

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TESLA, INC.,
Petitioner,

v.

INTELLECTUAL VENTURES II LLC,
Patent Owner.

IPR2025-00343
U.S. Patent No. 10,292,138

**DECLARATION OF DR. ZHI DING, PH.D.,
UNDER 37 C.F.R. § 1.68 IN SUPPORT OF PETITION FOR
INTER PARTES REVIEW**

TABLE OF CONTENTS

I.	Introduction.....	4
II.	Qualifications and Professional Experience.....	6
III.	Level of Ordinary Skill in the Art	12
IV.	Relevant Legal Standards	13
V.	The '138 Patent.....	15
A.	Overview of the '138 Patent	15
B.	Prosecution History of the '138 Patent	19
C.	Supplemental Examination	20
D.	Previous IPRs Involving the '138 Patent	21
VI.	Claim Construction.....	23
VII.	Identification of How the Claims are Unpatentable.....	23
A.	Ground 1: Claims 1-4 and 8-11 are obvious over Eckert in view of Bucknell and Lohr-1	24
1.	Summary of Eckert.....	24
2.	Summary of Bucknell.....	27
3.	Eckert and Bucknell Are Analogous Art to the '138 Patent	28
4.	Summary of Lohr-1	30
5.	Lohr-1 is Analogous Art to the '138 Patent	31
6.	Claim 1	31
7.	Claim 2	72
8.	Claim 3	74
9.	Claim 4	76
10.	Claim 8	76
11.	Claim 9	79

12.	Claim 10	79
13.	Claim 11	79
B.	Ground 2: Claims 5 and 12 are obvious over Eckert in view of Bucknell, Lohr-1, and Hans	79
1.	Summary of Hans	79
2.	Reasons to combine Eckert and Hans	80
3.	Claim 5	86
4.	Claim 12	90
C.	Ground 3: Claims 6 and 13 are obvious over Eckert in view of Bucknell, Lohr-1, and Lohr-2.....	90
1.	Summary of Lohr-2	90
2.	Reasons to combine Eckert, Bucknell, Lohr-1, and Lohr-2	91
3.	Claim 6	93
4.	Claim 13	95
VIII.	Conclusion	96

I, Dr. Zhi Ding, do hereby declare as follows:

I. INTRODUCTION

1. I am making this declaration at the request of Tesla, Inc. in the matter of the *Inter Partes* Review of U.S. Patent No. 10,292,138 (“the ’138 patent”) to Meister, *et al.*

2. I am being compensated for my time spent on this matter and for reasonable and customary expenses associated with my work and testimony in this investigation. My compensation is not contingent on the outcome of this matter or the specifics of my testimony, and I have no other interest in this case or the parties thereto.

3. I have been asked to provide my opinions regarding whether claims 1-6 and 8-13 (“the Challenged Claims”) of the ’138 patent are patentable, or whether they would have been obvious to a person having ordinary skill in the art (“POSITA”) at the time of the alleged invention, in light of the prior art. It is my opinion that all of the limitations of the Challenged Claims would have been obvious to a POSITA.

4. In the preparation of this declaration, I have studied:

- a. the ’138 patent, Ex.1001;
- b. the prosecution history of the ’138 patent (“**’138 File History**”),

Ex.1002;

- c. U.S. Patent Application Publication No. 2006/0088058 by M. Eckert et al. (“**Eckert**”), Ex.1005; and
 - d. U.S. Patent Application Publication No. 2007/0297435 to P. Bucknell et al. (“**Bucknell**”), Ex.1006;
 - e. WIPO Publication WO 2005/125252 to J. Lohr et al. (“**Lohr-1**”), Ex.1007;
 - f. U.S. Patent No. 7,245,636 to M. Hans et al. (“**Hans**”), Ex.1008;
 - g. U.S. Patent Application Publication No. 2008/0254804 to J. Lohr et al. (“**Lohr-2**”), Ex.1009;
 - h. U.S. Patent Pub. No. 2005/0238051 to S. Yi et al. (“**Yi-1**”), Ex.1010;
 - i. U.S. Patent Pub. No. 2003/0076799 to Y. Kwak et al. (“**Kwak**”), Ex.1011;
 - j. U.S. Patent Pub. No. 2003/0123485 to S. Yi et al (“**Yi-II**”), Ex.1012;
 - k. IPR2022-01127, Ex. 2001, Declaration of Dr. Gary Lomp in Support of Patent Owner’s Preliminary Response, Ex.1013;
 - l. File History of Supplemental Examination 96/000,323, Ex.1018;
 - m. IPR2022-01127, Decision Denying Institution, January 3, 2023, Ex.1019; and
 - n. IPR2023-00020, Petition, October 6, 2022, Ex.1021.
5. In forming the opinions expressed below, I have considered:

the documents listed above;

the relevant legal standards, including the standard for obviousness, and any additional authoritative documents as cited in the body of this declaration; and

my own knowledge and experience based upon my work in the field of networking as described below, as well as the following materials.

6. Unless otherwise noted, all emphasis in any quoted material has been added.

II. QUALIFICATIONS AND PROFESSIONAL EXPERIENCE

7. I presently hold the title of Distinguished Professor in the Department of Electrical and Computer Engineering at the University of California, Davis. Before my appointment on July 1, 2020, I held the position of professor for the prior 24 years and have served as a faculty member at several United States universities for over 34 years. I am also a private technical consultant on various technologies related to information systems. In total, I have more than three decades of research experience on a wide range of topics related to data communications and signal processing.

8. I earned my Bachelor of Science degree in 1982 in wireless engineering from the Nanjing Institute of Technology (later renamed as Southeast University) in Nanjing, China. I earned my Master of Science degree in 1987 in

electrical engineering from the University of Toronto in Toronto, Canada. I earned my Ph.D. in 1990 in electrical engineering from Cornell University in Ithaca, New York.

9. My responsibilities as a Professor at University of California, Davis, include classroom instruction on various topics of communication systems and signal analysis, as well as mentoring undergraduate students and supervising graduate students in their research and development efforts on various topics related to digital communications. I have directly supervised such research and development works ranging from signal detection to wireless networking. As the chief academic advisor, I have also directly supervised the completion of over 20 Masters' theses and over 30 Ph.D. dissertations on various topics related to digital communications. I have served full time as a faculty member at three major research universities in the United States over the past 30 years, including Auburn University from 1990 to 1998, University of Iowa from 1999 to 2000, and University of California, Davis, from 2000 to present.

10. Since 1990, I have been selected as the principal investigator of multiple highly competitive federal and local research grants, including more than twenty major research projects supported by the National Science Foundation and two research projects funded by the U.S. Army Research Office. These competitive research projects focused on developing more efficient and effective

digital communication transceivers, networks, and signal processing tools. I have also participated in several large-scale projects supported by the Defense Advanced Research Projects Agency (DARPA) with teams of researchers. I have applied for, and received support from, other federal, state, and industry sponsors.

11. I have published over 250 peer-reviewed research articles in premier international journals, in addition to over 250 refereed technical articles at top international conferences on communications and information technologies. According to Google Scholar, my published works have been cited by over 20,000 times by peers. I also authored two books on communications technologies. My most recent book, coauthored with B.P. Lathi, is entitled, “Modern Digital and Analog Communication Systems,” 5th edition, and was published by the Oxford University Press in 2018. The 4th edition of this book (published in 2009) had been widely adopted as an introductory textbook to communication systems.

12. In addition to the over 500 published technical papers that have been cited over 20,000 times according to Google Scholar, I am also co-inventor of 4 issued U.S. patents on communication technologies.

13. I am a member of the Institute of Electrical and Electronics Engineers (IEEE) and was elevated to the grade of Fellow in January 2003 for contributions made in signal processing for communication. The IEEE is the world's largest professional society of engineers, with over 400,000 members in more than 160

countries. The IEEE has led the development of many standards for modern digital communications and networking, most notably, the IEEE 802 series of network standards. The IEEE Grade of Fellow is conferred by the Boards of Directors upon a person with an extraordinary record of accomplishments in any of the IEEE fields of interest. The total number selected in any one year does not exceed one-tenth of one percent of the total voting Institute membership.

14. I have served the IEEE in the following capacities:

- Chief Information Officer of the IEEE Communications Society from Jan. 2018 to present.
- Chief Marketing Officer of the IEEE Communications Society from Jan. 2020 to present.
- General Chair of the 2016 IEEE International Conference on Acoustics, Speech, and Signal Processing, the flagship conference of the IEEE Signal Processing Society.
- Chair of the Steering Committee for the IEEE Transactions on Wireless Communications from 2008 to 2010.
- Distinguished Lecturer of the IEEE Communications Society from January 2008 to December 2009.
- Technical Program Chair of the 2006 IEEE Globecom, one of two flagship annual IEEE Communication Society conferences.

- Distinguished Lecturer of the IEEE Circuits and Systems Society from 2004 to 2005.
- Associate Editor of the IEEE Transactions on Signal Processing from 1994 to 1997 and from 2001 to 2004.
- Member of the IEEE Statistical Signal and Array Processing for Communications Technical Committee from 1993 to 1998.
- Member of the IEEE Signal Processing for Communications Technical Committee from 1998 to 2004.

15. In 2012, I received the Wireless Communications Technical Committee Recognition Award from the IEEE Communications Society, an award given to a person with a high degree of visibility and contribution in the field of "Wireless and Mobile Communications Theory, Systems, and Networks." I received the 2020 Education Award from the IEEE Communications Society. According to the Society, this award "recognizes distinguished and significant contributions to education within the Society's technical scope."

16. I have also served as a technical consultant for the telecommunication industry. For example, in 1995 I consulted for Analog Devices, Inc., on the development of the first generation DOCSIS cable modem systems. I have also consulted for other companies, including Nortel Networks and NEC US Laboratories. I worked as a visiting faculty research fellow at NASA Glenn

Research Center in 1992 and at U.S. Air Force Wright Laboratory in 1993. I have served on multiple review panels of the National Science Foundation to evaluate competitive research proposals in the field of communication. I have also reviewed a large number of research proposals at the request of the National Science and Engineering Research Council (NSERC) of Canada as an expert panelist from 2010 to 2013, and also at the request of the Research Grant Council (RGC) of Hong Kong as an external reviewer.

17. I have served as an expert witness or consulting expert on a number of matters related to intellectual property, mostly in the arena of telecommunications, including cellular communications, Wi-Fi technologies, Bluetooth, and optical communications. For example, since 2007, I have been engaged to work on various litigations involving cellular, WiFi, Bluetooth, and optical communication networks. Many of my expert works related to the standard essentiality of patents with respect to the 3GPP 2G/3G/4G/5G technical specifications, the IEEE 802.11 standards, and the Bluetooth standards. I have provided testimonies at court trials or hearings in multiple jurisdictions, both in the United States and internationally. I have submitted declarations to PTAB as expert on a number of inter partes reviews of challenged patents.

18. Further experience and a complete list of my publications are presented in my curriculum vitae. *See* Ex.1004.

III. LEVEL OF ORDINARY SKILL IN THE ART

19. I understand there are multiple factors relevant to determining the level of ordinary skill in the pertinent art, including (1) the levels of education and experience of persons working in the field at the time of the invention; (2) the sophistication of the technology; (3) the types of problems encountered in the field; and (4) the prior art solutions to those problems.

20. It is my understanding that the earliest possible priority date for the '138 patent is May 8, 2006. I am familiar with the wireless communications art pertinent to the '138 Patent. I am also aware of the state of the art at the time of the alleged priority date. Based on the technologies disclosed in the '138 patent, a person of ordinary skill in the art ("POSITA") in the field of the '138 patent, as of the earliest possible priority date of May 8, 2006, would have been someone knowledgeable and familiar with the wireless communications systems that are pertinent to the '138 patent. That person would have had at least a bachelor's degree from an accredited program in electrical engineering, computer engineering, computer science, or equivalent training, and at least two years of professional experience relating to wireless communication technology. Lack of professional experience can be remedied by additional education, and vice versa. I believe that I possessed and exceeded such experience and knowledge before and at the priority date and that I am qualified to opine on the '138 Patent.

21. For purposes of this Declaration, in general, and unless otherwise noted, my statements and opinions, such as those regarding my experience and the understanding of a POSITA generally (and specifically related to the references I consulted herein), reflect the knowledge that existed in the field as of the earliest alleged priority date of the '138 patent (i.e., May 8, 2006). Unless otherwise stated, when I provide my understanding and analysis below, it is consistent with the level of a POSITA as of the alleged priority date of the '138 patent.

IV. RELEVANT LEGAL STANDARDS

22. I am not an attorney. In preparing and expressing my opinions and considering the subject matter of the '138 patent, I am relying on certain basic legal principles that counsel explained to me. These principles are discussed below.

23. I understand that prior art to the '138 patent includes patents and printed publications in the relevant art that predate the priority date of the alleged invention recited in the '138 patent.

24. I have been informed that a claim preamble may or may not limit the claim scope. For the purposes of this *Inter Partes* Review, I have been informed by counsel to include the preamble in the analysis for obviousness in order to follow a conservative approach.

25. I have been informed that a claimed invention is unpatentable under 35 U.S.C. § 103 if the differences between the invention and the prior art are such

that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. I have also been informed by counsel that the obviousness analysis takes into account factual inquiries including the level of ordinary skill in the art, the scope and content of the prior art, and the differences between the prior art and the claimed subject matter.

26. I have been informed that a threshold inquiry as to whether a reference can be considered in the obvious analysis is whether the reference is analogous art to the claimed invention. A reference is analogous art to the claimed invention if: (1) the reference is from the same field of endeavor as the claimed invention (even if it addresses a different problem); or (2) the reference is reasonably pertinent to the problem faced by the inventor (even if it is not in the same field of endeavor as the claimed invention).

27. I have been informed by counsel that the Supreme Court has recognized several rationales for combining references or modifying a reference to show obviousness of claimed subject matter. Some of these rationales include the following: (a) combining prior art elements according to known methods to yield predictable results; (b) simple substitution of one known element for another to obtain predictable results; (c) use of a known technique to improve a similar device (method, or product) in the same way; (d) applying a known technique to a known

device (method, or product) ready for improvement to yield predictable results; (e) choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success; and (f) some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

28. Also, I have been informed and understand that obviousness does not require physical combination or bodily incorporation but rather consideration of what the combined teachings of prior art references would have suggested to a POSITA at the time of the alleged invention.

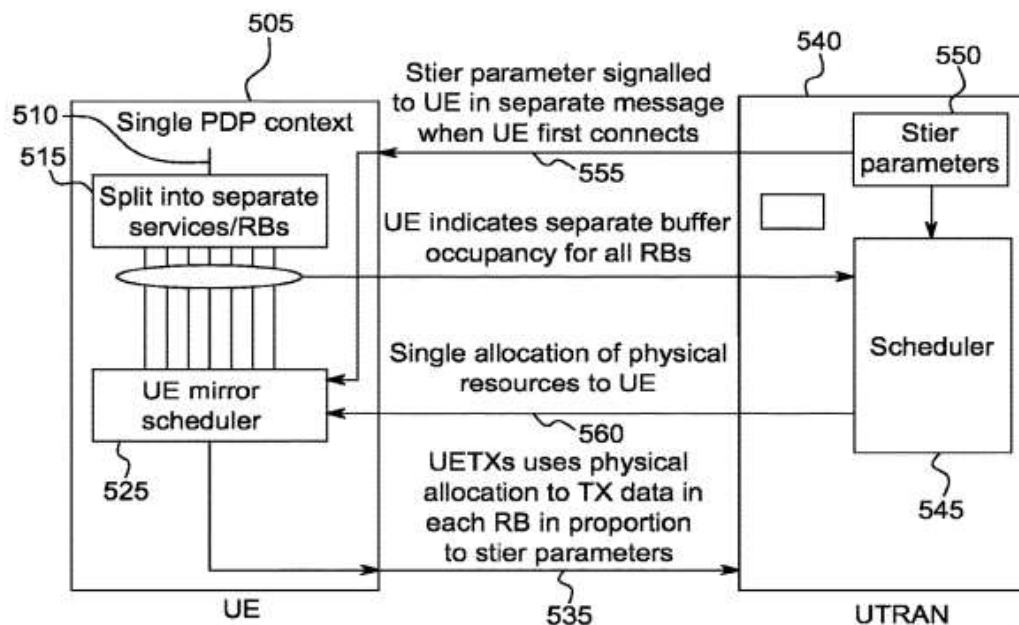
V. THE '138 PATENT

A. Overview of the '138 Patent

29. The '138 patent relates to the use of “radio bearers” in a wireless communications system. Ex.1001, Abstract. The '138 specification describes a service as an example radio bearer provided by the network to the user equipment (UE), where radio bearers are associated with queues, or buffers, that hold associated data. '138 patent, 4:4-5 (discussing “buffer occupancy for individual **radio bearers (or services)**”); 4:24-27 (“**radio bearers (e.g., services)**”); 5:66-6:2; Figure 2 (“Functionality identifies a particular service and filters all data associated with this service onto a particular RB [radio bearer]”); 9:32-35 (“UE is

able to signal to the network separate buffer occupancy for each queue associated with the various RBs.”).

30. The '138 patent attempts to prioritize the provision of uplink resources to services/radio bearers based on “buffer occupancy.” '138 patent, 4:4-7, 4:24-27 (discussing “prioritization” of “particular radio bearers (e.g. services)”). “This is in contrast to the conventional prioritization scheme provided by 3GPP, which uses a simple absolute priority scheme.” '138 patent, 4:24-29. As illustrated in Fig. 5, UE 505 transmits message 535 to UTRAN 540 indicating buffer occupancy for each of the radio bearers. *Id.* at 10:8-18. The UTRAN provides a single allocation of physical (communication) resources to UE with message 560, and the UE allocates the resources to the /services radio bearers based on the buffer prioritization scheme. *Id.* at 10:18-22.

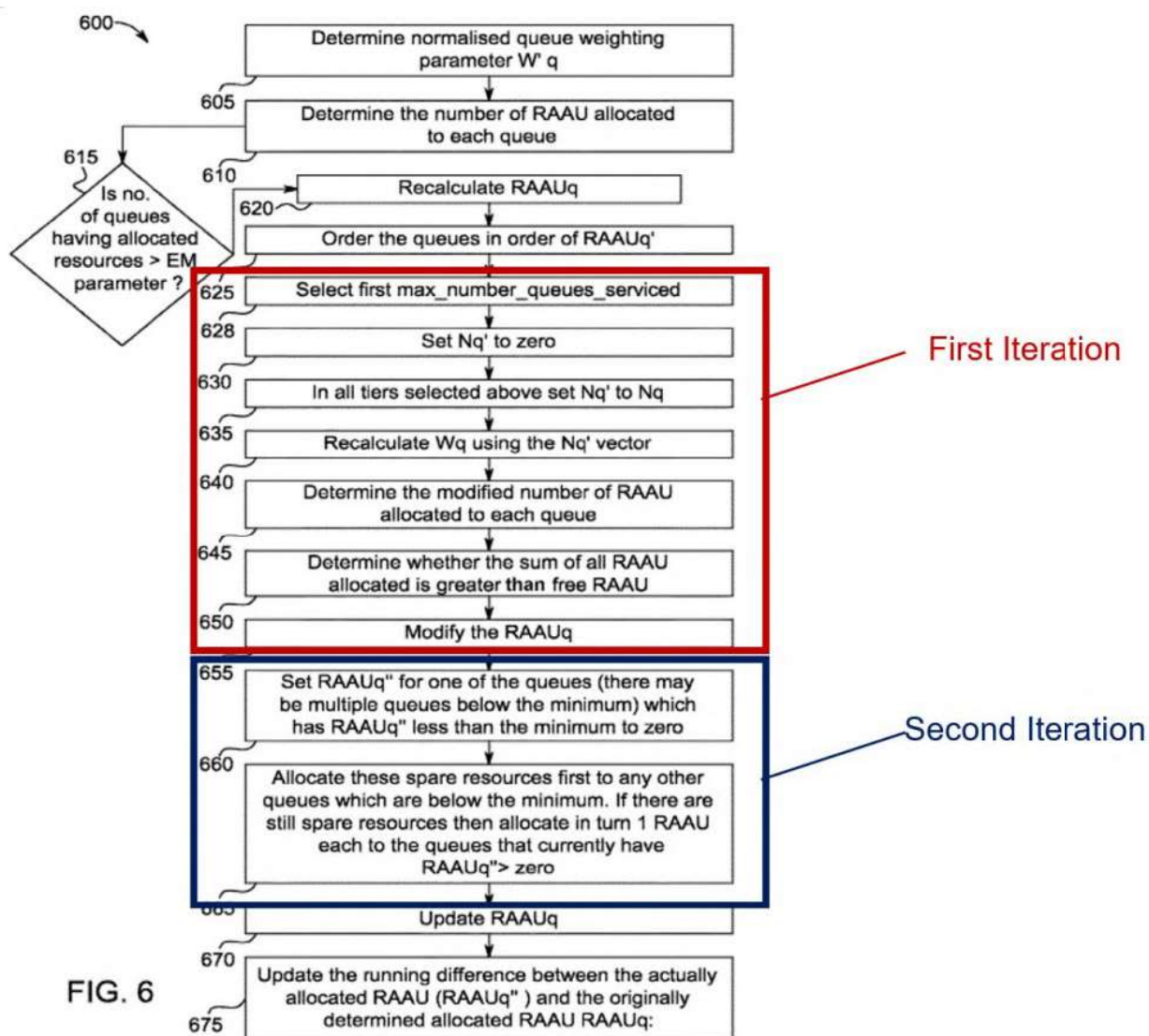


'138 patent, Fig. 5

31. The '138 patent illustrates its resource allocation process in more detail in Fig. 6, reproduced below. '138 patent, 10:48-51 (“algorithm describes one mechanism to limit a number of queues served at a single instant in time”). The algorithm initially takes the number of free resources (denoted by FreeRAAU) and divides them among the different queues, with the number of resources for the q^{th} queue denoted by RAAU $_q$ and a normalized queue weighting parameter W'_q defining a percentage. '138 patent, 10:56-11:10. If the number of queues exceeds a threshold, the resources allocated to each queue is recalculated. *Id.*, 11:11-17.

32. The Challenged Claims require selecting data from the plurality of radio bearers “using a first iteration and a second iteration.” In order to provide additional context on how the '138 patent describes a “first iteration” data selection

from “a subset” of radio bearers and a “second iteration” data selection, recited in claim 1, an annotated version of Figure 6 as provided by Patent Owner’s expert in IPR2022-01127 is below.



Ex.1013, ¶34. A parameter— `max_number_queues_served` —appears in step 625 above. According to Patent Owner’s expert: “In this step, a subset of all queues (corresponding to the `max_number_queues_served`) is selected from the top of the ordering.” Ex.1013, ¶38 (emphasis in original). Note that the only mention of

“iterations” in the ’138 patent specification is with respect to steps 610 and 615, where “no limitation has been applied in the first iteration” (steps 605 and 610) but “on the second iteration” there is a limitation placed on the number of queues in step 615. ’138 patent, 11:32-37. As shown above, in IPR2022-01127, Patent Owner describes the iterations corresponding to the claims using steps 628-665. Ex.1013, ¶34. The discussion of steps 628-665 does not use the term “iteration” at all in the ’138 patent specification.

33. Patent Owner’s expert provided no guidance as to how he arrived at this seemingly arbitrary grouping of steps into the recited “iterations.” Ex.1013, ¶¶34-44. Notwithstanding this delineation, the claims themselves recite the requirements of each iteration, as follows:

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

These requirements are disclosed in the prior art, as discussed below.

B. Prosecution History of the ’138 Patent

34. During prosecution of Application No. 15/618,669 (“the ’669 application”) that led to the ’138 patent, there were no rejections based on prior art. In a first non-final office action, the only rejections were obviousness-type double

patenting rejections. Ex.1002, 226-233. In response, Applicant filed new claims 9-22. Ex.1002, 204-213. The Examiner then issued a Notice of Allowance, stating that the prior art of record does not disclose limitations including (limitation numbers added by Petitioner):

[1.7] *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,*

[1.8] *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,*

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

Ex.1002, 191. Applicant thereafter submitted an Information Disclosure Statement with new references for consideration, and a new Notice of Allowance issued. *Id.*, 75-76.

C. Supplemental Examination

35. Patent Owner then filed a request for supplemental examination of the '138 patent based on DE102004044956A1 ("Choi"). Ex.1018, 40, 156-157. The request included the following analysis (referring to the last elements of claim 1, with limitation numbering added by Petitioner):¹

¹ The language "*a distribution component configured to*" does not appear in claim 1.

[1.7]	a distribution component configured to, wherein the selection of the data occurs using a first iteration and a second iteration,	Choi does not appear to disclose this feature.
[1.8]	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.	
[1.9]		

Ex.1018, 48; *see also* 53-54. The Request was denied as lacking a substantial new question of patentability for the same reasons given by the Requester: Choi allegedly provides no teaching regarding the “*first iteration*” and “*second iteration*” limitations of claims 1 and 8. Ex.1018, 22-25.

D. Previous IPRs Involving the ’138 Patent

36. There are two prior IPRs challenging the ’138 patent – IPR2022-01127 and IPR2023-00020 – both involving different petitioners than Tesla.

37. In IPR2022-01127, the dispute centered on the construction of the term “*a subset of the plurality of radio bearers.*” IPR2022-01127, Decision Denying Institution, Jan. 3, 2023 (Ex.1019), 12-19. Petitioner argued that no construction was necessary, whereas Patent Owner argued that the term means “less than all of the plurality of radio bearers.” *Id.* The Board adopted Patent Owner’s construction. *Id.*, 18-19, and determined that, based on this construction, the prior art does not disclose *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 (labeled as [1.8] herein). Ex.1019, 23-29. The IPR was therefore denied institution. *Id.*, 34.

38. None of the prior art references used in IPR2022-01127 are used in this Petition.

39. IPR2023-00020 settled prior to the filing of any response by Patent Owner or institution decision. In Ground 1, Petitioner in IPR2023-00020 relied upon the same reference – Piesa, U.S. Patent No. 6,850,540 – for the same limitation (the “*first iteration*” limitation with “*a subset of the plurality of radio bearers*”) that was the basis for denial in IPR2022-01127. Compare Ex.1021, 36-37 and Ex.1019, 23-29. IPR2023-00020 added Grounds 2 and 3 to also address the independent claims of the ’138 patent, and those grounds relied on the patent (U.S. Patent No. 7,944,935) corresponding to the Bucknell reference (Ex.1006) used herein, in combination with the U.S. patent (U.S. Patent No. 7,869,461) corresponding to the WIPO publication Lohr-1 (Ex.1007) used herein. While analysis is presented regarding the “*first iteration*” and “*second iteration*” of claim 1, there appears to be no analysis that Bucknell applies to “*a subset of the plurality of radio bearers,*” instead apparently relying on Piesa. Ex.1021, 51-54. Regardless, neither Patent Owner nor the Office has previously substantively addressed the disclosures of Bucknell or Lohr-1.

VI. CLAIM CONSTRUCTION

40. It is my understanding that in order to properly evaluate the '138 patent, the terms of the claims must first be interpreted. It is my understanding that for the purposes of this *inter partes* review, the claims are to be construed under the so-called *Phillips* standard, under which claim terms are given their ordinary and customary meaning as would be understood by one of ordinary skill in the art in light of the specification and prosecution history, unless the inventor has set forth a special meaning for a term. In IPR2022-01127, the Board preliminarily determined that *a subset of the plurality of radio bearers* means “*less than all of the plurality of radio bearers.*” Ex.1019, 18-19. I apply the prior art in accordance with that construction; however, a formal construction is unnecessary in view of the asserted grounds. For the purposes of my analysis below, I do not believe any claim terms require an explicit construction.

VII. IDENTIFICATION OF HOW THE CLAIMS ARE UNPATENTABLE

41. I have been asked to provide my opinion as to whether the Challenged Claims of the '138 patent would have been obvious in view of the prior art. The discussion below provides a detailed analysis of how the prior art references identified below teach the limitations of the Challenged Claims of the '138 patent.

42. As part of my analysis, I have considered the scope and content of the prior art and any differences between the alleged invention and the prior art. I

describe in detail below the scope and content of the prior art, as well as differences between the alleged invention and the prior art, on an element-by-element basis for each Challenged Claims of the '138 patent.

43. As described in detail below, the alleged invention of the Challenged Claims would have been obvious in view of the teachings of the identified prior art references as well as the knowledge of a POSITA.

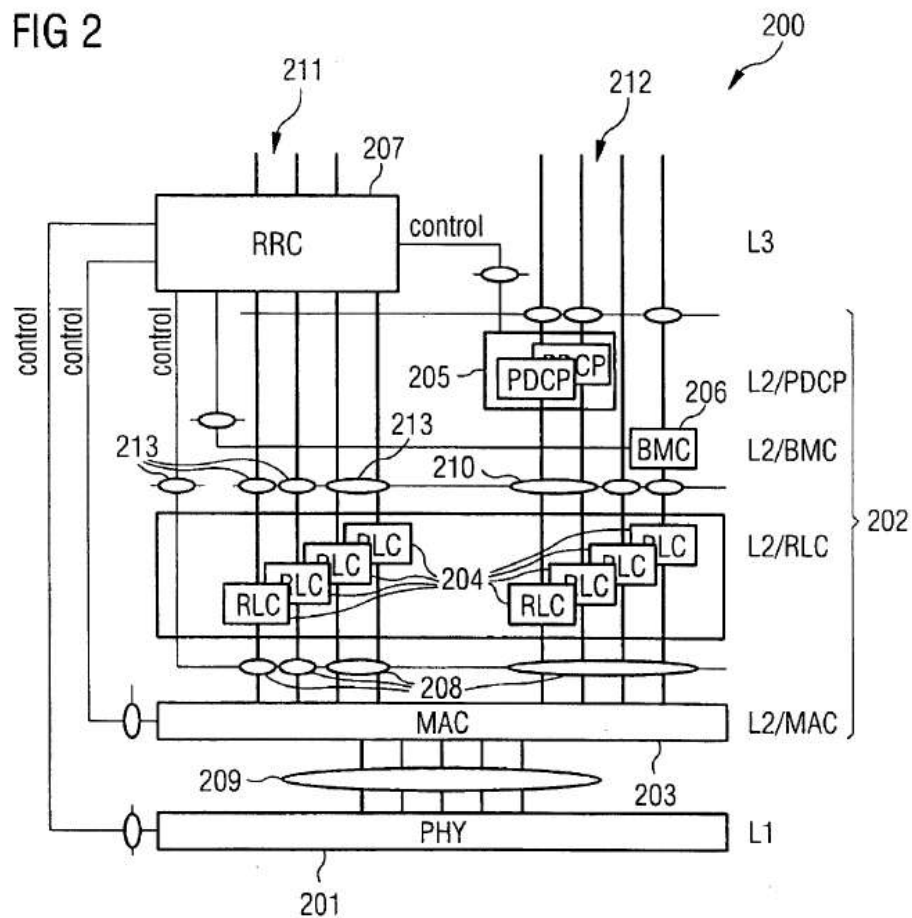
A. Ground 1: Claims 1-4 and 8-11 are obvious over Eckert in view of Bucknell and Lohr-1

1. Summary of Eckert

44. Eckert relates to a “UMTS (Universal Mobile Telecommunications System)” mobile radio system. Eckert, [0003]. This area of technology is described in terms of numerous, but standard, acronyms that are assumed familiar to a POSITA, with technical standards related to the technology being referred to throughout Eckert. *See, e.g.*, Eckert, [0005] (“An overview and a detailed description of the air interface protocol layers based on UMTS can be found in 3GPP TS 25.301, Technical Specification, Third Generation Partnership Project; Technical Specification Group Radio Access Network; Radio Interface Protocol Architecture (Release 1999).”), [0006] (“To this end, the units of the RRC layer in the mobile radio terminal and in the mobile radio network control unit use the signalling radio bearers to interchange appropriate RRC messages, as described in 3GPP TS 25.331, Technical Specification, Third Generation Partnership Project;

Technical Specification Group Radio Access Network; RRC Protocol Specification (Release 1999).”), [0007], [0009], [0020] (“In line with the MAC-hs subprotocol, as described in 3GPP TS 25.321, Technical Specification, Third Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) Protocol Specification...”), [0021], [0152] (each referring to a standards document promulgated by 3GPP).

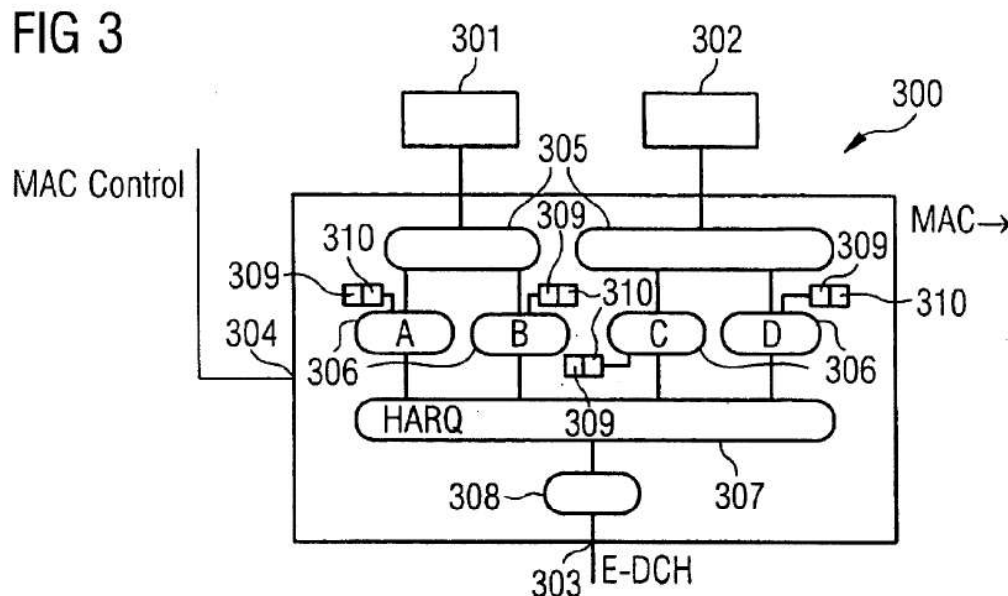
45. Eckert presents its teachings in the context of a “UMTS air interface...logically divided into three protocol layers,” where the “protocol layers...are implemented both in the mobile radio terminal 118 and in the UMTS base station 108, 109, 110, 111 or in the respective mobile radio network control unit 106, 107.” Eckert, [0143]. Referring to Figure 2, below, there is “layer 1” (L1), “layer 2” (L2), and “layer 3” (L3), corresponding to the “physical layer,” “data link layer,” and “network layer,” respectively. Bucknell, [0143]-[0147]. Layer 2 includes “a plurality of subprotocol layers,” including “the Medium Access Control protocol Layer (MAC protocol layer) 203” and “the Radio Link Control protocol layer 204 (RLC protocol layer).” *Id.*, [0146]. “The RLC protocol layer 204 is modelled such that there is an independent RLC entity for each radio bearer.” *Id.*, [0160]. The details regarding the “protocol layer arrangement 200” are further described in technical standards promulgated by 3GPP. Bucknell, [0152].



Eckert, Figure 2

46. The “MAC-e (MAC enhanced uplink) subprotocol layer 300...receives its data from the MAC-d subprotocol layer via ‘MAC-d flows’ 301, 302 and in turn transmits its data via the E-DCH transport channel 303 to the physical layer 201.” Eckert, [0168]. The E-DCH transport channel is a “new dedicated transport channel called Enhanced Dedicated Channel (E-DCH).” *Id.*, [0167]. “[E]ach MAC-d flow 301, 302 in the MAC-d subprotocol layer [is] assigned a priority, said priority being used by the function priority queue

distribution.” *Id.*, [0170]. “The data buffer storage in the priority queues 306 then buffer-stores the data until they are retrieved for transmission.” *Id.*, [0171].



Eckert, Figure 3

2. Summary of Bucknell

47. Bucknell focuses on activities in the MAC-e subprotocol layer including the E-DCH transport channel. Bucknell, [0002] (“[I]n UMTS for an Enhanced Uplink Data Channel (E-DCH), at the Medium Access Control (MAC) layer data packets, referred to as MAC-d Protocol Data Units or MAC-d PDUs, are grouped together for transmission to form larger, enhanced PDUs termed MAC-e PDUs.”). A MAC-e PDU is divided into “a first portion 90 and a second portion 95,” *id.*, [0020], as shown in Figure 2 below.

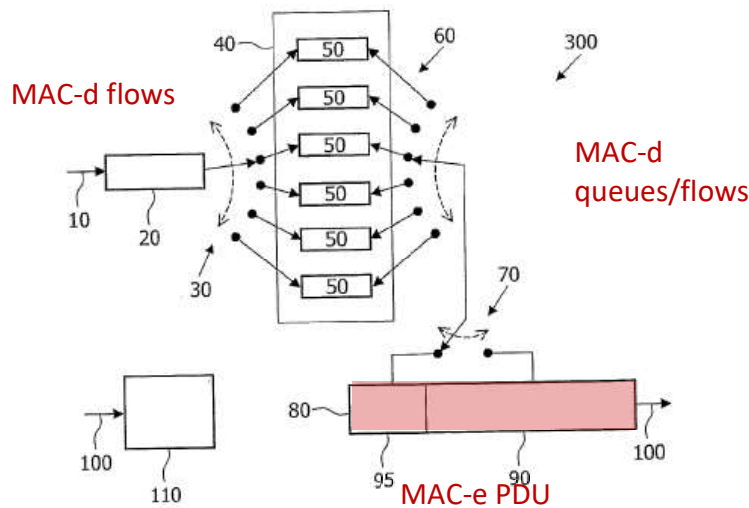


FIG. 2

Bucknell, Figure 2 (annotated)

48. Bucknell presents numerous examples of selecting data from a “subset” of MAC-d queues 50 and sequentially populating the portions 90 and 95 of a MAC-e PDU. Bucknell, [0025]-[0030]. These examples are discussed further in the analysis of various claim limitations.

3. Eckert and Bucknell Are Analogous Art to the '138 Patent

49. Eckert and Bucknell are each analogous art to the '138 patent at least because Eckert and Bucknell both pertain to the same field of endeavor as the '138 patent, namely, wireless, cellular communication systems, such a Universal Mobile Telecommunication System (UMTS). Ex.1001, 1:23-28 (“The invention is applicable...for use in the universal mobile telecommunication standard” [UMTS])), 2:5-67; Eckert, [0112] (“The mobile radio devices and also the mobile radio network control unit are...preferably for communication on the basis of the

cellular mobile radio system UMTS.”); Bucknell, [0001] (“The invention has application in...mobile communication systems such as the Universal Mobile Telecommunication System (UMTS).”).

50. Eckert and Bucknell are also analogous art to the ’138 patent because Eckert and Bucknell are reasonably pertinent to a same problem faced by the inventor of the ’138 patent of how “to provide an improved mechanism to differentiate between IP data flows.” Ex.1001, 3:17-18. Eckert is related to this problem because Eckert is concerned with how data of different priorities are to be transmitted. Eckert, [0015] (“[A] decision has not yet been made regarding the details of how the data about the new transport channel E-DCH are to be transmitted via the UMTS air interface. One possible solution is to split the data according to their priorities over various data buffer storages... which are then processed and hence transmitted ... according to ... their priority.”). Bucknell is also related to the problem of the ’138 patent because Bucknell is concerned with “a method of multiplexing data packets” for transmission in UMTS, Bucknell, [0001], such as “multiplex[ing] data packets having different priorities,” *id.*, [0002].

51. Motivations to combine Eckert and Bucknell are presented in the analysis of relevant limitations where teachings of Eckert and Bucknell are combined.

4. Summary of Lohr-1

52. Lohr-1 also relates to the Enhanced Uplink Dedicated Channel (E-DCH) implemented in a UMTS network protocol layer architecture compliant with wireless standards. Lohr-1, 4:19-26 (“**Enhanced Uplink Dedicated Channel (E-DCH)** Uplink enhancements for Dedicated Transport Channels (DTCH) are currently studied by the 3GPP Technical Specification Group RAN (see 3GPP TR 25.896: ‘Feasibility Study for Enhanced Uplink for UTRA FDD (Release 6)’, available at <http://www.3gpp.org>)...”), 1:16-20 (“The standardized European version of IMT-2000 is commonly called UMTS (Universal Mobile Telecommunication System). The first release of the specification of UMTS has been published in 1999 (Release 99). In the mean time several improvements to the standard have been standardized by the 3GPP...”). Consistent with Eckert and Bucknell, Lohr-1 describes the MAC-d subprotocol layer as having data flows and corresponding priority queues. *Id.*, 5:26-6:1 (“There are M different data flows (MAC-d) carrying data packets to be transmitted from user equipment to Node B. These data flows can have different QoS (Quality of Service), e.g. delay and error requirements, and may require different configurations of HARQ instances. Therefore the data packets can be stored in different Priority Queues.”). Lohr-1 explains that a “radio bearer control message” sent from the network to a mobile terminal includes a “set of parameters indicating the priorities of a logical channel

of the radio bearer” and that a radio bearer may be established according to these parameters. *Id.*, 20:14-24.

5. Lohr-1 is Analogous Art to the '138 Patent

53. Lohr-1 is analogous prior art to the '138 patent at least because Lohr-1 pertains to the same field of endeavor as the '138 patent, namely, wireless, cellular communication systems, such UMTS systems. '138 patent, 1:23-28, 2:5-67; Lohr-1, 24:25-25:4 (“...[M]ost of the embodiments are outlined in relation to a UMTS communication system and the terminology used in the subsequent sections mainly relates to the UMTS terminology...”).

54. Lohr-1 is also analogous art to the '138 patent because Lohr-1 is reasonably pertinent to a same problem faced by the inventor of the '138 patent of how “to provide an improved mechanism to differentiate between IP data flows.” '138 patent, 3:17-18. Lohr-1 is directed to differentiating between different data flows according to priority. Lohr-1, 25:15-19 (“According to one aspect of an embodiment of the invention a different priority handling of uplink transmissions depending on the scheduling mode is introduced.”).

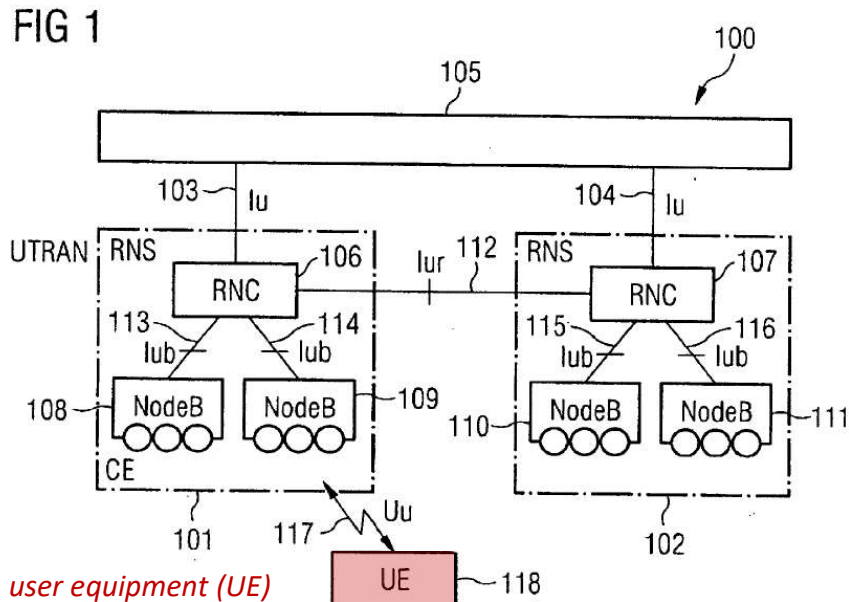
6. Claim 1

[1.0] *A user equipment (UE) comprising:*

55. Eckert discloses or renders obvious limitation [1.0].

56. For example, Figure 1 in Eckert illustrates a communication system in

which base stations 108, 109, 110, 111 communicate with a “user equipment, UE” 118, Eckert, [0138], thereby disclosing “a user equipment (UE).”



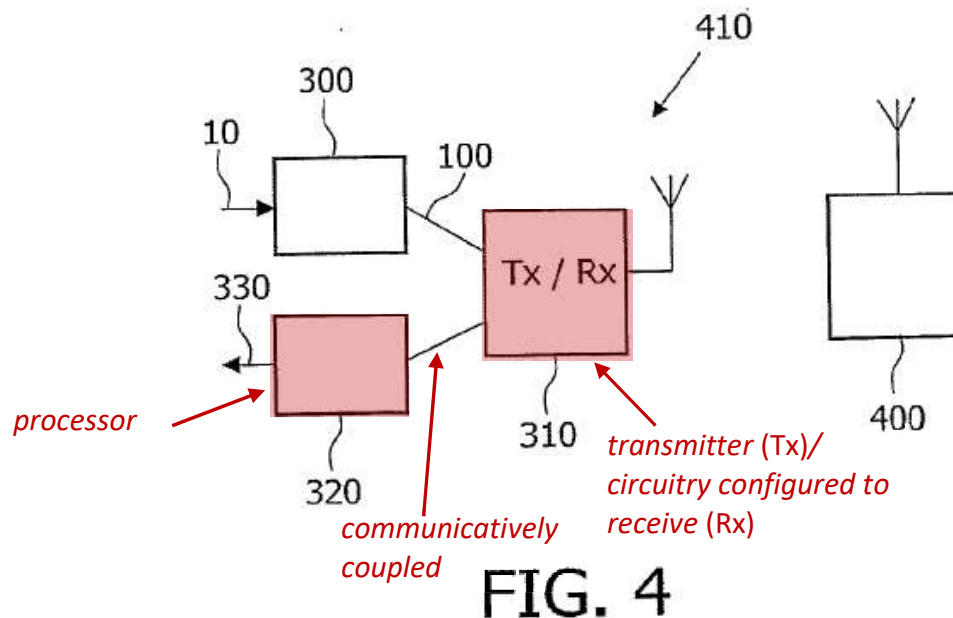
Eckert, Figure 1 (annotated)

[1.1]] a processor communicatively coupled to a transmitter and circuitry configured to receive; and

57. Eckert in view of Bucknell renders obvious limitation [1.1].

58. Eckert teaches a user equipment (used synonymously with the term “mobile radio terminal”) communicating with a base station (Ex.1005, [0138]), and Bucknell similarly discloses a mobile communication terminal 310 having a transceiver 310 (*a transmitter and circuitry configured to receive*) and a processor 320 (*processor*). Bucknell, [0032] (“The **communication terminal 410** ... comprises ... a **transceiver 310** for transmitting data and receiving

acknowledgements, and a processor 320..."); [0001] (“[T]he invention has application in...**mobile** communication systems such as ...UMTS”). As shown in Figure 4, the processor is “*communicatively coupled*” to the transceiver 310.



Bucknell, Figure 4 (annotated)

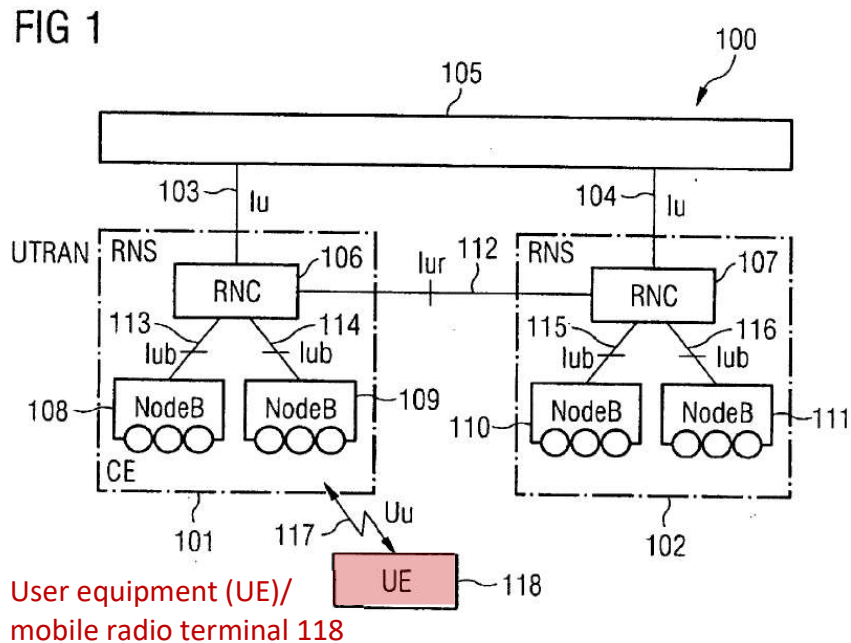
59. Thus, Bucknell discloses or renders obvious *a processor* (Bucknell's processor 320) *communicatively coupled to a transmitter and circuitry configured to receive* (connected to Bucknell's transceiver 310).

Motivation to Combine Eckert with Bucknell

60. Eckert discloses UMTS user equipment and various functions implemented on the user equipment, but Eckert provides insufficient details regarding the internal architecture of such a user equipment. Thus, a POSITA would have been motivated to look to Bucknell, which provides details about the

internal architecture of a UMTS-compatible mobile radio terminal as including a processor and a transceiver.

61. In more detail, Figure 1 (below) in Eckert illustrates a communication system in which base stations 108, 109, 110, 111 communicate with “a subscriber terminal 118 (user equipment, UE), subsequently also called mobile radio terminal.” Eckert, [0138]. Thus, Eckert uses the terms “UE”/“user equipment” synonymously with “mobile radio terminal.”



Eckert, Figure 1 (annotated)

62. Eckert relates to an uplink channel called an Enhanced Dedicated Channel (E-DCH). Eckert, [0012] (“The standardization committee 3GPP ... is currently ... working on improving the packet data transmission via dedicated

transport channels in the uplink,” such as “a new dedicated transport channel called Enhanced Dedicated Channel (E-DCH).”). Eckert describes the E-DCH and associated MAC-e subprotocol layer being implemented on the mobile radio terminal 118 (user equipment):

Both functions are implemented in a new sublayer of the MAC protocol layer 203, **as illustrated in line with a first embodiment in FIG. 3 as MAC-e (MAC enhanced uplink) subprotocol layer 300, which is likewise implemented both on the terminal, i.e. in the mobile radio terminal 118...** The MAC-e subprotocol layer 300 ... in turn **transmits its data via the E-DCH transport channel 303** to the physical layer 201.

Eckert, [0168]. While Eckert describes the E-DCH transport channel being implemented in a mobile terminal/UE, Eckert provides insufficient details regarding the internal architecture of such a mobile terminal/UE. Bucknell provides such details on the internal architecture of a mobile terminal for implementing an E-DCH, such as in Eckert, including a “transceiver” and a “processor.” Bucknell, [0032] (“[A] communication terminal 410” having “a transceiver 310 for transmitting data and receiving acknowledgements, and a processor 320...”), [0002] (discussing different priorities of packets “in UMTS for an Enhanced Uplink Data Channel (E-DCH)”); Bucknell, [0020].

63. A POSITA would have found it beneficial to implement the transmission and reception functions in a transceiver and control of the transceiver

by a processor (e.g., to implement software modules) to achieve (1) simplicity of implementation via programming or configuration of a single processor and a single transceiver and (2) speed of implementation as a result of a simple architecture.

64. Implementing Eckert's user equipment (UE) using Bucknell's processor and transceiver would have involved combining prior art elements (Eckert's UE having an architecture with Bucknell's processor and transceiver) according to known methods (having a processor control a transceiver) to yield the predictable and beneficial result of a UE architecture for implementing the teachings of Eckert and Bucknell. In other words, it would have been naturally beneficial to implement Bucknell's standard UMTS-compatible mobile radio terminal architecture in Eckert so that Eckert's device is also UMTS compatible.

65. A POSITA would have had a reasonable expectation of success in implementing Bucknell's mobile terminal hardware architecture in Eckert's UE because both Bucknell and Eckert describe the same MAC protocol layer having the same E-DCH channel. Eckert, [0168]; Bucknell, [0002]. Thus, a POSITA would have expected that using Bucknell's processor and transceiver to provide the hardware platform for Eckert's UE would be successful.

[1.2] *the processor is configured to:*

66. As explained in the analysis of limitation [1.1], Eckert's UE includes

Bucknell's processor. A POSITA would have found it obvious or would have understood that a processor in a mobile terminal, such as Bucknell's processor, would be programmed or configured to perform various functions, such as the functions in the remaining limitations, which are obvious in view of the teachings of Eckert, Bucknell, and Lohr-1, thereby rendering obvious claim element [1.2].

For example, Lohr-1 explains that "the various embodiments of the present invention may also be implemented by means of software modules which are executed by a processor..." Lohr-1, 34:11-12. Similarly, Yi-1 explains that:

The features of the present invention can be implemented in software, firmware, hardware, or any combination thereof.

Namely, the features of the present invention may be implemented in hardware by using hardware logic such as codes, circuit chips and ASIC, or may be implemented as codes using computer programming languages stored in computer-readable storage media (such as hard disks, floppy disks, tapes, etc.), optical storage media, of other memory devices such as ROMs or RAMs.

The codes stored in the computer-readable storage media can be accessed and executed by a processor. The codes implementing the features of the present invention may be accessed through a transmission medium or may be accessed through a file server on a network. In such case, the devices having the codes implemented therein are comprised of wireline (fixed line) transmission mediums (such as a network transmission line), wireless (radio) transmission

mediums, signal transmission, wireless (radio) signals, infrared signals, and the like.

FIG. 11 depicts a wireless communications device such as a **mobile terminal (1100) that can perform the functions of the present invention. This wireless communications device is comprised of a processing unit module (1110) (such as a microprocessor or digital processor)...**

Yi-1, [00074]-[0076]. Exemplary functions performed by Yi-1's mobile terminal include the same set of protocol layers as described in Eckert. *Compare* Yi-1 Figure 2 and Eckert Figure 2; *see also* Yi-1, [0006]-[0011]. Thus, Yi-1 describes protocol layers implemented using a processor in a mobile terminal. These references explain the understanding of a POSITA at the priority date of the alleged invention recited in the '138 patent that Bucknell's processor would have been commonly programmed to perform various functions, such as the functions of the remaining limitations. Some benefits of a UE architecture of a processor and transceiver are (1) simplicity of implementation and (2) speed of implementation as explained *supra* in the analysis of limitation [1.1].

[1.3] cause the circuitry to receive parameters associated with a plurality of radio bearers,

67. Eckert in view of Lohr-1 renders obvious limitation [1.3].

68. Eckert presents a protocol stack for communication between a base station and a UE. Eckert, [0005]. The protocol stack includes a Radio Resource

Control (RRC) protocol layer, which is responsible for configuring and reconfiguring radio bearers:

One of the three protocol layers of the UMTS air interface is known as the **Radio Resource Control (RRC) protocol layer**. The **RRC protocol or the RRC protocol layer is responsible for setting up and clearing down and also for (re)configuring ... radio bearers**, and also for negotiating all parameters of the protocol layers of layer 1 and layer 2 on the basis of UMTS.

Eckert, [0006].

69. Furthermore, as was understood generally in the art, a radio bearer provides a corresponding service over the wireless medium. Eckert, [0156] (providing “services by means of radio bearers (RB)”), [0161]; Yi-1, [0014] (“[A] radio bearer (RB) [is] established, respectively, for providing services having an appropriate QoS.”); Yi-2, [0011] (“And in general, the establishment of a radio bearer (RB) refers to regulating the protocol layers and the channel characteristics of the channels required for providing a specific service.”). Eckert’s usage of the term of art “radio bearer” is consistent with that of the ’138 patent, which describes a service as an example radio bearer. ’138 patent, 4:4-5 (“radio bearers (or services)”), 4:24-27 (“radio bearers (e.g., services)”).

70. Eckert’s UE may maintain a plurality of services, provided by a plurality of radio bearers (*plurality of radio bearers*), simultaneously. For example, in one embodiment of Eckert, three packet services are provided on the uplink in

parallel:

For the exemplary embodiments shown, a transmission scenario is assumed in which **a user of the mobile radio terminal 118 uses three packet services in the uplink at parallel times**, for example one service for interactive gaming on the internet, one service for downloading text files and one service for streaming video data.

Eckert, [0197]. Other prior art confirms that a UE can have multiple radio bearers, each providing a service. For example, in describing a figure (Figure 7) that is identical to Eckert's Figure 2, one **reference states that "one UE may have several RBs** and, in general, one RLC entity and one PDCP entity are used for one RB." Yi-2, [0118]; [0121] ("**Setting up an RB includes a process of determining a protocol layer and channel characteristics required for providing a predetermined service in a radio area**, as well as setting up each specific parameter and an operation method."). Thus, Eckert describes the use of a radio bearer to provide a service and describes a UE providing a plurality of services at the same time, thereby disclosing or rendering obvious a plurality of radio bearers.

71. Eckert explains that the RRC protocol layer is responsible for "negotiating all parameters of the protocol layers of layer 1 and layer 2 on the basis of UMTS." Eckert, [0006]. Protocol layer 2 (L2) includes radio bearers – for example, "the data link layer 202, protocol layer 2," Eckert, [0146], is shown in Figure 2 as including "radio bearers 210," *id.*, [0163]. Layer 2 202 also includes

the MAC layer. *See* Eckert, Figure 2. Eckert explains that “**the UMTS mobile radio core network 105 provides this requested service** in a prescribed, defined quality of service (QoS) which corresponds to the Quality of Service requirements of the service in question.” Eckert, [0177]. The core network provides these services via other infrastructure network elements, such as NodeB. *See* Eckert, Figure 1 (illustrating core network 105 and NodeB 108, 109). Because the UMTS mobile radio core network provides the services, it would have been obvious to a POSITA at the priority date of the alleged invention recited in the ’138 patent that the RRC protocol layer at the network side is responsible for providing the parameters of the radio bearers (in layer 2), including the priority levels of the logical channels of the radio bearers.

72. Lohr-1 confirms that the network communicates parameters, such as priorities of a logical channel of the radio bearer, in a “radio bearer control message” to a “mobile terminal.” Lohr-1, 20:14-24. The message provides “the set of parameters indicating the priorities of a logical channel of a radio bearer” and the radio bearer is established in accordance with these parameters. *Id.* Eckert’s logical channels are associated with MAC-d flows, and MAC-d flows have corresponding priorities used in the data buffer storages in the MAC-e subprotocol layer. Eckert, [0170].

73. Therefore, Eckert in view of Lohr-1 renders obvious *cause the*

circuitry to receive parameters (Lohr-1's disclosure that priorities of logical channels of radio bearers are communicated from the radio network to a UE in a control message) *associated with a plurality of radio bearers* (Eckert's UE that maintains multiple services (radio bearers) simultaneously, with each radio bearer being associated with one or more logical channels and MAC-d buffer storages).

Motivation to Combine Eckert and Lohr-1

74. A POSITA seeking to implement Eckert's teachings in a UMTS network would have been motivated to specify implementation detail missing from Eckert regarding how a UE establishes priorities for its logical channels and associated queues in the UMTS MAC-d layer (priorities used by Bucknell for multiplexing data), and Lohr-1 provides implementation detail for establishing a radio bearer and associated logical channel and priorities in UE in a UMTS network. Applying these UMTS-specific teachings is nothing more than the predictable use of prior art elements according to their established functions.

75. Eckert explains that "the Radio Resource Control (RRC) protocol layer... is responsible for negotiating all parameters of the protocol layers of layer 1 and layer 2 on the basis of UMTS." Eckert, [0006]. Protocol layer 2 (L2) includes radio bearers – for example, "the data link layer 202, protocol layer 2," Eckert, [0146], is shown in Figure 2 as including "radio bearers 210," *id.*, [0163]. Layer 2 202 also includes the MAC layer. *See* Eckert, Figure 2. Eckert explains

that “the UMTS mobile radio core network 105 provides this requested service in a prescribed, defined quality of service (QoS) which corresponds to the Quality of Service requirements of the service in question.” Eckert, [0177]. The core network provides these services via other infrastructure network elements, such as NodeB. *See* Eckert, Figure 1 (core network 105 and NodeB 108, 109). Because the UMTS mobile radio core network provides the services, it would have been obvious to a POSITA at the priority date of the alleged invention recited in the ’138 patent that the RRC protocol layer at the network side is responsible for providing the parameters of the radio bearers (in layer 2), including the priority levels of the logical channels of the radio bearers, as described in Lohr-1.

76. Lohr-1 confirms that the network communicates parameters, such as priorities of a logical channel of the radio bearer, in a “radio bearer control message” to a “mobile terminal.” Lohr-1, 20:14-24. The message provides “the set of parameters indicating the priorities of a logical channel of a radio bearer” and the radio bearer is established in accordance with these parameters.

77. Eckert’s logical channels are associated with MAC-d flows, and MAC-d flows also have a priority. Eckert, [0170] (“In the MAC-d subprotocol layer, one or more logical channels are multiplexed onto an MAC-d flow 301, 302, with each MAC-d flow 301, 302 in the MAC-d subprotocol layer being assigned a priority, said priority being used by the function priority queue distribution,

implemented ... to split the data over the data buffer storages 306 with the different priorities.”). Thus, it would have been obvious to a POSITA at the priority date of the alleged ‘138 patent invention that the priorities of the priority queues in Eckert are communicated from the network to a mobile terminal.

78. Using a control message, as in Lohr-1, to indicate priorities associated with logical channels and their associated queues in Eckert would have involved the combination of prior art elements (Lohr-1’s control message in a UMTS system that has radio bearers used in Eckert’s UMTS system that also has radio bearers and other similar protocol elements) according to known methods (sending Lohr-1’s control message from the network) to yield the predictable and beneficial result of describing how priorities associated with logical channels are established.

79. A POSITA would have had a reasonable expectation of success in using Lohr-1’s control message in Eckert’s UMTS system because Lohr-1 is described in the context of a “UMTS system” in which “data is transmitted via an E-DCH,” Lohr-1, 22:17-18, which is the same context as Eckert. Eckert, [0112]-[0113] (“[T]he invention is used within the context of UMTS.”); [0167] (“Enhanced-DCH (E-DCH) is provided,” and “scheduling is controlled by a UMTS base station.”).

[1.4] 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,

80. Eckert discloses or renders obvious limitation [1.4].

81. Eckert describes determining and indicating data buffer storage filling levels “for each radio bearer,” thereby disclosing or rendering obvious limitation [1.4]. For example, Eckert discloses that a “measurement result list shown in Table 1 is thus transmitted from ... the mobile radio terminal ... and **the respective RRC [sic RLC] data buffer storage filling level is indicated for each radio bearer (RB).**” Eckert, [0011]. Table 1 presents example information elements of a message that conveys radio bearer (RB) identity and “RLC Buffer Payload” information for the radio bearer.

TABLE 1

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Traffic volume measurement results	OP	1 to <maxRB>		
>RB Identity	MP		RB Identity 10.3.4.1 6	
>RLC Buffer Payload	OP		Enumerated (0, 4, 8, 16, 32, 64, 128, 256, 512, 1024, 2K, 4K, 8K, 16K, 32K, 64K, 128K, 256K, 512K, 1024K)	In bytes And N Kbytes = N*1024 bytes. Twelve spare values are needed.
>Average of RLC Buffer Payload	OP		Enumerated (0, 4, 8, 16, 32, 64, 128, 256, 512, 1024, 2K, 4K, 8K, 16K, 32K, 64K, 128K, 256K, 512K, 1024K)	In bytes And N Kbytes = N*1024 bytes. Twelve spare values are needed.
>Variance of RLC Buffer	OP		Enumerated (0, 4,	In bytes And N

Eckert, Table 1 (annotated)

See also Eckert, [0164] (describing “provid[ing] [] an indication of the RLC data buffer filling levels of the transport channel in question, i.e. it is indicated how many data items there are currently in the respective RLC data buffer storages of the mobile radio terminal 118”), [0244].

82. Thus, Eckert discloses *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 (mobile radio terminal determines the RLC data buffer filling level for each radio bearer and transmits a message including this information).

[1.5] *cause the transmitter to transmit a message including the plurality of buffer occupancies to a network,*

83. Eckert combined with Bucknell renders obvious limitation [1.5].

84. As discussed in [1.4], Eckert discloses transmitting a “measurement result list” that indicates “data buffer storage filling level for each radio bearer” (*transmit a message including the plurality of buffer occupancies to a network*):

The **measurement result list** shown in Table 1 **is thus transmitted from** an RRC unit in **the mobile radio terminal** to the RRC unit in the corresponding mobile radio network control unit, **and the respective RRC data buffer storage filling level is indicated for each radio bearer (RB).**

Eckert, [0011]; *see also* [0164]. As explained in the analysis of limitation [1.1], Bucknell’s transceiver implemented in Eckert’s UE transmits data, such as the buffer storage level information.

85. Thus, Eckert in view of Bucknell discloses *cause the transmitter* (Bucknell’s transceiver in Eckert’s UE) *to transmit a message including the plurality of buffer occupancies to a network* (Eckert discloses transmitting a “measurement result list” that indicates “data buffer storage filling level for each radio bearer”).

[1.6] *cause the circuitry to receive a single allocation of uplink resources,*

86. Eckert discloses or renders obvious limitation [1.6] (with the understanding that Eckert's UE has Bucknell's receive *circuitry* controlled by a *processor*, per analysis of [1.1] and [1.2]). Eckert combined with Lohr-1 also renders obvious limitation [1.6] (with the same understanding that Eckert's UE has Bucknell's receive *circuitry* controlled by a *processor*).

87. **First**, Eckert discloses or renders obvious limitation [1.6]. Eckert explains that mobile radio terminals (UEs) are allocated "resources" by the network and "the protocols of the protocol layers 1 and 2 are configured." Eckert, [0189]. Eckert relates to the issue of "how the data about **the new transport channel E-DCH** are to be transmitted via the UMTS air interface." Eckert, [0015]. Data from buffer storages are transmitted in "a defined time interval via the E-dedicated channel (E-DCH)." Eckert, [0116] ("The data which are transmitted within a defined time interval via the E-dedicated channel (E-DCH) are in this case made up proportionally from the data which are buffer-stored in the respective data buffer storages..."). The allocated E-DCH channel, which is a transport channel and also an uplink channel, Eckert, [0012], is an example of *a single allocation of uplink resources*.

88. The '138 patent confirms that a transport channel is an example of "a single allocation of [] radio resources." Ex.1001, 9:36-43 ("In this manner, a single

PDP context implies a single CCTrCh. This single physical allocation of radio resources provided to a UE...”). Although the ’138 patent does not specify the abbreviation CCTrCh, it was understood in the art to refer to a transport channel known as the Coded Composite Transport Channel. *See* Ex.1011, [0021] (“CCTrCH (Coded Composite Transport Channel)”).

89. **Second**, Eckert combined with Lohr-1 also renders obvious claim element [1.6], disclosing or rendering obvious *a single allocation of uplink resources* at an even more granular level than a transport channel.

90. Eckert focuses on a unit of time in UMTS called a “transmission time interval” and also a MAC-e protocol data unit within the transmission time interval. Eckert, [0023]. Eckert teaches how data from various priority queues in a UE are selected for uplink transmission in this allocation. Eckert, [0023] (“In line with the UMTS Enhanced Uplink method, on the other hand, the data having various priorities, i.e. the data from various priority queues, are **transmitted in an MAC-e protocol data unit within a data transmission time interval.**”). Eckert explains that scheduling of the E-DCH in a UE is controlled by a base station. Eckert, [0012] (“[A] new dedicated transport channel called Enhanced Dedicated Channel (E-DCH) has been introduced for this purpose. The fundamental characteristics of this new transport channel include ... **scheduling controlled by the base station**, also called NodeB in UMTS...”). Based on Eckert, it would have

been obvious that network elements (such as base station) schedule times for a UE to transmit and communicate those times to the UE, e.g., indicate to the UE a transmission time interval to the UE for transmission.

91. Like Eckert, Lohr-1 also relates to the E-DCH of UMTS, including different MAC-d data flows. Lohr-1, 5-6 (section entitled “E-DCH MAC Architecture at the user equipment”). Lohr-1 confirms that a base station (called a Node B in UMTS) specifies time intervals for transmission. Lohr-1, 7:6-9 (“With a grant message sent in the downlink from the Node B to the UE, the Node B assigns the UE the TFCS with maximum data rate and the time interval, the UE is allowed to send.”).

92. Thus, Eckert in view of Lohr-1 discloses a UE receiving “maximum data rate and the time interval” (receive a single allocation of uplink resources) for an E-DCH channel, thereby also disclosing or rendering obvious limitation [1.6].

[1.7] *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,*

93. Eckert combined with Bucknell renders obvious limitation [1.7].

94. **First**, Bucknell describes a selection of data from each of the MAC-d flows for transmission in a MAC-e PDU over E-DCH (*select data ... for transmission using the single allocation of uplink resources*), where, in view of Eckert, it would have been obvious to a POSITA that the MAC-d flows correspond

to a *plurality of radio bearers*, thereby rendering obvious *select data from the plurality of radio bearers for transmission using the single allocation of uplink resources*.

95. As explained in the analysis of limitation [1.3], Eckert describes the use of a radio bearer to provide a service and describes a UE providing a plurality of services at the same time, thereby disclosing or rendering obvious *a plurality of radio bearers*.

Radio bearers correspond to MAC-d flows and corresponding buffers

96. As explained in the analysis of limitation [1.3], Eckert's UE maintains a plurality of services simultaneously, provided by a plurality of radio bearers (*plurality of radio bearers*).

97. As explained below, packets of a radio bearer are provided via one or more logical channels to the MAC protocol layer, which includes the MAC-e subprotocol layer; and the logical channels are multiplexed onto MAC-d flows. Thus, Eckert discloses or renders obvious that a plurality of MAC-d flows corresponds to a *plurality of radio bearers*.

98. Each radio bearer forms a data pipe or flow that is created and flows down through each layer of the protocol stack (RLC layer to MAC layer to physical layer). For example, "in general, the establishment of a radio bearer (RB) refers to regulating the protocol layers and the channel characteristics of the

channels required for providing a specific Service, as well as setting their respective specific parameters and operation methods.” Yi-1, [0011]. As another example, Patent Owner’s expert in IPR2022-01127 explains that “[a] Radio Bearer may be thought of as a “pipe” through which data can be transferred.” Ex.1013, ¶27, FN 3.

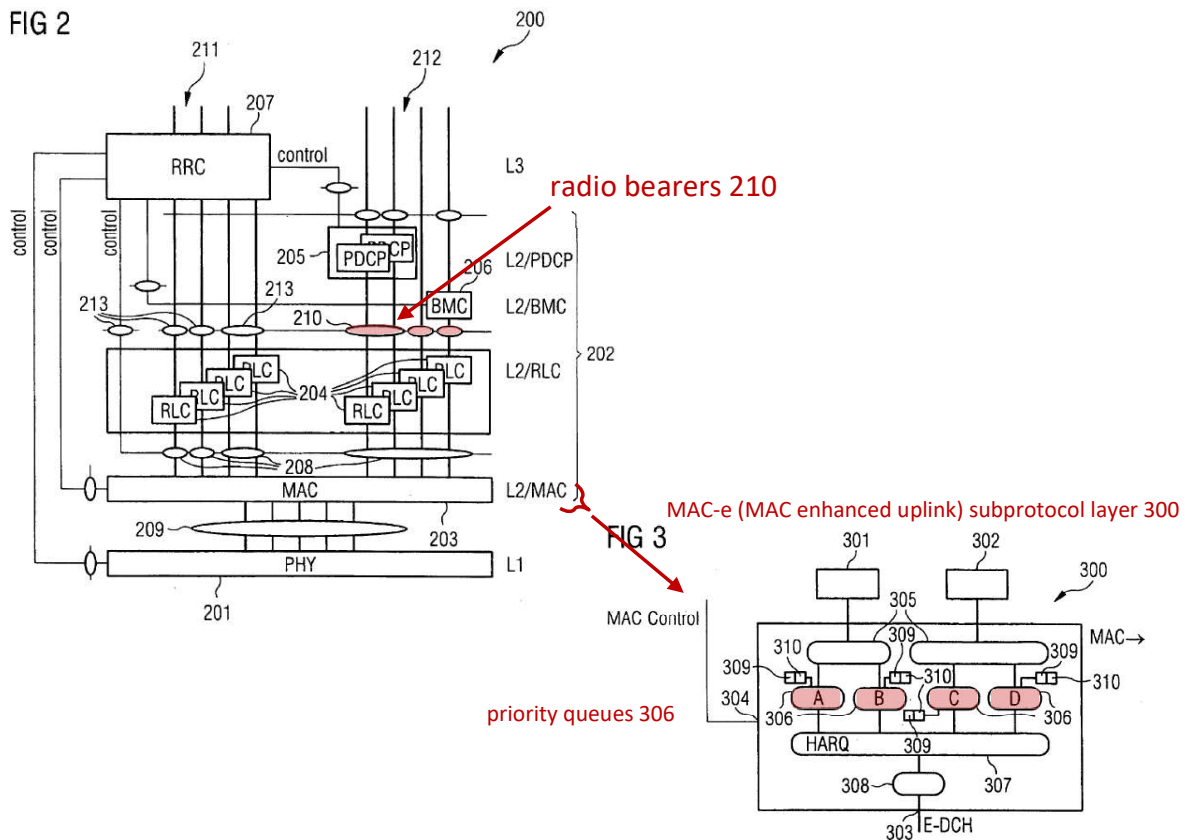
99. Each radio bearer is associated with an “RLC entity.” Eckert, [0160] (“The RLC protocol layer 204 is modelled such that there is an independent RLC entity for each radio bearer...”). The RLC entity “split[s] or assemble[s] the useful data and ...from radio bearers ... into data packets,” which are then transferred “the MAC protocol layer 203 for further transport or for further processing.” Eckert, [0160]. Further, “[t]he MAC protocol layer 203 ... provides ... the RLC protocol layer 204 with its or their services using logical channels 208 as service access points and these are used to characterize what type of file the transported data involve.” Eckert, [0154]

100. The MAC protocol layer 203 includes a “sublayer” known as “MAC-e (MAC enhanced uplink) subprotocol layer 300, which is likewise implemented both on the terminal, i.e. in the mobile radio terminal 118, and on the network.... The MAC-e subprotocol layer 300 receives its data from the MAC-d subprotocol layer via ‘MAC-d flows’ 301, 302 and in turn transmits its data via the E-DCH transport channel 303 to the physical layer 201.” Eckert, [0168]. “In the MAC-d

subprotocol layer, one or more logical channels are multiplexed onto an MAC-d flow 301, 302...” Eckert, [0170].

101. In summary, in Eckert, there an RLC entity for each radio bearer; an RLC entity creates packets of a corresponding radio bearer that are provided via one or more logical channels to the MAC protocol layer, which includes the MAC-e subprotocol layer; and the logical channels are multiplexed onto MAC-d flows.

102. Further, there are priority queues in Eckert for the various priorities of the logical channels in the MAC-d flows, illustrated in Figure 3 as A, B, C, and D (each numbered 306). Eckert, [0170]. (“[E]ach MAC- d flow 301, 302 in the MAC-d subprotocol layer being assigned a priority, said priority being used by the function priority queue distribution, implemented in a priority queue distribution unit 305 in the MAC-e subprotocol layer 300, to split the data over the data buffer storages 306 with the different priorities, i.e. for processing using data of different priorities in a respective data buffer storage, with a data buffer storage respectively buffer-storing data of one priority.”). Eckert’s Figure 2 and Figure 3 are presented below to illustrate the general relationship between protocol layers, radio bearers 210, logical channels 208, MAC-d flows 301, 302, and corresponding data buffer storages 306 for different priorities.



Eckert, Figures 2 and 3 (annotated)

103. Eckert further explains that “[i]n one advantageous variant, **a priority queue buffer storage is provided in the MAC-e subprotocol layer for each data traffic class.**” Eckert, [0117]. Four traffic classes may be supported: conversational, streaming, interactive, and background, *id.*, [0178]-[0186], and each of the traffic classes may have its own assigned priority queue 306, *id.*, [0268]. As explained above, these services (radio bearers) may be provided in parallel. Eckert, [0197]. Thus, Eckert discloses that each of the buffers (306) A, B,

C, D in FIG. 3 may serve a different traffic class, which corresponds to a radio bearer.

Data Selection from MAC-d flows and queue/buffer storages

104. Both Eckert and Bucknell describes selecting data from a plurality of MAC-d flows (*select data from the plurality of radio bearers*) to fill a single scheduled data unit in the form of a MAC-e PDU for transmission (*for transmission*) over the E-DCH (*using the single allocation of uplink resources*, per the analysis of limitation [1.6]). For example, Eckert discloses that “[t]he MAC-e subprotocol layer 300 receives its data from the MAC-d subprotocol layer via ‘MAC-d flows’ 301, 302 and in turn transmits its data via the E-DCH transport channel 303.” Eckert, [0168]; *see also* [0228]. Bucknell likewise discloses that:

[I]n UMTS for an **Enhanced Uplink Data Channel (E-DCH)**, at the Medium Access Control (MAC) layer **data packets, referred to as MAC-d Protocol Data Units or MAC-d PDUs, are grouped together for transmission to form larger, enhanced PDUs termed MAC-e PDUs.**

Bucknell, [0002].

In UMTS, the process of multiplexing of MAC-d PDUs into MAC-e PDUs is responsible for ensuring that **MAC-d flow priorities** are taken into account in an appropriate way.

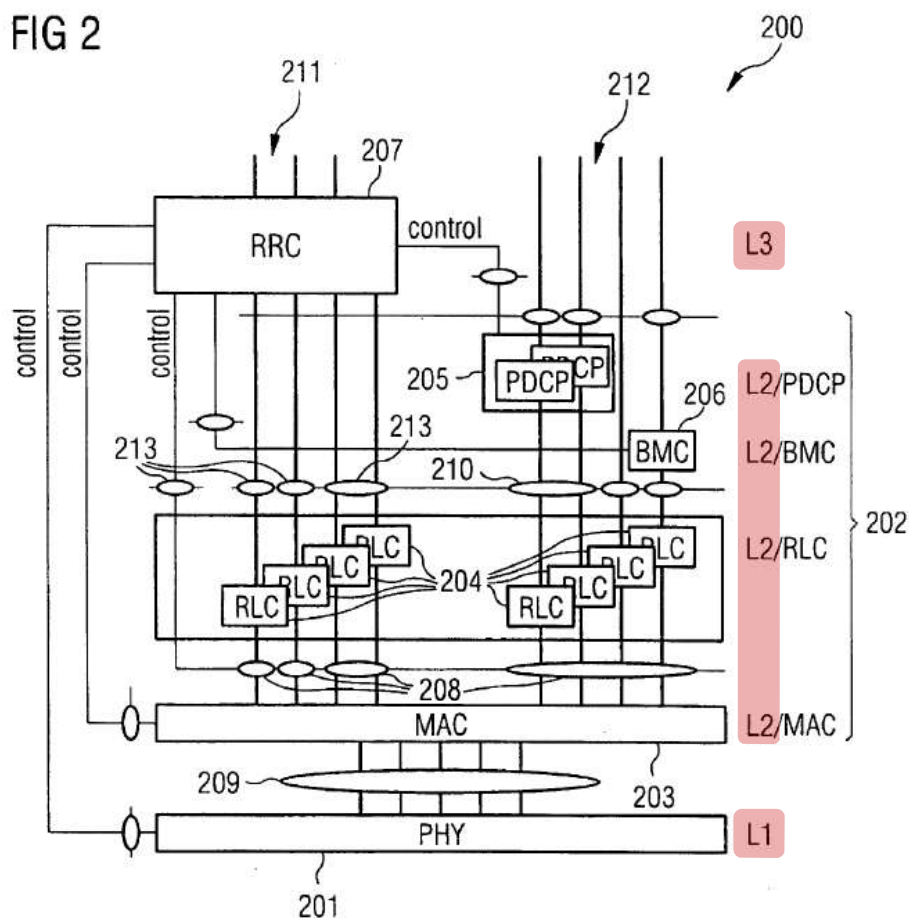
Id., [0003].

[T]he packets may be routed to the queue stores 50 **according to their respective MAC-d flows**, with each flow having an associated priority...

Id., [0020].

105. Both Eckert and Bucknell describe the use of MAC-d queues/flows having different assigned priorities, and forming a MAC-e PDU with MAC-d PDUs. *See* Eckert, [0085] (“[T]he **MAC-e SDUs from various MAC-d flows (MAC-d data streams) and various priorities**, that is to say data from various priority queues, [] form a protocol data unit...”); *see also* [0170]; Bucknell, [0002] (“There is a requirement in communication systems to **multiplex data packets having different priorities**. For example, in UMTS for an Enhanced Uplink Data Channel (E-DCH), at the ... **MAC-d Protocol Data Units or MAC-d PDUs, are grouped together for transmission to form larger, enhanced PDUs termed MAC-e PDUs.**”).

106. Bucknell focuses only on the MAC layer in a UMTS system and does not provide details on the layers above and below the MAC layer. Eckert is an exemplary reference that provides details on these protocol layers – Layer 1, Layer 2 (which includes the MAC layer) in a UMTS system, and Layer 3. *See*, e.g., Eckert, Figure 2, below, and associated description (Layer 1, 2, and 3, labeled as L1, L2, L3, respectively).



Eckert, Figure 2 (annotated)

107. Bucknell describes selecting data packets from MAC-d queues to fill a MAC-e PDU. Bucknell, [0003] and Figure 1. Referring to Figure 2 (below), Bucknell describes that “packets may be routed to the queue stores 50 according to their respective MAC-d flows, with each flow having an associated priority.” Bucknell, [0020]. Bucknell further describes selecting data packets from the MAC-d queues 50 to populate an output buffer, which would have been understood to represent an example MAC-e PDU based on the description and

illustration of Figure 1. See Bucknell, [0002]-[0003].

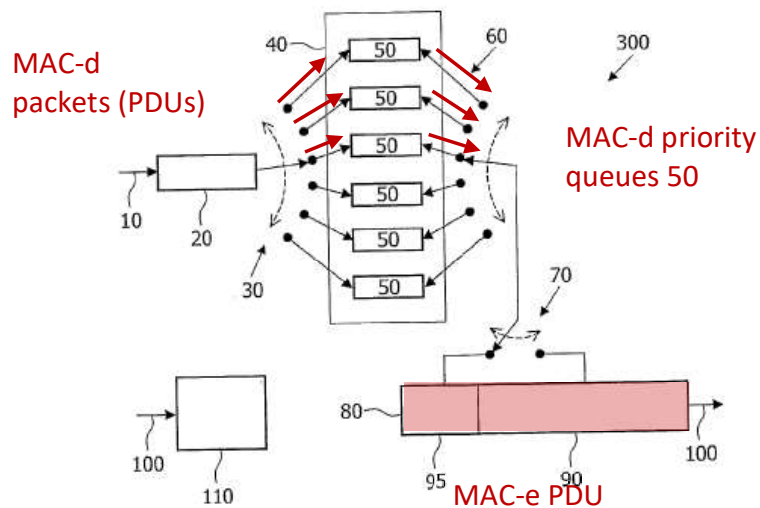


FIG. 2

Bucknell, Figure 2 (annotated)

Bucknell describes that its data selection process iterates over the MAC-d queues 50 multiple times to populate the MAC-e PDU. Ex.1006, [0006], [0025]-[0028].

For example, during a *first iteration*, data is selected from a “subset” of MAC-d queues 50 and during a *second iteration*, data is selected from the queues 50 based on “the amount of data in the respective queues,” as described in more detail in limitations [1.8] and [1.9]. *Id.*

108. Thus, Eckert in view of Bucknell renders obvious *select data from the plurality of radio bearers* (select data from a plurality of MAC-d flows and corresponding priority queues) *for transmission using the single allocation of uplink resources* (for transmission on E-DCH).

109. **Second**, the data selected from the MAC-d flows in Bucknell (*a*

plurality of radio bearers) is transmitted in a single E-DCH (*a single allocation of uplink resources*, per the analysis of limitation [1.6]) and, more granularly, in a transmission time interval (TTI) (another example of *a single allocation of uplink resources*, per the analysis of [1.6]), per Eckert, thereby also disclosing or rendering obvious *select data from the plurality of radio bearers for transmission using the single allocation of uplink resources*.

110. Eckert explains that a MAC-e protocol data unit is transmitted within a “data transmission time interval” (another *single allocation of uplink resources*):

In line with the UMTS Enhanced Uplink method, ... the data from various priority queues, are transmitted in an MAC-e protocol data unit within a data transmission time interval.

Eckert, [0023]; *see also* [0085].

111. Further, Bucknell describes the selection of data for transmission from MAC-d flows using at least two iterations, as described in the analysis of claim elements [1.8] and [1.9], thereby rendering obvious *wherein the selection of the data occurs using a first iteration and a second iteration*.

[1.8] 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,

112. Eckert in view of Bucknell renders obvious limitation [1.8].

113. As explained in the analysis of limitations [1.3] and [1.7], in view of the teachings of Eckert, the MAC-d flows in Bucknell correspond to radio bearers,

and examples of the “received parameters” are the priority values of logical channels associated with the MAC-d flows. As explained below, Bucknell describes an iterative process in which data is first selected from a “subset” of MAC-d flows (*a subset of the plurality of radio bearers*) based on priority values (*received parameters*).

114. Bucknell describes selecting data packets from MAC-d queues to populate a MAC-e PDU. Bucknell, [0003] and Figure 1. Referring to Figure 2 (below), Bucknell describes that “packets may be routed to the queue stores 50 according to their respective MAC-d flows, with each flow having an associated priority.” Bucknell, [0020]. Bucknell further describes selecting data packets from the MAC-d queues 50 to populate an output buffer, which would have been understood to represent an example MAC-e PDU based on the description and illustration of Figure 1. *See* Bucknell, [0002]-[0003]. The MAC-e PDU is divided into “a first portion 90 and a second portion 95,” *id.*, [0020], as shown in Figure 2 below. The “MAC-e PDU” is divided “into at least two portions” thus “enabling different multiplexing rules to be used for the different portions” to provide “flexibility for appropriate handling of priorities, guaranteed bit-rates and starvation scenarios.” Bucknell, [0006].

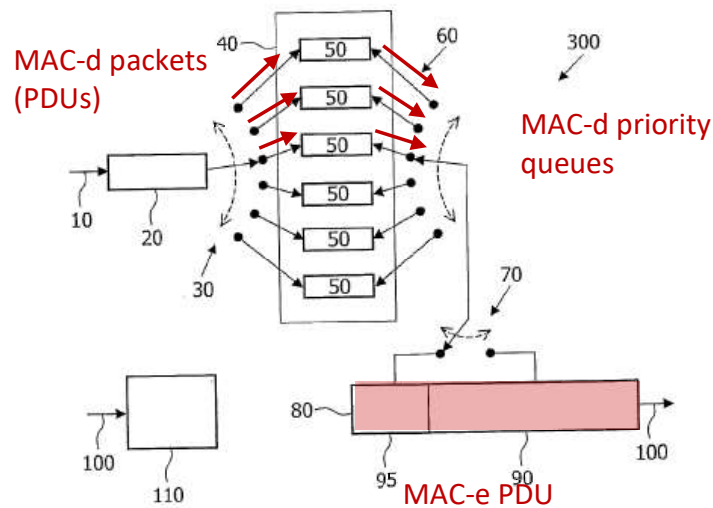


FIG. 2

Bucknell, Figure 2 (annotated)

115. Bucknell presents numerous examples of selecting data from a “subset” of MAC-d queues 50 (*radio bearers*) and populating the two portions 90 and 95 of a MAC-e PDU using different *iterations* of reading data from MAC-d queues 50. Bucknell, [0025]-[0030] (“Some examples are given below...,” listing examples labeled (1) through (13)). The examples are referred in the discussion below as example (1), (2), (3), etc., using the numbering from Bucknell, with a focus on examples (2) through (5) and (7) through (9), *id.*, [0027]-[0028], in the remaining analysis.

116. Bucknell’s data selection process is iterative because multiple passes through the MAC-d queues 50 are required to populate the different portions 90 and 95 of the MAC-e PDU—i.e., data selection from the queues 50 happens

multiple times. Ex.1006, [0006], [0025]-[0028]. And, during each pass (*iteration*), Bucknell may apply different data selection “rules,” as illustrated in Bucknell’s different examples (1) through (13). Ex.1006, [0006], [0025]-[0030]. Each pass through the relevant set or subset of MAC-d queues 50 to select data for a given portion 90 or 95 according to Bucknell’s stated rules is an example *iteration*, as recited in claim 1. And Bucknell’s rules for selecting data for the different portions 90, 95 satisfy the requirements of each *iteration* stated in claim 1 as explained below and in the analysis of limitation [1.9].

117. For example, in Bucknell’s example (2), “the second portion 95 is populated by **taking one data packet in turn from each of the subset of queues**, excluding the highest priority queue,” *id.*, [0027], and in example (4), as a “variation on 2), the second portion 95 can be populated before the first portion 90.” These examples teach that the second portion 95 of a MAC-e PDU is first populated using a “subset of queues, excluding the highest priority queue,” or queues with priorities less than the highest priority (*first iteration*, data selected from *subset* of queues), and, next, the first portion 90 is populated using the highest priority queue (*second iteration*). The priorities of all queues must be known to determine which priority is the “highest.” Example (5) reinforces that the different portions 90, 95 can be populated using “subsets of the queues” (*a subset of the plurality of radio bearers*). Bucknell, [0027]. These teachings in Bucknell meet the

Board's preliminary construction in IPR2022-01127 of "*a subset of the plurality of radio bearers*" construed to mean "*less than all of the plurality of radio bearers*."

(See Section VI).

118. Thus, in Bucknell, data may first be selected from a subset of MAC-d packet queues (*a subset of the plurality of radio bearers*) based on the priorities (*based on the received parameters*), e.g., data may be selected from all queues except the highest priority queue (i.e., less than all of the queues), which correspond to *radio bearers* according to Eckert, in a first iteration, thereby rendering obvious *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*, as claimed.

Motivation to Combine Eckert and Bucknell

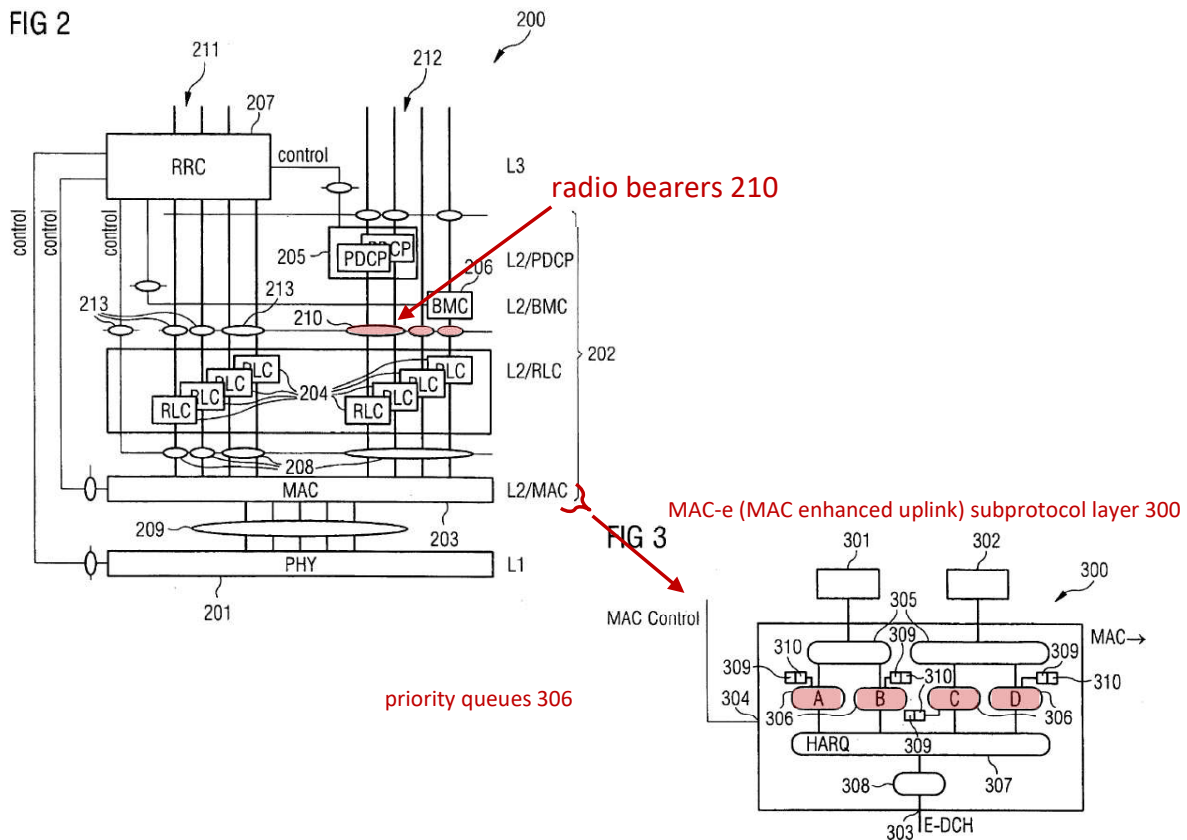
119. A POSITA would have been motivated to modify Eckert's method of selecting data from MAC-d priority queues for transmission with Bucknell's method of selecting data from MAC-d priority queues for two reasons: (1) to reduce control signaling overhead and (2) to reduce complexity compared to Eckert's method.

120. Referring to Figure 2, Eckert presents a MAC protocol layer 203 within the larger context of a set of UMTS protocol layers (labeled as L1 (Layer 1), L2 (Layer 2), L3 (Layer 3)). Eckert, [0143], [0146] ("[P]rotocol layer 2 ...

includes the Medium Access Control protocol Layer (MAC protocol layer) 203.”).

There is a radio link control (RLC) entity for each radio bearer, and the RLC layer transfers packets to the MAC layer for transport or processing. Eckert, [0160].

Consistent with the teachings in Bucknell, Eckert’s MAC layer, as in Bucknell, includes a “MAC-e subprotocol layer” and a “MAC-d subprotocol layer,” and data is split therein over various “data buffer storages”/“priority queues” and processed in accordance with priorities. Eckert, [0167]-[0171]; Bucknell, [0002]. Eckert further explains that “[i]n one advantageous variant, **a priority queue buffer storage is provided in the MAC-e subprotocol layer for each data traffic class.**” Eckert, [0117]. The combined teachings of Eckert’s Figures 2 and 3 are below.



Eckert, Figures 2 and 3 (annotated)

121. Eckert recognizes that a “MAC-e protocol data unit” may be created by “retriev[ing], i.e., read[ing], the data from the various priority queues” according to a number of alternatives, such as “**according to particular criteria, such as the priorities of the data or the weightings or weighting value ranges** transmitted using an RRC message.” Eckert, [0228]. Bucknell specifies implementation detail for how to select data for a MAC-e PDU according to “priorities of the data,” which fits seamlessly in Eckert’s framework to address this issue.

122. Although Eckert acknowledges that a MAC-e PDU can be created based on priorities of data, Eckert primarily focuses on a technique for selecting packets from MAC-d priority queues based on percentage weight values that have been sent to the UE from a base station. Eckert, [0244] (“[T]he UTRAN uses an RRC message 500, as shown by way of example in FIG. 5, to signal to the mobile radio terminal 118 the weighting of the individual priority queues 306.”). The UE selects packets from MAC-d queues in proportion to the percentage weight values. *See, e.g.*, Eckert, [0131] or [0280] (“[T]he data packets buffer-stored in the priority queue buffer storages are transmitted proportionally via the E-DCH transport channel 303 from the various priority queues 306 in line with their explicit weighting (i.e. the weighting values) and the selected transport format.”).

123. Bucknell presents alternatives for reading data from priority queues that involve dividing “a data packet, such as a MAC-e PDU” into at least two different portions with “different multiplexing rules to be used for the different portions” to beneficially avoid “starvation” of “low priority” queues, thus enabling **“flexible and efficient multiplexing of data packets,”** Bucknell, [0003]-[0006]. As explained in the analysis of limitation [1.8], Bucknell discloses a number of ways to fill two portions of a MAC-e PDU, *see* Bucknell, [0025]-[0031], as alternatives to Eckert’s queue weighting for selecting packets from queues, that a POSITA would have found advantageous and looked to, for the following reasons.

First, Bucknell's alternatives do not require sending weighting values from a base station to a UE, as is done in Eckert, *see* Eckert, [0244] (“[A]n RRC message...signal[s] to the mobile radio terminal 118 the weighting of the individual priority queues...and additionally the weighting bands within which the weighting of the priority queues 306 can be lowered and raised dynamically...”), thus beneficially achieving reducing control signaling overhead compared to Eckert's techniques. **Second**, Bucknell's methods reduce complexity compared to Eckert's use of queue weights by avoiding the use of calculations that involve selecting data from queues in exact proportion to weighting values. Eckert, [0280].

124. Using Bucknell's multiplexing scheme for the MAC-e subprotocol layer within the more complete set of protocol layers of Eckert's system would have involved the combination of prior art elements (multiplexing MAC-d flows into a MAC-e PDU according to Bucknell's teachings, in the UMTS protocol architecture of Eckert, which has a MAC-e protocol layer) according to known methods (applying the rules of Bucknell in Eckert, which likewise already has priority queues) to yield the predictable and beneficial result of using the information already existing in Eckert's user equipment to form protocol data units with data from multiple queues, while avoiding starvation of lower priority queues. In addition, it would have been obvious to try using Bucknell's multiplexing and packet formation techniques in Eckert's system because Eckert describes a system

that has the information (e.g., priorities associated with queues) needed for applying Bucknell's rules. Finally, use of Bucknell's multiplexing and packet formation techniques in place of Eckert's queue weighting represents simple substitution of one known element (Eckert's queue weighting) with another (Bucknell's multiplexing according to priority) to yield the predictable result of the implementation of Bucknell's MAC-e sublayer.

125. A POSITA would have had a reasonable expectation of success in implementing Bucknell's teachings regarding selecting packets from priority queues in a MAC layer within Eckert's MAC layer and overall protocol stack because both Eckert and Bucknell address a same issue of how to multiplex data packets from queues having different priorities for transmission in the Enhanced Uplink Data Channel (E-DCH). Eckert, [0015]; Bucknell, [0002]-[0004]. Thus, a POSITA would have expected for Bucknell's techniques for transmission in the E-DCH to work for the same E-DCH in Eckert.

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

126. Bucknell discloses or renders obvious limitation [1.9] in several ways.

127. As discussed in [1.8], each pass through the relevant set or subset of MAC-d queues 50 to select data for a given portion 90 or 95 is an example *iteration*, as recited in claim 1, and Bucknell's rules for selecting data for the different portions 90, 95 satisfy the requirements of each iteration recited in claim

1. For example, Bucknell examples (2) and (4) teach that the second portion 95 of a MAC-e PDU is first populated using data from a “subset of queues, excluding the highest priority queue” (*first iteration*), and, next, the first portion 90 can be populated using data from the highest priority queue. Bucknell, [0025]-[0027]. Bucknell also teaches that the highest priority can be assigned to the queue with the “most data,” *id.*, [0028] (the selection of the first portion 90 “**can be based on the amount of data in the respective queues, for example assigning highest priority to the queue with most data.**”), thereby disclosing or rendering obvious *in the second iteration, the selection of the data is based on buffered data for respective radio bearers*. In other words, the selection of data for the first portion 90 is based on priority, which in turn is based on the amount of buffered data, thereby making the selection of data for portion 90 based on the amount of buffered data (*based on buffered data for respective radio bearers*), thereby also disclosing or rendering obvious limitation [1.9].

128. In addition, in example (9), “**one or both selections for the first and second portions 90, 95 can be modified to take into account the length of queue, for example by preferentially selecting from queues exceeding a certain length.**” Bucknell, [0028]. In more detail, all queues exceeding a certain length may be identified and then ordered according to priority, with Bucknell’s examples (2) and (4) (as examples) applied to read data from those queues. Thus, in each

iteration of selecting data from queues, the queues may be serviced in an order according to both priority (data selection *based on the received parameters*, per [1.8]) and the queue length exceeding a certain length (data selection based on *buffered data*), thereby disclosing or rendering obvious limitation [1.9].

129. Bucknell describes additional ways that limitation [1.9] is disclosed, based on the teachings of examples 2 and 4 (discussed previously) in view of example 3, which recites:

3) As a variation on 2), if the resource available for the first portion 90 is not fully used, then the unused resource can be made available for the second portion 95.

Bucknell, [0027]. Combining example (3) with example (4) (linked via example (2)) to reverse the order of serving first portion 90 and second portion 95 yields the following procedure:

- a. Fill second portion 95 using a subset of the queues; (*first iteration*)
- b. Attempt to fill first portion 90 but first portion 90 not fully used;
- c. Fill remaining unused portion of first portion 90 using the same subset of queues from step (a),

where steps (b) and (c) together are an example of the *second iteration* and step (c) alone is also an example of the *second iteration*, which are other ways that Bucknell discloses or renders obvious limitation [1.9] (including if both priority and queue length are factored into determining queues to be serviced as discussed

above). Note that in this example, the *first iteration* and the *second iteration* of selecting data are sequentially performed using the same subset of queues, per steps (a) and (c) (the same *subset of the plurality of radio bearers* of limitation [1.8]). See *supra* analysis of limitation [1.8] for the motivation to combine Eckert and Bucknell.

[1.10] *cause the transmitter to transmit a signal including the selected data.*

130. Bucknell discloses or renders obvious limitation [1.10].

131. The MAC-e PDU (*selected data*) assembled by Bucknell, by multiplexing data from MAC-d queues in apparatus 300, is transmitted using Bucknell's transceiver 310 (*transmitter*):

The communication terminal 410 for **transmitting data comprises the apparatus for multiplexing 300 as described above with reference to FIG. 2 coupled to a transceiver 310 for transmitting data...**

Bucknell, [0032].

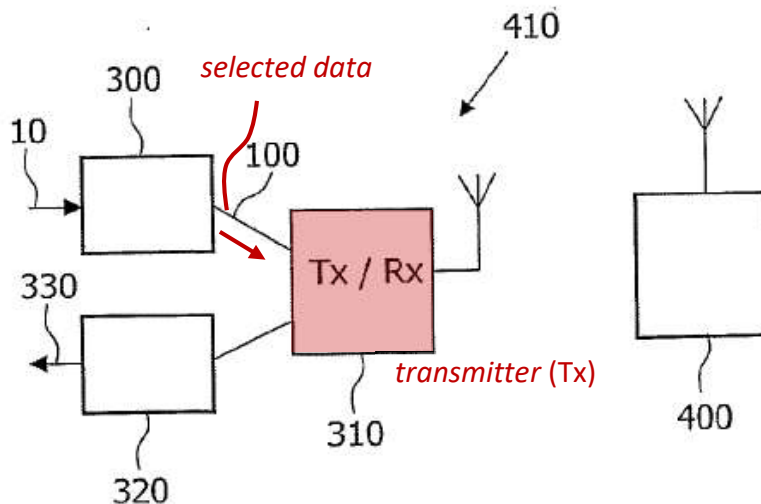


FIG. 4

Bucknell, Figure 4 (annotated)

132. Thus,, Bucknell discloses or renders obvious *cause the transmitter* (transceiver 310) *to transmit a signal including the selected data* (transmit MAC-e PDU assembled by multiplexing apparatus 300).

7. Claim 2

The UE of claim 1, [2.1] wherein the plurality of radio bearers are associated with a plurality of channels.

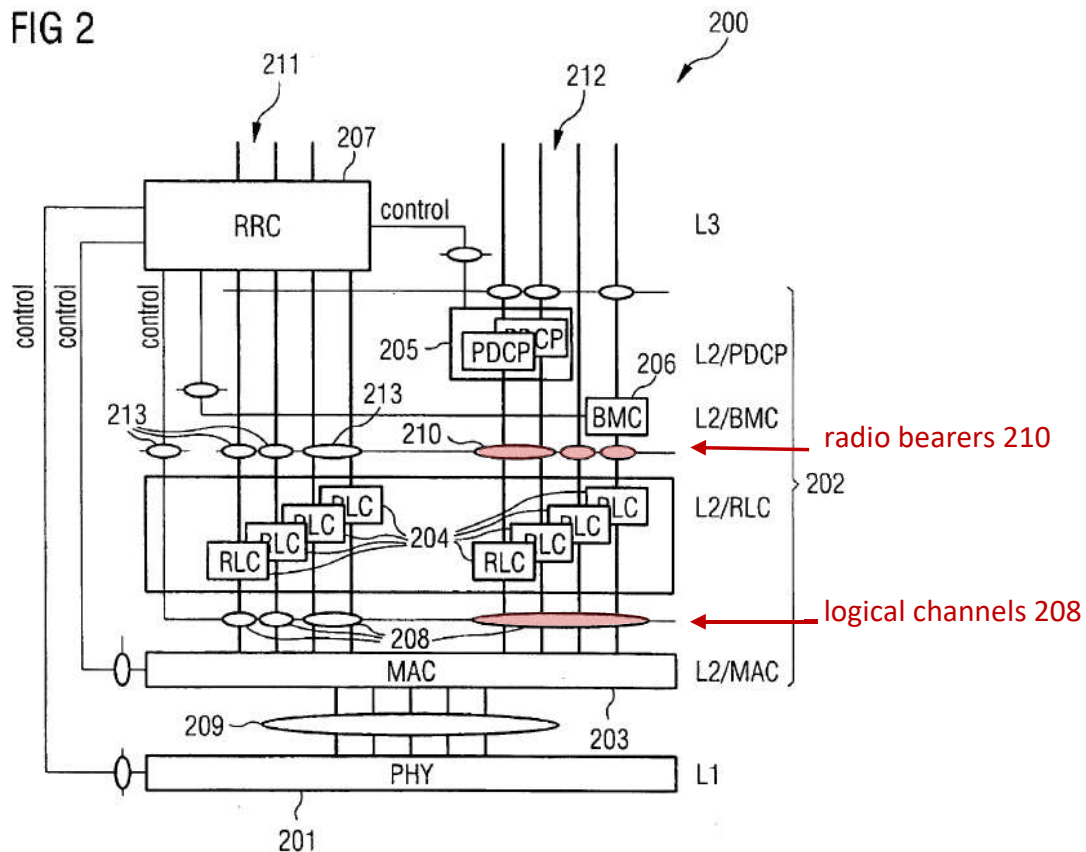
133. Eckert discloses or renders obvious limitation [2.1].

134. As explained in the analysis of limitation [1.3], Eckert describes the use of radio bearers to provide a service and describes a UE providing a plurality of services at the same time, thereby disclosing or rendering obvious a plurality of radio bearers. For example, there may be four different types of services (radio bearers) being provided in parallel. *See* Eckert, [0267]-[0268] (describing four

queues, one for each of the “four traffic classes ‘conversational’, ‘streaming’, ‘Interactive’ and ‘background’,” which may also represent the number of logical channels). Eckert, [0267]-[0268].

135. As also explained in the analysis of [1.3], referring to Figure 2, Eckert discloses that each radio bearer is associated with an “RLC entity.” Eckert, [0160] (“The RLC protocol layer 204 is modelled such that there is an independent RLC entity for each radio bearer...”). The RLC entity “split[s] or assemble[s] the useful data and ...from radio bearers ... into data packets,” which are then transferred “the MAC protocol layer 203 for further transport or for further processing.” Eckert, [0160]. **“The MAC protocol layer 203 ... provides ... the RLC protocol layer 204 with its or their services using logical channels 208 as service access points and these are used to characterize what type of file the transported data involve.”** Eckert, [0154]. Figure 2 is reproduced below, noting the radio bearers are labeled as 210, *id.*, [0156] (“...radio bearers (RB) 210...”) and logical channels 208, *id.*, [0155].

FIG 2



Eckert, Figure 2 (annotated)

136. Thus, Eckert discloses or renders obvious *the plurality of radio bearers* (a plurality of services provided by a plurality of radio bearers) *are associated with a plurality of channels* (services are provided using logical channels, each associated with a priority).

8. Claim 3

The UE of claim 1, [3.1] wherein each radio bearer of the plurality of radio bearers is associated with at least one data flow or IP flow.

137. Eckert discloses or renders obvious limitation [3.1] in multiple ways.

138. **First**, as explained in the analysis of limitation [1.7], each radio bearer

is associated with a “MAC-d flow,” thereby also disclosing that *each radio bearer of the plurality of radio bearers is associated with at least one data flow*.

139. **Second**, as discussed in the analysis of limitation [1.3], referring to Figure 2, Eckert discloses that “**the PDCP [packet data convergence protocol] protocol layer 205 and the BMC [broadcast/multicast control] protocol layer 206 are provided with their services by means of radio bearers (RB) 210 as service access points.**” Eckert, [0156].

140. Furthermore, also referring to Figure 2, there is one RLC entity per radio bearer, and the RLC layer transfers packets to the MAC layer. Eckert, [0160]. Figure 2 illustrates the “**protocol layers...implemented both in the mobile radio terminal 118 and in the UMTS base station 108, 109, 110, 111.**” Eckert, [0143]. As shown in Figure 2, and discussed above, there are multiple radio bearers and corresponding RLC entities and PDCP entities. Other prior art confirms this teaching. See Yi-2, [0118] (“[O]ne UE may have several RBs [radio bearers] and, in general, one RLC entity and one PDCP entity are used for one RB.”).

141. Thus, Eckert describes and illustrates multiple PDCP entities (*at least one [packet] data flow*) associated with multiple radio bearers, such that *each radio bearer of the plurality of radio bearers is associated with at least one data flow* (PDCP entity and its associated data service).

9. Claim 4

The UE of claim 2, [4.1] wherein the selected data is selected based on a priority or a Quality of Service (QoS).

142. Bucknell discloses or renders obvious limitation [4.1].

143. As discussed in the analysis of limitation [1.8], during Bucknell's *first iteration* of data selection, the MAC-e PDU is first populated using data from queues based on "priority." Bucknell, [0025]-[0027] ("the second portion 95 is populated by taking one data packet in turn from each of the subset of queues, excluding the highest priority queue"), thereby disclosing *the selected data is selected based on a priority*.

144. Further, Bucknell discloses the selected data is selected based *on a Quality of Service (QoS)*. For example, Bucknell teaches that "[s]ome examples are given below of how the data packets may be selected from the queues in the queue stores 50 to populate the group of data packets assembled in the first portion 90 and second portion 95 of the output buffer 80". Bucknell, [0025]. "10) The selection can be based on the QoS currently achieved for a particular data flow. For example, data can be preferentially selected from a queue where the average or worst case delay is exceeding a QoS requirement." Bucknell, [0028].

10. Claim 8

[8.0] A method performed by a user equipment (UE), the method comprising:

145. Claim 8 is a substantially similar method version of claim 1.

Limitation [8.0] is substantively similar to [1.0]. Therefore, the prior art renders obvious limitation [8.0] for the same reasons.

[8.1] *receiving, by the UE, parameters associated with a plurality of radio bearers;*

146. Limitation [8.1] is substantively similar to [1.3]. Therefore, the prior art renders obvious limitation [8.1] for the same reasons.

[8.2] *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;*

147. Limitation [8.2] is substantively the same as limitation [1.4], except that limitation [8.2] adds “*by a processor of the UE.*” As explained in the analysis of limitation [1.1] and [1.2], Bucknell discloses *a processor*, and it would have been obvious that Bucknell’s processor can be programmed or configured to perform various functions. Thus, Eckert discloses or renders obvious limitation [8.2] (in view of Bucknell’s teachings regarding *a processor*) for the same reasons as [1.4].

[8.3] *transmitting, by a transmitter of the UE, a message including the plurality of buffer occupancies to a network;*

148. Limitation [8.3] is substantively similar to limitation [1.5]. Therefore, the prior art renders obvious limitation [8.3] for the same reasons.

[8.4] *receiving, by the UE, a single allocation of uplink resources;*

149. Limitation [8.4] is substantively similar to limitation [1.6]. Therefore,

the prior art renders obvious limitation [8.4] for the same reasons.

[8.5] *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 iteration and a second iteration;*

150. Limitation [8.5] is substantively similar to limitation [1.7], except that limitation [8.5] adds “*by the processor.*” As explained in the analysis of limitation [1.1] and [1.2], Bucknell discloses *a processor*, and it would have been obvious that Bucknell’s processor can be programmed or configured to perform various functions. Thus, Eckert discloses or renders obvious limitation [8.5] (in view of Bucknell’s teachings regarding *a processor*) for the same reasons as [1.7].

[8.6] *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;*

151. Limitation [8.6] is substantively similar to limitation [1.8]. Therefore, the prior art renders obvious limitation [8.6] for the same reasons.

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

152. Limitation [8.7] is substantively similar to limitation [1.9]. Therefore, the prior art renders obvious limitation [8.7] for the same reasons.

[8.8] *transmitting, by the transmitter, a signal including the selected data.*

153. Limitation [8.8] is substantively similar to limitation [1.10]. Therefore, the prior art renders obvious limitation [8.8] for the same reasons.

11. Claim 9

The method of claim 8, [9.1] wherein the plurality of radio bearers are associated with a plurality of channels.

154. Limitation [9.1] is substantively similar to limitation [2.1]. Therefore, the prior art renders obvious limitation [9.1] for the same reasons.

12. Claim 10

The method of claim 8, [10.1] wherein each radio bearer of the plurality of radio bearers is associated with at least one data flow or IP flow.

155. Limitation [10.1] is substantively similar to limitation [3.1]. Therefore, the prior art renders obvious limitation [10.1] for the same reasons.

13. Claim 11

The method of claim 8, [11.1] wherein the selected data is selected based on a priority or a Quality of Service (QoS).

156. Limitation [11.1] is substantively similar to limitation [4.1]. Therefore, the prior art renders obvious limitation [11.1] for the same reasons.

B. Ground 2: Claims 5 and 12 are obvious over Eckert in view of Bucknell, Lohr-1, and Hans

1. Summary of Hans

157. Hans is directed to a conventional set of protocol layers in a UMTS system. Hans, 3:6-14 (The wireless network “is operated according to the UMTS standard,” and “[t]he functionalities of the UMTS mobile wireless system may be divided into layers.”). Hans explains that “UMTS-specific protocols may lie underneath network layer.” Hans, 3:58-59. Hans presents details about its network

layer and provision of data services that parameters about the quality of service of a data service are “referred to as a PDP [packet data protocol] context.” Hans, 3:51-67. A PDP context is important for informing layers below the network layer how to handle data as part of a service. Hans, 4:19-23.

2. Reasons to combine Eckert and Hans

158. For the reasons set forth below, a POSITA would have been motivated to combine the teachings of Eckert and Hans.

a) Analogous art

159. Hans is analogous art to the '138 patent at least because Hans pertains to the same field of endeavor as the '138 patent, namely, wireless, cellular communication systems, such UMTS systems. Ex.1001, 1:23-28, 2:5-67.

160. Hans is also analogous art to the '138 patent because Hans is reasonably pertinent to the same problem faced by the inventor of the '138 patent of how “to provide an improved mechanism to differentiate between IP data flows.” Ex.1001, 3:17-18. Hans is pertinent to this problem because Hans is concerned with “suggest[ing] functionalities within a convergence protocol layer” in a “mobile wireless system according to the UMTS standard,” such as the “PDCP (Packet Data Convergence Protocol)” layer within UMTS. Hans, 2:66-3:11. Hans further explains that the PDCP “tailors the user data which comes from the PDP context for transmission via an air interface,” Hans, 4:19-28, where a “PDP

context” refers to data reflecting “parameters about quality of service QoS” for packet data services, *id.*, 3:59-65. Thus, Hans is also concerned with packet data flows in UMTS systems.

b) Motivation to combine Eckert with Hans

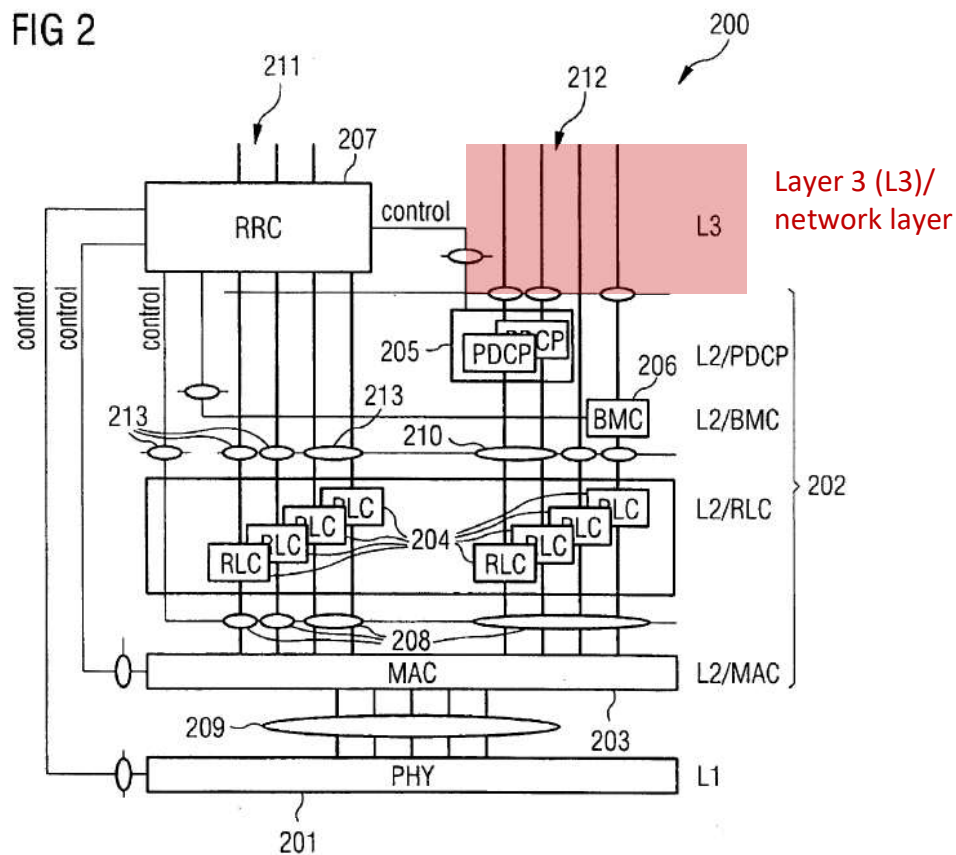
161. A POSITA seeking to implement Eckert’s teachings in a UMTS network would have been motivated to implement a complete network protocol stack for providing applications in Eckert’s UE, and Hans provides implementation detail for the network layer in the protocols stack in a UMTS system that is missing from Eckert. Applying the standard UMTS network stack in Eckert’s UMTS system is nothing more than the predictable use of prior art elements according to their established functions.

162. In more detail, Eckert describes the various protocol layers, explaining that (referring to Figure 2):

The topmost layer of the UMTS air interface Uu is the mobile radio network layer (protocol layer 3 on the basis of the OSI reference model), having the mobile radio resource control unit 207 (Radio Resource Control protocol layer, RRC protocol layer).

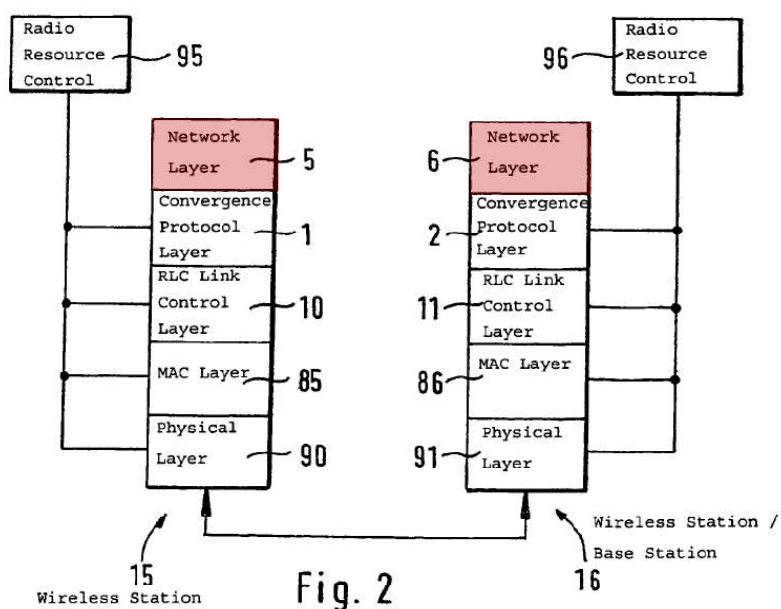
Eckert, [0147]. “Layer 3” is denoted by “L3” in Figure 2 below, focusing on the “user plane” 212 which is responsible for data transmission. Eckert, [0151].

FIG 2



Eckert, Figure 2 (annotated)

Hans illustrates the same protocol stack at both a “mobile station” and a “base station” as in Eckert Figure 2, but at a higher level of abstraction and broader scope than Figure 2. Hans, 3:12-51.



Hans, Figure 2 (annotated)

163. Hans explains that “UMTS-specific protocols may lie underneath network layer 5, 6,” Hans, 3:58-59, where the “[t]he convergence protocol used according to the UMTS standard is referred to in this case as PDCP (Packet Data Convergence Protocol),” *id.*, 3:9-11, which is also presented in Eckert (*see, e.g.*, layer labeled “L2/PDCP” in Eckert’s Figure 2 above). The “network protocols” of “network layer 5,6” are “referred to as PDP (Packet Data Protocol),” and data about each PDP, such as “parameters about quality of service QOS [] is referred to as **PDP context**.” Hans, 3:51-67. A PDP context is important for informing the PDCP layer how to handle data as part of a service. Hans, 4:19-23 (“The PDCP... tailors the user data which comes from a PDP context for transmission via an air interface...”).

164. Hans provides further information on the relationship between a radio bearer, PDCP entities (part of the described “convergence protocol layer 1, 2”), and a PDP context of the network layer 5, 6:

A data carrier, which may also be referred to as a radio bearer or RB, and which provides RLC link control layer 10, 11 lying underneath convergence protocol layer 1, 2, is then used for the transmission of any of the multiplexed packet data streams from various PDP contexts 21, 22.

Hans, 4:42-46. Figure 3 of Hans provides a broad scope illustration of various protocol layers and entities within those layers, such as a PDP context within the network layer, a PDCP protocol entity within the convergence protocol layer, a carrier, also known as a radio bearer, and the RLC layer (see above Hans, 4:42-46):

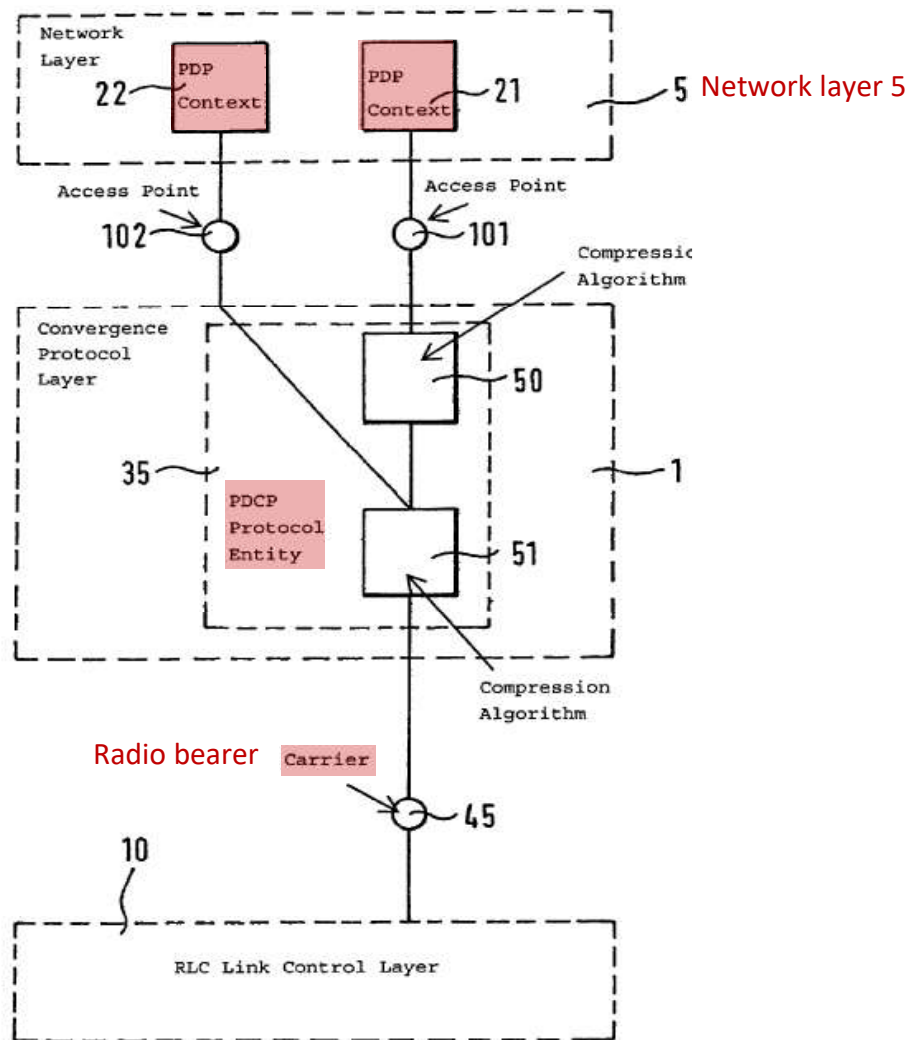


Fig. 3

Hans, Figure 3 (annotated)

165. Thus, Hans beneficially provides further detail about how the network layer (Layer 3 or L3) in Eckert would have been implemented and connected to the PDCP entities in the convergence protocol layer of Layer 2.

166. Providing further detail about the network layer in the Eckert-Bucknell-Lohr-1 system would have involved combining prior art elements (a

conventional network layer 3 residing above UMTS layers 1 and 2) according to known methods (using a network layer to help provide data services) to yield the predictable result of a UE that is configured to provide or support data services. It would also have been obvious to try implementing Hans' teachings regarding PDP contexts to provide a quality of service to a convergence protocol layer having PDCP entities because the Eckert-Bucknell-Lohr-1 protocol stack (illustrated in Figure 2 of Eckert) already uses PDCP entities and is connected to a network layer (Layer 3).

c) Reasonable expectation of success

167. A POSITA would have had a reasonable expectation of success in using Hans' teachings regarding its network layer provided as a layer on top of UMTS-specific protocol layers, such as Eckert's UMTS protocol layers, because Eckert indicates use of a network layer (layer 3) above the same UMTS layers as shown in Hans, albeit with less detail about the network layer than Hans. Hans describes a PDP context in the network layer as important for informing the PDCP, as disclosed in both Hans and Eckert, about how to handle data as part of a service. Hans, 4:19-23. Thus, a POSITA would have had a reasonable expectation of success in providing Eckert's services using Hans' PDP contexts.

3. Claim 5

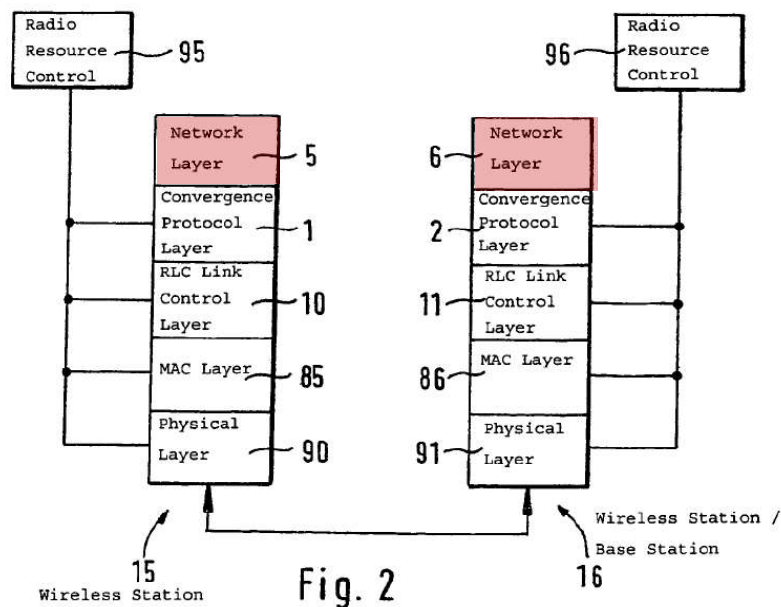
The UE of claim 1, [5.1] wherein the plurality of radio bearers are associated with at least one packet data protocol (PDP) context.

168. Eckert in view of Hans renders obvious limitation [5.1].

169. As explained in the analysis of limitation [1.3], Eckert explains that a service is provided by a radio bearer, and a UE may maintain a plurality of services, provided by a plurality of radio bearers (*plurality of radio bearers*).

170. Eckert describes the various protocol layers, explaining that (referring to Figure 2) “[t]he topmost layer of the UMTS air interface Uu is the mobile radio network layer (protocol layer 3 on the basis of the OSI reference model).” Eckert, [0147]. Eckert provides no further information about the network layer. A POSITA seeking to implement Eckert’s teachings in a UMTS network would have been motivated to learn implementation detail for a network layer in UMTS networks. Hans provides such detail. Reasons to combine Eckert and Hans are provided *supra* Section VII.B.2.

171. Hans’ Figure 2 illustrates a network layer in a protocol stack at both a “mobile station” (network layer 5) and a “base station” (network layer 6). Hans, 3:12-51.



Hans, Figure 2

172. “The convergence protocol used according to the UMTS standard is referred to in this case as PDCP (Packet Data Convergence Protocol).” Hans, 3:9-11. The network protocols are associated a “PDP context,” which may “contain parameters about quality of service QOS” of a “data link.” Hans, 3:51-67. A PDP context is important for informing the PDCP layer how to handle data as part of a service. Hans, 4:19-23 (“The PDCP... tailors the user data which comes from a PDP context for transmission via an air interface...”).

173. Hans provides further information on the relationship between a radio bearer, PDCP entities (part of the described “convergence protocol layer 1, 2”), and a PDP context of the network layer 5, 6, Hans, 4:42-46, illustrating the relationships in Figure 3, such as a PDP context within the network layer 5, a

PDCP protocol entity within the convergence protocol layer 1, and “carrier”/“radio bearer,” *id.*

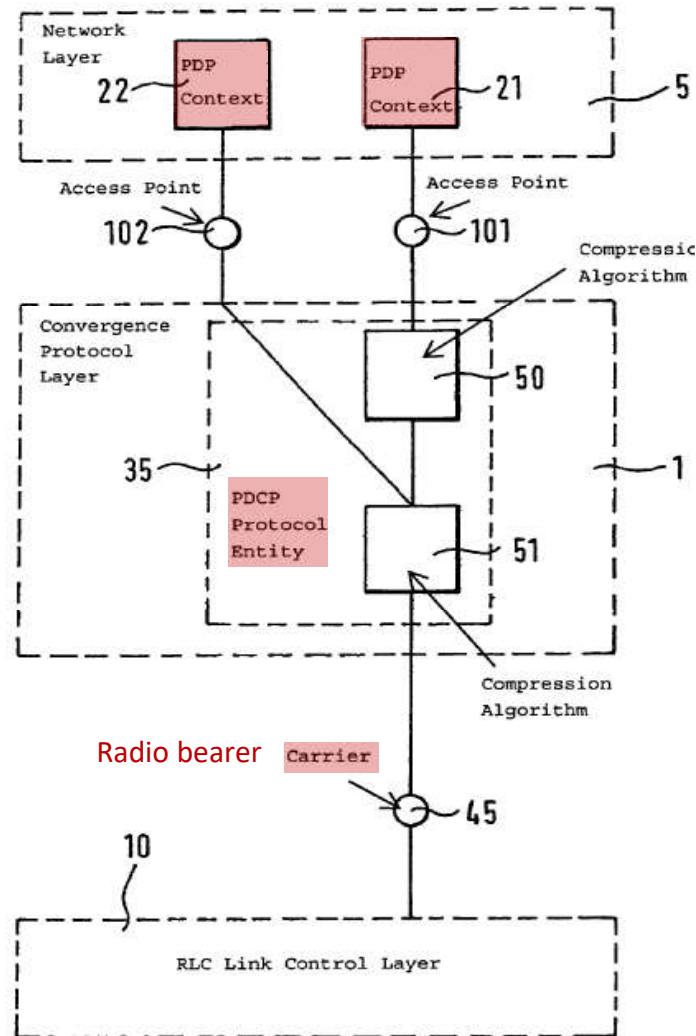


Fig. 3

Hans, Figure 3 (annotated)

174. The network has the flexibility to use one PDP context per PDCP protocol entity or multiple PDP contexts per PDCP protocol entity, and one PDCP protocol entity per radio bearer, such that each PDP context is associated with a

radio bearer (via a PDCP protocol entity):

Multiple PDP contexts 21, 22 may be connected to one PDCP protocol entity 35; however, one PDP context 21, 22 may only be connected to one PDCP protocol entity 35. Each PDCP protocol entity 35 uses one carrier 45, which may also be referred to as a radio bearer.

Hans, 4:49-58.

175. Thus, Eckert in view of Hans renders obvious *the plurality of radio bearers* (Eckert's plurality of radio bearers) *are associated with at least one packet data protocol (PDP) context* (per Hans' teachings, each PDP context is associated with at least one radio bearer via a PDCP entity).

4. Claim 12

The method of claim 8, [12.1] wherein the plurality of radio bearers are associated with at least one packet data protocol (PDP) context.

176. Limitation [12.1] is substantially similar to limitation [5.1]. Therefore, the prior discloses or renders obvious limitation [12.1] for the same reasons.

C. Ground 3: Claims 6 and 13 are obvious over Eckert in view of Bucknell, Lohr-1, and Lohr-2

1. Summary of Lohr-2

177. Lohr-2 relates to a UMTS system that employs data transmitted in the E-DCH channel. Lohr-2, [0157]. In this context, Lohr-2 describes a channel, known as an "Enhanced Absolute Grant Channel" E-AGCH, as a physical channel, Lohr-2, [0038], and a shared channel, *id.*, [0110], that provides scheduling

information for the E-DCH from a scheduler in the network, *id.*, [0041].

2. Reasons to combine Eckert, Bucknell, Lohr-1, and Lohr-2

178. For the reasons set forth below, a POSITA would have been motivated to combine the teachings of Eckert, Bucknell, and Lohr-2.

a) Analogous art

179. Lohr-2 is analogous prior art to the '138 patent at least because Lohr-2 pertains to the same field of endeavor as the '138 patent, namely, wireless, cellular communication systems, such UMTS systems. Ex.1001, 1:23-28, 2:5-67; Lohr-2, [0154] (“most of the embodiments are outlined in relation to a UMTS communication system and the terminology used in the subsequent sections mainly relates to the UMTS terminology.”).

180. Lohr-2 is also analogous art to the '138 patent because Lohr-2 is reasonably pertinent to a same problem faced by the inventor of the '138 patent of how “to provide an improved mechanism to differentiate between IP data flows.” Ex.1001, 3:17-18. Lohr-2 relates to this problem because Lohr-2 is concerned with adapting how uplink data transmissions and associated resources are scheduled and granted (e.g., on “the absolute grant channel” (E-AGCH)) to prevent an “overload situation in neighboring cells” during handover. Lohr-2, [0156]-[0160]; [0089] (“[S]cheduling decisions” are “reflected in the...absolute grant.”). Scheduling data transmissions and allocated resources to those transmissions provides for data

flows, such as those in the '138 patent.

b) Motivation to Combine Eckert-Bucknell-Lohr-1 with Lohr-2

181. A POSITA seeking to implement the combined teachings of Eckert-Bucknell-Lohr-1 in a UMTS network would have been motivated to specify implementation detail missing from Eckert, Bucknell, and Lohr-1 regarding how a UE knows when or how much E-DCH resources to use. Lohr-2 provides details regarding how E-DCH resources are scheduled, and Lohr-2 is in the same context as Eckert and Bucknell – a UMTS communication system that employ an E-DCH channel. Lohr-2, [0154], [0157]. Applying these UMTS teachings is nothing more than the predictable use of prior art elements according to their established functions.

182. Lohr-2 explains that the “MAC-e/es handles the E-DCH specific functions,” and “[t]he MAC-e/es entity receives scheduling information from Node B (network side) via Layer 1 signaling as shown in FIG. 6,” such as “[a]bsolute grants [] received on E-AGCH (Enhanced Absolute Grant Channel).” Lohr-2, [0038]. Implementing Lohr-2’s E-AGCH for UMTS in the UMTS network of Eckert-Bucknell-Lohr-1 is nothing more than combining prior art elements (Lohr-1’s E-AGCH) according to known methods (use of a channel in UMTS) to yield the predictable result of implementing the E-AGCH in a UMTS system as it was intended.

c) Reasonable expectation of success

183. A POSITA would have had a reasonable expectation of success in using Lohr-2's Enhanced Absolute Grant Channel (E-AGCH) in the UMTS system of Eckert, Bucknell, and Lohr-1 because Lohr-2's E-AGCH is described in the context of use in a UMTS system, Lohr-2, [0154] ("most of the embodiments are outlined in relation to a UMTS communication system"); which is the same context as Eckert, Bucknell, and Lohr-1, *see* Eckert, [0112]-[0113], [0167], Bucknell, [0001], and Lohr-1, 4:19-26, 1:16-20, respectively.

3. Claim 6

The UE of claim 1, [6.1] wherein the single allocation of uplink resources is received on a physical shared channel from a scheduler in the network.

184. Lohr-2 discloses or renders obvious limitation [6.1].

185. As explained in the analysis of limitation [1.6], an allocated E-DCH channel is an example of *a single allocation of uplink resources*. As explained below, Lohr-2 describes an "Enhanced Absolute Grant Channel" E-AGCH as a physical channel and a shared channel that provides scheduling information for the E-DCH from a scheduler in the network.

186. Lohr-2 explains that the "MAC-e/es handles the E-DCH specific functions," and "[t]he MAC-e/es entity receives **scheduling information** from **Node B (network side) via Layer 1 signaling** as shown in FIG. 6," such as "[a]bsolute grants [] received on E-AGCH (Enhanced Absolute Grant

Channel).” Lohr-2, [0038]. “Layer 1” is a reference to the physical layer, *see* Eckert, [0145] (“the physical layer PHY 201, which represents the protocol layer 1...”), so E-AGCH, which provides “Layer 1” signaling, is a physical layer channel. The “Layer 1” signaling, including the E-AGCH, is illustrated in Figure 6, below. Therefore, the E-AGCH is a *physical* [] *channel*.

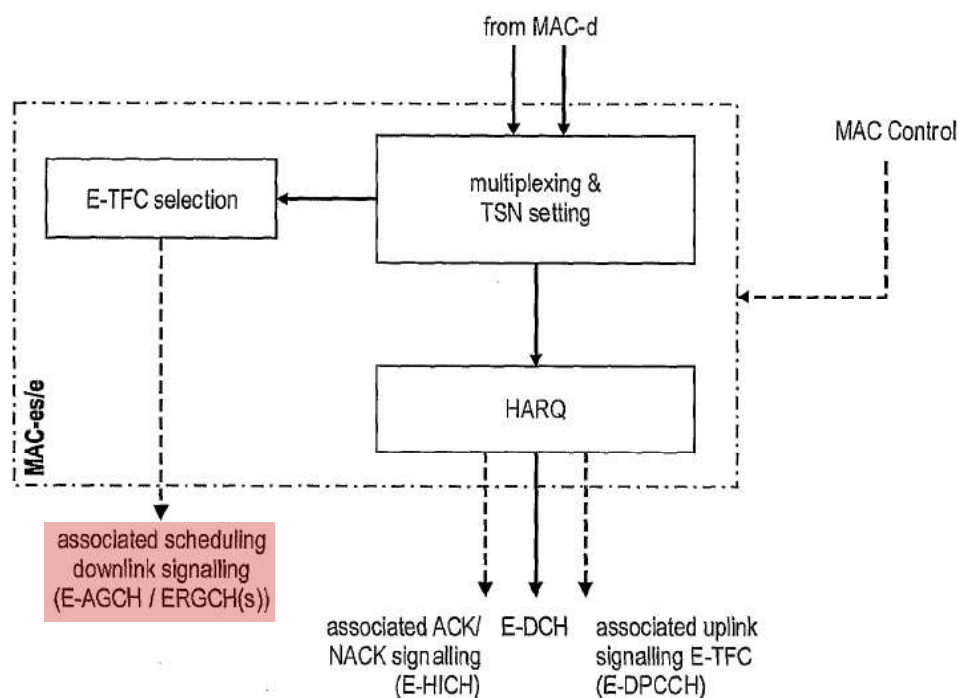


Fig. 6

Lohr-2, Figure 6 (annotated)

187. Lohr-2 also describes the E-AGCH (enhanced absolute grant channel) as a *shared* channel. Lohr-2, [0110] (referring to the “absolute grant channel” as “shared”). Thus, the E-AGCH is a *physical shared channel*.

188. As explained in the analysis of limitation [1.6], an allocated E-DCH

channel (that combines multiple MAC-d flows) is an example of *a single allocation of uplink resources*. The E-DCH scheduler (*scheduler*) manages E-DCH cell resources, and the E-DCH scheduler is in a Node B, or base station (*in the network*): “There is ... **one E-DCH scheduler function in the Node-B for all UEs. ...**” Lohr-2, [0041]; [0028] (“Node Bs” and “base stations” are synonymous). Thus, a NodeB, which includes a E-DCH scheduler, provides “absolute grants.” Lohr-2, [0051]-[0052].

189. Thus, Lohr-2 discloses *the single allocation of uplink resources* (E-DCH resources) *is received on a physical shared channel* (E-AGCH (Enhanced Absolute Grant Channel), which is a physical channel that is shared) *from a scheduler in the network* (from an “E-DCH scheduler” in a base station).

4. Claim 13

The method of claim 8, [13.1] wherein the single allocation of uplink resources is received on a physical shared channel from a scheduler in the network.

190. Limitation [13.1] is substantively similar to limitation [6.1]. Therefore, the prior art renders obvious limitation [13.1] for the same reasons.

VIII. CONCLUSION

191. This declaration and my opinions herein are made to the best of my knowledge and understanding, and based on the material available to me, at the time of signing this declaration. I declare that all statements made herein on my own knowledge are true and that all statements made on information and belief are believed to be true, and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 or Title 18 of the United States Code.

Date: December 31, 2024



Digitally signed by Zhi Ding
Date: 2024.12.31 09:56:48 -08'00'

Zhi Ding