

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

AMERICAN HONDA MOTOR CO., INC.
Petitioner,

v.

INTELLECTUAL VENTURES II LLC,
Patent Owner.

Case No. IPR2023-00020
U.S. Patent No. 10,292,138

**PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 10,292,138**

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1006	U.S. Patent 7,869,461 to Lohr, et al.
1007	PCT Pub. No. WO2005/034542 to Choi (translation and certification)
1008	U.S. Patent No. 7,944,935 to Bucknell, et al.
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1014	Joint Status Report Regarding Venue-Related Discovery, <i>Intellectual Ventures I LLC, et al. v. Honda Motor Co., Ltd., et al.</i> , No. 3:22-cv-761 (N.D. Tex. Sept. 1, 2022)

Exhibit	Description
1015	Order, <i>Intellectual Ventures I LLC v. Toyota Motor Corp.</i> , No. 2:21-cv-00389 (E.D. Tex. Feb. 12, 2022) (consolidating <i>Intellectual Ventures I LLC v. Toyota Motor Corp.</i> , No. 2:21-cv-00389 (E.D. Tex. filed Oct. 19, 2021) (Member Case) with <i>Intellectual Ventures I LLC v. Honda Motor Co., Ltd.</i> , 2:21-cv-00390 (E.D. Tex. filed Oct. 19, 2021) (Lead Case)).
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I. INTRODUCTION

Petitioner American Honda Motor Co., Inc. (“Petitioner” or “Honda”) requests *inter partes* review of claims 1–4, 6–11, 13, and 14 of U.S. Patent No. 10,292,138 (“the ’138 patent”), purportedly assigned to Patent Owner Intellectual Ventures II LLC (“IV” or “Patent Owner”).

The ’138 patent is directed to user equipment (UE), such as a cell phone, that iteratively selects queued data for transmission. ’138 patent, Abstract. In a “first iteration,” the UE selects data based on a “priority” of the data in the queue, ensuring high priority data is transmitted first. *Id.*, 8:44–9:25; 10:48–11:10. In a “second iteration,” the UE selects data based on a running “backlog” for each queue, ensuring no queue, even those containing relatively lower-priority data, is starved of bandwidth. *Id.*, 11:11–38. But, as the prior art described below demonstrates, it was well-known before May 8, 2006 (the ’138 patent’s earliest claimed priority date) to implement such iterative selection of queued data for transmission based on the data’s priority and a running backlog counter.

II. PRECISE RELIEF REQUESTED

A. Claims for Which Review Is Requested

Petitioner respectfully requests *inter partes* review under 35 U.S.C. § 311 of claims 1–4, 6–11, 13, and 14 of the ’138 patent, and the cancellation of those claims as unpatentable.

B. Statutory Grounds

Each asserted reference identified in the table below is prior art under pre-AIA 35 U.S.C. § 102(a), § 102(b), and/or § 102(e).

Prior Art References	
Peisa (Ex. 1005), U.S. Patent No. 6,850,540, issued February 1, 2005 (§§ 102(a), (b), (e)).	
Lohr (Ex. 1006), U.S. Patent No. 7,869,461, published as PCT Pub. No. WO2005/125252 on December 29, 2005 (§§ 102 (a), (e)).	
Choi (Ex. 1007), PCT Pub. No. WO2005/034542, published on April 14, 2005 (§§ 102(a), (b)).	
Bucknell (Ex. 1008), U.S. Patent No. 7,944,935, filed November 4, 2005 (§ 102(e)).	

Claims 1–4, 6–11, 13, and 14 of the '138 patent are unpatentable under pre-AIA 35 U.S.C. §§102 and/or 103 based on the following grounds:

Grounds of Unpatentability	
1	Peisa in view of Lohr renders obvious claims 1–4, 6–11, 13, and 14.
2	Peisa in view of Choi and further in view of Bucknell renders obvious claims 1–4, 6–11, 13, and 14.
3	Peisa in view of Lohr and further in view of Bucknell renders obvious claims 1–4, 6–11, 13, and 14.

III. THE '138 PATENT

The application for the '138 patent was filed on June 9, 2017, as Application No. 15/618,669 (“the '669 application”). Ex. 1001. The '669 application claims

priority, through a series of continuation applications, to Application No. 11/430,421, filed on May 8, 2006. *Id.*, 1:8–19.

The '138 patent describes a UE that uses a “first” and “second” iteration to select data for transmission from radio bearers. '138 patent, Abstract. Consistent with the UMTS environment in which the '138 patent's UE operates, the UE communicates via the Uu interface with a “Node-B (base station)” that in turn communicates with a “radio network controller (RNC),” which is responsible for communicating with the core network. *Id.*, 6:28–34, Fig. 1; Ex. 1002 ¶ 32. Together the Node B and RNC form the UMTS Radio Access Network (UTRAN). '138 patent, 6:12–16, 6:35–36. The iterative scheduling algorithm of the '138 patent relies on a running backlog counter for each queue that is incremented by the amount of data queued for transmission that could not be transmitted in a given iteration due to bandwidth constraints and restrictions on number of queues serviced. *Id.*, 11:28–31 (“running_RAAU_delta is the running difference between the number of RAAU [quanta of physical resources (codes and timeslots)] that would be allocated without the limitation of the number of queues serviced and the number of RAAU allocated with the limitation”); Ex. 1002 ¶¶ 36–38. In a first step, resources are allocated according to a weighted average of the priority level of each input flow (RAAUq). *Id.*, 10:47–11:10. Then in a second step, the weighting of each input flow is adjusted using the backlog counter (RAAUq'). *Id.*, 11:11–31.

The resource allocation mechanism of the '138 patent is iterative in at least one of two senses: *first*, in that resources are allocated to queues in two or more discrete steps, *see id.*, 11:1–10, 12:11–15, Fig. 6 (steps 605, 610, and 665), and *second*, in that parameters such as running_RAAU_delta is “determined from the previous iteration of the algorithm.” *Id.*, 11:32–38; Ex. 1002 ¶ 39.

The Challenged Claims require that the UE select data from a plurality of radio bearers for transmission in a first and second iteration. In the first iteration, the selection is based on parameters received from the network. In the second iteration, the selection is based on buffered data for the respective radio bearers.

Claim 1, below, is representative:

A user equipment (UE) comprising:

a processor communicatively coupled to a transmitter and circuitry configured to receive; and

the processor is configured to:

cause the circuitry to *receive parameters associated with a plurality of radio bearers*,

determine a plurality of buffer occupancies, wherein each of the plurality of buffer occupancies is associated with one or more radio bearers of the plurality of radio bearers,

cause the transmitter to transmit a message including the plurality of buffer occupancies to a network,

cause the circuitry to receive a single allocation of uplink resources,

select data from the plurality of radio bearers for transmission using the single allocation of uplink resources, wherein *the selection of the data occurs using a first iteration and a second iteration*,

wherein in the *first iteration*, the selection of the *data is selected* from a subset of the plurality of radio bearers *based on the received parameters*,

wherein in the *second iteration*, the *selection of the data is based on buffered data for respective radio bearers*, and

cause the transmitter to transmit a signal including the selected data.

'138 Patent, 13:59–14:6 (claim 1).¹

IV. LEVEL OF ORDINARY SKILL

A person of ordinary skill in the art (“POSITA”) at the time of the priority date of the '138 patent would have had a Bachelor of Science in electrical engineering, computer engineering, or an equivalent field, as well as three years of experience in wireless communication technology, or a master’s degree in electrical engineering, or other equivalent degree. Ex. 1002 ¶ 28. Additional education could substitute for professional experience and vice versa. *Id.*

V. CLAIM CONSTRUCTION

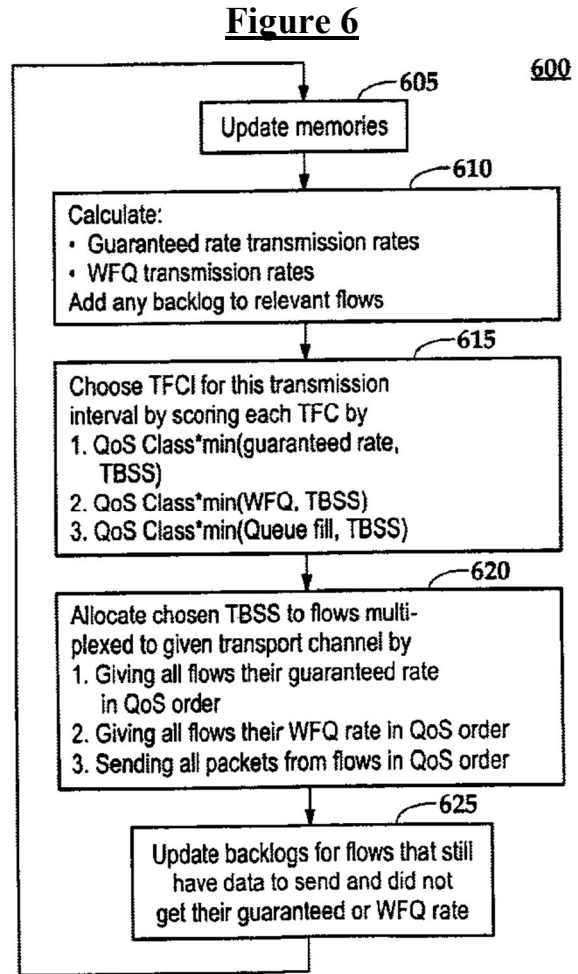
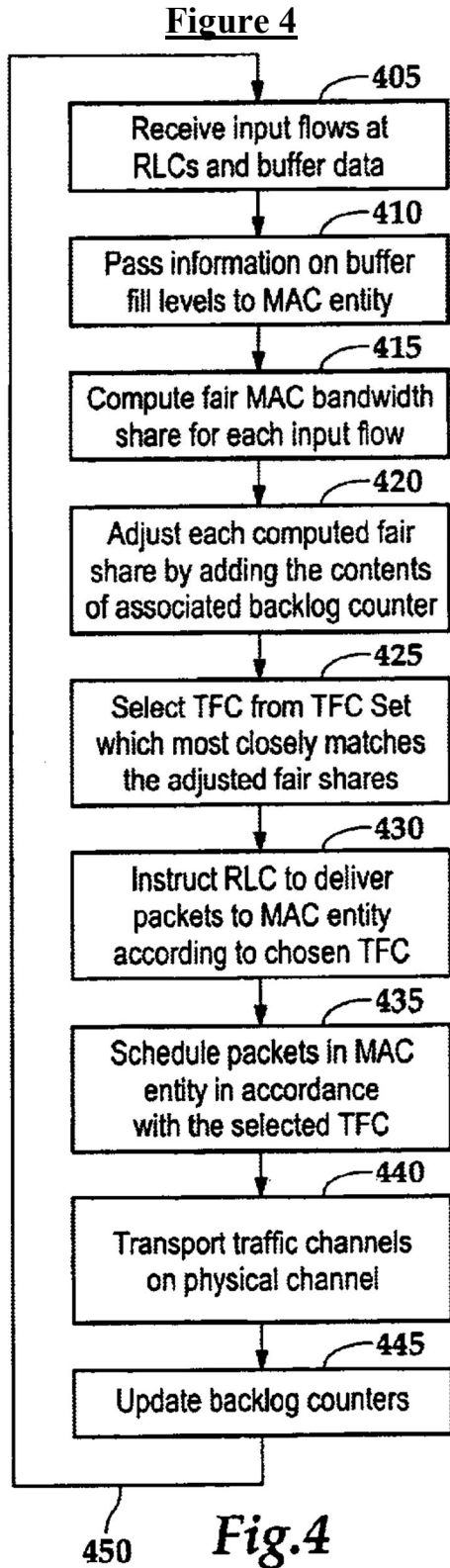
The Board construes claims in accordance with 37 C.F.R. § 42.200(b) and *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). Claims need only be construed to the extent necessary to resolve a controversy. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017). Here, no terms need construction because the claims read on the asserted prior art under any construction consistent with *Phillips*.

¹ Unless otherwise noted, all emphasis has been added.

VI. BRIEF OVERVIEW OF PRIOR ART REFERENCES

A. Peisa

U.S. Patent No. 6,850,540 to Janne Johannes Peisa, et al. (“Peisa”) was filed on October 27, 2000, and issued on February 1, 2005. Peisa, Cover. Peisa relates to methods and systems for packet scheduling in a Universal Mobile Telecommunications System (UMTS), commonly known as part of the “3G” standard. *Id.*, Abstract; Ex. 1002 ¶¶ 46–48. Peisa discloses methods and systems that are adapted for use in the UMTS Terrestrial Radio Access Network (UTRAN), which is described in Technical Specification (TS) 25.401 (1999-09) of the 3rd Generation Partnership Project (3GPP), which Peisa incorporates by reference in its entirety. Peisa, 1:64–2:16. Peisa discloses various embodiments of iterative packet scheduling algorithms including those in which, like the ’138 patent, a “backlog counter ... keeps track of the backlog of unsent data for a given input flow.” *Id.*, 9:3–6. In particular, Peisa discloses “a *two-step scheduling process* in a scheduler 735 located in the MAC layer,” which can be located in “the UE.” *Id.*, 18:9–18. As Figures 4 and 6 show, after allocating bandwidth to input flows in a first iteration based on each input flow’s “fair share”—which is based on weighting parameters such as QoS—Peisa’s algorithm updates the backlog counters so they may be taken into account in subsequent iterations of the scheduling algorithm. *Id.*, 9:8–30.



Id., Figs. 4, 6.

B. Lohr

U.S. Patent 7,869,461 to Joachim Lohr, et al. (“Lohr”) was filed as PCT Application No. EP2005/006361 on June 14, 2005, and published as PCT Publication No. WO2005/125252 on December 29, 2005. Lohr, Cover. Lohr relates to methods for transmitting data from a mobile terminal to a radio access network based on the “scheduling mode” of radio bearers associated with logical channels. *Id.*, Abstract. Lohr describes methods for use in the UMTS standard and subsequent releases promulgated by 3GPP. *Id.*, 1:26–32. In disclosures related to packet scheduling in such systems, Lohr teaches that the network controls the “maximum rate” a UE can transmit in the uplink during a time interval, and relays this information through messages between the network and the UE. *Id.*, 2:41–61. Such messages include a “grant message” and “Scheduling Assignment (SA).” *Id.*, 5:17–21.

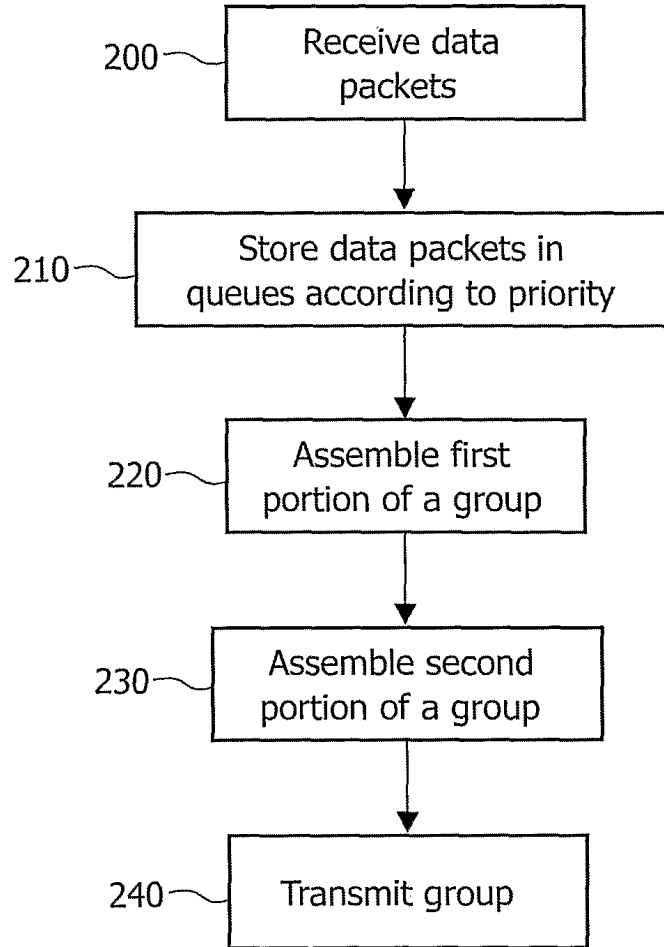
C. Choi

PCT Publication No. WO2005/034542 (“Choi”) was published on April 14, 2005. Choi, Cover. Choi relates to methods and systems for transmission and reception of data according to the UMTS standard. *Id.*, Abstract. Choi describes a system in which a Radio Resource Control (RRC) entity within the Radio Network Control (RNC) entity is responsible for the control and allocation of uplink resources for UEs. *Id.* at 1. In one embodiment, Buffer Status Control and Buffer Status

Report messages are used to exchange information between the network and UEs concerning the buffer occupancies of radio bearers or logical channels. *Id.* at 16.

D. Bucknell

U.S. Patent No. 7,944,935 to Paul Bucknell, et al. (“Bucknell”) was filed as PCT Application No. IB2005/053618 on November 4, 2005. Bucknell, Cover. Bucknell relates to methods of multiplexing data packets in mobile communication systems such as UMTS. *Id.*, 1:4–11. In an embodiment, data is iteratively selected for transmission from multiple queues in a first portion and a second portion. *Id.*, 3:56–4:4. As Figure 3 shows, in either the first or second portion, data may be selected from queues based on parameters such as priority or QoS, or the length of the queue. *Id.*, 4:5–5:24.



Id., Fig. 3.

VII. THE BOARD SHOULD NOT EXERCISE DISCRETION TO DENY INSTITUTION

IV asserted the '138 patent against Petitioners in *Intellectual Ventures I LLC v. Honda Motor Co.*, No. 22-cv-00761 (N.D. Tex., filed Apr. 4, 2022) (the “related litigation”).² IV has separately asserted the '138 patent against GM in WDTX (“the

² The '138 patent was previously asserted against Petitioner in *Intellectual Ventures I LLC v. Honda Motor Co.*, No. 21-cv-00390 (E.D. Tex., filed Oct. 19, 2021). Patent Owner voluntarily dismissed Petitioner from that case. Ex. 1009; Ex. 1010.

GM litigation”), and Toyota in EDTX (“the Toyota litigation”). As explained below, the Board should not exercise discretion to deny institution because this Petition presents compelling evidence of unpatentability, and, in the alternative, the most salient factors demonstrate that the Board should not deny institution of this Petition under Sections 314(a) or 325(d). *See Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, 2020 WL 2126495, Paper 11 (P.T.A.B. Mar. 20, 2020) (precedential) (“*Fintiv*”); *Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6 (P.T.A.B. Feb. 13, 2020) (precedential) (“*Advanced Bionics*”); *Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 (P.T.A.B. Dec. 15, 2017) (precedential) (“*Becton, Dickinson*”); *General Plastic Industrial Co., Ltd. v. Canon Kabushiki Kaisha*, IPR2016-01357, Paper 19 (P.T.A.B. Sept. 6, 2017).

A. The Board Need Not Reach the *Fintiv* Factors Due to Compelling Evidence of Unpatentability

In a June 21, 2022, Memorandum to the Board, the Director of the USPTO clarified that the Board “will not rely on the *Fintiv* factors to discretionarily deny institution ... where a petition presents compelling evidence of unpatentability,” *i.e.*, evidence that, “if unrebutted at trial, would plainly lead to a conclusion that one or more claims are unpatentable by a preponderance of the evidence.” USPTO Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation (June 21, 2022) (“*Fintiv* Memorandum”), at 2, 4. As explained in Section VIII, this Petition meets that criteria.

B. The *Fintiv* Factors Favor Institution

To the extent the Board finds it necessary to analyze the *Fintiv* factors, for the reasons explained below the Board should not exercise discretion to deny institution.

Factor 1 (existence or likelihood of a stay if proceeding is instituted): The related litigation is in its early stages. Petitioners filed a Motion to Transfer Venue to the Central District of California, which remains pending. Ex. 1014. Where, as here, a stay on the basis of parallel IPR proceedings has been neither requested nor granted, “[t]his factor does not weigh for or against discretionary denial.” *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 15, at *12 (P.T.A.B. May 13, 2020). Thus, Factor 1 is neutral.

Factor 2 (proximity of trial date to statutory IPR deadline): IV filed the complaint in the related litigation on April 4, 2022. Ex. 1012. As of this Petition, the related litigation has no trial date. By any calculation, the Board will issue its final written decision prior to a realistic trial date.³ Based on the most recent available statistics from the Administrative Office of the U.S. Courts, the median time from filing to trial in civil cases in the Northern District of Texas is 25.1 months (Ex. 1013, at 34), placing trial in May 2024—*i.e.*, after the Board’s anticipated

³ The Director recently clarified that in weighing *Fintiv* Factor 2 the Board may consider “evidence regarding the most recent statistics on median time-to-trial for civil actions in the district court in which the parallel litigation resides.” *Fintiv* Memorandum, at 8–9.

statutory deadline for final written decision. Moreover, nearly half of all civil cases in the district have been pending for over three years, suggesting that a May 2024 trial date is conservative. Finally, based on the parties' jointly proposed schedule to resolve the Motion to Transfer Venue, that motion will not be ripe for resolution until after October 13, 2022. Ex. 1014. Accordingly, the Board would almost certainly issue a final written decision in this proceeding several months before any scheduled trial date, even if the court disposed of the pending Motion to Transfer Venue and entered a case schedule immediately after briefing concluded. Factor 2 thus weighs strongly against the Board exercising discretion to deny institution.

To the extent the Board considers trial dates of related matters other than those involving Petitioner, the Board should still not deny institution. The GM and Toyota litigations commenced October 19, 2021. *See* Section X.B. Although both litigations have trials scheduled for July 2023, time-to-trial statistics indicate that anticipated trial dates could be as late as October 2023 to January 2024. Ex. 1013, at 35, 37. Trial dates are not determinative, however, but are instead weighed along with the other factors. *Netnut Ltd., v. Bright Data Ltd.*, IPR2021-01492, Paper 12, at *9–16 (P.T.A.B. March 21, 2022) (instituting review with related litigation trial date six months before final written decision deadline); *Coolit Sys., Inc., v. Asetek Danmark A/S*, IPR2021-01195, Paper 10, at *11, 14 (P.T.A.B. Dec. 28, 2021) (same by five months); *Align Tech., Inc., v. 3Shape A/S*, IPR2021-01313, Paper 11, at *16–

19 (P.T.A.B. Feb. 10, 2022) (four months), *STMicroelectronics, Inc., v. Ocean Semiconductor LLC*, IPR2021-01349, Paper 13, at *10, 13 (P.T.A.B. March 4, 2022) (three months); *STMicroelectronics, Inc., v. Optical Licensing, LLC*, IPR2021-01593, Paper 9, at *12–17 (P.T.A.B. March 17, 2022) (same); *Micron Technology, Inc., v. Vervain, LLC*, IPR2021-01550, Paper 11, at *9–13 (P.T.A.B. April 11, 2022) (same). Accordingly, the possibility that the GM or Toyota litigation could go to trial a few months prior to the expected final written decision in this proceeding should not weigh against institution.

Factor 3 (investment in parallel proceeding by court and parties): The court in the related litigation has yet to issue any substantive orders relating to the '138 patent, and thus the investment in the parallel district court proceeding is minimal. Given the early stage of the case and the parties' agreement to stay non-venue deadlines, there has been essentially no investment in substantive issues, such as claim construction or exchange of substantive contentions regarding infringement or validity. And with non-venue work expected to commence no earlier than October 2022, it is unlikely that the court and the parties will have incurred more than nominal investment regarding the validity of the '138 patent by the time of institution. *Protect Animals with Satellites LLC, v. OnPoint Sys., LLC*, IPR2021-01483, Paper 11, at *14–15 (P.T.A.B. Mar. 4, 2022); *Fintiv* at 9–10; *Netnut*, Paper 12 at 11; *Ford Motor Co. v. Safe Driving Techs. LLC*, IPR2021-01446, Paper 11, at

*41–42 (P.T.A.B. March 14, 2022). Even the prior EDTX case never proceeded to any substantive orders or filings. Accordingly, this factor weighs against discretionary denial.

Factor 4 (overlap between issues): In the related litigation, IV has only asserted claim 1 of the '138 patent. Ex. 1012, at 62–72.⁴ Nonetheless, to mitigate concerns about potential overlap between issues, Petitioner stipulates that, should this IPR be instituted, it will not pursue in the related litigation the grounds raised in this Petition. *Sand Revolution II LLC v. Cont'l Intermodal Grp.-Trucking LLC*, IPR2019-01393, 2020 WL 3273334, Paper 24, at *12 (P.T.A.B. June 16, 2020). This factor therefore favors institution.

To the extent the Board considers potential overlap with related matters other than those involving Petitioner, the Board should still not deny institution on the basis of Factor 4. It is uncertain whether GM or Toyota will assert at trial any of the references or grounds presented in this Petition, or whether IV will continue to assert precisely the claims challenged here, as contentions are subject to narrowing and as trial approaches. *The Data Company Technologies Inc., v. Bright Data Ltd.*, IPR2022-00138, Paper 12, at *13–14 (P.T.A.B. May 11, 2022). Thus, this factor weighs in favor of Board not exercising discretionary denial.

⁴ In the prior EDTX case, IV asserted claims 1–4, 6–11, 13, and 14.

Factor 5 (whether Petitioner and defendant in parallel proceeding are the same party): Petitioner is a defendant in the related litigation. But Petitioner is not a party in the GM or Toyota litigations. Furthermore, neither GM nor Toyota is an RPI. *Bose Corp. v. Koss Corp.*, IPR2021-00680, Paper 15, at *18–19 (P.T.A.B. Oct. 13, 2021); *TCL Industries Holdings Co., Ltd. and Hisense Co., Ltd., v. Parkervision, Inc.*, IPR2021- 00990, Paper 9, at *28–29 (P.T.A.B. Nov. 22, 2021); *Data Company*, Paper 12, at *14–15. This factor therefore favors institution.

Factor 6 (other circumstances, including merits): This factor favors institution because the merits of this Petition are strong. The Petition relies upon materially different and non-cumulative primary references not applied during prosecution of the '138 patent (or in the Toyota IPR). *See* Section VI.

Accordingly, the *Fintiv* factors favor instituting this IPR.

C. The General Plastic Factors Favor Institution

The *General Plastic* factors weigh heavily in favor of instituting Petitioner's first and only petition challenging claims of the '138 patent. *Gen. Plastic Indus. Co. v. Canon Kabushiki Kaisha*, IPR2016-01357, 2017 WL 3917706, Paper 19, at *15–19 (P.T.A.B. Sept. 6, 2017) (precedential). Thus, the Board should decline to exercise its discretion under § 314(a).

In particular, Petitioner is not a party to the prior Toyota IPR challenging the '138 patent, and has not had the benefit of reviewing a POPR or institution decision

in that proceeding. Factors 1 and 3 thus weigh against the Board denying institution of the instant Petition. *Unified Patents, Inc. v. Certified Measurement, LLC*, IPR2018-00548, Paper 7, at *7–8 (P.T.A.B. Sept. 5, 2018).

Factors 2, 4, and 5 “bear little relevance” here because Petitioner has never challenged the ’138 patent, and thus these factors weigh against the Board denying institution of the instant Petition. *Unified Patents*, Paper 7, at *7–8 (citing *Alcatel-Lucent USA Inc. v. Oyster Optics, LLC*, IPR2017-02146, Paper 12, at *12 (P.T.A.B. Feb. 28, 2018)).

The final two factors are “efficiency considerations.” *Valve Corporation v. Electronic Scripting Products, Inc.*, IPR2019-00063, Paper 11, at *15 (P.T.A.B. April 2, 2019). Here, the Petition promotes adjudicative efficiencies. This Petition advances arguments based on references not considered during prosecution of the ’138 patent. The Board will already be familiar with the ’138 patent and the state of the art from the Toyota IPR, but will not have to decide identical issues given that this Petition raises new references that are not included in the Toyota IPR. *Illumina, Inc. v. Ravgen, Inc.*, IPR2021-01271, Paper 12, at *18 (P.T.A.B. Jan. 26, 2022). And there is no readily identifiable roadblock for the Board to issue a final determination within the statutory one-year limit. Thus, Factors 6 and 7 weigh against discretionary denial of the instant Petition.

D. The *Advanced Bionics–Becton, Dickinson* Factors Favor Institution

The *Advanced Bionics–Becton, Dickinson* framework also weighs against discretionary denial under Section 315(d). The instant Petition does not present the same or substantially the same art considered by the Patent Office during initial examination. *See* '138 patent, Cover. Accordingly, asserted references are non-cumulative of the prior art considered during prosecution and IPRs.

VIII. THE CHALLENGED CLAIMS ARE UNPATENTABLE OVER THE PRIOR ART

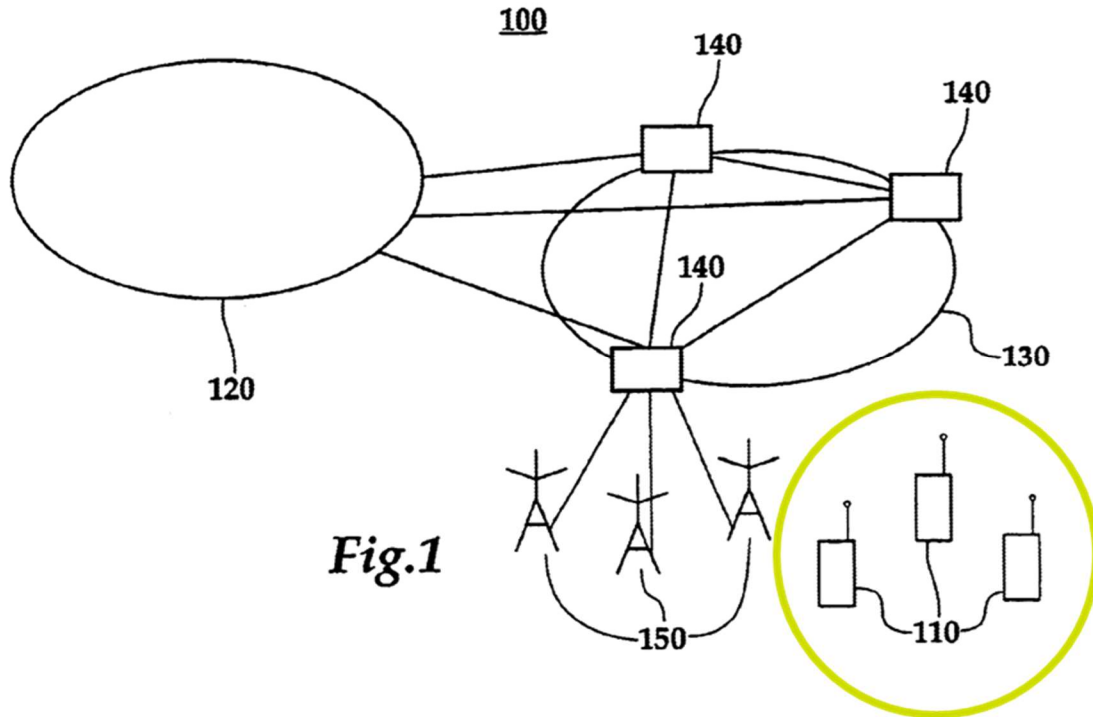
A. Ground 1: Peisa in Combination with Lohr Renders Claims 1–4, 6–11, 13, and 14 Obvious

1. Independent Claims 1, 8

Claims 1 and 8 recite substantially the same methods and features, except that claim 1 is written in apparatus form and claim 6 in method form. For the reasons explained below, claims 1 and 8 are obvious over Peisa in combination with Lohr.

a. Preamble: “A user equipment (UE) comprising:” and “A method performed by a user equipment (UE), the method comprising:”

To the extent the preambles are limiting, Peisa discloses a user equipment (UE) and methods performed by a UE. Ex. 1002 ¶¶ 46–48. In particular, Peisa describes an exemplary cellular Universal Mobile Telecommunications System (UMTS) network 100, shown in Figure 1, including “multiple user equipments (UEs) 110.” Peisa, 2:12–14.



Id., Fig. 1.⁵ Such UE “may include, for example, mobile stations” or “mobile terminals” with “wireless links.” *Id.* Peisa specifically explains that the method steps described in greater detail below can be performed by the UE within the UMTS. *See, e.g.*, Peisa, 13:44–53, 17:62–65, 18:17–18.

b. “a processor communicatively coupled to a transmitter and circuitry configured to receive” (Claim 1 only)

Peisa teaches a UE comprising a processor communicatively coupled to a transmitter and circuitry configured to receive. Ex. 1002 ¶¶ 49–54. As acknowledged in the specification of the ’138 patent, the processing hardware required to practice the claimed scheduling algorithms embraces “*any* suitable

⁵ Unless otherwise noted, all color annotations in figures have been added.

distribution of functionality between different functional units or logic elements.”
’138 patent, 13:3–10; *see also id.*, 13:11–19 (“invention may be implemented in any suitable form including hardware, software, firmware, or any combination of these” such as “a single unit or IC, in a plurality of units or ICs or as part of other functional units”).

Peisa discloses the claimed processor. Peisa describes embodiments that are implemented in “circuits, logic modules (implemented in, for example, software, hardware, firmware, some combination thereof, etc.).” Peisa, 3:66–4:4. Peisa further discloses, as Figure 7 shows, that UE 110 includes Medium Access Control (MAC) entities, further including a “scheduler” or “scheduling” entity. Peisa, 9:8–12, 9:30–34, 13:50–53, 17:62–65, 18:17–18, 20:19–24, Figs. 2, 3, 5, 7.

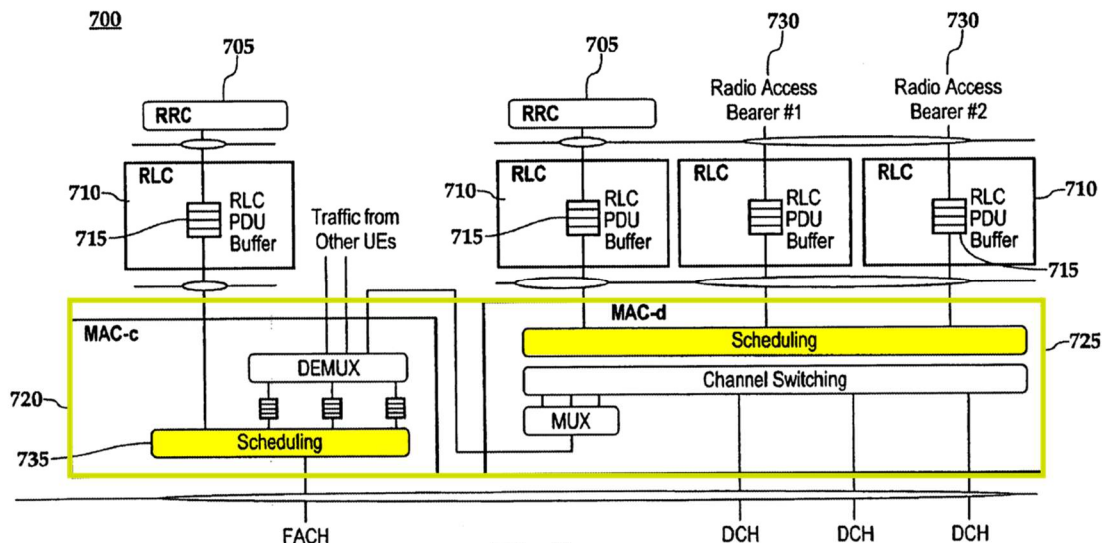
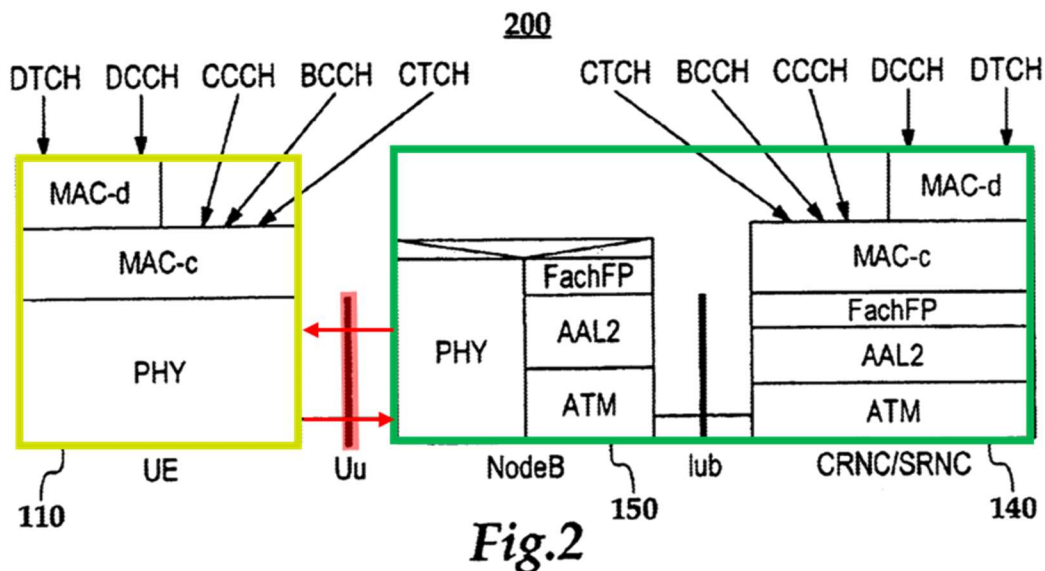


Fig.7

Id., Fig. 7. A POSITA would recognize that Peisa's UEs, which can be "mobile stations, mobile terminals, laptops/personal digital assistants (PDAs) with wireless links, etc.," Peisa, 2:15–17, necessarily include the claimed processor configured to implement the scheduler in the MAC entity. Ex. 1002 ¶¶ 50–54.

Peisa also teaches a transmitter and circuitry configured to receive. As Figure 2 shows, Peisa's UE 110 comprises a "PHY layer," *i.e.*, a physical layer, that sends transmissions to and receives transmissions from a network device, namely "Node B 150" within UTRAN 130, via the "Uu" air interface. Ex. 1002 ¶ 50; Peisa, 4:23–34.



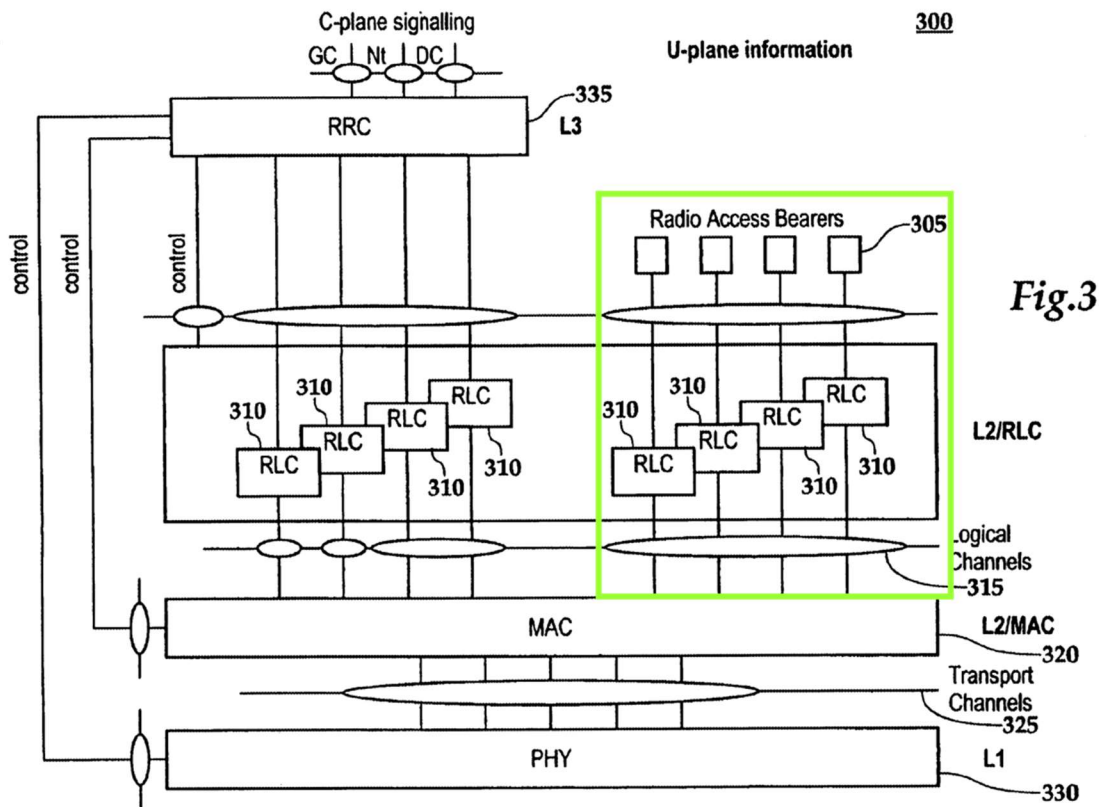
Peisa, Fig. 2.

A POSITA would understand that to implement Peisa's PHY (physical) layer, Peisa's UE 110 necessarily includes transmitting and receiving equipment, and circuitry that is configured to transmit and receive messages using such equipment,

as any UE in a cellular system does. Ex. 1002 ¶¶ 50–54. By way of example, Peisa describes a forward access channel (FACH), which a POSITA would recognize as a UMTS downlink channel, *i.e.*, a channel on which UE 110 receives transmissions from Node B 150. Ex. 1002 ¶ 50; Peisa, 4:23–47. Peisa explains, as illustrated in annotated Figure 2 above, that a MAC-c entity in UTRAN 130 uses FACH to transmit packets to the corresponding MAC-c entity in UE 110 via Node B 150, using the Uu air interface to the PHY layer in UE 110. Peisa, 4:58–67, 5:54–6:24. FACH is then mapped to a physical channel for transmission via Node B 150’s PHY layer over the Uu air interface. *Id.* 4:43–47. As a POSITA would appreciate, circuitry in UE 110 is necessary to receive those transmissions from the network. Ex. 1002 ¶ 52.

c. “[the processor is configured to: cause the circuitry to receive / receiving, by the UE,] parameters associated with a plurality of radio bearers”

The processor within Peisa’s UE 110 receives the claimed parameters associated with a plurality of radio bearers. Ex. 1002 ¶¶ 55–60. Specifically, in Peisa’s system “[u]ser and signaling data may be carried between an RNC [Radio Network Controller] 140”—part of UTRAN 130 that includes Node B 150 for directly communicating with the UE—“and a UE 110 using Radio Access Bearers (RABs)” as Figure 3 shows. Peisa, 4:28–31.



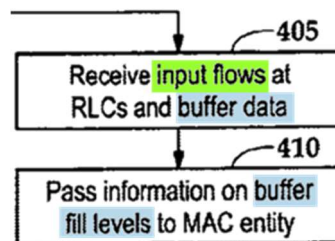
Id., Fig. 3.

In Peisa, associations are made between RABs, channels, and “data flows” or “inputs flows.” *Id.*, 4:28–34, 6:41–50, 8:19–25; Ex. 1002 ¶¶ 58–59. Specifically, a UE 110 “is allocated one or more RABs, each of which is capable of carrying a flow of user or signaling data” and which “are mapped onto respective logical channels.” Peisa, 4:31–34. As Peisa explains, each of the RABs or logical channels has “RAB parameters, which are allocated ... by the network” and sent from the network to the UE and “may equate to a Quality of Service (QoS) or Guaranteed rate allocated to a user for a particular network service.” *Id.*, 8:47–51; *see also id.*, 5:8–10 (“UMTS defines a framework in which different Quality of Services (QoS) may be assigned

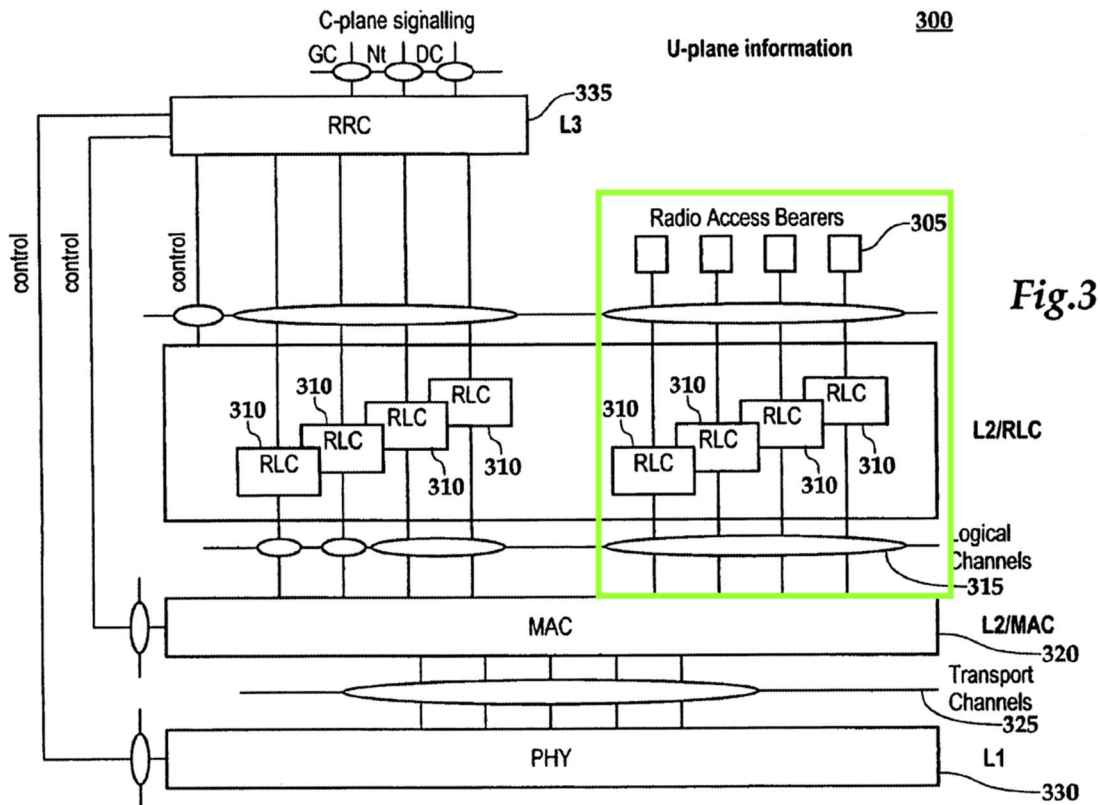
to different RABs.”), 18:36–43 (“QoS Class” and “Guaranteed Rate” parameters are “obtained from the corresponding RAB parameter”). As just one example, Peisa explains that the “weighting for a data flow may be defined by one or more Radio Access Bearer (RAB) parameters allocated to a RAB by the UMTS network, where the RAB is associated with each MAC input flow.” *Id.*, 9:47–51. Such parameters are used in the scheduling process that, according to Peisa, may be implemented in the UE, *see id.*, 10:57–67, 18:13–18, and therefore a POSITA would understand that the RAB parameters are received by the processor and other circuitry on the UE, as required by the claims. Ex. 1002 ¶¶ 59–60.

- d. “[the processor is configured to ... determine / determining, by a processor of the UE,] a plurality of buffer occupancies, wherein each of the plurality of buffer occupancies is associated with one or more radio bearers of the plurality of radio bearers”**

Peisa discloses that the processor of the UE determines a plurality of buffer occupancies, each associated with one or more radio bearers. Ex. 1002 ¶¶ 61–64. Specifically, in step 405 of the scheduling algorithm illustrated in Figure 4, UE 110 receives input flows at Radio Link Control (“RLC”) entities and buffers the data for each input flow. Peisa, 6:45–48, 10:37–38.



Id., Fig. 4 (excerpted). Then, as shown in annotated Figure 3 below, Peisa explains that each RLC entity 310 is associated with a RAB 305. *Id.*, 6:20–65, Fig. 3.



Id., Fig 3. Thus, a POSITA would recognize that the buffer occupancies associated with each RLC entity are also associated with any RABs associated with that RLC. Ex. 1002 ¶ 62; Peisa, 9:47–51.

Furthermore, Peisa makes clear that its scheduling processes and associated layer-2 entities, such as MAC and RLC entities, “may be implemented in ... the UE.” *Id.*, 18:17–18; *see also id.*, 13:50–53, 17:59–65. A POSITA would thus appreciate that in order to maintain “queue fill levels” for each of the queues associated with radio bearers and to “pass[]” such “[i]nformation on buffer fill

levels” to a MAC entity, such as one residing on the network, Peisa, 10:39–40, 14:52–59, the UE would necessarily have to first “determine” the plurality of buffer occupancies associated with the radio bearers as required by the claims. Ex. 1002 ¶ 63.

To the extent that Peisa does not disclose this limitation, it would have been obvious to combine the disclosures of Lohr for this element. Ex. 1002 ¶ 64. Specifically, Lohr describes a “Layer-1” message (*i.e.*, in the physical layer) called a “Scheduling Information Update (SI)” that is “sent in the uplink” from UE to the network. Lohr, 7:27–30. The message from the UE to the network provides information on the UE’s status, including its “buffer occupancy.” *Id.*, 7:33–35. A POSITA would know that in order to transmit the buffer occupancy information, the UE must first determine the buffer occupancy information, thus satisfying this element. Ex. 1002 ¶ 64.

Motivation to Combine Peisa and Lohr

Like Peisa, Lohr is directed to methods and devices for use within the UMTS architecture, including the use of UEs. Peisa, 2:12–16 & Fig. 1; Lohr, 2:62–68 & Fig. 1. And like Peisa, Lohr describes mechanisms for scheduling transmissions in a UMTS architecture where different data flows can have different QoS requirements and are thus queued according to their priority levels. Lohr, 4:21–37 & Fig. 4. Accordingly, as Dr. Wicker explains, it would have been obvious to

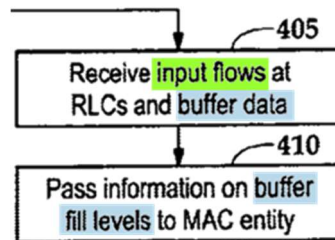
combine Peisa's disclosures with those of Lohr because both teach complementary methods and systems for packet scheduling in UMTS networks, specifically through the use of optimizing TFCs to maximize throughput of QoS-differentiated data streams. Ex. 1002 ¶ 65.

Accordingly, a POSITA would have been motivated to combine the scheduling algorithms of Peisa, which rely in part on buffer occupancies for individual channels, with the message structure of Lohr, which provides status information including buffer occupancy. Ex. 1002 ¶ 66. Specifically, Peisa teaches that buffer fill levels are passed to a MAC entity (which are distributed among UEs and the network), therefore suggesting that a message of some kind is required to convey that information. Peisa, 9:30–34, 9:62–10:14, 10:37–42, 13:50–53, 17:59–18:19, Fig. 4. Lohr, on the other hand, teaches a specific system of messaging between the network and UE, including a “scheduling assignment” message sent by the UE containing buffer occupancy status information. Lohr, 7:27–35; Ex. 1002 ¶ 67.

- e. **“[the processor is configured to ... cause the transmitter to transmit / transmitting, by a transmitter of the UE,] a message including the plurality of buffer occupancies to a network”**

Peisa also discloses that the UE transmits a message including the plurality of buffer occupancies, determined as described above in Section VIII.A.1.d, to the network, using its processor and/or transmitter. Ex. 1002 ¶¶ 68–70. Specifically, in

the process of buffering data for input flows and computing the fair bandwidth share for each input flow, Peisa includes the step of passing “[i]nformation on buffer fill levels ... to the MAC entity,” as shown below in annotated Figure 4. Peisa, 10:37–42, Fig. 4.



Id., Fig. 4 (excerpted).

As explained above, MAC entities are distributed between UEs and the network. *Id.*, 13:50–53, 17:59–65, 18:17–18. Specifically, Peisa discloses a MAC entity implemented at a UE “receiv[ing] data transmitted in the logical channels 315 and further map[ping] the data from the logical channels 315 onto a set of transport channels 325” for transmission. *Id.*, 6:50–54. Peisa also teaches that “[i]nformation on buffer fill levels” associated with input flows from the logical channels is passed from the UE to another MAC entity, this time in the network. *Id.*, 10:39–40. Notably, in Peisa’s system, MAC entities (including one to which buffer fill levels are transmitted) are implemented at a Radio Network Controller (RNC) on the network side, *e.g.*, at UTRAN 130. *Id.*, 9:30–34, 9:62–10:14, 17:59–18:19.

Based on Peisa’s teachings, a POSITA would understand that the MAC-c entity in UE 110 passes information on buffer fill levels for multiple radio bearers

(the claimed “plurality of buffer occupancies”) associated with flows from the logical channels 350 via UE 110’s PHY (physical) layer via the Node B 150 and ultimately to UTRAN 130’s MAC-c entity (*i.e.*, a network). Ex. 1002 ¶ 70.

To the extent that Peisa does not disclose this limitation, it would have been obvious to combine the disclosures of Lohr to supply the claimed transmission of a “message including the plurality of buffer occupancies to a network.” Ex. 1002 ¶ 71. Specifically, Lohr describes a “Layer-1” message (*i.e.*, in the physical layer) called a “Scheduling Information Update (SI)” that is “sent in the uplink” from UE to the network. Lohr, 7:27–30. The message from the UE to the network provides information on the UE’s status, including its “buffer occupancy.” *Id.*, 7:33–35.

f. “[the processor is configured to . . . cause the circuitry to receive / receiving, by the UE,] a single allocation of uplink resources”

Circuitry and or a processor within Peisa’s UE 110 receives the claimed “single allocation of uplink resources.” Ex. 1002 ¶¶ 72–79. Specifically, Peisa discloses that, via the PHY layer, “the mobile station *receives a predetermined transmission bandwidth*,” out of the “total bandwidth” allocated “*by the network*” to “physical transport channel 330.” Peisa, 2:22–26, 6:54–57; *see also id.*, 6:66–7:2. In addition, as Peisa explains, the bandwidth of transport channels is “configured by a Radio Resource Controller (RRC) entity 335” (also involved in “routing data associated with the UE 110 directly to and from the core network” and thus part of

the network, *see id.*, 4:53–57), which “informs the MAC entity 320 of a Transport Block Set (TBS) size, which is the ***total number of bits the MAC entity can transmit to the physical layer in a single transmission time interval (TTI).***” *Id.*, 6:66–7:2. Peisa explains that the “MAC-c entity in the RNC 140 transfers MAC-c Packet Data Units (PDUs) to the peer MAC-c entity at the UE 110[.]” *Id.*, 4:58–62. Notably, Peisa teaches that the various MAC and Radio Link Control (RLC) entities may be distributed among the network devices ***or UE 110.*** *See id.*, 17:62–65 (“The MAC-c, MAC-d, and RLC layers of UMTS may be located, for example, in a Radio Network Controller (RNC) 140 (of FIG. 1) of the UTRAN 130, a User Equipment (UE) 110, etc.”). Accordingly, a POSITA would appreciate that for the RRC entity 335 to “inform” a MAC entity in the UE of the “total number of bits” it can transmit to the physical layer in a single TTI, *see id.*, 6:66–7:2, the network would necessarily have to send a transmission, received by the UE, that includes an allocation for the UE to use as an uplink resource, or, at an absolute minimum, doing so would be an obvious variation, as it is quite common for a network to allocate resources to a UE in this manner. Ex. 1002 ¶ 74. Indeed, Peisa’s embodiments are designed for use in UMTS, Peisa, 2:26–29, 2:48–57, which includes allocation messages for assigning UEs resource on uplink channels. Ex. 1011 § 5.6.6.1–3; Ex. 1002 ¶ 75. Accordingly, Peisa discloses these limitations.

To the extent that Peisa does not expressly disclose the UE receiving a single allocation of uplink resources, a POSITA would look to Lohr to supply this limitation. Ex. 1002 ¶¶ 76–79. Like Peisa, Lohr is directed to methods and devices for use within the UMTS architecture, including the use of UEs. Peisa, 2:12–16 & Fig. 1; Lohr, 2:62–68 & Fig. 1. And like Peisa, Lohr describes mechanisms for scheduling transmissions in a UMTS architecture where different data flows can have different QoS requirements and are thus queued according to their priority levels. Lohr, 4:21–37 & Fig. 4. Accordingly, it would have been obvious to combine Peisa’s disclosures with those of Lohr because both teach complementary methods and systems for packet scheduling in UMTS networks, specifically through the use of optimizing Transport Format Combinations (TFC) to maximize throughput of QoS-differentiated data streams. Ex. 1002 ¶ 77.

Lohr describes a system in which packet scheduling is distributed between a “Radio Network Controller (RNC)” and UE. Lohr, 2:40–42. Among other things, the RNC controls the “maximum rate” a UE “is allowed to transmit during uplink transmission.” *Id.*, 2:47–49. The RNC in Lohr does so by “allocating a set of different transport formats” to each UE. *Id.*, 2:49–51. Lohr goes on to explain that this may be accomplished by “messaging between RNC” and UE, *id.*, 2:52–55, referred to as a “grant message ... from the Node B to the UE” or alternatively a “scheduling assignment.” *Id.*, 5:17–21, 7:64–8:2. As a POSITA would immediately

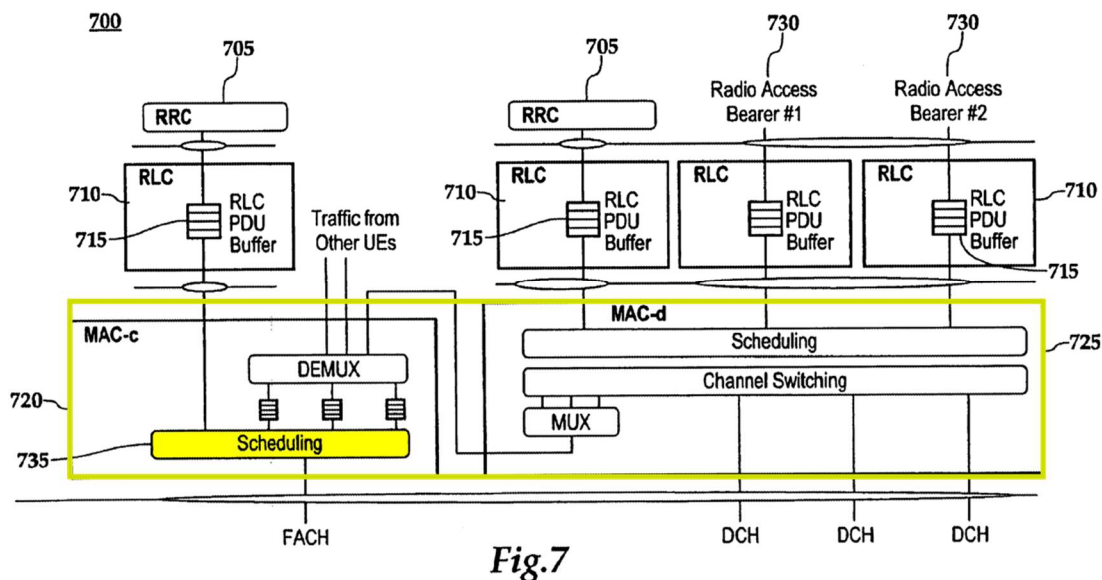
appreciate, Lohr's grant message or scheduling assignment, which notifies the UE of the "maximum data rate and the time interval" the UE is allowed to send, *id.*, 5:17–21, is a "single allocation of uplink resources" from a network device to the UE, as claimed. Ex. 1002 ¶ 78.

Accordingly, a POSITA would have been motivated to combine the scheduling algorithms of Peisa with the message structure of Lohr. Specifically, Peisa teaches that the MAC entity of the UE needs to be "inform[ed]" by the network of the "total number of bits" it can transmit to the physical layer in a single TTI, therefore suggesting that an additional message is required to convey that information. Peisa, 6:66–7:2; *see also id.*, 2:22–26, 6:54–57; Ex. 1002 ¶ 77. Lohr, on the other hand, teaches a specific system of messaging between the network and UE, including a "grant message" and "scheduling assignment" that allocates uplink resources to a UE. Lohr, 5:17–21, 7:64–8:2; *see also id.*, 2:52–55; Ex. 1002 ¶ 79.

- g. "[the processor is configured to ... select data / selecting, by the processor, data from the plurality of radio bearers] for transmission using the single allocation of uplink resources, wherein the selection of the data occurs using a first and a second iteration"**

Peisa discloses the selection of data for transmission using the single allocation of uplink resources in a first and second iteration. Ex. 1002 ¶¶ 80–82. As noted above, MAC entities may be located in the UE. Peisa, 17:62–65. Embodiments of Peisa's invention provide "all flows a guaranteed bit rate by

following a *two-step scheduling process* in a scheduler 735 located in the MAC layer.” *Id.*, 18:9–13. Peisa further explains that it may be advantageous to implement such embodiments of its “two-level scheduling process,” described in greater detail below, “in the RNC node” or “the UE.” *Id.*, 18:16–18. Accordingly, a POSITA would appreciate that scheduler 735, shown in annotated Figure 7 below, can be implemented in a processor in the UE. Ex. 1002 ¶ 80.

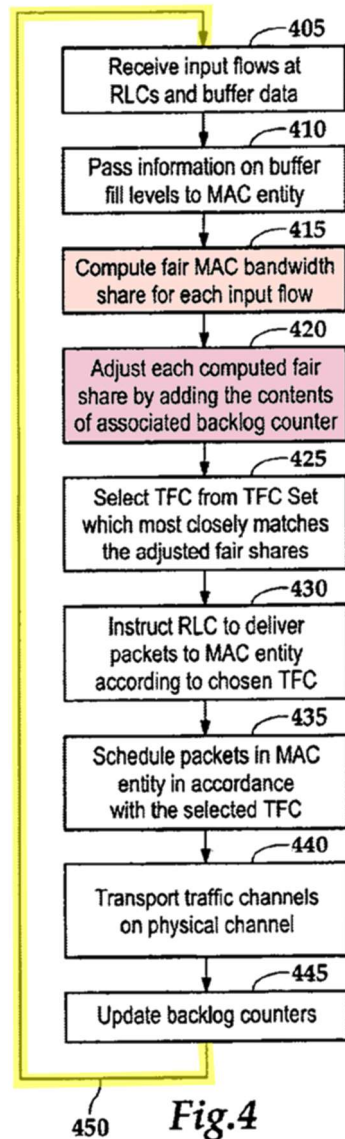


Peisa, Fig. 7.

The scheduler of Peisa’s system selects data and does so using an iterative scheduling algorithm with a first and second iteration, as required by the claims. Specifically, Peisa’s scheduler employs an algorithm described as a “two-step

rating” or “scheduling process.” *id.*, 11:10, 18:9–17.⁶ As shown below in annotated Figure 4, “[a]fter the information on buffer fill levels is passed to the MAC entity, the fair MAC bandwidth share for each input flow” is computed” in step 415. *Id.*, 10:40–44. The computed fair share of each is then adjusted by adding the contents of an associated backlog counter to the respective computed fair share in step 420. *Id.*, 10:42–44. Once the computed fair shares have been adjusted, a TFC is selected from the TFC set to most closely match the adjusted fair shares. *Id.*, 10:40–47. Finally, as indicated by “arrow 450,” the process may continue repeatedly, such as “when new input flows are received at the RLCs, which buffer the data” at step 405. *Id.*, 10:53–56.

⁶ Peisa describes each of its embodiments as being exemplary methods to be used in accordance with its present invention, which relies on a common UMTS architecture depicted in Figures 3 and 7. *See id.*, 6:20–39, 10:29–32, 17:48–55, 18:29–31.



Id., Fig. 4. Accordingly, a POSITA would understand that the scheduling algorithm of Peisa allocates resources in using a first and a second iteration, namely, step 415's computation of a "fair MAC bandwidth share for each input flow" and step 420's adjustment of each input flow's "computed fair share by adding the contents of [the] associated backlog counter." Ex. 1002 ¶ 81; Peisa, 9:40–44, 10:42–47.

A POSITA would also understand Peisa's algorithm to include at least two iterations by virtue of its repeating nature: as shown above in Figure 4, once the backlog counters are updated in step 445 to be "taken into account when selecting a TFC for the subsequent frame of the output data flow," Peisa, 9:19–24, the algorithm restarts at step 405 by receiving input flows at RLCs and buffering data again. *Id.*, 10:37–38, 10:54–56; Ex. 1002 ¶ 82.

h. "wherein in the first iteration, the selection of data is selected from a subset of the plurality of radio bearers based on the received parameters"

As explained above in Section VIII.A.1.g, the scheduling algorithm in Figure 4 is iterative. In the first iteration, the scheduling algorithm computes a "fair MAC bandwidth share" for each input flow of data in step 415. Peisa, 10:40–42. Peisa discloses that this computation of shares is based on the "weights" for each input flow as defined by the RNC. Peisa, 9:40–46. Further, as explained above in Section VIII.A.1.c, the weighting for each input flow is determined using "RAB parameters," such as a RAB's QoS or Guaranteed Rate, which are received by the UE from the network.

Specifically, in this first iteration of Peisa's "Weighted Fair Queuing (WFQ)" method, the "weighting for each input flow" is determined "on the basis of certain RAB parameters," which may "equate to a Quality of Service (QoS) or Guaranteed rate." Peisa, 8:45–51. Peisa selects data for transmission from a subset of the

plurality of radio bearers based on these received parameters, by “choosing the best TFC” that maximizes the “amount of packets sent from each queue” up to the computed fair share for the queue. *Id.*, 11:11–20, 13:54–65. Peisa further explains that it is “of course necessary to share the total available bandwidth between the logical channels 315.” *Id.*, 8:3–4. Scheduler 735 in the MAC entity of the UE performs this sharing or allocation of bandwidth between logical channels. *See, e.g., id.*, 8:3–7, 17:66–18:2, 18:9–18. As a POSITA would appreciate, a TFC may be selected that allocates bandwidth to only a subset of radio bearers, especially where other radio bearers have been assigned parameters, such as the “Guaranteed Rate” parameter, equal to zero. *Id.*, 18:53–55; *see also id.*, 18:60–19:17; Ex. 1002 ¶ 85. Accordingly, a POSITA would understand that the first iteration of Peisa’s algorithm includes selection of data from a subset (*i.e.*, from fewer than all logical channels) of the plurality of radio bearers based on the received parameters. Ex. 1002 ¶ 85.

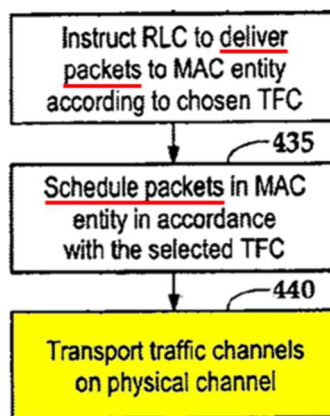
i. “wherein in the second iteration, the selection of the data is based on buffered data for respective radio bearers”

Peisa discloses a scheduling algorithm wherein, in the second iteration, the selection of data is based on buffered data for respective radio bearers. Ex. 1002 ¶¶ 86–87. Specifically, after selecting data based on received parameters such as QoS Class or Guaranteed Rate as described above in Section VIII.A.1.h, Peisa’s scheduling algorithm adjusts the “computed fair share” by “adding the contents of

an associated backlog counter,” *i.e.*, buffered data that was not transmitted in a previous iteration, for the respective input flow, which is associated with one or more RABs. Peisa, 10:42–44. As Peisa explains, its scheduling algorithm updates the backlog counter for each input flow that did not get to transmit all of its data during the previous iteration. *Id.*, 9:1–34; *see also id.*, 9:28–30. This adjustment involves subtracting the actual “data transmission rate” from the “determined fair distribution” for the input flow and “adding the difference to a backlog counter for the input flow.” *Id.*, 9:19–24. Thus, for each input flow in the first iteration that transmitted less than its “determined fair distribution,” the backlog counter will be incremented to reflect that the input flow had buffered data that was not transmitted. *Id.*, 9:3–6, 9:19–24. Peisa further explains that the purpose of this backlog counter is to ensure the backlog of buffered data is “taken into account when selecting a TFC for the subsequent frame of the output data flow” and that “[t]he tendency is to adjust the selected TFC to reduce the backlogs. *Id.*, 9:22–24, 9:27–28. For example, Peisa describes embodiments in which TFCs are selected based on a “two-level scoring” system where in the second step “missing bits are added to backlog counter of the corresponding flow and the selection is repeated for the next TTI.” *Id.*, 11:20–34; *see also id.*, 13:54–14:6. Accordingly, a POSITA would understand that in the second iteration of Peisa’s algorithm, data is selected based on buffered data, that is, unsent data represented by the backlog counter for each queue. Ex. 1002 ¶ 87.

- j. “[the processor is configured to . . . cause the transmitter to transmit / transmitting, by the transmitter,] a signal including the selected data”

Peisa teaches that UE 110 transmits a signal including the data selected in the previous steps of its algorithm, as described above in Sections VIII.A.1.g–i. Ex. 1002 ¶ 88. Specifically, as shown below in excerpted Figure 4, after selecting the packets to deliver and schedule in a MAC entity in accordance with the selected TFC, in step 440 the scheduling algorithm transmits the selected data on one or more physical channels:

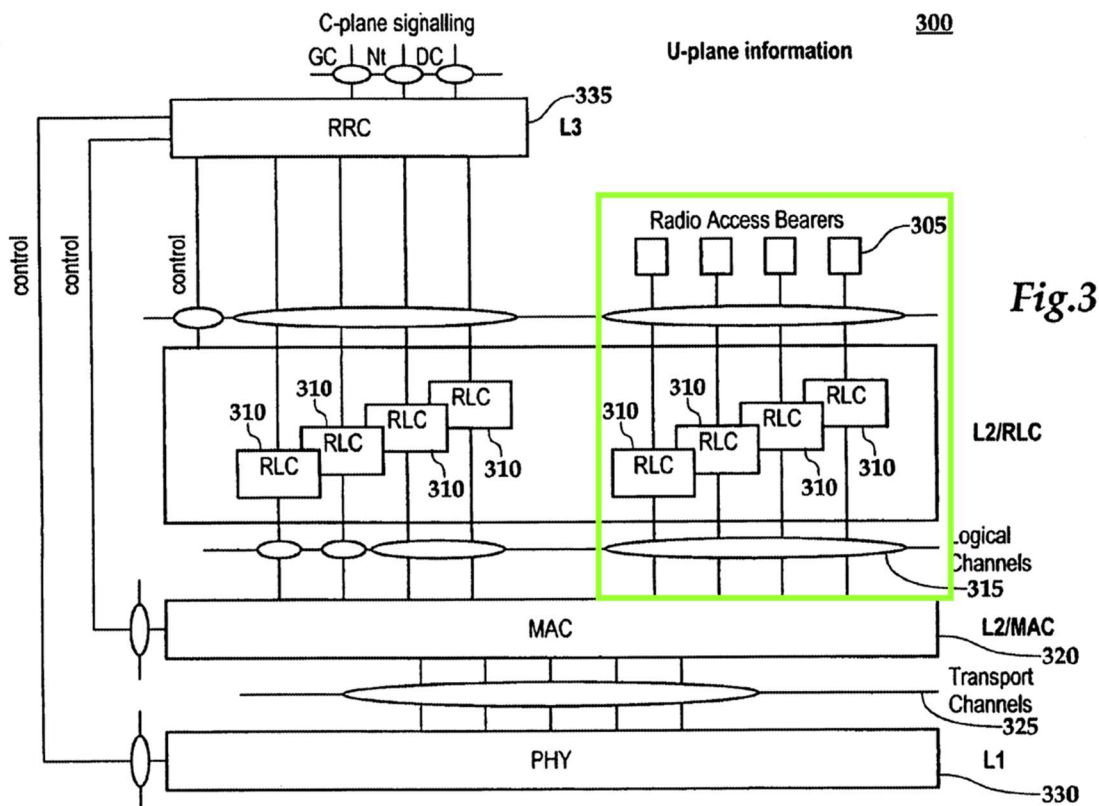


Peisa, Fig. 4. As Peisa explains, “[a]fter packet scheduling, the traffic channels may be transported on the physical channels.” *Id.*, 10:50–52. As a POSITA would understand based on Peisa’s disclosures of physical layer transmissions in a UMTS network, after selecting data in the first and second iterations described above, the UE in Peisa transmits a signal including that selected data. Ex. 1002 ¶ 88.

2. Dependent Claims 2, 9

“[The UE of claim 1 / The method of claim 8], wherein the plurality of radio bearers are associated with a plurality of channels.”

Peisa discloses the UE of claim 1 and method of claim 8 for the reasons explained above in Section VIII.A.1. Peisa further discloses the common additional limitation of claims 2 and 9, that the plurality of radio bearers are associated with a plurality of channels. Ex. 1002 ¶ 89. Specifically, as illustrated in annotated Figure 3, below, Peisa’s RABs (radio bearers) 305 are associated with logical channels 315, as well as transport channels 325 and a physical channel 330. Peisa, 6:41–65.



Id., Fig. 3.

As Peisa explains, “[i]n the RLC layer, RABs 305 are mapped onto respective logical channels 315.” Peisa, 6:49–50. As a POSITA would understand, each radio bearer in this arrangement is associated with its own logical channel, and thus the plurality of radio bearers are associated with a plurality of channels. Ex. 1002 ¶ 89. Moreover, MAC entity 320 in turn “maps the data from the logical channels 315 onto a set of transport channels 325” and “[t]he transport channels 325 are finally mapped to a single physical transport channel 330.” *Id.*, 6:54–57. Thus, Peisa also discloses that each of its plurality of radio bearers (RABs) is itself associated with a plurality of channels, including at least one each of the “respective logical channels 315,” “transport channels 325,” and a “single physical transport channel 330,” as recited by these additional limitations of claims 2 and 9. *Id.*, 6:48–60.

3. Dependent Claims 3, 10

“[The UE of claim 1 / The method of claim 8], wherein each radio bearer of the plurality of radio bearers is associated with at least one data flow or IP flow.”

Peisa discloses the UE of claim 1 and method of claim 8 for the reasons explained above in Section VIII.A.1. Peisa further discloses the common additional limitation of claims 3 and 10, that each radio bearer of the plurality of radio bearers is associated with at least one data flow or IP flow. Ex. 1002 ¶ 90. Specifically, Peisa describes “[d]ata flows (e.g., in the form of segments) from the RABs 305” that are “passed to respective Radio Link Control (RLC) entities 310, which amongst

other tasks buffer the received data segments.” Peisa, 6:45–57. These “data flows” represent data segments carried by respective RABs and are also referred to by Peisa as “input data flows,” or simply, “input flows.” *E.g., id.*, 2:40–47, 3:1–15, 4:28–34, 8:19–25, 8:26–27, 8:35–37. Peisa also teaches that an example of a data flow is one using the “Transmission Control Protocol (TCP)” and “Internet Protocol (IP)” networks. *Id.*, 8:19–25. From these disclosures, a POSITA would understand that each RAB (radio bearer) in Peisa’s system is associated with at least one data flow or IP flow. Ex. 1002 ¶ 90.

4. Dependent Claims 4, 11

“[The UE of claim 1 / The method of claim 8], wherein the selected data is selected based on a priority or a Quality of Service (QoS).”

Peisa discloses the UE of claim 1 and method of claim 8 for the reasons explained above in Section VIII.A.1. Peisa further discloses the common additional limitation of claims 4 and 11, that the selected data is selected based on a priority or a Quality of Service (QoS). Ex. 1002 ¶¶ 91–92. Specifically, Peisa explains that “UMTS defines a framework in which different Quality of Services (QoSs) may be assigned to different RABs.” Peisa, 5:8–9. In Peisa’s system, packets with certain QoSs are be prioritized for transmission: “Packets corresponding to a RAB that has been allocated a high QoS should be transmitted over the air interface at a high priority whilst packets corresponding to a RAB that has been allocated a low QoS

should be transmitted over the air interface at a lower priority.” *Id.*, 5:8–14. These priorities, Peisa explains, “may be determined at the MAC entity ... on the basis of RAB parameters.” *Id.*, 5:14–16. As explained above in Sections VIII.A.1.c, g–h, these same RAB parameters received from the network are used in Peisa’s scheduling algorithm to compute the fair bandwidth share for each input flow, and therefore to select data for transmission. *Id.*, 9:35–56, 10:40–42. Further, each RAB parameter “may equate to a Quality of Service (QoS) ... allocated to a user for a particular network service.” *Id.*, 8:48–51; *see also id.*, 14:37–40. Thus, Peisa discloses that the “RAB parameters” on which the fair MAC bandwidth is computed in at least the algorithm’s first iteration may equate to a QoS for the particular service or data type carried by the radio bearer. Accordingly, Peisa discloses that the selected data is based on a priority or QoS. Ex. 1002 ¶ 92.

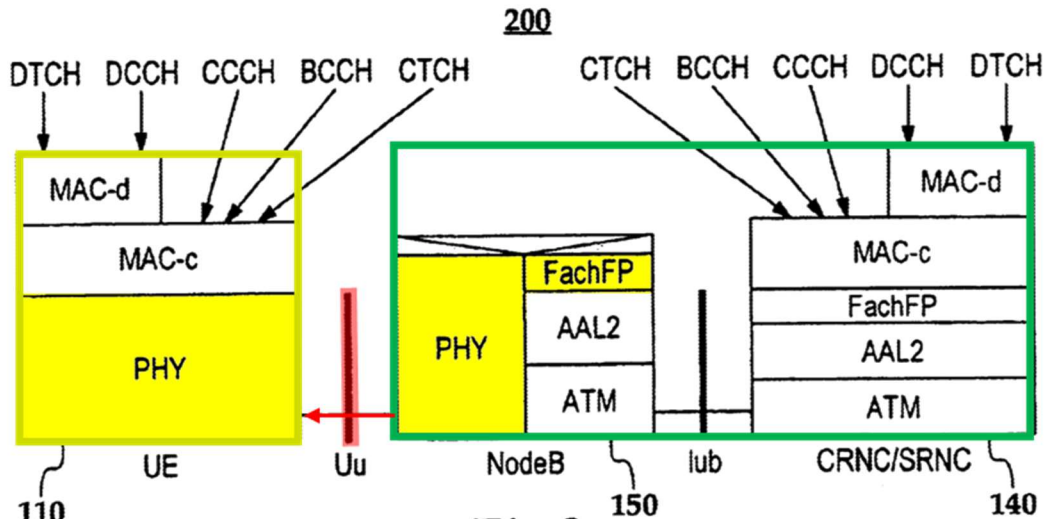
5. Dependent Claims 6, 13

“[The UE of claim 1 / The method of claim 8], wherein the single allocation of uplink resources is received on a physical shared channel from a scheduler in the network.”

Peisa discloses the UE of claim 1 and method of claim 8 for the reasons explained above in Section VIII.A.1. Peisa further discloses the common additional limitation of claims 6 and 13, that the single allocation of uplink resources is received on a physical shared channel from a scheduler in the network. Ex. 1002 ¶¶ 93–94. As explained above in Section VIII.A.1.f, the UE in Peisa receives a single allocation

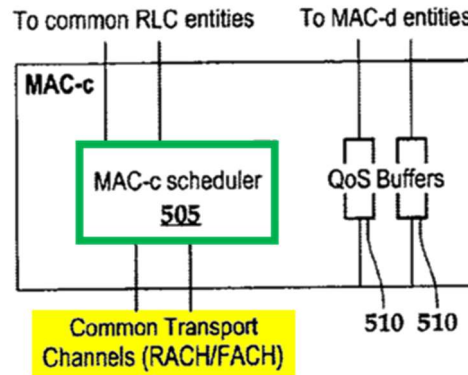
of uplink resources from the network. Peisa, 2:22–26, 6:54–57, 6:66–7:2. To the extent this is not expressly disclosed in Peisa, Lohr describes “messaging between” the network and UE, including a “grant message” or “scheduling assignment.” Lohr, 2:47–55, 5:17–21, 7:64–8:2.

Peisa, alone or in combination with Lohr, teaches that the allocation of uplink resources is received on a physical shared channel from a scheduler in the network. As shown below in annotated Figure 2, Peisa discloses that a MAC-c entity in UTRAN 130 uses the forward access channel (FACH) to transmit messages to the MAC-c entity in UE 110 via Node B 150, the Uu air interface, and the PHY (physical) layer. Peisa, 4:58–67.



Id., Fig. 2. Furthermore, Peisa discloses that the MAC-c entity in the network uses a scheduler to transmit messages to UE 110 via FACH. *Id.*, 13:26–31. As shown

below in annotated Figure 5, the MAC-c scheduler in the network is connected to Common Transport Channels (RACH/FACH). *Id.*, 13:28–31.



Id., Fig. 5.

Accordingly, a POSITA would understand that scheduling messages—such as those required to allocate uplink resources to a UE—would be transmitted from the network to the UE via common (*i.e.*, shared) physical channels like FACH. Ex. 1002 ¶ 94.

6. Dependent Claims 7, 14

“[The UE of claim 1 / The method of claim 8], wherein the subset of the plurality of radio bearers is associated with a Quality of Service (QoS).”

Peisa discloses the UE of claim 1 and method of claim 8 for the reasons explained above in Section VIII.A.1. Peisa further discloses the common additional limitation of claims 7 and 14, that the subset of the plurality of radio bearers is associated with a QoS. Ex. 1002 ¶ 95. As explained above in Section VIII.A.4 with respect to claims 4 and 11, Peisa discloses that each of UE 110’s RABs (or logical channels or “flows”) has a corresponding QoS parameter. Peisa, 8:45–51. Thus,

because Peisa discloses that a UE's RABs are each allocated parameters including a QoS, Peisa also discloses that the subset of the plurality of radio bearers is associated with a QoS. Ex. 1002 ¶ 95.

B. Ground 2: Peisa in Combination with Choi and Bucknell Renders Claims 1–4, 6–11, 13, and 14 Obvious

1. Independent Claims 1, 8

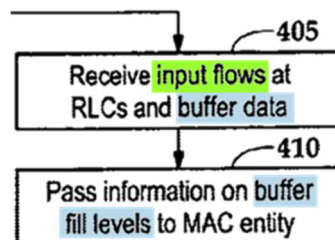
Peisa discloses each limitation of independent claims 1 and 8 for the reasons explained in Section VIII.A.1, above. To the extent that Peisa does not expressly disclose that its UE “determine[s]” and then “transmit[s] ... a message including” a “plurality of buffer occupancies,” as explained above in Sections VIII.A.1.d–e, a POSITA would have looked to Choi to supply those limitations, as explained below. Likewise, to the extent that Peisa does not expressly disclose selection of data using a “first iteration” based on “received parameters” and a “second iteration” based on “buffered data,” as explained above in Sections VIII.A.1.g–i, a POSITA would have looked to Bucknell.

Motivation to Combine Peisa, Choi, and Bucknell

Like Peisa, Choi and Bucknell are directed to communications systems that interoperate with the UMTS standard. Peisa, 1:64–2:16; Choi at 1; Bucknell, 1:4–11; Ex. 1002 ¶¶ 97–100. Peisa and Choi both describe UMTS entities such as a RRC and RNC that are responsible for the control and allocation of uplink resources for UEs. Peisa, 1:64–2:13, 4:48–57; Choi at 1, 11; Ex. 1002 ¶ 99. Peisa and Bucknell

both teach iterative schemes for scheduling packets in bandwidth-constrained environments where different input flows require different QoS or prioritization. Peisa, 9:3–30; Bucknell, 3:56–5:24; Ex. 1002 ¶ 100. Accordingly, a POSITA would view each of Choi and Bucknell as analogous art within the same field as Peisa and, for reasons explained in greater detail below, would have been motivated to combine the disclosures of Peisa, Choi, and Bucknell to arrive at the systems and methods recited by claims 1 and 8.

A POSITA would recognize the benefits of extending Peisa’s scheduling algorithm at the UE, which, as shown below in annotated Figure 4, receives and buffers data for multiple input flows before passing information on buffer fill levels to a MAC entity in the network, Peisa, 6:45–48, 10:37–42, with Choi’s Buffer Status Control or Buffer Status Report messages. Ex. 1002 ¶ 99.



Id., Fig. 4 (excerpted).

Specifically, Peisa teaches that buffer fill levels are passed to a MAC entity (which are distributed among UEs and the network), therefore suggesting that a message of some kind is required to convey that information. Peisa, 9:30–34, 9:62–10:14, 10:37–42, 13:50–53, 17:59–18:19, Fig. 4; Ex. 1002 ¶ 99. Choi, on the other

hand, discloses Buffer Status Control and Buffer Status Report messages sent between the network and UE to facilitate exchange of information relating to the buffer status of channels that are to be “multiplexed into the transport channel.” Choi at 16. It would have been obvious to a POSITA to combine Peisa’s resource scheduling algorithm that passes information on buffer fill levels with Choi’s buffer status messages. Ex. 1002 ¶ 99. Moreover, a POSITA could have combined the packet scheduling system of Peisa with the message-passing scheme of Choi by known methods, yielding predictable results, as each element merely performs the same function in the combined system as it does separately. *Id.*

Similarly, a POSITA would have found it obvious to extend the iterative scheduling algorithm of Peisa to include the two-group/two-rule elements of Bucknell’s method. Specifically, a POSITA would have seen the benefit of introducing Bucknell’s flexible rules for allocating resources among numerous, priority-based queues in a UMTS network to Peisa’s iterative scheduling algorithm for a UE in such a network. Ex. 1002 ¶ 100. Moreover, such a combination would have been obvious to try, as the data selection rules described by Bucknell are simply examples of a finite number of identified and predictable solutions for data prioritization, and a POSITA would have had a reasonable expectation of success in applying them to Peisa’s algorithm. *Id.*

- a. **“[determine / determining, by a processor of the UE,] a plurality of buffer occupancies, wherein each of the plurality of buffer occupancies is associated with one or more radio bearers of the plurality of radio bearers,” and “[cause the transmitter to transmit / transmitting, by a transmitter of the UE,] a message including the plurality of buffer occupancies to a network”**

Choi discloses determining, and transmitting a message including, a plurality of buffer occupancies, each associated with one or more radio bearers. Ex. 1002 ¶¶ 101–03. Choi teaches that within the structure of UMTS, RRC in the RNC entity is “responsible for controlling and allocating the radio resources for all subscriber devices located in a radio cell.” Choi at 1. The network can allocate a UE specific dedicated services, for example “two packet services in parallel in the uplink, each with a data rate of 64 kbps ... for internet browsing and streaming of data” and such allocations can be made on the basis of the “current traffic situation in the radio cell CE1 and the requested quality of service QoS.” *Id.* at 11. As a POSITA would appreciate from these disclosures, for the network to efficiently allocate specific resources consistent with each UE’s QoS needs, the RRC in the network needs to have some awareness of the amount of data each priority-based queue has buffered for transmission. Ex. 1002 ¶ 101 (citing Choi, 12). To that end, Choi introduces two “messages” that are “exchanged between the base station” in the network “and a user equipment UE via an STB [Signal Transport Block]”—“Buffer Status Control” and “Buffer Status Report.” Choi at 15, 16. The Buffer Status Control message is sent

from the network to the UE with the “current data volume of a specific transport channel, i.e. the current RIC buffer status of all RBs or logical channels that are multiplexed onto the transport channel.” *Id.* at 16. Likewise, the Buffer Status Report is sent in reply from the UE to the network “with signaling of the data volume of the transport channel.” *Id.* at 16. A POSITA would understand from these disclosures that the entity that is buffering the data (which may include the UE) has to, before transmitting a message containing the plurality of buffer occupancies, first determine the buffer occupancies for each of the queues in which data is waiting to be transmitted. Ex. 1002 ¶ 102.

This is further supported by the disclosures of Bucknell. Specifically, Bucknell maintains information about queue “occupancy,” or length of data waiting to be transmitted from each queue, so that it can apply data selection rules such as “assigning highest priority to the queue with the most data,” “selecting from the longest queue,” “selecting from queues exceeding a certain length,” or “dividing the resources in a way which is proportional to the amount of data” in the queues. Bucknell, 3:38–41, 4:7–63, 5:1–4. A POSITA would understand that, in order to apply rules based on queue length (a.k.a. “buffer occupancy”), Bucknell and the combined system of Peisa, Choi, and Bucknell would necessarily first “determine” each of the buffer occupancies associated with a queue and then “transmit” that

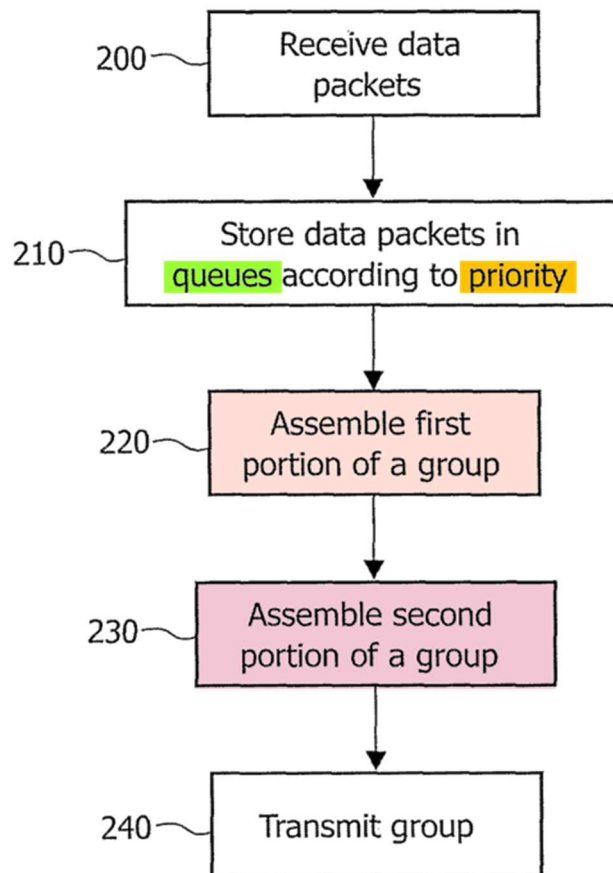
information to the entity that prioritizes and schedules packets for transmission from those queues. Ex. 1002 ¶ 103.

- b. **“[the processor is configured to ... select data / selecting, by the processor, data from the plurality of radio bearers] for transmission using the single allocation of uplink resources, wherein the selection of the data occurs using a first and a second iteration, wherein in the first iteration, the selection of data is selected from a subset of the plurality of radio bearers based on the received parameters, wherein in the second iteration, the selection of the data is based on buffered data for respective radio bearers”**

Bucknell discloses a system in which data is selected for transmission in a first iteration based on received parameters and in a second iteration based on buffered data for respective radio bearers. Ex. 1002 ¶¶ 104–07. Specifically, Bucknell teaches a method of “multiplexing data packets having different assigned priorities” in a UMTS network. Bucknell, 1:8–11, 1:50–53. In Bucknell’s system, the priorities may be “assigned to each data packet *prior to reception*” or “may be routed to ... queue stores 50 according to their respective MAC-d flows, with each flow having an associated priority.” *Id.*, 3:5–10. Thus, a POSITA would recognize that, like Peisa, Bucknell receives data having a parameter such as the priority of the data or input flow, and buffers that data in queues according to priority. Ex. 1002 ¶ 104; Bucknell, 1:52–53.

Additionally, Bucknell discloses selection of data in two iterations as claimed. For example, Bucknell’s method involves “assembling a group of the data packets

wherein a *first portion* of the group is populated with *data packets selected from one or more of the queues according to a first rule* and a *second portion* of the group is populated with *data packets selected from one or more of the queues according to a second rule.*” Bucknell, 1:53–58. Bucknell further discloses an iterative process, shown below in annotated Figure 3, that is “repeated” after each group of packets is assembled and then transmitted. *Id.*, 3:56–4:4.



Id., Fig. 3.

In assembling the “first portion” of the group according to the “first rule,” Bucknell’s method selects data packets from the queues based on a variety of parameters, including, for example, the “priority” or “QoS requirement” of the data

packets. *Id.*, 3:27–29; 4:64–67; *see also id.*, 4:18–38, 4:45–52, 5:16–24. Similarly, in assembling the “second portion” based on a “second rule,” the method selects data packets from the queues based on, for example, “the amount of data in the respective queues,” using “length of queue” as a way of arbitrating between queues of “equal priority,” and/or “preferentially selecting from queues exceeding a certain length.” *Id.*, 4:53–63; *see also id.*, 5:1–24. Accordingly, a POSITA would understand these disclosures to meet the claimed requirements that in the first iteration data is selected based on received parameters and in a second iteration based on buffered data. Ex. 1002 ¶¶ 105–06.

This is further supported by the disclosures of Choi. Specifically, Choi explains that various “parameters” are configured for radio bearers, including that “logical channels are assigned different priorities from 1 to 8.” Choi, 6:4–9. In Choi’s system, “data packets are preferred by the logical channels having a higher priority,” but in a “stalemate situation” where multiple “logical channels on the same transport channel have the same priority, the *buffer occupancy* ... is taken into account as a further criterion.” *Id.*, 6:10–15. Accordingly, a POSITA would recognize that the combined system of Peisa, Choi, and Bucknell selects data in a first iteration based on received parameters (*e.g.*, priority or QoS requirement) and in a second iteration based on buffered data (*e.g.*, queue length or buffer occupancy). Ex. 1002 ¶ 107.

2. Dependent Claims 2, 3, 7, 9, 10 & 14

Peisa discloses the additional limitations of claims 2, 3, 7, 9, 10, and 14 for the reasons explained as to the corresponding claims above. *See* Sections VIII.A.2, 3, 6, *supra*.

3. Dependent Claims 4 & 11

“[The UE of claim 1 / The method of claim 8], wherein the selected data is selected based on a priority or a Quality of Service (QoS).”

Peisa, alone or in combination with Choi and Bucknell, discloses the UE of claim 1 and method of claim 8 for the reasons explained above in Sections VIII.A.1 VIII.B.1. To the extent that Peisa itself does not further disclose the common additional limitation of claims 4 and 11, that the selected data is selected based on a priority or a Quality of Service (QoS), those limitations are supplied by Bucknell. Ex. 1002 ¶ 109. Specifically, Bucknell describes various rules by which “data packets may be selected from the queues ... to populate the group of data packets assembled in the first portion 90 ... of the output buffer 80.” Bucknell, 4:5–8. Among those rules are several based on the priority of the data packets, input flow, and/or queue associated with such data packets or flows. *See id.*, 4:18–35. Additional rules are based on a queue or data packet’s “QoS requirement” or factors such as “transmission delay,” which a POSITA would recognize as a type of QoS. *Id.*, 4:45–52, 4:64–67; *see also id.*, 5:5–24; Ex. 1002 ¶ 109. In sum, a POSITA

would recognize Bucknell's method as selecting data based on a priority or QoS as claimed.

4. Dependent Claims 6, 13

“[The UE of claim 1 / The method of claim 8], wherein the single allocation of uplink resources is received on a physical shared channel from a scheduler in the network.”

Peisa, alone or in combination with Choi and Bucknell, discloses the UE of claim 1 and method of claim 8 for the reasons explained above in Sections VIII.A.1 VIII.B.1. To the extent that Peisa itself does not further disclose the common additional limitation of claims 6 and 13, that the single allocation of uplink resources is received on a physical shared channel from a scheduler in the network, this limitation is disclosed by Choi. Ex. 1002 ¶ 110. In the system of Choi, which operates in a UMTS network, network entities such as RRC and RNC are “responsible for controlling and *allocating the radio resources for all subscriber devices* located in a radio cell.” Choi, 1. Consistent with ordinary usage in the UMTS network, the lowest of the three protocol layers is the “physical layer, Layer 1,” which is present in the architecture of both the network and the UE. *Id.* at 6. Control information from network to UE, which a POSITA would understand to include messages allocating uplink resources, is transported by “shared” logical channels that are mapped to “common transport channels such as ... FACH in the downlink.” *Id.*, 8; Ex. 1002 ¶ 110. As a POSITA would appreciate, transport

channels like FACH are ultimately multiplexed onto common or “shared” physical channels, and therefore in the combined system of Peisa and Choi, the allocation of uplink resources is received by the UE on a physical shared channel from a scheduler in the network, as claimed. Ex. 1002 ¶ 110.

C. Ground 3: Peisa in Combination with Lohr and Bucknell Renders Claims 1–4, 6–11, 13, and 14 Obvious

1. Independent Claims 1, 8

Peisa in combination with Lohr renders claims 1 and 8 obvious, as explained above in connection with Ground 1. *See* Section VIII.A.1. To the extent that the combination does not expressly disclose “[determine / determining, by a processor of the UE,] a plurality of buffer occupancies, wherein each of the plurality of buffer occupancies is associated with one or more radio bearers of the plurality of radio bearers,” and “[cause the transmitter to transmit / transmitting, by a transmitter of the UE,] a message including the plurality of buffer occupancies to a network” and/or “[the processor is configured to ... select data / selecting, by the processor, data from the plurality of radio bearers] for transmission using the single allocation of uplink resources, wherein the selection of the data occurs using a first and a second iteration, wherein in the first iteration, the selection of data is selected from a subset of the plurality of radio bearers based on the received parameters, wherein in the second iteration, the selection of the data is based on buffered data for

respective radio bearers,” as explained above in Sections VIII.B.1.a and VIII.B.1.b, a POSITA would have looked to Bucknell to supply that limitation.

Motivation to Combine Peisa, Lohr, and Bucknell

A POSITA would have been motivated to combine these references at least because, as explained above in Sections VIII.A.1 and VIII.B.1, each reference is analogous art within the field of cellular networks based on the UMTS architecture. Ex. 1002 ¶ 111; Peisa, 1:64–2:16, 2:12–16, 9:3–30 & Fig. 1; Lohr, 2:62–68 & Fig. 1; Bucknell, 1:4–11, 3:56–5:24. Accordingly, a POSITA would have been motivated to combine the scheduling algorithms of Peisa, the message structure of Lohr, and the resource allocation rules of Bucknell to arrive at the claimed invention. Ex. 1002 ¶ 111.

2. Dependent Claims 2, 3, 6, 7, 9, 10, 13, & 14

Peisa in combination with Lohr renders claims 2, 3, 6, 7, 9, 10, 13, and 14 obvious, as explained above in connection with Ground 1.

3. Dependent Claims 4 & 11

“[The UE of claim 1 / The method of claim 8], wherein the selected data is selected based on a priority or a Quality of Service (QoS).”

Peisa in combination with Lohr renders claims 4 and 11 obvious, as explained above in connection with Ground 1. *See* Section VIII.A.4. To the extent that the combination does not expressly disclose “[the UE of claim 1 / the method of claim 8], wherein the selected data is selected based on a priority or a Quality of Service

(QoS),” as explained above in Section VIII.B.3, a POSITA would have looked to Bucknell to supply that limitation.

IX. GROUNDS FOR STANDING

Petitioner certifies that the ’138 patent is available for *inter partes* review and that Petitioner is not barred or estopped from requesting *inter partes* review challenging the patent claims on the grounds identified herein.

X. MANDATORY NOTICES

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

The real parties-in-interest are American Honda Motor Co., Inc., Honda Motor Co., Ltd., and American Honda Finance Corp.

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

To the best of Petitioner’s knowledge, the ’138 patent is, or has been, involved in the following district court litigations, appeals, and Board proceedings.

Name	Number	Court	Filed
<i>Toyota Motor Corp. v. Intellectual Ventures II LLC</i>	IPR2022-01127	PTAB	June 10, 2022
<i>Intellectual Ventures I LLC et al. v. Honda Motor Co. Ltd. et al.</i> ⁷	3:22-cv-00761	NDTX	Apr. 4, 2022

⁷ On April 4, 2022, IV filed a notice of voluntary dismissal removing the Honda defendants from the consolidated EDTX litigation. IV refiled its complaint against Honda in the NDTX.

Name	Number	Court	Filed
<i>Intellectual Ventures I LLC et al. v. Toyota Motor Corp. et al.</i> ⁸	2:21-cv-00389	EDTX	Oct. 19, 2021
<i>Intellectual Ventures I LLC et al. v. Honda Motor Co. Ltd. et al.</i>	2:21-cv-00390	EDTX	Oct. 19, 2021
<i>Intellectual Ventures I LLC et al. v. General Motors Company et al.</i>	6:21-cv-01088	WDTX	Oct. 19, 2021

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

Lead Counsel	Back-Up Counsel
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⁸ See also Ex. 1015 (order consolidating -00389 Member Case with -00390 Lead Case).

Lead Counsel	Back-Up Counsel
	Akshay S. Deoras, (to seek <i>pro hac vice</i> admission) akshay.deoras@kirkland.com Postal and Hand-Delivery Address: KIRKLAND & ELLIS LLP 555 California Street San Francisco, CA 94104 Telephone: 415-439-1400 Facsimile: 415-439-1500

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

Petitioner concurrently submits a Power of Attorney, 37 C.F.R. §42.10(b), and consents to electronic service to Honda-IV@kirkland.com.

XI. CERTIFICATION UNDER 37 C.F.R. § 42.24(d)

Pursuant to 37 C.F.R. § 42.24(d), the undersigned hereby certifies that the foregoing Petition contains 12,077 words, excluding parts of this Petition exempted under § 42.24(a), as measured by the word-processing system used to prepare this paper.

XII. CONCLUSION

Petitioner requests that the Board institute *inter partes* review and cancel each challenged claim.

Respectfully submitted,

Dated: October 6, 2022

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of the foregoing document was served on October 6, 2022 via overnight delivery directed to the attorney of record for the patent at the following address:

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A courtesy copy was also served by electronic mail on the attorneys below for the following related matter:

Intellectual Ventures I LLC et al. v. American Honda Motor Co., LTD. et al.,
Case No. 3:22-cv-00761 (N.D. Tex.)

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