicatively couple the baseband unit to the plurality of signal sources;*
 - [1.e] *wherein the baseband unit is configured to receive a plurality of radio resources from the first signal source and the second signal source;*
 - [1.f] *wherein the baseband unit is configured to send a digital representation of a first set of radio resources to the first remote unit at a first point in time, the first set of radio resources for transmission at an antenna of the first remote unit;*
 - [1.g] *wherein the baseband unit is configured to send a digital representation of a second set of radio resources to the first remote unit at a second point in time, the second set of radio resources for transmission at the antenna of the first remote unit;*
 - [1.h] *wherein a number of radio resources in the first set of radio resources is different from a number of radio resources in the second set of radio resources; and*

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

C. Summary of the Prosecution History

1. The '499 Patent

The application from which the '499 Patent issued was filed on Aug. 9, 2018 as a continuation of the application that issued as the '178 Patent. EX-1013, 30-39.

The Challenged Claims were submitted to the Office by a preliminary amendment filed Feb. 11, 2019. EX-1013, 24-28. The Office issued an Office Action on Feb. 21, 2019 rejecting the pending independent claims on the basis of obviousness-type double patenting over the corresponding independent claims of the parent '178 Patent. Specifically, Claim 1 (pending as Claim 10) directed to the system was rejected over system Claim 10 of the '178 Patent; Claim 8 (pending as Claim 18) directed to a baseband controller was rejected over host unit Claim 1 of the '178 Patent; and Claim 14 (pending as Claim 24) was rejected over method Claim 15 of the '178 Patent. EX-1013, 15-20.

PO filed a Terminal Disclaimer on Apr. 17, 2019, to overcome the double patenting rejection. EX-1013, 10-11. The Notice of Allowance issued May 8, 2019. EX-1013, 1-9. Despite considering the IDS submitted Aug. 9, 2018, the

Examiner identified the “closest prior art on record” as Sulzberger et al. (US 2005/0152695) and Boldi. et al. (US 8,855,489). EX-1013, 7-8.

The ’499 Patent issued Jun. 25, 2019.

2. The Parent ’178 Patent

As discussed above, an adverse judgment canceling Claims 1-30 of the parent ’178 Patent was entered by the Board Jun. 30, 2021. *See* EX-1005. The adverse judgment was entered as a result of PO’s motion to cancel Claims 1-30 subsequent to the Board instituting *inter partes* review of the claims at least on the basis that Claims 1-30 were anticipated by or obvious over Wu. *See* EX-1005, EX-1004.

D. Claim Construction

Petitioners propose that each claim term in the Challenged Claims be given its plain and ordinary meaning in this proceeding, and that no specific construction of any claim term is required because the prior art relied on in this Petition meets each of the claim terms under any reasonable construction. EX-1012, ¶37.

Petitioners acknowledge that in the case IPR2020-01430 directed to the ’499 Patent, the Board did not provide a specific construction for “radio resources,” however, the Board did determine that the plain and ordinary meaning of “radio resources” as would have been understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure: (1)

includes RF carriers, CDMA codes, and TDMA time slots; and (2) excludes data that does not incorporate information used in the transmission of the radio resource from an antenna of the remote unit. EX-1019, 11-12. The application of the plain and ordinary meaning in this Petition with respect to “radio resources” is consistent with the Board’s previous determination.

E. Priority Date

The ’499 Patent is a continuation of the ’178 Patent which, through a series of continuation applications, claims the benefit of Provisional Patent Application No. 61/439,940 filed February 7, 2011. For the purposes of this Petition, Petitioners do not challenge the claimed priority of February 7, 2011.

F. Person of Ordinary Skill in the Art

A person of ordinary skill in the art (POSA) at the time of the ’499 Patent would have at least a bachelor’s degree in electrical engineering or an equivalent field with two to three years of work experience in wireless communications networks. EX-1012, ¶40. A person with an advanced degree in electrical engineering or an equivalent field would require less industry experience. EX-1012, ¶40.

G. State of the Art

The following section describes the state of the art for DAS networks of February 2011. EX-1012, ¶41. The prior art references, and the discussions of what was known to a POSA, provide the factual support for the general description

of the state of the art at the time of the invention, provide additional motivation to modify or combine the references. Accordingly, these references should be considered by the Board.

1. Prior Art DAS

A distributed antenna system (DAS) is used to improve the capacity and coverage area of wireless systems, particularly for improving coverage inside buildings and other indoor environments. EX-1016, 3:11-14. DAS typically use fiber optic or unshielded twisted pair/shielded twisted pair (UTP/STP) cables to transmit digital radio signals, which typical are digital baseband signals. EX-1016, 3:11-14. The typical DAS configuration is shown below in Fig. 1. As shown in Fig. 1, the Remote radio heads (RRHs), 17, are placed in various locations, such as around a building, and the primary hub, 14, distributes the downlink radio signals to the RRHs as well as collects the uplink radio signals for the base station 11. EX-1016, 3:15-17. Additionally, as mentioned above, the transmitted signals are digital radio signals, and thus, it is easy to support multiple carriers and multiple base stations at the same time. EX-1016, 3:17-18; EX-1012, ¶42.

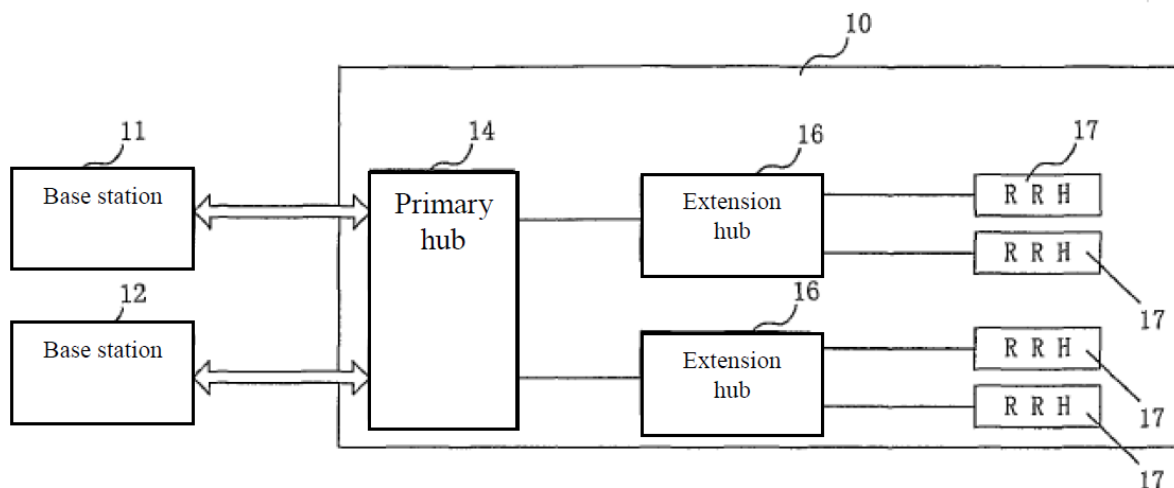


Fig. 1

EX-1016, Fig. 1; EX-1012, ¶42.

a. Allocation of radio resources based on loading of DAS

One such prior art DAS allowed dynamic reallocation of the carrier frequencies used by the remote units based on the relative loading of the system as communication traffic of a region changed. As shown in FIG. 2 below, a cell management device (CMU) 24 acts as the host and is connected to the base station 21, and is configured to distribute a downlink wireless signal to the radio remote unit 26 (RRH), collect an uplink wireless signal, and transmit the uplink radio signal to the base station 21. CMU 24 also collects load information of the distributed antenna system 20 and reconfigures the distributed antenna system 20 based on the load information. EX-1016, 13:28-30; EX-1012, ¶43.

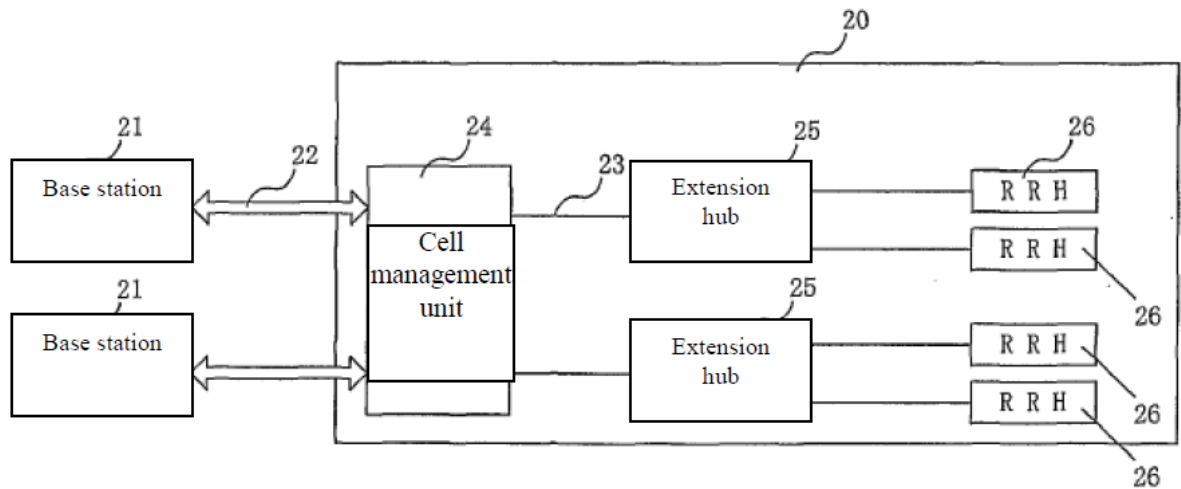


Fig. 2

EX-1016, Fig. 2; EX-1012, ¶43.

b. Reconfiguration of software defined radios

The use of software defined radios as the remote units, allowed for users to reprogram them in the field and thus provided maximum flexibility. EX-1012, ¶44.

One such use of software defined radios is illustrated in FIG. 2 above. The CMU configured the remote radio units by reconfiguring the packet address of the carrier signals such that the carrier signals are delivered to different RRHs and by notifying the remote radio unit 26 to switch the carrier to an available carrier frequency. EX-1016, 13:1-16. Thus, the CMU included a route reconfiguration module and carrier reconfiguration model that allowed a high-load radio remote

unit to switch the carrier to the carrier of a corresponding low-load radio remote unit according to the relative loads of the remote radio units. EX-1016, 13:28-30; EX-1012, ¶45.

One known remote radio unit uses a field programmable gate array (FPGA), which provided the ability to reconfigure the carrier frequencies of the radio in the field. The FPGA included a Digital Up-Converters (DUC) and a Digital Down-Converters (DDC) that were programmed with a center frequency and bandwidth to reconfigure the carrier of the remote radio unit. EX-1017, FIG. 6; ¶¶42-43. A POSA understood that the use of a FPGA in a remote radio unit is beneficial because the remote radio unit can be adjusted to meet the changing needs of the end user very simply using programming. EX-1017, ¶46; EX-1012, ¶46.

c. Processing communications from multiple signal sources.

It was known that a host could process signals from multiple signal sources. For example, as illustrated in FIG. 2 a single CMU can receive signals from two signal sources, base stations 21. The base stations 21 are connected to the CMU 24 via the CPRI interface 22 which converts the RF signal from the base stations 21 to the digital base band signal 23 to be properly routed to the appropriate RRH. The base band signal 23 is also converted to an RF signal for transmission by the base station. EX-1016 5:31-33; EX-1012, ¶47.

The Common Public Radio Interface (CPRI) 22 was a well-known protocol that was used for packetizing and addressing digital base band signals sent between base stations and hosts and remote radio units. EX-1010, 6, 30, 32, 40, 42, 84, Figs. 7, 13E, 14, 15, 16. CPRI communications are “packetized” because the CPRI standard defines a specific protocol for mapping and framing the IQ payload data into defined CPRI frames for transmission over the CPRI link. EX-1010, 6-7; EX-1012, ¶48.

The basic frames, hyperframes, and 10ms frames of the CPRI standard are well-defined in length and content by the CPRI standard. *Id.* The CPRI protocol also discloses the use of destination addresses. EX-1010, p. 84 (6.3.2. and 6.3.3)(“address table...used for switching...addresses to all REs”) ; EX-1012, ¶49.

A POSA understood that other protocols were available and also suitable for packetizing and addressing signals sent between base stations and hosts and remote radio units, including the OBSAI standard. EX. 1022, 16, Fig. 1, 26, Fig. 9, 63-66, Fig. 37. The OBSAI standard defines a protocol that packetize IQ data for transmission to remote RF units from digital baseband units, where the fundamental message structure for communication between the baseband module and the remote radio units is the fixed-length “message” that comprises header information, including an address followed by 16 bytes of payload. EX. 1022, 16, Fig. 1, 26, Fig. 9, 63-66, 69, Fig. 37; EX-1012, ¶50.

VI. IDENTIFICATION OF CHALLENGES

A. Challenged Claims

Claims 1-19 of the '499 Patent are challenged in this Petition.

B. Statutory Grounds for Challenges

The Challenges are set forth in detail below and summarized as follows:

Ground	Claims	Basis	Reference(s)
1	1-5, 8-11, 13-16, 18-19	§ 103	Wu
2	6, 7, 12, 17	§ 103	Wu in view of Sabat-552

C. The Prior Art

1. Wu

U.S. Patent Application Pub. No. 2010/0128676 was filed November 11, 2009 and published May 27, 2010. Wu qualifies as prior art at least under § 102(e). Wu was provided to the Examiner by PO along with 260 other references on August 9, 2018, concurrently with the filing of the application. EX-1013, 40-50. Thus, while Wu was cited on the face of the '499 Patent, it was not applied by the Examiner, nor did PO inform the Examiner that an IPR had been instituted based upon substantially similar claims that were found to be obvious over Wu. (Institution decision of '473 IPR2018-00571, Paper 53), prior to the issuance of the '499 Patent.

2. Sabat-552

U.S. Patent No. 6,963,552 issued November 8, 2005. Sabat-552 qualifies as prior art at least under § 102(b).

VII. IDENTIFICATION OF HOW THE CHALLENGED CLAIMS ARE UNPATENTABLE

A. Ground 1: Claims 1-5, 8-11, 13-16, and 18-19 are Obvious Over Wu in View of the Knowledge of a POSA

1. The Wu Reference

Wu is titled “Carrier Channel Distribution System” and describes a system for transporting wireless communications where base transceiver stations (BTSs) communicate signals to remote transceiver units (RTUs) via one or more host units. EX-1007, Title, ¶0030. The system provides control over the communication by splitting carrier channels from their bands and routing only selected channels to RTUs according to a routing policy. EX-1007, ¶0009. The carrier channels may be routed “individually, collectively as shown, or in arbitrary groups” to RTUs as desired using a matrix switch according to a routing policy, where the routing policy can be updated or reconfigured as desired. EX-1007, ¶¶0049, 0009, 0011, 0038-39, 0047. Wu discloses that “more channels” can be allocated when needed to increase the bandwidth available in a particular region. EX-1007 ¶0046; ¶¶0039-45; EX-1012, ¶54.

Wu provides a schematic of the system in Figure 1:

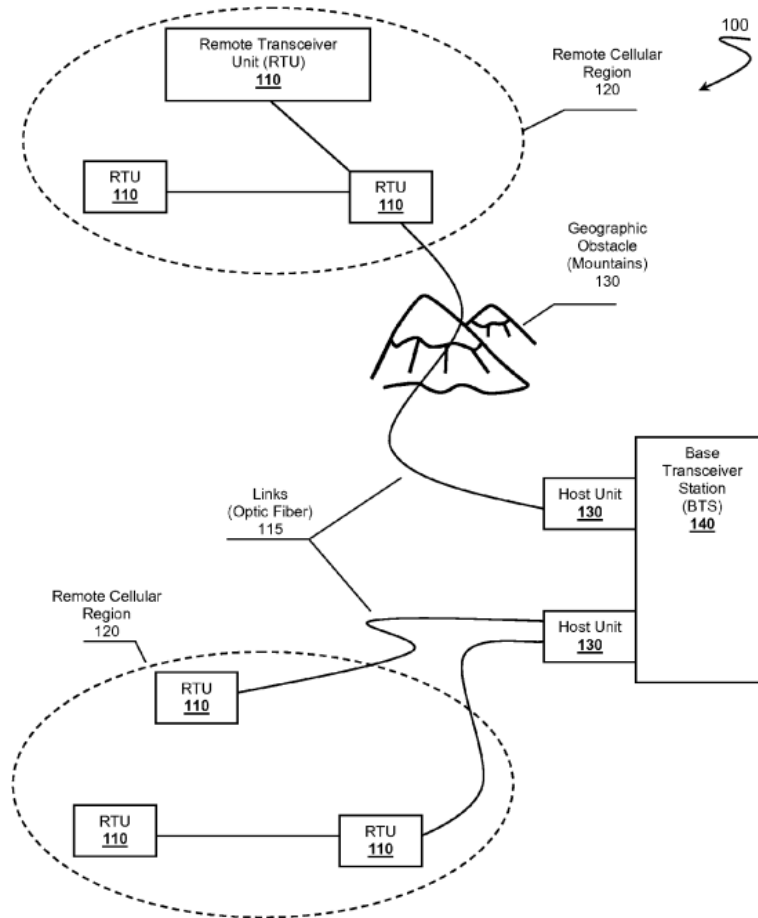


Figure 1

EX-1007, Fig. 1; EX-1012, ¶55.

Wu also provides a schematic of a BTS in Figure 2:

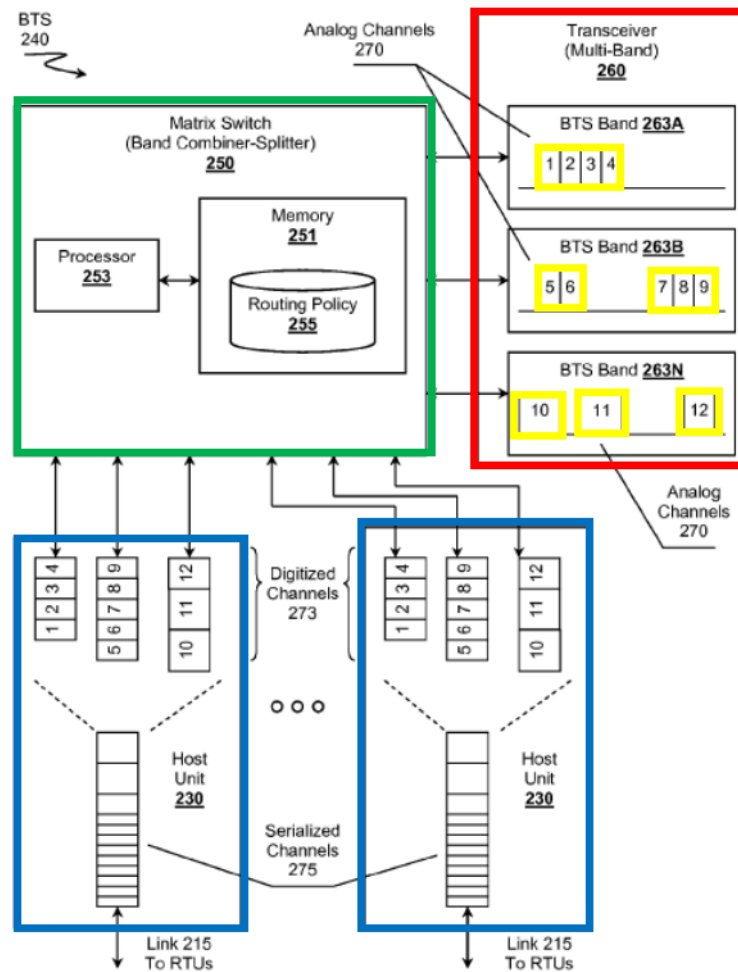


Figure 2

EX-1007, Fig. 2 (annotated in color); EX-1012, ¶56.

Figure 2 illustrates base transceiver station (BTS) 240 comprising transceiver 260 (outlined in red), matrix switch 250 (outlined in green), and host units 230 (outlined in blue). EX-1007, ¶¶ 0015, 34–36. Transceiver 260 receives signals on BTS bands 263A – 263N, and each band may include multiple analog channels 270 (outlined in yellow). EX-1007, ¶¶35-37. Transceiver 260 forwards

the received channels 270 to matrix switch 250 that routes the channels to host unit 230 according to Routing Policy 255. Host unit 230 further distributes the signals to RTUs over links 215. EX-1007, ¶38. Transmissions between host units and RTUs are disclosed as preferably occurring according to suitable standards such as the CPRI Standard. EX-1007, ¶¶ 31, 49; EX-1012, ¶57.

The system is bi-directional, and carrier channel signals are received by host units 230 from RTUs and forwarded to transceiver 260 for transmission within bands 263. EX-1007, ¶¶36, 49. Wu also discloses that some signals may be received at an RTU with another RTU acting as intermediary. EX-1007, Figs. 1, 4, ¶¶33, 51; EX-1012, ¶58.

Policy 255 can be reconfigured to change the routing of channels to the one or more RTUs. *Id.* ¶¶ 48, 49. For example, channels may be routed, allocated, or distributed based on anticipated requirements of remote regions during a certain time of day, or based on current traffic load within the region. EX-1007, ¶¶43, 44; EX-1012, ¶59.

2. Detailed Application of Wu to the Challenged Claims

a. Claim 1

i. [1.pre] A system for transporting wireless communications, comprising:

Wu discloses a system for transporting wireless communications. Wu is directed to “wireless carrier channel technologies” including “apparatus, systems

and methods in which a carrier channel distribution system can route individual carrier channels to Remote Transceiver Units (RTUs).” EX-1007, ¶¶0002, 0011; EX-1012, ¶60.

Wu provides a schematic of the system in Figure 1 showing how wireless communication signals are transported from BTS 140 [*signal source*] and Host Unit 130 [*baseband unit*] to RTUs 110 [*remote units*]. EX-1012, ¶61.

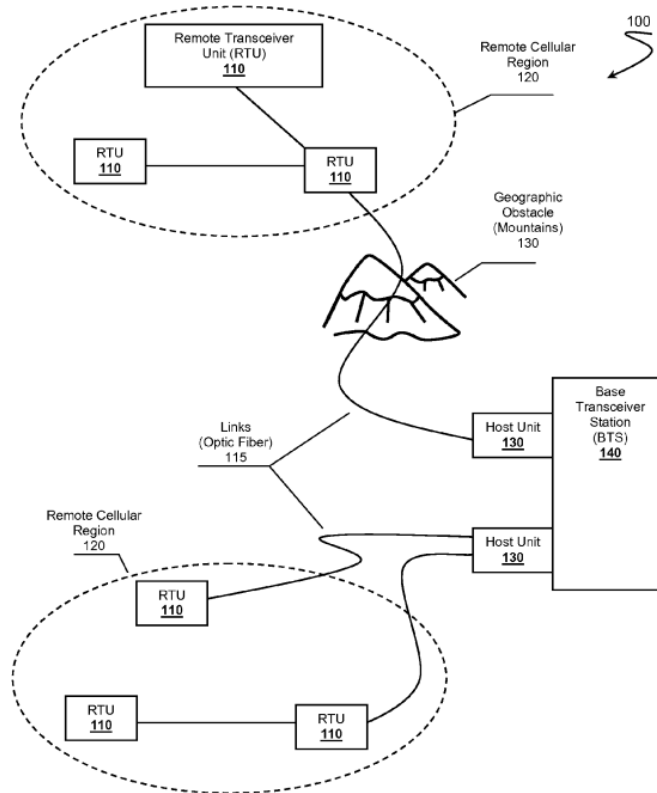


Figure 1

EX-1007, Fig. 1; EX-1012, ¶61.

ii. [1.a] a baseband unit;

Wu discloses a baseband unit. Wu provides a schematic of a base transceiver station (BTS) in Figure 2:

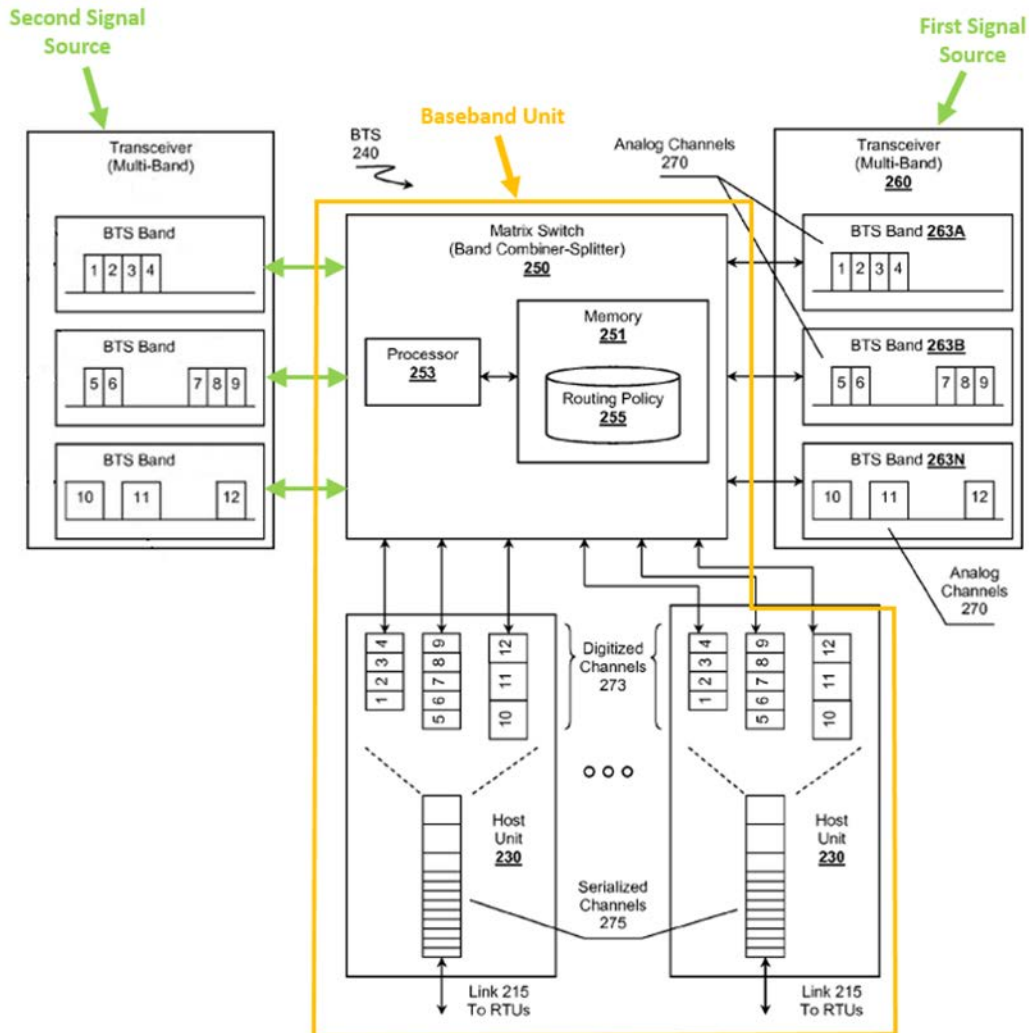


Figure 2

EX-1007, Fig. 2 (annotated in color); EX-1012, ¶62.

The BTS 240 comprises transceiver 260, matrix switch 250, and host units 230. EX-1007, ¶0015, Fig. 2. The combination of matrix switch 250 and host units 230 form a system [*baseband unit*] that manages two-way communications

between the RTUs 110 [*remote units*] and the transceiver 260 [*signal source*]. EX-1007, ¶¶0035-38. The matrix switch and host units together disclose the *baseband unit* recited in the Challenged Claims. EX-1012, ¶63.

In fact, the Board has already determined that the matrix switch 250 and host units 230 of Wu disclose the “host unit” recited in the claims of the related ’473 Patent and parent ’178 Patent. Specifically, the Board found “Wu discloses the claimed host unit as a combination of the matrix switch and host units” and that “it would have been obvious to place the functionality of both Wu’s matrix switch and host units in a single unit.” EX-1006, 21-22; EX-1004, 28; EX-1012, ¶64.

The “host unit” recited in the claims of the ’473 Patent and the ’178 Patent is the same element as the “baseband unit” recited in the Challenged Claims. Wu discloses or renders obvious the claimed baseband unit. EX-1012, ¶65.

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

Wu discloses a plurality of signal sources, including at least a first signal source and a second signal source. As illustrated in annotated Fig. 2 above, Wu discloses a BTS 240 comprising transceiver 260 [*signal source*]. Wu explains that “multi-band transceiver 260 is preferably configured to receiver [sic] or to transmit wireless signals within a plurality of frequency bands as represented by bands 263A, 263B, through 263N” and that “[e]ach of bands 263 preferably comprises

multiple channels.” EX-1007, ¶0035. Wu further explains that “BTS 240 can be coupled to more than one of multi-band transceiver 260.” EX-1007, ¶0034); EX-1012, ¶66. Fig. 2 has been annotated to illustrate the disclosed by Wu wherein the BTS 240 is coupled to a first and a second transceiver 260 [at least a first signal source and a second signal source]. EX-1012, ¶66.

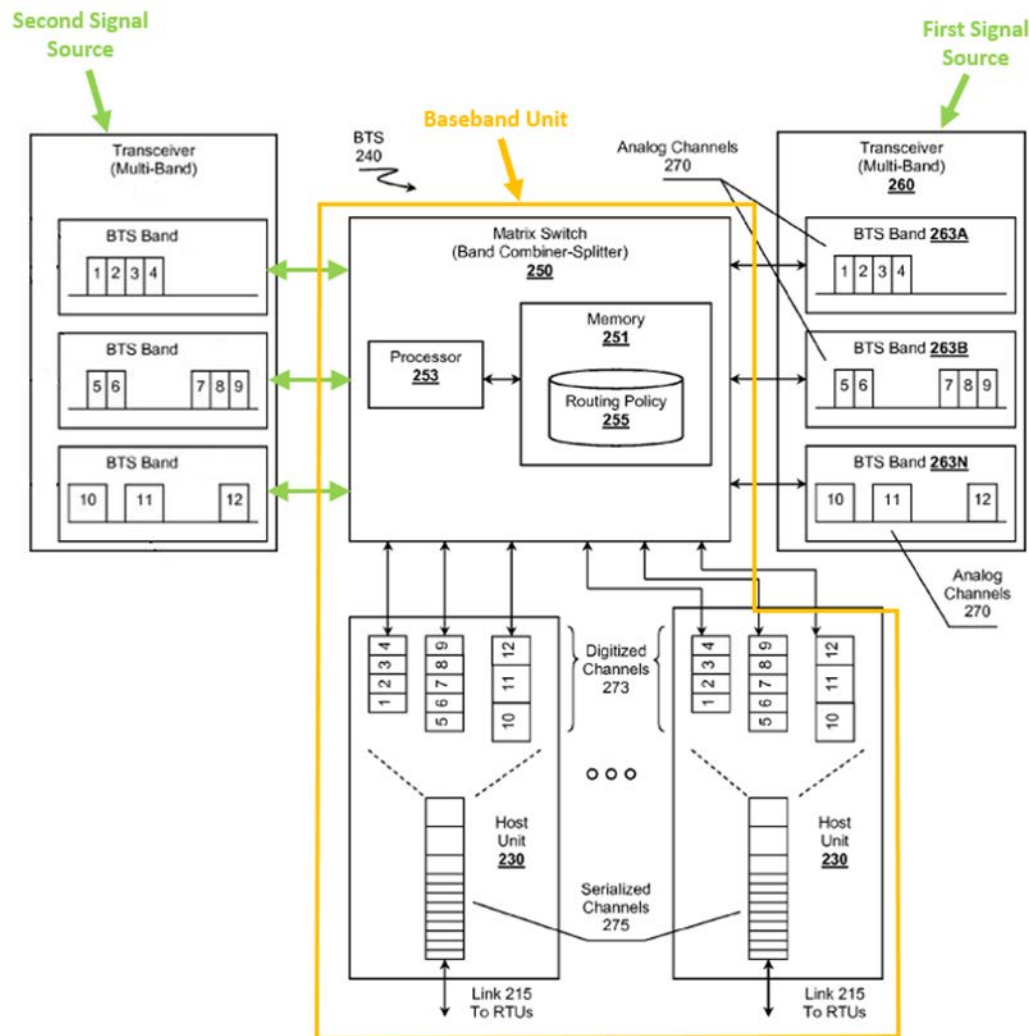


Figure 2

EX-1007, Fig. 2 (annotated in color); EX-1012, ¶66.

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

Wu discloses a plurality of remote units, including at least a first remote unit and a second remote unit. As illustrated in Fig. 1 above and Fig. 4 below, Wu discloses a system 100 comprising a plurality of RTUs 110 [*a first remote unit and a second remote unit*]. EX-1007, Fig. 1, ¶¶0031-33; EX-1012, ¶67.

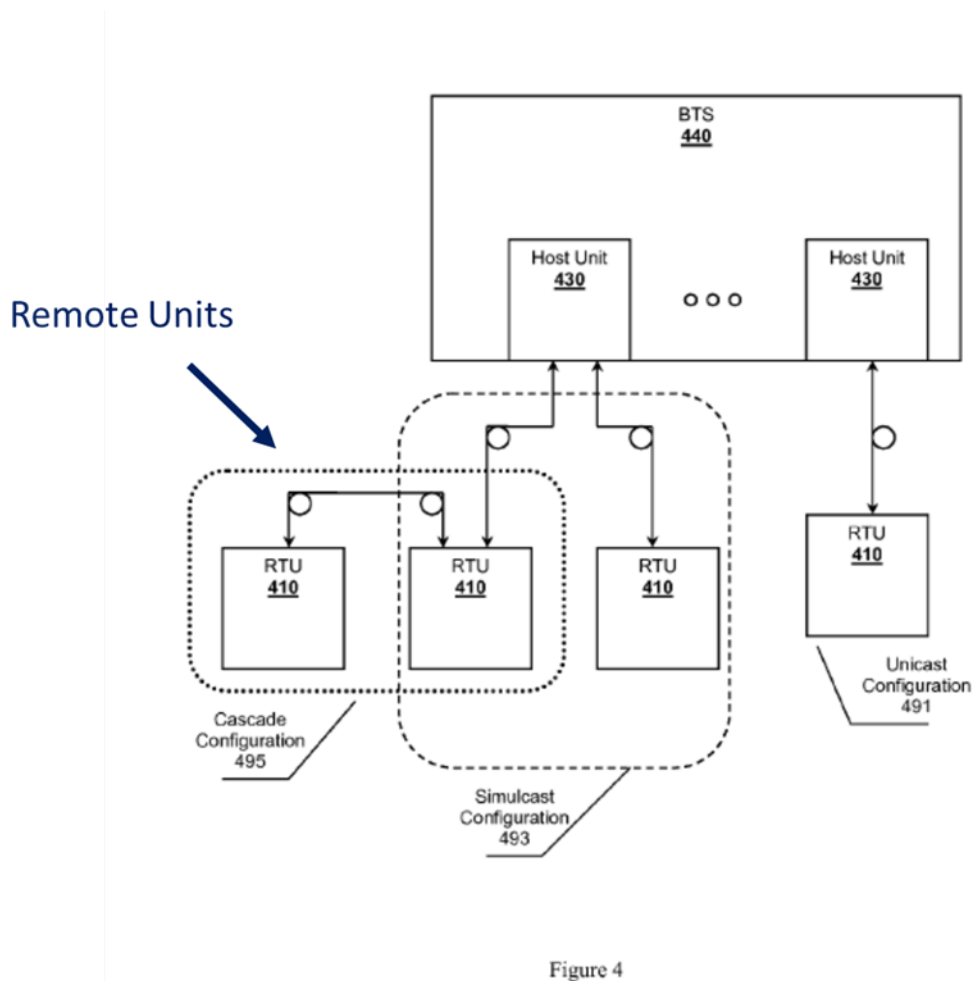


Figure 4

EX-1007, Fig. 4 (annotated in color); EX-1012, ¶67.

- v. [1.d] *wherein the baseband unit comprises a plurality of interfaces to communicatively couple*

the baseband unit to the plurality of signal sources;

Wu discloses the baseband unit comprising a plurality of interfaces to communicatively couple the baseband unit to the plurality of signal sources. Wu discloses that matrix switch 250 (a component of the baseband unit) is communicatively coupled to a plurality of BTS Bands 263A – 263N from each of the first and second transceivers 260 and a POSA understood that each communication coupling includes an interface. EX-1007, ¶0042, Fig. 2. Thus, the baseband unit, which includes matrix switch 250, comprises a plurality of interfaces to communicatively couple the baseband unit to a plurality of signal sources. EX-1012, ¶68.

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

Wu discloses a system where the baseband unit is configured to receive a plurality of radio resources from the first signal source and the second signal source. As illustrated in the annotated Fig. 2 above, the matrix switch 250 receives analog channels 270 [*radio resources*] including channels 1 – 12 from each of the BTS Bands 263 of the first and second transceivers 260. EX-1007, ¶¶0035-38, Fig. 2. A POSA understood that the carrier channels 1 – 12 are radio resources as recited in the Challenged Claims. EX-1012, ¶69.

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

Wu discloses a system where the baseband unit is configured to send a digital representation of a first set of radio resources to the first remote unit at a first point in time, the first set of radio resources for transmission at an antenna of the first remote unit. Wu explains that the combination of matrix switch 250 and units 230 [*baseband unit*] digitize the carrier channels [*radio resources*] and send digital representations of the channels 273 to the RTUs. EX-1007, ¶49. Wu further explains that matrix switch 250 is configurable to route the digitized channels 273 [*digital representation of radio resources*] “individually, collectively ..., or in arbitrary groups” (*a first set*) to a first RTU [*first remote unit*]. EX-1007, ¶0049; EX-1012, ¶70.

Wu also describes that the number of channels routed to an RTU may change by means of a routing policy that includes rules for reacting to events and conditions such as usage, load, weather, etc. EX-1007, ¶¶0038-47; EX-1012, ¶71.

As an example, “[t]he rules of policy 255 can include one or more criterion representing a trigger ... When the criteria are met, matrix switch 250 can take appropriate routing action.” EX-1007, ¶0041. Wu explains that the routing actions

may include allocating more channels to a region to increase the bandwidth available at a first point in time. EX-1007, ¶¶0046; EX-1012, ¶72.

Wu discloses that the RTUs provide “wireless coverage” to remote cellular regions. EX-1007, ¶¶0030, 0004. A POSA understood that “wireless coverage” requires transmission of communications using an antenna, and that there are antennas associated with each RTU for transmitting radio resources; EX-1012, ¶73.

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

Wu discloses a system where the baseband unit is configured to send a digital representation of a second set of radio resources to the first remote unit at a second point in time, the second set of radio resources for transmission at the antenna of the first remote unit. As set forth for element [1.f] above, Wu describes a routing policy that includes rules for reacting to various events and conditions. EX-1007, ¶¶0038-47. The routing actions may allocating more channels [*a second set of radio resources*] to an RTU to increase the bandwidth available in the region of the RTU at a time following the triggering event [*a second point in time*]. EX-1007, ¶0046; EX-1012, ¶74.

- ix. [1.h] wherein a number of radio resources in the first set of radio resources is different from a number of radio resources in the second set of radio resources;**

Wu discloses a system where a number of radio resources in the first set of radio resources is different from a number of radio resources in the second set of radio resources. Wu explains the routing policy may change the configuration of the system “to allocate more channels” to a first RTU in a region “to increase the bandwidth available” in the region in response to conditions. EX-1007, ¶0046. In such a scenario, the number of channels [*radio resources*] transmitted in the first set prior to the routing policy change is different than the number of channels transmitted in the second set after the change in policy; EX-1012, ¶75.

- x. and [1.i] wherein the baseband unit is configured to receive digital signals from each of the plurality of remote units.**

Wu discloses a system where the baseband unit is configured to receive digital signals from each of the plurality of remote units. Wu explains that the system is bi-directional such that the units 230 (components of the *baseband unit*) may receive digital representations of uplink signals from each of the plurality of RTUs. EX-1007, ¶0036, 0049. Wu discloses that the RTUs include analog-to-digital converters for digitizing received signals for digital transport to the host units 230. EX-1007, ¶0056; EX-1012, ¶76.

b. Claim 2

- i. The system of claim 1 wherein the baseband unit is configured to packetize each digital representation of a radio resource.*

Wu discloses a system wherein the baseband unit is configured to packetize each digital representation of a radio resource. Wu discloses that the communication links 115, 215 between units 130, 230 and RTUs 110, 210 employ one or more standards such as CPRI or OBSAI to exchange digitized signals (channels 273) [*digital representations of a radio resource*]. EX-1007, ¶¶0031, 0049. As discussed in the State of the Art section above, a POSA understood that the exchange of digitized signals employing the protocols set forth in the CPRI or OBSAI standards “packetize” data for transmission between endpoints. EX-1010, 6, 30, 32, 40, 42, 84, Figs. 7, 13E, 14, 15, 16; EX-1012, ¶77.

c. Claim 3

- i. The system of claim 1 wherein the digital representation of the first set of radio resources includes destination information identifying the first remote unit and the digital representation of the second set of radio resources includes destination information identifying the first remote unit.*

Wu discloses a system wherein the digital representation of the first set of radio resources includes destination information identifying the first remote unit and the digital representation of the second set of radio resources includes

destination information identifying the first remote unit. As set forth for Claim 2, Wu discloses that units 130, 230 may employ the CPRI or OBSAI standards to communicate with RTUs 110, 210. As described in the State of the Art section above, a POSA understood that the protocols for these standards employ destination addresses for routing signals. EX-1010, 6, 30, 32, 40, 42, 84, Figs. 7, 13E, 14, 15, 16; EX-1012, ¶78.

d. Claim 4

- i. The system of claim 1 wherein the first set of radio resources is a subset of the plurality of radio resources and includes at least some radio resources from the first signal source and at least some radio resources from the second signal source.*

Wu discloses a system wherein the first set of radio resources is a subset of the plurality of radio resources and includes at least some radio resources from the first signal source and at least some radio resources from the second signal source. EX-1012, ¶79.

Wu discloses that baseband unit can receive signals from a first and second signal source as shown in Fig 2:

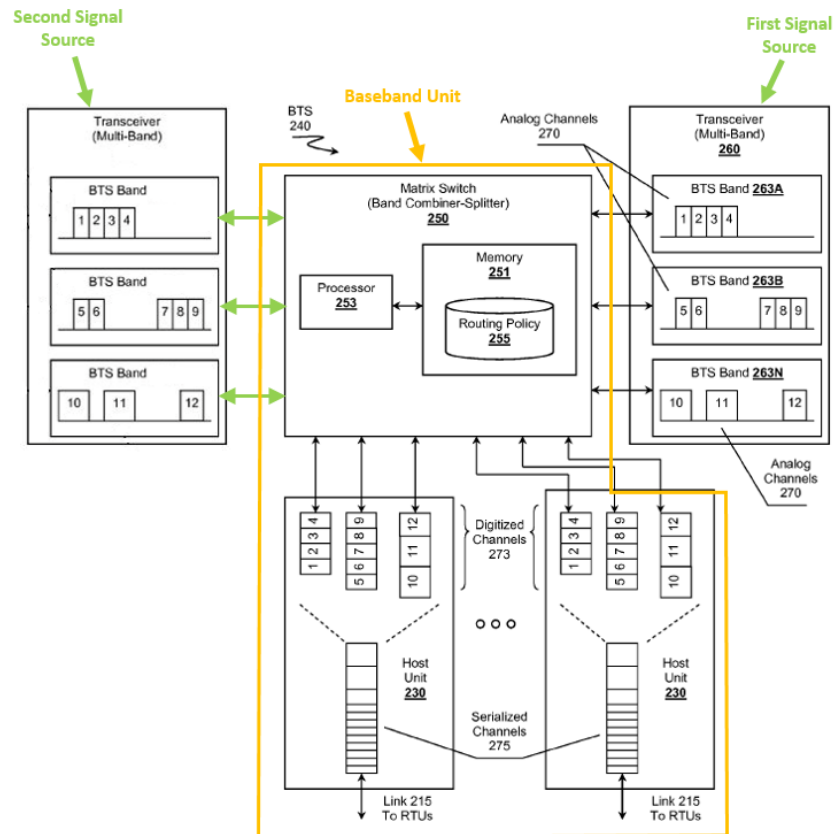


Figure 2

EX-1007, Fig. 2 (annotated in color); EX-1012, ¶80.

Wu further describes that radio resources in the form of channels 270 from the first and second signal sources “can be routed or allocated according to policy 255 individually, collectively as shown, or in arbitrary groups. Serialized channel 275 can then be sent to the RTUs over links 215.” EX-1007, ¶0040. A POSA understood that these arbitrary groups would include at some radio resources from the first signal source and at least some radio resources from the second signal source. EX-1012, ¶81.

e. Claim 5

- i. The system of claim 1 wherein the baseband unit and at least one of the plurality of signal sources are part of a baseband controller.*

As shown in annotated FIG. 2 above, Wu discloses a baseband controller in the form of the baseband unit (yellow) and a first or second signal source (green).

EX-1012, ¶82.

f. Claim 8

- i. A baseband controller for use in the transport of wireless communications, comprising:*

See Claim 1, elements [1.pre] and [1.a]; and Claim 5.

- ii. a plurality of interfaces to communicatively couple a baseband unit to a plurality of signal sources, including at least a first signal source and a second signal source;*

See Claim 1, elements [1.b] and [1.d].

- iii. at least one interface to communicatively couple the baseband unit to a plurality of remote units, including at least a first remote unit;*

See Claim 1, element [1.c]. Wu discloses that the baseband unit is communicatively coupled to a plurality of remote units over links 215 using the Common Public Radio Interface (CPRI). EX-1007 ¶0040; EX-1012, ¶85.

- iv. *wherein the baseband unit is configured to receive a plurality of radio resources from the first signal source and the second signal source;*

See Claim 1, element [1.e].

- v. *wherein the baseband unit is configured to send digital representations of a first set of radio resources to the first remote unit at a first point in time, the first set of radio resources for transmission at an antenna of the first remote unit;*

See Claim 1, element [1.f].

- vi. *wherein the baseband unit is configured to send digital representations of a second set of radio resources to the first remote unit at a second point in time, the second set of radio resources for transmission at the antenna of the first remote unit;*

See Claim 1, element [1.g].

- vii. *and wherein a number of radio resources in the first set of radio resources is different from a number of radio resources in the second set of radio resources.*

See Claim 1, element [1.h].

g. Claim 9

- i. *The baseband controller of claim 8 wherein the baseband unit is configured to packetize each digital representation of a radio resource.*

See Claim 2.

h. Claim 10

- i. The baseband controller of claim 8 wherein the digital representation of the first set of radio resources includes destination information identifying the first remote unit and the digital representation of the second set of radio resources includes destination information identifying the first remote unit.*

See Claims 2 and 3.

i. Claim 11

- i. The baseband controller of claim 8 wherein the first set of radio resources is a subset of the plurality of radio resources and includes at least some radio resources from the first signal source and at least some radio resources from the second signal source.*

See Claim 4.

j. Claim 12

- i. The baseband controller of claim 8 wherein the baseband unit further comprises at least one interface to communicatively couple the baseband unit to one or more additional baseband units.*

See Claims 6 and 7.

k. Claim 13

- i. The baseband controller of claim 8 wherein the plurality of radio resources include a first composite signal from the first signal source and*

a second composite signal from the second signal source, and the baseband unit is configured to form the digital representation of the first set of radio resources from a first subset of the first composite signal and a second subset of the second composite signal.

Wu discloses that baseband unit can receive signals from a first and second signal source as shown in Fig 2. Wu further describes that radio resources in the form of channels 270 from the first and second signal sources “can be routed or allocated according to policy 255 individually, collectively as shown, or in arbitrary groups. Serialized channel 275 can then be sent to the RTUs over links 215.” EX-1007 ¶0040. A POSA understood that the signals from the first and second signal sources would be composite signals and that baseband unit would form a digital representation 275 from an arbitrary group including a first subset of the first composite signal and a second subset of the second composite signal. EX-1012, ¶94.

I. Claim 14

- i. A method for providing digital signals in a Distributed Antenna System (DAS), comprising:*

See Claim 1, element [1.pre].

- ii. receiving at a baseband unit, from a plurality of signal sources including at least a first signal*

source and a second signal source, a plurality of radio resources;

See Claim 1, elements [1.a], [1.b], and [1.e].

- iii. transmitting from the baseband unit, at a first point in time, a digital representation of a first set of radio resources to a first remote unit, the first set of radio resources for transmission at an antenna of the first remote unit;*

See Claim 1, element [1.f].

- iv. transmitting from the baseband unit, at a second point in time, a digital representation of a second set of radio resources to the first remote unit, the second set of radio resources for transmission at the antenna of the first remote unit;*

See Claim 1, element [1.g].

- v. wherein a number of radio resources in the first set of radio resources is different from a number of radio resources in the second set of radio resources.*

See Claim 1, element [1.h].

m. Claim 15

- i. The method of claim 14 wherein the digital representation of the first set of radio resources includes destination information identifying the first remote unit and the digital representation of the second set of radio resources includes*

destination information identifying the second remote unit.

See Claims 2 and 3.

n. Claim 16

- i. The method of claim 14 wherein the first set of radio resources is a subset of the plurality of radio resources and includes at least some radio resources from the first signal source and at least some radio resources from the second signal source.*

See Claim 4.

o. Claim 17

- i. The method of claim 14 further comprising receiving at the baseband unit, from at least one additional baseband unit, a second plurality of radio resources.*

See Claims 6 and 7.

p. Claim 18

- i. The method of claim 14 wherein the plurality of radio resources include a first composite signal from the first signal source and a second composite signal from the second signal source, the method further comprising forming, at the baseband unit, the digital representation of the first set of radio resources from a first subset of the first composite signal and a second subset of the second composite signal.*

See Claim 13.

q. Claim 19

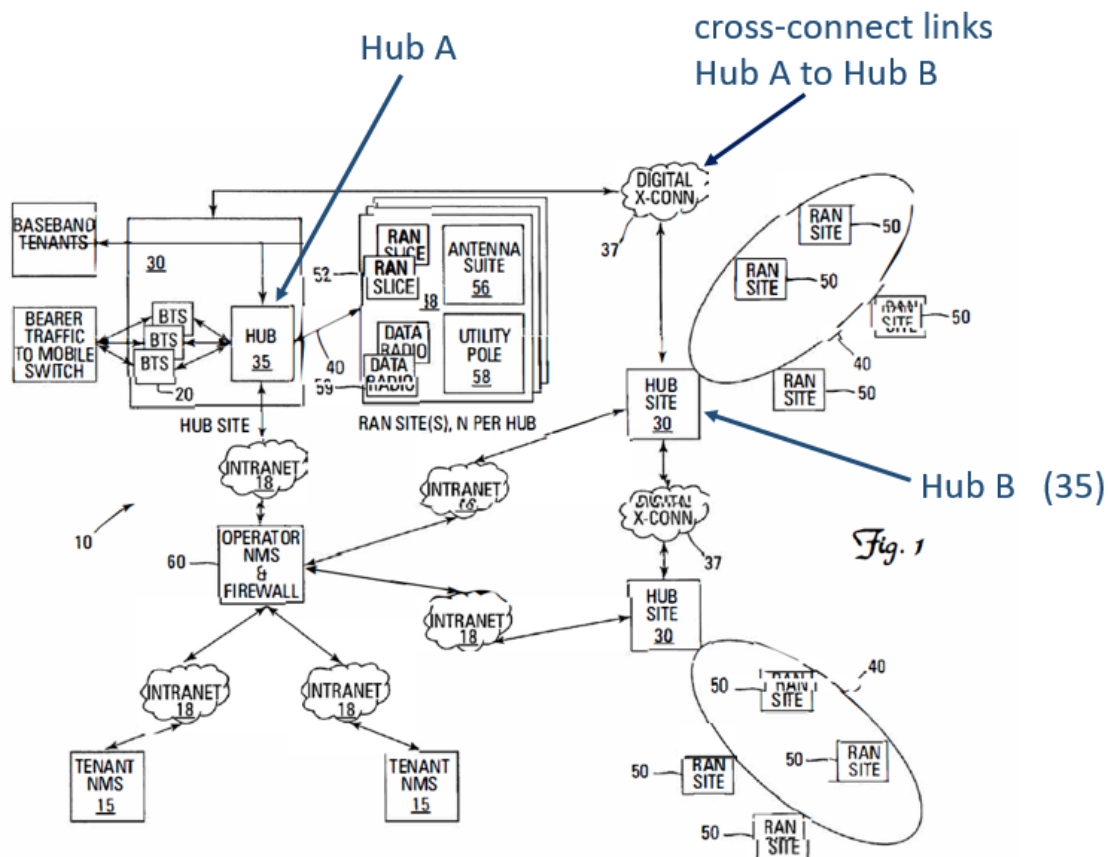
- i. The method of claim 14 further comprising packetizing, at the baseband unit, at least a subset of the plurality of radio resources.*

See Claim 2.

B. Ground 2: Claims 6, 7, 12, and 17 are Obvious Over Wu and Sabat-552

1. The Sabat-552 Reference

Sabat-552 discloses an open access RF signal distribution system that allows different wireless service providers to share the network infrastructure to support wireless voice, data, and other services. EX-1008, 5:6-9. Sabat-552 provides Fig. 1 (annotated below to identify multiple hubs) as a block diagram of its open access system:



EX-1008, Fig. 1 (annotated in color); EX-1012, ¶105.

Sabat-552 explains that the system 10 comprises multiple hub sites 30 that comprise base stations (BTSs) 20 and hub 35 to communicate signals from the BTSs 20 to distributed RF access node (RAN) sites 50. EX-1008, 5:6-12. The hubs 35 at the hub sites 30 are connected by digital cross-connects 37 so that signals from the BTS 20 of any service provider located at any hub site 30 can be transmitted to any RAN site 50 either directly or indirectly. EX-1008, 6:55-59; EX-1012, ¶106.

2. Detailed Application of Wu and Sabat-552 to Claims 6, 7, 12, and 17

a. Claims 6 and 7

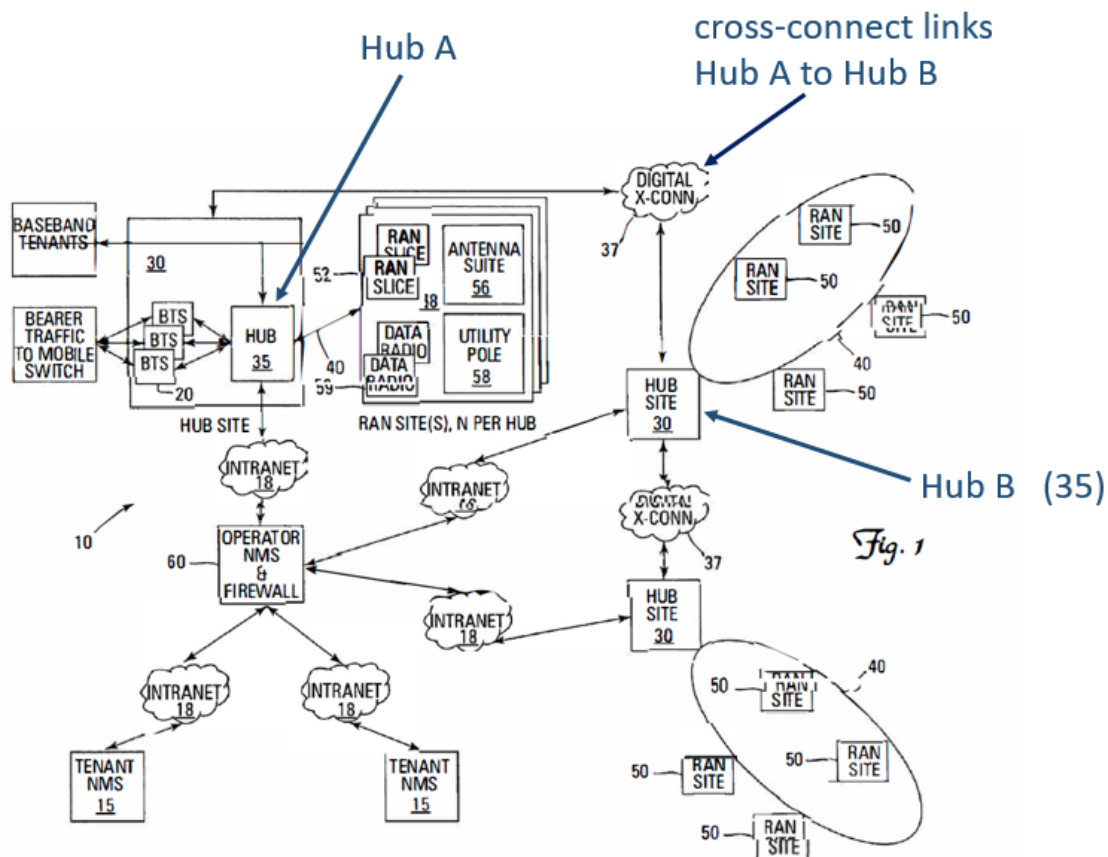
6. The system of claim 1 wherein the baseband unit further comprises at least one interface to communicatively couple the baseband unit to one or more additional baseband units.

7. The system of Claim 6 wherein the one or more additional baseband units includes a plurality of additional baseband units, and the baseband unit is connected to at least a first one of the plurality of additional baseband units through a direct connection and at least a second one of the plurality of additional baseband units through an indirect connection.

Wu in combination with Sabat-552 discloses the system of Claims 6 and 7.

As set forth above, Wu discloses and/or renders obvious Claim 1. Sabat-552 discloses that hub 35 located at a first hub site 30 in a digital wireless RF distribution system may be coupled to other hubs 35 through digital cross-connects 37 so that the signals received at BTS 20 located at the first hub site 30 can be digitized and transmitted to any of the remote units coupled to any of the other connected hubs in the system either directly or indirectly. EX-1008, Fig. 1, 6:55-61; EX-1012, ¶107.

Sabat-552 provides Fig. 1 (annotated below in color) as a block diagram of its open access system:



EX-1008 Fig. 1 (annotated in color); EX-1012, ¶108.

Sabat-552 discloses that hub 35 [baseband unit] at a first hub site 30 receives signals [radio resources] from the BTSs 20 [signal sources] located at the first hub site and may transmit a digital representation of the signals not only to remote RAN sites 50 [remote units] but also to a plurality of additional hubs 35 [additional baseband units] for further transmission to the RAN sites 50 communicatively coupled to the additional hubs 35. Sabat-552 discloses that a hub 35 may be connected to additional hubs both by direct connection and by indirect connection. As illustrated above in annotated Fig. 1, Hub A [baseband unit]

located at the first hub site is connected to Hub B [*at least a first one of the plurality of additional baseband units*] through a direct connection and is connected to Hub C [*at least a second one of the plurality of additional baseband units*] through an indirect connection passing through intervening Hub B. EX-1008, Fig. 1; EX-1012, ¶109.

A POSA would have been motivated to combine the teachings of Wu and Sabat-552 to interconnect a first matrix switch/unit 230 with one or more of a plurality of additional matrix switch/units 230. EX-1012, ¶110. Sabat-552 teaches that interconnecting the hubs 35 enables the system to transmit the radio resources received from a BTS 20 located at a first hub site 30 to any remote RAN site 50 within the system through direct and indirect connections. Thus, a POSA understood that such a system avoided the cost of building additional base stations and distribution networks to distribute radio resources to the expanded coverage area. EX-1012, ¶110. Sabat-552 further teaches that its design of interconnecting hubs enables the system to be easily shared among service providers. EX-1008 2:48-58; 3:65-4:5; expert. Therefore, it would have been obvious to a POSA to interconnect the matrix switch/units 230 in the system of Wu with one or more of a plurality of additional matrix switch/units 230 to distribute the radio resources input to the first matrix switch to be communicated to RTUs that connect with a

different matrix switch to reduce equipment costs and to share infrastructure among service providers. EX-1012, ¶110.

b. Claim 12

12. The baseband controller of claim 8 wherein the baseband unit further comprises at least one interface to communicatively couple the baseband unit to one or more additional baseband units.

See Claims 6 and 7.

c. Claim 17

17. The method of claim 14 further comprising receiving at the baseband unit, from at least one additional baseband unit, a second plurality of radio resources.

See Claims 6 and 7.

Sabat-552 teaches that a hub 35 located a hub site 30 may receive signals from the BTSs 20 located at the hub site 30, but also may receive signals from a hub 35 located at another hub site 30. A POSA understood that the radio resources received from the other hub 35 [*additional baseband unit*] would comprise a second plurality of radio resources with the first plurality of radio resources being received from the BTSs 20 located at the same hub site 30. EX-1012, ¶113.

VIII. PO is Estopped From Arguing the Patentability of the Challenged Claims Over Grounds 1 and 2

As discussed above, PO canceled all claims in the parent '178 Patent in response to an *inter partes* review being instituted challenging those claims

resulting in an adverse judgment entered Jun. 30, 2019. See EX-1005. Under 37 C.F.R. § 42.73(d)(3), PO is precluded from taking action inconsistent with the adverse judgment, including arguing the patentability before the Board of any claim that is not patentably distinct from a finally canceled claim.

In IPR2020-01473, Claims 1-25 of the '178 Patent were challenged as being anticipated by or obvious over Wu, and Claims 26-30 were challenged as obvious over the combination of Wu and Sabat-552. As a result of those challenges, Claims 1-30 of the '178 Patent were canceled by adverse judgment.

This Petition challenges Claims 1-5, 8-11, 13-16, and 18-19 as being obvious over Wu (Ground 1) and demonstrates that those claims are not patentably distinct from Claims 1-25 of the '178 Patent canceled by adverse judgment. PO is therefore precluded from arguing the patentability of the Challenged Claims over Ground 1.

This Petition also challenges Claims 6, 7, 12, and 17 as being obvious over the combination of Wu and Sabat-552 (Ground 2) and demonstrates that those claims are not patentably distinct from Claims 26 and 28 canceled by adverse judgment. PO is therefore precluded from arguing the patentability of the Challenged Claims over Ground 2.

IX. THE BOARD SHOULD NOT EXERCISE ITS DISCRETION AND DENY INSTITUTION

A. The Board Should Not Deny Institution Under 35 U.S.C. § 325(d)

PO may urge the Board to exercise its discretion and deny institution on the basis that Wu was before the examiner during prosecution of the '499 Patent.

However, as determined by the Board in its decision to institute *inter partes* review in the parent '178 Patent, the Examiner's failure to find that Wu disclosed or taught the limitations described by the Examiner as missing in the art of record constitutes sufficient Examiner error warranting the Board to decline to exercise its discretion under 35 U.S.C. § 325(d) to deny institution. EX-1004 9-17.

Here, as discussed in the prosecution history of the '499 Patent, Wu was disclosed among 261 references in an IDS filed concurrently with the application that issued as the '499 Patent. Similar to the prosecution of the '178 Patent, the Examiner failed to find that Wu disclosed or taught the limitations described as missing in the "closest prior art of record" identified by the Examiner in the Notice of Allowance. The Examiner's failure with respect to Wu constitutes sufficient error warranting the Board to decline to exercise its discretion under 35 U.S.C. § 325(d) to deny institution of trial based on this Petition.

B. The Board Should Not Deny Institution Under 35 U.S.C. § 314(a)

The PTAB has discretion to deny institution under 35 U.S.C. § 314(a).
Related to the Director's June 2022 interim guidance regarding application of the

Fintiv factors³, (1) the Petition is particularly strong in the underlying merits, and (2) Petitioner adopts the identical stipulation from *Sotera*, namely, that if the IPR is instituted, Petitioner will not pursue in the Related Litigation any ground raised or that could have been reasonably raised in an IPR for the challenged patent. Thus, under the Interim Guidance, the Board should not deny institution.

Nevertheless, the Board's decision in *Sotera Wireless, Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12 (Dec. 1, 2020) (precedential as to § II.A) and the Director's decision in *CommScope Techs. LLC v. Dali Wireless, Inc.*, IPR2022-01242, Paper 23 (Feb. 27, 2023) (precedential) instruct that a holistic view of the remaining *Fintiv* factors also weighs in favor of institution.

Factor 1 is neutral because, although a motion to stay is pending, no decision has been rendered and thus this factor is speculative at best and neither weighs for or against institution.

Under Factor 2, trial is scheduled to begin in late October, 2023. Petitioner seeks joinder to IPR2022-01419 wherein a final written decision is expected by March 9, 2024. Considering the inherent uncertainties of litigation scheduling,

³ Interim Procedure For Discretionary Denials In AIA Post Grant Proceedings With Parallel District Court Litigation, PTO Director's Memorandum (June 21, 2022).

particularly where multiple defendants are involved, and the fact that Petitioner seeks to join an IPR2022-01419 that has been instituted, this factor weighs against discretionary denial.

Under Factor 3, *Sotera* noted that infringement and invalidity contentions had been exchanged, and that “fact discovery is ongoing, expert reports are not due yet, and substantive motion practice is yet to come” and found that “although the parties and the District Court have invested some effort in the parallel proceedings to date, further effort remains to be expended in this case before trial.” *Sotera* p. 16. Likewise, here, fact discovery is ongoing, expert reports are not due yet, and substantive motion practice is a few months away.

Under Factor 4, in addition to the *Sotera* stipulation that Petitioner issued to PO, in the Related Litigation, PO is only asserting a subset of the claims that are being challenged in the present Petition. Thus, the district court will not be addressing the validity of all of the claims challenged by this Petition.

Under Factor 5, Petitioner is a defendant in the Related Litigation.

Under Factor 6, other circumstances weigh in favor of institution. Here, the merits of the Petition are particularly strong. The Board instituted IPR2022-01419 challenging the same claims of the '499 Patent under identical grounds as presented in the present Petition, and which Petitioner seeks to join.

When viewed holistically, the timing of the present Petition is reasonable, there is minimal overlap between the present IPR and the Related Litigation, and Petitioner seeks to join the already instituted IPR2022-01419 challenging the claims under identical grounds. Coupling these *Fintiv* considerations with compelling evidence of unpatentability presented in the Petition, the efficiency and integrity of the IPR process is best served by instituting review.

The Board should also not exercise discretion under *General Plastics* as the Petitioners have not been a petitioner, nor real party of interest in any previous Petitions noted below against the '499 Patent.

X. Mandatory Notices Under 37 C.F.R. §42.8

A. Real Party-in-Interest (37 C.F.R. § 42.8(b)(1))

AT&T Corp., AT&T Communications LLC AT&T Services, Inc., AT&T Mobility LLC, and AT&T Mobility II LLC are the real parties-in-interest. In addition, AT&T Inc. is identified as a real party-in-interest only to the extent that Patent Owners contend it needs to be named as such. AT&T Inc. is and always has been a holding company that is a legally and factually distinct entity from its subsidiaries. Each of AT&T Inc.'s subsidiaries, including AT&T Corp, AT&T Mobility LLC, AT&T Mobility LLC II, and AT&T Services, Inc., maintains its own independent own independent status, identity, and structure. AT&T Inc. does

not provide any of the products and services at issue in the underlying patent infringement lawsuit.

B. Related Matters (37 C.F.R. § 42.8(b)(2))

1. Judicial Matters

As of the filing date of this Petition and to the best knowledge of Petitioners, the '499 Patent is involved in the following litigations ("Related Litigations"):

Dali Wireless, Inc. v. AT&T Corp., et al., E.D. Texas (Case No. 2:22-cv-12)

Dali Wireless, Inc. v. Cellco Partnership d/b/a Verizon Wireless, et al., W.D. Texas (Case No. 6:22-cv-00104-ADA).

Dali Wireless, Inc. v. T-Mobile US, Inc., et al., E.D. Texas (Case No. 2:22-cv-414-RWS-RSP)

2. Administrative Matters:

As of the filing date of this Petition and to the best knowledge of Petitioners, the '499 Patent was subject to the following *inter partes* reviews:

John Mezzalingua Associates, LLC v. Dali Wireless, Inc. (IPR2020-01430)(institution denied)

CommScope Technologies LLC v. Dali Wireless, Inc. (IPR2022-01293)(institution granted)

Ericsson Inc., v. Dali Wireless, Inc. (IPR2022-01419)(institution granted)

3. Related Patents

See Exhibit EX-1021.

C. Lead/Back-up Counsel (37 C.F.R. § 42.8(b)(3)):

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D. Notice of Service Information (37 C.F.R. § 42.8(b)(4)):

Please direct all correspondence to lead and back-up counsel at the above addresses. Petitioners consent to electronic service at the email addresses above.

XI. CONCLUSION

For the reasons set forth above, Petitioners have established a reasonable likelihood of prevailing with respect to all Challenged Claims of the '499 Patent and requests the Board grant joinder and then cancel all claims as unpatentable.

Date: April 7, 2023

Respectfully submitted,

BY: s/Patrick Craig Muldoon/
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Washington, D.C. 20001

ATTORNEY FOR PETITIONERS

CERTIFICATION OF SERVICE ON PO

Pursuant to 37 C.F.R. §§ 42.6(e), 42.8(b)(4) and 42.105, the undersigned certifies that on April 7, 2023, a complete and entire copy of this Petition for *Inter partes* Review of U.S. Patent No. 10,334,499 and all supporting exhibits/papers were served via Federal Express, postage prepaid, to the PO by serving the correspondence address of record for the '499 Patent:

Artegis Law Group, LLP
John Carey
7710 Cherry Park Drive Suite T #104
Houston TX 77095

A courtesy copy was also sent via electronic mail to Patent Owner's counsel listed below.

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ATTORNEY FOR PETITIONERS

CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24 *et seq.*, the undersigned certifies that this document complies with the type-volume limitations. This document contains 10,884 words as calculated by the “Word Count” feature of Microsoft Word 2010, the word processing program used to create it.

Dated: April 7, 2023

By:

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