

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD.,
Petitioner,

v.

ASUS TECHNOLOGY LICENSING INC.,
Patent Owner

Case: IPR2024-01246
U.S. Patent No. 10,986,585

**PETITION FOR *INTER PARTES* REVIEW OF CLAIMS 1-20
OF U.S. PATENT NO. 10,986,585**

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PETITIONER’S EXHIBIT LIST

Exhibit No.	Description
1001	U.S. Patent No. 10,986,585 (the “585 patent”)
1002	Declaration of Michael A.M. Davies
1003	File History of U.S. Patent Application No. 16/395,760 as obtained from Patent Center
1004	File History of U.S. Provisional Application No. 62/669,461 as obtained from Patent Center
1005	Stefania Sesia, et al., <i>LTE The UMTS Long Term Evolution From Theory to Practice, Second Ed.</i> (Wiley 2011) (excerpts)
1006	Erik Dahlman, et al., <i>4G, LTE-Advanced Pro and The Road to 5G, Third Edition</i> (Academic Press 2016) (excerpts)
1007	Ericsson, <i>Power Headroom Reporting in NR</i> , Tdoc R2-1713484 (revision of R2-1711182), 3GPP TSG-RAN WG2 #100, Reno, Nov. 27-Dec. 1, 2017
1008	3 rd Generation Partnership Project; Technical Specification Group Radio Access Network; NR; Physical layer procedures for control (Release 15), 3GPP TS 38.213 V15.1.0 (2018-03)
1009	3 rd Generation Partnership Project; Technical Specification Group Radio Access Network; NR; Medium Access Control (MAC) protocol specification (Release 15), 3GPP TS 38.321 V15.1.0 (2018-03)
1010	3 rd Generation Partnership Project; Technical Specification Group Radio Access Network; NR; Services provided by the physical layer (Release 15), 3GPP TS 38.202 V15.1.0

Exhibit No.	Description
	(2018-03)
1011	3 rd Generation Partnership Project; Technical Specification Group Radio Access Network; NR; Radio Resource Control (RRC) protocol specification (Release 15), 3GPP TS 38.331 V15.1.0 (2018-03)
1012	Samsung, <i>Summary of NR UL power control – CA aspects</i> , Tdoc R1-1805571, 3GPP TSG RAN WG1 Meeting #92bis, Sanya, China, April 16 th – 20 th , 2018
1013	PCT Application Publication No. WO 2018/026165 A1
1014	U.S. Patent Application Publication No. 2017/0359734 (“Lee”)
1015	U.S. Patent Application Publication No. 2015/0282150 (“Nigam”)
1016	Declaration of Craig Bishop
1017	U.S. Patent Application Publication No. 2015/0358920 (“Sorrentino”)
1018	Huawei, et al., <i>Discussion on PHR calculation</i> , Tdoc R1-1710475, 3GPP TSG-RAN, WG1 NR Ad Hoc Meeting, Qingdao, China, June 27-30, 2017
1019	3 rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); Medium Access Control (MAC) protocol specification (Release 11), 3GPP TS 36.321 V11.6.0 (2015-03)
1020	Samsung <i>Sotera</i> Stipulation letter regarding IPR grounds in district court litigation

CLAIM LISTING

Claim 1. [1P] A method for deriving a pathloss change, comprising:

[1A] a UE (User Equipment) derives a first pathloss value from a first pathloss reference of a serving cell, [1B] wherein the first pathloss value is used for deriving a power headroom value included in a first power headroom report;

[1C] the UE derives a second pathloss value from a second pathloss reference of the serving cell after deriving the first pathloss value, [1D] wherein the second pathloss reference is separate from the first pathloss reference and is used for power control for a first Physical Uplink Shared Channel (PUSCH) transmission on the serving cell;

[1E] the UE derives the pathloss change based on the first pathloss value and the second pathloss value; and

[1F] the UE determines whether a second power headroom report is triggered based on whether the pathloss change is more than a threshold.

Claim 2. The method of claim 1, wherein the second power headroom report is transmitted via the first PUSCH transmission when the second power headroom report is triggered.

Claim 3. The method of claim 1, wherein the first pathloss value is used for power control for a second PUSCH transmission on the serving cell, wherein the first power headroom report is transmitted via the second PUSCH transmission.

Claim 4. The method of claim 3, wherein a second downlink control information (DCI) scheduling the second PUSCH transmission indicates the first pathloss reference.

Claim 5. The method of claim 3, wherein the second PUSCH transmission is configured by a parameter ConfiguredGrantConfig and the ConfiguredGrantConfig indicates the first pathloss reference.

Claim 6. The method of claim 1, wherein a first DCI scheduling the first PUSCH transmission indicates the second pathloss reference.

Claim 7. The method of claim 1, wherein the first PUSCH transmission is configured by a parameter ConfiguredGrantConfig and the ConfiguredGrantConfig indicates the second pathloss reference.

Claim 8. The method of claim 1, wherein the first pathloss reference is a pathloss reference with the smallest entry of a pathloss reference configuration of the serving cell when the UE does not transmit any

PUSCH transmission on the serving cell when transmitting the first power headroom report.

Claim 9. The method of claim 8, wherein the pathloss reference configuration is PUSCH-PathlossReferenceRS.

Claim 10. [10P] A method for deriving a pathloss change, comprising:

[10A] a UE (User Equipment) derives a first pathloss value from a first pathloss reference of a serving cell, [10B] wherein the first pathloss value is used for deriving a first power headroom value included in a first power headroom report;

[10C] the UE derives a second pathloss value from a second pathloss reference of the serving cell after deriving the first pathloss value, [10D] wherein the second pathloss reference is separate from the first pathloss reference and is used for deriving a second power headroom value;

[10E] the UE derives the pathloss change based on the first pathloss value and the second pathloss value; and

[10F] the UE determines whether a second power headroom report to include the second power headroom value is triggered based on

whether the pathloss change is more than a threshold.

Claim 11. The method of claim 10, wherein the second pathloss value is not used for power control for a Physical Uplink Shared Channel (PUSCH) transmission on the serving cell.

Claim 12. The method of claim 10, wherein the smallest entry of a pathloss reference configuration of the serving cell is the second pathloss reference.

Claim 13. The method of claim 10, wherein the first pathloss value is used for power control for a PUSCH transmission on the serving cell, wherein the first power headroom report is transmitted via the PUSCH transmission.

Claim 14. The method of claim 13, wherein a downlink control information (DCI) scheduling the PUSCH transmission indicates the first pathloss reference.

Claim 15. The method of claim 13, wherein the PUSCH transmission is configured by a parameter ConfiguredGrantConfig and the ConfiguredGrantConfig indicates the first pathloss reference.

Claim 16. The method of claim 10, wherein the first pathloss reference

is a pathloss reference with the smallest entry of a pathloss reference configuration of the serving cell when the UE does not transmit any PUSCH transmission on the serving cell when transmitting the first power headroom report.

Claim 17. [17P] A User Equipment (UE) for deriving a pathloss change, comprising:

[17A] a control circuit;

[17B] a processor provided with the control circuit; and

a memory operatively coupled to the processor;

[17C] wherein the processor is configured to execute a program code to:

[17Ci] derive a first pathloss value from a first pathloss reference of a serving cell, [17Cii] wherein the first pathloss value is used for deriving a power headroom value included in a first power headroom report;

[17Ciii] derive a second pathloss value from a second pathloss reference of the serving cell after deriving the first pathloss value, wherein the second pathloss reference is

separate from the first pathloss reference and [17Civ] is used for power control for a first Physical Uplink Shared Channel (PUSCH) transmission on the serving cell;

[17Cv] derive the pathloss change based on the first pathloss value and the second pathloss value; and

[17Cvi] determine whether a second power headroom report is triggered based on whether the pathloss change is more than a threshold.

Claim 18. The UE of claim 17, wherein the second power headroom report is transmitted via the first PUSCH transmission when the second power headroom report is triggered.

Claim 19. The UE of claim 17, wherein the first pathloss value is used for power control for a second PUSCH transmission on the serving cell, wherein the first power headroom report is transmitted via the second PUSCH transmission.

Claim 20. The UE of claim 17, wherein the first pathloss reference is a pathloss reference with the smallest entry of a pathloss reference configuration of the serving cell when the UE does not transmit any

PUSCH transmission on the serving cell when transmitting the first power headroom report.

Samsung Electronics Co., Ltd. hereby petitions for *inter partes* review of claims 1-20 of U.S. Patent No. 10,986,585. As shown below, the challenged claims are unpatentable and should not have issued.

I. TECHNICAL BACKGROUND

Mobile devices in wireless communications systems can communicate with a network base station. The fourth and fifth generations of mobile communications standards, known as 4G LTE (“Long Term Evolution”)¹ and 5G NR (“New Radio”), are of interest for this Petition.

In 4G and 5G systems, the mobile terminal is referred to as User Equipment (“UE”). The base station is called an “eNodeB” (“eNB”) in 4G or “gNodeB” (“gNB”) in 5G. Communications from the network to the UE use the *downlink*; communications from the UE use the *uplink*.

A. Uplink Scheduling, Power Control, and Power Headroom Reporting in 4G

The power at which a UE transmits over the uplink is important. If the power is too low, the eNB will not be able to decipher the transmission. EX-1016, p.216. If the power is too high, the UE’s signal

¹ References to LTE are to Release 10, unless otherwise indicated.

can interfere with signals from other UEs and the UE may expend unnecessary battery power transmitting data on the uplink. *Id.* In LTE, UEs engage in two forms of uplink power control: open-loop and closed-loop. *Id.*, p.217. These power control mechanisms are applied to physical data channels such as the Physical Uplink Shared Channel (“PUSCH”). *Id.*, pp.217, 221-223.

LTE open-loop power control calculations use pathloss of the downlink signal. EX-1016, p.217. Downlink pathloss is determined based on a known pathloss reference (a signal of known transmission power). EX-1005, pp.413-415. By determining pathloss of the downlink, the UE gets an indication of channel conditions and distance to the eNB. *Id.* Using open-loop power control, the UE determines its uplink transmit power. EX-1005, pp.413-415; EX-1006, pp.216-223.

Closed-loop power control in LTE is controlled by the eNB. Using closed-loop power control, the UE can receive an indication from the eNB about how to adjust its uplink transmit power. EX-1005, pp.411-420; EX-1006, pp.216-223. LTE UEs transmit an indication of their uplink transmit power—their power headroom—to the eNB in a power headroom report (“PHR”). EX-1019, pp.8, 28-30. Broadly speaking, power

headroom reflects the difference between a maximum transmit power of the UE and the estimated uplink transmit power. EX-1019, pp.28-30; EX-1005, p.644; EX-1006, pp.260-261. Triggers are used to determine whether to transmit a PHR to the eNB. For example, when a timer expires (*prohibitPHR-Timer*) and the pathloss changes by more than a threshold (*dl-PathlossChange*) for at least one activated Serving Cell, or upon expiration of the *periodicPHR-Timer*, a PHR is triggered. EX-1019, pp.28-29.

B. Uplink Power Control and PHR in 5G Technical Specification Development

Two decisions relevant to this Petition were made before the earliest possible effective filing date during development of 5G technical specifications. First, 3GPP decided that uplink power control techniques used in LTE would be incorporated into 5G. EX-1007, pp.1-4. Second, the 3GPP group “RAN 1” decided that power control would be implemented on a per-carrier basis. *Id.*

Because 5G UEs can switch downlink signals (beams), questions arose about when to “trigger” a PHR. EX-1007, pp.2-3; EX-1018, p.2. The ’585 patent purports to answer this question. EX-1001, 1:19-21. As the Petition shows, Patent Owner was not the first to propose the solution it

Developers of 5G standards wanted to determine which pathloss reference to use when determining whether a PHR is triggered. Ericsson suggested using the original beam as the initial reference and the new beam to determine whether the pathloss threshold had been exceeded. EX-1007, p.3. Thus, a PHR is generated and transmitted when the pathloss difference between a new beam and an old beam exceed a threshold. *Id.* Another solution, proposed by Huawei, was to average the pathloss over a first group of beams, and, upon beam switch, average the pathloss over a second group of beams and take the difference between the second group of beams and first group of beams to determine whether to trigger a PHR. EX-1018.

II. THE '585 PATENT

A. The Description

The '585 patent relates to triggering PHRs when multiple pathloss references are used. EX-1001, 1:18-21. PHRs are sent from a UE to the network to allow the network to “realize how much extra transmission power is available in the UE and how to schedule resource to the UE properly, e.g. is it proper to schedule more resource to the UE (e.g., UE has more power headroom).” *Id.*, 6:62-67. The '585 patent also describes

virtual PHRs, which are reported “while there is no current transmission[.]” *Id.*, 7:3-11.

As is evident from the provisional, the specification copies large swaths of prior art 3GPP technical specifications and documents. EX-1004, pp.21-22, 24-79. As with LTE, a PHR can be triggered when the difference between a “current” and a “previous” pathloss value exceed a threshold. EX-1001, 27:10-11, 27:56-60, 31:6-7, 31:28-29, 32:15-17. The ’585 patent proposes many options to address multi-beam scenarios in 5G. There are nine options for choosing the “current pathloss value,” *id.*, 31:6-27, and ten options for determining the “previous pathloss value,” *id.*, 31:29-58. These options can be combined in any way to “form a new embodiment.” *Id.*, 31:59-63, 32:5-20.

The ’585 patent claims are directed to the use of a pathloss reference for a prior PHR as the “previous pathloss value” and a pathloss reference identified when a new beam is used by the UE as the “current pathloss value.” The pathloss difference is used to determine whether to trigger a PHR.

B. Prosecution History

The originally-filed claims were rejected as obvious over

US2017/0359734 (“Lee”) in view of US2015/0282150 (“Nigam”). EX-1003, p.293. Lee triggers a PHR if a “*ProhibitPHR-Timer*” expires and the pathloss has changed by more than “*dl-PathlossChange dB*.” EX-1003, pp.293-294; EX-1014, ¶99. Because Lee discloses that the UE could “measure two or more cell-specific CSI-RS,” the examiner concluded it determined two different pathloss values from a pathloss reference. EX-1003, p.294 (quoting EX-1014, ¶[0131]). The examiner found that Lee was “silent” on use of the second pathloss reference for power control for a PUSCH transmission. EX-1003, p.294. The examiner concluded Nigam disclosed the missing features and concluded that the claims were obvious. *Id.*, pp.293-294.

The applicant disagreed, averring that Lee lacked the second pathloss reference for deriving the second pathloss value. EX-1003, pp.276-283. The examiner disagreed, stating that the two pathloss values to calculate the “*dl-PathlossChange*” showed two pathloss references. EX-1003, p.183.

The claims were amended to require that the “second pathloss reference is separate from the first pathloss reference and is used for power control[.]” EX-1003, pp.152-153, 155. This amendment required

“that the second pathloss value is derived from a second pathloss reference of the serving cell after deriving the first pathloss value, wherein the second pathloss reference is **separate from the first pathloss reference**,” and that the prior art failed to teach this added limitation. EX-1003, pp.156-157 (emphasis original). Because Lee “merely teaches general pathloss measurement based on a single pathloss reference” without a “second pathloss value from a second pathloss reference **after deriving the first pathloss value**,” applicant argued the claims were allowable. *Id.*, p.157. The examiner allowed the claims. EX-1003, pp.14-16.

III. THE POSITA

The person of ordinary skill in the art (“POSITA”) as of May 10, 2018 would have known that the 5G standards-setting process was underway and that 5G specifications were released. EX-1002, ¶¶46-47. The POSITA would have known of PHR techniques and uplink power control using pathloss estimates. *Id.*

The POSITA would have had at least a bachelor’s degree in electrical engineering, computer science, computer networking, or network engineering, and a familiarity with telecommunications. *Id.* The

POSITA would have been familiar with relevant 3GPP standards existing as of May 10, 2018, as well as software for communications protocols. *Id.* A POSITA would have had two years working in wireless communications, though lack of experience may be accommodated with more education, such as a Master's degree with a focus on modern cellular communications technologies (and vice versa). *Id.*, ¶48.

IV. CLAIM CONSTRUCTION

No claim terms require explicit construction in this proceeding and the plain meaning of the terms should apply. For clarity, “first” and “second” as used throughout the claims do not identify a sequence, but instead reflect multiple instances of the same type of thing (*e.g.*, “first pathloss reference” and “second pathloss reference”). *3M Innovative Properties Co. v. Avery Dennison Corp.*, 350 F.3d 1365, 1371 (Fed. Cir. 2003) (“The use of the terms ‘first’ and ‘second’ is common patent-law convention to distinguish between repeated instances of an element.”).

V. PROPOSED GROUNDS AND PRIOR ART STATUS OF REFERENCES

A. The Proposed Grounds Directly Address the Reasons for Allowance.

The '585 patent claims were allowed because they were amended to require two separate pathloss references for determining pathloss in

PHR triggering. *Supra* §III.B. Ericsson and Huawei describe techniques that use separate pathloss references to determine pathloss change and PHR triggering. Ericsson and Huawei were not of record during prosecution and disclose the subject matter that led to the allowance of the claims. Discretionary denial is inappropriate given the non-cumulative nature of the grounds. 35 U.S.C. § 325(d).

B. Prior Art Status and Analogous Art

1. Ericsson

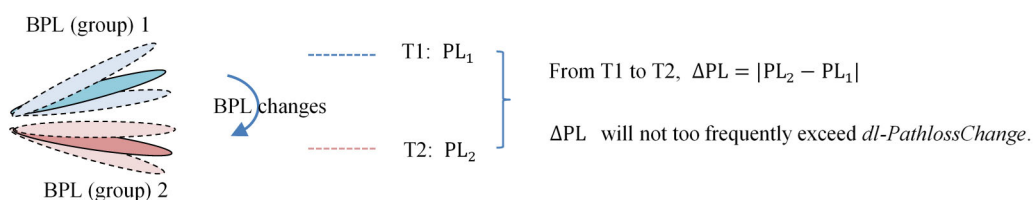
Ericsson describes techniques for selecting a pathloss reference for use in PHR triggering when beam switching occurs. EX-1007, p.3. Pathloss is determined after beam switching occurs based on a comparison between an “old beam” and a “new beam.” *Id.* The pathloss difference may trigger a PHR: “[i]f the DL PL change (referred to as ‘*dl-PathlossChange*’) becomes more than *dl-PathlossChange* dB when switching beam,” a PHR is triggered. *Id.*

Ericsson is analogous to the ’585 patent. Ericsson is a technical contribution submitted to 3GPP TSG RAN WG2 for a meeting held in 2017. EX-1016, ¶54; EX-1007, p.1. Ericsson was submitted to RAN WG2 in 2017, and was made “available on the 3GPP public file server...where an interested member of the public exercising reasonable diligence could

freely access” it. EX-1016, ¶55. Ericsson was publicly available on November 17, 2017. *Id.*, ¶57. Ericsson is prior art under post-AIA 35 U.S.C. §102(a)(1). Because Ericsson describes triggering PHRs, it is in the same field of endeavor as the ’585 patent and is reasonably pertinent to the problems allegedly solved by the ’585 patent, including selecting appropriate pathloss references and criteria for triggering PHRs. EX-1002, ¶55; EX-1007, p.3; EX-1001, 27:50-56.

2. Huawei

Huawei proposes a technique for selecting pathloss references to use to determine whether to trigger a PHR with beam group switching when multiple downlink beams are serving the UE. EX-1018, p.2. The following illustration shows Huawei’s proposal:



EX-1018, p.2. Huawei thus shows that using separate pathloss references to determine whether to trigger a PHR should not have led to the allowance of the ’585 patent claims.

Huawei is analogous prior art to the ’585 patent. Huawei is a

technical contribution submitted to 3GPP TSG RAN WG1 for a meeting held in 2017. EX-1016, ¶88; EX-1018, p.1. Huawei was made “available on the 3GPP public file server...where an interested member of the public exercising reasonable diligence could freely access” it. EX-1016, ¶89. Huawei was publicly available on June 17, 2017. *Id.*, ¶91. Huawei is prior art under post-AIA 35 U.S.C. §102(a)(1). Because Huawei describes triggering PHRs, it is in the same field of endeavor as the ’585 patent and is at least reasonably pertinent to the problem allegedly solved by the ’585 patent, including selecting the appropriate references for determining pathloss and triggering PHRs. EX-1002, ¶57; EX-1018, p.2; EX-1001, 27:50-56.

3. TS38.213

TS38.213 is a 3GPP Technical Specification (version 15.1.0) that describes techniques for use in 5G systems, including uplink power control and PHR. EX-1008, pp.12-24. TS38.213 was made publicly available by 3GPP in March 2018 after the “plenary meeting responsible for” TS38.213. EX-1016, ¶61. TS38.213 was publicly accessible via the 3GPP website because it was uploaded on April 8, 2018. *Id.*, ¶64. TS38.213 is prior art under post-AIA 35 U.S.C. §102(a)(1). TS38.213 is

analogous to the '585 patent because it describes the same techniques, such as uplink power control and PHR. EX-1002, ¶¶63-65.

4. TS38.321

TS38.321 is a 3GPP Technical Specification (version 15.1.0) and describes techniques for use in 5G systems including the handling of Single Entry PHR MAC control elements (“CE”). EX-1009, pp.52-53. Portions of version 15.1.0 of TS38.321 are reproduced in the specification of the '585 patent. EX-1001, 25:31-27:9. TS38.321 is thus both prior art and analogous art. TS38.321 was approved in March 2018 and was publicly available on the 3GPP website by April 2, 2018, thus making it prior art to the '585 patent under post-AIA §102(a)(1). EX-1016, ¶¶67-70.

5. TS38.331

TS38.331 is a 3GPP Technical Specification (version 15.1.0) and describes techniques for use in 5G systems, including configuration of bandwidth parts, including ConfiguredGrantConfig, which is “used to configure uplink transmission without dynamic grant according to two possible schemes.” EX-1011, p.73. This configuration information allows for the configuration of various PUSCH parameters including the pathlossReferenceIndex. *Id.*, pp.73, 75. TS38.331 is referenced in the '585 specification for its discussion of PUSCH power control for an uplink

bandwidth part. EX-1001, 18:18-19:39. TS38.331 is in the same field of endeavor and reasonably pertinent to the problem being solved in the '585 patent, and is therefore analogous art. EX-1002, ¶¶73-74.

6. Samsung

Samsung is an input document to 3GPP which describes several open issues for the NR specifications and discusses “issues on power control for NR-CA and EN-DC,” including techniques for setting parameters for virtual PHRs. EX-1012, pp., 1, 2, 7.

Samsung is analogous prior art to the '585 patent. Samsung is a technical contribution submitted to 3GPP TSG RAN WG1 for a meeting held in April 2018. EX-1016, ¶83; EX-1012, p.1. On April 19, 2018, it was made “available on the 3GPP public file server...where an interested member of the public exercising reasonable diligence could freely access” it. EX-1016, ¶¶84-87. Samsung is prior art under post-AIA 35 U.S.C. § 102(a)(1). Samsung describes techniques for setting parameters used in calculating power headroom, including identifying the pathloss reference, and thus it is in the same field of endeavor as the '585 patent and is reasonably pertinent to the problems allegedly solved by the '585 patent, including selecting references for determining pathloss. EX-1002,

¶¶79-81; EX-1012, p.7; EX-1001, 14:66-15:9. The '585 patent states that an agreement was reached as to “Opt 2” for setting values of j , qd , and l in virtual PHRs expressed in Samsung. EX-1001, 14:66-15:9; EX-1012, p.7.

7. Sorrentino

Sorrentino was filed as a PCT application on January 14, 2014 and is prior art under post-AIA 35 U.S.C. §102(a)(1). Sorrentino describes its “field” as including techniques for “handling uplink transmit power reporting in a radio access network of a cellular radio system.” EX-1017, Abstract, ¶[0002]. This is the same field as the '585 patent, which also relates to PHR and triggering. EX-1001, 1:18-21; EX-1002, ¶88. Sorrentino is reasonably pertinent to the problem being solved by the '585 patent because it describes hardware used in connection with the UE for PHR. EX-1017, ¶[0117], FIG. 15; EX-1002, ¶88.

VI. OVERVIEW OF THE GROUNDS

The following grounds are presented for trial:

Ground	Prior Art and Basis	Claims
1	§103: Ericsson in view of TS38.213	1, 6, 10
2	§103: Ericsson in view of TS38.213 and further in view of TS38.321	2-4, 13-14

Ground	Prior Art and Basis	Claims
3	§103: Ericsson in view of TS38.213 and TS38.321 and further in view of TS38.331	5, 7, 15
4	§103: Ericsson in view of TS38.213 and TS38.321 and further in view of Samsung	8-9, 11-12, 16
5	§103: Ericsson in view of TS38.213 and Sorrentino	17
6	§103: Ericsson in view of TS38.213 and Sorrentino and further in view of TS38.321	18-19
7	§103: Ericsson in view of TS38.213 and Sorrentino and further in view of Samsung	20
8	§103: Huawei in view of TS38.213	1, 10
9	§103: Huawei in view of TS38.213 and further in view of TS38.321	2-3, 13
10	§103: Huawei in view of TS38.213 and TS38.321 and further in view of TS38.331	5, 7, 15
11	§103: Huawei in view of TS38.213 and Sorrentino	17
12	§103: Huawei in view of TS38.213 and Sorrentino and further in view of TS38.321	18-19

VII. DETAILED DISCUSSION

A. Ground 1: Claims 1, 6, and 10 Would Have Been Obvious Over Ericsson in View of TS38.213

1. Claims 1 and 10

a. Preambles [1P], [10P]

If the preambles of claims 1 and 10 are limiting, Ericsson discloses and renders obvious a “**method for deriving pathloss change.**” EX-1002, ¶¶94-97. According to Ericsson, **pathloss change** is **derived** when the UE switches beam: “the UE measures on the new beam by the reference measurement is from the old beam.” EX-1007, p.3. “If the DL PL change (referred to as ‘dl-Pathlosschange’ becomes more than *dl-PathlossChange* dB when switching beam, a new PHR would be triggered.” *Id.* Ericsson’s reference to “DL PL change” and “*dl-PathlossChange*” refers to **pathloss change** as recited in the preambles, and this pathloss change is **derived** from a pathloss measurement on old and new beams. EX-1002, ¶96.

b. Limitations [1A], [10A]

Ericsson discloses that a UE (User Equipment) derives a **first pathloss value from a first pathloss reference of a serving cell** as recited in Limitations [1A] and [10A]. EX-1002, ¶¶98-102. Ericsson’s UE

determines when to report power headroom. “[T]he UE only reports PHR report with respect to beam specific power control.” EX-1007, p.3. To determine whether to send the PHR, “the UE measures on the new beam but the reference measurement is from the old beam” and the “dl-PathlossChange” is derived using pathloss measurements on the “old” and “new” beams. *Id.*; EX-1002, ¶100.

Ericsson discloses pathloss measurements to get a **first pathloss value** on an “old beam”—*i.e.*, the claimed **first pathloss reference of a serving cell**—because a POSITA would have known that the old downlink beam originates from a serving cell and is used as “the reference measurement” to determine a change in downlink pathloss (and thus whether to trigger a PHR). EX-1002, ¶101.

c. Limitations [1B], [10B]

Ericsson in view of TS38.213 renders obvious that **the first pathloss value is used for deriving a power headroom value included in a first PHR** as recited Limitations [1B] and [10B]. EX-1002, ¶¶103-116.

Ericsson discloses that a “UE will maintain one pathloss estimation per beam.” EX-1007, p.3. A POSITA would have known that pathloss

measurements are used to determine both (1) when to trigger a PHR, and (2) calculating a power headroom value to include in the PHR. EX-1002, ¶104. Ericsson explains that when the network receives a PHR, it can “interpret PHR” and thus be informed of “the power headroom situation when PHR is transmitted at the time . . . for each serving cell.” EX-1007, p.3. A POSITA would have understood how to use Ericsson’s first pathloss value (determined from the “old beam”) to derive a power headroom value to include in the PHR. EX-1002, ¶108. While that process was understood from LTE and was set during development of 5G, it is not described in Ericsson.

Using Ericsson’s **first pathloss value for deriving a power headroom value included in a first PHR** is disclosed and rendered obvious by TS38.213. EX-1002, ¶¶110-116. TS38.213 describes UE uplink power control in section 7.7.1. EX-1008, p.24. TS38.213 describes a “Type 1 PH Report,” and explains that:

If a UE transmits PUSCH in PUSCH transmission period i on UL BWP b of carrier f of serving cell c , the UE computes a power headroom for a Type 1 report as

$$\begin{aligned} PH_{type1,b,f,c}(i,j,q_d,l) \\ &= P_{C_{MAX},f,c}(i) \\ &\quad - \left\{ P_{O_{PUSCHb,f,c}}(j) \right. \\ &\quad \left. + 10 \log_{10} \left(2^{\mu} \cdot M_{RB,b,f,c}^{PUSCH}(i) \right) + \alpha_{b,f,c}(j) \right. \\ &\quad \left. \cdot PL_{b,f,c}(q_d) + \Delta_{TF,b,f,c}(i) + f_{b,f,c}(i,l) \right\} [dB] \end{aligned}$$

EX-1008, p.24. Subclause 7.1.1 defines certain of the variables in this expression. *Id.* $PL_{b,f,c}(q_d)$ is defined as “a downlink path-loss estimate in dB calculated by the UE using reference signal (RS) resource q_d for UL BWP b of carrier f of serving cell c .” EX-1008, p.14.

A POSITA would have thus understood that TS38.213 describes **the first pathloss value** ($PL_{b,f,c}(q_d)$) is used **for deriving a power headroom value** ($PH_{type1,b,f,c}(i,j,q_d,l)$) **included in the first PHR**—*i.e.*, a “Type 1” PHR. EX-1002, ¶¶112-114; EX-1008, p.24.

The POSITA would have found it obvious to use Ericsson’s **first pathloss value for deriving a power headroom value included in the first power headroom report** because calculating power headroom for an uplink transmission and reporting it to the network in a PHR to inform the network of the UE’s power headroom value was a known use for pathloss values, as explained further below. *See infra* §VII.B.2; EX-1002, ¶116. This technique was known at least since the

development of LTE. EX-1002, ¶116.

d. Limitations [1C], [10C]

Ericsson discloses and renders obvious a **UE** that **derives a second pathloss value from a second pathloss reference of the serving cell after deriving the first pathloss value, wherein the second pathloss reference is separate from the first pathloss reference.** In Ericsson, the claimed **second pathloss reference of the serving cell** is the “new beam” on which a **second pathloss value** is derived **after deriving the first pathloss value.**

Ericsson explains that after a “change of serving beam” to a second beam, the “UE measures [the pathloss] on the new beam.” EX-1007, p.3. The “new beam” is a **second pathloss reference of the serving cell** and it is **separate from the first pathloss reference** because the new serving beam is a different beam from the one the UE was previously on. EX-1002, ¶119. Ericsson’s **UE derives a second pathloss value from a second pathloss reference of the serving cell** because the “UE measures [the pathloss] on the new beam.” *Id.*, ¶120. And, because the pathloss measurement “on the new beam” occurs after pathloss measurement on the old beam (after a beam switch), it occurs **after**

deriving the first pathloss value as recited in claims 1 and 10. *Id.*

e. **Limitations [1D], [10D]**

Claims 1 and 10 differ as to Limitations [1D] and [10D]. These Limitations are disclosed and rendered obvious by Ericsson in view of TS38.213.

Limitation [1D]. Limitation [1D] requires that the second pathloss reference **is used for power control for a first Physical Uplink Shared Channel (PUSCH) transmission on the serving cell**. Ericsson explains that RAN 1—a group within 3GPP—“already agreed that NR [5G] supports beam specific power control.” EX-1007, p.3. They also agreed that there would be “two power control processes per cell.” *Id.*, p.2. Ericsson states that “one PUSCH [Physical Uplink Shared Channel] transmission should be subject to only one power control process.” *Id.*

TS38.213 describes details of PUSCH power control, and, combined with Ericsson, renders obvious using the second pathloss reference **for power control** for the first PUSCH transmission. TS38.213 states:

If a UE transmits on a PUSCH on UL BWP b of carrier f of serving cell c using parameter set configuration with index j and PUSCH power

control adjustment state with index l , the UE shall determine the PUSCH transmission power $P_{\text{PUSCH},f,c}(i,j,q_d,l)$ in PUSCH transmission period i as

$$P_{\text{PUSCH},f,c}(i,j,q_d,l) = \{P_{\text{CMAX},f,c}(i), P_{\text{O_PUSCH},f,c}(j) + 10 \log_{10}(2^{\mu} \cdot M_{\text{RB},f,c}^{\text{PUSCH}}(i)) + \alpha_{f,c}(j) \cdot PL_{f,c}(q_d) + \Delta_{\text{TF},f,c}(i) + f_{f,c}(i,l)\} [\text{dBm}]$$

where,

* * * * *

$PL_{b,f,c}(q_d)$ is a downlink path-loss estimate in dB calculated by the UE using reference signal (RS) resource q_d for UL BWP b of carrier f of serving cell c .

EX-1008, pp.13-14. Based on the combined teachings of Ericsson and TS38.213, the downlink pathloss estimate ($PL_{b,f,c}(q_d)$) determined on Ericsson's "new beam" is used by the UE to "determine the PUSCH transmission power $P_{\text{PUSCH},f,c}(i,j,q_d,l)$ in PUSCH transmission period i " on that new beam. EX-1008, p.13; EX-1007, p.3; EX-1002, ¶¶127-131. This PUSCH transmission is on "carrier f of serving cell c " and is thus a first PUSCH transmission **on the serving cell**.

A POSITA would have found it obvious to use the second pathloss reference **for power control for a first PUSCH transmission on the**

serving cell for the reasons explained above and further below. *Supra* §VII.A.1.d; *infra* §VII.A.2.

Limitation [10D]. Limitation [10D] requires that the second pathloss reference **is used for deriving a second power headroom value**. This would have been obvious over Ericsson in view of TS38.213. Ericsson explains that when there is a “change of serving beam . . . the UE measures on the new beam” to determine whether the downlink PL exceeds *dl-PathlossChange* dB to trigger a PHR. EX-1007, p.3. Ericsson thus teaches measuring a second pathloss on a second pathloss reference. EX-1002, ¶133. As explained for Limitations [1B] and [10B], according to TS38.213, the measured pathloss value ($PL_{b,f,c}(q_d)$) (here, the second pathloss value from the **second pathloss reference**) would obviously have been used **for deriving a second power headroom value** ($PH_{type1,b,f,c}(i,j,q_d,l)$) using the pathloss ($PL_{b,f,c}(q_d)$) from the **second pathloss reference** after a beam switch to include in a “Type 1” PHR. *Id.*; EX-1008, p.24.

It would have been obvious to use Ericsson’s second pathloss reference for deriving a second power headroom value to include in a PHR sent via the first PUSCH transmission after a beam switch (and thus

change in the pathloss reference) because calculating the power headroom for an uplink transmission and reporting it to the network in a PHR to inform the network of the UE's power headroom value was a known use of power headroom values, as explained herein. *See infra* §VII.B.2; EX-1002, ¶134. This technique had been known at least since the development of the LTE specifications. EX-1002, ¶134.

*f. **Limitation [1E], [10E]***

Ericsson discloses that **the UE derives the pathloss change based on the first pathloss value and the second pathloss value.**

For example, Ericsson explains that:

[I]n the case of a beam switch, that the UE measures on the new beam but the reference measurement is from the old beam. If the DL PL change (referred to as “dl-PathlossChange”) becomes more than dl-PathlossChange dB when switching beam, a new PHR would be triggered. This example explains how the beam switches would operate based on the LTE PHR format and trigger.

EX-1007, p.3; *see also id.* (“When evaluating if a PHR can be triggered during the beam switch, the UE MAC entity may compare PL

measurements between different beams (i.e., the measurements on a new beam but the reference measurements is from the old beam.)). To calculate *dl-PathlossChange*, and determine whether it is “more than *dl-PathlossChange* dB,” the difference is taken between a first pathloss value from the “old beam” and the second pathloss value from the “new beam.” *Id.*; EX-1002, ¶¶136-137. Ericsson’s UE thus derives *dl-PathlossChange* based on the first pathloss value and the second pathloss value.

g. Limitations [1F], [10F]

Limitations [1F] and [10F] require that **the UE determines whether a second power headroom report is triggered based on whether the pathloss change is more than a threshold**. Limitation [10F] further requires that the second PHR **include the second power headroom value**. These limitations are disclosed or rendered obvious by Ericsson alone or in view of TS38.213.

Ericsson explains that the **UE determines whether a second power headroom report is triggered based on whether the pathloss change is more than a threshold** because “a new”—*i.e.*, a second—“PHR would be triggered” when *dl-PathlossChange* “becomes

more than dl-PathlossChange dB when switching beam.” EX-1007, p.3; *see also id.* (“[T]he LTE parameter ‘*dl-PathlossChange*’ is sufficient for PHR during beam-switches.”).

Ericsson also explains that “[u]pon reception of the PHR, the network can interpret PHR accordingly, *i.e.*, the power headroom situation when PHR is transmitted at the time (beginning of the TTI, that used to transmit PHR) for each serving cell.” *Id.* The network is informed of “the power headroom situation when the PHR is transmitted” because the PHR **includes the second power headroom value** derived using the second pathloss reference. EX-1002, ¶142.

At minimum, this additional aspect of Limitation [10F] would have been obvious over Ericsson in view of TS38.213 because TS38.213 explains that the pathloss value ($PL_{b,f,c}(q_d)$) is used to calculate the power headroom ($PH_{type1,b,f,c}(i,j,q_d,l)$) to include in a Type 1 PHR. *Supra* §VII.A.1.c. Using this technique with Ericsson would have been obvious as discussed below. *Infra* §VII.A.3.

2. Claim 6

Claim 6 requires **wherein a first DCI scheduling the first PUSCH transmission indicates the second pathloss reference.**

This claim would have been obvious over Ericsson in view of TS38.213.

Ericsson describes using a **second pathloss reference** to determine whether to trigger a new PHR in a beam switching scenario. *Supra* §VII.A.1.d. Ericsson does not discuss scheduling PUSCH transmissions. Scheduling PUSCH transmissions using DCI and having the DCI indicate the pathloss reference for PHR calculations is described by TS38.213.

TS38.213 explains that DCI, such as “DCI format 0_1,” is used to schedule PUSCH transmissions. EX-1008, p.13 (“If the PUSCH transmission is scheduled by a DCI format 0_1 . . .”). “DCI format 0_1” can **indicate the second pathloss reference** because “[i]f the PUSCH transmission is scheduled by DCI format 0_1 and if the DCI format 0_1 includes a SRI field, the UE determines the RS resource q_d from the value of *pusch-pathlossreference-index* that is mapped to the SRI field value.” *Id.* Thus, the **pathloss reference** (“RS resource q_d ”) is determined from value *pusch-pathlossreference-index* mapped to the SRI field value in DCI format 0_1. EX-1002, ¶146.

It would have been obvious to implement Ericsson to schedule a first PUSCH using DCI format 0_1 and identify the second pathloss

reference using the DCI format 0_1 with an SRI field as disclosed in TS38.213 for the reasons explained below. *Infra* §VII.A.3.

3. Obviousness of Claims 1, 6, and 10; Motivation to Combine.

A POSITA would have found it obvious to implement uplink power control and PHR techniques from TS38.213 with Ericsson's techniques for triggering PHRs with beam switching. EX-1002, ¶¶89-147. Ericsson does not explicitly describe how to calculate power headroom from the pathloss reference and instead presumes the reader knows how. A POSITA would naturally have looked to expressions for calculating power headroom values found in TS38.213. EX-1002, ¶89. Ericsson was intended to be used in NR systems and methods, and a POSITA would have been led to NR specifications for other techniques that are used to calculate power headroom for NR. EX-1002, ¶90.

A POSITA would have found it obvious to use the pathloss value from the pathloss reference to perform uplink power control as set forth in TS38.213 for these same reasons: Ericsson and TS38.213 were designed to be used in NR systems, and both describe using pathloss references for various purposes, including performing uplink power control (to be performed on a per-beam basis), and determining whether

to trigger a PHR. EX-1002, ¶90.

Finally, a POSITA would have looked to TS38.213 to determine how to identify which pathloss reference to use based on a DCI that schedules a PUSCH. EX-1002, ¶91. A POSITA considering Ericsson would have looked for techniques to determine which of numerous pathloss references to use for, *e.g.*, uplink power control, determining whether to trigger a PHR, and for calculating the power headroom value. *Id.* A known technique for identifying the pathloss reference was to look at the DCI used to schedule the PUSCH transmission. Using this known technique in combination with Ericsson's system would have used a prior art technique for its known purpose with predictable results, including being able to use the DCI to identify the pathloss reference to use for various purposes by the UE. *Id.*

Indeed, a POSITA would have looked to the 3GPP technical specifications for NR, including TS38.213, to identify procedures to be implemented on Ericsson's UE because the technical specifications described known procedures intended to be used in NR-compatible UEs with expected results of being able to communicate over interoperable wireless communication networks. EX-1002, ¶92. A POSITA would have

reasonably expected to succeed in making the claimed combinations because Ericsson and TS38.213 were designed to be used together in NR-compatible UEs. *Id.*

B. Ground 2: Claims 2-4 and 13-14 Would Have Been Obvious Over Ericsson in View of TS38.213 and Further in View of TS38.321.

1. Claim 2

Claim 2 recites **wherein the second power headroom report is transmitted via the first PUSCH transmission when the second power headroom report is triggered**. This would have been obvious over Ericsson in view of TS38.213 and further in view of TS38.321.

Ericsson describes triggering “a new PHR” (**a second power headroom report**) when *dl-PathlossChange* exceeds *dl-PathlossChange* dB. EX-1007, p.3. When triggered, Ericsson’s PHR is—or at least obviously would have been—**transmitted via the first PUSCH transmission**.

TS38.321 describes how a PHR is provided from the MAC layer to the physical layer for transmission. A “Single Entry PHR MAC CE” is an example of a MAC control element. EX-1009, pp.52-53. A MAC entity of the UE handles transport channels such as the UL-SCH (uplink shared channel). EX-1009, p.9. A POSITA would have known that the UL-SCH

is transmitted over the PUSCH. EX-1002, ¶¶156-157 (citing EX-1010, p.7 (“The physical-layer model for Uplink Shared Channel transmission is described based on the corresponding PUSCH physical-layer-processing chain[.]”)). Thus, a PHR is included in a MAC CE and is conveyed by the MAC entity of the UE on the UL-SCH transport channel, which is physically transmitted via PUSCH to the network. EX-1002, ¶157. Thus, the **second PHR is transmitted via the first PUSCH transmission** after a beam switch and the **second PHR** is triggered as described above.

A POSITA would have found it obvious to transmit the second PHR via the first PUSCH transmission when the PHR is triggered based on Ericsson in view of TS38.213 and further in view of TS38.321 because Ericsson’s PHR triggering and reporting techniques were intended to be used in NR, and TS38.213 and TS38.321 are NR specifications which describe PHR and transmission of MAC CEs, like PHR MAC CEs, as described further below. EX-1002, ¶158; *infra* §VII.B.4.

2. Claims 3 and 13

Claim 3 requires **the first pathloss value is used for power control for a second PUSCH transmission on the serving cell, wherein the first power headroom report is transmitted via the**

second PUSCH transmission. Claim 13 is the same as claim 3 except that it omits the word “second.” Ericsson in view of TS38.213 and further in view of TS38.321 renders both claims 3 and 13 obvious.

As explained above, the **first pathloss value** is determined using the “old beam” before a beam switch. *Supra* Limitation [1A]. Ericsson does not explicitly state that the first pathloss value is used for **power control for a second PUSCH**, but using a pathloss value measured on the “old beam” to control the power used to transmit on the PUSCH transmission associated with that old beam is a technique that would have been obvious over TS38.213. EX-1002, ¶162. TS38.213 defines the expression for determining PUSCH transmit power $P_{\text{PUSCH},f,c}(i,j,q_d,l)$ using $PL_{b,f,c}(q_d)$, which is the downlink path-loss estimate in dB. EX-1008, pp.13-14.

The **first power headroom report** is a PHR transmitted while the UE measures pathloss on the “old beam” as described above. *Supra* Limitation [1B]. A POSITA would have found it obvious to transmit that **first power headroom report via the second PUSCH transmission**—*i.e.*, on the uplink beam used before beam switching—based on TS38.321, which explains that PHR MAC CEs are transmitted

via PUSCH, as described in connection with claim 2. *Supra* §VII.B.1.

It would have been obvious to include in Ericsson a technique where the **first pathloss value** is used for **power control for a second PUSCH transmission on the serving cell** and the **first power headroom report is transmitted via the second PUSCH transmission** based on TS38.213 and TS38.321 for the reasons explained above in connection with claim 2 and further below, *infra* §VII.B.4.

3. Claims 4 and 14

Ericsson in view of TS38.213 and further in view of TS38.321 render obvious **wherein a second downlink control information (DCI) scheduling the second PUSCH transmission indicates the first pathloss reference** as recited in claim 4. Claim 14 omits the word “second” when referring to the DCI and PUSCH transmission but is otherwise the same as claim 4. Ericsson in view of TS38.213 and further in view of TS38.321 renders both claims 4 and 14 obvious.

As explained above, Ericsson describes a **second PUSCH transmission**—*i.e.*, one transmitted before a beam switch and using the “old beam” as the pathloss reference. TS38.213 describes how a UE

identifies the pathloss reference to use for calculating the PUSCH transmission power. EX-1008, pp.13-14. As explained above, TS38.213 explains that “ $PL_{b,f,c}(q_d)$ is a downlink path-loss estimate in dB calculated by the UE using reference signal (RS) resource q_d for UL BWP b of carrier f of serving cell c .” *Id.*, p.14. One of the methods to identify the pathloss reference is described by TS38.213:

If the PUSCH transmission is scheduled by a DCI format 0_1 and if the DCI format 0_1 includes a SRI field, the UE determines the RS resource q_d from the value of *pusch-pathlossreference-index* that is mapped to the SRI field value.

EX-1008, p.14. Thus, TS38.213 discloses using **downlink control information (DCI)**—*i.e.*, “DCI format 0_1” **scheduling the second PUSCH** transmission—*i.e.*, transmission on PUSCH before Ericsson’s beam switch—and the DCI **indicates the first pathloss reference**—*i.e.*, the “RS resource q_d ” as indicated by *pusch-pathlossreference-index*. *Id.*; EX-1002, ¶167. The DCI would have obviously been a “second” DCI because different DCI would have been used to schedule PUSCH before and after a beam switch in the combined Ericsson-TS38.213-TS38.321 techniques. *Id.*

It would have been obvious to use **a second downlink control information (DCI) scheduling the second PUSCH transmission** which **indicates the first pathloss reference** in the context of Ericsson. These claimed techniques were defined in NR specifications and Ericsson's techniques were designed for NR. *Infra* §VII.B.4. Thus, claims 4 and 14 would have been obvious over Ericsson in view of TS38.213 and further in view of TS38.321.

4. Obviousness of Claims 2-4 and 13-14; Motivation to Combine.

A POSITA would have found it obvious to implement techniques from TS38.213 and TS38.321 with Ericsson's PHR triggering techniques. EX-1002, ¶¶148-150. Ericsson does not explicitly state that the PHR is transmitted "via" a first or second PUSCH. Yet, TS38.321 explains how MAC CEs, including the MAC CE for PHR, are conveyed to the physical layer via the UL-SCH transport channel to be transmitted over the air via a PUSCH transmission. EX-1002, ¶148. A POSITA would have looked to TS38.321 for discussion of how a PHR is conveyed from the MAC layer over the air via the physical layer. *Id.* A POSITA would thus have found it obvious to transmit Ericsson's PHR via the claimed PUSCH transmissions because this was a known way for a PHR to be transmitted

from the UE to the network. *Id.*

A POSITA considering Ericsson would also have looked for techniques to determine which of numerous possible pathloss references to use for various purposes, including uplink power control, determining whether to trigger a PHR, and calculating the power headroom value. EX-1002, ¶149. A known technique for identifying the pathloss reference was to use the DCI used to schedule PUSCH transmissions to indicate the pathloss reference. Using this known technique in connection with Ericsson's prior art system would have used a prior art technique for its known purpose with the predictable result of being able to use the DCI to identify the pathloss reference to use for various UE processes. *Id.*

A POSITA would have looked to 3GPP NR specifications, including TS38.213, to identify additional procedures for Ericsson's UE because the specifications described known procedures for use in NR-compatible UEs with expected results of being able to communicate over interoperable wireless communication networks. EX-1002, ¶150. A POSITA would have reasonably expected to succeed in making the claimed combinations because Ericsson and TS38.213 were designed to be used together in NR-compatible UEs. *Id.*

C. Ground 3: Claims 5, 7, and 15 Would Have Been Obvious Over Ericsson in View of TS38.213 and TS38.321 and Further in View of TS38.331.

1. Claims 5 and 7

Ericsson in view of TS38.213 and TS38.321 and further in view of TS38.331 render obvious **the second [first]² PUSCH transmission is configured by a parameter ConfiguredGrantConfig and the ConfiguredGrantConfig indicates the first [second] pathloss reference** as recited in claims 5, 7, and 15.

Ericsson's **second PUSCH transmission** is a PUSCH transmission that occurs before a beam switch, as explained above, and the **first PUSCH transmission** is a PUSCH transmission that occurs after beam switching. *Supra* §VII.A.1.d. NR standards included several ways to configure PUSCH transmissions and identify the pathloss reference for use with uplink power control. EX-1002, ¶174. One way to configure PUSCH transmissions and identify the pathloss reference applies when configuring a bandwidth part. EX-1011, p.64. In NR, “at least an initial bandwidth part comprising of at least a downlink

² Claim 15 does not recite “first” or “second” PUSCH transmission. This analysis applies equally to claim 15.

bandwidth part and” one or two uplink BWPs are configured. *Id.* “The IE *ConfiguredGrantConfig* is used to configure uplink transmission without dynamic grant according to two possible schemes. The actual uplink grant may either be configured via RRC (type1) or provided via the PDCCH (addressed to CS-RNTI) (type2).” *Id.*, p.73. Therefore, TS38.331 discloses that a **PUSCH transmission is configured by a parameter ConfiguredGrantConfig**. EX-1002, ¶174. This technique would have been applicable to Ericsson’s first and second PUSCH transmission before and after beam switching. *Id.*

ConfiguredGrantConfig includes “pathlossReferenceIndex,” which indicates **the [first/second] pathloss reference** to use with power control for the applicable PUSCH transmission and to determine whether to trigger a PHR.

```
--ASN1START
--TAG-CONFIGUREDGRANTCONFIG-START
ConfiguredGrantConfig ::= SEQUENCE {
    mcsAndTBS INTEGER (0..31),
    -- Enables intra-slot frequency hopping with the given frequency hopping offset
    -- Corresponds to L1 parameter 'UL-TWG-hopping' (see 38.214, section FFS_Section)
    frequencyHoppingOffset INTEGER (1..maxNrofPhysicalResourceBlocks-1),
    pathlossReferenceIndex INTEGER (0..maxNrofPUSCH-PathlossReferenceRSs-1),
    ...
}
OPTIONAL --Cond-Type
```

EX-1011, pp.73, 75. Therefore, TS38.331 describes the additional requirements of claims 5, 7, and 15.

It would have been obvious to use **ConfiguredGrantConfig** to configure Ericsson's first and second **PUSCH transmissions** and to **indicate the** first and second **pathloss references** (before and after beam switching) because Ericsson was intended to be used in NR and TS38.213, TS.38.321, and TS38.331 are part of the NR specification; this would have led a POSITA to combine the described techniques. EX-1002, ¶176. Additionally, a POSITA considering Ericsson would have looked for known techniques to configure the PUSCH transmission before and after beam switching, to identify the reference to use for determining pathloss to use for PUSCH power control, and to determine whether to transmit a PHR. *Id.* A POSITA would have been aware that 3GPP specified techniques for configuring PUSCH transmissions and for identifying the pathloss reference. EX-1002, ¶177. A POSITA would have found it obvious to use the 3GPP-specified techniques, such as using **ConfiguredGrantConfig**, to configure Ericsson's second PUSCH and identify the pathloss reference for uplink power control and PHR triggering. *Id.*

Not only is the combination of these references suggested implicitly by their context as part of NR standard-setting, the combination of

TS38.331 with Ericsson-TS38.213-TS-38.321 would have merely combined prior art techniques according to known methods to achieve predictable results—namely, combining Ericsson’s technique for triggering PHRs with beam switching with techniques specified by the specifications for identifying the pathloss reference to use for determining downlink pathloss and configuring PUSCH transmissions, including TS38.213, TS38.321, and TS38.331. EX-1002, ¶178.

D. Ground 4: Claims 8-9, 11-12, and 16 Would Have Been Obvious Over Ericsson in View of TS38.213 and TS38.321 and Further in View of Samsung.

1. Claims 8 and 16

Ericsson in view of TS38.213 and TS38.321 and further in view of Samsung would have rendered obvious **wherein the first pathloss reference is a pathloss reference with the smallest entry of a pathloss reference configuration of the serving cell when the UE does not transmit any PUSCH transmission on the serving cell when transmitting the first power headroom report** as recited in claims 8 and 16. EX-1002, ¶¶182-191. These claims address a scenario related to virtual PHR—*i.e.*, a PHR generated when a PUSCH is not transmitted to the serving cell. EX-1002, ¶183.

As explained above, Ericsson discloses **a first pathloss**

reference—*i.e.*, the “old beam.” *Supra* §V.B.1. TS38.213 describes circumstances **when the UE does not transmit any PUSCH transmission on the serving cell when transmitting the first power headroom report.** In describing a “Type 1 PH Report,” TS38.213 explains that:

If the UE does not transmit PUSCH in PUSCH transmission period i on UL BWP b of carrier f of serving cell c , the UE computes a power headroom for a Type 1 report as

$$PH_{\text{type1 } b, f, c}(i, j, q_d, l) = \tilde{P}_{\text{CMAX}, f, c}(i) - \left\{ P_{\text{O_PUSCH}, b, f, c}(j) + \alpha_{b, f, c}(j) \cdot PL_{b, f, c}(q_d) + f_{b, f, c}(i, l) \right\}$$

[dB]

where $\tilde{P}_{\text{CMAX}, f, c}(i)$ is computed assuming MPR=0dB, A-MPR=0dB, P-MPR=0dB. DT_C =0dB. MPR, A-MPR, P-MPR and DT_C are defined in [8-1, TS 38.101-1] and [8-2, TS38.101-2].

EX-1008, p.24. TS38.213 thus describes a situation in which a PHR is calculated **when the UE does not transmit any PUSCH transmission on the serving cell.** EX-1002, ¶¶185-186.

Samsung describes submissions for NR uplink power control for use with carrier aggregation. EX-1012, p.1. Samsung states that one open issue was the default parameter settings for virtual PHR—*i.e.*, a PHR

transmitted when there is no PUSCH transmission—thus requiring the use of reference values in the reporting process rather than PUSCH power. EX-1013, ¶[183] (“[F]or an uplink carrier which has not been determined in or before the second reference subframe to transmit a PUSCH in the first reference subframe, the UE determines the PHR type of the uplink carrier as a virtual PHR.”).

Samsung describes setting default parameters for a virtual PHR. EX-1012, p.6. One of those parameters is the pathloss reference, q_d , which is set using “*pusch-pathlossreference-index=0* of *pusch-pathloss-Reference-rs*.” EX-1012, p.7. *pusch-pathloss-Reference-rs* is the **pathloss reference of the serving cell** and *pusch-pathlossreference-index=0* is the **pathloss reference with the smallest entry** (*i.e.*, “0”) of the **pathloss reference configuration** (*pusch-pathloss-Reference-rs*). EX-1012, p.7; EX-1002, ¶189.

Therefore, the combined teachings of Ericsson, TS38.213, and Samsung disclose that when a virtual PHR is transmitted (*i.e.*, **when the UE does not transmit any PUSCH transmission on the serving cell when transmitting the first power headroom report**) the first pathloss reference is a pathloss reference (q_d) with the smallest

entry of a pathloss reference configuration of the serving cell (q_d is set to “ q_d , *pusch-pathlossreference-index*=0 of *pusch-pathloss-Reference-rs*”). EX-1002, ¶190. The obviousness of using this technique in combination with Ericsson is described below. *Infra* §VII.D.5.

2. Claim 9

Ericsson in view of TS38.213, TS38.321, and further in view of Samsung renders obvious **wherein the pathloss reference configuration is PUSCH-PathlossReferenceRS** as recited in claim 9. As explained in the discussion of claim 8, the smallest entry of a pathloss reference is *pusch-pathlossreference-index*=0 of *pusch-pathloss-Reference-rs*. *Supra* §VII.D.1. Thus, the pathloss reference configuration is “***pusch-pathloss-Reference-rs***” as recited in claim 9. EX-1012, p.7; EX-1002, ¶¶192-193. The obviousness of using this technique in combination with Ericsson is described below. *Infra* §VII.D.5.

3. Claim 11

Ericsson in view of TS38.213, as applied to claim 10 above, and further in view of Samsung renders obvious **wherein the second pathloss value is not used for power control for a Physical Uplink Shared Channel (PUSCH) transmission on the serving cell** as recited in claim 11. Specifically, Samsung describes aspects of a “virtual

power headroom report,” which a POSITA knew was used when there was no scheduled uplink PUSCH transmission. EX-1002, ¶195.

As explained above in connection with Claim 8, there are instances in which there is no PUSCH scheduled in a time-period *i*. *Supra* §VII.D.1. Thus, a virtual PHR may be granted and transmitted. *Id.* When a virtual PHR is generated there is no PUSCH transmission to perform power control on. Thus, the second pathloss value is not used for power control for a PUSCH transmission on the serving cell when it is used in a virtual PHR after beam switching in the context of Ericsson. EX-1002, ¶195.

The obviousness of using this technique in combination with Ericsson is described below. *Infra* §VII.D.5.

4. Claim 12

Ericsson in view of TS38.213, as applied to claim 10, and further in view of Samsung render obvious **wherein the smallest entry of a pathloss reference configuration of the serving cell is the second pathloss reference** as recited in claim 12.

As explained above in connection with Claim 8, when no PUSCH transmission is scheduled at time *i*, a virtual PHR may be transmitted as explained by Samsung and suggested by TS38.213. *See supra* §VII.D.1.

When a virtual PHR is generated, Samsung explains that the pathloss reference signal (RS) q_d^3 is set using “*pusch-pathlossreference-index=0* of *pusch-pathloss-Reference-rs*.” EX-1007, p.7. *pusch-pathloss-Reference-rs* is the **pathloss reference of the serving cell** and *pusch-pathlossreference-index=0* is the **pathloss reference with the smallest entry** (i.e., “0”) of the **pathloss reference configuration** (*pusch-pathloss-Reference-rs*). The obviousness of using this technique in combination with Ericsson is described below. *Infra* §VII.D.5.

**5. Obviousness of Claims 8-9, 11-12, and 16;
Motivation to Combine.**

It would have been obvious to further modify Ericsson to generate a virtual PHR when the UE does not transmit a PUSCH transmission on the serving cell when transmitting a PHR. EX-1002, ¶¶179-180. In this scenario, it would have been obvious to identify the pathloss reference as being the smallest entry of a pathloss reference configuration of the serving cell in view of TS38.213 and Samsung. *Id.*, ¶180. A POSITA would have been motivated to add known processes for transmission of virtual PHRs because it would allow the UE to report power headroom

³ q_d means “reference signal (RS) resource.” EX-1008, p.14.

even when a PUSCH is not scheduled, thus allowing the network to better manage performance and resource allocation. *Id.*, ¶179.

Additionally, in implementing virtual PHRs with Ericsson, a POSITA would have obviously implemented Samsung's technique to identify the pathloss reference (q_d) as the smallest entry of a pathloss reference configuration, and to use PUSCH-PathlossReferenceRS as the pathloss reference configuration. EX-1002, ¶180. Doing so would have combined a known technique for identifying the pathloss reference to use to calculate power headroom for a virtual PHR, according to known methods of implementing techniques for PHR in wireless systems such as NR to achieve predictable results by allowing a virtual PHR to be sent using an appropriate pathloss reference. *Id.* Indeed, the '585 patent admits that this technique was adopted by 3GPP already. EX-1001, 14:66-15:6. A POSITA would have reasonably expected to succeed in combining these techniques for PHR because they were intended to be implemented together in NR. EX-1002, ¶180.

E. Ground 5: Claim 17 Would Have Been Obvious Over Ericsson in View of TS38.213 and Sorrentino.

1. Preamble [17P]

Even if the preamble of claim 17 is a limitation, it would have been

obvious to have a **User Equipment (UE) for deriving a pathloss change** based on Ericsson in view of TS38.213 in view of Sorrentino. EX-1002, ¶¶204-206.

Ericsson describes techniques used for power control and PHR reporting from a UE for use with beam switching in NR applications. As described above. TS38.213 describes “Uplink Power Control,” and various UE behaviors as described in connection with claims 1 and 10. *Supra* §VII.A.1.

Sorrentino describes a UE that includes the hardware of claim 17, discussed below. EX-1017, FIG. 15. It would have been obvious to use Sorrentino’s hardware to implement the combined techniques defined by Ericsson in view of TS38.213.

2. Limitations [17A], [17B], and [17C]

Ericsson in view of TS38.213 and Sorrentino disclose a **control circuit** (Limitation 17[A]); a **processor provided with the control circuit; and a memory operatively coupled to the processor** (Limitation [17B]), where the **processor is configured to execute a program code**. Specifically, Sorrentino discloses the hardware recited in these limitations of claim 17 as illustrated below:

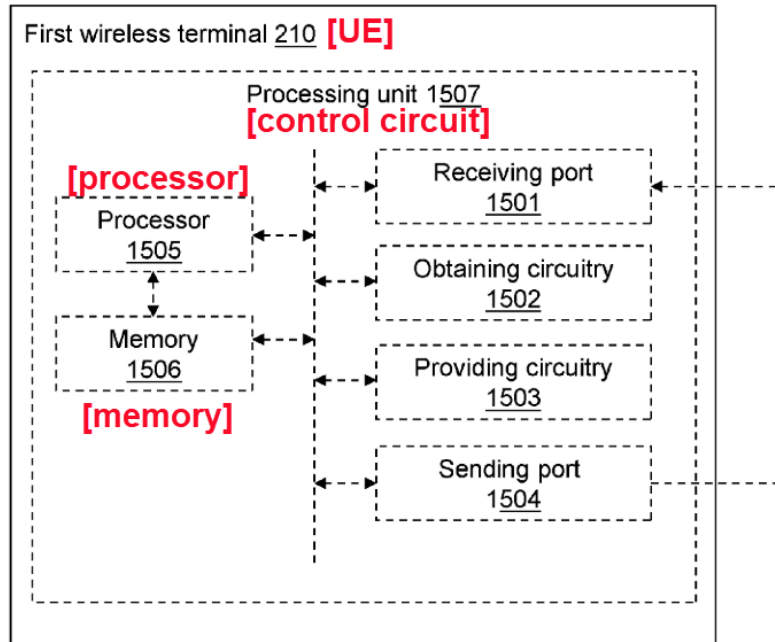


Fig. 15

EX-1017, FIG. 15 (annotated); EX-1002, ¶208.

Sorrentino's UE can be used with PHR transmission. EX-1017, ¶[0066] ("The first wireless terminal 210 provides a . . . PHR[.]"). Sorrentino's first wireless terminal is a UE. *Id.*, ¶[0003]. "[T]he first wireless terminal 210 may comprise an arrangement schematically depicted in FIG. 15." *Id.*, ¶[0152]. Sorrentino's UE includes a **control circuit** ("processing unit 1507"). EX-1017, FIG. 15; ¶¶[0164]-[0165] ("wireless terminal 210 may comprise a processing unit 1507, which may comprise one or more" circuits); EX-1002, ¶¶209-211.

Sorrentino discloses a **processor provided with the control**

circuit depicted as item 1505 in FIG. 15. EX-1017, FIG. 15, ¶[0159] (“[F]irst wireless terminal 210 may be...implemented through...processor 1505 depicted in FIG. 15[.]”).

Sorrentino discloses **a memory operatively coupled to the processor** in FIG. 15. EX-1017, FIG. 15; ¶[0163] (“The wireless terminal 210 may further comprise a memory 1506...arranged to store...applications involved in or for performing the functions and actions of embodiments herein.”). FIG. 15 shows Sorrentino’s memory operatively coupled to the processor. *Id.*, FIG. 15; EX-1002, ¶213.

Because Sorrentino’s processor is configured to execute the processes associated with transmitting PHRs, the **processor is configured to execute a program code** to carry out specified methods. EX-1017, ¶[0164] (“[P]orts and circuitry 1501-1505 may refer to...processors configured with software and/or firmware (e.g., stored in memory) that, when executed by the one or more processors such as the processor 1505, perform as described above.”). Therefore, Sorrentino describes the UE hardware recited in claim 17. EX-1002, ¶¶214-215.

It would have been obvious to use Sorrentino’s UE hardware to implement the combined techniques of Ericsson and TS38.213 for the

reasons described below. *Infra* §VII.E.4.

3. Limitations [17Ci]-[17Cvi]

Claim 17's recited functionality tracks Limitations [1A]-[1F]. The analysis of claim 1 is thus applicable to claim 17. *Supra* §VII.A.1. It would have been obvious to implement the combined techniques of Ericsson in view of TS38.213 in Sorrentino's hardware, including control circuitry, processor, and memory, for the reasons explained below. *Infra* §VII.E.4.

4. Obviousness of Claim 17; Motivation to Combine

Claim 17 would have been obvious over Ericsson in view of TS38.213 and Sorrentino. EX-1002, ¶¶200-202. Reference is made to discussion of why the procedures for triggering a PHR with beam switching in an NR system would have been obvious over the combined teachings of Ericsson and TS38.213. *Supra* §VII.A.3. The functionality of the processor recited in claim 17 would have been obvious for those same reasons.

It would have further been obvious to look to known hardware for implementing the uplink power headroom reporting and power control described by the combined teachings of Ericsson and TS38.213. EX-1002, ¶201. A POSITA would have known that Ericsson and TS38.213, specified functionality that may be supported by NR-compatible UEs, but

do not dictate hardware to be used to implement that functionality. *Id.*

The POSITA would have looked to references like Sorrentino to implement the functionality of Ericsson and TS38.213 in a UE. Including the functionality of Ericsson in view of TS38.213 in software stored in Sorrentino's memory and executed by Sorrentino's processor in its control circuitry would have been an obvious way to implement the combined teachings of Ericsson and TS38.213. *Id.*

The claimed subject matter employs Sorrentino's known hardware for its intended purpose—processing instructions to support wireless communications, including power headroom reporting. EX-1017, ¶¶[0152], [0159], [0163], [0164]-[0165]; EX-1002, ¶202. Combining Ericsson and TS38.213 with Sorrentino's hardware would have merely combined prior art elements (the functionality of the combined teachings of Ericsson and TS38.213) according to known methods (implementing communications techniques in software/firmware) to yield predictable results (a UE that can implement technical specifications for cellular communications). *Id.*

F. Ground 6: Claims 18-19 Would Have Been Obvious Over Ericsson in View of TS38.213 and Sorrentino and Further in View of TS38.321.

1. Claim 18

Claim 18 tracks the language of claim 2 but is recited as functionality that the processor of claim 17 is configured to perform. The functionality specified in claim 18 would have been obvious over the combined teachings of Ericsson in view of TS38.213 and further in view of TS38.321 as explained for claim 2. *Supra* §VII.B.1. It would have been obvious to implement the functionality specified in claim 18 in Sorrentino's hardware for the reason explained in connection with claim 17. *Supra* §VII.E.

2. Claim 19

Claim 19 tracks the language of claim 3 but is recited as functionality that the processor of claim 17 is configured to perform. The functionality specified in claim 19 would have been obvious over the combined teachings of Ericsson in view of TS38.213 and further in view of TS38.321 as explained for claim 3. *Supra* §VII.B.2. It would have been obvious to implement the functionality specified in claim 19 in Sorrentino's hardware for the reason explained in connection with claim 17. *Supra* §VII.E.

G. Ground 7: Claim 20 Would Have Been Obvious Over Ericsson in View of TS38.213 and Sorrentino and Further in View of Samsung.

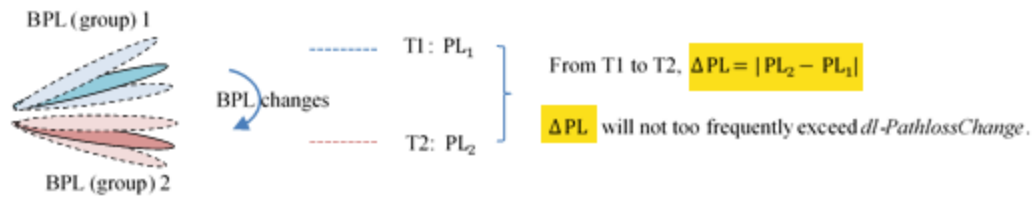
Claim 20 tracks the language of claim 8 but is recited as functionality that the processor of claim 17 is configured to perform. The functionality specified in claim 20 would have been obvious over the combined teachings of Ericsson in view of TS38.213 and further in view of Samsung as explained for claim 8. *Supra* §VII.D.1. It would have been obvious to implement the functionality specified in claim 20 in Sorrentino’s hardware for the reason explained in connection with claim 17. *Supra* §VII.E.

H. Ground 8: Claims 1 and 10 Would Have Been Obvious Over Huawei in View of TS38.213

1. Claims 1 and 10

a. Preambles [1P], [10P]

Insofar as the preambles of claims 1 and 10 are limiting, Huawei discloses and renders obvious a “**method for deriving pathloss change.**” EX-1002, ¶¶224-226. According to Huawei, **pathloss change** is **derived**: “a change in pathloss (ΔPL) can be determined,” illustrated below. EX-1018, p.2.

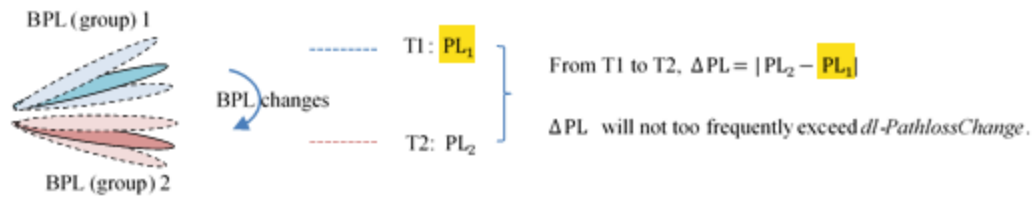


EX-1018, p.2; EX-1002, ¶226.

b. Limitations [1A], [10A]

A POSITA would have understood that Huawei discloses a **UE (User Equipment) derives a first pathloss value from a first pathloss reference of a serving cell** as recited in Limitations [1A] and [10A]. EX-1002, ¶¶227-229. A POSITA would have understood that Huawei discusses techniques to be implemented on UEs because it relates to calculating a PHR transmitted from a UE to the network, and discusses “uplink power control,” which is the link from the UE to the network. EX-1018, pp.1-2; EX-1002, ¶227. Huawei’s techniques are performed by the UE. *Id.*

Huawei’s UE derives the **first pathloss reference value from a first pathloss reference of a serving cell** because it describes calculating “PL₁” (pathloss reference value 1) based on “BPL (group) 1” (a first pathloss reference of a serving cell), shown below:



EX-1018, p.2 (annotated). The beams would have been understood to originate from a serving cell that serves the UE and provides data over the downlink to the UE, because the serving cell is the network entity that provides radio resources to the UE. EX-1002, ¶229.

c. Limitations [1B], [10B]

Huawei in view of TS38.213 renders obvious that **the first pathloss value is used for deriving a power headroom value included in a first PHR** as recited Limitations [1B] and [10B]. EX-1002, ¶¶230-236. In Huawei’s multi-beam operation, “each BPL (group) would lead to one PH value,” where “PH” is power headroom. EX-1018, p.2; EX-1002, ¶231. Huawei also explains how PH values are reported in PHRs. EX-1018, p.2 (“the UE could collect beams with large PL change and report the PHs of them.”).

Even if Huawei did not disclose using the **first pathloss value** for **deriving a power headroom value to be included in a first PHR**, this would have been obvious over TS38.213. EX-1002, ¶¶233-236.

TS38.213 describes that **the first pathloss value is used for deriving a power headroom value included in a first power headroom report** in its description of UE uplink power control. EX-1008, p.24.

TS38.213 describes a “Type 1 PH Report,” explaining that:

If a UE transmits PUSCH in PUSCH transmission period i on UL BWP b of carrier f of serving cell c , the UE computes a power headroom for a Type 1 report as

$$\begin{aligned}
 PH_{type1,b,f,c}(i,j,q_d,l) &= P_{CMAX,f,c}(i) \\
 &- \left\{ P_{O_{PUSCHb,f,c}}(j) \right. \\
 &+ 10 \log_{10} \left(2^{\mu} \cdot M_{RB,b,f,c}^{PUSCH}(i) \right) + \alpha_{b,f,c}(j) \\
 &\left. \cdot PL_{b,f,c}(q_d) + \Delta_{TF,b,f,c}(i) + f_{b,f,c}(i,l) \right\} [dB]
 \end{aligned}$$

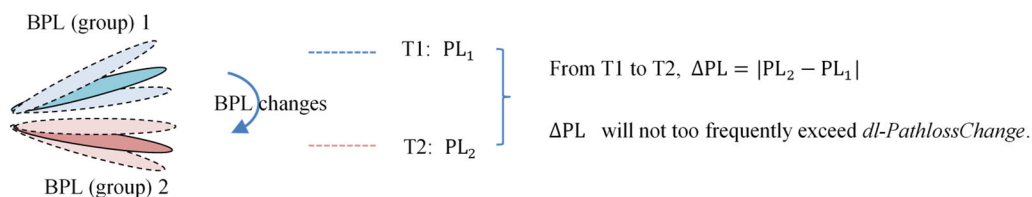
EX-1008, p.24. $PL_{b,f,c}(q_d)$ is “a downlink path-loss estimate in dB calculated by the UE using reference signal (RS) resource q_d for UL BWP b of carrier f of serving cell c .” EX-1008, p.14.

A POSITA would have understood from these expressions that TS38.213 describes that **the first pathloss value** ($PL_{b,f,c}(q_d)$) is used **for deriving a power headroom value** ($PH_{type1,b,f,c}(i,j,q_d,l)$) **included in the first power headroom report** (“Type 1”). EX-1002, ¶235; EX-1008, p.24.

The POSITA would have found it obvious to use Huawei's **first pathloss value for deriving a power headroom value included in the first PHR** because it was known to use pathloss values to calculate power headroom for an uplink transmission and report them to the network in a PHR. EX-1002, ¶236. This technique was known at least since the development of LTE. EX-1002, ¶236.

d. Limitations [1C], [10C]

Huawei discloses and renders obvious a **UE that derives a second pathloss value from a second pathloss reference of the serving cell after deriving the first pathloss value, wherein the second pathloss reference is separate from the first pathloss reference.** In Huawei, the claimed **second pathloss reference of the serving cell** is “BPL (group) 2” on which a **second pathloss value (“PL₂”)** is derived **after deriving the first pathloss value—i.e., at time 2 (“T2”) after time 1 (“T1”),** shown below:



EX-1018, p.2.

Huawei's **second pathloss reference is separate from the first pathloss reference**. As illustrated above, BPLs are different groups of beams from the serving cell that are monitored to determine the pathloss and whether it has changed more than *dl-PathlossChange*. EX-1002, ¶239.

e. Limitations [1D], [10D]

Claims 1 and 10 differ as to Limitations [1D] and [10D]. These Limitations are disclosed and rendered obvious by Huawei in view of TS38.213.

Limitation [1D]. Limitation [1D] requires the second pathloss reference **is used for power control for a first Physical Uplink Shared Channel (PUSCH) transmission on the serving cell**. Huawei explains that “[i]n previous meetings, it was agreed that NR supports beam specific power control as baseline.” EX-1018, p.1. Additionally, “NR defines beam specific open & closed loop parameters.” *Id.* While Huawei describes using pathloss in power control, *id.*, p.2, Huawei does not describe how the **second pathloss reference (BPL (group) 2) is used for power control for a first PUSCH transmission on the serving cell**.

TS38.213 describes the details of PUSCH power control, and combined with Huawei, renders obvious the use of the second pathloss reference **for power control** for the first PUSCH transmission. TS38.213 states:

If a UE transmits on a PUSCH on UL BWP b of carrier f of serving cell c using parameter set configuration with index j and PUSCH power control adjustment state with index l , the UE shall determine the PUSCH transmission power $P_{\text{PUSCH},f,c}(i, j, q_d, l)$ in PUSCH transmission period i as

$$P_{\text{PUSCH},f,c}(i, j, q_d, l) = \{P_{\text{CMAX},f,c}(i), P_{\text{O_PUSCH},f,c}(j) + 10 \log_{10}(2^{\mu} \cdot M_{\text{RB},f,c}^{\text{PUSCH}}(i)) + \alpha_{f,c}(j) \cdot PL_{f,c}(q_d) + \Delta_{\text{TF},f,c}(i) + f_{f,c}(i, l)\} [\text{dBm}]$$

where,

* * * * *

$PL_{b,f,c}(q_d)$ is a downlink path-loss estimate in dB calculated by the UE using reference signal (RS) resource q_d for UL BWP b of carrier f of serving cell c .

EX-1008, pp.13-14. Based on Huawei and TS38.213, it would have been obvious to determine the downlink pathloss estimate ($PL_{b,f,c}(q_d)$) based on averaging downlink pathloss from “BPL (group) 2” by the UE to

“determine the PUSCH transmission power $P_{\text{PUSCH},f,c}(i,j,q_d,l)$ in PUSCH transmission period i .” EX-1008, p.13; EX-1002, ¶246. This PUSCH transmission is on “carrier f of serving cell c ” and reflects a first PUSCH transmission **on the serving cell**.

A POSITA would have therefore found it obvious to use Huawei’s second pathloss reference (BPL (group) 1) **for power control for a first PUSCH transmission on the serving cell**. *Infra* §VII.H.2.

Limitation [10D]. Limitation [10D] requires that the second pathloss reference **is used for deriving a second power headroom value**. This would have been obvious over Huawei in view of TS38.213. Huawei explains that in multi-beam operation, “each BPL (group) would lead to one PH value,” (*i.e.*, power headroom value). EX-1018, p.2; EX-1002, ¶249. PH values are reported in PHRs. EX-1018, p.2.

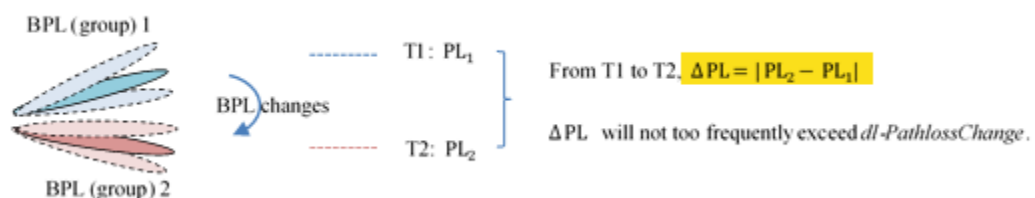
As explained in Limitations [1B] and [10B], TS38.213 discloses that the measured pathloss value ($PL_{b,f,c}(q_d)$) (here, the second pathloss value from the **second pathloss reference**) is used **for deriving a second power headroom value** ($PH_{\text{type1},b,f,c}(i,j,q_d,l)$)—*i.e.*, a **power headroom value** determined using the pathloss from the second pathloss reference after a beam group switch to include in a “Type 1” PHR

to be sent in a PUSCH transmission. EX-1002, ¶250; EX-1008, p.24.

It would have been obvious to use the second pathloss reference for deriving a second power headroom value to include in a PHR sent via the first PUSCH transmission after a beam group switch (*i.e.*, change in pathloss reference) because it was known at least since the development of LTE to use pathloss values to calculate the power headroom for an uplink transmission and report them to the network in a PHR to inform the network of the UE's power headroom value. *See infra* §VII.H.2; EX-1002, ¶251.

f. Limitations [1E], [10E]

Huawei discloses that **the UE derives the pathloss change based on the first pathloss value and the second pathloss value.** Specifically, Huawei's **UE derives the pathloss change (ΔPL) based on the first pathloss value (PL_1) and the second pathloss value (PL_2)** as shown below:



EX-1018, p.2.

g. Limitations [1F], [10F]

Limitations [1F] and [10F] require that **the UE determines whether a second PHR is triggered based on whether the pathloss change is more than a threshold**. Limitation [10F] further requires the second PHR **to include the second power headroom value**. These limitations are disclosed or rendered obvious by Huawei alone or in view of TS38.213.

Huawei explains that the **UE determines whether a second PHR is triggered based on whether the pathloss change is more than a threshold** because Huawei discloses that a PHR is transmitted if ΔPL is greater than *dl-PathlossChange*. Huawei, p.2; *id.* (“Change of PL for PHR triggering is also be based on a BPL group level.”); *id.* (“In LTE system...[the] UE will be configured with two timer: *prohibitPHR-Timer* and *periodicPHR-Timer* and a threshold parameter *dl-PathlossChange*.”).

Limitation [10F] requires that the second PHR **include the second power headroom value**. This additional aspect of Limitation [10F] would have been obvious over Huawei in view of TS38.213 because TS38.213 explains that the pathloss value ($PL_{b,f,c}(q_d)$) is used to calculate

the power headroom ($PH_{type1,b,f,c}(i,j,q_d,l)$) to include in a Type 1 PHR.

Supra §VII.A.1.c. Including this additional feature in Huawei's system would have been obvious. *Infra* §VII.H.2.

2. Obviousness of Claims 1 and 10; Motivation to Combine.

A POSITA would have found it obvious to implement techniques from TS38.213 with techniques for determining whether to trigger a PHR when the UE undergoes beam group switching and averaging pathloss across multiple beams during multi-beam operation as shown in Huawei. EX-1002, ¶¶221-222. Even if Huawei did not explicitly describe how to calculate power headroom from the pathloss reference, it would have been obvious to use expressions for calculating a power headroom value to include in a PHR from TS38.213, which provides a mathematical relationship for use in NR, which would have been further obvious to modify for Huawei's multi-beam scenario in which multiple pathloss values are averaged. EX-1002, ¶221. A POSITA would have been led to TS38.213 from looking at NR specifications for techniques for calculating power headroom.

A POSITA would have found it obvious to use the pathloss value from the pathloss reference to perform uplink power control set forth in

TS38.213 for these same reasons: Huawei and TS38.213 were designed to be used in NR, and TS38.213 describes using pathloss references for performing uplink power control (on a per-beam basis) and for determining whether to trigger a PHR. EX-1002, ¶222.

A POSITA would have looked to NR specifications, including TS38.213, to identify procedures to be implemented on Huawei's UE because the specifications described known procedures to be used in NR with expected results of being able to communicate over interoperable wireless communication networks. EX-1002, ¶222. A POSITA would have reasonably expected to succeed in making the claimed combinations because Huawei and TS38.213 were designed to be used together in NR-compatible UEs. *Id.*

I. Ground 9: Claims 2-3 and 13 Would Have Been Obvious Over Huawei in View of TS38.213 and Further in View of TS38.321.

1. Claim 2

Claim 2 recites **wherein the second PHR is transmitted via the first PUSCH transmission when the second PHR is triggered.** This would have been obvious over Huawei in view of TS38.213 and further in view of TS38.321.

Huawei alone or in view of TS38.213 renders obvious triggering a

second PHR after switching beam groups for the reasons explained in Limitations [1F] and [10F]. It would have been obvious to transmit Huawei's PHR **via the first PUSCH transmission** based on TS38.321.

TS38.321 describes how a PHR is provided from the MAC layer to the physical layer for transmission. A "Single Entry PHR MAC CE" is an example of a MAC CE. EX-1009, pp.52-53. A MAC entity of the UE handles transport channels such as the UL-SCH (uplink shared channel). EX-1009, p.9. A POSITA would have known that the UL-SCH is transmitted over the PUSCH. EX-1002, ¶¶267-268 (citing EX-1010, p.7 ("The physical-layer model for Uplink Shared Channel transmission is described based on the corresponding PUSCH physical-layer-processing chain.")). A PHR included in a MAC CE is conveyed by the MAC entity of the UE on the UL-SCH transport channel, and physically transmitted via PUSCH to the network. *Id.*, ¶268. Thus, the **second PHR is transmitted via the first PUSCH transmission** after a beam switch and the **second PHR** is triggered as described above based on TS38.321.

A POSITA would have found it obvious to transmit the second PHR via the first PUSCH transmission based on Huawei in view of TS38.213 and further in view of TS38.321 because Huawei's PHR triggering and

reporting techniques were intended to be used in NR, and TS38.213 and TS38.321 describe PHR and transmission of MAC CEs in NR. EX-1002, ¶269; *infra* §VII.B.1.

2. Claims 3 and 13

Claims 3 and 13 require **the first pathloss value is used for power control for a second PUSCH transmission on the serving cell, wherein the first PHR is transmitted via the second PUSCH transmission**. Claim 13 is the same as claim 3 except that it omits the word “second.” Both claims 3 and 13 would have been obvious over Huawei in view of TS38.213 and further in view of TS38.321.

As explained in Limitation [1A], the **first pathloss value** is determined using the BPL (group) 1 before beam group switching. Huawei does not explicitly state that the first pathloss value is used for **power control for a second PUSCH**, but using a pathloss value measured on a first set of beams before beam group switching to control the power used to transmit on the PUSCH transmission associated with the original set of beams is a technique that would have been obvious over TS38.213. EX-1002, ¶271. TS38.213 defines the expression for determining PUSCH transmit power, $P_{\text{PUSCH},f,c}(i,j,q_d,l)$ using $PL_{b,f,c}(q_d)$,

which is the downlink path-loss estimate in dB. EX-1008, pp.13-14.

The **first PHR** is transmitted while the UE measures pathloss on BPL (group) 1. *Supra* Limitations [1B], [10B]. A POSITA would have found it obvious to transmit that **first PHR via the second PUSCH transmission** based on TS38.321, which explains that PHR MAC CEs are transmitted via PUSCH. *Supra* Claim 2.

It would have been obvious that the **first pathloss value** was used for a **second PUSCH transmission on the serving cell** and that the **first PHR is transmitted via the second PUSCH transmission** based on TS38.213 and TS38.321 for the reasons explained in connection with Limitation 1A and below, *infra* §VII.I.3.

3. Obviousness of Claims 2-3 and 13; Motivation to Combine.

A POSITA would have found it obvious to implement techniques from TS38.213 and TS38.321 for determining whether to trigger a PHR when the UE switches beam groups during multi-beam operation as described by Huawei. EX-1002, ¶¶259-261. While Huawei does not explicitly state that the PHR is transmitted “via” a first or second PUSCH, TS38.321 explains how MAC CEs, including for PHR, are conveyed to the physical layer via the UL-SCH transport channel to be

transmitted via PUSCH transmission. EX-1002, ¶260. A POSITA would have looked to TS38.321 for discussion of how a PHR is conveyed from the MAC layer over the air via the physical layer. *Id.* A POSITA would have found it obvious to transmit Huawei's PHR via the claimed PUSCH transmissions because this was a known way for a PHR to be transmitted to the network. *Id.*

Indeed, a POSITA would have looked to NR specifications, including TS38.213, to identify additional procedures to implement on Huawei's UE because the specifications described known procedures for NR with expected results of being able to communicate over interoperable wireless networks. EX-1002, ¶261. A POSITA would have reasonably expected to succeed in making the claimed combinations because Huawei and TS38.213 were designed to be used together in NR-compatible UEs. *Id.*

J. Ground 10: Claims 5, 7, and 15 Would Have Been Obvious Over Huawei in View of TS38.213 and TS38.321 and Further in View of TS38.331.

1. Claims 5, 7, and 15

Huawei in view of TS38.213 and TS38.321 and further in view of

TS38.331 render obvious **the second [first]⁴ PUSCH transmission is configured by a parameter ConfiguredGrantConfig and the ConfiguredGrantConfig indicates the first [second] pathloss reference** as recited in claims 5, 7, and 15.

Huawei's **second PUSCH transmission** occurs *after* beam group switching and the **first PUSCH transmission** occurs *before* beam group switching. *Supra* §VII.H.1.d. Draft NR standards included techniques for configuring PUSCH transmissions and identifying the pathloss reference for uplink power control. EX-1002, ¶278. One way to configure PUSCH transmissions and identify the pathloss reference to use for power control and PHR triggering applies when configuring a bandwidth part. EX-1009, p.64. “[A]t least an initial bandwidth part comprising of at least a downlink bandwidth part and” one or two uplink BWPs are configured. *Id.* “The IE ConfiguredGrantConfig is used to configure uplink transmission without dynamic grant according to...RRC (type1) or provided via the PDCCH (addressed to CS-RNTI) (type2).” *Id.*, p.73

⁴ Claim 15 does not recite “first” or “second” PUSCH transmission, but this analysis applies in the same manner to claim 15.

(underline added). TS38.331 discloses a **PUSCH transmission is configured by a parameter ConfiguredGrantConfig**. EX-1002, ¶279. This technique applies to Huawei's first and second PUSCH transmissions. *Id.*

ConfiguredGrantConfig includes “pathlossReferenceIndex,” which indicates **the [first/second] pathloss reference** to use with power control for the applicable PUSCH transmission and in determining whether to trigger a PHR.

```
--ASN1START
--TAG-CONFIGUREDGRANTCONFIG-START
ConfiguredGrantConfig ::= SEQUENCE {
```

```
    mcsAndTBS          INTEGER (0..31),
    -- Enables intra-slot frequency hopping with the given frequency hopping offset
    -- Corresponds to L1 parameter 'UL-TWG-hopping' (see 38.214, section FFS_Section)
    frequencyHoppingOffset INTEGER (1..maxNrofPhysicalResourceBlocks-1),
    pathlossReferenceIndex INTEGER (0..maxNrofPUSCH-PathlossReferenceRSs-1),
    ...
}
OPTIONAL-Cond-Type1
```

EX-1011, pp.73, 75. Therefore, TS38.331 teaches the additional requirements of claims 5, 7, and 15. A POSITA would have understood that in implementing the techniques described in Huawei, the modification would have included identifying pathloss references that are part of Huawei's BPL groups, either by group or individually. EX-1002, ¶¶280-282.

It would have been obvious to use the techniques described in

TS38.331, including **ConfiguredGrantConfig**, to configure Huawei's first and second **PUSCH transmissions** and to **indicate the** first and second **pathloss references** depending on whether the PUSCH transmission occurs before or after beam group switching because (1) Huawei was intended for use in NR, and (2) TS38.213, TS.38.321, and TS38.331 are part of the NR specification, leading a POSITA to naturally have combined the various techniques. EX-1002, ¶283. Additionally, a POSITA considering Huawei would have looked for techniques to configure the PUSCH transmission before beam group switching, to identify the reference to use for determining pathloss to use for PUSCH power control, and to determine whether to transmit a PHR. *Id.* Before the effective filing date, a POSITA would have known 3GPP's techniques for configuring PUSCH transmissions, identifying the reference to use for determining whether a PHR is triggered, and for uplink power control, and would have found it obvious to use those techniques, such as using **ConfiguredGrantConfig**, to configure Huawei's second PUSCH and identify the pathloss reference to use for uplink power control and PHR triggering. *Id.*

Not only is the combination of these references suggested implicitly

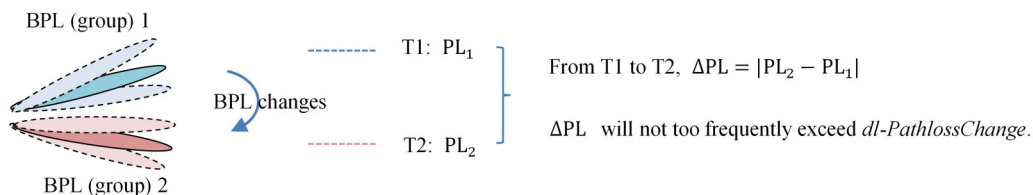
by their context as being part of NR standard-setting, the combination of TS38.331 with Huawei-TS38.213-TS-38.321 would have merely combined prior art techniques according to known methods to achieve predictable results—namely, combining Huawei’s technique for triggering PHRs with beam group switching techniques with techniques specified by the standard for identifying the pathloss reference to use for determining downlink pathloss and configuring PUSCH transmissions. EX-1002, ¶284.

K. Ground 11: Claim 17 Would Have Been Obvious Over Huawei in View of TS38.213 and Sorrentino.

1. Preamble [17P]

Even if the preamble of claim 17 is a limitation, it would have been obvious to have **a UE for deriving a pathloss change** based on Huawei in view of TS38.213 in view of Sorrentino.

Huawei describes PHR techniques for use in NR applications, and specifically those in which multi-beam operation and beam group switching are employed. According to Huawei, the UE takes multiple pathloss measurements to derive a pathloss value from “multiple BPLs within one group” and later determines a pathloss value from a second BPL group. EX-1018, p.2; EX-1002, ¶290.



When the difference in pathloss (ΔPL) exceeds *dl-PathlossChange*, a PHR is triggered. EX-1018, p.2.

TS38.213 describes “Uplink Power Control,” and UE behavioral aspects as described in claims 1 and 10. *Supra* §VII.H.1.

Sorrentino describes a UE that includes hardware components required by claim 17. EX-1017, FIG. 15. It would have been obvious to use Sorrentino’s hardware to implement the teachings of Huawei in view of TS38.213, as described further below. EX-1002, ¶293.

2. Limitations [17A], [17B], and [17C]

Huawei in view of TS38.213 and Sorrentino disclose **a control circuit** (Limitation 17[A]) and **a processor provided with the control circuit; and a memory operatively coupled to the processor** (Limitation [17B], where the **processor is configured to execute a program code**. Sorrentino discloses the hardware recited in these limitations as illustrated below:

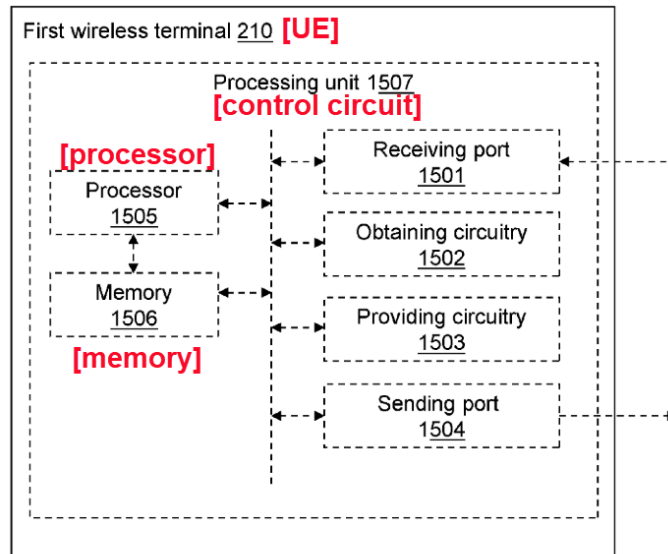


Fig. 15

EX-1017, FIG. 15 (annotated); EX-1002, ¶294.

Sorrentino describes a UE (first wireless terminal 210) that can be used with PHR transmission. EX-1017, ¶[0066] (“The first wireless terminal 210 provides a respective transmit power report, e.g. PHR, for at least one of multiple uplink reference signal transmission configurations”). “To perform the actions 1401-1404 for handling uplink transmit power reporting...the first wireless terminal 210 may comprise an arrangement schematically depicted in FIG. 15.” *Id.*, ¶[0152]. Sorrentino’s UE includes a **control circuit** (“processing unit 1507”). EX-1017, FIG. 15; ¶¶[0164]-[0165] (“wireless terminal 210 may comprise a processing unit 1507, which may comprise one or more” circuits). EX-1002, ¶¶296-298.

Sorrentino also discloses **a processor with a control circuit** (item 1505). EX-1017, FIG. 15. “The embodiments of the first wireless terminal **210** may” be implemented through “processor 1505 depicted in FIG. 15[.]” EX-1017, ¶[0159]. Sorrentino discloses **a memory operatively coupled to the processor**. EX-1017, FIG. 15. Sorrentino explains that “[t]he wireless terminal 210 may further comprise a memory 1506...arranged to store data, such as configurations and/or applications involved in or for performing the functions and actions of embodiments herein.” *Id.*, ¶[0163]. The memory is operatively connected to the processor. *Id.*, FIG. 15; EX-1002, ¶300.

Because Sorrentino’s processor is configured to execute processes associated with transmitting PHRs, the **processor is configured to execute a program code** to carry out specified methods. EX-1017, ¶[0164] (“Those skilled in the art will also appreciate that the ports and circuitry 1501-1505 may refer to...one or more processors configured with software and/or firmware (e.g., stored in memory) that, when executed by the one or more processors such as the processor 1505, perform as described above.”). Therefore, Sorrentino describes the hardware for the UE recited in claim 17. EX-1002, ¶302.

It would have been obvious to use Sorrentino's control circuit in connection with the UE implementing the combined techniques of Huawei in view of TS38.213 for the reasons described below. *Infra* §VII.K.4.

3. Limitations [17Ci]-[17Cvi]

The functionality performed by the processor recited in claim 17 tracks Limitations [1A]-[1F] of claim 1. Analysis of these limitations of claim 1 is equally applicable to claim 17. *Supra* §VII.H.1. It would have been obvious to implement these techniques as rendered obvious by Huawei in view of TS38.213 in Sorrentino's hardware, including control circuitry, processor, and memory.

4. Obviousness of Claim 17; Motivation to Combine

Claim 17 would have been obvious over Huawei in view of TS38.213 and Sorrentino. As described, triggering a PHR when the UE is undergoing beam group switching in an NR system would have been obvious over the teachings of Huawei and TS38.213. *Supra* §VII.K.4. The functionality of the processor recited in claim 17 would have been obvious for the same reasons.

It would have further been obvious to look to known hardware for implementing cellular communications techniques, such as uplink power

reporting, to implement the combination of Huawei and TS38.213. EX-1002, ¶286. A POSITA would have known that Huawei and the 3GPP technical specifications, such as TS38.213, specified functionality that may be supported by UEs, but do not dictate hardware to implement the functionality. *Id.* The POSITA therefore would have looked to references like Sorrentino to implement the functionality in a UE. Including Huawei's functionality in view of TS38.213 in software stored in Sorrentino's memory and executed by Sorrentino's processor in its control circuitry would have been an obvious way to implement the functionality defined by the combined teachings of Huawei in view of TS38.213. *Id.*

The claimed subject matter merely combines Sorrentino's known hardware for its intended purpose—processing instructions to support cellular communications, including power reporting, to the network. EX-1017, ¶¶[0152], [0159], [0163], [0164]-[0165]; EX-1002, ¶287. Thus, combining Huawei in view of TS38.213 with Sorrentino's hardware would have merely combined prior art elements (the functionality of Huawei and TS38.213) according to known methods (implementing cellular communications functionality in software/firmware) to yield predictable results (a UE that can implement functionality specified in

technical specifications for cellular communications). EX-1002, ¶287.

L. Ground 12: Claims 18-19 Would Have Been Obvious Over Huawei in View of TS38.213 and Sorrentino and Further in View of TS38.321.

1. Claim 18

Claim 18 tracks the language of claim 2 but is recited as functionality that the processor of claim 17 is configured to perform. The functionality specified in claim 18 would have been obvious over the combined teachings of Huawei in view of TS38.213 and further in view of TS38.321, as explained in connection with claim 2. *Supra* §§VII.I.1. It would have been obvious to implement the functionality specified in claim 18 in Sorrentino's hardware for the reason explained in connection with claim 17. *Supra* §VII.K.

2. Claim 19

Claim 19 tracks the language of claim 3 but is recited as functionality that the processor of claim 17 is configured to perform. The functionality in claim 19 would have been obvious over the combination of Huawei in view of TS38.213 and further in view of TS38.321, as explained in connection with claim 3. *Supra* §VII.I.2. It would have been obvious to implement the functionality in claim 19 in Sorrentino's hardware for the reason explained in connection with claim 17. *Supra*

VIII. DISCRETIONARY DENIAL IS UNWARRANTED

A. 35 U.S.C. §314(a) Does Not Favor Denial

Petitioner has stipulated that it will not pursue grounds that are, or reasonably could have been, raised in this proceeding in connection with a challenge to the validity of the '585 patent in the co-pending district court litigation. (Ex-1014.) *Sotera Wireless, Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12 (PTAB Dec. 1, 2020). Under the Director's "binding guidance...the Board 'will not discretionarily deny institution...where a petitioner stipulates not to pursue in a parallel district court proceeding the same grounds as in the petition or any grounds that could have reasonably been raised in the petition.'" *EVE Energy Co., Ltd. v. VARTA Microbattery GmbH*, IPR2022-01476, Paper 16 at 9 (PTAB Mar. 14, 2023). Therefore, the Board should not issue a discretionary denial based on *Fintiv. Id.*

B. 35 U.S.C. §325(d) Does Not Favor Denial

Non-institution under §325(d) would be improper in view of the *Advanced Bionics* framework and the *Becton Dickinson* factors. Ericsson and Huawei, cited in Petitioner's Grounds, were not before the examiner during prosecution and were not cited by the examiner in any Office

As shown above in §II.B., the examiner’s rejection related to Lee in view of Nigam. The applicant alleged that this combination did not disclose the first and second pathloss references were “separate.” Petitioner does not rely on Lee or Nigam, and the prior art cited herein discloses using first and second pathloss references that are “separate” from each other when determining whether to trigger a PHR. Furthermore, the examiner did not have the benefit of the Davies declaration, which explains what a POSITA would have understood from the prior art at the time of the ’585 patent. EX-1002. Accordingly, discretionary denial under 35 U.S.C. §325(d) would be improper.

IX. STANDING

Petitioner has standing to bring this proceeding because it is not the Patent Owner and is not estopped from filing this Petition. Additionally, the ’585 patent is subject to IPR.

X. MANDATORY NOTICES

A. Real Parties-in-Interest

Petitioner certifies that the real parties-in-interest are Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., and Samsung Research America.

B. Related Matters

The '585 patent has been asserted in the litigation styled *ASUS Technology Licensing Inc. v. Samsung Electronics Co., Ltd., et al.*, No. 2:23-cv-00409, pending in the United States District Court for the Eastern District of Texas. Petitioner is not aware of any other proceedings that are currently pending involving the '585 patent.

C. Lead and Back-Up Counsel

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D. Service

Petitioner consents to and prefers electronic service by emailing Samsung-ASUS-IPRs@gtlaw.com and counsel of record.

XI. FEES

The required fee is being paid electronically through P-TACTS

Dated: August 9, 2024

Respectfully Submitted,

/s/ Andrew R. Sommer

Andrew R. Sommer

Reg. No. 53,932

CERTIFICATE OF COMPLIANCE

This petition complies with the word count limits set forth in 37 C.F.R. § 42.24(a)(i), effective May 2, 2016, because this Petition contains less than 14,000 words, excluding the parts of the petition exempted by 37 C.F.R. § 42.24(a), as determined using the word count provided by Microsoft Word, which was used to prepare this Petition.

Dated: August 9, 2024

Respectfully Submitted,

/s/ Andrew R. Sommer

Andrew R. Sommer

Reg. No. 53,932

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§ 42.6(e) and 42.105(a), the undersigned certifies that on August 9, 2024, I caused a true and correct copy of all exhibits identified in the above Table of Exhibits and Petitioner's Power of Attorney by Priority Mail Express, or by means at least as fast and reliable as Priority Mail Express, on the Patent Owner at the correspondence address of record for U.S. Patent No. 10,986,585 as follows:

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I further certify that a courtesy copy of the above-identified materials were served on litigation counsel by electronic means upon the foregoing individuals:

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