

Case No. IPR 2025-_____
Petition for *Inter Partes* Review of
U.S. Patent No. 9,413,502

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ERICSSON INC. AND NOKIA OF AMERICA CORPORATION

Petitioners,

v.

HEADWATER PARTNERS II LLC

Patent Owner.

Case No. IPR2025-_____

U.S. Patent No. 9,413,502

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 9,413,502

UNDER 35 U.S.C. §§ 311-319 AND 37 C.F.R. § 42.100 *ET SEQ.*

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2. 1[a] / 30[a]. a base station (BS) operable to communicate directly with a first data network; 28[a]. a base station (BS) operative to directly communication with a first data network; 31[a]. [a base station comprising] means for communicating directly with a first data network; 20
3. 1[b] / 30[b]. a plurality of backhaul user equipment (bUE) devices, each of the plurality of bUE devices operable to wirelessly communicate with the BS through at least a first communication technology, and the plurality of bUE devices each operable to communicate with a second data network through at least a second communication technology, wherein the second data network is different than the first data network; 28[b]. a backhaul user equipment (bUE) device, the bUE devices operable to wirelessly communicate with the BS through at least a first communication technology, and the bUE device operable to communicate with a second data network through at least a second communication technology; ...21
- 31[b]. [a base station comprising] means for wirelessly communicating with each of a plurality of backhaul user equipment (bUE) devices through at least a first communication technology, wherein the plurality of bUE devices are each operable to communicate with a second data network through at least a second communication technology; 40[a]. [a backhaul user equipment configured to] wirelessly communicate with a base station (BS); 40[b]. communicate a second data network through at least a second communication technology; wherein 40[c]. the bUE device is one of a plurality of bUE devices, wherein each of the bUE devices is also operable to communicate with second data network; 43[a]. wirelessly communicating, by at least one of a plurality of backhaul user equipment (bUE) devices, with a base station (BS) through at least a first communication technology; 43[b]. communicating, by at least one of the plurality of bUE devices, with a second data network through at least a second communication technology; 22
4. 1[c]. the BS operative to: wirelessly communicate with one or more user equipment (UE) devices, and network connect the

one or more UE devices to the second data network through one or more of the plurality of bUE devices, or directly to the first data network through a third communication technology; 28[c]. the BS operative to: communicate with the first data network over at least a third communication technology; 28[d]. [the BS operative to:] wirelessly communicate with one or more user equipment (UE) devices, and network connect the one or more UE devices to the second data network through one or more of the plurality of bUE devices, or directly to the first data network through the third communication technology; 30[c]. the BS operative to: communicate with the first data network through at least a third communication technology; 30[d]. [the BS operative to:] wirelessly communicate with one or more user equipment (UE) devices, and network connect the one or more UE devices to the first data network or the second data network through one or more of the plurality of bUE devices or the third communication technology; 31[c]. means for wirelessly communicating with one or more user equipment (UE) devices, and network connect the one or more UE devices to the second data network through one or more of the plurality of bUE devices or to the first data network through a third communication technology; 40[g]. the BS wirelessly communicates with the one or more user equipment (UE) devices, and network connects the one or more UE devices to the second data network through one or more of the plurality of bUE devices or to a first data network through a third communication technology, wherein the first data network is different than the second data network. 43[c]. wirelessly communicating, by the BS, with one or more user equipment (UE) devices, and network connecting the one or more UE devices to the a second data network through one or more of the plurality of bUE devices or to a first data network through a third communication technology, wherein the second data network is different than the first data network; 27

5. 1[d] / 30[e]. [the BS operative to:] communicate backhaul (BH) traffic through a selectable one of to the second data network through the one or more of the plurality of bUE

devices, and directly to the first data network, wherein the BH traffic comprises access traffic from the one or more UE devices; 28[e]. [the BS operative to:] communicate backhaul (BH) traffic through a selectable one of to the second data network through the one or more of the plurality of bUE devices, and directly to the first data network, wherein the BH traffic comprises access traffic associated with the one or more UE devices; 31[d]. a controller operative to select one or more of the plurality of bUE devices for backhaul (BH) traffic to the second data network or the BS for BH traffic directly to the first data network, wherein the BH traffic comprises access traffic associated with the one or more UE devices; 40[d]. the bUE further operative to: be selected from the plurality of bUE devices for backhaul (BH) traffic to the second data network, wherein the BH traffic comprises access traffic associated with one or more UE devices; 43[d]. selecting, one or more of the plurality of bUE devices for backhaul (BH) traffic to the second data network or the BS for BH traffic to the first data network, wherein the BH traffic comprises access traffic associated with the one or more UE devices;.....32

6. 1[e] / 30[f]. [the BS operative to:] aid in selecting a transmission power level of at least one of the plurality of bUE devices, and at least one of the one or more UE devices; and 28[f]. [the BS operative to:] aid in selecting a transmission power level of at least one of the bUE devices, and at least one of the one or more UE devices; and 31[e]. the controller operative to aid in selecting a transmission power level of at least one of the plurality of bUE devices, and at least one of the one or more UE devices; and 40[e]. [the bUE further operative to:] receive from the BS a signal for aiding in selecting a transmission power level; 43[e]. aiding, by the BS, in selecting a transmission power level of at least one of the plurality of bUE devices, or at least one of the one or more UE devices; and.....36
7. 1[f] / 28[g] / 30[g]. [the BS operative to:] transmit resource block (RB) scheduling information for the BH traffic of at

- least one of the plurality of bUE devices and the access traffic of at least one of the one or more UE devices. 37
- 31[f]. means for transmitting resource block (RB) scheduling information for the BH traffic of at least one of the plurality of bUE devices and the access traffic of at least one of the one or more UE devices. 40[f]. [the bUE further operative to:] receive from the BS transmit resource block (RB) scheduling information for the BH traffic; wherein 43[f]. transmitting, by the BS, resource block (RB) scheduling information for the BH traffic of at least one of the plurality of bUE devices and the access traffic of at least one of the one or more UE devices. 37
8. 2. The system of claim 1, wherein the plurality of bUE devices wirelessly communicate with the BS over one or more of wireless communication technologies, wherein the one or more wireless communication technologies comprise at least one of WiFi, WiMax, 3, 4G, LTE, Orthogonal frequency division multiple access (OFDMA), Wideband code division multiple access (WCDMA). 40
9. 3. The system of claim 1, wherein the one or more UE devices wirelessly communicate with the BS and the plurality of bUE devices wirelessly communicate with the BS utilizing a same wireless communication technology. 4. The system of claim 3, wherein the one or more UE devices wirelessly communicate with the BS, and the plurality of bUE devices wirelessly communicate with the BS utilizing the same wireless communication technology and a shared one or more frequency channels. 41
10. 5. The system of claim 1, wherein at least one of the plurality bUE devices is at least one of associated with or a part of a small cell BS, wherein the small cell BS comprises client side modem functionality. 42
11. 12. The system of claim 1, wherein the access traffic associated with the one or more UE devices is classified into two or more data flows based on a data flow parameter and the

	selection of the one or more plurality of bUE devices for the BH traffic is used in part on the data flow parameter.	43
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15.	The system of claim 14, wherein the partition comprises one or more of a unit of time, a unit of frequency, a code.	45
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15.	17. The system of claim 1, further comprising classifying and prioritizing the BH traffic based on the access traffic, and wherein the RB scheduling information for the BH traffic is based on the BH traffic prioritization. 38. The BS of claim 31, wherein the controller of the BS is further operative to classify and prioritize the BH traffic based on the access traffic, and wherein the RB scheduling information for the BH traffic is based on the BH traffic prioritization.	48
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2. 6. The system of claim 1, wherein the BS is further operative to obtain one or more first parameters associated with the wireless communication between one or more of the plurality of bUE devices and the BS. 33. The BS of claim 31, wherein the controller of the BS is further operative to obtain one or more first parameters associated with the wireless communication between one or more of the plurality of bUE devices and the BS. 44. The method of claim 43, further comprising obtaining one or more first parameters associated with the wireless communication between one or more of the plurality of bUE devices and the BS.....	51
3. 7. The system of claim 6, wherein a selection of the one or more of the plurality of bUE devices for the BH traffic is based on the first parameters. 34. The BS of claim 33, wherein the selection of the one or more of the plurality of bUE devices for the BH traffic is based on the first parameters. 45. The method of claim 44, wherein the selection of the one or more of the plurality of bUE devices for the BH traffic is based on the first parameters.	52
4. 8. The system of claim 6, wherein the one or more first parameters comprises one or more of a link quality, link quality statistics, link quality variation, path loss, fading, shadowing, Signal to Noise Ratio (SNR), Signal to Interference and Noise Ratio(SINR), Packet Error Rate (PER), received interference, interference generated to other devices, Channel Quality Indicator (CQI), Channel State Information (CSI), Modulation and Coding Scheme (MCS), Precoding Matrix Indicator (PMI), rank indicator (RI), single user or multiuser Multiple Input Multiple Output (SU-MIMO or MU-MIMO) information.	54
5. 9. The system of claim 1, wherein the BS is further operative to obtain one or more second parameters associated with the second data network through at least the second communication technology. 35. The BS of claim 31, wherein the controller of the BS s further operative to obtain one or	

more second parameters associated with the second data network through at least the second communication technology.	55
6. 10. The system of claim 9, wherein a selection of the one or more of the plurality of bUE devices for the BH traffic is based on the one or more second parameters. 36. The BS of claim 35, wherein the selection of the one or more of the plurality of bUE devices for the BH traffic is based on the one or more second parameters.	56
7. 11. The system of claim 9, wherein the one or more second parameters comprise one or more of a link quality, bandwidth, throughput, cost, latency, jitter, QoS, PER.	57
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46. The method of claim 43, wherein a bUE selection of one or more of the plurality of bUE devices is based on one or more first parameters of the wireless communication with the BS or one or more second parameters of the second communication technology.	58
9. 29. The system of claim 28, wherein the BS is further operative to obtain one or more third parameters associated with the first data network through at least the third communication technology.	58
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Case No. IPR 2025-_____
Petition for *Inter Partes* Review of
U.S. Patent No. 9,413,502

Exhibit No.	Document
1001	U.S. Patent No. 9,413,502 (“the ’502 Patent”)
1002	Prosecution History of U.S. Application No. 14/053,561, filed October 14, 2013, which issued as the ’502 Patent
1003	U.S. Provisional Patent Application No. 61/714,135, filed October 15, 2012, to which the ’502 Patent may claim priority
1004	U.S. Patent No. 9,544,827 (“Ishii”)
1005	International Application No. WO2013/037903A2 (“Sfar”)
1006	Declaration of Dr. Stan McClellan, Ph.D. (“McClellan Decl.”)
1007	Curriculum Vitae of Dr. Stan McClellan, Ph.D.

I. INTRODUCTION

Petitioners Ericsson Inc. (“Ericsson”) and Nokia of America Corporation (“Nokia”) (collectively, “Petitioners”) respectfully request *inter partes* review of Claims 1-17, 19, 26, 28-41 and 43-46 (the “Challenged Claims”) of U.S. Patent No. 9,413,502 (“the ’502 Patent,” Ex. 1001) in accordance with 35 U.S.C. §§ 311-319 and 37 C.F.R. § 42.100 *et seq.* The ’502 Patent claims connecting smartphones (“user equipment” or “UE,”) to data networks, wherein base stations (“BS”) route backhaul (“BH”) traffic through a selectable one of a plurality of backhaul user equipment (“bUE,” *e.g.*, a femtocell, picocell, relay node, etc.). When the ’502 Patent was filed in 2012, these practices were already well-known.

This Petition primarily relies on U.S. Patent No. 9,544,827 (“Ishii”), filed on September 12, 2012, which was not before the Examiner. Ishii predates the ’502 Patent, identifies the same problem as the ’502 Patent (creating efficient wireless networks) and uses the same solution (backhaul user equipment devices) as the ’502 Patent.

This Petition, associated exhibits, and the Declaration of Stan McClellan, Ph.D. (submitted herewith) establish the invalidity of the challenged claims under 35 U.S.C. § 103(a) (pre-AIA) and 35 U.S.C. § 103 (AIA).

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

Petitioners certify pursuant to 37 C.F.R. § 42.104(a) that the '502 Patent is available for *inter partes* review, and that Petitioners are not barred or estopped from requesting *inter partes* review based on the grounds identified herein.

III. IDENTIFICATION OF CHALLENGE (37 C.F.R. § 42.104(b)) AND RELIEF REQUESTED (37 C.F.R. § 42.22(a))

A. Identification of Prior Art

Ex. 1004 – Ishii was filed on September 12, 2012 as a PCT filing (PCT/US2012/054856) that was published in English on March 21, 2013 (WO2013/040028), and claims priority to U.S. Provisional Patent Application No. 61/533,382, which was filed on September 12, 2011, and U.S. Provisional Application No. 61/534,709, which was filed on September 14, 2011. The critical date of the '502 Patent is October 15, 2012, making Ishii prior art to the '502 Patent under 35 U.S.C. §§ 102(e) and 103(a) (pre-AIA) or 35 U.S.C. §§ 102(a)(1), (a)(2) and 103 (AIA).

Ex. 1005 – Sfar was filed on September 13, 2012 as a PCT filing (PCT/EP2012/067975) that was published in English on March 21, 2013, and claims priority from European Patent Application No. 11306173.3, which was filed on September 16, 2011, and US Provisional Patent Application No. 61/552,034, which was filed on October 27, 2011. The critical date of the '502 Patent is October 15,

2012, making Sfar prior art to the '502 Patent under 35 U.S.C. §§ 102(e) and 103(a) (pre-AIA) or 35 U.S.C. §§ 102(a)(1), (a)(2) and 103 (AIA).

Ishii and Sfar were not cited during the prosecution of the '502 Patent, and are not cumulative of any prior art that was considered.

B. Statutory Grounds Upon Which the Challenge is Based

#	Challenged Claims	35 U.S.C. §	Prior Art
1	1-5, 12-17, 26, 28, 30-32, 37, 38, 40 and 43	103	Ishii and the knowledge of a POSITA
2	6-11, 19, 29, 33-36, 39, 41 and 44-46	103	Ishii, Sfar, and the knowledge of a POSITA

C. Requested Relief

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 '502 Patent.

IV. OVERVIEW OF THE '502 PATENT

The '502 Patent is entitled "Backhaul assisted by user equipment." The '502 Patent issued on August 9, 2016 from U.S. Patent Appl. No. 14/053,561, filed on

October 14, 2013. The '502 Patent claims priority to U.S. Provisional Appl. No. 61/714,135, filed on October 15, 2012.¹

A. Specification

The '502 Patent specification relates to a system, methods, and apparatuses comprising a BS operable to connect UE devices to data networks through multiple backhaul pathways. (Ex. 1001, Abstract.) The backhaul portion of a communication network is the link between a core network and the access points of the communication network (*e.g.*, a BS). (Ex. 1006, ¶ 27.) Figure 3 below shows an example embodiment of the alleged invention of the '502 Patent:

¹ Petitioners do not concede that the challenged claims are entitled to the benefit of the provisional application, however, all art identified by Petitioners antedates October 15, 2012.

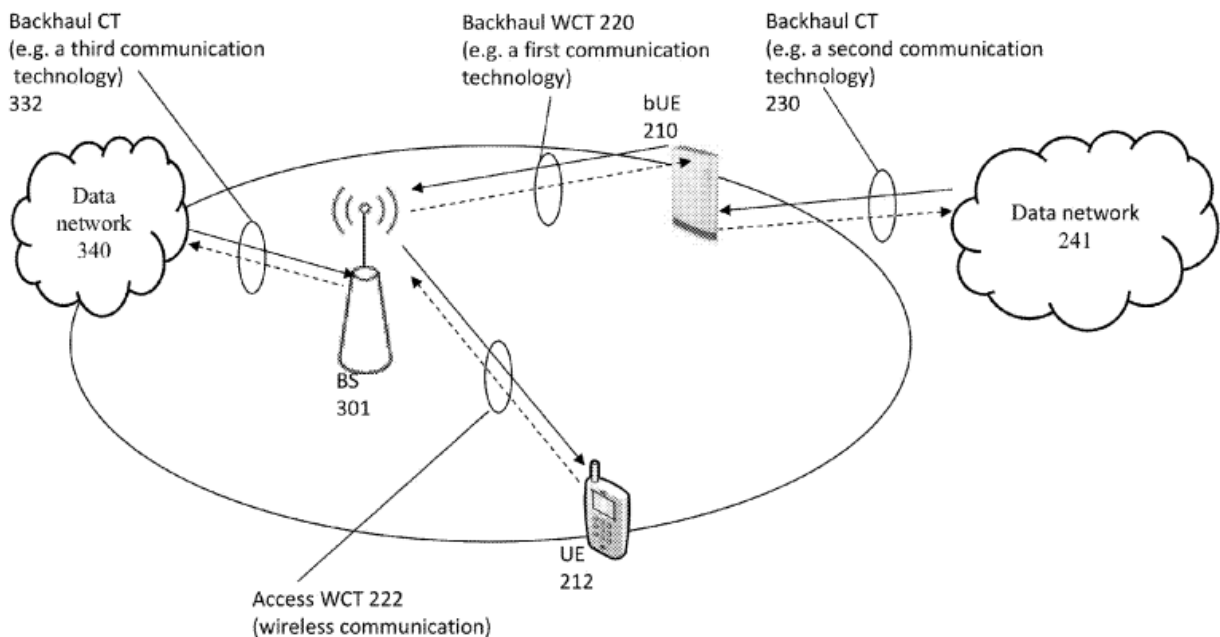


Figure 3

(Ex. 1001, Fig. 3.) As shown in Figure 3, The BS (301) communicates with a UE (212) through a wireless communication technology. The BS (301) also has (i) a first backhaul pathway (332) directly to a first data network (340), and (ii) a second backhaul pathway (220, 230) to a second data network (241) via backhaul user equipment device (210) (Ex. 1001, Fig. 3.) While not pictured, the base station can have multiple backhaul pathways via bUE devices. (Ex. 1001, 10:59-62.) Each leg of these backhaul pathways (i.e., connection from BS to first data network, connection from BS to bUE, and connection from bUE to second data network) can employ a different communication technology. (Ex. 1001, cl. 1.)

The UE communicates access traffic to the base station. In turn, the base station selectively chooses one of those backhaul pathways to communicate the backhaul traffic associated with that access traffic. (Ex. 1001, 10:36-42.) In some embodiments, the BS selects the appropriate backhaul pathway based on a characteristic of the access traffic. (Ex. 1001, 9:18-23.) In other embodiments, the BS selects the appropriate backhaul pathway based on one or more characteristics of the backhaul pathways. (Ex. 1001, 12:34-39.) Finally, the base station also helps coordinate (i) the transmission power level of the UE and bUE devices, and (ii) radio resource sharing between the various network entities. (Ex. 1001, cl. 1.)

B. Prosecution History

The '502 Patent prosecution history is submitted as Ex. 1002. The application that issued as the '502 Patent, U.S. Application No. 14/053,561 ("'561 Application"), was filed on October 14, 2013. It claims priority to U.S. Provisional Application No. 61/714,135, filed on October 15, 2012, which is submitted as Ex. 1003. As filed, Claim 1 of the '561 Application recited:

A system comprising:

a base station (BS);

a plurality of backhaul user equipment (bUE) devices, each of the plurality of bUE devices operable to wirelessly communicate with the BS through at least a first communication technology, and the plurality of bUE devices each operable to communicate

with at least one data network through at least a second communication technology;

the BS operative to:

wirelessly communicate with one or more user equipment (UE) devices, and network connect the one or more UE devices to the at least one data network through one or more of the plurality of bUE devices;

select one or more of the plurality of bUE devices for backhaul (BH) traffic, wherein the BH traffic comprises access traffic associated with the one or more UE devices;

aid in selecting a transmission power level of at least one of the plurality of bUE devices, or at least one of the one or more UE devices; and

transmit resource block (RB) scheduling information for the BH traffic of at least one of the plurality of bUE devices and the access traffic of at least one of the one or more UE devices.

(Ex. 1002, 73.)

On May 14, 2015, the Examiner issued an Office Action rejecting Claims 1-20 and 22-46 based on obviousness over U.S. Publication No. 2013/0242055 to Bao in view of secondary references, and indicating Claim 21 as being allowable if rewritten in independent form. (Ex. 1002, 178-198.) In an amendment dated July 31, 2015, the applicant presented arguments in an attempt to overcome the prior art rejections. (Ex. 1002, 234.) The applicant argued that:

1. The cited references do not teach or suggest aiding in selecting the transmission power level of at least one of the one or more bUE devices, or at least one of the one or more UE devices. . . .

2. The cited references do not teach or suggest the BS operative to transmit resource block (RB) scheduling information for the BH traffic transmission of at least one of the one or more bUE devices **and** the access traffic of at least one of the one or more UE devices.

(Ex. 1002, 234) (emphasis in original).

On November 4, 2015, the Examiner issued a Final Office Action maintaining the rejections against Claims 1-20 and 22-46 based on obviousness over Bao in view of the secondary references. (Ex. 1002, 257-261.) In response, the applicant amended Claims 1, 7, 9, 10, 19, 27-31, 35, 40 and 41-43 in an amendment dated January 29, 2016. (Ex. 1002, 275-286.) Claim 1 of the '561 Application was amended as follows:

A system comprising:

a base station (BS) operable to communicate directly with a first data network;

a plurality of backhaul user equipment (bUE) devices, each of the plurality of bUE devices operable to wirelessly communicate with the BS through at least a first communication technology, and the plurality of bUE devices each operable to communicate with ~~at least one~~ a second data network through at least a second communication technology, wherein the second data network is different than the first data network;

the BS operative to:

wirelessly communicate with one or more user equipment (UE) devices, and network connect the one or more UE devices to the ~~at least one~~ second data network through one or more of the plurality of bUE devices, or directly to the first data network through a third communication technology;

~~select~~ communicate one or more of the plurality of bUE devices for backhaul (BH) traffic through a selectable one of to the second data network through the one or more of the plurality of bUE devices, and directly to the first data network, wherein the BH traffic comprises access traffic associated with the one or more UE devices;

aid in selecting a transmission power level of at least one of the plurality of bUE devices, ~~or~~ and at least one of the one or more UE devices; and

transmit resource block (RB) scheduling information for the BH traffic of at least one of the plurality of bUE devices and the access traffic of at least one of the one or more UE devices.

(Ex. 1002, 275.) Based on this amendment, the applicant argued in part:

None of the cited reference teach or suggest a BS (wherein the BS is operable to wirelessly communicate with one or more user equipment (UE) devices), that is connectable to two different data networks. That is, to a first data network through a third communication technology or to a second data network through one or more bUE devices.

(Ex. 1002, 289.)

A Notice of Allowance issued on April 7, 2016. (Ex. 1002, 307.)

The prior art references relied upon for the grounds of unpatentability addressed in this Petition were not cited during the prosecution of the '561

Application. As such, it was material error to not have addressed Claims 1-17, 19, 26, 28-41 and 43-46 of the '502 Patent at least in view of the technical disclosures and teachings of Ishii and Sfar, which render Claims 1-17, 19, 26, 28-41 and 43-46 invalid.

C. Priority Date

The '502 Patent issued from a “transition application” because its application straddled the dividing line between pre-AIA and AIA regimes: March 16, 2013. (*See* Manual of Patent Examining Procedure (“MPEP”) § 2159.02; Ex. 1002, 1-5; Ex. 1003.) Specifically, the '502 Patent’s provisional application was filed before that date (October 15, 2012), while its non-provisional application was filed after that date (October 14, 2013). (Ex. 1002, 1-5; Ex. 1003.) As a result, Petitioners detail, in the alternative, how all art referenced in this Petition satisfies the prior art requirements under either pre-AIA or AIA regimes. (*See* Section III.A.)

D. Challenged Claims

Independent Claim 1 is substantially similar to independent Claims 28, 30, 31, 40 and 43² and describes the use of a BS and bUE to route backhaul traffic from UEs to two different data networks:

1[pre] A system comprising:

1[a] a base station (BS) operable to communicate directly with a first data network;

1[b] a plurality of backhaul user equipment (bUE) devices, each of the plurality of bUE devices operable to wirelessly communicate with the BS through at least a first communication technology, and the plurality of bUE devices each operable to communicate with a second data network through at least a second communication technology, wherein the second data network is different than the first data network;

1[c] the BS operative to: wirelessly communicate with one or more user equipment (UE) devices, and network connect the one or more UE devices to the second data network through one or more of the plurality of bUE devices, or directly to the first data network through a third communication technology;

1[d] [the BS operative to:] communicate backhaul (BH) traffic through a selectable one of to the second data network through the one or more

² Claims 28 and 30 cover nearly identical systems to that of Claim 1. Claims 31 and 40 differ from Claim 1 in that they are written as apparatus claims for the BS and bUEs used in the system of Claim 1. Claim 43 differs from Claim 1 in that it is written as a method claim.

of the plurality of bUE devices, and directly to the first data network, wherein the BH traffic comprises access traffic from the one or more UE devices;

1[e] [the BS operative to:] aid in selecting a transmission power level of at least one of the plurality of bUE devices, and at least one of the one or more UE devices; and;

1[f] [the BS operative to:] transmit resource block (RB) scheduling information for the BH traffic of at least one of the plurality of bUE devices and the access traffic of at least one of the one or more UE devices.

The dependent claims add various limitations to the independent claims. For example:

6. The system of claim 1, wherein the BS is further operative to obtain one or more first parameters associated with the wireless communication between one or more of the plurality of bUE devices and the BS.

7. The system of claim 6, wherein a selection of the one or more of the plurality of bUE devices for the BH traffic is based on the first parameters.

9. The system of claim 1, wherein the BS is further operative to obtain one or more second parameters associated with the second data network through at least the second communication technology.

10. The system of claim 9, wherein a selection of the one or more of the plurality of bUE devices for the BH traffic is based on the one or more second parameters.

12. The system of claim 1, wherein the access traffic associated with the one or more UE devices is classified into two or more data flows based on a data flow parameter and the selection of the one or more

plurality of bUE devices for the BH traffic is based in part on the data flow parameter.

29. The system of claim 28, wherein the BS is further operative to obtain one or more third parameters associated with the first data network through at least the third communication technology.

As explained in detail below, Claims 1-17, 19, 26, 28-41 and 43-46 of the '502 Patent would have been obvious in view of the prior art.

V. LEVEL OF ORDINARY SKILL IN THE ART

For purposes of this *inter partes* review, Petitioners assert that a hypothetical person having ordinary skill in the art ("POSITA") in the context of the '502 Patent would have been someone with at least (1) a bachelor's degree in electrical engineering, computer engineering/science, or a related scientific field, and (2) either (a) a master's degree in electrical engineering, computer engineering/science, or a related field, or (b) two or more years of work or research experience in wireless networking and/or computing. (Ex. 1006, ¶ 21.)

VI. CLAIM CONSTRUCTION (37 C.F.R. § 42.104(b)(3))

In an *inter partes* review, claims are "construed using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. § 282(b)." (37 C.F.R. § 42.100(b).) Claims must be given their ordinary and customary meaning as understood by one of ordinary skill in the art at the time of the invention in light of the specification and the prosecution history pertaining

to the patent. (*Id.*; see also *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312-1313 (Fed. Cir. 2015) (*en banc*); 83 Fed. Reg. 51,340.)

For the purposes of this Petition, Petitioners propose a construction for the term “client side modem functionality” below to aid the Board’s review, and contend that all other claim terms be given their plain and ordinary meaning as would be understood in the context of the ’502 Patent’s disclosure.

A. “Client side modem functionality” (Claim 5)

The specification of the ’502 Patent explains that “client side modem functionality” means at least “a subset of a UE device or bUE device functionality.” (Ex. 1001, 6:46-50 (“For at least one embodiment a small cell BS (for example one or more of a microcell, a picocell, a relay node, femtocell) includes client side modem functionality (for example a subset of a UE device or bUE device functionality).”)) A POSITA at the time of the ’502 patent’s filing would have understood “client side modem functionality” to mean “a subset of a UE device or bUE device functionality” because the patentee has explicitly defined it that way. (Ex. 1006, ¶ 36.); MPEP 2173.05(a) (“When the specification states the meaning that a term in the claim is intended to have, the claim is examined using that meaning, in order to achieve a complete exploration of the applicant’s invention and its relation to the prior art.”))

VII. DESCRIPTION OF THE PRIOR ART

A. Ishii

Ishii relates to a wireless network where a BS can connect a UE device to a network via multiple backhaul pathways. (Ex. 1004, Abstract.) Figure 5 shows an example embodiment:

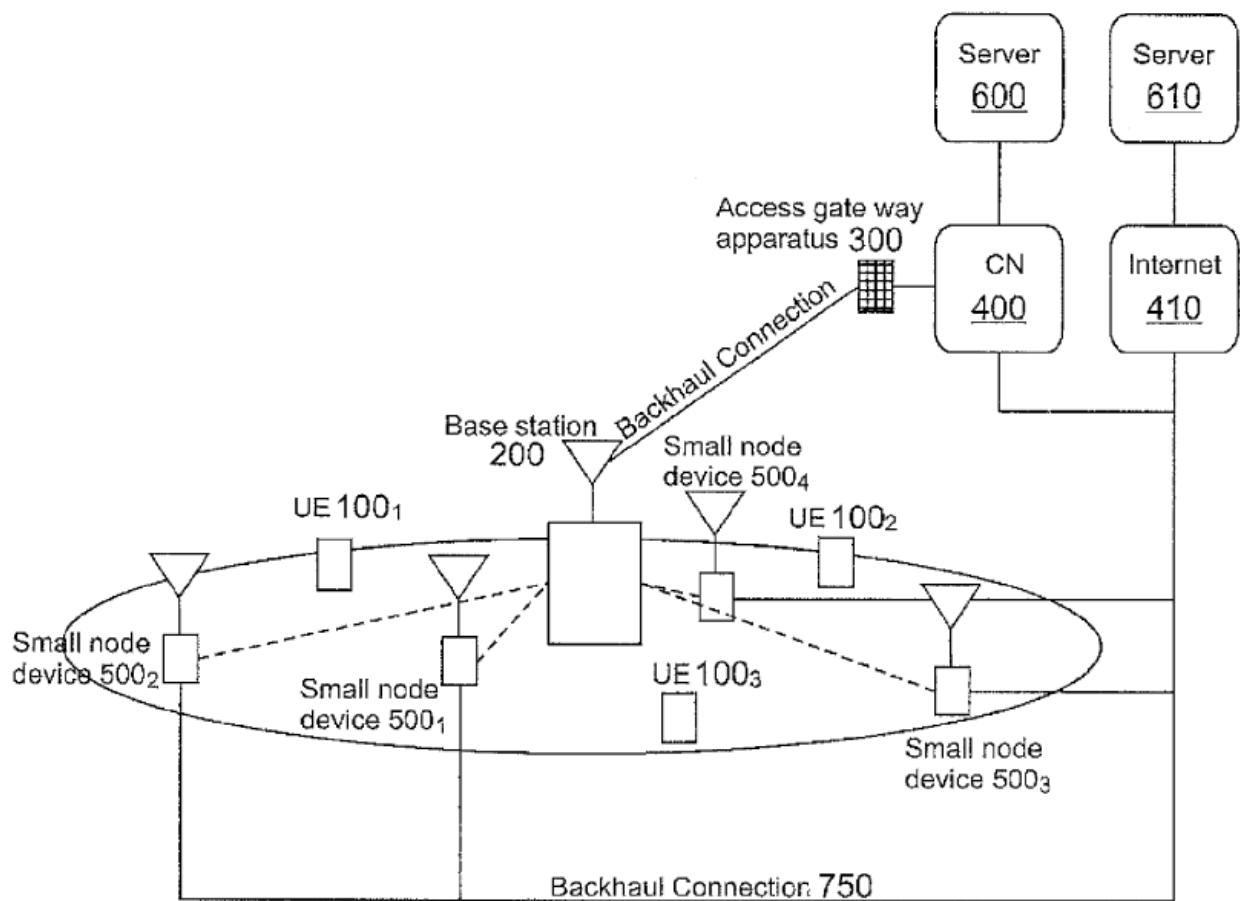


FIG. 5

(Ex. 1001, Fig. 5.) As shown in Figure 5, the BS (200) is in communication with UE devices (100₁-100₃). (Ex. 1004, Fig. 5, 6:36-37, 10:46-48.) The BS (200) is also in

communication with a number of small node devices (500₁-500₄). (Ex. 1004, Fig. 5, 10:46-50.) The BS (200) is connected to a core network (400) via a backhaul connection, while the small node devices (500₁-500₄) are connected to the core network (400) and a second network (the Internet) (410) via a different backhaul connection (750). (Ex. 1004, Fig. 5, 6:47-49, 10:46-53.)

Figure 3 of Ishii further explains how data flows through Ishii's network architecture:

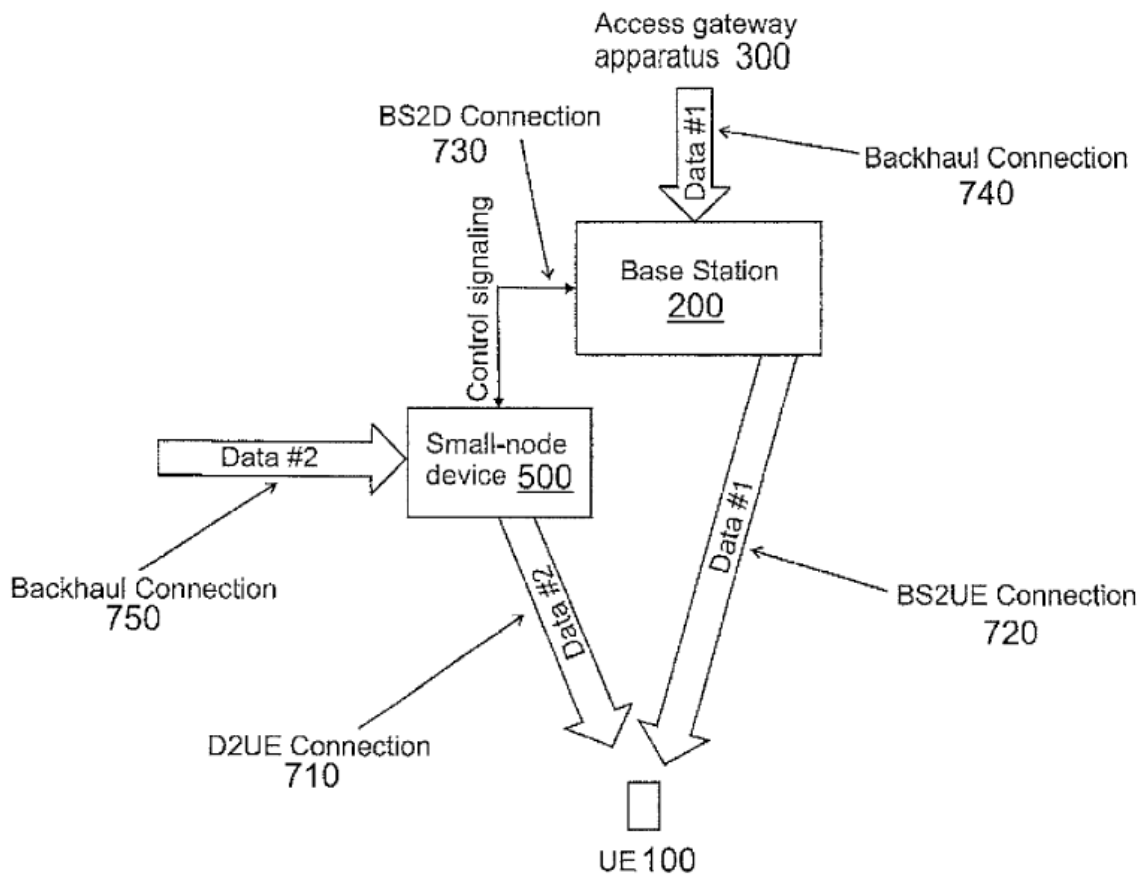


FIG. 3

(Ex. 1004, Fig. 3.)³ When a UE attempts to communicate with a data network, the BS selects the appropriate backhaul path for the UE (either via (i) BS2UE Connection 720 and Backhaul Connection 740, or (ii) D2UE Connection 710 and Backhaul Connection 750). (Ex. 1004, 10:1-22.) The BS selects the appropriate backhaul path by considering characteristics of the access traffic and the connection between the UE and the small-node device or BS. (Ex. 1004, 10:5-8, 10:27-37.) The BS then sends control signaling to the UE (100) via BS2UE Connection (720) and to the small-node device (500) via BS2D Connection (730), and the UE communicates with a data network in accordance with the BS's instructions. (Ex. 1004, 10:22-27.) As discussed above, Backhaul Connection 750 may be to a different data network (the Internet) than Backhaul Connection 740 (a core network). (Ex. 1004, Fig. 5, 6:47-49, 10:46-53.) Just as in the '502 Patent, the base station also helps coordinate (i) the transmission power level of the UE and bUE devices, and (ii) radio resource sharing between the various network entities. (Ex. 1004, 14:52-15:21, 12:39-13:24.)

³ While Figure 3 shows data flowing in the downlink direction, Ishii explains that data may also flow in the uplink direction. (Ex. 1004, 10:1-22)

B. Sfar

Sfar describes a method of communication in a cellular network where a base station is able to select an alternative backhaul path if its primary backhaul path cannot satisfy a request from a UE. Figure 1 shows the general network architecture of Sfar:

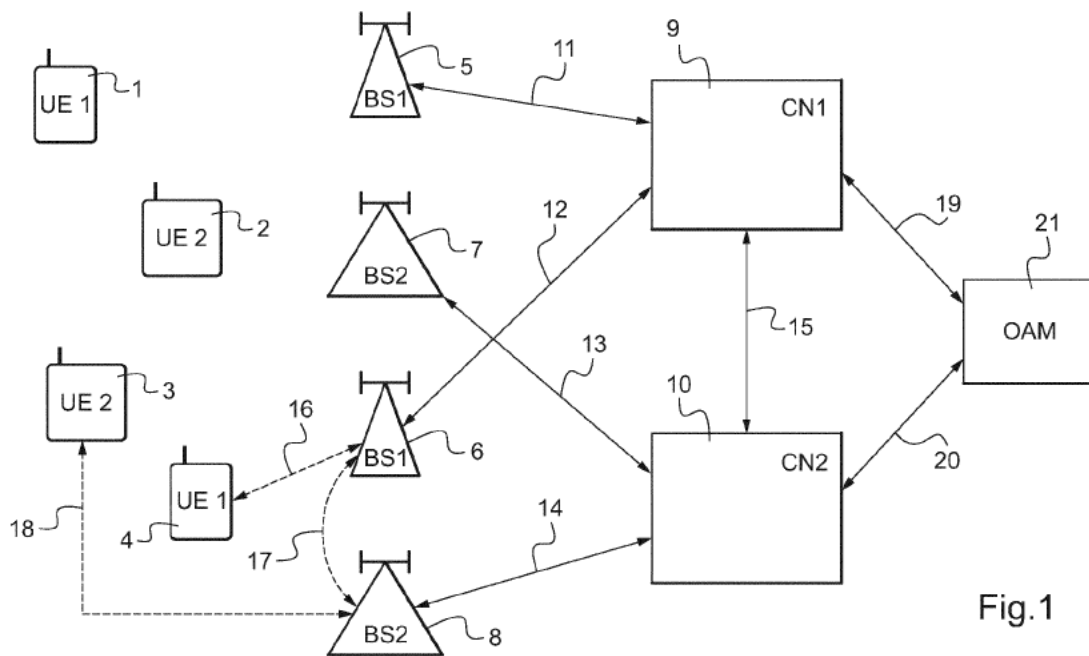


Fig.1

(Ex. 1005, Fig. 1.) There exists a first BS (6) connected to a first core network (9) and a second BS (8) connected to a second core network (10). When a UE (4) sends a request to the first base station to communicate with the first core network, the first base station generally communicates the corresponding backhaul traffic via the backhaul path with the first core network (12). However, if that backhaul path is unable to satisfy the request, then the first base station will “find base station 8 of

second network as available and as providing sufficient quality of service for its backhaul to satisfy request of mobile user equipment 4 of first network” via connection 17. (Ex. 1005, 7:11-14.)

VIII. GROUNDS OF UNPATENTABILITY

As evidenced by the ’502 Patent and the references cited below, a POSITA would understand that it was possible to provide multiple backhaul pathways such that a base station could select the appropriate backhaul option. As discussed below, Ishii and Sfar arrived at the same solution claimed by the ’502 Patent prior to the priority date of the ’502 Patent. Thus, there is a reasonable likelihood that Petitioners will show that Claims 1-17, 19, 26, 28-41 and 43-46 of the ’502 Patent are not patentable.

A. Ground 1: Claims 1-5, 12-17, 26, 28, 30-32, 37, 38, 40 and 43 Are Rendered Obvious by Ishii Under 35 U.S.C. § 103

As explained in this section, all of the limitations of Claims 1-5, 12-17, 26, 28, 30-32, 37, 38, 40 and 43 are taught, suggested, or rendered obvious by Ishii in view of the knowledge of a POSITA under 35 U.S.C. § 103.

- 1. 1[pre] / 28[pre] / 30[pre]. A system comprising:
31[pre]. A base station, comprising:**

40[pre]. A backhaul user equipment (bUE) device the bUE device operative to:

43[pre]. A method of providing backhaul, comprising:

To the extent the claims' preambles are limiting, Ishii discloses these limitations. As discussed in detail below and in Section VII.A, Ishii discloses systems and methods for offloading backhaul traffic through a backhaul user equipment device. (See, *e.g.*, Ex. 1004, Abstract, 2:42-3:42, cls. 1-23.) These systems and methods include a base station. (See, *e.g.*, Ex. 1004, 2:51-63.) Furthermore, as discussed in more detail below, the systems and methods disclosed in Ishii make use of “advanced user equipment” and “small node devices,” both of which are bUEs. (See, *e.g.*, Ex. 1004, 5:3-8:67; Ex. 1006, ¶ 47.)

2. **1[a] / 30[a]. a base station (BS) operable to communicate directly with a first data network;**

28[a]. a base station (BS) operative to directly communication with a first data network;

31[a]. [a base station comprising] means for communicating directly with a first data network;

Ishii discloses a system and methods comprising a base station operable to communicate directly with a first data network⁴ because it discloses a base station that connects to a higher layer station, which is part of the core network. (Ex. 1004, 6:34-53 (“Base station 200 is connected to a higher layer station, for example, an access gateway apparatus 300. In turn, access gateway 300 is connected to a core network (CN) 400.”), 9:17-22, Fig. 1a, Fig. 1b; Ex. 1006, ¶ 48.) This core network is a first data network. (Ex. 1006, ¶ 48.)

3. **1[b] / 30[b]. a plurality of backhaul user equipment (bUE) devices, each of the plurality of bUE devices operable to wirelessly communicate with the BS through at least a first communication technology, and the plurality of bUE devices each operable to communicate with a second data**

⁴ Claim 31 requires a base station comprising “means for communicating directly with a first data network.” The ’502 Patent explains that these means may be any “modules, circuits, or other means.” (Ex. 1001, 48:25-27.) Ishii explains that the base station comprises a “backhaul communication section” which communicates with the core network. (Ex. 1004, 21:22-27.) A POSITA would understand from Ishii’s disclosure of a backhaul communication section corresponds to the means of the ’502 Patent. (Ex. 1006, ¶ 50.)

network through at least a second communication technology, wherein the second data network is different than the first data network;

28[b]. a backhaul user equipment (bUE) device, the bUE devices operable to wirelessly communicate with the BS through at least a first communication technology, and the bUE device operable to communicate with a second data network through at least a second communication technology;

31[b]. [a base station comprising] means for wirelessly communicating with each of a plurality of backhaul user equipment (bUE) devices through at least a first communication technology, wherein the plurality of bUE devices are each operable to communicate with a second data network through at least a second communication technology;

40[a]. [a backhaul user equipment configured to] wirelessly communicate with a base station (BS);

40[b]. communicate a second data network through at least a second communication technology; wherein

40[c]. the bUE device is one of a plurality of bUE devices, wherein each of the bUE devices is also operable to communicate with second data network;

43[a]. wirelessly communicating, by at least one of a plurality of backhaul user equipment (bUE) devices, with a base station (BS) through at least a first communication technology;

43[b]. communicating, by at least one of the plurality of bUE devices, with a second data network through at least a second communication technology;

Ishii discloses a plurality of backhaul user equipment devices operable to wirelessly communicate with (1) the base station through at least a first

communication technology, and (2) a second data network through at least a second communication technology, wherein the second data network is different than the first data network.

First, Ishii discloses “advanced user equipment” (“UE-A”) and “small-node devices.” (Ex. 1004, 3:32-35 (“the first architecture uses a novel network device denoted as an advanced user equipment (UE-A).”), 6:66-7:6 (“A second architecture is shown in FIG. 1b. In an analogous fashion to the UE-A of the first architecture, the second architecture uses a cellular network device that enables a user to offload traffic from a macrocell base station without the prior art drawbacks discussed earlier.”).)⁵ As discussed below, Ishii explains that these UE-A and small node devices function as backhaul user equipment devices. (Ex. 1006, ¶ 53.)

With respect to the UE-A, Ishii explains that UE-A “shares a number of features in common with conventional user equipment (UE). . . . [but] with respect to a UE, a UE-A may be a network-side device analogous to a base station or other

⁵ The UE-A and small-node devices described in Ishii function in materially the same way. (Ex. 1004, 30:39-43 (“Thus, as used herein, a “small-node device” is synonymous with an “advanced user equipment” unless the BS2D link is a modified X2 interface.”); Ex. 1006, ¶ 53.)

network-side node. . . . In contrast to a conventional UE, the UE-A of the first architecture allows offloading of data traffic that would otherwise have to be carried by the link between the macrocell base station and the UE.” (Ex. 1004, 5:11-23.) Ishii further explains that “[t]he UE-A has a backhaul link to the core network and/or the Internet to accommodate the offloaded data.” (Ex. 1004, 5:23-25.) With respect to small-node devices, Ishii explains that “[i]n an analogous fashion to the UE-A of the first architecture, the second architecture uses a cellular network device that enables a user to offload traffic from a macrocell base station The cellular network devices of the second architecture opportunistically offload traffic from the macro base stations and are denoted as small-node devices hereinafter.” (Ex. 1004, 6:66-7:6.) Like the UE-A, Ishii explains that “[t]o perform this offloading of data traffic, the small-node devices have a backhaul link, which is connected to the Internet or the core network so as to communicate with a server in the Internet or the core network.” (Ex. 1004, 7:49-52.)

As shown in Figures 1a and 1b, the system disclosed in Ishii, whether employing UE-A (Fig. 1a) or small-node devices (Fig. 1b), comprises not just one but a plurality of bUEs (500₁ through 500₃):

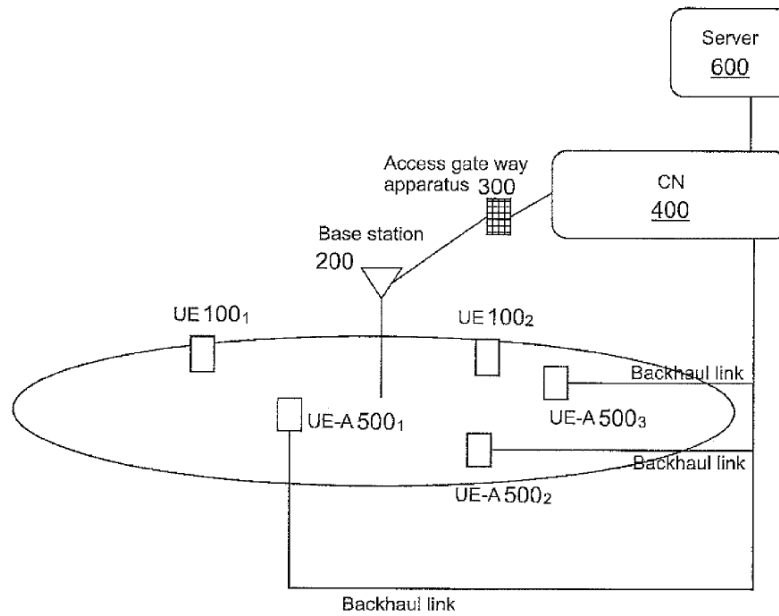


FIG. 1a

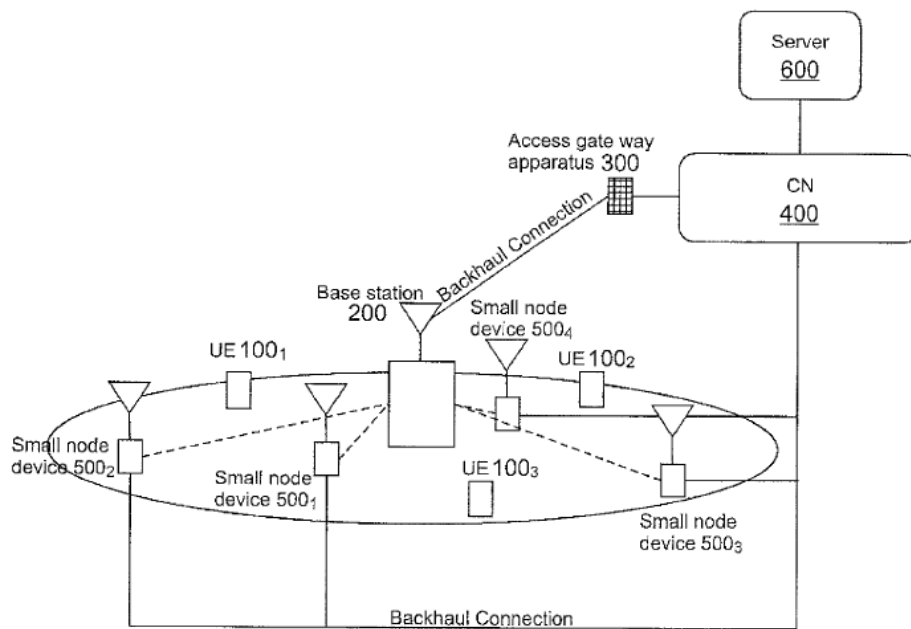


FIG. 1b

(Ex. 1004, Fig. 1a, Fig. 1b, 9:3-5.)

Second, Ishii discloses that its plurality of bUE devices wirelessly communicate with the base station through a first communication technology. (Ex. 1004, 9:35-39 (“Small-node devices 500 communicate with base station 200 using a base-station-to-small-node-device (BS2D) link. For example, the BS2D link may comprise a wired X2 interface link. Alternatively, **the BS2D link may be a wired or wireless link** that is different from an X2 link.”); Ex. 1006, ¶ 57.)

Finally, Ishii discloses that the UE-A or small node devices may connect to the Internet. (Ex. 1004, 5:23-25 (“The UE-A has a backhaul link to the core network and/or the Internet to accommodate the offloaded data.”), 7:49-52 (“To perform this offloading of data traffic, the small-node devices have a backhaul link, which is connected to the Internet or the core network so as to communicate with a server in the Internet or the core network.”); Ex. 1006, ¶ 58.) As shown in Ishii’s Figure 5 below, the internet (410) is a second data network different from the first core data network (400).

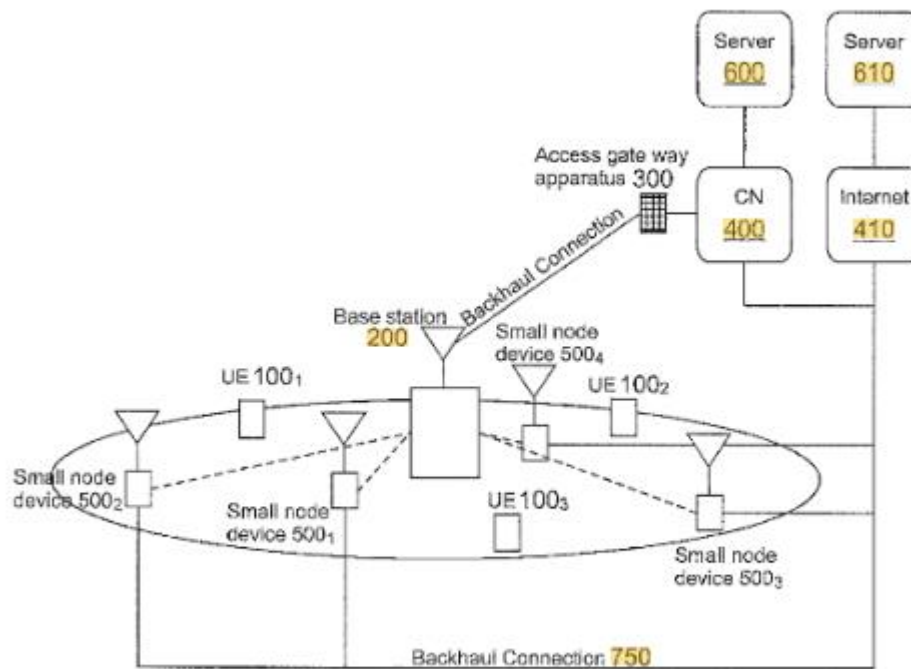


FIG. 5

(Ex. 1004, Fig. 5; Ex. 1006, ¶ 59.) The UE-A or small node devices communicate with the Internet through WiFi or a cellular connection. (Ex. 1004, 7:52-55 (“The backhaul link to the small-node device is not limited to a wired connection to the Internet, but may be a wireless connection to the Internet, such as a WiFi or cellular connection.”).) This WiFi or cellular connection is a second communication technology that is different from the first communication technology (i.e., an X2 interface or LTE). (Ex. 1004, 9:35-39; Ex. 1006, ¶ 59.)

4. **1[c]. the BS operative to: wirelessly communicate with one or more user equipment (UE) devices, and network connect the one or more UE devices to the second data network through one or more of the plurality of bUE devices, or directly to the**

first data network through a third communication technology;

28[c]. the BS operative to: communicate with the first data network over at least a third communication technology; 28[d]. [the BS operative to:] wirelessly communicate with one or more user equipment (UE) devices, and network connect the one or more UE devices to the second data network through one or more of the plurality of bUE devices, or directly to the first data network through the third communication technology;

30[c]. the BS operative to: communicate with the first data network through at least a third communication technology; 30[d]. [the BS operative to:] wirelessly communicate with one or more user equipment (UE) devices, and network connect the one or more UE devices to the first data network or the second data network through one or more of the plurality of bUE devices or the third communication technology;

31[c]. means for wirelessly communicating with one or more user equipment (UE) devices, and network connect the one or more UE devices to the second data network through one or more of the plurality of bUE devices or to the first data network through a third communication technology;

40[g]. the BS wirelessly communicates with the one or more user equipment (UE) devices, and network connects the one or more UE devices to the second data network through one or more of the plurality of bUE devices or to a first data network through a third communication technology, wherein the first data network is different than the second data network.

43[c]. wirelessly communicating, by the BS, with one or more user equipment (UE) devices, and network connecting the one or more UE devices to the a second data network through one or more of the plurality of bUE devices or to a first data

network through a third communication technology, wherein the second data network is different than the first data network;

Ishii discloses a base station that wirelessly communicates with one or more user equipment and is able to network connect the one or more user equipment devices (1) to the second data network through one or more of the plurality of bUE devices, or (2) directly to the first data network through a third communication technology. (Ex. 1004, Fig. 5; Ex. 1006, ¶ 60.)

First, Ishii explains that the base station communicates with the UE through a wireless BS2UE connection. (Ex. 1004, 3:3-11 (“In accordance with a second aspect of the disclosure, a user equipment (UE) configured to receive offloaded data from a small-node device in a cellular telecommunication system is provided that includes: *a macro-base-station-to-the-user-equipment (BS2UE) communication section configured to receive a first control-plane message and user-plane data from the base station over a wireless BS2UE link . . .*”); Ex. 1006, ¶ 61.)

Second, Ishii explains that through control plane signaling,⁶ the base station network connects the UE: (1) to the second data network through one or more of the plurality of bUE devices, or (2) directly to the first data network:

⁶ The '502 Patent contemplates that data uplink data passes from the UE through the base station to the bUE. Petitioners do not believe that this is a requirement of the Challenged Claims. *See, e.g., Superguide Corp. v. DirecTV Enterprises, Inc.*, 358 F.3d 870, 875, 69 U.S.P.Q.2d 1865, 1868 (Fed. Cir. 2004) (“Though understanding the claim language may be aided by explanations contained in the written description, it is important not to import into a claim limitations that are not part of the claim. For example, a particular embodiment appearing in the written description may not be read into a claim when the claim language is broader than the embodiment.”). However, to the extent the Board believes that a BS is only operable to “network connect” a UE to a bUE if data flows from the UE to the BS to the bUE, Ishii still meets this limitation. Ishii discloses that the data from the UE may pass through the base station before reaching the small node device or UE-A. (Ex. 1004, 9:54-60 (“In other embodiments, small-node devices 500 may be connected to base station 200, instead of the core network 400. In this case, data plane traffic flows in

[T]here must be an entity that decides what data will be offloaded through the small-node devices as opposed to a conventional exchange between the user equipment and the base station. Because the base station receives radio link quality reports from the user equipment and/or the small-node devices, the base station is a natural choice for the data partition decision (i.e., deciding what data should be offloaded).

* * *

Control-plane signaling is transmitted in BS2D connection 730 so that base station 200 can control the establishment, reconfiguration, release, and handoff of D2UE connection 710. Control signaling is transmitted also in BS2UE connection 720 so that base station 200 can perform these functions for D2UE connection 710.

(Ex. 1004, 10:2-22; Ex. 1006, ¶ 62.)

Finally, Ishii discloses that the base station communicates with the first data network through a third communication technology. (Ex. 1004, 6:40-46 (“Evolved Universal Terrestrial Radio Access (E-UTRA)/Universal Terrestrial Radio Access Network (UTRAN) (also denoted as Long Term Evolution (LTE)) is applied in the system of FIG. 1b but it will be appreciated that a wide variety of other wireless protocols such as WiMAX, WiFi, or LTE Advanced may also be implemented in

base station 200, but data processing in the base station 200 can be minimized, because data processing in lower layers such as physical layer or MAC layer is handled by small-node device 500.”).)

the system.”), 9:10-16; 17:11-16 (“Backhaul communication section 506 is connected to core network 400 via a backhaul link. The backhaul link may be a wired connection or a wireless connection or a mixture of a wired connection and a wireless connection. The wireless connection may be a connection provided by a WiFi (Wireless LAN) or cellular system.”) Ex. 1006, ¶ 63.)

5. **1[d] / 30[e]. [the BS operative to:] communicate backhaul (BH) traffic through a selectable one of to the second data network through the one or more of the plurality of bUE devices, and directly to the first data network, wherein the BH traffic comprises access traffic from the one or more UE devices;**

28[e]. [the BS operative to:] communicate backhaul (BH) traffic through a selectable one of to the second data network through the one or more of the plurality of bUE devices, and directly to the first data network, wherein the BH traffic comprises access traffic associated with the one or more UE devices;

31[d]. a controller operative to select one or more of the plurality of bUE devices for backhaul (BH) traffic to the second data network or the BS for BH traffic directly to the first data network, wherein the BH traffic comprises access traffic associated with the one or more UE devices;

40[d]. the bUE further operative to: be selected from the plurality of bUE devices for backhaul (BH) traffic to the second data network, wherein the BH traffic comprises access traffic associated with one or more UE devices;

43[d]. selecting, one or more of the plurality of bUE devices for backhaul (BH) traffic to the second data network or the BS for BH traffic to the first data network, wherein the BH

traffic comprises access traffic associated with the one or more UE devices;

Ishii discloses that the base station communicates backhaul traffic⁷ through a selectable one or more of the plurality of bUE devices to the second data network and directly to the first data network. (Ex. 1004, 10:1-22, 12:56-13:9.) Ishii's Figure 3 is demonstrative:

⁷ See Section VIII.A.2.

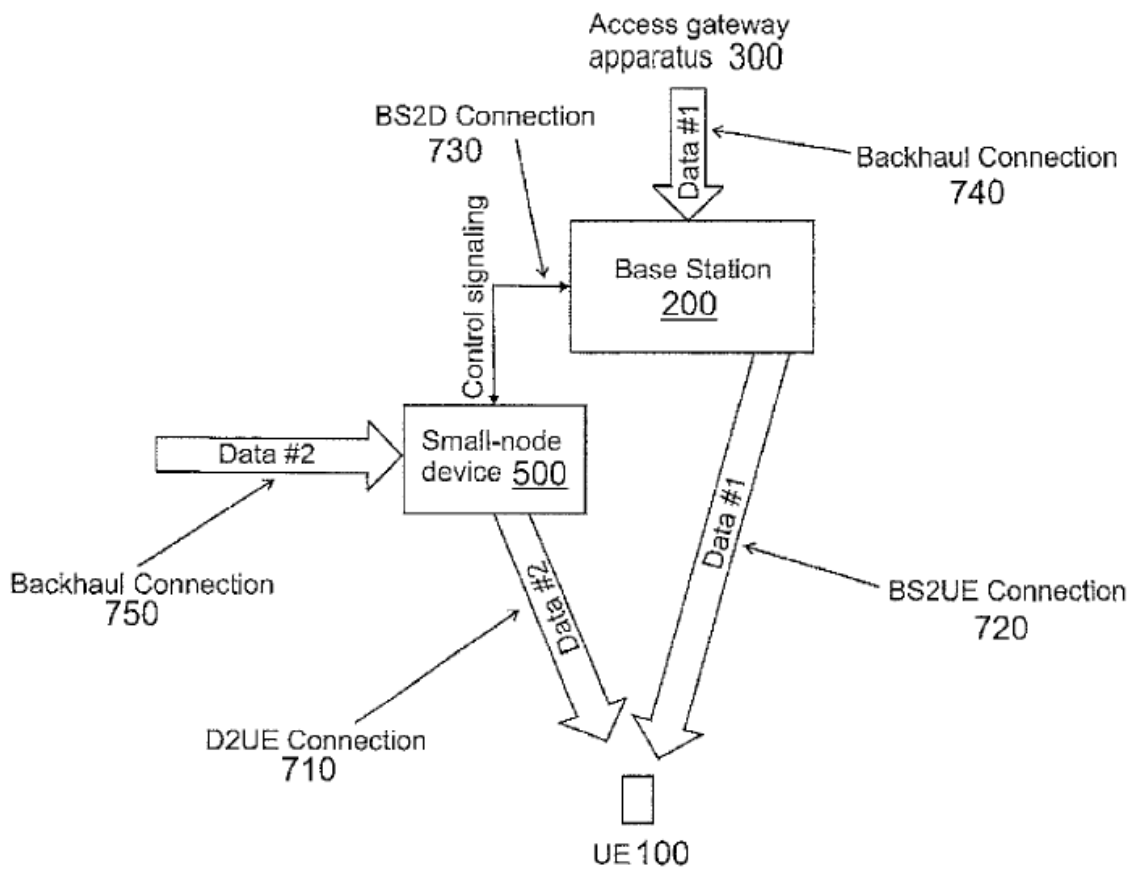


FIG. 3

(Ex. 1004, Fig. 3.) Ishii explains that in Figure 3, the base station communicates backhaul traffic to and from the UE both through the base station and through the small node device, and the base station selects which device to use when offloading backhaul traffic:

FIG. 3 illustrates data flow in the communication system of FIG. 2. In that regard, **there must be an entity that decides what data will be offloaded through the small-node devices as opposed to a conventional exchange between the user equipment and the base station. Because the base station**

receives radio link quality reports from the user equipment and/or the small-node devices, the base station is a natural choice for the data partition decision (i.e., deciding what data should be offloaded). With regard to FIG. 3, a decision has been made to offload some data but also have other data not be offloaded. ***The non-offloaded data is designated as Data #1, which is transferred from the access gateway apparatus 300 to the base station 200 in backhaul connection 740 and then transmitted to user equipment 100 in BS2UE connection 720 in downlink (DL), and vice versa in uplink (UL).*** The flow for Data #1 is thus be transmitted in a conventional fashion. In addition to Data #1, ***offloaded Data #2 is transferred from core network 400 to small-node device 500 in backhaul connection 750 and then transmitted to user equipment 100 in D2UE connection 710 in DL, and vice versa in UL. Control-plane signaling is transmitted in BS2D connection 730 so that base station 200 can control the establishment, reconfiguration, release, and handoff of D2UE connection 710. Control signaling is transmitted also in BS2UE connection 720 so that base station 200 can perform these functions for D2UE connection 710.***

(Ex. 1004, 10:1-22, 12:56-13:9 (“In that regard, base station 200 may select the appropriate connection (D2UE connection 710 or BS2UE connection 720) that should be preferentially utilized in the communications for each radio bearer.”); Ex. 1006, ¶ 66.) While Figure 3 explains that Data #2 is offloaded to the first data network, Ishii explains that Data #2 may be offloaded to a second data network instead. (Ex. 1004, 11:12-15 (“It may also be determined by data bearers whether data should flow via the small-node devices and the Internet 410, or via the small-node devices and core network 400, or via the small-node devices and base station 200.”); Fig. 5.; Ex. 1006, ¶ 67.)

While Figure 3 shows arrows denoting downlink traffic, Ishii explains that Data #1 and Data #2 travel in both the downlink (DL) and uplink (UL) directions. (Ex. 1004, 10:1-22.) Since the traffic includes uplink (UL) traffic from the UE to the UE-A/small node device (Data #2 through D2UE connection 710) and base station (Data #1 through BS2UE connection 720), the corresponding uplink backhaul traffic comprises access traffic associated with the UE. (Ex. 1004, 10:1-22, Fig. 3; Ex. 1006, ¶ 68.)

6. **1[e] / 30[f]. [the BS operative to:] aid in selecting a transmission power level of at least one of the plurality of bUE devices, and at least one of the one or more UE devices; and**

28[f]. [the BS operative to:] aid in selecting a transmission power level of at least one of the bUE devices, and at least one of the one or more UE devices; and

31[e]. the controller operative to aid in selecting a transmission power level of at least one of the plurality of bUE devices, and at least one of the one or more UE devices; and

40[e]. [the bUE further operative to:] receive from the BS a signal for aiding in selecting a transmission power level;

43[e]. aiding, by the BS, in selecting a transmission power level of at least one of the plurality of bUE devices, or at least one of the one or more UE devices; and

Ishii discloses that the base station is operative to aid in selecting a transmission power level of at least one of the plurality of bUE devices, and at least

one of the one or more UE devices in both the downlink (DL) and uplink (UL) directions:

Base station 200 may set the maximum transmission power for DL or UL in D2UE connection 710 based on the number of the user equipment in the cell where the small-node device provide radio communication service. For example, the base station sets the maximum transmission power to be higher in case that the number of the user equipment in the cell is relatively small. ***Conversely, the base station will set the maximum transmission power to be lower if the number of the user equipment in the cell is large.*** As a result, an interference level in the carrier used in D2UE connection 710 can be reduced by making the maximum transmission power low in a high density deployment. In case that there are relatively few user equipment, coverage area of D2UE connection 710 can be increased by making the maximum transmission power relatively high. Another power selection scheme is discussed further below with regard to an FDD enhancement for the D2UE link.

(Ex. 1004, 14:60-15:21) With respect to the D2UE connection, DL communications are transmitted from the small node device or UE-A while UL communications are transmitted by the UE. (Ex. 1006, ¶ 71.) By disclosing that the base station sets the transmission power level of both the DL and UL communications of the D2UE connection, Ishii discloses that the base station aids in selecting a transmission power level of both the bUE devices and UE devices. (Ex. 1006, ¶ 71.)

7. **1[f] / 28[g] / 30[g]. [the BS operative to:] transmit resource block (RB) scheduling information for the BH traffic of at least one of the plurality of bUE devices and the access traffic of at least one of the one or more UE devices.**
31[f]. means for transmitting resource block (RB) scheduling information for the BH traffic of at least one of the plurality of bUE devices and the access traffic of at least

one of the one or more UE devices.

40[f]. [the bUE further operative to:] receive from the BS transmit resource block (RB) scheduling information for the BH traffic; wherein

43[f]. transmitting, by the BS, resource block (RB) scheduling information for the BH traffic of at least one of the plurality of bUE devices and the access traffic of at least one of the one or more UE devices.

Ishii inherently discloses that the base station is operative to transmit resource block scheduling information for the access traffic of at least one of the one or more UE devices. As explained in Ishii:

Base station 200 may control the radio resource allocation for D2UE connection 710. The radio resources may be allocated selectively in the time domain, frequency domain, and code domain resources. For example, base station 200 may configure D2UE connection 710 to use a non-overlapping spectrum with regard to any other D2UE connections such as by controlling a carrier center frequency. As a result, interference problems caused by other D2UE connections can be mitigated. Similarly, base station 200 may configure the time resource in D2UE connection 710 so that it does not overlap with the time resource utilized in other D2UE connections. Alternatively, base station 200 may configure the code resource in D2UE connection 710 so that it does not overlap with the code resource utilized in other D2UE connections. As a result, interference problems caused by other D2UE connections can be mitigated.

(Ex. 1004, 14:10-25.) A POSITA would understand that the base station must send resource block scheduling information to control radio resource allocation of the D2UE connection, which is access traffic. (Ex. 1006, ¶ 74.) For instance, Ishii explicitly states that “[t]he invention focuses on the Physical (PHY) and Link

Layer design of systems such as 3GPP's Long Term Evolution (LTE).” (Ishii, 9:43-47; Ex. 1006, ¶ 74.) In LTE, radio resources are managed using resource block allocations. Therefore, a POSITA would understand based on the disclosure that the invention of Ishii focuses on LTE systems that radio resource control in LTE would be implemented by having the BS transmit resource block scheduling information. (Ex. 1006, ¶ 74.)

Ishii also inherently discloses that the base station is operative to transmit resource block scheduling information for the backhaul traffic of the at least one of the plurality of bUE devices because it discloses transmitting backhaul traffic according to a half-duplex FDD radio resource assignment. (Ishii, Abstract (“The user equipment can send and receive data through the small-node device using the backhaul link according to a half-duplex FDD radio resource assignment in a wireless link between the user equipment and the small-node device.”); Ex. 1006, ¶ 75.) A POSITA would understand that the base station must be the network entity controlling radio resource allocation of the backhaul link (by, as discussed above, transmitting resource block scheduling information), because it is the entity sending control plane signaling to the bUE and UE devices and controlling radio resource allocation for the D2UE connection. (Ishii, 10:22-27; 14:10-25; Ex. 1006, ¶ 75.)

To the extent the Board does not agree that Ishii discloses that the base station is operative to transmit resource block scheduling information for the backhaul traffic of the at least one of the plurality of bUE devices, a POSITA would find it obvious to modify Ishii such that the BS would transmit RB scheduling information for the backhaul traffic of the at least one of the plurality of bUE devices. (Ex. 1006, ¶ 76.) Radio resource management was and is a common issue in wireless systems, and prioritization and classification of traffic to be placed on limited capacity channels was an ongoing concern as of October 15, 2012. (Ex. 1006, ¶ 76.) Ishii discloses that the BS may be in communication with a plurality of bUE devices, each with a BH connection to the same data network. (Ishii, Fig. 5, 6:47-49, 10:46-53; Ex. 1006, ¶ 76.) A POSITA would understand that the plurality of bUE's would need to share radio resources when transmitting backhaul traffic on a limited capacity channel, and, for the reasons discussed above, it would be obvious to modify the base station of Ishii to control the radio resource allocation of the backhaul traffic of the plurality of bUEs by sending resource block scheduling information. (Ex. 1006, ¶ 76.)

8. **2. The system of claim 1, wherein the plurality of bUE devices wirelessly communicate with the BS over one or more of wireless communication technologies, wherein the one or more wireless communication technologies comprise at least one of WiFi, WiMax, 3G, 4G, LTE, Orthogonal frequency**

division multiple access (OFDMA), Wideband code division multiple access (WCDMA).

Claim 2 is dependent upon Claim 1, all limitations of which are disclosed in or rendered obvious by Ishii. Ishii further discloses that the plurality of bUE devices wirelessly communicate with the BS over one or more wireless communication technologies, including at least LTE. (Ex. 1004, 9:38-39 (“Alternatively, the BS2D link may be a wired or wireless link that is different from an X2 link.”); 11:42-51 (“Similarly, base station 200 configures BS2D connection 730 between base station 200 and small-node devices 500. . . . In some other embodiments, the protocol design may be an LTE interface.”); cl. 7 (“7. The small-node device of claim 1, wherein the BS2D link is an LTE link.”); 6:40-46 (“Evolved Universal Terrestrial Radio Access (E-UTRA)/Universal Terrestrial Radio Access Network (UTRAN) (also denoted as Long Term Evolution (LTE)) is applied in the system of FIG. 1b but it will be appreciated that a wide variety of other wireless protocols such as WiMAX, WiFi, or LTE Advanced may also be implemented in the system.”), 9:10-16.)

9. 3. The system of claim 1, wherein the one or more UE devices wirelessly communicate with the BS and the plurality of bUE devices wirelessly communicate with the BS utilizing a same wireless communication technology.

4. The system of claim 3, wherein the one or more UE devices wirelessly communicate with the BS, and the plurality of bUE devices wirelessly communicate with the

BS utilizing the same wireless communication technology and a shared one or more frequency channels.

32. The BS of claim 31, wherein the one or more UE devices wirelessly communicate with the BS and the plurality of bUE devices wirelessly communicate with the BS utilizing a same wireless communication technology.

Claim 3 is dependent upon Claim 1, and Claim 32 is dependent on Claim 31, all limitations of which are disclosed in or rendered obvious by Ishii. Claim 3 and 31 further require that the one or more UE devices and the bUE devices wirelessly communicate with the BS using the same technology. Claim 4 is dependent on Claim 3. Claim 4 also requires that the UE and bUE devices communicate with the BS with one or more shared frequency channels.

Ishii discloses that the one or more UE devices wirelessly communicate with the BS (i.e., the BS2UE link in Ishii) and the bUE devices to wirelessly communicate with the BS (i.e., the BS2D link in Ishii) using the same wireless communication technology (i.e., LTE) across one or more shared frequency channels. (Ex. 1004, 5:35-38 (“In an LTE embodiment, ***the LTE links (the Macro2UE and Macro2D) links may operate at 2 GHz*** whereas the D2UE link operates at a different frequency such as, for example, 3.5 GHz.”) (emphasis added))

10. **5. The system of claim 1, wherein at least one of the plurality bUE devices is at least one of associated with or a part of a**

small cell BS, wherein the small cell BS comprises client side modem functionality.

Claim 5 is dependent upon Claim 1, all limitations of which are disclosed in or rendered obvious by Ishii. Ishii further discloses that at least one of the plurality of bUE devices is at least one of associated with or a part of a small cell BS, wherein the small cell BS comprises client side modem functionality. As discussed above in Section VI.A, the specification of the '502 Patent defines “client side modem functionality” to mean at least “a subset of a UE device or bUE device functionality.” (Ex. 1001, 6:46-50.) Therefore, bUE devices would always “comprise client side modem functionality.” As explained above, the UE-A and small node devices of Ishii are bUE devices, and thus “comprise client side modem functionality.” (*Supra* Section VIII.A.3.) The small node devices disclosed in Ishii are associated with or part of a small cell BS. (Ex. 1004, 7:13-15 (“The small-node device is analogous to a femto or pico base station[.]”); Ex. 1006, ¶ 84.)

11. 12. The system of claim 1, wherein the access traffic associated with the one or more UE devices is classified into two or more data flows based on a data flow parameter and the selection of the one or more plurality of bUE devices for the BH traffic is based in part on the data flow parameter.

37. The BS of claim 31, wherein the access traffic associated with the one or more UE devices is classified into two or more data flows based on a data flow parameter and the selection of the one or more plurality of bUE devices for the BH traffic is based in part on the data flow parameter.

Claim 12 is dependent upon Claim 1, and Claim 37 is dependent on Claim 31, all limitations of which are disclosed in or rendered obvious by Ishii. Ishii further discloses that the access traffic associated with the one or more UE devices is classified into two or more data flows based on a data flow parameter and the selection of the one or more plurality of bUE devices for the BH traffic is based in part on the data flow parameter:

Base station 200 may also configure one or more radio bearers for the communications such as in BS2UE link 720 and D2UE link 710. ***Control signaling for configuring the radio bearers is transmitted to user equipment 100 in BS2UE connection 720.*** Similarly, control signaling for configuring the radio bearers is transmitted to small-node device 500 in BS2D connection 730.

The radio bearers for BS2UE connection 720 may be the same or different from the ones for the D2UE connection 710. ***For example, radio bearers for packets of non-real-time services, such as web browsing, e-mail, and FTP, may be configured in D2UE connection 710. Conversely, radio bearers for packets of real-time services, such as VoIP and streaming, may be configured for BS2UE connection 720. Alternatively, the radio bearers for packets of non-real-time services are configured for both D2UE connection 710 and in BS2UE connection 720 such that packets of non-real-time services may be transmitted preferentially in D2UE connection 710. In yet another alternative, the radio bearers for the packets of real-time services are configured both in D2UE connection 710 and in BS2UE connection 720 such that the real-time services packets may be transmitted preferentially in BS2UE connection 720. Such prioritization or priority for the packets may be configured by base station 200. In that regard, base station 200 may select the appropriate connection (D2UE connection 710 or BS2UE connection 720) that should be preferentially utilized in the communications for each radio bearer.***

(Ex. 1004, 12:49-13:9.)

12. **13. The system of claim 1, wherein the BS operative to aid in selecting the transmission power level of at least one of the plurality of bUE devices, or the one or more UE devices is assisted by a signal transmitted by the BS.**

Claim 13 is dependent upon Claim 1, all limitations of which are disclosed in or rendered obvious by Ishii. As discussed above, Ishii further discloses that the BS is operative to aid in selecting the transmission power level of at least one of the plurality of bUE devices, or the one or more UE devices is assisted by a signal transmitted by the BS. (See Section VIII.A.6.)

13. **14. The system of claim 1, wherein a resource block comprises a partition of a carrier or frequency channel for the wirelessly communicating.**

- 15. The system of claim 14, wherein the partition comprises one or more of a unit of time, a unit of frequency, a code.**

Claim 14 is dependent upon Claim 1, all limitations of which are disclosed in or rendered obvious by Ishii. Claim 14 adds the limitation that a resource block comprises a partition of a carrier or frequency channel for the wirelessly communicating. Claim 15 is dependent on Claim 14, and further requires that the partition comprises one or more of a unit of time, a unit of frequency, a code.

Ishii discloses that a resource block may comprise a partition of a carrier or frequency channel for wireless communicating, where the partition comprises one or more of a unit of time, frequency, or code:

Base station 200 may control the radio resource allocation for D2UE connection 710. ***The radio resources may be allocated selectively in the time domain, frequency domain, and code domain resources.*** For example, base station 200 may configure D2UE connection 710 to use a non-overlapping spectrum with regard to any other D2UE connections such as by controlling a carrier center frequency. As a result, interference problems caused by other D2UE connections can be mitigated. Similarly, base station 200 may configure the time resource in D2UE connection 710 so that it does not overlap with the time resource utilized in other D2UE connections. Alternatively, base station 200 may configure the code resource in D2UE connection 710 so that it does not overlap with the code resource utilized in other D2UE connections. As a result, interference problems caused by other D2UE connections can be mitigated.

(Ex. 1004, 14:10-25; Ex. 1006, ¶ 90.)

14. **16. The system of claim 1, wherein the wireless communication between the plurality of bUE devices and the BS is enhanced relative to the wireless communication between the BS and at least one of the one or more UE devices, wherein the enhanced wireless communication comprises one or more of better antenna gain, more antennas, outdoor installation, better processing power, better transmit or receive analog or digital performance, lower transmit power, higher or outdoor installation, improved link parameters, improved number of antennas.**

Claim 16 is dependent upon Claim 1, all limitations of which are disclosed in or rendered obvious by Ishii. It would have been obvious for a POSITA to modify Ishii to enhance the wireless communication between the bUE devices and the BS relative to the wireless communication between the BS and UE devices through better antenna gain, more antennas, outdoor installation, better processing power, better transmit or receive analog or digital performance, lower transmit power,

higher or outdoor installation, improved link parameters, improved number of antennas. (Ex. 1006, ¶ 92.)

As of October 15, 2012, enhancements to wireless communications links had been the staple of many modern communications technologies for many years, and mechanisms including antenna improvements, multiple-input/multiple-output (MIMO) architectures, increased symbol density, higher-order modulation and encoding techniques, and similar were commonly leveraged approaches to wireless communications networks including 2G/3G/LTE/4G “cellular”, IEEE 802.11a/b/g/n/ax “WiFi,” and many others. (Ex. 1006, ¶ 93.)

A POSITA would recognize that it would be desirable to enhance the communication between the bUE and BS relative to the communication between the BS and UE because the BS may be managing multiple relay nodes or bUE systems in addition multiple directly connected UE systems. As a result, the control signaling between BS and bUE would need to be more robust, including potentially higher bandwidth, different types of modulation, and more sophisticated resource allocation. Ishii explicitly states that “[t]he invention focuses on the Physical (PHY) and Link Layer design of systems such as 3GPP’s Long Term Evolution (LTE),” thus it would be obvious for a POSITA to leverage mechanisms which were known

in LTE for enhancing the wireless communication between the bUE and BS. (Ishii, 9:43-47; Ex. 1006, ¶ 94.)

15. **17. The system of claim 1, further comprising classifying and prioritizing the BH traffic based on the access traffic, and wherein the RB scheduling information for the BH traffic is based on the BH traffic prioritization.**

38. The BS of claim 31, wherein the controller of the BS is further operative to classify and prioritize the BH traffic based on the access traffic, and wherein the RB scheduling information for the BH traffic is based on the BH traffic prioritization.

Claim 17 is dependent upon Claim 1, and Claim 38 is dependent on Claim 31, all limitations of which are disclosed in or rendered obvious by Ishii. Ishii inherently discloses that the BH traffic is classified and prioritized based on the access traffic, and wherein the RB scheduling information for the BH traffic is based on the BH traffic prioritization. (Ex. 1006, ¶ 96.) As discussed above with respect to the independent claims, Ishii discloses transmitting RB scheduling information for the BH traffic of at least one of the plurality of bUE devices. (*See supra* Section VIII.A.7.) A POSITA would recognize from the disclosure of Ishii that the RB scheduling information for the BH traffic must necessarily be based on some method of prioritization of the BH traffic, and that the classification/prioritization of uplink BH traffic must necessarily be based on traffic characteristics of the access traffic. (Ex. 1006, ¶ 98.)

16. 26. The system of claim 1, wherein at least a first bUE device of the plurality of bUE devices transmits or receives access traffic associated with the first bUE.

Claim 26 is dependent upon Claim 1, all limitations of which are disclosed in or rendered obvious by Ishii. As discussed above, Ishii further discloses that at least a first bUE device of the plurality of bUE devices transmits or receives access traffic associated with the first bUE. (*See* Section VIII.A.5.)

B. Ground 2: Claims 6-11, 19, 29, 33-36, 39, 41 and 44-46 Are Rendered Obvious by Ishii In View of Sfar Under 35 U.S.C. § 103

All of the limitations of Claims 6-11, 19, 29, 33-36, 39, 41 and 44-46 are taught or suggested in Ishii in view of Sfar. (Ex. 1006, ¶¶ 103-134.)

1. Motivation to Combine Ishii and Sfar

A POSITA would have been motivated to combine the teachings of Ishii with Sfar. Ishii recognized that devices serving as backhaul user equipment could be used to offload backhaul traffic when the primary backhaul option was not satisfactory. (Ex. 1004, Abstract, Cls. 1-23.) A POSITA faced with the problem of trying to improve backhaul would have looked to Sfar because Ishii and Sfar are in the same technological field and are trying to solve the exact same problem in almost the exact same way. (Ex. 1005, Abstract.)

Both Ishii and Sfar were trying to improve the backhaul of wireless networks comprising UE, BS, and a core network. In the networks disclosed in both Ishii and

Sfar, the UE connects to the base station, and the base station has a primary backhaul path to a core network. (*Compare* Ex. 1004, 6:34-49 *with* Ex. 1005, 2:19-25.) Ishii and Sfar both recognized that this primary backhaul path was not satisfactory, and both came up with the same solution: to employ bUE devices that could offload some or all of the backhaul traffic of the UE. (*Compare* Ex. 1004, 6:66-7:12 *with* Ex. 1005, 2:26-32.) A POSITA would thus naturally look to combine Ishii and Sfar to solve the problem of offloading some or all of the backhaul traffic associated with a UE. (Ex. 1006, ¶ 108.)

Moreover, because it was known that base stations selectively communicate backhaul traffic either to a first data network directly or to a second data network through a bUE device, as explained above in Section VIII.A.5, it would have been obvious to try making that selection based on a finite number of parameters. (Ex. 1006, ¶ 109.) Specifically, it would have been obvious to a POSITA to obtain and use Sfar's first parameters associated with the wireless communication between one or more of the plurality of bUE devices and the base station in Ishii's system; second parameters associated with the second data network in Ishii's system; or third parameters associated with the first data network in Ishii's system in deciding whether or not backhaul traffic should be offloaded to the second data network through a bUE device. (Ex. 1006, ¶ 110.) Indeed, such first, second and third

parameters are three of only a few possible variable types in the simple system with so few elements. (Ex. 1006, ¶ 110.) For the reasons discussed above, a POSITA would have anticipated a high likelihood of success using first, second or third parameters to determine whether or not the second data network could receive offloaded backhaul traffic. (Ex. 1006, ¶ 110.) Additional, and more specific, reasons for combining these references are discussed below with respect to specific claim features.

2. 6. The system of claim 1, wherein the BS is further operative to obtain one or more first parameters associated with the wireless communication between one or more of the plurality of bUE devices and the BS.

33. The BS of claim 31, wherein the controller of the BS is further operative to obtain one or more first parameters associated with the wireless communication between one or more of the plurality of bUE devices and the BS.

44. The method of claim 43, further comprising obtaining one or more first parameters associated with the wireless communication between one or more of the plurality of bUE devices and the BS.

Claim 6 is dependent upon Claim 1, all limitations of which are disclosed in or rendered obvious by Ishii. Likewise, Claim 33 is dependent upon Claim 31 and Claim 44 is dependent upon claim 43, all limitations of which are disclosed in or rendered obvious by Ishii in view of Sfar. Sfar further discloses that the BS is operative to obtain one or more first parameters associated with the wireless

communication between one or more of the plurality of bUE devices and the BS. Sfar discloses that if a UE connects to the base station of a first network, but the base station is unable to provide sufficient backhaul for the UE's traffic, then the base station of the first network may find a base station of a second network to serve as a bUE and provide that backhaul as long as the base station is (i) available, and (ii) able to provide sufficient quality of service for its backhaul to satisfy the UE's requirements. (Ex. 1005, 7:10-32, cl. 1 (“main base station (6) or core network (9) of first network trying to select another neighbour base station (8) of at least a second cellular network different from first network, according at least to availability of a backhaul of said another neighbour base station (8) and/or to offered quality of service of the backhaul of said another neighbour base station (8)”)).) Sfar further explains that the first base station connects to the second base station via an air interface, which is a wireless communication. (Ex. 1005, 3:1-5.) By determining whether the second base station is “available,” the first base station is obtaining a parameter associated with the wireless communication between one of more of the bUE devices. (Ex. 1006, ¶ 113.)

3. 7. The system of claim 6, wherein a selection of the one or more of the plurality of bUE devices for the BH traffic is based on the first parameters.

34. The BS of claim 33, wherein the selection of the one or more of the plurality of bUE devices for the BH traffic is

based on the first parameters.

45. The method of claim 44, wherein the selection of the one or more of the plurality of bUE devices for the BH traffic is based on the first parameters.

Claim 7 is dependent upon Claim 6, all limitations of which are disclosed in or rendered obvious by Ishii in view of Sfar. Likewise, Claim 34 is dependent upon Claim 33 and Claim 45 is dependent upon Claim 44, all limitations of which are disclosed in or rendered obvious by Ishii in view of Sfar. Sfar further discloses that the selection [by the BS] of the one or more of the plurality of bUE devices for the BH traffic is based on the first parameters. Sfar discloses that if a UE connects to the base station of a first network, but the base station is unable to provide sufficient backhaul for the UE's traffic, the base station of the first network may find a base station of a second network to provide that backhaul as long as the base station is (i) available, and (ii) able to provide sufficient quality of service for its backhaul to satisfy the UE's requirements. (Ex. 1005, 7:10-32, cl. 1 ("main base station (6) or core network (9) of first network trying to select another neighbour base station (8) of at least a second cellular network different from first network, according at least to availability of a backhaul of said another neighbour base station (8) and/or to offered quality of service of the backhaul of said another neighbour base station (8)").) The availability of the second base station to act as a bUE is a parameter of

the second base station, and the selection of the second base station for backhaul traffic by the first base station is determined by this availability factor. (Ex. 1006, ¶ 116.)

4. **8. The system of claim 6, wherein the one or more first parameters comprises one or more of a link quality, link quality statistics, link quality variation, path loss, fading, shadowing, Signal to Noise Ratio (SNR), Signal to Interference and Noise Ratio (SINR), Packet Error Rate (PER), received interference, interference generated to other devices, Channel Quality Indicator (CQI), Channel State Information (CSI), Modulation and Coding Scheme (MCS), Precoding Matrix Indicator (PMI), rank indicator (RI), single user or multiuser Multiple Input Multiple Output (SU-MIMO or MU-MIMO) information.**

Claim 8 is dependent upon Claim 6, all limitations of which are disclosed in or rendered obvious by Ishii in view of Sfar. Sfar further discloses that the parameter obtained by the first base station that is associated with the communication between the first base station and second base station can comprise one or more of a link quality, link quality statistics, link quality variation, path loss, fading, shadowing, Signal to Noise Ratio (SNR), Signal to Interference and Noise Ratio (SINR), Packet Error Rate (PER), received interference, interference generated to other devices, Channel Quality Indicator (CQI), Channel State Information (CSI), Modulation and Coding Scheme (MCS), Precoding Matrix Indicator (PMI), rank indicator (RI), single user or multiuser Multiple Input Multiple Output (SU-MIMO or MU-MIMO)

information. Link quality is a parameter that can indicate that the second base station is available to offload backhaul traffic of the first base station. (Ex. 1006, ¶ 119.)

5. **9. The system of claim 1, wherein the BS is further operative to obtain one or more second parameters associated with the second data network through at least the second communication technology.**

35. The BS of claim 31, wherein the controller of the BS is further operative to obtain one or more second parameters associated with the second data network through at least the second communication technology.

Claim 9 is dependent upon Claim 1, all limitations of which are disclosed in or rendered obvious by Ishii. Likewise, Claim 35 is dependent upon Claim 31, all limitations of which are disclosed in or rendered obvious by Ishii. Sfar further discloses that the BS is operative to obtain one or more second parameters associated with the through at least the second communication technology. The second communication technology disclosed in Claims 9 and 35 is the communication technology used by the bUE to communicate with the second data network. Sfar discloses that if a UE connects to the base station of a first network but the base station is unable to provide sufficient backhaul for the UE's traffic, the base station of the first network may find a base station of a second network to serve as a bUE and provide backhaul to the second data network as long as the base station is (i) available, and (ii) able to provide sufficient quality of service for its backhaul to

satisfy the UE's requirements. (Ex. 1005, 7:10-32, cl. 1 ("main base station (6) or core network (9) of first network trying to select another neighbour base station (8) of at least a second cellular network different from first network, according at least to availability of a backhaul of said another neighbour base station (8) and/or to offered quality of service of the backhaul of said another neighbour base station (8)").) By determining that the second base station is able to provide sufficient quality of service for its backhaul to satisfy the UE's requirements, the base station of the first network is obtaining a parameter associated with the second data network through at least the second communication technology.

6. 10. The system of claim 9, wherein a selection of the one or more of the plurality of bUE devices for the BH traffic is based on the one or more second parameters.

36. The BS of claim 35, wherein the selection of the one or more of the plurality of bUE devices for the BH traffic is based on the one or more second parameters.

Claim 10 depends upon Claim 9, and Claim 36 depends upon Claim 35. As discussed above, Ishii in view of Sfar discloses each limitation of Claims 9 and 35. Sfar further discloses that the selection of the one or more of the plurality of bUE devices for the backhaul traffic is based on the one or more second parameters. As discussed above, Sfar discloses that the first base station obtains a second parameter associated with the through at least the second communication technology. (See

supra Section VIII.B.5.) Sfar further discloses that the first base station selects the second base station for backhaul traffic based in part on this second parameter. (Ex. 1005, 7:10-32, cl. 1 (“**main base station (6) or core network (9) of first network trying to select another neighbour base station (8) of at least a second cellular network different from first network, according at least to** availability of a backhaul of said another neighbour base station (8) and/or to **offered quality of service of the backhaul of said another neighbour base station (8)**”).).)

7. **11. The system of claim 9, wherein the one or more second parameters comprise one or more of a link quality, bandwidth, throughput, cost, latency, jitter, QoS, PER.**

Claim 11 depends upon Claim 9, all limitations of which are disclosed in or rendered obvious by Ishii in view of Sfar. Sfar further discloses that the one or more second parameters comprise one or more of a link quality, bandwidth, throughput, cost, latency, jitter, QoS (quality of service), and PER because Sfar discloses that the selecting a second base station for backhaul based on offered quality of service. (Sfar, 7:10-32, cl. 1 (“**main base station (6) or core network (9) of first network trying to select another neighbour base station (8) of at least a second cellular network different from first network, according at least to availability of a backhaul of said another neighbour base station (8) and/or to offered quality of service of the backhaul of said another neighbour base station (8)**”); Ex. 1006, ¶ 126.)

8. **19. The system of claim 1, wherein a bUE device selection of one or more of the plurality of bUE devices is based on one or more first parameters of the wireless communication between the bUE device and the BS or one or more second parameters of associated with the second data network through at least the second communication technology.**

39. The BS of claim 31, wherein a bUE selection of one or more of the plurality of bUE devices is based on one or more first parameters of the wireless communication with the BS or one or more second parameters of the second communication technology.

46. The method of claim 43, wherein a bUE selection of one or more of the plurality of bUE devices is based on one or more first parameters of the wireless communication with the BS or one or more second parameters of the second communication technology.

As discussed above, Ishii in view of Sfar discloses that the BS may select a bUE device based on one or more first parameters. (*See supra* Section VIII.B.3.)
Ishii in view of Sfar also discloses that the BS may select a bUE device based on one or more second parameters. (*See supra* Section VIII.B.6.)

9. **29. The system of claim 28, wherein the BS is further operative to obtain one or more third parameters associated with the first data network through at least the third communication technology.**

Claim 28 depends upon Claim 27, all limitations of which are disclosed in or rendered obvious by Ishii. Sfar discloses that the BS is operative to obtain one or more third parameters associated with the first data network through at least the third

communication technology. Sfar explains that if the first base station receives a request from a UE, it will first check if the request can be satisfied through its own backhaul according to traffic load. (Ex. 1005, cl. 1 (“a) main base station (6) of a first cellular network receiving a request from or to a mobile user equipment (4) of the first network; b) main base station (6) checking if request can be satisfied through own backhaul according to traffic load”).) By checking whether the first base station’s backhaul link to the first network is able to satisfy a UE’s request, the first base station is obtaining a third parameter associated with the first data network through the third communication technology (the technology used by the first base station to connect to the first network.)

10. 41. The bUE device of claim 40, further operative to process a BH traffic header information based on the second data network through the at least a second communication technology.

Claim 41 depends upon Claim 40, all limitations of which are disclosed in or rendered obvious by Ishii in view of Sfar. A POSITA would further understand based on the disclosures in Ishii that the bUE device is further operative to process a BH traffic header information based on the second data network through the at least a second communication technology. (Ex. 1006, ¶ 132.) This claim is merely describing the conventional routing of packets on a data network, where the forwarding device (here, the bUE) inspects header information from ingress packets

(here, from the UE), and selects an egress port or link on which to forward the packets. The egress port comprises a “second data network” and may be configured to use a “second communication technology.” (Ex. 1006, ¶ 133.)

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

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

None of the references relied upon herein was cited, discussed or applied in the ’502 Patent’s prosecution history, nor are the references the same or substantially the same as those considered during prosecution. (See Ex. 1002, 200, 202, 203, 209-216, 316, 317, 321, 322.) Accordingly, the Board should not exercise its discretion under Section 325(d).

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

The *Fintiv* analysis is unlikely to apply because on December 30, 2024, the parties jointly moved to dismiss the ’502 Patent from the related district court litigations.

X. CONCLUSION

Petitioners have presented evidence that the subject matter of Claims 1-17, 19, 26, 28-41 and 43-46 of the ’502 Patent was known in the art prior to the ’502 Patent’s priority date. Therefore, there is a reasonable likelihood that Petitioners will

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prevail as to each these claims. *Inter partes* review of Claims 1-17, 19, 26, 28-41
and 43-46 is therefore respectfully requested.

Dated: January 2, 2025

Respectfully submitted,

Holland & Knight LLP

/s/ Jacob K. Baron
Jacob K. Baron
Reg. No. 48,961

XI. MANDATORY NOTICES (37 C.F.R. § 42.8(b))

A. Real Parties In Interest (37 C.F.R. § 42.8(b)(1))

Petitioners Ericsson and Nokia are real parties-in-interest (“RPIs”). In an abundance of caution, only for purposes of this proceeding, and only to the extent that Patent Owner contends that they should be named an RPI, Petitioners also identify the following entities as potential RPIs without conceding that they would satisfy the factually intensive RPI test: Sprint LLC, AT&T Services, Inc., AT&T Mobility LLC, AT&T Enterprises LLC,⁸ T-Mobile USA, Inc., Cellco Partnership d/b/a Verizon Wireless, Verizon Corporate Services Group Inc., and Telefonaktiebolaget LM Ericsson. In addition, some of the entities listed above out of an abundance of caution are holding companies that are legally and factually distinct from their subsidiaries (that may also be listed above and which maintain their own independent corporate status, identity, and structure) and have not provided any products or services that might be at issue in the underlying patent infringement lawsuit.

⁸ Related-Matter Defendant AT&T Corp. has undergone a corporate transaction and is now merged and converted into AT&T Enterprises, LLC.

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

The '502 Patent is asserted in the following co-pending litigations, all of which are in the District Court for the Eastern District of Texas⁹:

Case Caption	Case No.
<i>Headwater Partners II LLC v. Cellco Partnership d/b/a Verizon Wireless et al.</i>	2:24-cv-00007-JRG
<i>Headwater Partners II LLC v. T-Mobile USA, Inc. et al.</i>	2:24-cv-00015-JRG
<i>Headwater Partners II LLC v. AT&T Services, Inc. et al.</i>	2:24-cv-00016-JRG

C. Lead and Back-Up Counsel (37 C.F.R. § 42.8(b)(3))

Lead counsel: Jacob K. Baron (Reg. No. 48,961; Jacob.Baron@hklaw.com).

Backup counsel: Jacob W.S. Schneider (*pro hac vice* motion forthcoming; Jacob.Schneider@hklaw.com).

The mailing address for all PTAB correspondence is Holland & Knight LLP, 10 St. James Ave., 11th Floor, Boston, MA 02116.

⁹ The parties jointly moved to dismiss the '502 Patent from these district court litigations on December 30, 2024.

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

Please address all correspondence to lead counsel at the address above.
Petitioners consent to electronic service at: Jacob.Baron@hklaw.com and
ClientTeamHeadwaterLitigation@hklaw.com.

E. Fee for *Inter Partes* Review

The Director is authorized to charge the fee specified by 37 CFR § 42.15(a)
to Deposit Account No. 50-2324.

XII. CERTIFICATE OF SERVICE

The undersigned certifies that a complete copy of this Petition for *Inter Partes*
Review of U.S. Patent No. 9,413,502 and all Exhibits and other documents filed
together with this Petition were served on the official correspondence address for
U.S. Patent No. 9,413,502 shown in Patent Center and Headwater Partners II LLC's
current litigation counsel:

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**ATTORNEYS FOR,
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via FEDERAL EXPRESS overnight delivery, on January 2, 2025.

Dated: January 2, 2025

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*Counsel for Ericsson Inc. and Nokia of
America Corporation*

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XIII. CERTIFICATE OF COMPLIANCE WITH 37 C.F.R. § 42.24

I hereby certify that this Petition complies with the word count limitation of 37 C.F.R. § 42.24(a)(1)(i) because the Petition contains 12,806 words, excluding the cover page and the parts of the Petition exempted by 37 C.F.R. § 42.24(a)(1).

Dated: January 2, 2025

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