

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TESLA, INC.,
Petitioner,

v.

INTELLECTUAL VENTURES II LLC,
Patent Owner.

Case IPR2025-00220

U.S. Patent No. 11,206,670

**DECLARATION OF GARY R. LOMP, PH.D. IN SUPPORT OF PATENT
OWNER'S RESPONSE**

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I. INTRODUCTION

1. My name is Gary R. Lomp. I am an expert in mobile telecommunications and wireless technology. I have been retained as an expert witness to provide my independent opinion regarding certain matters at issue in *inter partes* review of U.S. Patent No. 11,206,670 (“the ‘670 patent”) in IPR2025-00220. I have been retained by Intellectual Ventures II LLC, the Patent Owner in the above proceedings. The Petitioner is Tesla, Inc. (hereinafter “Petitioner”).

2. For my work on this case, I am being compensated for my time at my normal consulting rate. I am also being reimbursed for expenses that I incur during the course of this work. My compensation does not depend on the substance of my opinions or the outcome of any issues in this case.

3. My analysis of the materials produced in this matter is ongoing and I will continue to review any new material as it is provided. This declaration represents only those opinions I have formed to date. I reserve the right to amend or supplement my opinions based on additional documents or evidence I am presented, including without limitation any arguments or expert declarations advanced by Petitioner in this case.

4. I am not a legal expert and offer no opinions on the law. However, I have been informed by counsel of the various legal standards that apply, and I have applied those standards in arriving at my conclusions.

II. QUALIFICATIONS

5. Based on my qualifications, education, knowledge, expertise, experience, and work background, I believe I am qualified to offer opinions relating to the technology described in the '670 Patent. Exhibit 2011 is a copy of my current curriculum vitae ("CV"), detailing my education and experience. Additionally, the following overview of my background pertains to my qualifications for providing expert testimony in this matter.

6. I am currently an Adjunct Professor in Wireless Communications at the NYU Tandon School of Engineering and President of TekTactiks, a research and expert consulting company. My job duties include directing and performing research in, and technical evaluation of, advanced communication system design, especially new cellular technologies. I have over 45 years of experience in the field of wireless telecommunications, including advanced military communications systems, commercial satellite, WiFi and cellular systems research and development. I have over 20 years of experience in providing expert services in the field of wireless telecommunications. I hold Ph.D., Master's and Bachelor's degrees in Electrical Engineering, all from the Polytechnic Institute of New York (now part of NYU Tandon School of Engineering).

7. I am a named inventor on over 100 issued U.S. Patents in the field of wireless telecommunications. Most of these patents pertain to wireless

communication, including communication system architecture, communication system signal processing and communication system protocols.

8. In addition to my technical experience in the field of wireless communications systems, I have been a principal and executive in multiple wireless technology corporations. In the late 1980s and early 1990s, I was Vice President and Chief Scientist at SCS Mobilecom, a wireless company that developed new technology based on spread spectrum technologies and advanced signal processing (DSP) techniques. Following the acquisition of SCS Mobilecom by InterDigital Communications, Corporation in 1992, I held various leadership roles at InterDigital, including General Manager of the Wireless Products Business Unit and Executive Vice President and Chief Technology Officer, where I helped develop 2G and 3G technologies. After InterDigital, I served in leadership positions at several wireless startups, including Symbol Technologies (where I led the Wide Area Wireless technology division), LayerOne Wireless Technologies Inc. (where I served as CEO) and incNetworks (where I served as CTO). I am also the Founder and President of The TekTacktics Group, Inc., a private company that has provided expert services and telecommunications consulting in the Telecommunications industry for the past 15 years.

9. In terms of commercial research and development (R&D) experience, I have worked extensively on the design and optimization of radio frequency (RF)

communications systems for enhanced capacity and service coverage. A further object of my work has been to realize systems that are “converged” or are ingredients in a converged network concept. Convergence means the technical integration of heterogeneous services (such as voice, data, and multimedia) and heterogeneous radio technologies (macrocellular, microcellular, WiFi, cordless phone) into a seamless operating unit. This work requires cross functional design in which the respective heterogeneous technologies are made to interoperate.

10. During this career activity, I have had first-hand knowledge and exposure to numerous discussions and debates in support of the advancement of new wireless technologies and paradigms. These new technologies addressed various air interface methods, including orthogonal frequency division multiplexing (OFDM) and Orthogonal Frequency Division Multiple Access (OFDMA), a closely related method of utilizing the OFDM format to provide shared access. My current research includes the presently evolving 5G cellular concept, which incorporates, among other things, MIMO-OFDM/OFDMA processing. As outlined above, my involvement in wireless R&D has also drawn me to fundamental system architecture issues and philosophies including the functional portioning of the overall wireless network. I have had the benefit of collaboration and debate with numerous top tier innovators, from many industry-leading organizations in the field. In particular, I have detailed knowledge and recollection of the atmosphere surrounding the

ongoing wireless technology revolution that began in the late 1980s and continues to the present day, including the period surrounding the present invention, and also including attempts by interested parties across the globe to promulgate and protect preferred ideas and intellectual property.

11. With respect to the technologies relevant to the '670 Patent, my experience includes over 35 years of research and development in the area of cellular telephone technology and systems, beginning at the very start of the commercialization of previously classified spread spectrum techniques, with which I had also a decade of prior experience. During that period of my career I had roles ranging from Senior Member of Technical Staff and Senior Principal Engineer to Chief Scientist and Chief Technology Officer heading a team of over 100 engineers in the development of the earliest WCDMA prototypes. Later I founded a small consulting business engaged in the conduct of basic research in radio Communications, which I have practiced for 20 years. As the wireless technology landscape evolved, I performed basic research in the optimization of OFDM-based systems, MIMO (Multiple Input Multiple Output) Systems, and MUD (Multi-User Detection)-based Systems. I am a named inventor on over 100 US Patents pertaining to wireless systems.

12. To place the experience that I have in the context of innovation and invention, I have been involved throughout my career in the evolution of many other

basic radio communication technologies since their inception, such as MIMO, Multiuser Detection, and FEC coding advances such as Turbo and LDPC, and soft output decoders such as the Soft Output Viterbi Algorithm (SOVA). A significant portion of the engineering design work I have performed has entailed the introduction of new techniques to provide capabilities that had not existed previously, such as a recently deployed novel baseband processor capable of robust demodulation and combining of signal components received on two antennas, respectively, at very low signal to noise ratios. Most recently, I have designed an advanced form of OFDM in which the impairments of channel dispersion are mitigated in both the time domain (as in conventional OFDM) and the frequency domain (which is an Achilles heel of OFDM). This achievement is the result of many years of perseverance culminating in the discovery of a mathematical tool of broad applicability (to wit, Simultaneous Approximate Singular Value Decomposition). Previously, a similar tenacity-fueled accomplishment produced the first and only complete closed-form theory of equalization of offset modulation formats in multipath channels, again a result of a persistent creative attack on the problem. In a word, I am well versed and well aware of the nuances of innovation and the toils of invention.

13. My CV contains further details on my education, experience, publications, and other qualifications to render an expert opinion in this case. Ex. 2011.

III. MATERIALS CONSIDERED

14. In the course of conducting my analysis and forming my opinions, I have reviewed materials including those listed below:

- i. U.S. Patent No. 11,206,670 (“the ‘670 patent” or Ex 1001);
- ii. The prosecution history of the ‘670 patent Ex. 1002;
- iii. The Declaration signed by Dr. Zhi Ding in IPR2025-00220 (the “Ding Declaration” or Ex. 1003);
- iv. US Patent Application 2012/ 0327895 (“Wallen” or Ex. 1005)
- v. Provisional Patent Application to Wallen (“Wallen-Prov” or Ex. 1006)
- vi. US Patent Application 2011/026947 to (“Berggren” or Ex. 1007)
- vii. IV’s Preliminary Infringement Contentions for the ‘670 Patent Ex. 1013
- viii. *LTE – The UMTS Long Term Evolution From Theory to Practice Second Edition* John Wiley & Sons Ltd. (2011) Ex. 2009;
- ix. The exhibits and other documents cited herein.

IV. LEGAL STANDARDS

15. I am not a lawyer, and I do not intend to offer any opinions as to the interpretation of the law. When considering the '670 patent and stating my opinions, I rely on the following legal standards as described to me by the attorneys for Intellectual Ventures.

A. Priority Date of a Patent

16. I understand that the analysis of alleged obviousness of the Patent should be performed from the perspective of a person of ordinary skill in the art ("POSITA") as of the priority date of the Patent. The Patent claims priority to January 20, 2012. My opinions in this matter are from the perspective of a POSITA as of that date; however, my opinions do not change if the priority date is slightly changed.

B. Level of Ordinary Skill in The Art

17. My opinions in this declaration are based on the understandings of a person of ordinary skill in the art as of the time of the invention. I understand that the POSITA is a hypothetical person who is presumed to have known the relevant art at the time of the invention. By "relevant," I mean relevant to the challenged claims of the '670 patent.

18. I understand that various factors should be considered when determining the POSITA in connection with a particular patent. I understand that

these factors include, without limitation, the type of problems encountered in the art, the prior solutions to those problems found in the prior art references, the rapidity with which innovations are made, the sophistication of the technology, the level of education of active workers in the field, and my own experience working with those of skill in the art at the time of the invention.

19. Dr. Ding opines that a POSITA “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.” Ex. 1003 at ¶ 20. For the purpose of this declaration, I will apply the same definition of the level of skill of a POSITA.

20. Based on my experience, education, and training, I met the definition of a POSITA as of the priority date of the Patent. My qualifications at that time far exceeded that of a POSITA, and I had worked with, as well as supervised, many POSITA’s throughout my work in the field. My opinions concerning the ‘670 patent claims and the prior art are from the perspective of a POSITA, as set forth above.

21. As further discussed below, my opinions as stated in this declaration are valid even if the Board adopts a slightly different level of ordinary skill in the art.

C. Claim Construction

22. I understand that claims in a patent-at-issue in an IPR are generally interpreted according to the district court-type claim construction.

23. I further understand that this means that claim terms are interpreted as they would have been interpreted by a person of ordinary skill in the art at the time of the invention, in light of the specification and the patent's prosecution history in the patent office.

D. Obviousness Legal Standard

24. I understand that a patent claim is unpatentable if the claimed invention would have been obvious to a person of ordinary skill in the art at the time of the invention.

25. I understand that an obviousness analysis involves comparing a claim to the prior art to determine whether the claimed invention would have been obvious to a person of ordinary skill in the art at the time of the invention in view of the prior art and in light of the general knowledge in the art as a whole. I also understand that obviousness is ultimately a legal conclusion based on underlying facts of four general types, all of which must be considered: (1) the scope and content of the prior art; (2) the level of ordinary skill in the art; (3) the differences between the claimed invention and the prior art; and (4) any objective indicia of non-obviousness, including any praise of the invention. Objective indicia of non-obviousness may

include, for example, commercial success of an embodiment, a long-felt need, skepticism, failure by others to find the solution provided by the claimed invention, copying by others of the subject matter of the claimed invention, unexpected results of the claimed invention, acceptance of others and industry praise, and licensing of the patents.

26. I also understand that obviousness may be established under certain circumstances by combining or modifying the teachings of the prior art. However, I have been informed that a claim is not proved obvious merely by demonstrating that each of the elements was independently known in the prior art. I have been informed that many, if not all, inventions rely on building blocks already previously known, and claimed discoveries almost of necessity will likely be combinations of what is already known. I have been informed that it is important to identify whether a reason existed at the time of the invention that would have motivated a person of ordinary skill in the art in the relevant field to combine the known elements in the way the claimed invention does. Specific teachings, suggestions, or motivations to combine any first prior art reference with a second prior art reference can be explicit or implicit, but must have existed before the date of purported invention. I understand that prior art references themselves may be one source of a specific teaching or suggestion to combine features of the prior art, but that such suggestions

or motivations to combine art may come from the knowledge that a person of ordinary skill in the art would have had.

27. I understand that a reference may be relied upon for all that it teaches, including uses beyond its primary purpose, but also including teachings that lead away from the invention. I understand that a reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, although the mere disclosure of alternative designs does not teach away.

28. I further understand that whether there is a reasonable expectation of success in combining references in a particular way is also relevant to the analysis.

29. I understand that it is improper to use hindsight to combine references or elements of references to reconstruct the invention using the claims as a guide. My analysis of the prior art is made from the perspective of a person of ordinary skill in the art at the time of the invention.

30. I am not offering any legal opinions in this declaration nor am I qualified to do so. I only consider such legal standards in framing my opinions and conclusions as well as placing assertions made by Petitioners in the Petition into the proper context. Additionally, from a subject matter perspective, I understand that the petitioner always has the burden of persuasion regarding a challenge of patentability of an invention under an *inter partes* review.

V. RELEVANT TECHNOLOGY BACKGROUND

31. In 4G and 5G cellular networks communication is organized in terms of orthogonal frequency-division multiplexing (OFDM) symbols. In other words, physical layer transmissions use OFDM symbols. Every OFDM symbol occupies a certain location in the time-frequency plane. OFDM symbols in the frequency domain have many subcarriers, which can also be called “resource elements.” The allocation of resource elements in response to user communication requirements is central to the multiple access functionality. In this context, the term OFDMA (Orthogonal Frequency Division Multiple Access) is also used. See Ex. 2009 pp. 3,14,25,123-143, 145-147 and 193-195,204,205. 5G networks are advanced further, relative to LTE Networks, but they are based on the same OFDM/OFDMA technology and principles explained in Ex. 2009.

32. Before exchanging data and voice with the cellular network a terminal device¹ must find a Base Station (BS, also eNodeB or eNB in LTE) and connect to it. Generally, this happens upon power-up. The cell search procedure begins with receiving the Primary Synchronization Signals (PSS) and the Secondary Synchronization Signals (SSS). The PSS and the SSS are transmitted twice per 10 ms radio frame. They provide information such as the physical ID of the cell,

¹ In the prior art a terminal device can be called a mobile device, UE, or simply a mobile phone. A terminal device in the context of the ‘670 patent can be Machine-Type Communications (MTC) device or a non-MTC type device.

information whether FDD or TDD is used, and the cyclic prefix (CP) length. See Ex. 2009, pp. 194-196. The synchronization signals help the UE to acquire frame, subframe and symbol timing.

33. The bandwidth of an LTE cell is configurable between approximately 1.4, 3, 5, 10, or 20 MHz, and unknown in advance. The PSS and SSS are transmitted in the central six Resource Blocks (RBs, with one Resource Block occupying 180 kHz) and occupy 1.4 MHz. All devices are capable of receiving this bandwidth of 1.4 MHz. See Ex. 2009, § 7.2

34. After the PSS/SSS a device tries to receive the Master Information Block (MIB). It includes parameters that are needed to acquire other information from the cell such as the bandwidth of the cell, and other parameters such as PHICH configuration and the most-significant 8 bits of the System Frame Number (SFN). The size of the MIB is only 14 bits. The MIB is transmitted with a period of 40 ms. See Ex. 2009, pp. 102, 232.

35. The MIB is transmitted over the same 1.4 MHz. In addition to the MIB there are System Information Blocks (SIBs). A UE must receive at least two SIBs (SIB1 and SIB2) before being able to communicate with the BS. These SIBs are transmitted on the PDSCH (the physical downlink shared channel) over the entire bandwidth of the cell and typically are not limited to 1.4 MHz. Terminals in the prior art had bandwidths up to 20 MHz and were capable of receiving the SIBs. At the

same time, the ‘670 patent recognized that then-novel MTC devices had narrower bandwidths and could not receive the SIBs aimed at the wideband mobile terminals: “Rel. 8/9/10 has specified that basic physical layer synchronization signals (Primary Synchronization Signals—PSS, and Secondary Synchronization Signals—SSS), and the most fundamental system information (Master Information Block—MIB) is transmitted using only the central 6 resource blocks which are receivable with a 1.4 MHz transceiver.” See Ex. 1001 at 9:39-55.

36. Once the terminal determines the bandwidth of the cell it can determine the locations in the time-frequency plane allocated to the Physical Control Format Indicator Channel (PCFICH) and decode the PCFICH. The CFI indicates the number of OFDM symbols allocated to the Physical Downlink Control Channel (PDCCH). The CFI, in conjunction with the bandwidth of the cell is used to calculate the location of the PDCCH. This is followed by a blind search of the PDCCH common search space to find the PDCCH for the SIB1 from a number of candidates. Ex. 2009, pp. 240-241.

37. This blind search is generally computationally expensive. See Ex. 2009, § 9.3.5.5. Therefore, the LTE standard narrows the possible locations to the common search space. This reduces somewhat the computational complexity. But even then, searching for the particular PDCCH requires significant computational effort: “...a Release 8/9 UE is required to carry out a maximum of 44 blind decodings in any

subframe (12 in the common search space and 32 in the UE-specific search space).”

See Ex. 2009, p. 296.

38. SIB1 is transmitted every 80 ms, in subframe 5 of each radio frame. The frequencies occupied by SIB1 vary. Additionally, there are 3 retransmissions of each SIB1 transmission. The PDCCH indicates the Resource Blocks and the Modulation and Coding Scheme used to transmit SIB1. This is why the PDCCH is necessary to decode SIB1. The contents of SIB1 can change every 80 ms, but typically it changes less often. See Ex. 2009, p. 102.

VI. CLAIM CONSTRUCTION

39. The claim limitations at issue must be construed under *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005). Claim language is not read in isolation. *Phillips*, 415 F.3d at 1315. Rather, the claim language, when read in light of the specification and the prosecution history, elucidates the meaning of the claim language.

A. “...the MIB includes an indication of ... resources for use in acquiring additional system information ... the indicated ... resources include control information for use by the UE to acquire a system information block 1” (claims 1, 7, and 13)

40. Claim 1 recites a MIB that “...includes an indication of ... resources for use in acquiring additional system information ... the indicated ... resources include control information for use by the UE to acquire a system information block 1”. Claims 7 and 13 recite similar limitations. This claim language requires information

for use by the UE to acquire a system information block 1. Under its plain and ordinary meaning, System information block 1 (SIB1) is an ordinary, legacy SIB, is not an MTC-specific SIB, and is not intended for an MTC device. See *Infra*, paragraphs 38, 48, and Ex. 2008, pp. 60, 509.

VII. OVERVIEW OF THE ‘670 PATENT

41. The ‘670 patent is directed at machine type communications (MTC), also known as machine-to-machine (M2M) communications.

“Examples include so-called machine type communication (MTC) applications, also known as machine-to-machine (M2M) communications, some of which are in some respects typified by semi-autonomous or autonomous wireless communication devices (i.e. MTC devices) communicating small amounts of data on a relatively infrequent basis. Ex. 1001 at 1:59-65.

42. The ‘670 patent recognizes that then prior-art LTE terminal devices are sophisticated.

“However, third and fourth generation mobile telecommunication networks typically employ advanced data modulation techniques and support wide bandwidth usage on the radio interface which can require more complex and expensive radio transceivers to implement.” Ex. 1001 at 2:15-19.

43. Thus, bandwidth is a key difference between prior-art non-MTC devices and the MTC devices that are “relatively simple and inexpensive.” Ex. 1001 at 2:10.

“However, as indicated above, there is now a desire to use relatively inexpensive and less complex devices to communicate using LTE type networks.” Ex. 1001 at 2:23-25.

44. The non-MTC devices support wide bandwidth, while the MTC devices do not support wide bandwidth “to be inexpensive and less complex.” The ‘670 patent introduces a subordinate carrier for MTC devices.

“The first carrier **110 a** is a host carrier having a broad bandwidth, while the second carrier **110 b** is a subordinate carrier having a narrower bandwidth located within the frequency band of the host carrier.” Ex. 1001 at 8:13-16.

45. As discussed above, the synchronization signals and the MIB are transmitted in a portion of the cell bandwidth: “Further, the PSS, SSS and PBCH are in a first bandwidth of a cell having a cell bandwidth, wherein the first bandwidth is a first portion of the cell bandwidth.” Ex. 1001 at Abstract.

46. The bandwidth capability of the second type of device is limited: “...the second type of terminal device may not be capable of receiving the full bandwidth of the first frequency band but be capable of receiving the full bandwidth of the second frequency band.” Ex. 1001 at 4:6-9.

47. The problem addressed by the ‘670 patent is that “the MTC device may be unable to receive the host carrier SIBs which are signaled across the full host carrier frequency band F_1 .” Ex. 1001 at 13:65-67. This is a problem because without system information the second type of device is unable to communicate on the cell.

48. Of the various SIBs (SIB1, SIB2, et seq.), SIB1, that is *Legacy* SIB1, is prominent because it is transmitted in the “core frequency range” (1.4 MHz in LTE) that can be detected and decoded by all devices on the network. This makes SIB1 useful as a container for additional information, including information particularized for MTC-like communication devices that may (and generally do) have reduced bandwidth capabilities. Such devices can read SIB1. Moreover, the SIB1 transmission carries a payload whose size is not fixed, in contradistinction to the MIB, which has a fixed, limited capacity of 24 bits. Thus it is natural and efficient to utilize SIB1 in the defining signaling that can envelop MTC-like devices in the blanket of critical information required to map and allocate communication resources in a heterogeneous network (device) environment.

49. The ‘670 patent teaches that the configuration parameters (such a bandwidth) of the Subordinate Carrier(s) can be signaled in three different ways: (1) it could be fixed; (2) signaled in the legacy MIB; or (3) Signaled in a scMIB. See Ex. 1001 at 14:14-36. Of these, the latter 2 require specification of the resources to be availed in performing the necessary signaling. The legacy MIB has limited “spare resources (signaling bits), and therefore utilizing those resources would entail a very compact method of encoding the Subordinate Carrier Parameters, such as from a list of predefined configurations. Introduction of a special dedicated scMIB provides the most flexible method but also requires somewhat more modification of the legacy

3GPP Standard. The ‘670 Patent exposes these issues and provides exemplary guidance and embodiments of useful alternatives.

50. Of particular note is the ‘670 patent’s disclosure of a simpler way (compared to LTE) to define the time-frequency resources for the subordinate carrier, including a certain pattern of time periods that are keyed to System Frame Numbers (SFN’s). The patent introduces “radio resource segments,” which “may be sub-frames of radio frames.” See Ex. 1001 at 2:65-66.

The radio resource segments may be sub-frames of radio frames in the time direction, each radio frame comprising a plurality of sub-frames. The second acquisition information may be transmitted in at least some of the sub-frames allocated to the subordinate carrier. Ex. 1001 at 4:36-40.

As described in relation to FIG. 3, the subordinate carrier resources (for use by MTC devices) may be defined by a certain bandwidth in the frequency domain (frequency band F_2 in FIG. 3 for example) and a certain pattern of time periods in the time domain. The certain pattern of time periods may be a sequence of subframes as described above with reference to FIG. 4. Ex. 1001 at 10:16-22.

51. The patent also explains that “The system frame number can be derived from the MIB of the host carrier.” Ex. 1001 at 11:17-18. Examples of these subframe patterns are given in Figures 5A to 5D. Ex. 1001 at Figs. 5A, 5B, 5C, 5D.

52. Thus, based on the foregoing, in the context of the ‘670 patent, “control information” is indicated in a simpler way, without a separate control channel.

53. The advantage of the ‘670 invention is the considerable flexibility in allocating resources to the subordinate carrier:

“It will be appreciated that this mechanism provides a great deal of flexibility in how much carrier resource is to be allocated to the subordinate carrier, and also how that resource is distributed with respect to time.” Ex. 1001 at 12:6-9.

54. The ‘670 patent describes the procedure according to which an MTC device can join the network:

“Fig. 6 describes a schematic flow diagram of a first part of a camp-on procedure. At a step A1, an MTC device seeking to camp-on to a subordinate carrier, for example following power-up, seeks to identify and decode PSS (Primary Synchronization Signals) and SSS (Secondary Synchronization Signals) signaling being broadcast in its location. Once the MTC device synchronizes to a carrier using the PSS and SSS, the MTC device determines the frame timing and proceeds to decode the PBCH to determine the MIB for the carrier. At a step A2, the MTC device determines whether or not a subordinate carrier indicator flag is present in the MIB.” Ex. 1001 at 13:22-34.

VIII. CLAIMS-AT-ISSUE

55. I understand that Petitioners have challenged claims 1-18 of the ‘670 Patent as being rendered obvious by Wallen in combination with Berggren.

IX. OVERVIEW OF WALLEN

56. Wallen is also concerned with MTC devices. See Ex. 1005. The cells on which MTC devices can operate are referred to as M-Cells. A name intended to

reflect the enhanced capability of the cell to support MTC and similar low-complexity devices on the LTE Network. Wallen addresses the problem of the incompatibility of such devices with legacy LTE (because of their reduced bandwidth and processing capacity) by postulating 5 distinct solution scenarios that may be suitable for adaptation to the MTC-like device capabilities. These are:

- a. Utilization of the legacy SIB, either by availing of “spare bits” and introducing discrete set (indexed by the spare bit patterns) of configurations with present parameters or, alternatively, by expanding the legacy SIB (which may no longer be standard).
- b. Adding a pointer (using spare bits) to the legacy MIB that points to a special M-SIB
- c. Redirecting (via the legacy MIB, for example) the UE to a separate M-CELL having an M-MIB and M-SIBS and enabling communication in the “standard manner.”
- d. MIB specifies that MTC device utilizes either the usual RACH or a special M-RACH to gain access to the M-CELL.
- e. MIB identifies resource blocks containing the M-PDCCH which is a special control channel devoted to M-type devices.

This M-PDCCH might be transmitted in locations occupied by the legacy PDCCH, but that would entail utilizing the full bandwidth, which is what is to be avoided.

Regarding this, Wallen says relatively little:

Again taking LTE systems as a non-limiting example, in some embodiments, the M-cells may be created by reserving RB pairs that are adjacent in frequency in an ordinary (legacy) subframe, and transmitting an M-PDCCH at an OFDM symbol position that is different from the symbol position occupied by the host cell's PDCCH. As an alternative, particular subframes can be reserved in which M-PDCCHs are transmitted at an OFDM symbol position that would otherwise be occupied by the host cell's PDCCH." Ex. 1005 at [0044].

57. Wallen recognizes that the legacy MIB includes spare bits which can be used for conveying resource blocks that in turn contain "further information" so that the MTC device can connect to the M-cell:

"For example, the LTE standard defines a MIB such that it includes spare bits. These spare bits can be used for conveying the MTC-related information, such as time-and/or frequency-wise locations of resource blocks or resource elements that the MTC device needs to receive and decode for further information to be able to connect to the M-cell." Ex. 1005 at [0065].

"In still another aspect, the MIB901 includes time/frequency information (represented by the number "3" enclosed in a circle) that informs the MTC device of a location of the resource blocks and/or MCS allocated to a specific M-cell. Armed with this information, the MTC device is then able to determine (e.g., via standardization)

positions of an M-MIB and/or M-SIB(s) associated with the M-cell.” Ex. 1005 at [0070].

58. Wallen’s M-PDCCH allows the MTC device to receive the MTC-specific SIBs by providing downlink assignments pointing to the SIBs:

“In another aspect (represented by the number “5” enclosed in a circle), the MIB 901 indicates the resource blocks, reference signal sequence, or search space allocated to a specific M-PDCCH, which should occupy regions of the host system’s radiofrequency spectrum that are different from the host system’s own (legacy) PDCCH locations. The M-PDCCH supplies control information to the MTC device, including MTC specific SIBs or downlink assignments pointing to the SIBs that are intended for this MTC device. The M-PDCCH may comply with the legacy PDCCH format for the MTC device’s lower bandwidth, or it may alternatively be encoded using a new format (e.g., Relay Physical Downlink Control Channel “R-PDCCH).” Ex. 1005 at [0072].

While the introduction of M-type device related SIBs makes sense, I note that Wallen does not contemplate this construct in Wallen-Prov (Ex. 1006). Wallen-Prov discloses MTC-PDCCH as follows:

“a specific MTC-PDCCH, which should be different than the legacy PDCCH locations, where an MTC can receive and detect control information, including the MTC specific SIBs or downlink assignments pointing to the SIBs.” Wallen-Prov (Ex. 1006 at 1.3, item 5.)

The Wallen Patent (Ex. 1005), in contrast, refers to “downlink assignments pointing to SIBs that intended for *this* MTC device”. (Emphasis added.)

X. OVERVIEW OF BERGGREN

59. Berggren (Ex. 1007) is not concerned with devices of limited bandwidth. On the contrary, Berggren is concerned with devices that are capable of even higher data rates than legacy terminals. The main technology to provide these data rates is carrier aggregation, which involves primary resource blocks and extension resource blocks.

“For higher data rates and backwards compatibility, it is carrier aggregation may be advantageous in an example development, LTE-Advanced, utilizing simultaneous transmission/reception over multiple so called component carriers. A component carrier structure may include RBS of a legacy system, such as LTE in relation to LTE-Advanced, referred to as primary RBs and RBs of a new or more developed system, Such as LTE-Advanced, referred to as extension RBs.” Ex. 1007 at [0006].

60. Carrier aggregation is a different problem than MTC devices because it requires devices with wider bandwidths than legacy LTE devices. Berggren addresses the problem of signaling for carrier aggregation in a way that achieves backwards compatibility:

“The allocation of number of primary RBs and the number of extension RBs may be considered a resource partitioning of the component carrier. To communicate the resource partition of the component carrier to user equipment, UE, may be a problem as such.” Ex. 1007 at [0006].

XI. OPINIONS

A. Ground 1: Claims 1-18 are not obvious over Wallen in view of Berggren

61. In Ground 1, Dr. Ding challenges claims 1-18 as obvious under 35 U.S.C. § 103 over Wallen in view of Berggren. See Ex. 1003 at p. 26. I disagree with Dr. Ding. The proposed combination of Wallen and Berggren does not teach each and every element of the claims.

62. Wallen does not disclose or teach, alone or in combination with Berggren, “...wherein the **MIB includes an indication of frequency resources and time resources** for use in acquiring additional system information ... **wherein the indicated frequency resources and time resources include control information** for use by the UE to acquire a **system information block 1.**” as required by Claim 1 (emphasis added).

63. The Petition refers to these elements of Claim 1 as [1.4] and [1.6]. Further, these claim elements correspond to elements [7.4] and [7.6], as well as [13.4] and [13.6]. Therefore, these claim elements are required by all of the challenged claims.

- a. **Elements [1.4] (and also [7.4], as well as [13.4])² are not obvious in view of the cited portions of Wallen in view of Berggren**

64. Regarding claim limitation [1.4], Dr. Ding opines that “Wallen discloses that *the MIB* (the MIB) *includes an indication of frequency resources and time resources* (indicates the resource blocks) *for use in acquiring additional system information* (where an MTC device can find control information that in turn points to SIBs):” (See Ex. 1003 at ¶ 84). I disagree. The evidence that Dr. Ding cites does not support his opinion. The portion of Wallen cited in Dr. Ding’s opinion to support his opinion reads as follows:

“In another aspect (represented by the number ‘5’ enclosed in a circle), **the MIB 901 indicates the resource blocks, reference signal sequence, or search space allocated to a specific M-PDCCH**, which should occupy regions of the host system’s radiofrequency spectrum that are different from the host system’s own (legacy) PDCCH locations. **The M-PDCCH supplies control information to the MTC device, including MTC specific SIBs or downlink assignments pointing to the SIBs** that are intended for this MTC device.” See Ex.1005, [0072] (emphasis added).

65. Thus, according to the portion of Wallen cited by Dr. Ding, Wallen’s MIB indicates the resource blocks, reference signal sequence, or search space for **M-PDCCH**.

² I have adopted the numbering of claim limitations as in the Ding Declaration.

66. Dr. Ding opines that “These resource blocks of the M-PDCCH include “control information” that indicates “downlink assignments pointing to the SIBs.” See Ex. 1003 at ¶ 85.

67. This statement by Dr. Ding is entirely too general however. A PDCCH is **not** a “System Information Channel”, which is functionality that is in fact realized by a transmitted PBCH (not PDCCH) that a UE reads during initial access. At best, “M-PDCCH supplies control information ... including MTC specific SIBs or downlink assignments pointing to SIBs that are intended for this MTC device.” Ex. 1005 at [0072]. M-PDCCH does not supply or point to SIBs generally, but, if at all, only SIBs that are specific to MTC or M-type devices. See Ex. 1005 at [0072].

b. Element [1.6] (and also [7.6], as well as [13.6]) are not obvious in view of the cited portions of Wallen in view of Berggren

68. Element [1.6] of claim 1 requires that “the frequency resources and time resources” introduced in Element [1.4] “include control information for use by the UE to acquire a system information block 1.” According to the preceding excerpt from Wallen (cf. paragraph 61), the “frequency resources and time resources” in Wallen’s fifth alternative do not point to “a system information block 1,” but rather to SIBs specific to MTC devices.

69. Regarding claim element [1.6], Dr. Ding further opines that “[a]s explained in the analysis of limitation [1.4], Wallen’s MIB indicates the frequency

and time locations of “resource blocks” (the indicated frequency resources and the time resources) ‘allocated to a specific M-PDCCH’ **which, in turn**, includes ‘control information’ (control information) such as ‘downlink assignments pointing to the SIBs” (for use by the UE to acquire a system information block).’ See Ex. 1003 at ¶ 91 (emphasis added). Consistent with this argument, Dr. Ding annotates FIG. 9 of Wallen with “MIB indicates the time/frequency location of M-PDCCH, **which in turn** has “control information” such as downlink assignments pointing to SIBs (not shown).” See Ex. 1003 at p. 50 (emphasis added).

70. For the requirement in Element [1.6] that the “frequency resources and time resources” be used “to acquire a system information block 1,” the Petition shifts from Wallen’s **fifth** alternative to aspects of Wallen’s **first** alternative where “[T]he MIB 901 ... includes time/frequency information ... that informs the MTC device of a location of the resource blocks ... allocated to the first system information block (SIB 1)”. Petition, 51-52 (emphasis in original). In context, Wallen describes the **first** alternative as follows:

In one aspect, the MIB 901 (which occupies its standard location in the host cell) includes time/frequency information (represented by the number ‘1’ enclosed in a circle) that informs the MTC device of a location of the resource blocks and/or modulation and coding scheme (MCS) allocated to the first system information block (SIB1) that is transmitted in a system standardized location (e.g., in subframe 5 in an LTE system). The first SIB, which is a legacy SIB, is allocated frequency

resources such that it can be read by an MTC device. Ex. 1005, [0068] (emphasis added).

71. The context of Wallen's first alternative is a legacy SIB that provides spare bits that might be used to signal information (by identifying a choice of possible configurations using the limited bits). The context of Wallen's fifth alternative is an M-PDCCH which provides information enabling the MTC device to receive MTC-specific SIBs, not legacy SIBs. Moreover, MTC-specific SIBs would not point to legacy SIBs because legacy SIBs are already available to all devices. Legacy SIBs cannot be regarded MTC-specific SIBs.

72. The combination of aspects of Wallen's first and fifth alternatives proposed in the Petition is inconsistent with the teachings of Wallen. More specifically, Wallen's special physical downlink control channel (M-PDCCH) is adapted for use by MTCs to acquire "MTC specific SIBs" (as disclosed in Wallen's fifth alternative) rather than a "legacy MIB" such as the first system information block (SIB1) (as discussed in Wallen's first alternative).

73. A POSITA facing the task of designing an efficient signaling scheme that can provide MTC and MTC-like communication device access to the LTE network would adopt a systematic approach.

- a. Certain information is available to all devices (the MIB and Legacy SIB1).

- b. Certain new signaling channels and information cannisters may be necessary to permit M-type devices to obtain the necessary configuration information.

A logical separation of these aspects would be POSITA's natural inclination, enabling the use of the common information to the greatest extent and relegating the handling the necessary special "M-type information" to ancillary means, such as a special control channel and or special data repositories (M-SIBs).

74. Indeed, the legacy MIB is acquired naturally in the initial access by the UE seeking to connect to the network, before any M- specific (MTC like, etc.) access is attempted, and, in particular, before the UE ever reads information from the "special physical downlink control channel." The Petition's proposed combination of aspects of Wallen's first and fifth approaches conflates the logically distinct aspects of "what is already available" and "what must be added as an extension" in order for the M-type devices to access the network. Such a combination is informed by hindsight, driven by the goal of matching the language of claim 1, not logic.

75. The Petition's argument that "SIB1 is the only LTE specific LTE SIB disclosed in Wallen" misses the mark. Petition, 52. It is undisputable that Wallen discloses both "MTC specific SIBs" and a "legacy MIB." Further, as has already been pointed out, there is no reason or benefit associated with providing a pointer to

the legacy SIB using the specially allocated M-PDCCH because such a pointer would be superfluous.

76. I note that, in connection with his analysis of [1.4] and [1.6], in two footnotes in his Declaration Dr. Ding alleges that

⁴ According to Patent Owner's apparent understanding of limitation [1.4] in the district court litigation, the MIB points directly to system information, such as an SIB1. Ex.1013, 25. Note that Wallen presents an embodiment that discloses or renders obvious limitation [1.4] under Patent Owner's apparent understanding that an MIB that points directly to SIB1 satisfies limitation [1.4]. Wallen [0068] ("the MIB 901...informs the MTC device of a location of the resource blocks ... allocated to the first system information block (SIB 1)"), Figure 9; Wallen-Prov, 9, Figure 1" See Ex. 1003 at p. 47. See also *Id.* at p. 51-52.

77. Dr. Ding is incorrect. Ex.1013 p. 25 highlights a schedulingInfoSib1-BR field of a MIB as indicating "...the index to the tables that define SystemInformationBlockType1-BR scheduling information..." According to Ex. 1013 p. 25 the schedulingInfoSib1-BR field corresponds to "...**control information** for use by the UE to acquire a system information block 1" as required by Claim 1. Based on the foregoing a POSITA would have understood from the passage of Wallen relied on by Dr. Ding ('the MIB 901...informs the MTC device of a location of the resource blocks ... allocated to the first system information block (SIB 1)') that it does not include "...control information for use by the UE to acquire a system

information block 1” as required by Claim 1 of the ‘670 patent. At most, the MIB of Wallen indicates the actual frequency and time resources of SIB1, and not “...control information...” as in claim 1.

78. Dr. Ding does not rely on Berggren regarding [1.4] and [1.6]. Accordingly, no combination of Berggren with Wallen has been established to remedy the deficiencies in Wallen discussed above.

- c. **Claims 1-18 are not obvious over Wallen in view of Berggren at least for the reason that a POSITA would not have understood Wallen-Prov to provide support for the specific portions of Wallen relied upon in the petition to map to the challenged claims.**

79. The petition relies on several aspects of Wallen. See Paper 2 at X. B, and X. C. 1. The petition also relies on the filing date of Wallen-Prov as providing a basis for Wallen as prior art. See Paper 2 at p. 10, Footnote 2, and at X. B.

1. A POSITA would not have understood figure 13 of Wallen to be supported by figure 5 of Wallen-Prov

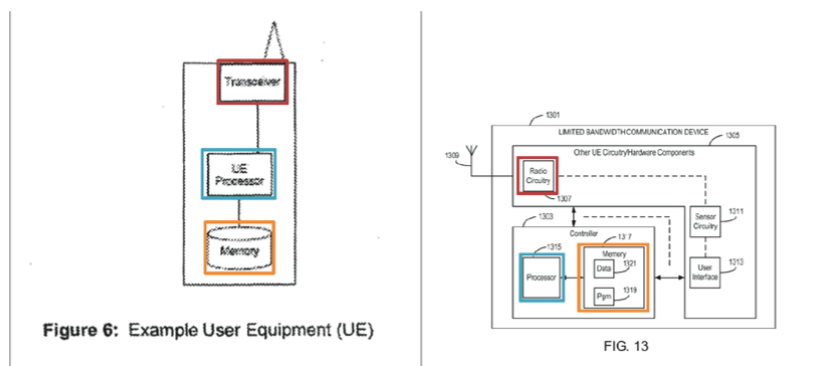
80. The petition cites Section X of Dr. Ding’s opinion as providing the basis for reliance on the filing date of Wallen-Prov in this way. See Paper 2 at p. 18.

81. In particular, Sections IX and X of Dr. Ding’s opinion provide a comparison of aspects of Wallen-Prov and Wallen in an attempt to show that Wallen is entitled to the benefit of the filing date of Wallen-Prov.

82. It is clear from the comparison in Dr. Ding’s opinion however that Figure 13 of Wallen, relied on in the Declaration and in Dr. Ding’s opinion, is not

supported by the aspects of Wallen-Prov indicated as providing such support. See Ex. 1003 p. 90.

83. For example, an excerpt from the “comparison chart” set forth in Dr. Ding’s declaration is shown below.



See Ex. 1003 p. 90.

84. The left side of this excerpt shows Figure 6 of the Wallen-Prov, which depicts one of the UEs from Figure 5 which are cellular telephones. Ex. 1006, 12.

85. The right side of this excerpt compares new Figure 13, added in the Wallen utility application, “depicting a block diagram of a limited bandwidth communication device,” i.e., an MTC device, With Figure 6. Ex. 1005, [0013].

86. By this comparison, Dr. Ding’s declaration attempts to show that Figure 13 of Wallen is supported by Figure 6 (and Figure 5) of Wallen-Prov. However, a POSITA would not have considered Figure 13 of Wallen to be supported by Figure 6 (and Figure 5) of Wallen-Prov.

87. This aspect of the “comparison chart” is comparing “apples and oranges.” The diagram on the left is depicting a cellular telephone and the diagram on the right is depicting a block diagram of a “limited bandwidth communication device,” i.e., an MTC device. The diagrams look different because they are depicting different devices.

88. At minimum, one skilled in the art, reading Figure 6 (and Figure 5) of Wallen-Prov would not immediately discern the material in Figure 13 of Wallen relating to an MTC device.

89. This is at least because, at the time of both Wallen and Wallen-Prov, a POSITA would not have understood a cellular telephone, as clearly shown in Figure 6 of Wallen-Prov, to be a MTC device (or limited bandwidth device).

90. Further, a POSITA would in fact have understood a cellular telephone not to be an MTC device, at least for the reason that a cellular telephone includes multiple human-communication interface components, such as a screen, speaker and microphone, which are not found in devices purposed for Machine Communication.

91. In addition to the above, as a general observation, it should be noted that the entire problem addressed by Wallen stems from the fact that the M-type device has limited bandwidth. This fact is not at all incorporated into Wallen’s inventive process, as depicted in Warren-Prov. Neither does Warren-Prov exemplify any solution that reflects and or rectifies this problem by restricting relevant

signaling, including newly invented signaling, to the reduced bandwidth that is accessible by all UE devices. This accommodation is fundamental, not incidental. Despite its importance of this accommodation, according to Figure 1 of Warren-Prov (and Figure 9 of Warren as Issued) the frequencies of all “M-signaling” signaling, along with legacy signaling, appear to span a range similar to the *legacy* PDCCH, which is the entire LTE bandwidth.

XII. CONCLUSION

92. For the foregoing reasons, based on my expertise and experience and the record of this case that I have reviewed, it is my opinion that the challenged claims are not shown to be disclosed or obvious.

93. I understand that my opinions discussed above support a legal conclusion that the challenged claims are nonobvious.

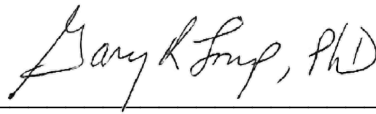
XIII. DECLARATION

In signing this declaration, I recognize that the declaration will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I also recognize that I may be subject to cross-examination in the case and that cross-examination will take place within the United States. If cross-examination is required, I will appear for cross-examination within the United States during the time allotted.

I hereby declare that all statements made herein of my own knowledge are true and all statements made herein on information and belief were and are believed by me to be true, and that all statements herein were and are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code and that any such willful false statements may jeopardize the validity of the application or any patents issued thereon.

Respectfully Submitted,

October 14, 2025

A handwritten signature in cursive script that reads "Gary R. Lomp, PhD". The signature is written in dark ink and is positioned above a horizontal line.

Gary R. Lomp, Ph.D.