UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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TCL Communication Technology Holdings Limited
TCT Mobile International Limited
TCT Mobile, Inc.
TCT Mobile (US) Inc.
TCT Mobile (US) Holdings Inc.

Petitioners,

v.

Mitsubishi Electric Corporation,

Patent Owner.

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Case IPR2023-00957
U.S. Patent No. 9,635,656

EXHIBIT 2001
DECLARATION OF TODOR COOKLEV, PH.D.

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I. INTRODUCTION

1. My name is Todor V. Cooklev. 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. 10,200,656 ("the '656 patent") in IPR2023-00997. I have been retained by Mitsubishi Electric Corporation ("MELCO"), the Patent Owner in the above proceedings. Petitioners are TCL Communication Technology Holdings Limited, TCT Mobile International Limited, TCT Mobile, Inc., TCT Mobile (US) Inc., and TCT Mobile (US) Holdings Inc (collectively "Petitioner").

2. For my work on this case, I am being compensated at my typical consulting rate of $700 per hour. I am also being reimbursed for reasonable 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.

II. QUALIFICATIONS

4. I am currently Professor of Electrical and Computer Engineering at Purdue University in Fort Wayne, Indiana. At the same institution since 2008 I have served in several faculty and administrative positions, including as the Director of the Wireless Technology Center, ITT Associate Professor of Wireless Communication and Applied Research, and subsequently as Harris Professor of Wireless Communication and Applied Research.

5. I graduated from the Technical University of Sofia, Bulgaria in 1988 with a Diploma of Engineering in the field of Electrical Engineering. I graduated from Tokyo Institute of Technology in Tokyo, Japan in 1995 with a Doctor of Philosophy (Ph.D.) degree in Electrical Engineering.

6. I teach several courses related to the hardware and software architectures of wireless systems and wireless devices. My research interests include most aspects of modern wireless systems, including hardware/software architectures. I have given and occasionally continue to give seminars, tutorials, and presentations worldwide.

7. I have received research funding from the National Science Foundation (NSF), the Defense Advanced Research Projects Agency (DARPA), the U.S. Air Force Research Laboratory, the Office of Naval Research, and a number of private companies, including major technology companies.

8. I have authored and co-authored more than 100 peer-reviewed articles. I am also a named inventor on 32 U.S. patents, most of which relate to the hardware or software aspects of communication systems. For part of this work in 2019, I was inducted into the Purdue Inventors Hall of Fame. A list of my publications and patents appears in my *curriculum vitae* attached as Appendix 1.

9. In addition to my academic experience, I have experience in technology and product development in the computer networking and data communications industry. My work has been in the areas of communication protocols, software, digital signal processing, and integrated circuit design for communication systems.

10. I have contributed to the development of several major standards for communication systems and numerous amendments. I have participated in many meetings of standards committees. I have prepared, submitted, and presented documents relating to technical matters considered by these committees. I have chaired some committee meetings and served in other leadership roles.

11. Between 2000-2002 and 2005-2008 I was a Voting Member of the IEEE 802.11 Working Group. Around 2005-2007 I was Chair or a Study Group within IEEE 802.11. For part of my work I received an award from IEEE Standards Association in 2012.

12. Between 2007-2011 I participated in the work of the Software-Defined Radio Forum (later renamed Wireless Innovation Forum). During 2011-2012

attended 3GPP standards committee meetings. Around that time, I contributed to and submitted several documents relating to LTE-Advanced.

13. In 2020, I was elected to serve on the Board of Governors of the IEEE Standards Association for one term beginning January 2021. The Board of Governors provides overall leadership of the IEEE Standards Association.

14. Currently, I am a Series Editor for Wireless and Radio Communications of the IEEE Communications Standards Magazine (which is the premier journal in the field of communication standards) and have held that position since 2017. As a member of the Editorial Board I coordinate the review of scholarly manuscripts submitted to the wireless and radio communications series.

15. I am qualified by education and experience to testify as an expert with respect to subject matter in the fields of wireless communications, wireless communications protocols, wireless data transmission, wireless device hardware, data and signal processing hardware and software, and wireless device interoperability.

16. I have attached a current copy of my curriculum *vitae* as Exhibit 2003, which includes a list of my publications. My CV also includes a list of cases during at least the last four years in which I have provided testimony as an expert.

III. LEGAL STANDARDS

17. I am not a lawyer, and I do not intend to offer any opinions as to the interpretation of the law. When considering the ’656 patent and stating my opinions, I rely on the following legal standards as described to me by the attorneys for the Patent Owner.

A. Priority Date

18. 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 ‘656 Patent claims priority to October 27, 2006. My opinions in this matter are from the perspective of a POSITA as of that date.

B. Level Of Ordinary Skill In The Art.

19. 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 person of ordinary skill in the art 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 claim of the ’656 patent.

20. I understand that various factors should be considered when determining the person of ordinary skill in the art in connection with a particular patent. I understand that these factors include, without limitation, the type

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.

21. Mr. Lanning opines that "Based upon my knowledge of this field, I conclude that a POSITA at the time of the alleged invention of the '656 patent, and for that matter, at all subsequent times through the present, would have held at least a degree in electrical engineering, computer engineering, computer science or a similar discipline, with at least two years of relevant industry or research experience, including experience designing, planning, or implementing cellular networks. Additional work or research experience can substitute for less or different education, and vice-versa. A person of ordinary skill in the art would also have had familiarity with the 3GPP LTE technical standards." Ex. 1003 [Lanning-Decl.] ¶ 33. For the purpose of this declaration, I will apply the same definition of the level of skill of a POSITA.

22. 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. My opinions concerning the '656 Patent and the prior art are from the perspective of a POSITA, as set forth above.

23. 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.

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

25. I further understand 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.

26. 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.

27. 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 claim invention, unexpected results of the claimed invention, acceptance of others and industry praise, and licensing of the patents.

28. 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.

29. 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.

30. 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.

31. 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.

32. 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 Petitioner 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.

IV. OVERVIEW OF THE '656 PATENT

33. Having reviewed the '656 Patent, I understand that it describes a new and innovative way to resolve conflicts or collisions between the transmission of certain signals in an LTE communications system. According to the '656 Patent, a mobile terminal transmits a signal indicating either the quality of the received data or the quality of the downlink communication path to the base station via an uplink transmission when receiving data from a base station in an LTE communications system. EX1001, 2:25-30. An example of a signal providing the quality information indicating the quality of the received data or the quality of the downlink communication path, which generically can be referred to as a quality notification signal, is a Channel Quality Indicator or CQI. *Id*., 2:30-35. Separate from sending a CQI, a mobile terminal can be configured to transmit a signal requesting allocation of uplink radio resources to the base station when the mobile terminal has data to transmit to the base station. *Id*., 2:46-49. This type of request sent to the base station can be termed, for example, a scheduling request, an uplink resource request, or an uplink scheduling request signal. *Id*., 2:49-52.

34. Whether sending over the same channel or over separate channels, the mobile terminal may from time to time have both a quality notification signal and

scheduling request signal to send in which their transmission would coincide, conflict, or collide. *Id*., 3:15-26; 4:37-43; 5:28-36; 6:3-24. The quality notification and scheduling request signals have no correlation among them; accordingly, conventional LTE communication systems may be configured to transmit them with multi-carrier transmission. *Id*., 7:10-35. When transmitted at the same time, the peak to average power ratio ("PAPR") can become high due to the high peak of the transmission signals time waveforms. Id., 7:36-39. The high PAPR increases the power consumption of the mobile terminal and correspondingly narrows the cell coverage. *Id*., 7:39-42. Moreover, when transmission of these signals coincides, it can create an interference wave that affects other mobile terminals in the conventional LTE communications system. *Id*., 7:42-44.

35. According to the '656 Patent, the inventive system can provide a communications system that is capable of solving these problems. *Id*., 7:45-51. For example, in the event that the transmission of the quality notification signal (e.g., CQI) coincides with the transmission of the scheduling request signal (e.g., SR), the transmission of the quality notification is stopped while transmitting the scheduling request signal. *Id*., 16:7-21; 18:37-43. By stopping transmission of the quality notification signal while transmitting the scheduling request signal, the mobile terminal can prevent an increase in the radio resources load on the communication system and implement transmission with a correspondingly lower PAPR. *Id*., 15:9-

33; 18:44-54. Having reviewed the prior art cited in the Grounds of the Petition, as well as the Petition itself explaining the basis of the Grounds, it is my opinion that the cited prior art fails to recognize these problems and likewise fails to disclose or suggest the inventive solution disclosed in the ’656 Patent and recited in claim 3.

V. CLAIM-AT-ISSUE

36. The only claim being challenged by the Petition is claim 3 of the ’656 Patent, which recites the following:

3. A mobile terminal configured to:

transmit a quality notification signal for notifying downlink communication quality to a base station, and

transmit a scheduling request signal with which to make a request for allocation of radio resources to said base station before transmitting transmission data to said base station, wherein said mobile terminal includes:

a transmitter configured to transmit said quality notification signal to said base station, and to transmit said scheduling request signal to said base station; and

a controller configured to perform a first control process that includes, when the mobile terminal has not been allocated a radio resource for transmitting said transmission data, transmitting said scheduling request signal to said base station, and a second control process that includes, when a

transmission of said quality notification signal coincides with that of said scheduling request signal in said transmitter, stopping transmitting said quality notification signal during a time interval during which said transmitter transmits said scheduling request signal.

VI. OPINIONS

E. Ground 1: UMESH in View of the Knowledge of a POSITA Does Not Render Obvious Claim 3

37. Regardless of the construction for "when a transmission of said quality notification signal coincides with that of said scheduling request signal in said transmitter," whether applying the construction from the Markman order, Petitioner's proposed construction, or the plain and ordinary meaning, it is my opinion that claim 3 is not obvious over UMESH in view of the knowledge of a POSITA because the combination does not teach the "second control process" nor the "coincides" condition. UMESH never performs the "second control process" and does not condition stopping the transmission of the quality notification signal when it coincides with the transmission of the scheduling request signal. Even if combinable, Petitioner does not cite any evidence nor explain why the knowledge of a POSITA can make up for UMESH's deficiencies. Moreover, because UMESH does not recognize any problem of the signals "coinciding," in my opinion, a POSITA would not have known to perform the "second control process" nor

condition stopping the transmission of the quality notification signal when it coincides with the transmission of the scheduling request signal.

a. UMESH never conditions transmission of the quality control signal on whether or not there is a potentially coincident scheduling request signal; instead, UMESH always (i.e., unconditionally) bumps the quality control signal every time the scheduling request signal is to be transmitted

38. The ’656 Patent, as recited in claim 3, recites an inventive solution to resolving when a conflict arises over the transmission of a scheduling request signal and a quality notification signal. In my opinion, there is nothing in UMESH that contemplates this conflict or how to resolve it. Instead, UMESH describes simple alternative processes for scheduling the transmission of a scheduling request signal. In particular, UMESH describes a fixed schedule for transmitting the scheduling request signal and quality notification signal in predetermined timeslots (*see* EX1010, ¶¶0068-0075) or notifies a base station that the scheduling request signal will be sent in a subsequent timeslot (*see* EX1010, ¶¶0076-0085). Neither transmission method has a conflict in which the scheduling request and quality notification signals coincide. As a result, besides not describing such a coinciding transmission, UMESH consequently has no need to perform the “second control process” that conditions stopping the transmission of the quality notification signal when it coincides with the transmission of the scheduling request signal.

39. UMESH discloses that a mobile communication system 100 includes a base station 10, mobile stations 20a to 20c, and a radio control device 30 that controls radio communication between base station 10 and mobile stations 20a to 20c. EX1010, ¶0032. Mobile stations 20a to 20c and base station 10 transmit via dedicated physical channels as shown in Fig. 2 below. *Id.*, ¶¶0032-0033.

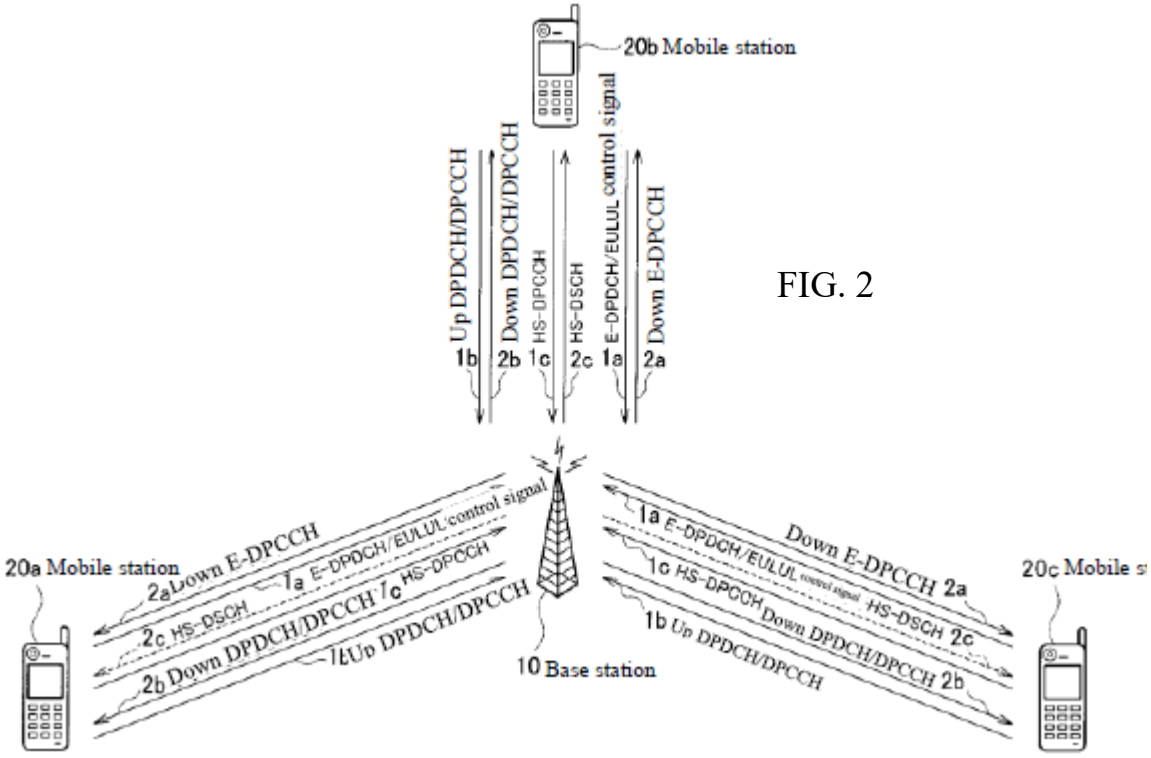


FIG. 2

40. For uplink communication, mobile stations 20a to 20c use E-DPDCH/EULUL control signal 1a, DPDCH/DPCCH 1b, and HS-DPCCH 1c. *Id.*, ¶0033. E-DPDCH/EULUL control signal 1a is an enhanced dedicated physical data channel that performs enhanced transmission of user data and an EULUL control signal, where the EULUL control signal is an enhanced uplink physical control

signal conforming to the enhanced uplink. Id., ¶0035. HS-DPCCH 1c is a high-speed uplink physical control channel conforming to high-speed packet access. *Id.*, ¶0036.

41. HS-DPCCH includes a subframe 3 (outlined in red in annotated Fig. 3 below) that is subjected to code-division multiplexing using three different spread codes and transmitted simultaneously with DPDCH and DPCCH. *Id.*, ¶0041.

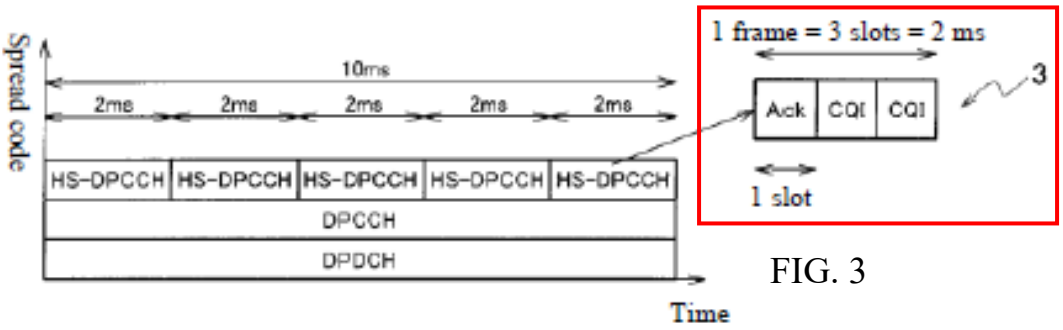


FIG. 3

HS-DPCCH subframe 3 includes three time slots with one time slot transmitting an acknowledgment (Ack) in an ACK slot and two time slots transmitting a channel quality indicator (CQI) in respective CQI slots. *Id.*, ¶0042. Since the slot pattern of HS-DPCCH subframe 3 is fixed, base station 10 can distinguish between Ack and CQI when receiving data on the HS-DPCCH. *Id.* The CQI provides information regarding downlink radio quality between each mobile station 20a to 20c and base station 10. *Id.*, ¶0044. Petitioner asserts that the CQI corresponds to the "quality notification signal" of claim 3. Pet. 26-28.

42. According to UMESH, mobile stations 20a to 20c can transmit the CQI in all frames of HS-DPCCH or at intervals. EX1010, ¶0047. In interval

transmission, the CQI can be transmitted at fixed transmission intervals in select frames instead of transmitting CQI in every frame, which consequently makes the CQI slot available to transmit other signals in frames lacking CQI. S*ee id*., ¶0053 (transmission interval for CQI can be in all HS-DPCCH frames or once every certain number of frames such as 2, 4, 5, or 10). UMESH indicates a EULUL control signal can be transmitted in the CQI slot when not used to send the CQI. EX1010, ¶¶0047-0048. UMESH also notes that the EULUL control signal can be a rate request/scheduling information (RR/SI) signal. *Id*., ¶0075. Petitioner asserts that the EULUL control signal, when configured as an RR/SI signal, corresponds to the "scheduling request signal" of claim 3. Pet. 28-30.

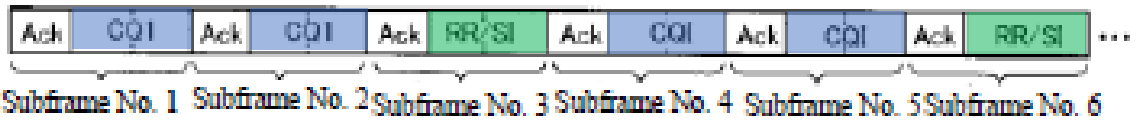
i. The first transmission method in UMESH stops transmission of the quality control signal according to a predetermined schedule

43. To transmit the CQI and EULUL signals, UMESH discloses two transmission methods that use the HS-DPCCH channel for transmission. EX1010, ¶¶0068-0085. In the first transmission method, UMESH discloses mobile station 20a transmits the EULUL control signal in the CQI slot according to a cycle known in the base station 10. *Id*., ¶0069. To set this known cycle, a setting unit 41 in control device 40 sets a timing for transmitting the EULUL control signal and notifies mobile station 20a and base station 10 so that the set timing is known in both mobile station 20a and base station 10. *Id*., ¶¶0070-0073. With this set timing, also

referred to as "a constant transmission cycle," a radio control unit 23 of mobile station 20a controls radio unit 21 establishes a fixed, repeating cycle of sending the EULUL control signal in place of the CQI signal every predetermined number of frames, such as once every three CQI slots. *Id*., ¶0073.

44. In this first transmission method, UMESH describes a fixed scheduling transmission process that is known to both the mobile station 20a and the base station 10 before either the CQI or EULUL control signals are transmitted. The timing for sending the EULUL control signal is fixed and predetermined, as is the timing for sending the CQI signal. This fixed and predetermined scheduling ensures there is no conflict over the transmission of the EULUL control signal and the CQI signal.

45. The fixed and predetermined scheduling of UMESH's first transmission method is shown in the following annotated excerpt of Fig. 10 of UMESH, below. As shown, subframes 1, 2, 4, and 5 include CQI (highlighted in blue) and subframes 3 and 6 include RR/SI (highlighted in green).



Consistent with the description in UMESH and my explanation above of that description, this arrangement of CQI and RR/SI (a version of the EULUL control signal according to EX1010, ¶0075) in Fig. 10 shows the fixed and predetermined scheduling as a predetermined repeating pattern of two CQIs followed by one

EULUL control signal every three subframes. Such a predetermined repeating pattern fully supports my explanation that UMESH's first transmission method transmits the CQI and the EULUL control signals according to a fixed and predetermined scheduling.

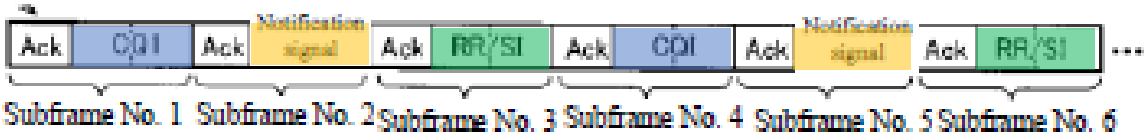
46. For a POSITA, it is the logical and necessary conclusion that the transmission timing for both the CQI and EULUL control signals is predetermined in the first transmission method because the scheduling and timing of the transmission of both the CQI signal and the EULUL control signal are both ***set in advance*** of any transmission and ***known in advance*** by both mobile station 20a and base station 10. It is also the logical and necessary conclusion that the CQI and the EULUL control signal can neither be scheduled nor transmitted at the same time and thus can never coincide because the transmission timing is predetermined.

ii. The second transmission method in UMESH stops transmission of the quality control signal to send a notification signal

47. In UMESH's second transmission method, prior to the transmission of a EULUL control signal, the transmission notification unit 26 of mobile station 20a first notifies base station 10 of an upcoming transmission of the EULUL control signal. EX1010, ¶0076. According to UMESH, by providing base station 10 with advanced notice of the upcoming transmission of the EULUL control signal, base station 10 can identify and distinguish the EULUL control signal from among time-

division multiplexed signals received by base station 10. *Id*. To send the notification signal, mobile station 20a transmits the notification signal to base station 10 in the CQI slot in place of the CQI signal. *Id*., ¶0077. Then, subsequent to the transmission of the notification signal, mobile station 20a transmits the EULUL control signal to base station 10 in the next subframe. *Id*.

48. In this second transmission method, UMESH describes first sending a notification signal in place of the CQI signal and then subsequently sending the EULUL control signal. This ordering of transmission is shown in the annotated excerpt of Fig. 11 of UMESH, below. As shown, subframes 1 and 4 include CQI (highlighted in blue), subframes 2 and 5 include the notification signal (highlighted in orange), and subframes 3 and 6 include RR/SI (highlighted in green).



As shown in this arrangement, the notification signal is first sent in place of the CQI signal, and then after sending the notification signal, the EULUL control signal (as an RR/SI signal in this arrangement) is sent. Accordingly, the scheduling of the CQI transmission is bumped so that a notification signal can be sent instead. Moreover, the notification signal must be sent prior to the EULUL control signal in UMESH's second transmission method.

49. Thus, according to my understanding and the understanding of a POSITA, UMESH's second transmission method first transmits a notification signal to base station 10 in place of a CQI signal. Only ***after*** sending the notification signal does mobile station 20a then send the EULUL control signal in the next subframe. Moreover, a POSITA would understand that, since mobile station 20a conditions exchanging CQI transmission for the transmission of the notification signal, and the notification signal must be sent prior to the EULUL control signal, a POSITA would have understood that the CQI signal and the EULUL control signal can neither be scheduled nor transmitted at the same time in the second transmission method. It also logically and necessarily follows and a POSITA would have understood that, since UMESH also teaches that the base station expects the subsequent subframe to include the EULUL control signal in response to receiving and recognizing the notification signal, the mobile station 20a cannot schedule or transmit the CQI signal in the next subframe. Instead, once the notification signal is sent, the mobile station 20a can send only a EULUL control signal in that next subframe.

b. Petitioner has not shown UMESH discloses the second control process that conditions stopping transmission of a quality notification signal "when a transmission of said quality notification signal coincides with that of said scheduling request signal in said transmitter"

50. As I will explain herein, Petitioner has not shown that UMESH has a second control process that conditions the stopping of the transmission of a

notification signal "when a transmission of said quality notification signal coincides with that of said scheduling request signal in said transmitter." Indeed, UMESH does not even suggest the second control process because UMESH's transmission methods provide no reason to have the second control process.

i. UMESH's transmission methods do not condition stopping the transmission of a quality notification signal "when a transmission of said quality notification signal coincides with that of said scheduling request signal in said transmitter"

51. As explained above, UMESH stops transmission of the quality control signal according to a predetermined schedule or to send a notification signal, not when transmission of the quality control signal coincides with transmission of the scheduling request signal.

52. To support its contention that UMESH stops CQI transmission when transmission of the quality notification signal "coincides" with the scheduling request signal, Petitioner makes reference to ¶0073. Pet. 34-35. But neither this portion, nor any other portion of UMESH, teaches that these signals ever coincide or that transmission of one is stopped for the other. ¶0073 is part of UMESH's description of the first transmission method. As I previously explained, UMESH's first transmission method has setting unit 41 in control device 40 set a repeated, constant transmission cycle for scheduling and transmitting the CQI signal and the EULUL control signal. EX1010, ¶¶0070-0073. Once this repeated, constant transmission cycle is set, control device 40 notifies both mobile station 20a and base

station 10 of the cycle. *Id*. Accordingly, both mobile station 20a and base station 10 know the repeated, constant cycle in advance of transmission of the CQI and EULUL control signals. *Id*.

53. As I also explained previously, a POSITA would understand that it logically and necessarily follows that the scheduling and transmission timing for both signals is predetermined in the first transmission method because the scheduling and timing of the transmission of both the CQI and the EULUL control signal are i) set to a repeated, constant cycle and ii) known in advance by both mobile station 20a and base station 10. By having both predetermined timing and advanced notice to both mobile station 20a and base station 10, it also logically and necessarily follows that transmission of the CQI signal and the EULUL control signal can never "coincide." The predetermined timing and advanced notice also mean that the CQI signal and the EULUL control signal cannot be scheduled at the same time, cannot be transmitted at the same time, and cannot coincide.

54. In addition to ¶0073, Petitioner also makes reference to ¶0058 of UMESH. Pet. 35. In this paragraph, UMESH merely discloses that an EULUL control signal can be sent in the CQI slot. EX1010, ¶0058. As I already explained above regarding the first and second transmission methods, UMESH describes sending the EULUL control signal in the CQI slot in place of a CQI signal. While ¶0058 describes sending the EULUL control signal in the ***CQI slot***, that paragraph

does not describe any scenario in which the EULUL control signal and ***CQI signal*** are transmitted simultaneously, are scheduled to be transmitted simultaneously, or in any way have their transmission coincide.

55. When put in context with the subsequent description, UMESH makes clear that it does not describe any scenario in which the EULUL control signal and CQI signal are transmitted simultaneously, are scheduled to be transmitted simultaneously, or in any way have their transmission coincide. In ¶0059, UMESH addresses the timing in which radio control unit 23 of mobile station 20a can "set the transmission interval" of the EULUL control signal and the CQI such that they are transmitted according to the "set transmission interval," "a transmission interval designated by the base station 10," or "a transmission interval set in advance by operation." EX1010, ¶0059. A POSITA would understand that UMESH's reference to the "set transmission interval" is as a description of UMESH's first transmission method of a repeated, constant transmission cycle in which the scheduling and transmission timing of the CQI signal and the EULUL control signal are predetermined at set transmission intervals. *See* EX1010, ¶0053 (transmission interval for CQI can be once every certain number of frames such as 2, 4, 5, or 10). By sending the CQI and EULUL control signal according to such predetermined timing, a POSITA would have understood that the scheduling and transmission of the CQI and EULUL control signals are prevented from ever coinciding.

56. Because the scheduling and transmission of the CQI and EULUL controls signal in UMESH cannot coincide, the evidence cited by Petitioner fails to show that the stopping of the transmission of a quality notification signal is conditioned to "when a transmission of said quality notification signal coincides with that of said scheduling request signal in said transmitter." UMESH therefore fails to meet this limitation of claim 3.

ii. UMESH never performs the claimed second control process of checking if there is coincidence of the quality notification signal and the scheduling request signal

57. UMESH never performs the "second control process" of claim 3 because it never considers or addresses a conflict in the transmission of the quality notification signal and the scheduling request signal. In UMESH's first transmission methods, the scheduling request signal is inserted into a slot in place of the quality notification signal in an advanced and predetermined manner. In the second transmission method, a notification signal is inserted into a slot in place of the quality notification signal, and only after that is the scheduling request signal sent. With these transmission methods, these simple techniques disclosed in UMESH never perform and have no need to perform the "second control process" of claim 3.

58. Claim 3 recites both a "first control process" and a "second control process." A controller performs the "first control process" to transmit the scheduling request signal to the base station when the mobile terminal has not been allocated a

radio resource for transmitting the transmission data. The controller performs the "second control process" to stop transmitting the quality notification signal during a time interval during which said transmitter transmits the scheduling request signal when a transmission of the quality notification signal coincides with that of the scheduling request signal. While UMESH does perform a process to transmit a scheduling request signal, UMESH never performs the required "second control process."

59. UMESH' first transmission method establishes a predetermined schedule for sending the CQI signal and the EULUL control signal when the EULUL control signal needs to be sent. This predetermined schedule is a fixed pattern, such as a pattern of two CQI signals for every EULUL control signal, like shown in Fig. 10 of UMESH. UMESH's second transmission method, when the EULUL control signal needs to be sent, sends a notification signal to provide the base station with advanced notice of the subsequently sent EULUL control signal. Thus, in both transmission methods, UMESH can send the EULUL control signal as a scheduling request signal, which Petitioner asserts is the "first control process."

60. While UMESH's transmission methods may schedule the transmission of the EULUL control signal, neither one performs the "second control process." UMESH never checks to determine if there is any actual or potential coincidence, conflict, or collision between the transmission of the CQI signal and the transmission

of the EULUL controls signal. This check is never made because UMESH's transmission methods have already scheduled the transmission of the EULUL control signal. With the EULUL control signal already scheduled for transmission according to both transmission methods, a POSITA would understand that it logically and necessarily follows that the transmission of the CQI signal and the EULUL control signal cannot coincide. Without the possibility of their transmission coinciding, UMESH provides no reason to even check if there could be coincidence. UMESH therefore fails to perform the "second control process" as required by claim 3.

c. Knowledge of a POSITA Cannot Cure UMESH's Deficiencies

61. As explained above, UMESH does not meet the "second control process" or conditioning the stopping of CQI transmission to when transmission of the CQI signal and the EULUL control signal coincide. To the extent Ground 1 relies on the knowledge of a POSITA, Petitioner's evidence for meeting limitation 3[5] in claim 3 relies solely on UMESH and makes no reference or citation to the knowledge of a POSITA. *See* Pet. 34-36. Accordingly, even if combinable, Petitioner has failed to meet its burden of demonstrating that each and every limitation of the '656 Patent claim 3 is disclosed by UMESH in view of the knowledge of a POSITA.

d. Petitioner has not shown UMESH discloses the "first control process" that transmits the scheduling request signal to the base station "when the mobile terminal has not been allocated a radio resource for transmitting said transmission data"

62. Petitioner's contention that UMESH transmits a scheduling request signal to the base station "when the mobile terminal has not been allocated a radio resource for transmitting said transmission data" is not supported by the evidence. To support this contention, Petitioner refers to ¶0075 of UMESH. Pet. 33-34. That paragraph states that:

> The mobile station 20a can transmit, for example, RR (rate request) / SI (scheduling information) as the EULUL control signal to the base station 10. RR/SI is one of the EULUL control signals being discussed by 3GPP. RR and SI are information necessary in enhanced access for the base station 10 to calculate uplink radio resources to assign to the mobile station 20a.

EX1010, ¶0075. But even when the EULUL control signal is the RR/SI, asserted to be a scheduling request signal, nothing in this paragraph indicates the RR/SI is sent when the mobile terminal has not been allocated a radio resource for transmitting transmission data.

63. In proper context, UMESH makes clear that the EULUL control signal as the RR/SI is sent when radio resources have already been allocated for transmitting transmission data. UMESH expressly teaches that the RR/SI information is necessary to provide enhanced access in which the base station

determines uplink radio resources to provide that enhanced access. EX1010, ¶0075. But independent of the uplink radio resources for "enhanced access," UMESH discloses that 3G mobile systems include a dedicated physical data channel (DPDCH) as a W-CDMA uplink physical channel. EX1010, ¶0002. The "enhanced access," on the other hand, is for configuring of the enhanced transmission of user data using an enhanced DPDCH (E-DPDCH). *Id*., ¶0003.

64. The E-DPDCH does not replace the DPDCH, but rather supplements it. UMESH confirms this supplemental aspect of the E-DPDCH when it indicates that it is "an object to transmit an enhanced uplink physical control signal conforming to enhanced access ***without affecting existing physical channels*** or increasing a peak-to-average ratio in transmission power of a mobile station." *Id*., ¶0010. In other words, the enhanced access using the E-DPDCH is configured when there are already existing physical channels including the DPDCH. In that context, the EULUL control signal as an RR/SI signal is sent in UMESH when the mobile terminal has already been allocated a radio resource, such as the DPDCH, for transmitting transmission data. The E-DPDCH is therefore an enhanced and additional radio resource for transmitting transmission data supplemental to the already existing DPDCH. Accordingly, the EULUL control signal as the RR/SI in UMESH is sent when radio resources have ***already*** been allocated for transmitting

transmission data, and UMESH consequently does not perform the "first control process" of claim 2.

F. Ground 2: UMESH in View of TS 25.309 Does Not Render Claim 3 Obvious

65. Even if combinable, Petitioner has failed to meet its burden of demonstrating that each and every limitation of the '656 Patent claim 3 is disclosed by UMESH in view of TS 25.309. Section VII.B.2.f. of the Petition, relating to claim 3's limitation of "a second control process that includes, when a transmission of said quality notification signal coincides with that of said scheduling request signal in said transmitter, stopping transmitting said quality notification signal during a time interval during which said transmitter transmits said scheduling request signal," relies exclusively on the evidence cited in Section VII.A.6 in Ground 1. Pet. 43. Similarly, Section VII.B.2.e. of the Petition, relating to claim 3's limitation of "a first control process," relies exclusively on UMESH to teach the scheduling request signal is sent "when the mobile terminal has not been allocated a radio resource for data transmission. Pet. 43. In other words, Ground 2 also relies solely on UMESH to address these limitations of claim 3 absent from UMESH without any reference or citation to TS 25.309.

66. Having failed to meet its burden, Ground 2 of the Petition must fail.

G. Ground 3: UMESH in View of TS R1-060583 Does Not Render Claim 3 Obvious

67. Even if combinable, Petitioner has failed to meet its burden of demonstrating that each and every limitation of the '656 Patent claim 3 is disclosed by UMESH in view of R1-060583. Section VII.C.2.f. of the Petition, also relating to claim 3's limitation of "a second control process that includes, when a transmission of said quality notification signal coincides with that of said scheduling request signal in said transmitter, stopping transmitting said quality notification signal during a time interval during which said transmitter transmits said scheduling request signal," relies exclusively on the evidence cited in Section VII.A.6 in Ground 1. Pet. 50. In other words, Ground 3 again relies solely on UMESH to address this limitation of claim 3 absent from UMESH without any reference or citation to R1-060583. Accordingly, Petitioner has failed to meet its burden of demonstrating that each and every limitation of the '656 Patent claim 3 is disclosed by UMESH in view of R1-060583.

68. Having failed to meet its burden, Ground 3 of the Petition must fail.

VII. CONCLUSION

69. 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 claim is not shown to be disclosed or obvious.

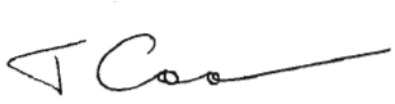
70. I understand that my opinions discussed above support a legal conclusion that the challenged claim is nonobvious.

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,

September 14, 2023



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Todor V. Cooklev, Ph.D.