

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

Petitioner,

v.

Mitsubishi Electric Corporation,

Patent Owner.

Case IPR2023-00957
U.S. Patent No. 10,200,976

EXHIBIT 2005
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. 10,200,976 (“the ’976 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.

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. 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.

6. 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.

7. 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.

8. 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.

9. 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.

10. 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.

11. 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.

12. 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.

13. Between 2007-2011 I participated in the work of the Software-Defined Radio Forum (later renamed Wireless Innovation Forum). During 2011-2012 I attended 3GPP standards committee meetings. Around that time, I contributed to and submitted several documents relating to LTE-Advanced.

14. 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.

15. 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.

16. 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.

17. 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

18. I am not a lawyer, and I do not intend to offer any opinions as to the interpretation of the law. When considering the '976 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

19. 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 '976 Patent claims priority to January 7, 2011. My opinions in this matter are from the perspective of a POSITA as of that date.

B. Level Of Ordinary Skill In The Art.

20. I understand that the Board has adopted Petitioner's proposal for the level of a person of ordinary skill in the art. As this level is consistent with my own view of the appropriate level of a person of ordinary skill in the art, I have no further opinion on it. As further discussed below, my opinions as stated in this declaration

are valid and in accordance with level of ordinary skill in the art adopted by the Board.

C. Claim Construction.

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

22. 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. Anticipation Legal Standard.

23. I understand that a patent claim is anticipated if every element of a claim is disclosed expressly or inherently in a single prior art reference. In addition to every element being disclosed expressly or inherently, I also understand that the single prior art reference must disclose every element being arranged or combined in the same way as the claim. I further understand that it is not proper to combine different embodiments in a single prior art reference to show anticipation.

E. 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 claim 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 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 '976 PATENT

31. Having reviewed the '976 Patent, I understand that it describes a new and innovative way to implement carrier aggregation in a communication system such as LTE that improves and maximizes efficient use of system resources. Carrier aggregation (CA) involves aggregating two or more component carriers (CCs) to support wider transmission bandwidths of up to 100 MHz. EX1001, 9:6-9. The CA proposed in the '976 Patent supports contiguous CCs, non-contiguous CCs, and CCs in different frequency bandwidths. *Id.*, 9:17-19.

32. Prior to the '976 Patent, it was understood by a POSITA that a conventional cellular communication system required resources for uplink (UL) to be reserved in the same frequency band as that of the resources for downlink (DL). EX1001, 10:37-40. This required pairing of UL and DL frequency resources in the correspondingly paired UL and DL frequency bands can lead to inefficient allocation of resources. For example, a user equipment (UE), such as a mobile phone, may at

times need more resources for downloading data from a base station than it needs for uploading data. *Id.*, 10:40-47.

A. Carrier Aggregation and Allocating Different UL and DL Resources

33. The 3rd Generation Partnership Project (3GPP) proposed a fourth generation (4G) cellular communication system (also known as LTE) to address some of these inefficiencies, such as when a UE needs more downlink transmission resources than uplink transmission resources. In 4G LTE, the 3GPP proposed ways to enable a UE to have increased bandwidth and to enable a UE to be configured with more downlink resources than uplink resources. Addressing increased bandwidth, 4G LTE Release 10 includes the concept of carrier aggregation (CA). EX1001, 9:6-16. CA aggregates two or more component carriers (CCs) for downlink and uplink, which supports wider transmission bandwidths by enabling the UE to transmit and receive data across multiple CCs. *Id.* The multiple CCs are provided by a plurality of serving cells from a base station at the same time.

34. In its discussion of Carrier Aggregation, TS 36.300 V10.0.0 release 10 proposed both implementing CA and allowing a UE to be configured with more downlink resources than uplink resources. *See, e.g.*, EX1012, 50 (§ 7.5 “Carrier Aggregation”). I note that these same capabilities are also summarized in the ’976 Patent. EX1001, 9:3-67. CA configurations according to TS 36.300 V10.0.0 include a UE that can be configured to have UL and DL links with a Primary Serving Cell

(PCell) and respective UL and DL links with one or more Secondary Serving Cells (SCell). EX1012, 50. The PCell includes a Downlink Primary Component Carrier (DL PCC) and an Uplink Primary Component Carrier (UL PCC) while each SCell includes a Downlink Secondary Component Carrier (DL SCC) and an Uplink Secondary Component Carrier (UL SCC). *Id.* I note this is also described in the '976 Patent. EX1001, 9:3-43. A UE having this CA capability and configured to communicate with one or more SCells in addition to the PCell has increased bandwidth for UL and DL data transmission as compared to a UE without CA capability. *See* EX1001, 9:6-9; EX1012, 40 (§ 5.5 "Carrier Aggregation").

35. TS 36.300 V10.0.0 also indicated that it is possible for a UE to have a different number of UL and DL resources, referred to as asymmetrical CA by the '976 Patent. EX1012, 50; EX1001, 23:23-31. The UE is typically configured to communicate with each SCell using one UL SCC and one DL SCC, with each SCell being configured by the base station to have one UL SCC and one DL SCC available to the UE. *See* EX2010, 27:7-12. While this is the typical configuration and arrangement, it is also possible for the UE to have a number of DL SCCs larger than or equal to the number of UL SCCs although no UE configuration with an SCell can be for UL resources only. EX1012, 50. The '976 Patent describes different options for configuring a UE with different arrangements of UL and DL resources. EX1001, 9:44-49.

36. While asymmetrical CA permitted a UE to be configured with differing numbers of UL and DL resources, each cell was nevertheless configured by the base station with UL resources associated with DL resources. EX1001, 23:41-46. That's because, prior to the '976 Patent, no cell could be configured by a base station to have a DL frequency band without a UL frequency band paired therewith. *Id.*, 23:46-49. In other words, the base station needed to reserve the UL resource for a cell in the same frequency band as that of the DL resource. *Id.*, 24:3-8. Similarly, a UL frequency band, which is paired with a DL frequency band, needed to be necessarily reserved by the base station in the DL frequency band, which diminished efficient use of frequency resources. *Id.*, 24:8-15.

B. Pairing of DL and UL Frequency Bands and Corresponding Pairing of DL/UL Links in a Cell

37. As explained in TS 36.101, LTE established predetermined pairing of frequency bands, also understood by a POSITA as operating bands, usable for communication between a cell and a UE. EX1001, 8:33-36. Each DL frequency band has a predetermined pairing with a UL frequency band, and each UL frequency band differs from the paired DL frequency band. *Id.*, 8:36-43. As would have been understood by a POSITA, this required pairing in frequency-division duplex (FDD) communication was configured to serve conventional communication, such as voice communication, which required transmission and reception at the same time by splitting the frequencies between downlink and uplink. *Id.*, 8:36-47.

38. TS 36.101 V10.0.0 (identified as Non-Patent Document 8 in the '976 Patent) shows an example of this predetermined pairing of frequency bands is shown. EX2006, 16-17 (§ 5.5 Operating Bands).

Table 5.5-1 E-UTRA operating bands

E-UTRA Operating Band	Uplink (UL) operating band BS receive UE transmit		Downlink (DL) operating band BS transmit UE receive		Duplex Mode
	~~F_{UL, low}~~	~~= F_{UL, high}~~	~~F_{DL, low}~~	~~= F_{DL, high}~~	
1	1920 MHz	– 1980 MHz	2110 MHz	– 2170 MHz	FDD
2	1850 MHz	– 1910 MHz	1930 MHz	– 1990 MHz	FDD
3	1710 MHz	– 1785 MHz	1805 MHz	– 1880 MHz	FDD
4	1710 MHz	– 1755 MHz	2110 MHz	– 2155 MHz	FDD
5	824 MHz	– 849 MHz	869 MHz	– 894MHz	FDD
6 ¹	830 MHz	– 840 MHz	875 MHz	– 885 MHz	FDD
7	2500 MHz	– 2570 MHz	2620 MHz	– 2690 MHz	FDD
8	880 MHz	– 915 MHz	925 MHz	– 960 MHz	FDD
9	1749.9 MHz	– 1784.9 MHz	1844.9 MHz	– 1879.9 MHz	FDD
10	1710 MHz	– 1770 MHz	2110 MHz	– 2170 MHz	FDD
11	1427.9 MHz	– 1447.9 MHz	1475.9 MHz	– 1495.9 MHz	FDD
12	698 MHz	– 716 MHz	728 MHz	– 746 MHz	FDD
13	777 MHz	– 787 MHz	746 MHz	– 756 MHz	FDD
14	788 MHz	– 798 MHz	758 MHz	– 768 MHz	FDD
15	Reserved		Reserved		FDD
16	Reserved		Reserved		FDD
17	704 MHz	– 716 MHz	734 MHz	– 746 MHz	FDD
18	815 MHz	– 830 MHz	860 MHz	– 875 MHz	FDD
19	830 MHz	– 845 MHz	875 MHz	– 890 MHz	FDD
20	832 MHz	– 862 MHz	791 MHz	– 821 MHz	FDD
21	1447.9 MHz	– 1462.9 MHz	1495.9 MHz	– 1510.9 MHz	FDD
...					
33	1900 MHz	– 1920 MHz	1900 MHz	– 1920 MHz	TDD
34	2010 MHz	– 2025 MHz	2010 MHz	– 2025 MHz	TDD
35	1850 MHz	– 1910 MHz	1850 MHz	– 1910 MHz	TDD
36	1930 MHz	– 1990 MHz	1930 MHz	– 1990 MHz	TDD
37	1910 MHz	– 1930 MHz	1910 MHz	– 1930 MHz	TDD
38	2570 MHz	– 2620 MHz	2570 MHz	– 2620 MHz	TDD
39	1880 MHz	– 1920 MHz	1880 MHz	– 1920 MHz	TDD
40	2300 MHz	– 2400 MHz	2300 MHz	– 2400 MHz	TDD
41	2496 MHz	– 2690 MHz	2496 MHz	– 2690 MHz	TDD

Note 1: Band 6 is not applicable

As shown in Table 5.5-1 above, every UL operating band is paired with a DL operating band.

39. A cell broadcasts the frequency band information and uplink carrier frequency deployed by the cell to UEs as broadcast information. EX1001, 8:57-61.

The frequency band information is included in a System Information Block 1 (SIB1), and uplink carrier frequency is included in a SIB2. *Id.* Notably, in the event that the uplink carrier frequency is not included in the SIB2, the UE can still derive the uplink carrier frequency from the downlink carrier frequency included in SIB1. *Id.*, 8:61-65. To do so, the UE uses a known default value for the transmit-receive (TX-RX) frequency separation. *Id.*

C. Proposals to Enable a UE to be Configured with DL Resource Only on an SCell

40. Having reviewed TS 36.300 V10.0.0, I did not find anything in this reference that teaches a POSITA how to indicate to a UE to have a configuration with more DL resources than UL resources. The '976 Patent fills in for this absence, describing multiple proposals for notifying the UE to be configured with more DL resources than UL resources. EX1001, 23:23-40. Such configurations include enabling a UE to be configured to use only the DL SCC of a particular SCell.

41. The '976 Patent discloses that the UE can recognize it should not be configured with the UL CC associated with the DL CC of that cell by receiving indication information in the SIB1 or SIB2. *Id.*, 24:41-61. One example disclosed in the '976 Patent is to use the parameter “ul-CarrierFreq” as indication information; “ul-CarrierFreq” is included in SIB2 to indicate the carrier frequency of the UL CC associated with the DL CC in the cell. To indicate the UE should not be configured with the UL CC, “ul-CarrierFreq” can be configured without a value or the parameter

itself can be removed altogether from the SIB2. *Id.*, 25:10-41. In another example, the '976 Patent suggests creating a new parameter called "ULCCconfig." This new parameter can be added to the SIB as a binary value with a value of "1" if the UE is to be configured with the UL CC and "0" if the UE is not configured with the UL CC. *Id.*, 25:42-52.

42. The '976 Patents suggestion of using an existing parameter or creating a parameter to provide indication information is very similar to the schemes disclosed in R2-104515 (EX1013). Opt 2 in R2-104515 suggested using an existing parameter "freqBandIndicator" to indicate the UE should not be configured with the UL CC when the parameter is absent from the SIB. EX1013, 4. This existing parameter "freqBandIndicator" is very similar to the parameter "ul-CarrierFreq" described in the '976 Patent.

43. When no "freqBandIndicator" is included, thus indicating the UE should not be configured with the UL CC, R1-104515 nevertheless notes that the base station "can choose to transmit or not to transmit this secondary cell's UL resources configurations to the UE" and the "UE can ignore these configurations because of UL absence." *Id.* Since the base station can choose whether or not to transmit the cell's UL resources configurations, a POSITA would clearly have understood that the base station will have configured the secondary cell to have UL resources configurations. This distinction illustrates how UE configuration

differentiates from cell configuration. While the base station has configured the secondary cell to have UL resources, the UE simply “ignores” those UL resources.

44. Opt 3 in R2-104515 proposes a scheme very similar to the new parameter “ULCCconfigu” described in the ’976 Patent. Opt 3 disclosed creating a new parameter “ul-PresenceIndicator” to indicate whether or not the UE is to be configured with UL resources. EX1013, 4-5. When set to false, “the UE ignores any UL resource configurations of the secondary cell,” and the UE is not configured with UL resources. *Id.*, 5. It is also significant that Opt 3 likewise indicates the base station “can choose to transmit or not to transmit this secondary cell’s UL resources configurations to the UE” and the “UE can ignore these configurations because of UL absence.” *Id.* Thus, a POSITA would have understood in both Opt 2 and Opt 3 of R2-104515 that the base station has already configured the secondary cell to have UL resources, regardless of whether the UE is configured to simply “ignore” those UL resources.

D. Innovation of the ’976 Patent to Enable Base Station to Configure Cell with DL Resources Only

45. The fact that the base station has already configured the secondary cell to include UL resources as disclosed in R2-104515, even when a UE is to be

configured with DL resources only,¹ resulted in a significant inefficiency. As would have been understood by a POSITA, this inefficiency arose due to the predetermined pairing of UL and DL frequency bands and the necessary pairing of UL and DL resources when a base station configures a cell.

46. Not only did the '976 Patent recognize this inefficiency, but it also proposed a solution. In particular, the '976 Patent teaches a new method of assigning frequency bands (i.e., operating bands) that includes establishing a frequency band for DL only with no paired UL frequency band. EX1001, 49:46-57. Fig. 41, shown below, provides an example of a DL frequency band without a paired UL frequency band.

F I G . 4 1

Band	Uplink (UL) operating Band	Downlink (DL) operating Band	Duplex Mode
	F _{UL_low} — F _{UL_high}	F _{DL_low} — F _{DL_high}	
A	—	FB_DL_l — FB_DL_h	FDD

Band A in Fig. 41 has a designated frequency range between FB_DL_l and FB_DL_h for the downlink but with no frequency range pairing for the uplink. *Id.*

¹ Prior to the '976 Patent “configured with DL resources only” means that there are nevertheless UL resources configured but unused. According to the '976 Patent “configured with DL resources only” means that there are no UL resources configured.

47. The '976 Patent's proposed solution to this inefficiency, establishing a DL frequency band without a paired UL frequency band, provides multiple benefits. First, it eliminates the need to allocate a frequency band for uplink as an actual frequency resource, which preserves that frequency band for other use and allows for efficient use of frequency resources in a case where there are discrete and narrow-band frequency resources. *Id.*, 49:58-67. By eliminating the need to always reserve a resource for UL in the same frequency band as that of a resource for DL in the communication system, the system can allocate the UL resource for UL to another cell, another operator, or another system, which improves the efficient use of frequency resources. *Id.*, 32:40-50.

48. In addition, such a configuration enables a reduction in the amount of necessary information provided to a UE served by the cell. *Id.*, 50:1-5. Since the DL CC configured in the DL frequency band is included in the SIB1, and the configuration of the frequency band for DL with no paired UL frequency band is predetermined (e.g., like in Fig. 41), the UE already knows this predetermined arrangement and can recognize the configuration in advance. *Id.*, 50:6-10. The UE can therefore recognize that the frequency band in which that cell is configured has no UL frequency band, which enables the UE to recognize that there is no UL CC to be associated with a DL CC of that cell. *Id.*, 50:11-17. As a result, the system information of a cell can be reduced, which enables a reduced signaling amount from

the cell to the UE, in contrast to the schemes described in R2-104515. *Id.*, 50:17-19.

49. Moreover, because the frequency band assigned to the cell has only a DL frequency band without a paired UL frequency band, the base station necessarily configures the cell without UL resources, which reduces the processing burden of the base station. In other words, by configuring the system to include a frequency band with DL only and no paired UL, the base station can use that frequency band to configure a “non-associated cell” having DL resources only, in contrast to R2-104515 in which the base station configures each secondary cell to include both UL and DL resources.

50. 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 this improved and innovative use of frequency allocation and likewise fails to disclose or suggest the inventive solution disclosed in the '976 Patent and recited in claim 2.

V. CLAIM-AT-ISSUE

51. The only claim being challenged by the Petition is claim 2 of the '976 Patent, which recites the following:

2. A communication terminal device performing radio communication with a base station device, wherein

the communication terminal device performs uplink communication using an associated cell configured by the base station to include a resource for uplink and a resource for downlink, the resource for uplink being allocated to the uplink communication to the base station device, the resource for downlink being allocated to the downlink communication from the base station device, and

the communication terminal device performs downlink communication using the associated cell and a non-associated cell configured by the base station to include only another resource for downlink, the other resource for downlink being allocated to the downlink communication from the base station device.

VI. OPINIONS

A. Ground 1: Even if Combinable, TS 36.300 and R2-104515 Fail to Disclose or Suggest a “non-associated cell” as Recited in Claim 2 of the ’976 Patent

52. Claim 2 of the ’976 Patent makes a distinction between an “associated cell” and a “non-associated cell. Whereas the “associated cell” has both uplink and downlink resources allocated, the base station configures the “non-associated cell” to have only a downlink resource with no uplink resource allocated.

53. According to claim 2, it is the base station that configures the “non-associated cell” to have only a downlink resource, not the communication terminal

such as a UE. Based on my examination of the Petition, this distinction recited in claim 2 about what element configures the “non-associated cell” is not addressed in the Petition. More important, as I will explain, neither TS 36.300 nor R2-104515 teaches that the base station configures the “non-associated cell” to have only a downlink resource.

1. TS 36.300, as of the priority date of the '976 Patent, did not disclose or suggest a “non-associated cell” configured by the base station to have only a downlink resource allocated

54. Based on my experience with and knowledge of 3GPP technical specifications, the TS 36.300 specification provides an overview of the overall architecture and works in conjunction with other technical specifications to fill in details on particular features. Accordingly, TS 36.300 10.0.0 (EX1012), which is cited in Ground 1, is associated with other 3GPP technical specifications including TS 36.101. It is notable that TS 36.300 indicates it provides “an overview and overall description of the E-UTRAN radio interface protocol architecture,” but “[d]etails of the radio interface protocols are specified in companion specifications of the 36 series.” Among those companion specifications is TS 36.101, which provides the specification for User Equipment (UE) radio transmission and reception and “establishes the minimum RF characteristics and minimum performance requirements for E-UTRA User Equipment (UE).” EX2006, 12. A POSITA would have studied TS 36.101 to inform their understanding of whether or not a base station

could configure a non-associated cell to have a resource for downlink but without a resource for uplink.

55. TS 36.101 V10.0.0 (EX2006), which is contemporaneous to TS 36.300 V10.0.0, not only has no disclosure of a “non-associated cell” being configured by a base station with downlink resources only, but also does not allow such a configuration. That version and all subsequent versions prior to the priority date of the ’976 Patent disclose the base station configuring an “associated cell” with both uplink and downlink resources allocated. It was not until well more than a year after the priority date that TS 36.300 in conjunction with TS 36.101 V11.3.0 (EX2009) discloses the possibility of a “non-associated cell” having only downlink resources allocated.

a. TS 36.101 confirms that all operating bands in TS 36.300 prior to the priority date of the ’976 Patent were assigned with both uplink and downlink resources

56. It is my opinion that a POSITA’s understanding of would have studied TS 36.101 V10.0.0 (EX2006) to determine whether or not a cell included resources for uplink and downlink according to Release 10, as disclosed in TS 36.300 V10.0.0 (EX1012). It is notable that the ’976 Patent specifically cites and describes the relevance of TS 36.101 V10.0.0 in relation to the required pairing of UL and DL operating bands, as I explained earlier. TS 36.101 includes a Section 5 “Operating

bands and channel arrangement” that is highly relevant to the assignment of uplink and downlink resources and the pairing of operating bands.

Table 5.5-1 E-UTRA operating bands

E-UTRA Operating Band	Uplink (UL) operating band BS receive UE transmit	Downlink (DL) operating band BS transmit UE receive	Duplex Mode
	$F_{UL,low} - F_{UL,high}$	$F_{DL,low} - F_{DL,high}$	
1	1920 MHz – 1980 MHz	2110 MHz – 2170 MHz	FDD
2	1850 MHz – <u>1910 MHz</u>	1930 MHz – 1990 MHz	FDD
3	1710 MHz – 1785 MHz	1805 MHz – 1880 MHz	FDD
4	1710 MHz – 1755 MHz	2110 MHz – 2155 MHz	FDD
5	824 MHz – 849 MHz	880 MHz – 894 MHz	FDD
6 ¹	830 MHz – <u>840 MHz</u>	875 MHz – 885 MHz	FDD
7	2500 MHz – 2570 MHz	2620 MHz – 2690 MHz	FDD
8	880 MHz – 915 MHz	925 MHz – 960 MHz	FDD
9	1749.9 MHz – 1784.9 MHz	1844.9 MHz – 1879.9 MHz	FDD
10	1710 MHz – 1770 MHz	2110 MHz – 2170 MHz	FDD
11	1427.9 MHz – 1447.9 MHz	1475.9 MHz – 1495.9 MHz	FDD
12	698 MHz – 716 MHz	728 MHz – 746 MHz	FDD
13	777 MHz – 787 MHz	748 MHz – 758 MHz	FDD
14	788 MHz – 798 MHz	758 MHz – 768 MHz	FDD
15	Reserved	Reserved	FDD
16	Reserved	Reserved	FDD
17	704 MHz – 716 MHz	734 MHz – 746 MHz	FDD
18	815 MHz – 830 MHz	860 MHz – 875 MHz	FDD
19	830 MHz – 845 MHz	875 MHz – 890 MHz	FDD
20	832 MHz – 862 MHz	791 MHz – 821 MHz	FDD
21	1447.9 MHz – 1462.9 MHz	1495.9 MHz – 1510.9 MHz	FDD
...			
33	1900 MHz – 1920 MHz	1900 MHz – 1920 MHz	TDD
34	2010 MHz – 2025 MHz	2010 MHz – 2025 MHz	TDD
35	1850 MHz – 1910 MHz	1850 MHz – 1910 MHz	TDD
36	1930 MHz – 1990 MHz	1930 MHz – 1990 MHz	TDD
37	1910 MHz – 1930 MHz	1910 MHz – 1930 MHz	TDD
38	2570 MHz – 2620 MHz	2570 MHz – 2620 MHz	TDD
39	1880 MHz – 1920 MHz	1880 MHz – 1920 MHz	TDD
40	2300 MHz – 2400 MHz	2300 MHz – 2400 MHz	TDD
41	2496 MHz – 2690 MHz	2496 MHz – 2690 MHz	TDD

Note 1: Band 6 is not applicable

The operating bands in Table 5.5-1 define the frequencies used for uplink and downlink communication and thus define both uplink and downlink resources for every E-UTRA operating band.

57. When configuring a cell, TS 36.101 V10.0.0 shows that the base station would always assign resources provided by the frequency bands for both downlink and uplink. The opposite applies as well. Since TS 36.101 V10.0.0 pairs every

frequency band with both UL and DL resources, a POSITA would have understood that it is not possible for the base station to configure the cell by assigning a resource for downlink without also assigning a resource for uplink at the same time. A POSITA would therefore have concluded that Release 10, which includes TS 36.300 V10.0.0 (EX1012), did not teach a “non-associated cell” being configured by a base station to have downlink resources only.

58. Having reviewed the relevant 3GPP technical specifications developed prior to the priority date of the '976 Patent, it is clear that none of them disclosed the ability of a base station to configure a cell with only downlink resources. For some time after the priority date of the '976 Patent, this remained the same. For example, TS 36.101 V10.4.0 (EX2007) published ten months after the '976 Patent priority date defined E-UTRA operating bands similarly to V10.0.0 and also specifically defined carrier aggregation operation for the frequency bands for E-UTRA. EX2007, 16-17. The E-UTRA operating bands for TS 36.101 V10.4.0 are reproduced below:

Table 5.5-1 E-UTRA operating bands

E-UTRA Operating Band	Uplink (UL) operating band BS receive UE transmit	Downlink (DL) operating band BS transmit UE receive	Duplex Mode
	$F_{UL,low} = F_{UL,high}$	$F_{DL,low} = F_{DL,high}$	
1	1920 MHz – 1980 MHz	2110 MHz – 2170 MHz	FDD
2	1850 MHz – 1910 MHz	1930 MHz – 1990 MHz	FDD
3	1710 MHz – 1785 MHz	1805 MHz – 1880 MHz	FDD
4	1710 MHz – 1755 MHz	2110 MHz – 2155 MHz	FDD
5	824 MHz – 849 MHz	869 MHz – 894 MHz	FDD
6 ¹	830 MHz – 840 MHz	875 MHz – 885 MHz	FDD
7	2500 MHz – 2570 MHz	2620 MHz – 2690 MHz	FDD
8	880 MHz – 915 MHz	925 MHz – 960 MHz	FDD
9	1749.9 MHz – 1784.9 MHz	1844.9 MHz – 1879.9 MHz	FDD
10	1710 MHz – 1770 MHz	2110 MHz – 2170 MHz	FDD
11	1427.9 MHz – 1447.9 MHz	1475.9 MHz – 1495.9 MHz	FDD
12	699 MHz – 716 MHz	729 MHz – 746 MHz	FDD
13	777 MHz – 787 MHz	746 MHz – 756 MHz	FDD
14	788 MHz – 798 MHz	758 MHz – 768 MHz	FDD
15	Reserved	Reserved	FDD
16	Reserved	Reserved	FDD
17	704 MHz – 716 MHz	734 MHz – 746 MHz	FDD
18	815 MHz – 830 MHz	860 MHz – 875 MHz	FDD
19	830 MHz – 845 MHz	875 MHz – 890 MHz	FDD
20	832 MHz – 862 MHz	791 MHz – 821 MHz	FDD
21	1447.9 MHz – 1462.9 MHz	1495.9 MHz – 1510.9 MHz	FDD
22	3410 MHz – 3490 MHz	3510 MHz – 3590 MHz	FDD
23	2000 MHz – 2020 MHz	2180 MHz – 2200 MHz	FDD
24	1626.5 MHz – 1660.5 MHz	1525 MHz – 1559 MHz	FDD
25	1850 MHz – 1915 MHz	1930 MHz – 1995 MHz	FDD
...			
33	1900 MHz – 1920 MHz	1900 MHz – 1920 MHz	TDD
34	2010 MHz – 2025 MHz	2010 MHz – 2025 MHz	TDD
35	1850 MHz – 1910 MHz	1850 MHz – 1910 MHz	TDD
36	1930 MHz – 1990 MHz	1930 MHz – 1990 MHz	TDD
37	1910 MHz – 1930 MHz	1910 MHz – 1930 MHz	TDD
38	2570 MHz – 2620 MHz	2570 MHz – 2620 MHz	TDD
39	1880 MHz – 1920 MHz	1880 MHz – 1920 MHz	TDD
40	2300 MHz – 2400 MHz	2300 MHz – 2400 MHz	TDD
41	2496 MHz – 2690 MHz	2496 MHz – 2690 MHz	TDD
42	3400 MHz – 3600 MHz	3400 MHz – 3600 MHz	TDD
43	3600 MHz – 3800 MHz	3600 MHz – 3800 MHz	TDD

Note 1: Band 6 is not applicable

In addition, according to TS 36.101 V10.4.0, “E-UTRA carrier aggregation is designed to operate in the operating bands defined in Tables 5.5A-1 and 5.5A-2,” reproduced below:

Table 5.5A-1: Intra band CA operating bands

E-UTRA CA Band	E-UTRA Band	Uplink (UL) operating band			Downlink (DL) operating band			Duplex Mode
		BS receive / UE transmit			BS transmit / UE receive			
		~~FUL_low = FUL_high~~			~~FDL_low = FDL_high~~			
CA_1	1	1920 MHz	–	1980 MHz	2110 MHz	–	2170 MHz	FDD
CA_40	40	2300 MHz	–	2400 MHz	2300 MHz	–	2400 MHz	TDD

Table 5.5A-2: Inter band CA operating bands

E-UTRA CA Band	E-UTRA Band	Uplink (UL) operating band			Downlink (DL) operating band			Duplex Mode
		BS receive / UE transmit			BS transmit / UE receive			
		~~FUL_low = FUL_high~~			~~FDL_low = FDL_high~~			
CA_1-5	1	1920 MHz	–	1980 MHz	2110 MHz	–	2170 MHz	FDD
	5	824 MHz	–	849 MHz	869 MHz	–	894 MHz	

Just like the earlier version, TS36.101 V10.4.0 defines all CA operating bands with uplink and downlink resources always paired together. Accordingly, TS 36.101 V10.4.0, just like TS 36.101 V10.0.0, again teaches that it is not possible for the base station to configure the cell with downlink resources without also configuring the cell with uplink resources at the same time, including in the context of carrier aggregation.

59. Advancing a year, TS 36.101 V11.2.0 (EX2008) published in September 2012 still required assignment of both uplink and downlink resources across all operating bands including for carrier aggregation.

Table 5.5-1 E-UTRA operating bands

E-UTRA Operating Band	Uplink (UL) operating band BS receive UE transmit	Downlink (DL) operating band BS transmit UE receive	Duplex Mode
	$F_{UL, low} - F_{UL, high}$	$F_{DL, low} - F_{DL, high}$	
1	1920 MHz – 1980 MHz	2110 MHz – 2170 MHz	FDD
2	1850 MHz – 1910 MHz	1930 MHz – 1990 MHz	FDD
3	1710 MHz – 1785 MHz	1805 MHz – 1880 MHz	FDD
4	1710 MHz – 1755 MHz	2110 MHz – 2155 MHz	FDD
5	824 MHz – 849 MHz	869 MHz – 894 MHz	FDD
6 ¹	830 MHz – 840 MHz	875 MHz – 885 MHz	FDD
7	2500 MHz – 2570 MHz	2620 MHz – 2690 MHz	FDD
8	880 MHz – 915 MHz	925 MHz – 960 MHz	FDD
9	1749.9 MHz – 1784.9 MHz	1844.9 MHz – 1879.9 MHz	FDD
10	1710 MHz – 1770 MHz	2110 MHz – 2170 MHz	FDD
11	1427.9 MHz – 1447.9 MHz	1475.9 MHz – 1495.9 MHz	FDD
12	699 MHz – 716 MHz	729 MHz – 746 MHz	FDD
13	777 MHz – 787 MHz	746 MHz – 756 MHz	FDD
14	788 MHz – 798 MHz	758 MHz – 768 MHz	FDD
15	Reserved	Reserved	FDD
16	Reserved	Reserved	FDD
17	704 MHz – 716 MHz	734 MHz – 746 MHz	FDD
18	815 MHz – 830 MHz	860 MHz – 875 MHz	FDD
19	830 MHz – 845 MHz	875 MHz – 890 MHz	FDD
20	832 MHz – 862 MHz	791 MHz – 821 MHz	FDD
21	1447.9 MHz – 1462.9 MHz	1495.9 MHz – 1510.9 MHz	FDD
22	3410 MHz – 3490 MHz	3510 MHz – 3590 MHz	FDD
23	2000 MHz – 2020 MHz	2180 MHz – 2200 MHz	FDD
24	1626.5 MHz – 1660.5 MHz	1525 MHz – 1559 MHz	FDD
25	1850 MHz – 1915 MHz	1930 MHz – 1995 MHz	FDD
26	814 MHz – 849 MHz	859 MHz – 894 MHz	FDD
27	807 MHz – 824 MHz	852 MHz – 869 MHz	FDD
28	703 MHz – 748 MHz	758 MHz – 803 MHz	FDD
...			
33	1900 MHz – 1920 MHz	1900 MHz – 1920 MHz	TDD
34	2010 MHz – 2025 MHz	2010 MHz – 2025 MHz	TDD
35	1850 MHz – 1910 MHz	1850 MHz – 1910 MHz	TDD
36	1930 MHz – 1990 MHz	1930 MHz – 1990 MHz	TDD
37	1910 MHz – 1930 MHz	1910 MHz – 1930 MHz	TDD
38	2570 MHz – 2620 MHz	2570 MHz – 2620 MHz	TDD
39	1880 MHz – 1920 MHz	1880 MHz – 1920 MHz	TDD
40	2300 MHz – 2400 MHz	2300 MHz – 2400 MHz	TDD
41	2496 MHz – 2690 MHz	2496 MHz – 2690 MHz	TDD
42	3400 MHz – 3600 MHz	3400 MHz – 3600 MHz	TDD
43	3600 MHz – 3800 MHz	3600 MHz – 3800 MHz	TDD
44	703 MHz – 803 MHz	703 MHz – 803 MHz	TDD

NOTE 1: Band 6 is not applicable

Table 5.5A-1: Intra-band contiguous CA operating bands

E-UTRA CA Band	E-UTRA Band	Uplink (UL) operating band			Downlink (DL) operating band			Duplex Mode
		BS receive / UE transmit			BS transmit / UE receive			
		F _{UL_low} – F _{UL_high}			F _{DL_low} – F _{DL_high}			
CA_1	1	1920 MHz	–	1980 MHz	2110 MHz	–	2170 MHz	FDD
CA_7	7	2500 MHz	–	2570 MHz	2620 MHz	–	2690 MHz	FDD
CA_38	38	2570 MHz	–	2620 MHz	2570MHz	–	2620 MHz	TDD
CA_40	40	2300 MHz	–	2400 MHz	2300 MHz	–	2400 MHz	TDD
CA_41	41	2496 MHz		2690 MHz	2496 MHz		2690 MHz	TDD

Table 5.5A-2: Inter-band CA operating bands

E-UTRA CA Band	E-UTRA Band	Uplink (UL) operating band			Downlink (DL) operating band			Duplex Mode
		BS receive / UE transmit			BS transmit / UE receive			
		F _{UL_low} – F _{UL_high}			F _{DL_low} – F _{DL_high}			
CA_1-5	1	1920 MHz	–	1980 MHz	2110 MHz	–	2170 MHz	FDD
	5	824 MHz	–	849 MHz	869 MHz	–	894 MHz	
CA_1-18	1	1920	–	1980 MHz	2110	–	2170 MHz	FDD
	18	815	–	830 MHz	860	–	875 MHz	
CA_1-19	1	1920 MHz	–	1980 MHz	2110 MHz	–	2170 MHz	FDD
	19	830 MHz	–	845 MHz	875 MHz	–	890 MHz	
CA_1-21	1	1920 MHz	–	1980 MHz	2110 MHz	–	2170 MHz	FDD
	21	1447.9 MHz	–	1462.9 MHz	1495.9 MHz	–	1510.9 MHz	
CA_2-17	2	1850 MHz	–	1910 MHz	1930 MHz	–	1990 MHz	FDD
	17	704 MHz	–	716 MHz	734 MHz	–	746 MHz	
CA_3-5	3	1710 MHz	–	1785 MHz	1805 MHz	–	1880 MHz	FDD
	5	824 MHz	–	849 MHz	869 MHz	–	894 MHz	
CA_3-7	3	1710 MHz	–	1785 MHz	1805 MHz	–	1880 MHz	FDD
	7	2500 MHz	–	2570 MHz	2620 MHz	–	2690 MHz	
CA_3-20	3	1710 MHz	–	1785 MHz	1805 MHz	–	1880 MHz	FDD
	20	832 MHz	–	862 MHz	791 MHz	–	821 MHz	
CA_4-12	4	1710 MHz	–	1755 MHz	2110 MHz	–	2155 MHz	FDD
	12	699 MHz	–	716 MHz	629 MHz	–	746 MHz	
CA_4-13	4	1710 MHz	–	1755 MHz	2110 MHz	–	2155 MHz	FDD
	13	777 MHz	–	787 MHz	746 MHz	–	756 MHz	
CA_4-17	4	1710 MHz	–	1755 MHz	2110 MHz	–	2155 MHz	FDD
	17	704 MHz	–	716 MHz	734 MHz	–	746 MHz	
CA_7-20	7	2500 MHz	–	2570 MHz	2620 MHz	–	2690 MHz	FDD
	20	832 MHz	–	862 MHz	791 MHz	–	821 MHz	

EX2008, 20-22. Based on the examination of the relevant 3GPP technical specifications from prior to the priority date for the '976 Patent to a period of at least 18 months after the priority date, all versions of Release 10 and early versions of Release 11 required pairing of uplink and downlink resources across all operating bands including for carrier aggregation.

**b. Only well after the priority date of the '976 Patent does
TS 36.101 first disclose assigning downlink resources only**

60. It was not until December 2012 that the 3GPP standard in TS 36.101 V11.3.0 (EX2009) first suggests the possibility of a base station being able to configure a cell with downlink resources only. It is this version of TS 36.101 that identifies an operating band in which only downlink resources are assigned for the first time.

Table 5.5-1 E-UTRA operating bands

E-UTRA Operating Band	Uplink (UL) operating band BS receive UE transmit	Downlink (DL) operating band BS transmit UE receive	Duplex Mode
	$F_{UL_low} - F_{UL_high}$	$F_{DL_low} - F_{DL_high}$	
1	1920 MHz – 1980 MHz	2110 MHz – 2170 MHz	FDD
2	1850 MHz – 1910 MHz	1930 MHz – 1990 MHz	FDD
3	1710 MHz – 1785 MHz	1805 MHz – 1880 MHz	FDD
4	1710 MHz – 1755 MHz	2110 MHz – 2155 MHz	FDD
5	824 MHz – 849 MHz	869 MHz – 894 MHz	FDD
6 ¹	830 MHz – 840 MHz	875 MHz – 885 MHz	FDD
7	2500 MHz – 2570 MHz	2620 MHz – 2690 MHz	FDD
8	880 MHz – 915 MHz	925 MHz – 960 MHz	FDD
9	1749.9 MHz – 1784.9 MHz	1844.9 MHz – 1879.9 MHz	FDD
10	1710 MHz – 1770 MHz	2110 MHz – 2170 MHz	FDD
11	1427.9 MHz – 1447.9 MHz	1475.9 MHz – 1495.9 MHz	FDD
12	699 MHz – 716 MHz	729 MHz – 746 MHz	FDD
13	777 MHz – 787 MHz	746 MHz – 756 MHz	FDD
14	788 MHz – 798 MHz	758 MHz – 768 MHz	FDD
15	Reserved	Reserved	FDD
16	Reserved	Reserved	FDD
17	704 MHz – 716 MHz	734 MHz – 746 MHz	FDD
18	815 MHz – 830 MHz	860 MHz – 875 MHz	FDD
19	830 MHz – 845 MHz	875 MHz – 890 MHz	FDD
20	832 MHz – 862 MHz	791 MHz – 821 MHz	FDD
21	1447.9 MHz – 1462.9 MHz	1495.9 MHz – 1510.9 MHz	FDD
22	3410 MHz – 3490 MHz	3510 MHz – 3590 MHz	FDD
23	2000 MHz – 2020 MHz	2180 MHz – 2200 MHz	FDD
24	1626.5 MHz – 1660.5 MHz	1525 MHz – 1559 MHz	FDD
25	1850 MHz – 1915 MHz	1930 MHz – 1995 MHz	FDD
26	814 MHz – 849 MHz	859 MHz – 894 MHz	FDD
27	807 MHz – 824 MHz	852 MHz – 869 MHz	FDD
28	703 MHz – 748 MHz	758 MHz – 803 MHz	FDD
29	N/A	717 MHz – 728 MHz	FDD ²
...			
33	1900 MHz – 1920 MHz	1900 MHz – 1920 MHz	TDD
34	2010 MHz – 2025 MHz	2010 MHz – 2025 MHz	TDD
35	1850 MHz – 1910 MHz	1850 MHz – 1910 MHz	TDD
36	1930 MHz – 1990 MHz	1930 MHz – 1990 MHz	TDD
37	1910 MHz – 1930 MHz	1910 MHz – 1930 MHz	TDD
38	2570 MHz – 2620 MHz	2570 MHz – 2620 MHz	TDD
39	1880 MHz – 1920 MHz	1880 MHz – 1920 MHz	TDD
40	2300 MHz – 2400 MHz	2300 MHz – 2400 MHz	TDD
41	2496 MHz – 2690 MHz	2496 MHz – 2690 MHz	TDD
42	3400 MHz – 3600 MHz	3400 MHz – 3600 MHz	TDD
43	3600 MHz – 3800 MHz	3600 MHz – 3800 MHz	TDD
44	703 MHz – 803 MHz	703 MHz – 803 MHz	TDD
NOTE 1: Band 6 is not applicable			
NOTE 2: Restricted to E-UTRA operation when carrier aggregation is configured. The downlink operating band is paired with the uplink operating band (external) of the carrier aggregation configuration that is supporting the configured Pcell.			

EX2009, 21-23. As shown in Table 5.5-1 above, operating band 29 (highlighted in yellow) has only downlink resources assigned.

61. The operating band 29 in TS 36.101 V11.3.0 looks exactly like the operating band configuration shown in Fig. 41 of the '976 Patent in that both have no uplink resources paired with downlink resources.

F I G . 4 1

Band	Uplink (UL) operating Band	Downlink (DL) operating Band	Duplex Mode
	F _{UL_low} — F _{UL_high}	F _{DL_low} — F _{DL_high}	
A	—	FB_DL_l — FB_DL_h	FDD

As I previously explained, this configuration enables a base station to configure a cell with downlink resources only by configuring that cell with the operating band having only downlink resources.

62. Notably, TS 36.101 V11.3.0 also shows operating band 29 being used for carrier aggregation:

Table 5.5A-1: Intra-band contiguous CA operating bands

E-UTRA CA Band	E-UTRA Band	Uplink (UL) operating band		Downlink (DL) operating band		Duplex Mode
		BS receive / UE transmit		BS transmit / UE receive		
		F _{UL_low}	F _{UL_high}	F _{DL_low}	F _{DL_high}	
CA_1	1	1920 MHz	– 1980 MHz	2110 MHz	– 2170 MHz	FDD
CA_7	7	2500 MHz	– 2570 MHz	2620 MHz	– 2690 MHz	FDD
CA_38	38	2570 MHz	– 2620 MHz	2570MHz	– 2620 MHz	TDD
CA_40	40	2300 MHz	– 2400 MHz	2300 MHz	– 2400 MHz	TDD
CA_41	41	2496 MHz	2690 MHz	2496 MHz	2690 MHz	TDD

Table 5.5A-2: Inter-band CA operating bands

E-UTRA CA Band	E-UTRA Band	Uplink (UL) operating band			Downlink (DL) operating band			Duplex Mode
		BS receive / UE transmit			BS transmit / UE receive			
		F _{UL_low}	–	F _{UL_high}	F _{DL_low}	–	F _{DL_high}	
CA_1-5	1	1920 MHz	–	1980 MHz	2110 MHz	–	2170 MHz	FDD
	5	824 MHz	–	849 MHz	869 MHz	–	894 MHz	
CA_1-18	1	1920	–	1980 MHz	2110	–	2170 MHz	FDD
	18	815	–	830 MHz	860	–	875 MHz	
CA_1-19	1	1920 MHz	–	1980 MHz	2110 MHz	–	2170 MHz	FDD
	19	830 MHz	–	845 MHz	875 MHz	–	890 MHz	
CA_1-21	1	1920 MHz	–	1980 MHz	2110 MHz	–	2170 MHz	FDD
	21	1447.9 MHz	–	1462.9 MHz	1495.9 MHz	–	1510.9 MHz	
CA_2-17	2	1850 MHz	–	1910 MHz	1930 MHz	–	1990 MHz	FDD
	17	704 MHz	–	716 MHz	734 MHz	–	746 MHz	
CA_2-29	2	1850 MHz	–	1910 MHz	1930 MHz	–	1990 MHz	FDD
	29	N/A			717 MHz	–	728 MHz	
CA_3-5	3	1710 MHz	–	1785 MHz	1805 MHz	–	1880 MHz	FDD
	5	824 MHz	–	849 MHz	869 MHz	–	894 MHz	
CA_3-7	3	1710 MHz	–	1785 MHz	1805 MHz	–	1880 MHz	FDD
	7	2500 MHz	–	2570 MHz	2620 MHz	–	2690 MHz	
CA_3-8	3	1710 MHz		1785 MHz	1805 MHz		1880 MHz	FDD
	8	880 MHz		915 MHz	925 MHz		960 MHz	
CA_3-20	3	1710 MHz	–	1785 MHz	1805 MHz	–	1880 MHz	FDD
	20	832 MHz	–	862 MHz	791 MHz	–	821 MHz	
CA_4-5	4	1710 MHz	–	1755 MHz	2110 MHz	–	2155 MHz	FDD
	5	824 MHz	–	849 MHz	869 MHz	–	894 MHz	
CA_4A-7A	4	1710 MHz		1755 MHz	2110 MHz		2155 MHz	FDD
	7	2500 MHz		2570 MHz	2620 MHz		2690 MHz	
CA_4-12	4	1710 MHz	–	1755 MHz	2110 MHz	–	2155 MHz	FDD
	12	699 MHz	–	716 MHz	629 MHz	–	746 MHz	
CA_4-13	4	1710 MHz	–	1755 MHz	2110 MHz	–	2155 MHz	FDD
	13	777 MHz	–	787 MHz	746 MHz	–	756 MHz	
CA_4-17	4	1710 MHz	–	1755 MHz	2110 MHz	–	2155 MHz	FDD
	17	704 MHz	–	716 MHz	734 MHz	–	746 MHz	
CA_4-29	4	1710 MHz	–	1755 MHz	2110 MHz	–	2155 MHz	FDD
	29	N/A			717 MHz	–	728 MHz	

As shown in Table 5.5A-2, the operating bands 2 and 29 (highlighted in yellow) are aggregated with operating band 29 being limited to downlink resources only. Accordingly, as shown by these tables, not until December 2012 does the 3GPP standard disclose for the first time an operating band assignment consistent with a

“non-associated cell” that can be configured by a base station to have download resources only. All earlier versions always included assignments pairing uplink and downlink resources.

c. With no disclosure of assigning a downlink resource only until December 2012, the 3GPP standard including TS 36.300 and TS 36.101 fails to disclose or suggest a “non-associated cell” as recited in claim 2 of the ’976 Patent

63. It is my opinion that a POSITA would have concluded that the 3GPP standard including TS 36.300 V10.0.0 did not disclose or suggest a “non-associated cell” as recited in claim 2 that is configured by a base station to have downlink resources only. This conclusion is supported by the fact that no 3GPP standard included an operating band having downlink resources only and thus unpaired from uplink resources until December 2012, after the ’976 Patent priority date. It is therefore my opinion that TS 36.300 V10.0.0 (EX1012) does not teach a secondary serving cell (SCell) being configured by a base station to have downlink resources only.

64. While disclosing that a UE can be configured with more downlink resources than uplink resources (EX1012, 50), no operating band in the 3GPP standard prior to the ’976 Patent priority date had an operating band assignment with downlink resources only, unpaired from uplink resources. Because all operating band assignments paired both uplink and downlink, every SCell in TS 36.300 V10.0.0 would have been configured by a base station to include *both* uplink and

downlink resources. Moreover, when the base station configures a cell having both uplink and downlink resources (i.e., an “associated cell”), the UE can be configured to use that cell’s downlink resources only by “ignoring” the UL resource configuration established by the base station. *See, e.g.,* EX1013, 5. Because claim 2 requires the “non-associated cell” to be ***configured by the base station*** to have download resources only, TS 36.300 V10.0.0’s teaching that the *number* of downlink resources configured for use with the UE can be greater than the number of DL resources is irrelevant to teaching the “non-associated cell” of claim 2.

2. R2-104515 does not disclose or suggest a “non-associated cell” configured by the base station to have only a downlink resource allocated

65. R2-104515 does not teach the ***base station*** configuring a secondary cell to have downlink resources only and therefore does not teach a “non-associated cell.” While R2-104515 discloses ways for the ***UE*** to be configured with downlink resources only in a secondary cell, it also makes clear that the base station configures the secondary cell to have both uplink and downlink resources.

a. R2-104515’s recommended option makes clear the base station configures the secondary cell with both uplink and downlink resources

66. R2-104515 describes three options to notify a UE to be configured without UL resources in a secondary cell but recommends OPT 3 because of serious problems with Opt 1 and Opt 2. *See* EX1013, Observation 1 at 3, Observation 2 at

4, and Proposal at 5. Opt 3 proposes to define a new information element (IE) called ul-PresenceIndicator and defined as follows:

ul-PresenceIndicator

Indicates whether or not the UL resources are configured. When this parameter is set to 'false', the UE ignores any UL resource configurations of the secondary cell.

Id., 5. When ul-PresenceIndicator is set to false, “the UE ignores any UL resource configurations of the secondary cell.” Since the UE ignores any UL resource configurations of the secondary cell, the UE is not configured with UL resources. In my opinion, since the UE can be configured to “ignore” any UL resource configurations of the secondary cell, it would have been clear to a POSITA that the base station has necessarily configured the secondary cell to have UL resource configurations.

67. This understanding of a POSITA is confirmed in the following paragraph in R2-104515:

When *ul-PresenceIndicator* is set to 'false', UL resources will not be configured by UE, or the UE deletes any existing UL resource configurations of this cell. If *ul-PresenceIndicator* is set to 'true', UL resources are configured as normal. Note that when a secondary cell's *ul-PresenceIndicator* is set to 'false', eNB can choose to transmit or not to transmit its UL resources configurations to the UE. UE can ignore these configurations because of UL absence.

Id., 5. When ul-PresenceIndicator is set to false, the “UL resources will not be configured by UE,” but if set to true, “UL resources are configured as normal.” In my opinion, a POSITA would have understood that if ul-PresenceIndicator is being used to notify the UE whether it should or should not be configured with UL resources, then the necessary and logical conclusion is that the UE is also being

notified of the UL resources that have been configured by the base station for the secondary cell.

68. In addition, according to this paragraph, when `ul-PresenceIndicator` is false, the base station (i.e., eNB) “can choose to transmit or not to transmit this secondary cell’s UL resources configurations to the UE” and the “UE can ignore these configurations because of UL absence.” EX1013, 5. In my opinion, a POSITA would have understood that the secondary cell must have been configured with UL resources configurations because the base station chooses whether to transmit the secondary cell’s UL resources configurations. This understanding is confirmed by the fact that R2-104515 teaches the UE can “ignore” the UL resources configurations received from the base station.

69. I also completely disagree with Mr. Lanning’s assertion that the base station would not send the UL resource configuration if the base station did not intend the UE to use the resource are also directly contradicted by these subsequent statements in R2-104515. As I just explained, R2-104515 expressly states that, when `ul-PresenceIndicator` is false so that the UE is not configured with UL resources, the base station can still choose to transmit the secondary cell’s UL resources configurations to the UE. EX1013, 5.

b. How the base station configures a secondary cell is different and distinct from how the base station informs a UE to be configured to communicate with that secondary cell

70. To understand why neither TS 36.300 V10.0.0 nor R2-104515 teaches a secondary cell being configured by a base station with downlink resources only, it is important to understand that there is a difference between how a base station configures the resources of a secondary cell and how a UE is configured to use resources in that secondary cell. There is no contradiction between a base station configuring a secondary cell with both UL and DL resources and a base station messaging a UE to be configured to use only the DL resources of that secondary cell.

71. R2-104515's discloses using ul-PresenceIndicator to notify a UE to ignore UL resources despite the secondary cell being configured by the base station to have UL resources. EX1013, 4-5. A POSITA would clearly have understood that, if the base station had not configured the secondary cell with UL resources configurations, then there would not be any need to provide the UE with the ul-PresenceIndicator.

72. That there is a difference between how a base station configures the resources of a secondary cell and how a UE is configured to use resources in that secondary cell provides context for R2-104515's statement that "it is permitted that only DL resources are configured to secondary cells." Given that the R2-104515 expressly teaches the UE ignoring the UL resources of the secondary cell, a POSITA

would have understood this statement to mean that it is permitted to configure *the UE* with only DL resources when communicating with the secondary cells. My previous discussion regarding TS 36.300 and TS 36.101 that, as of the '976 Patent priority date, all frequency bands required configuring cells with paired UL and DL resources and that the base station was not capable of configuring the cell to have DL resources only, further supports this understanding. It is also consistent with R2-104515's recommended Opt 3 that makes clear that, while the UE can be configured to use only the DL resources of a secondary cell, the secondary cell has been configured by the base station to include UL resources configurations. EX1013, 5.

73. It is therefore my opinion that, since R2-104515 teaches that the base station configures the secondary cell with UL resources, regardless of whether the UE is configured to use those UL resources, R2-104515 does not teach a “non-associated cell configured by the base station to include only another resource for downlink.”

3. Even if combinable, claim 2 is not invalid because both TS 36.300 V10.0.0 and R2-104515 fail to disclose or suggest a “non-associated cell” configured by the base station to include only a downlink resource

74. As I have just explained, neither TS 36.300 V10.0.0 nor R2-104515 teaches “a non-associated cell configured by the base station to include only another resource for downlink,” as recited in claim 2 of the '976 Patent. Instead, both references teach configuring secondary cells with both uplink and downlink

resources. Accordingly, it is my opinion that, even if combinable, claim 2 is not invalid over the combination of TS 36.300 and R2-104515.

B. Ground 2: Malladi Does not Anticipate Claim 2 Because Malladi Fails to Disclose or Suggest the “Non-Associated Cell” of Claim 2

75. In accordance with my explanation in my original Declaration (EX2001), the ID found that “Petitioner has not shown Malladi to disclose a non-associated cell having no uplink carriers.” ID, 21. I therefore agree that Ground 2 of the Petition fails because Malladi would not have anticipated the “non-associated cell” of claim 2. Claim 2 is therefore valid over Malladi in Ground 2.

C. Ground 3: TS 25.319 Cannot Cure the Deficiencies of Malladi Because TS 25.319 Also Fails to Disclose or Suggest the “Non-Associated Cell” of Claim 2

76. As I explained in my original Declaration (EX2001) and as acknowledged by The ID, Malladi fails to disclose or suggest the “non-associated cell” of claim 2 of the '976 Patent. In my opinion, even if combinable, TS 25.319 also fails to disclose or suggest the “non-associated cell” of claim 2 of the '976 Patent.

1. Like Malladi, TS 25.319 Fails to Disclose or Suggest a Cell With Downlink Resources Only

77. TS 25.319 does not have any teachings of a cell having downlink resources only. TS 25.319 also has no teachings that a base station configures a cell with downlink resources only. It is also my opinion that Petitioner’s evidence to

support that TS 25.319 allegedly teaches such a cell relies on a clear misinterpretation of that evidence. When evaluated properly, it would have been clear to a POSITA that TS 25.319 has no disclosure or suggestion of a cell having downlink resources only.

78. There is no basis to assert “that the total number of uplink component carriers (*uplink resources*) can be one when the total number of downlink component carriers (*downlink resources*) is two” based on the below excerpt from TS 25.319. Petition, 75 (emphasis in original).

4 Background and introduction

The technical purpose of the Enhanced Uplink feature is to improve the performance of uplink dedicated and common (FDD and 1.28Mcps TDD only) transport channels, i.e. to increase capacity and throughput and reduce delay. This is applicable for UTRA TDD and FDD.

The following techniques are part of the Enhanced Uplink feature:

- Node B controlled scheduling: possibility for the Node B to control, within the limits set by the RNC, the set of TFCs from which the UE may choose a suitable TFC.
- Node B controlled physical resource scheduling (TDD only).
- Hybrid ARQ: rapid retransmissions of erroneously received data packets between UE and Node B.
- Higher order modulation (16QAM) (TDD and FDD).
- Intra-frame code hopping (3.84 Mcps and 7.68 Mcps TDD only).
- Shorter TTI: possibility of introducing a 2 ms TTI (FDD only).
- Enhanced Uplink in CELL_FACH state and Idle mode (FDD and 1.28Mcps TDD only).
- Dual Cell E-DCH (FDD).

EX. 1015, 9 (highlighting by Petitioner). This excerpt teaches that the “technical purpose of the Enhanced Uplink feature is to improve the performance of uplink dedicated and common (FDD and 1.28 Mcps TDD only transport channels, i.e., to increase capacity and throughput and reduce delay,” and that the Enhanced Uplink

feature includes Dual Cell E-DCH (FDD). *Id.* Not only does this excerpt have no discussion at all about the number of uplink and downlink component carriers, but the highlighted portion also simply discusses improving performance of the ***uplink channel***. The excerpt also lacks any mention at all of downlinks. Accordingly, there is no way a POSITA would have interpreted this excerpt as teaching one uplink component carrier with two downlink component carriers.

79. The Petition's other cited excerpt from TS 25.319 makes a plain and clear misinterpretation of the text. Petition, 76-77.

Serving E-DCH cell: Cell from which the UE receives Absolute Grants from the Node-B scheduler. A UE has one Serving E-DCH cell.

[**Secondary E-DCH Active Set:** In **Dual Cell E-DCH operation**, the set of cells on the secondary downlink carrier where E-DCH is carried for one UE.

Secondary Serving E-DCH cell: In Dual Cell E-DCH operation, cell from which the UE receives Absolute Grants from the Node-B scheduler on the secondary downlink. A UE can have zero or one Serving E-DCH cell on the secondary uplink carrier.]

EX. 1015, 7 (highlighting by Petitioner). Petitioner asserts that the excerpted passage from TS 25.319 states that “zero or one” refers to the number of secondary uplink carriers on the secondary cell. Petition, 76-77. That is not accurate. The passage highlighted in blue is that a “UE can have zero or one ***Serving E-DCH cell*** on the secondary uplink carrier,” which means that “zero or one” ***Serving E-DCH cell*** can be “on the secondary uplink carrier,” not that a secondary cell can have zero or one secondary uplink carriers. In other words, in addition to ***Secondary Serving E-DCH cell*** being on the secondary uplink carrier, the ***Serving E-DCH*** can also be

on the secondary uplink carrier. It is important to note that TS 25-319 separately teaches that multiple cells can be on the same carrier as the excerpted passage also defines Secondary E-DCH Active Set as “the *set of cells on the secondary downlink carrier* where E-DCH is carried for one UE.” EX1015, 7.

80. It is therefore my opinion that nothing in TS 25.319 teaches a base station configuring a cell to have downlink resources only. Since both Malladi and TS 25.319 fail to teach a “non-associated cell” as recited in claim 2 of the ’976 Patent, Petitioner’s Ground 3 therefore cannot show claim 2 is unpatentable as obvious over Malladi in view of TS 25.319.

VII. CONCLUSION

81. 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.

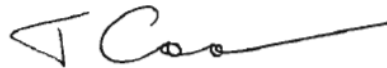
82. I understand that my opinions discussed above support a legal conclusion that the challenged claim is not anticipated and is nonobvious.

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,

March 1, 2024

A handwritten signature in black ink, appearing to read 'T Cooklev', with a long horizontal stroke extending to the right.

Todor V. Cooklev, Ph.D.