

**UNITED STATES PATENT AND TRADEMARK OFFICE**

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**BEFORE THE PATENT TRIAL AND APPEAL BOARD**

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ONEPLUS TECHNOLOGY (SHENZHEN) CO., LTD.,  
Petitioner,

v.

PANTECH CORP.,  
Patent Owner.

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U.S. Patent No. 9,769,776  
Filed: October 31, 2016  
Issued: September 19, 2017  
Inventors: Ki Bum Kwon et al.

TITLE: APPARATUS AND METHOD FOR UPLINK SYNCHRONIZING IN  
MULTIPLE COMPONENT CARRIER SYSTEM

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*Inter Partes* Review No. 2025-00720

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**PETITION FOR *INTER PARTES* REVIEW**

## TABLE OF CONTENTS

I.	INTRODUCTION .....	1
II.	COMPLIANCE WITH REQUIREMENTS FOR IPR.....	3
	A.    Grounds for Standing (§ 42.104(a)) .....	3
	B.    Identification of Challenge and Statement of Precise Relief Requested .....	3
III.	FEES FOR IPR REVIEW (§ 42.15(a)).....	4
IV.	MANDATORY NOTICES (§ 42.8(b)).....	5
	A.    Real Party-In-Interest (§ 42.8(b)(1)).....	5
	B.    Related Matters (§ 42.8(b)(2)) .....	5
	C.    Lead and Back-Up Counsel (§ 42.8(b)(3)) .....	5
	D.    Service Information (§ 42.8(b)(4)).....	6
V.	THE '776 PATENT .....	6
	A.    Brief Description .....	6
	B.    Prosecution History of the '776 Patent .....	11
VI.	LEVEL OF ORDINARY SKILL IN THE ART .....	11
VII.	HOW THE CHALLENGED CLAIMS ARE TO BE CONSTRUED .....	11
VIII.	PATENT OWNER'S INFRINGEMENT CONTENTIONS .....	12
IX.	THE PRIOR ART .....	13
	A.    Dinan .....	13
	B.    TS36.331 .....	14
	C.    Potevio.....	15
	D.    Sharp.....	16
	E.    The IPR References Are Analogous Art.....	17
X.	DETAILED EXPLANATION OF GROUNDS FOR CHALLENGE.....	18
	A.    Grounds I and II: Dinan Anticipates or Otherwise Renders Claims 1-8 Obvious.....	18
	1.    Independent Claim 1 .....	19

2.	Dependent Claim 2.....	31
3.	Dependent Claim 3.....	33
4.	Dependent Claim 4.....	33
5.	Claims 5-8 .....	34
B.	Ground III: Dinan and Potevio Render Claims 1-8 Obvious.....	34
1.	The Dinan-Potevio Combination .....	35
2.	Independent Claim 1 .....	38
3.	Dependent Claims 2-4.....	42
4.	Claims 5-8 .....	42
C.	Ground IV: Dinan and Sharp Render Claims 1-8 Obvious .....	43
1.	The Dinan-Sharp Combination.....	43
2.	Independent Claim 1 .....	46
3.	Dependent Claims 2-4.....	51
4.	Claims 5-8 .....	51
D.	Ground V: TS36.331 and Sharp Render Claims 1-8 Obvious.....	51
1.	The TS36.331-Sharp Combination .....	52
2.	Independent Claim 1 .....	55
3.	Dependent Claim 2.....	65
4.	Dependent Claim 3.....	66
5.	Dependent Claim 4.....	67
6.	Claims 5-8 .....	69
XI.	CONCLUSION.....	69

## TABLE OF AUTHORITIES

### Cases

<i>Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.</i> , 800 F.3d 1375 (Fed. Cir. 2015) .....	13
<i>In re Inland Steel Co.</i> , 265 F.3d 1354 (Fed. Cir. 2001) .....	37, 45, 55
<i>KSR Int’l Co. v. Teleflex Inc.</i> , 550 U.S. 398 (2007) .....	38, 46, 55
<i>Phillips v. AWH Corporation</i> , 415 F.3d 1303 (Fed. Cir. 2005) .....	12
<i>Realtime Data LLC v. Iancu</i> , 912 F.3d 1368 (Fed. Cir. 2019) .....	12

### Statutes

35 U.S.C. § 102 .....	4, 11, 13, 14, 16, 17
35 U.S.C. § 103 .....	4, 11, 18, 34, 43, 51
35 U.S.C. § 311-319 .....	71

### Regulations

37 C.F.R. § 42.10 .....	5
37 C.F.R. § 42.100 .....	11, 12, 71
37 C.F.R. § 42.104 .....	3, 18
37 C.F.R. § 42.15 .....	4
37 C.F.R. § 42.24 .....	70
37 C.F.R. § 42.8 .....	5, 6, 70

### Board Decisions

<i>Ericsson Inc. v. Intellectual Ventures II LLC</i> , IPR2014-00919, 2015 WL 8634628 (P.T.A.B. Dec. 7, 2015) .....	13
<i>Square, Inc. v. Unwired Planet LLC</i> , IPR2014-01164, 2015 WL 7428544 (P.T.A.B. Nov. 19, 2015) .....	13

**CLAIM LISTING**

	<b>Claim</b>
[1pre]	1. A user equipment (UE) comprising:
[1a]	a receiver to receive, from a base station, a first field comprising a first serving cell index (SCellIndex) to release a serving cell (SCell) associated with the first SCellIndex and
[1b]	a second field comprising at least one SCellIndex to add one or more SCell associated with the at least one SCellIndex and
[1c]	an identifier of a timing advance group (TAG) associated with the one or more SCell;
[1d]	a radio resource control (RRC) processor to release the SCell associated with the first SCellIndex and
[1e]	to add the one or more SCell as an available SCell for use with the UE and

	<b>Claim</b>
[5pre]	5. A method of user equipment (UE), comprising:
[5a]	receiving, from a base station, a first field comprising a first serving cell index (SCellIndex) to release a serving cell (SCell) associated with the first SCellIndex
[5b]	receiving, from the base station, a second field comprising at least one SCellIndex to add one or more SCell associated with the at least one SCellIndex and
[5c]	an identifier of a timing advance group (TAG) associated with the one or more SCell;
[5d]	releasing the SCell associated with the first SCellIndex for use with the UE;
[5e]	adding the one or more SCell as available SCell for use with the UE; and

	<b>Claim</b>
[1f]	to associate the one or more SCell with another available SCell associated with same TAG identifier,
[1g]	wherein the TAG is associated with SCells having timing based on a same timing advance (TA) value.
[2]	2. The UE of claim 1, wherein the RRC processor associates an SCell with a TAG associated with a primary serving cell (PCell) when the second field to add an SCell does not comprise identifier of the TAG
[3]	3. The UE of claim 1, wherein the receiver receives the first and second field through a RRC connection reconfiguration message.
[4]	4. The UE of claim 1, wherein the receiver receives, from the base station, the first field comprising an indication to remove an SCell from SCells available to the UE.

	<b>Claim</b>
[5f]	associating the one or more SCell with another available SCell associated with same TAG identifier,
[5g]	wherein the TAG is associated with SCells having timing based on a same timing advance (TA) value.
[6]	6. The method of claim 5, further comprising: associating an SCell with a TAG associated with a primary serving cell (PCell) when the second field to add an SCell does not comprise identifier of the TAG.
[7]	7. The method of claim 5, wherein the first and second field are received through a Radio Resource Control (RRC) connection reconfiguration message.
[8]	8. The method of claim 5, further comprising: receiving, from the base station, the first field comprising an indication to remove an SCell from SCells available to the UE.

**EXHIBITS**

<b>Exhibit</b>	<b>Description</b>
1001	U.S. Patent No. 9,769,776 (“the ’776 Patent”)
1002	File History of the ’776 Patent
1003	Declaration of Apostolos K. Kakaes, Ph.D.
1004	Declaration of Friedhelm Rodermund
1005	3GPP Technical Specification 36.331 v10.4.0 (“TS36.331”)
1006	Publication “R2-120218 – TA Group Handling” (“Sharp”)
1007	Publication “R2-115812 – Signalling for TA Group Configuration” (“Potevio”)
1008	Participant List from RAN2, Meeting #76, San_Francisco
1009	U.S. Patent Application Publication No. 2013/0188613 to Dinan, et al. (“Dinan”)
1010	U.S. Provisional Patent App. No. 61/590,366
1011	WIPO Publication No. WO2011/084005 A2 to Park, et al. (“Park”)
1012	Certified Translation of Park
1013	RESERVED
1014	“The GSM System for Mobile Communications” by Michel Mouly and Marie-Bernadette Pautet, 1992
1015	“LTE-The UMTS Long Term Evolution” Second Edition, 2011 by Stefania Sesia, Issam Toufik, Matthew Baker
1016	3GPP Technical Specification 36.300 V8.9.0, June 2009
1017	3GPP Technical Specification 36.331 v.8.7.0, September 2009

<b>Exhibit</b>	<b>Description</b>
1018	Participant List from RAN2, Meeting #77, Dresden, Germany
1019	RESERVED
1020	<i>Pantech Corp. v. Oneplus Tech. (Shenzhen) Co., Ltd.</i> , 5:24-cv-00038-RWS-JBB (E.D. Tex.), Plaintiff’s Infringement Contentions, November 27, 2024 (excerpts)
1021	Publication “R2-106856 – Introduction of Carrier Aggregation and UL/DL MIMO” (“Samsung”)

OnePlus Technology (Shenzhen) Co., Ltd. (“Petitioner”) requests *inter partes* review (“IPR”) of claims 1, 3 and 4 of U.S. Patent No. 9,669,776 (“the ’776 patent”) (EX1001), assigned to Pantech Corp. (“Patent Owner”).

## **I. INTRODUCTION**

The ’776 patent relates to cellular wireless communication systems employing base stations with multiple “serving cells” of different frequency bands. EX1001, 1:54-65. This technology, which was commercially used long before the priority date of the ’776 patent, allows for more robust and consistent communications between the base station and mobile terminals, or user equipment (UE). For example, the system may determine that user equipment should use one serving cell over another depending on signal strength, distance from the base station, or other factors. In such situations, the Radio Resource Control (RRC) software layer of the user equipment will add the preferred serving cell and, if necessary, release the prior serving cell.

The time a signal takes to travel between the UE and the base station (called propagation delay) varies depending upon the location of the UE relative to the base station. The UE compensates for signal propagation delay by transmitting its signal before its scheduled reception by an amount of time known as the “timing advance” (TA).

The '776 patent acknowledges that “a concept of Timing Advance Group (TAG),” i.e., “a group of one or more serving cells having the same timing advance value,” was known to perform timing alignment of multiple component carriers and that TAGs were used in protocols between base stations and serving cells. EX1001, 1:54-65. The patent concludes, however, that a signaling protocol using TAGs “has not yet been *clearly* defined” to inform a terminal of a change in secondary serving cell. *Id.*, 1:66-2:5 (emphasis added).

The '776 patent purports to advance these known technologies by including in the signaling protocol an “identifier” that identifies serving cells with the same TAG. Although the '776 patent identifies and claims a TAG identifier as a point of novelty, this modification to the existing protocols had been previously described and discussed in the community—known as the 3rd Generation Partnership Project (3GPP)—that develops protocols for mobile telecommunications.

For example, Dinan disclosed RRC signaling and a TAG-identifier for associating serving cells in a TAG with the same timing advance. Engineers from Potevio and Sharp had also defined and explicitly recommended the use of RRC signaling and a TAG-identifier for associating serving cells with the same timing advance. The Patent Office did not apply any of these prior art references to the claims of the '776 patent. The applicant particularly did not disclose during

examination of the '776 patent that the claimed invention of the '776 patent is the same prior proposal made by both Potevio and Sharp to the 3GPP group.

The challenges presented in this Petition rely on prior art, combinations of prior art, and expert testimony that were not available to the PTO. Petitioner respectfully request the Board to institute *inter partes* review and to cancel claims 1-8 of the '776 patent as unpatentable.

## **II. COMPLIANCE WITH REQUIREMENTS FOR IPR**

### **A. Grounds for Standing (§ 42.104(a))**

Pursuant to 37 C.F.R. § 42.104(a), Petitioner certifies that the '776 patent is available for IPR and that Petitioner is not barred or estopped from requesting IPR based on the Grounds identified in this petition.

### **B. Identification of Challenge and Statement of Precise Relief Requested**

Petitioner challenges claims 1-8 of the '776 patent (“the Challenged Claims”) and requests that these claims be found unpatentable and cancelled in view of the following references (collectively, “the IPR References”):

- (1) U.S. Patent Application Publication No. 2013/0188613 to Dinan, et al. (“Dinan”) (EX1009);
- (2) 3GPP Technical Specification 36.331 v10.4.0 (“TS36.331”) (EX1005);
- (3) Publication “R2-115812 – Signalling for TA Group Configuration” (“Potevio”) (EX1007); and

(4) Publication “R2-120218 – TA Group Handling” (“Sharp”) (EX1006).  
Petitioner asserts the following Grounds of unpatentability under 35 U.S.C. §§ 102 and 103 (pre-AIA):

<u>Ground</u>	<u>References</u>	<u>Statutory Basis</u>	<u>Challenged Claims</u>
I & II	Dinan	§§102/103	1-8
III	Dinan + Potevio	§ 103	1-8
IV	Dinan + Sharp	§ 103	1-8
V	TS36.331 + Sharp	§ 103	1-8

In support of the proposed Grounds, this Petition includes a full statement of the reason why each of the Challenged Claims should be held unpatentable under 35 U.S.C. §§ 102 and 103. Petitioner relies on the exhibits identified herein, including the prior art noted above and the declaration of Apostolos K. Kakaes, Ph.D. (EX1003)—an expert in the communication engineering industry and the field of wireless communications with over 40 years of experience. EX1003, ¶¶6-19, App’x A.

### **III. FEES FOR IPR REVIEW (§ 42.15(a))**

This Petition is accompanied by the fees set forth in 37 C.F.R. § 42.15(a). Please charge or credit Deposit Account No. 12-1216 with any shortage or overpayment of fees associated with this Petition and any other fees incurred by Petitioner in connection with this IPR.

**IV. MANDATORY NOTICES (§ 42.8(b))**

**A. Real Party-In-Interest (§ 42.8(b)(1))**

Petitioner certifies that the real parties-in-interest are OnePlus Technology (Shenzhen) Co., Ltd. and Guangdong OPPO Mobile Telecommunications Corp., Ltd.

**B. Related Matters (§ 42.8(b)(2))**

The '776 patent is asserted in the following pending action: *Pantech Corp. v. OnePlus Technology (Shenzhen) Co., Ltd.*, No. 5:24-cv-00038-RWS-JBB (E.D. Tex.) (the “Related Litigation”).

**C. Lead and Back-Up Counsel (§ 42.8(b)(3))**

Petitioner designates the following counsel:

Lead Counsel: Wesley O. Mueller (USPTO Reg. No. 33,976)  
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Pursuant to 37 C.F.R. § 42.10 (b), Petitioner has filed a power of attorney with the above designation of counsel.

**D. Service Information (§ 42.8(b)(4))**

Petitioner provides the following service information for designated counsel.

Petitioner consents to electronic service by email at the email addresses of the counsel provided below.

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**V. THE '776 PATENT**

The '776 patent, entitled “Apparatus and Method for Uplink Synchronizing in Multiple Component Carrier System,” was filed on October 31, 2016, and issued on September 19, 2017. EX1001, 1. The '776 patent is a continuation of U.S. Patent No. 9,516,614, which in turn is a continuation of U.S. Patent No. 8,964,645, filed on March 22, 2013. The '776 patent claims priority to Korean application No. 10-2012-0030216, filed March 23, 2012.

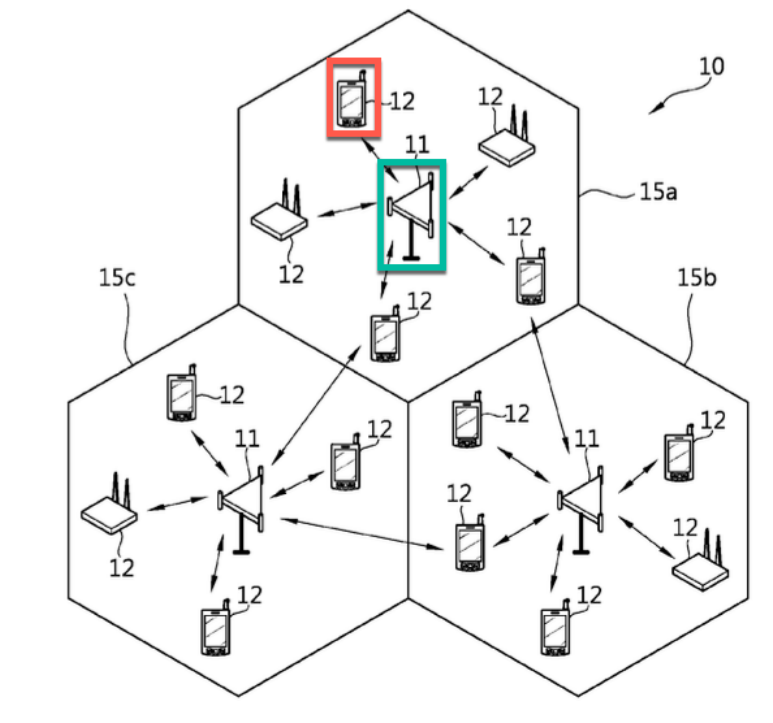
**A. Brief Description**

The '776 patent relates to “uplink synchronization in a multiple component carrier system.” EX1001, 1:20-23. Multiple component carrier systems use aggregated smaller frequency bands, “creat[ing] an effect of using a logically wide

band by aggregating a plurality of ... bands in a frequency domain.” *Id.*, 1:37-42.

As shown in FIG. 1, a UE (red) accesses a wireless communication system 10, which includes Base Stations 11 (green), that provide communication services to different cells 15a, 15b, 15c classified into a plurality of areas (or sectors). *Id.*,

2:59-60; FIG. 1. To establish communication, the UE performs a random access procedure that can include initial access, handover, scheduling requests, and timing alignment. *Id.*, 1:42-53.



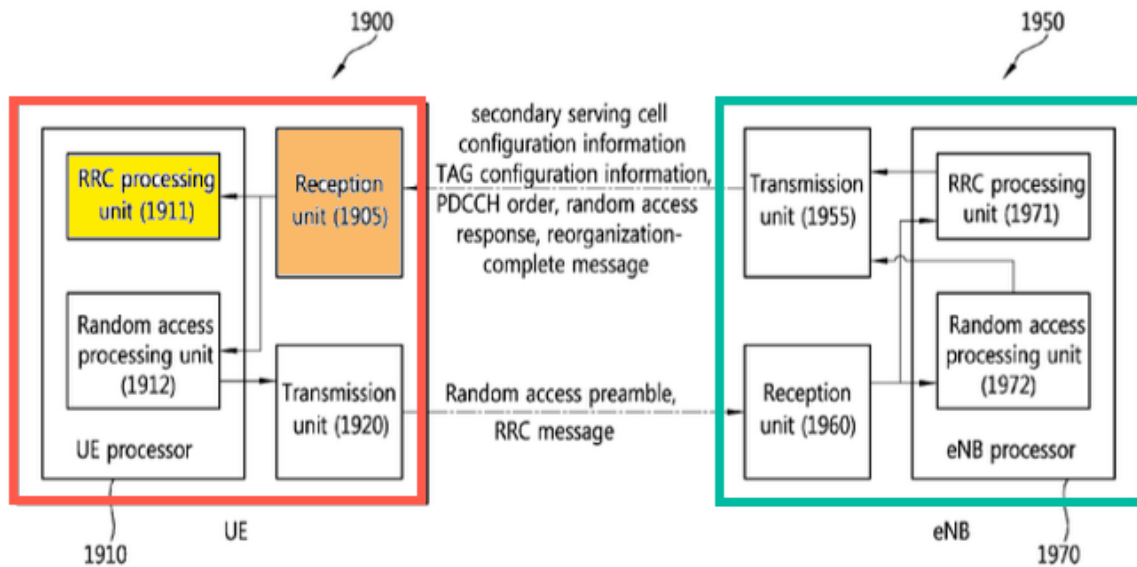
**'776 Patent-FIG. 1**

Because the signals transmitted from the UE to the base station may have different time delays, different timing advance values for the respective serving cells are determined by a given base station. *Id.*, 5:58-61; 7:4-13. The '776 patent

acknowledges that a timing advance group (TAG), i.e., “a group of one or more serving cells having the same timing advance value,” to provide timing alignment in multiple component carrier systems was known. *Id.*, 1:54-58.

The '776 patent contends that what had “not yet been clearly defined” was a “signaling protocol for informing that a secondary serving cell is included in what TAG.” *Id.*, 1:66-2:1. The '776 patent also contends that the manner in which a UE is informed “when a TAG to which a secondary serving cell belongs is changed according to a channel condition” had not been clearly established. *Id.*, 2:1-5.

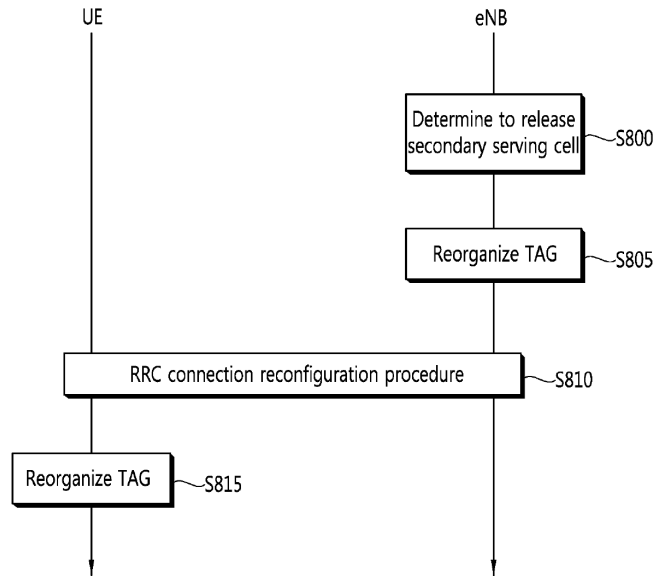
To implement these, the '776 patent discloses a UE 1900 with a generic reception unit 1905 to receive, from a serving base station, serving cell (SCell) configuration information. EX1001, 29:56-62; FIG. 16 (below). This includes a first field with a serving cell index (ScellIndex) of an SCell to release and a second field with at least one ScellIndex of an SCell to add and a TAG ID associated with the SCell(s) to add. *See id.*, 33:52-59. The UE also has a generic RRC processing unit for: releasing the SCell associated with the first field, adding the SCell(s) associated with the second field, and associating the added SCell(s) with another available SCell having the same TAG ID. *Id.*, 29:59-62; 33:60-34:3; FIG. 16.



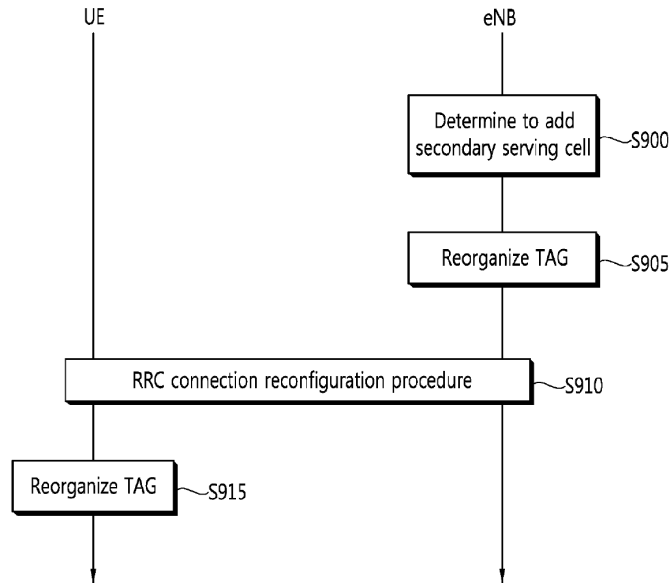
**'776 Patent-FIG. 16**

The base station communicates these decisions via an RRC message to the UE (steps S810 and S910, shown in FIGS. 5 and 6 below). In response, the UE reorganizes the TAG(s) (steps S815 and S915). EX1001, 13:3-17:43; FIGS. 5, 6. To release a serving cell, the RRC message includes a “sCellToReleaseList,” which “indicates the index of a secondary serving cell ‘SCellIndex’ to be released.” *Id.*, 14:11-34. To add a serving cell, the RRC message includes a “sCellToAddModList,” which “indicates the index of the secondary serving cell to be added ‘SCellIndex’” and can include “a TAG ID regarding the added secondary serving cell.” *Id.*, 16:61-17:37. “[T]he reorganized TAG configuration information may be included in the secondary serving cell configuration information and transmitted or may be transmitted through an additional field

different from that of the secondary serving cell configuration information.” *Id.*,  
16:41-60.



**EX1001, FIG. 5**



**EX1001, FIG. 6**

## **B. Prosecution History of the '776 Patent**

The application leading to the '776 patent was filed on October 31, 2016. EX1002, 112-115. The Patent Office rejected most of the originally-presented claims for obviousness-type double patenting over U.S. Patent No. 8,964,645, and objecting to claims 4, 8, and 12. EX1002, 213-220. The claims were not rejected under Sections 102 or 103 in view of any prior art. *Id.* The Applicant submitted a terminal disclaimer on March 17, 2017, to overcome the double patenting rejection. *Id.*, 245. A Notice of Allowance followed. *Id.*, 285-291.

## **VI. LEVEL OF ORDINARY SKILL IN THE ART**

A person of ordinary skill in the art (“POSA”) at the time of the earliest effective date for the Challenged Claims would have had a B.S. in Electrical Engineering or a related field and at least three years of experience designing, developing, and/or testing telecommunication systems. A POSA would also have had familiarity with the wireless telecommunication standards and well-known protocols for accessing wireless networks. More education may supplement practical experience or vice versa. EX1003, ¶109.

## **VII. HOW THE CHALLENGED CLAIMS ARE TO BE CONSTRUED**

In an *inter partes* review, claims “shall be construed using the same claim construction standard that would be used to construe the claim in a civil action.” 37 C.F.R. § 42.100. The Board gives claims their ordinary and customary

meaning, as would have been understood by a POSA at the time of the invention and in the context of the entire patent disclosure. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312-13 (Fed. Cir. 2005) (en banc); 37 C.F.R. § 42.100(b). No express constructions are necessary to conclude the prior art relied upon in this Petition renders the subject matter of the Challenged Claims unpatentable. *See Realtime Data LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe only those terms that are in controversy, and only to the extent necessary to resolve the controversy.”) (citation omitted).

#### **VIII. PATENT OWNER’S INFRINGEMENT CONTENTIONS**

Infringement allegations are “probative” of whether Patent Owner is taking “inconsistent positions” between this proceeding and district court litigation and are “relevant to the credibility” of Patent Owner’s “characterization of the [asserted] Patent in this proceeding.” *Ericsson Inc. v. Intellectual Ventures II LLC*, IPR2014-00919, 2015 WL 8634628, at \*3-4 (P.T.A.B. Dec. 7, 2015); *Square, Inc. v. Unwired Planet LLC*, IPR2014-01164, 2015 WL 7428544, at \*18-19 (P.T.A.B. Nov. 19, 2015). Accordingly, Petitioner includes Patent Owner’s infringement contentions from the Related Litigation, EX1020, which purportedly rely on a “plain and ordinary” meaning for the terms in the challenged claims.

## IX. THE PRIOR ART

The Petition assumes that the priority date for the Challenged Claims is the earliest claimed priority date in the '776 chain, i.e., March 23, 2012, the filing date of Korean application 10-2012-0030216. The references applied herein constitute prior art using that priority date.

### A. Dinan

Dinan is a U.S. patent application publication that published on July 25, 2013, from U.S. Patent Application No. 13/748,586 filed on January 24, 2013, claiming priority in part to U.S. Provisional Application No. 61/590,366, filed January 25, 2012. EX1009, 1. Because the '366 provisional application describes the relied-upon subject matter of Dinan and provides written description for at least one published claim of Dinan, Dinan qualifies as prior art under pre-AIA 35 U.S.C. § 102(e) as of the January 25, 2012 filing date of the '366 provisional application. EX1003, ¶¶112-116, 139-186; *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378, 1381-82 (Fed. Cir. 2015). Claim 1 of Dinan is described in the '366 provisional application. EX1003, ¶¶112-116. Citations to relevant portions of the '366 provisional application are provided in parallel with citations to Dinan in the unpatentability grounds *infra*, and in the Kakaes Declaration, EX1003.

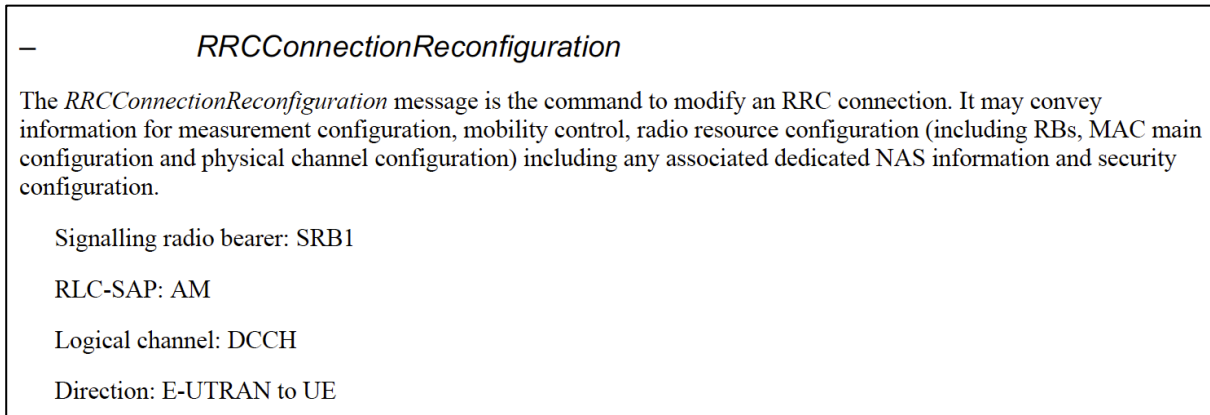
Dinan discloses the use of time alignment groups (TAGs) comprising serving cells having the same time alignment. EX1009, [0033]; EX1010, 26. A TAG identifier (TAG ID) associated with a serving cell (SCell) is transmitted from a base station to a UE. The TAG configuration is included in an RRC message (sCellToAddModList) that includes the TAG ID. EX1009, [0077]; EX1010, 30-31. Dinan thus discloses using RRC messages that include a TAG identifier (TAG-ID) used to associate serving cells associated with the same TAG as is claimed in the '776 patent. EX1003, ¶¶139-186.

**B. TS36.331**

TS36.331 is a Technical Specification published by the 3<sup>rd</sup> Generation Partnership Project (3GPP) in December 2011 and available on its public FTP server in December 2011. EX1005; EX1004, ¶¶23, 80-93. TS36.331 was indexed, cataloged and freely accessible via search engines at that time. *Id.* Thus, because TS36.331 published before the earliest priority date of the '776 patent, it qualifies as prior art to the '776 patent under pre-AIA 35 U.S.C. § 102(a).

TS36.331 provides detailed specifications of the RRC signaling protocol in LTE. It discloses detailed structure of RRC messages and related procedures, and would have been an important reference for a POSA when considering any wireless communication application in early 2012. EX1003, ¶¶117-120. For

example, it provides the structure and related procedures for a message called “*RRCConnectionReconfiguration*” message, as shown (partially) below:



EX1005, 126.

TS36.331 provides, in Section 5.3.5, specific information about actions to be taken with respect to the RRC connection reconfiguration message, including, e.g., instructions to the UE to add and release serving cells via a “sCellToReleaseList” and a “sCellToAddModList,” respectively. *Id.*, 60, 126-127; EX1003, ¶¶118-119.

### C. Potevio

Potevio is a printed publication by the 3<sup>rd</sup> Generation Partnership Project (3GPP) in November 2011<sup>1</sup>, as publication R2-115812. EX1007; EX1004, ¶¶20, 49-58. Potevio was available to attendees at the RAN WG2 meeting #76 in November 2011, and was indexed and available on the public 3GPP FTP server by

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<sup>1</sup> Although Potevio lists a date of November 2010, this is believed to be a typographical error, as meeting #76 took place in November 2011. EX1003, ¶121n.5. The error has no effect on the prior art status of Potevio for this Petition.

that time. *Id.* Potevio reflects Agenda Item 7.1.2.3 on “Signalling for TA group configuration” for “Discussion and Decision” at the 3GPP TSG-RAN WG2#76 meeting in San Francisco, November 14-18, 2011. EX1007. Potevio qualifies as prior art to the ’776 patent under pre-AIA 35 U.S.C. § 102(a) because it is published before the earliest priority date of the ’776 patent.

Potevio also discloses using RRC messages that include a TAG identifier (TA group index) used to associate serving cells associated with the same TAG. Potevio discloses that a “simple approach is introducing the concept of TA group index and all cells share the same TA value are configured with the same TA group index.” EX1007, 1.

Potevio discloses in a manner similar to Sharp that “RRC signalling is used to (re-)associate SCell with TA group.” *Id.* Potevio explains that for “delivering TA group index, RRC signaling is more flexible” and “the most reliable” compared to the other two options it identifies. *Id.*; EX1003, ¶¶121-125.

#### **D. Sharp**

Sharp is a printed publication by the 3<sup>rd</sup> Generation Partnership Project (3GPP) in February 2012 as publication R2-120218. EX1006; EX1004, ¶¶21, 59-68. Sharp was available to attendees at the RAN WG2 meeting #77 in February 2012, and was indexed and available on the public 3GPP FTP server by January 31, 2012. *Id.* Like Potevio, Sharp reflects Agenda Item 7.1.2.3 on “TA group

handling” for “Discussion and Decision” at the 3GPP TSG-RAN WG2#77 meeting in Dresden, Germany, February 6-10, 2012. EX1006. Sharp qualifies as prior art to the ’776 patent under pre-AIA 35 U.S.C. § 102(a) because it published before the earliest priority date of the ’776 patent.

Sharp discloses using RRC messages that include a TAG identifier (TAG-ID) used to associate serving cells associated with the same TAG. Sharp discloses that “RRC signalling is used to (re-)associate SCell with a TA group.” EX1006, 1. Sharp discloses that “it is necessary to provide some kind of identifier (i.e. TAG-ID) to create an association between the SCell(s) and the sTAG to which the SCell will align the UL [Uplink] timing.” *Id.* Sharp discloses that “TA group and UL of SCell in sTAG are mapped by TAG-ID.” *Id.* Sharp further discloses that “TAG-ID configuration should be included in the UL [Uplink] configuration of *PhysicalConfigDedicatedSCell*,” an RRC message. *Id.*, 3; EX1003, ¶¶126-129.

#### **E. The IPR References Are Analogous Art**

The IPR References are analogous art with respect to the ’776 patent because they all pertain to user equipment in a wireless communication system, which is in the same field of endeavor as the Challenged Claims of the ’776 patent. Compare EX1001, claims 1-8 with EX1009, [0024], [0027] (“The user 501 may use the wireless device (or UE: user equipment) to receive data traffic....”); EX1010, 10-11, with EX1005, 14 (“The present document specifies the Radio

Resource Control protocol for the radio interface between UE and E-UTRAN....”), 19 (“UE” is “User Equipment”), *with* EX1007, 1 (“In principle TA [timing advance] group partitioning is managed by [the base station] and TA group information is signaled to the UE [user equipment] for TA value application.”), and *with* EX1006, 3 (“TA group configuration is UE-specific.”); EX1003, ¶136. The IPR References also relate to the problem faced by the inventors, i.e., wireless communication in general, and protocols for uplink synchronization in a multiple component carrier system in particular. *Compare* EX1001, 1:19-23 *with* EX1009, [0018]; EX1010, 78-79, 85-86, 92-94, *with* EX1005, 14, 17, 60 (“SCell release” and “SCell add/modification” procedures), *with* EX1007, 1 (“In this contribution we study how to signal TA group configuration.”), and *with* EX1006, 1 (“[Timing Advance] group and [uplink] of SCell in sTAG are mapped by TAG-ID.”); EX1003, ¶137.

## **X. DETAILED EXPLANATION OF GROUNDS FOR CHALLENGE**

Pursuant to 37 C.F.R. § 42.104(b), the cited prior art renders the Challenged Claims obvious.

### **A. Grounds I and II: Dinan Anticipates or Otherwise Renders Claims 1-8 Obvious**

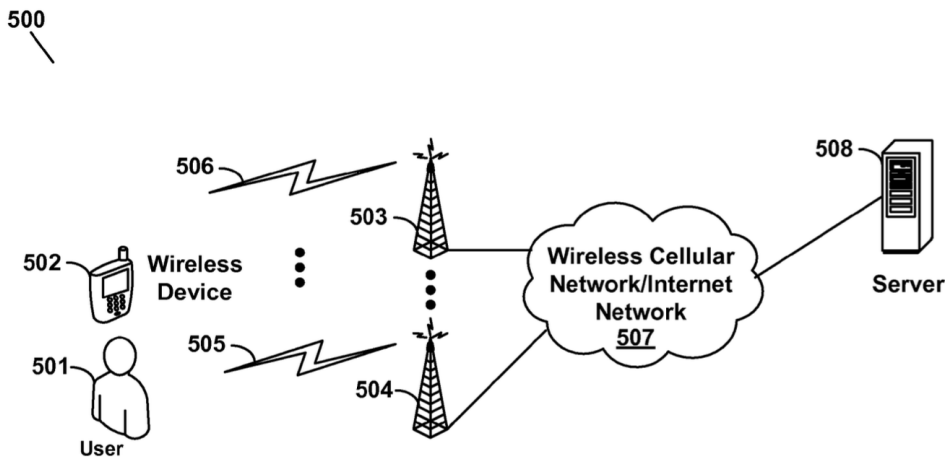
Claims 1-8 are anticipated by, or otherwise would have been obvious to a POSA under Section 103 in view of, Dinan. EX1003, ¶¶139-186.

## 1. Independent Claim 1

Dinan anticipates, or renders obvious, claim 1. EX1003, ¶¶140-178.

### (a) [1pre] A user equipment (UE)

Dinan discloses a user equipment (UE) as recited in Element [1pre]. Dinan discloses a “wireless device” (406 or 502) that is “user equipment.” EX1009, [0024], [0027] (“The user 501 may use the wireless device (or UE: user equipment) to receive data traffic....”), FIG. 5; EX1010, 10-11, FIG. 5; EX1003, ¶141.



**EX1009, FIG. 5; EX1010, FIG. 5.**

### (b) [1a] a receiver to receive, from a base station, a first field comprising a first serving cell index (SCellIndex) to release a serving cell (SCell) associated with the first SCellIndex

Dinan discloses a receiver to receive, from a base station, a first field comprising a first serving cell index (SCellIndex) to release a serving cell (SCell)

associated with the first SCellIndex as recited in Element [1a]. EX1003, ¶¶142-156. Dinan discloses that the UE comprises “at least one communication interface 407” which is a receiver that receives signals from a base station 401 via a bi-directional link 411. EX1009, [0024] (Base station 401 and wireless device 406 “configured to send and receive data over wireless link 411 using multiple frequency carriers”), FIG. 4; EX1010, 10, FIG. 4; EX1003, ¶¶142.

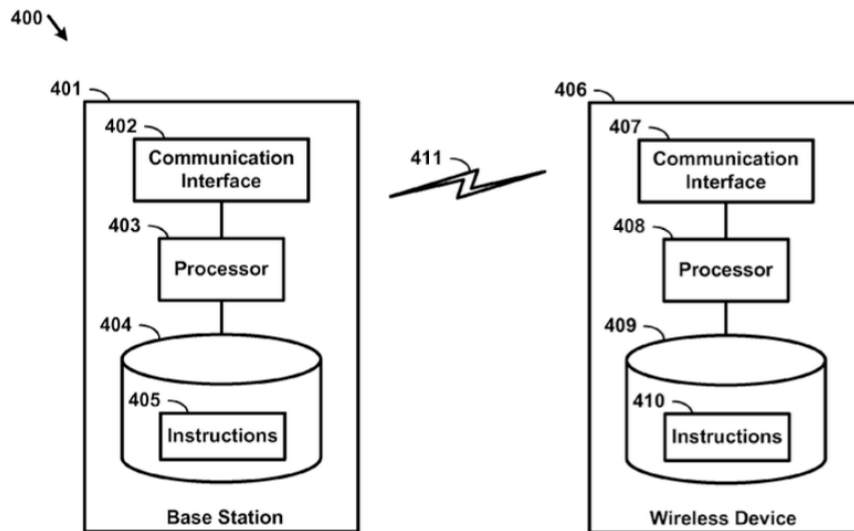


FIG. 4

**EX1009, FIG. 4; EX1010, FIG. 4**

Dinan describes that the purpose of an RRC connection reconfiguration procedure includes modifying an RRC connection between a base station and a UE, such as, “to ... release SCells.” EX1009, [0074]; EX1010, 30. Dinan discloses the use of a field—the sCellToReleaseList—in an RRC Connection Reconfiguration Message transmitted from a base station to release a serving cell

(SCell), just as is later disclosed in the '776 patent. *Compare id.* (“If the received RRC Connection Reconfiguration message includes the sCellToReleaseList, the UE may perform an SCell release.”) *with* EX1001, 14:11-34 (“The secondary serving cell configuration information for releasing the secondary serving cell is sCellToReleaseList.”); 26:28-31 (“If the secondary serving cell configuration information includes a field ‘sCellToReleaseList’, the secondary serving cell configuration information is for releasing the secondary serving cell.”). The '776 patent confirms that the sCellToReleaseList field includes a SCellIndex. EX1001, 14:11-34. A POSA would have understood that Dinan’s and the '776 patent’s use of the term “sCellToReleaseList” refer to the same field. EX1003, ¶¶143-144.

A POSA would have understood that the sCellToReleaseList field is an existing field in the art. EX1003, ¶145. Dinan and the '776 patent disclose using the sCellToReleaseList field according to its established manner and do not change this field. Accordingly, this field in Dinan and the same field in the '776 patent have the same content and the same function, which were known to a POSA at the time of the earliest claimed priority date of the '776 patent. *Id.*

The name of the field that performs the releasing of the SCells—the “sCellToReleaseList” field—itsself discloses that it is a list of SCell(s) to be released. So, the name of this field Dinan discloses to a POSA that this field

includes a SCellIndex to identify the SCell to release as this is the conventional manner in which the sCellToReleaseList field is populated. EX1003, ¶146.

A POSA would have understood that Dinan’s use of the unique TS36.331 “sCellToReleaseList” field was a reference to, and disclosure of, the TS36.331 protocol. *Id.*, ¶147 As explained below, this includes the use of an SCell index as recited in Element [1a]. Accordingly, a POSA would have understood that Dinan discloses a UE including a receiver to receive a RRC Connection Reconfiguration message including a *sCellToReleaseList* field comprising a serving cell index (SCellIndex) to identify the serving cell to be released. *Id.*

Furthermore, Dinan discloses the use of an SCellIndex in a sCellToAddModList field in communication messages between a base station and a UE in connection with adding an SCell. EX1009, [0075] (“When a UE receives an sCellToAddModList in an RRC reconfiguration message, the UE may process the content of the message. The UE may, for an sCellIndex value included in the sCellToAddModList that is not part of the current UE configuration (SCell addition), add the SCell corresponding to the cell identification....”); EX1010, 29-32. A POSA would have understood, and at least found it obvious, that an sCellIndex was also used in Dinan’s sCellToReleaseList field in a similar manner as the sCellIndex expressly described in connection with Dinan’s sCellToAddModList field. EX1003, ¶148.

To the extent that Dinan does not otherwise expressly or implicitly disclose Element [1a], a POSA would have found it obvious in view of Dinan’s disclosure of the *sCellToReleaseList* field and the knowledge of a POSA. Important to a POSA’s knowledge at the time was TS36.331, which is part of the fundamental standard in the telecommunication field and compliance with which is important for any research or commercial project. EX1003, ¶149. TS36.331 discloses a *sCellToReleaseList* field, sent in an RRC message, that includes a *SCellIndex* to release the *SCell* associated with the *SCellIndex* as recited in Element 1[a]. EX1003, ¶¶149-154.

TS36.331 defines a “*SCellIndex*” that “concerns a short identity, used to identify an *SCell*.” EX1005, 210; *see also id.*, 17 (3.1 Definitions) ([T]he term ‘serving cells’ is used to denote the set of one or more cells comprising of the primary cell and all secondary cells.”), 18 (“*SCell*” is an abbreviation for secondary cell). Each *SCellIndex* takes on a value between 1 and 7 that is used to identify an *SCell*. EX1005, 210.

TS36.331 discloses a UE receiving from a base station an RRC message (“*RRCConnectionReconfiguration*”) with a field (“*sCellToReleaseList*”) including an *SCellIndex* to identify an associated *SCell* to be released. EX1005, 46 (5.3.5.3 Reception of an *RRCConnectionReconfiguration* ... by the UE) (“[T]he UE shall:... 1>if the received *RRCConnectionReconfiguration* includes the

*sCellToReleaseList*. 2> perform SCell release as specified in 5.3.10.3a.”), 60 (5.3.10.3a SCell release), 126-127 (*RRCConnectionReconfiguration* message is a “command to modify an RRC connection” sent in the direction from base station to UE). TS36.331 discloses, for each *SCellIndex* value included in the *sCellToReleaseList* field, the UE shall release the SCell with the *SCellIndex* value. *Id.*, 60 (5.3.10.3a SCell release) (“The UE shall: if the release is triggered by reception of the *sCellToReleaseList*: ... for each *sCellIndex* value included in the *sCellToReleaseList*: if the current UE configuration includes an SCell with value *sCellIndex*: ... release the SCell”); EX1003, ¶¶150-154.

It would have been obvious to a POSA, and a POSA would have been motivated, to use and configure the Dinan UE with a receiver to receive, from a base station, a first field comprising a first serving cell index (*SCellIndex*) to release a serving cell (SCell) associated with the first *SCellIndex*, as recited in Element [1a]. *Id.*, ¶155 In particular, a POSA would have been motivated to apply TS36.331’s disclosure of using the *SCellIndex* in a *sCellToRelease* field to identify SCells to be released as doing so would bring Dinan into compliance with the TS36.331 specification. *Id.*

Additionally, configuring Dinan’s *sCellToReleaseList* field as described in TS36.331 would have yielded predictable results and required nothing more than routine engineering. EX1003, ¶156. A POSA would have only needed to

incorporate TS36.331’s specific details concerning the sCellToReleaseList field in the same sCellToReleaseList field referenced in Dinan. A POSA would have been capable of implementing these details, particularly as Dinan adopts the nomenclature of TS36.331 in describing the relevant field. A POSA would have understood that this modification had a high likelihood of success and was obvious. *Id.* Accordingly, Dinan discloses and renders obvious Element [1a].

**(c) [1b] a second field comprising at least one SCellIndex to add one or more SCell associated with the at least one SCellIndex**

Dinan discloses a second field comprising at least one SCellIndex to add one or more SCell associated with the at least one SCellIndex as recited in Element [1b]. EX1003, ¶¶157-163. Dinan describes that the purpose of an RRC connection reconfiguration procedure includes “to add ... SCells,” and discloses the use of a field—the sCellToAddModList—in an RRC reconfiguration message transmitted from a base station to add a serving cell in which an SCellIndex in the sCellToAddModList indicates the SCell associated with the SCellIndex to be added. *Compare* EX1009, [0075] (“When a UE receives an sCellToAddModList in an RRC reconfiguration message, the UE may process the content of the message. The UE may, for an sCellIndex value included in the sCellToAddModList that is not part of the current UE configuration (SCell addition), add the SCell corresponding to the cell identification....”), EX1010, 29-

32 *with* EX1001, 17:26-37 (the “sCellToAddModList” field “indicates the index of the secondary serving cell to be added ‘SCellIndex.’”); 26:31-35 (“[I]f the secondary serving cell configuration information includes a field ‘sCellToAddModList’, the secondary serving cell configuration information is for adding the secondary serving cell.”). A POSA would have understood that Dinan’s and the ’776 patent’s use of the term “sCellToAddModList” refer to the same field. EX1003, ¶¶159-161. Accordingly, Dinan discloses Element [1b].

**(d) [1c] an identifier of a timing advance group (TAG) associated with the one or more SCell**

Dinan discloses an identifier of a timing advance group (TAG) associated with the one or more SCell as recited in Element [1c]. EX1003, ¶¶163-165. Dinan discloses that “serving cells having an uplink to which the same time alignment (TA) applies may be grouped in a TA group (TAG).” EX1009, [0033]; EX1010, 26-27. Dinan discloses an identifier of a TAG in the form of a TAG ID: “The identity or index of a TA group which an SCell belongs to, a TA group identity (TAG ID), may be assigned to a SCell.” EX1009, [0077]; EX1010, 31.

Dinan discloses that the TAG identifier (TAG ID) associated with an SCell is transmitted from a base station to a UE in an RRC reconfiguration message in the same field used to add serving cells—the sCellToAddModList. EX1003, ¶164. Dinan discloses that TAG configuration information may be included in the

sCellToAddModList and that a TAG ID may be included in that TAG configuration information. EX1009, [0077] (“SCell TAG configuration(s) (e.g. TAG ID assignment) may be included in sCellToAddModList or one of the IEs in sCellToAddModList. A TAG ID may be included in the TAG configuration of a cell. The TA group may be configured when an SCell is added.”); EX1010, 30-31; EX1003, ¶164. The sCellToAddModList transmitted to the UE includes the TAG ID to which the SCell belongs. EX1009, [0077] (SCellToAddModList transmitted to a UE may comprise “the TAG ID that the SCell belongs to.”); EX1010, 31. Accordingly, Dinan discloses Element [1c].

**(e) [1d] a radio resource control (RRC) processor to release the SCell associated with the first SCellIndex**

Dinan discloses a radio resource control (RRC) processor to release the SCell associated with the first SCellIndex as recited in Element [1d]. EX1003, ¶¶166-169. Dinan discloses that the UE comprises “at least one processor 408” which is used to “process the content of [] message[s]” received, such as RRC reconfiguration messages. EX1009, [0024], [0026], [0075], FIG. 4; EX1010, 10-11, 29-31, FIG. 4.

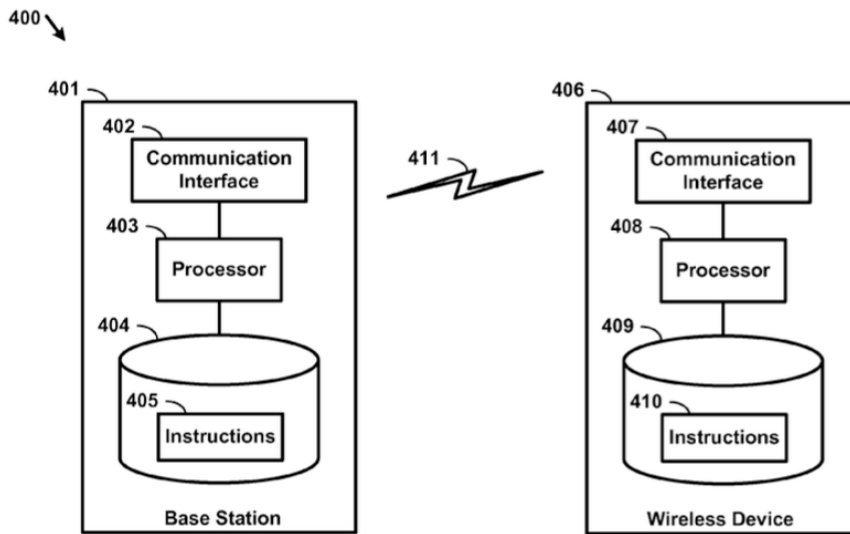


FIG. 4

**EX1009, FIG. 4; EX1010, FIG. 4.**

Dinan describes that the purpose of an RRC connection reconfiguration procedure may be “... to ... release SCells,” and that “[i]f the received RRC Connection Reconfiguration message includes the sCellToReleaseList, the UE may perform an SCell release.” EX1009, [0074]; EX1010, 30. As explained herein, this includes the use of an SCell index as recited in Element [1a]. *See* X.A.1.(b). A POSA would have understood that the UE includes a RRC processor to perform the operations commanded in the RRC Connection Reconfiguration message and that the RRC Connection Reconfiguration message includes a field comprising a serving cell index (SCellIndex) to identify the serving cell to be released. EX1003, ¶¶167-168. Accordingly, a POSITA would have understood that Dinan discloses

and renders obvious a UE including a RRC processor to release the SCell associated with the first SCellIndex. EX1003, ¶169.

**(f) [1e] to add the one or more SCell as an available SCell for use with the UE**

Dinan discloses adding the one or more SCell as an available SCell for use with the UE as recited in Element [1e]. EX1003, ¶¶170-172. Dinan discloses that the purpose of an RRC connection reconfiguration procedure includes “to add ... SCells,” and “[i]f the received RRC Connection Reconfiguration message includes the sCellToAddList, the UE may perform SCell additions.” EX1009, [0074]; EX1010, 30.

Dinan discloses:

When a UE receives an SCellTo AddModList in an RRC reconfiguration message, the UE may process the content of the message. The UE may, for an sCellIndex value included in the sCellToAddModList that is not part of the current UE configuration (SCell addition), add the SCell corresponding to the cell identification in accordance with the received radioResourceConfigCommonSCell (SCell common configuration parameters) and radioResourceConfigDedicatedSCell (SCell dedicated configuration parameters).

EX1009, [0075]; EX1010, 29-32. See the discussion of Element [1b] at Section X.A.1.(c) for additional details. Accordingly, Dinan discloses Element [1e].

**(g) [1f] to associate the one or more SCell with another available SCell associated with same TAG identifier**

Dinan discloses associating the one or more SCell with another available SCell associated with same TAG identifier as recited in Element [1f]. EX1003, ¶¶173-176. Dinan discloses “[t]he mapping of a serving cell to a TAG may be configured by the serving eNB with RRC signaling.” EX1009, [0069]; EX1010, 29-30. Dinan discloses the use of a TAG identifier included in the sCellToReleaseList RRC message to associate SCells together as part of the adding process:

SCell TAG configuration(s) (e.g. TAG ID assignment) may be included in sCellToAddModList or one of the IEs in sCellToAddModList. A TAG ID may be included in the TAG configuration of a cell. The TA group may be configured when an SCell is added. Thus the configuration of a TA group may be seen as part of the SCell addition/modification.

EX1009, [0077]; EX1010, 29-32. “The identity or index of a TA group which an SCell belongs to, a TA group identity (TAG ID), may be assigned to a SCell employing an dedicated parameter in radioResourceConfigDedicatedSCell[, which is part of the sCellToAddModList].” *Id.*

A POSA would have understood that a TAG may include two or more SCells having the same time alignment. EX1009, [0033]; EX1010, 26-27; EX1003, ¶175. A POSA would have understood, and found it obvious, that the one or more SCells being added in Dinan’s sCellToAddModList are respectively

associated with any other available SCell associated with same TAG identifier so as to take advantage of the benefits of organizing the SCells into TAGs. *Id.*

Accordingly, Dinan discloses and renders obvious Element [1f].

**(h) [1g] wherein the TAG is associated with SCells having timing based on a same timing advance (TA) value**

Dinan discloses the TAG is associated with SCells having timing based on the same timing advance (TA) value as recited in Element [1g]. *See* Element [1f], above in Section X.A.1.(g); EX1003, ¶¶177-178. Dinan discloses that “serving cells having an uplink to which the same time alignment (TA) applies may be grouped in a TA group (TAG).” EX1009, [0033]; EX1010, 26-27. A POSA would have understood that “time alignment” has the same meaning as “timing advance.” EX1003, ¶177. Element [1g] would have been well known to a POSA at the time of the earliest possible priority date of the ’776 patent, as recognized in its Background section. EX1001, 1:54-58; EX1003, ¶178. It would have been obvious in view of the knowledge of a POSA to include in the Dinan UE associating the TAG with SCells having timing based on a same timing advance (TA) value as recited in Element [1g] as this was the commonly understood organization of a TAG. Thus, Dinan renders claim 1 obvious.

**2. Dependent Claim 2**

**(a) The UE of claim 1, wherein the RRC processor associates an SCell with a TAG associated with a**

**primary serving cell (PCell) when the second field to add an SCell does not comprise identifier of the TAG**

Dinan discloses the added limitation of Claim 2 that the UE processor associates an SCell with a TAG associated with a primary serving cell (PCell) when the second field to add an SCell does not comprise identifier of the TAG. EX1003, ¶179. Dinan discloses, “SCell TAG configuration(s) (e.g. TAG ID assignment) may be included in sCellToAddModList or one of the IEs in sCellToAddModList.... Thus the configuration of a TA group may be seen as part of the SCell addition/modification.” EX1009, [0077]; EX1010, 30-31. Dinan discloses implicitly assigning a SCell to the TAG associated with the PCell (i.e., a “pTAG”) by not including a TAG ID in the sCellToAddModList:

[T]here is no need to explicitly assign a TAGID for cells in the pTAG. SCells configured with the pTAG may be grouped implicitly and a TAG ID for pTAG may not be needed or a TAGID may be assigned implicitly by default (for example, TAGID: 0). TAG identity may be regarded as Zero if the TAG identity field is absent in SCell dedicated parameters upon SCell addition. If an SCell is not configured with a TAG ID, it may apply that the SCell belongs to the pTAG.

EX1009, [0080]; EX1010, 32; *see also* EX1009, [0033] (“One TA group may contain the PCell and may be called a primary TAG (pTAG).”); EX1010, 26-27.

Accordingly, Dinan discloses and renders obvious claim 2.

**3. Dependent Claim 3**

- (a) The UE of claim 1, wherein the receiver receives the first and second field through a RRC connection reconfiguration message**

Dinan discloses the added limitation of Claim 3 that the receiver receives the first and second field through a RRC connection reconfiguration message.

EX1003, ¶¶180-182. Dinan discloses the UE receiver receives the first and second fields as recited in Claim 3 via the sCellToReleaseList and the sCellToAddModList, respectively. *See* Section X.A.1(b), (c). Dinan discloses the use of an RRC connection reconfiguration message to convey the sCellToReleaseList and the sCellToAddModList. EX1009, [0074] (“If the received RRC Connection Reconfiguration message includes the sCellToReleaseList, the UE may perform an SCell release. If the received RRC Connection Reconfiguration message includes the sCellToAddModlist, the UE may perform SCell additions or modification.”); EX1010, 30-31. Accordingly, Dinan discloses and renders obvious claim 3.

**4. Dependent Claim 4**

- (a) The UE of claim 1, wherein the receiver receives, from the base station, the first field comprising an indication to remove an SCell from SCells available to the UE**

Dinan discloses the added limitation of Claim 4. EX1003, ¶¶183-185.

Dinan discloses the UE receiver receives from the base station a RRC message

including the sCellToReleaseList. EX1009, [0074] (“If the received RRC Connection Reconfiguration message includes the sCellToReleaseList, the UE may perform an SCell release.”); EX1010, 30-31. Dinan discloses and renders obvious the UE receiver receiving, from the base station, the first SCellIndex by way of the sCellToReleaseList field. *See* Section X.A.1(b). Dinan discloses releasing the SCell in response to receiving the sCellToRelease List removes the SCell from the SCells available to the UE. EX1003, ¶184. For example, Dinan discloses the base station “may modify the TAG configuration of an SCell by removing (releasing) the SCell.” EX1009, [0070]; EX1010, 29-32. Dinan continues, “In an example implementation, it may not be possible to change the TAG associated with an SCell, but rather, the SCell may need to be removed and a new SCell may need to be added with another TAG.” *Id.* Accordingly, Dinan disclose and renders obvious claim 4.

## **5. Claims 5-8**

Dinan discloses and renders obvious claims 5-8 for the same reasons as claims 1-4, respectively. *See* Sections X.A.1-4.

### **B. Ground III: Dinan and Potevio Render Claims 1-8 Obvious**

Claims 1-8 would have been obvious to a POSA under Section 103 in view of Dinan and Potevio. EX1003, ¶¶187-222.

## 1. The Dinan-Potevio Combination

It would have been obvious to a POSA prior to the earliest possible priority date of the '776 patent to combine Dinan and Potevio to arrive at the subject matter of claims 1-8. EX1003, ¶¶188-200. A POSA would have been motivated to combine Dinan and Potevio because they are directed to the same technologies and a skilled artisan would have understood the benefits of combining these references. EX1003, ¶189. A POSA would have understood that there was a high likelihood of success in making the combination. *Id.*

Dinan and Potevio are readily combinable because they are directed to protocols for a radio interface between user equipment and base stations in LTE in systems using TA groups, and Potevio discloses specific ways to signal TA group configuration and to associate an SCell and a TAG. EX1007, 1 (“In this contribution we study how to signal TA group configuration.”); EX1003, ¶190. A POSA would have applied Potevio’s advantageous teachings on handling TAG configurations via the RRC to Dinan. EX1003, ¶190.

As recognized in the '776 patent, the concept of a timing advance group was well-known at the time of the purported invention. EX1001, 1:54-58. A POSA would have understood that there was a need for a mechanism to identify different TAGs, and that the simplest and most straightforward way to do so would be with a unique TAG identifier. EX1003, ¶¶191-196. Potevio discloses “how to signal

TA group configuration” and explains why a TA group index helps in that endeavor. EX1007, 1 (“One simple approach is introducing the concept of TA group index [where] all cells [that] share the same TA value are configured with the same TA group index.”); 2 (disclosing a “‘TA group index’ concept, [in which] cells with the same TA value share the same TA group index.”).

Further, the ’776 patent specification discloses the need for a “clearly defined” signaling protocol for informing that a secondary cell is included in a TAG, and for informing the UE when a TAG is changed according to a channel condition. EX1001, 1:66-2:5. Potevio discloses “[e]very cell should be associated to a TA group to apply TA value for uplink transmission. The relationship between configured cell and TA group should be configured by eNB, i.e. explicit signalling is necessary to establish mapping between each cell and a TA group.” EX1007, 1. Potevio also discloses using RRC signaling “to (re-)associate SCell with TA group.” EX1007, 2. Potevio explains that the RRC “is the most reliable” among the approaches considered by Potevio and “is more flexible” than the other approaches. *Id.*, 1-2.

A POSA would have looked to such teachings in Potevio, including the use of a TAG identifier and radio resource control (RRC) messaging, to associate the SCell being added with another available SCell associated with same TAG identifier. EX1003, ¶¶197-198. With these teachings, a POSA would have been

motivated to use and configure the Dinan UE receiver to receive a TAG-ID for a timing advance group (TAG) associated with one or more SCells having the same timing advance value, and to use and configure the RRC processor to associate the SCell being added with other available SCells for the same TAG identifier.

EX1003, ¶198.

A skilled artisan would have had a reasonable expectation of success in combining Dinan and Potevio. EX1003, ¶199. Potevio discloses that every cell should be associated with a TAG and the RRC signalling should be used “to establish mapping between each cell and a TA group.” EX1007, 1-2. When the prior art identifies a problem (associating SCells to a TAG) and provides express guidance on how to fix the problem, as in Potevio, a skilled artisan would have had a reasonable expectation of success in combining the prior art. *See, e.g., In re Inland Steel Co.*, 265 F.3d 1354, 1364 (Fed. Cir. 2001).

Additionally, this combination of Dinan with Potevio would have yielded predictable results and required nothing more than routine engineering. EX1003, ¶200. A POSA would have appreciated that an index was already successfully used to identify unique SCells, namely by using an SCellIndex, and would work similarly well to identify different TAGs. *Id.* A POSA would have only needed to incorporate the additional details from Potevio for use of the RRC to associate the SCell with other available SCells as proposed by Potevio. *Id.* A POSA would

have been capable of configuring the RRC with a TA group index as an identifier of a timing advance group (TAG) and to use it to associate SCells with the same timing advance (TA) value. *Id.* A POSA would have been capable of configuring the RRC with a TAG identifier of a timing advance group (TAG) and to use it to associate SCells with the same timing advance (TA) value. *Id.* A POSA would have understood that this modification had a high likelihood of success and was obvious. *Id.*

That the combination of Dinan and Potevio is the predictable use of interchangeable prior art elements according to their established functions supports a finding of obviousness. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 416 (2007). This combination is not of innovation but of ordinary skill and common sense. *Id.*, 421; EX1003, ¶¶199-200. Accordingly, the combination of Dinan and Potevio renders the Challenged Claims obvious.

## **2. Independent Claim 1**

The combination of Dinan and Potevio renders claim 1 obvious. EX1003, ¶¶201-222.

### **(a) Elements [1pre]-[1b]**

Dinan discloses and renders obvious Elements [1pre]-[1b], as described above in Sections X.A.1.(a)-X.A.1(c). EX1003, ¶202.

**(b) Element [1c]**

Dinan discloses Element [1c], as described above in Section X.A.1.(d). In addition, Potevio discloses Element [1c], and the Dinan-Potevio combination renders it obvious. EX1003, ¶¶203-208.

Potevio’s focal point is a “Need for TA group index.” EX1007, 1. Potevio discloses sending an RRC message with a TAG identifier associated with each SCell being added from the base station (eNB) to the receiver of the UE. *Id.* (“Every cell should be associated to a TA group to apply TA value for uplink transmission. The relationship between configured cell and TA group should be configured by eNB, i.e. explicit signalling is necessary to establish mapping between each cell and a TA group. One simple approach is introducing the concept of TA group index and all cells share the same TA value are configured with the same TA group index.”), 2 (“cells with [the] same TA value share the same TA group index”).

Potevio discloses using a RRC message to signal TA group configuration. EX1007, 2. Potevio explains that the RRC “is the most reliable” among the approaches considered by Potevio and “is more flexible” than the other approaches. *Id.*, 1-2.

A POSA would have been motivated in view of the teachings of Potevio and Dinan to include an identifier of a TAG (in the form of a TA group index)

associated with the SCell(s) being added and had a reasonable expectation of success. *See* Section X.B.1; EX1003, ¶¶203-208. Accordingly, the Dinan-Potevio combination discloses and renders obvious Element [1c].

**(c) Elements [1d]-[1e]**

Dinan discloses and renders obvious Elements [1d]-[1e], as described above in Sections X.A.1.(e)-X.A.1(f). EX1003, ¶209.

**(d) Element [1f]**

Dinan discloses Element [1f], as described above in Section X.A.1.(g). In addition, Potevio also discloses Element [1f], and the Dinan-Potevio combination renders it obvious. EX1003, ¶¶210-215.

Potevio discloses “[e]very cell should be associated to a TA group to apply TA value for uplink transmission. The relationship between configured cell and TA group should be configured by eNB, i.e. explicit signalling is necessary to establish mapping between each cell and a TA group.” EX1007, 1. Potevio also discloses using RRC signaling “to (re-)associate SCell with TA group.” EX1007, 2. Potevio discloses including in the RRC message a TA group index of each cell being added, with all cells sharing the same TA value being configured with the same TA group index. EX1007, 1.

A POSA would have understood that the RRC processor of the UE would process the RRC message including the TA group index of each SCell being

added, where “cells with [the] same TA value share the same TA group index,” EX1007, 2, to associate the one or more SCells being added with other available SCells associated with same TA group index “to (re)-associate SCell with TA group.” *Id.*; EX1003, ¶214. A POSA would have understood that “cells with [the] same TA value” form a TAG. EX1001, 1:54-58; EX1007, 1 (under the “‘TA group index’ concept, cells with the same TA value share the same TA group index”); EX1003, ¶214.

A POSA would have been motivated by the teachings of Potevio to modify Dinan to associate the SCell(s) being added as an available SCell for use with the UE with another available SCell associated with the same TAG identifier and had a reasonable expectation of success. *See* Section X.B.1; EX1003, ¶215.

Accordingly, the Dinan-Potevio combination discloses and renders obvious Element [1f].

**(e) Element [1g]**

The Dinan-Potevio combination discloses and render obvious Element [1g]. *See* Element [1f] above at Sections X.A.1.(g), X.B.2.(d); EX1003, ¶¶216-220.

In addition, Potevio discloses the TAG is identified by a TA group index, and the TAG is associated with SCells having the same timing advance value. EX1007, 1 (“Every cell should be associated to a TA group to apply TA value for uplink transmission.... One simple approach is introducing the concept of TA

group index and all cells share the same TA value are configured with the same TA group index.”), 2 (“cells with [the] same TA value share the same TA group index”).

A POSA would have been motivated by the teachings of Potevio to configure Dinan such that the TAG identified by the tag identifier is associated with SCells having timing based on the same timing advance (TA) value and had a reasonable expectation of success. *See* Section X.B.1; EX1003, ¶219.

Accordingly, the Dinan-Potevio combination discloses and renders obvious Element [1g].

Thus, because it would have been obvious to a POSA to combine Dinan with Potevio to arrive at the purported invention recited in claim 1, and a POSA would have had a reasonable expectation of success in doing so, claim 1 should be found unpatentable.

### **3. Dependent Claims 2-4**

Dinan discloses and renders obvious dependent claims 2-4, as described above in Sections X.A.2-4, respectively. EX1003, ¶221.

### **4. Claims 5-8**

The Dinan-Potevio combination renders claims 5-8 obvious for the same reasons as claims 1-4, respectively. *See* Sections X.B.2-3. EX1003, ¶222.

**C. Ground IV: Dinan and Sharp Render Claims 1-8 Obvious**

Claims 1-8 would have been obvious to a POSA under Section 103 in view of Dinan and Sharp. EX1003, ¶¶223-256.

**1. The Dinan-Sharp Combination**

It would have been obvious to a POSA prior to the earliest possible priority date of the '776 patent to combine Dinan and Sharp to arrive at the subject matter of claims 1-8. EX1003, ¶¶224-234. A POSA would have been motivated to combine Dinan and Sharp because they are directed to the same technologies and a skilled artisan would have understood the benefits of combining these references. EX1003, ¶¶224. A POSA would have understood that there was a high likelihood of success in making the combination. *Id.*

Dinan and Sharp are readily combinable because they are directed to protocols for a radio interface between user equipment and base stations in LTE in systems using TA groups, and Sharp discloses specific ways to associate an SCell and a TAG. EX1006, 1 (“In RAN2#76bis, RAN2 agreed that RRC signalling is used to (re-)associate SCell with a TA group.... In this contribution, we would like to discuss the way to handle TA group in a multi-TA scenario.”); EX1003, ¶225. A POSA would have applied Sharp’s advantageous teachings on handling signaling TA group configurations via the RRC to Dinan. EX1003, ¶225.

As recognized in the '776 patent, the concept of a timing advance group was well-known at the time of the purported invention. EX1001, 1:54-58. A POSA would have understood that there was a need for a mechanism to identify different TAGs, and that the simplest and most straightforward way to do so would be with a unique TAG identifier. EX1003, ¶¶226-230.

Further, the '776 patent specification discloses the need for a “clearly defined” signaling protocol for informing that a secondary cell is included in a TAG, and for informing the UE when a TAG is changed according to a channel condition. EX1001, 1:66-2:5. Sharp discloses “the way to handle TA group in a multi-TA scenario” by using a TAG identifier (i.e., a TAG-ID). EX1006, 1 (“[I]t is necessary to provide some kind of identifier (i.e. TAG-ID) to create an association between the SCell(s) and the sTAG to which the SCell will align the UL timing.... TA group and UL of SCell in sTAG are mapped by TAG-ID.”). Sharp also discloses that the radio resource control (RRC) is used to “(re-)associate SCell with a TA group.” *Id.*

A POSA would have looked to such teachings in Sharp, including the use of a TAG identifier and radio resource control (RRC) messaging to associate the SCell being added with another available SCell associated with same TAG identifier. EX1003, ¶¶231-232. With these teachings, a POSA would have been motivated to use and configure the Dinan UE receiver to receive a TAG-ID for a

timing advance group (TAG) associated with one or more SCells having the same timing advance value, and to use and configure the RRC processor to associate the SCell being added with other available SCells for the same TAG identifier.

EX1003, ¶232.

A skilled artisan would have had a reasonable expectation of success in combining Dinan and Sharp. EX1003, ¶233. Sharp discloses a specific suggestion as to how to modify a field of an RRC message to include the TAG-ID configuration. *See* EX1006, 3 (“TAG-ID configuration should be included in the UL configuration of *PhysicalConfigDedicatedSCell*.”); EX1003, ¶233. A POSA would have understood Sharp’s teachings to include TAG-ID configuration information is applicable to the *sCellToAddModList* field. EX1003, ¶233. When the prior art identifies a problem (associating SCells to a TAG) and provides express guidance on how to fix the problem, as in Sharp, a skilled artisan would have had a reasonable expectation of success in combining the prior art. *See, e.g., Inland Steel*, 265 F.3d at 1364.

Additionally, this combination of Dinan with Sharp would have yielded predictable results and required nothing more than routine engineering. EX1003, ¶234. A POSA would have appreciated an index was already successfully used to identify unique SCells, namely by using an *SCellIndex*, and would work similarly well to identify different TAGs. *Id.* A POSA would have only needed to modify

an existing RRC message, e.g. the *sCellToAddModList* field disclosed in Dinan or *PhysicalConfigDedicatedSCell* as proposed by Sharp. *Id.* A POSA would have been capable of configuring the RRC with a TAG-ID as an identifier of a timing advance group (TAG) and to use it to associate SCells with the same timing advance (TA) value. *Id.* A POSA would have understood that this modification had a high likelihood of success and was obvious. *Id.*

That the combination of Dinan and Sharp is the predictable use of interchangeable prior art elements according to their established functions supports a finding of obviousness. *See KSR*, 550 U.S. at 416. This combination is not of innovation but of ordinary skill and common sense. *Id.*, 421; EX1003, ¶¶233-234. Accordingly, the combination of Dinan and Sharp renders the Challenged Claims obvious.

## **2. Independent Claim 1**

The combination of Dinan and Sharp renders claim 1 obvious. EX1003, ¶¶235-254.

### **(a) Elements [1pre]-[1b]**

Dinan discloses and renders obvious Elements [1pre]-[1b], as described above in Sections X.A.1.(a)-X.A.1(c). EX1003, ¶236.

**(b) Element [1c]**

Dinan discloses Element [1c], as described above in Section X.A.1.(d). In addition, Sharp discloses Element [1c], and the Dinan-Sharp combination renders it obvious. EX1003, ¶¶237-243.

Sharp teaches “the way to handle TA group in a multi-TA scenario.” EX1006, 1. Sharp discloses the known problem of “how to realize the association between SCell and TA group” when RRC signaling is used. *Id.* Sharp notes that in Rel-11 “one or more TA groups can be configured with the SCells only (sTAG),” and, thus, “it is necessary to provide some kind of identifier (i.e. TAG-ID) to create an association between the SCell(s) and the sTAG to which the SCell will align the UL timing.” *Id.* Sharp discloses that “TA group and UL of SCell in sTAG are mapped by TAG-ID.” *Id.*

Sharp further discloses that “TAG-ID configuration should be included in UL configuration of *PhysicalConfigDedicatedSCell*.” EX1006, 3. A POSA would have understood that the *PhysicalConfigDedicatedSCell* is a field of an RRC message. *See e.g.*, EX1005, 58 (“if the received *radioResourceConfigDedicated* includes the *physicalConfigDedicated*: 2> reconfigure the physical channel configuration as specified in 5.3.10.6”), 126-127 (“SCellAdd ... *radioResourceConfigDedicatedSCell-r10*”), 174 (*PhysicalConfigDedicated*), 184 (*RadioResourceConfigDedicated*).

A POSA would have also found it obvious to include the TAG-ID disclosed in Sharp in Dinan's sCellToAddModList field such that the TAG-ID is in the same field used for adding a specific SCell. EX1003, ¶242. The Dinan provisional demonstrates the knowledge of a POSA at the time of the '776 patent. EX1010, 30-31 ("TAG configuration may be included in sCellToAddModlist and a TAG ID may be included in the TAG configuration. The TA group could be configured when an SCell is added."); EX1003, ¶242. A POSA would have recognized that the sCellToAddModList is one of a finite number of equally-suitable RRC messages for the TAG-ID. EX1003, ¶242.

A POSA would have been motivated by the teachings of Sharp to modify Dinan to include an identifier of a TAG (in the form of a TAG-ID) associated with the SCell(s) being added as recited in Element [1c] and had a reasonable expectation of success. *See* Section X.C.1; EX1003, ¶243. Accordingly, the Dinan-Sharp combination discloses and renders obvious Element [1c].

**(c) Elements [1d]-[1e]**

Dinan discloses and renders obvious Elements [1d]-[1e], as described above in Sections X.A.1.(e)-X.A.1(f). EX1003, ¶244.

**(d) Element [1f]**

Dinan discloses Element [1f], as described above in Section X.A.1.(g). In addition, Sharp also discloses Element [1f], and the Dinan-Sharp combination

renders it obvious. EX1003, ¶¶245-249. The discussion above with respect to Element 1[c] is incorporated herein. See Section X.C.2.(b)

Sharp discloses “it is necessary to provide some kind of identifier (i.e. TAG-ID) to create an association between the SCell(s) and the sTAG to which the SCell will align the UL timing.” EX1006, 1. Sharp discloses that “TA group and UL of SCell in sTAG are mapped by TAG-ID.” *Id.*

Sharp further discloses that “TAG-ID configuration should be included in UL configuration of *PhysicalConfigDedicatedSCell*.” EX1006, 3. A POSA would have understood that the *PhysicalConfigDedicatedSCell* is part of an RRC message described in TS36.331. *See e.g.*, EX1005, 58 (“if the received *radioResourceConfigDedicated* includes the *physicalConfigDedicated*: 2> reconfigure the physical channel configuration as specified in 5.3.10. 6”), 126-127 (“SCellAdd ... *radioResourceConfigDedicatedSCell-r10*”), 174 (*PhysicalConfigDedicated*), 184 (*RadioResourceConfigDedicated*). EX1003, ¶248. A POSA would have understood that the RRC processor of the UE would process the RRC message including the *PhysicalConfigDedicatedSCell* (or the *sCellToAddModList* in an obvious variant) to associate the one or more SCells being added with each other SCell available to the UE that itself is associated with same TAG identifier “to create an association between the SCell(s) and the sTAG to which the SCell will align the UL timing.” EX1006, 1; EX1003, ¶248.

A POSA would have been motivated by the teachings of Sharp to modify Dinan to associate the SCell(s) being added as an available SCell for use with the UE with another available SCell associated with the same TAG identifier and had a reasonable expectation of success. *See* Section X.C.1; EX1003, ¶249.

Accordingly, the Dinan-Sharp combination discloses and renders obvious Element [1f].

**(e) Element [1g]**

The Dinan-Sharp combination discloses and render obvious Element [1g]. EX1003, ¶¶250-254. *See* Element [1f] above at Sections X.A.1.(g), X.C.2.(d).

As the '776 patent recognizes, it was known at the time of the earliest claimed priority date that a TAG is “a group of one or more serving cells having the same timing advance value” and was used in a multiple component carrier system “to effectively perform timing alignment.” EX1001, 1:54-58. It therefore would have been obvious to a POSA that the TAG is associated with SCells having timing based on the same TA value as recited in Element [1g]. EX1003, ¶251.

In addition, Sharp discloses the TAG is associated with SCells having timing based on the same TA value. *See, e.g.*, EX1006, 1 (“[I]t is necessary to provide some kind of identifier (i.e. TAG-ID) to create an association between the SCell(s) and the sTAG to which the SCell will align with UL timing.... TA group and UL of SCell in sTAG are mapped by TAG-ID”). Furthermore, Sharp’s Figure 2 shows

“up to 4 TA groups” each having the same value for the TA command. EX1006, 2; EX1003, ¶252.

A POSA would have been motivated by the teachings of Sharp to configure Dinan such that the TAG identified by the TAG-ID is associated with SCells having timing based on the same timing advance (TA) value and had a reasonable expectation of success. *See* Section X.C.1; EX1003, ¶253. Accordingly, the Dinan-Sharp combination discloses and renders obvious Element [1g]

Thus, because it would have been obvious to a POSA to combine Dinan with Sharp to arrive at the purported invention recited in claim 1, and a POSA would have had a reasonable expectation of success in doing so, claim 1 should be found unpatentable.

### **3. Dependent Claims 2-4**

Dinan discloses and renders obvious dependent claims 2-4, as described above in Sections X.A.2-4, respectively. EX1003, ¶255.

### **4. Claims 5-8**

The Dinan-Sharp combination renders claims 5-8 obvious for the same reasons as claims 1-4, respectively. *See* Sections X.C.2-3. EX1003, ¶256.

### **D. Ground V: TS36.331 and Sharp Render Claims 1-8 Obvious**

Claims 1-8 would have been obvious to a POSA under Section 103 in view of TS36.331 and Sharp. EX1003, ¶¶257-328.

## 1. The TS36.331-Sharp Combination

It would have been obvious to a POSA prior to the earliest possible priority date of the '776 patent to combine TS36.331 and Sharp to arrive at the subject matter of claims 1-8. EX1003, ¶¶258-274. A POSA would have been motivated to combine TS36.331 and Sharp because they are directed to the same technologies and a skilled artisan would have understood the benefits of combining these references. EX1003, ¶258. A POSA would have understood that there was a high likelihood of success in making the combination. *Id.*

TS36.331 and Sharp are readily combinable because they are directed to protocols for a radio interface between user equipment and base stations in LTE in systems using TA groups, and Sharp discloses specific ways to associate an SCell and a TAG. EX1006, 1 (“In RAN2#76bis, RAN2 agreed that RRC signalling is used to (re-)associate SCell with a TA group.... In this contribution, we would like to discuss the way to handle TA group in a multi-TA scenario.”). A POSA would have applied Sharp’s teachings on handling signaling TA group configurations via the RRC to TS36.331’s specification because that is what Sharp’s teachings are intended to do. EX1003, ¶259.

A POSA would have been motivated to use and configure the TS36.331 specification following the TA group handling process disclosed in Sharp because the purpose of this Technical Document was to provide updates to TS36.331.

EX1003, ¶¶260-264. TS36.331 was produced by the Technical Specification Group “Radio Access Network,” and Sharp was submitted in subsequent meetings of the same “Working Group” (“WG”). EX1003, ¶¶261-263. Indeed, the Sharp Working Group was tasked with primary responsibility for the continued development of TS36.331. EX1003, ¶263. A POSA would have understood that Sharp was written to provide instructions for modifying TS36.331 created by peers who confirmed their suitability. EX1003, ¶264.

As recognized in the ’776 patent, the concept of a timing advance group was well-known at the time of the purported invention. EX1001, 1:54-58; EX1003, ¶265. A POSA would have understood that there was a need for a mechanism to identify different TAGs, and that the simplest and most straightforward way to do so would be with a unique TAG identifier. EX1003, ¶¶265-268. A POSA would have appreciated this approach was already successfully used to identify SCells, namely by using an SCellIndex, and would work similarly well to identify different TAGs. *Id.*, ¶267.

Additionally, the ’776 patent specification discloses the need for a “clearly defined” signaling protocol for informing that a secondary cell is included in a TAG, and for informing the UE when a TAG is changed according to a channel condition. EX1001, 1:66-2:5. Sharp discloses “the way to handle TA group in a multi-TA scenario” by using a TAG identifier (i.e., a TAG-ID). EX1006, 1 (“[I]t

is necessary to provide some kind of identifier (i.e. TAG-ID) to create an association between the SCell(s) and the sTAG to which the SCell will align the UL timing.... TA group and UL of SCell in sTAG are mapped by TAG-ID.”). Sharp also discloses that the radio resource control (RRC) is used to “(re-)associate SCell with a TA group.” *Id.*

A POSA would have looked to such teachings in Sharp to include the use of a TAG identifier and radio resource control (RRC) in the TS36.331 framework. EX1003, ¶¶269-270. With these teachings, a POSA would have been motivated to use and configure the TS36.331 system with a TAG-ID for a timing advance group (TAG) associated with one or more SCells having the same timing advance value, and to use and configure the RRC processor to associate SCell with other available SCells for the same TAG identifier. EX1003, ¶270.

A skilled artisan would have had a reasonable expectation of success in combining TS36.331 and Sharp. Sharp discloses a specific suggestion as to how to modify a field of an RRC message to include the TAG-ID configuration. *See* EX1006, 3 (“TAG-ID configuration should be included in UL configuration of *PhysicalConfigDedicatedSCell*.”); EX1003, ¶271. A POSA would have understood Sharp’s teachings to include TAG-ID configuration information is applicable to other RRC messages including the sCellToAddModList. *Id.* When the prior art identifies a problem and provides express guidance on how to fix the

problem, as in Sharp, a skilled artisan would have had a reasonable expectation of success in combining the prior art. *See, e.g., Inland Steel*, 265 F.3d at 1364.

Additionally, this combination of TS36.331 with Sharp would have yielded predictable results and required nothing more than routine engineering. EX1003, ¶272. A POSA would have only needed to modify an existing RRC message disclosed in the TS36.331 specification as proposed by Sharp. *Id.* A POSA would have been capable of configuring the RRC with a TAG-ID as an identifier of a timing advance group (TAG) and to use it to associate SCells with the same timing advance (TA) value. *Id.* A POSA would have understood that this modification had a high likelihood of success and was obvious. *Id.* That the combination of TS36.331 and Sharp is the predictable use of interchangeable prior art elements according to their established functions supports a finding of obviousness. *See KSR*, 550 U.S. at 416. This combination is not of innovation but of ordinary skill and common sense. *Id.*, 421; EX1003, ¶274. Accordingly, the combination of TS36.331 and Sharp renders the Challenged Claims obvious.

## **2. Independent Claim 1**

The combination of TS36.331 and Sharp renders claim 1 obvious. EX1003, ¶¶275-315.

**(a) Element [1pre]**

TS36.331 discloses a UE as recited in Element [1pre]. TS36.331 is comprehensive documentation for “the Radio Resource Control protocol for the radio interface between UE and E-UTRAN...” EX1005, 14, 17 (“E-UTRAN” is “Evolved Universal Terrestrial Radio Access Network”), 19 (“A UE is in RRC\_CONNECTED when an RRC connection has been established.”) (referring to “User Equipment” as “UE”); EX1003, ¶276.

**(b) Element [1a]**

TS36.331 discloses a receiver to receive, from a base station, a first field comprising a first serving cell index (SCellIndex) to release a serving cell (SCell) associated with the first SCellIndex as recited in Element [1a]. EX1003, ¶¶277-284. TS36.331 discloses the UE includes a receiver to receive RRC messages from the base station through the radio access network. *See, e.g.*, EX1005, 23 (“The UE shall: 1> process the received messages in order of reception by RRC, i.e. the processing of a message shall be completed before starting the processing of a subsequent message.”). A POSA would have understood that a UE includes a receiver to receive RRC messages, and, for the UE to process “received messages,” it must have a receiver to receive the RRC messages. EX1003, ¶277. TS36.331 discloses a RRC message called sCellToReleaseList to release a serving cell that

includes a *SCellIndex* to release the *SCell* associated with the *SCellIndex* as recited in Element 1[a]. See Section X.A.1.(b); EX1003, ¶¶277-284. .

Accordingly, TS36.331 discloses and renders obvious Element [1a].

**(c) Element [1b]**

TS36.331 discloses a second field comprising at least one *SCellIndex* to add one or more *SCell* associated with the at least one *SCellIndex* as recited in Element [1b]. EX1003, ¶¶285-290. TS36.331 discloses a UE receiving from a base station an RRC message (“*RRCConnectionReconfiguration*”) with a field (the “*sCellToAddModList*”) including an *SCellIndex* to identify at least one associated *SCell* to be added. EX1005, 46 (5.3.5.3 Reception of an *RRCConnectionReconfiguration* ... by the UE) (“[T]he UE shall:... 1>if the received *RRCConnectionReconfiguration* includes the *sCellToAddModList*. 2> perform *SCell* addition or modification as specified in 5.3.10.3b.”), 60 (5.3.10.3b *SCell* addition/modification).

TS36.331 discloses, for each *SCellIndex* value included in the *sCellToAddModList* not part of the current configuration, the UE shall add the *SCell* with such *SCellIndex* value. *Id.*, 60 (5.3.10.3b *SCell* addition/modification) (“The UE shall: 1> for each *sCellIndex* value included in the *sCellToAddModList* that is not part of the current UE configuration (*SCell* addition): 2> add the *SCell*.”); see also *id.*, 126-127 (*RRCConnectionReconfiguration* message). The

SCellIndex is used in the same way as in Element 1[a] except that, in this case, the one or more SCellIndex in the *SCellToAddModList* is used to identify an associated SCell to be added. EX1005, 60, 210; EX1003, ¶288.

A POSA would have understood that TS36.331's and the '776 patent's use of the term "sCellToAddModList" refers to the same field. *See* EX1001, 17:26-37 (the "sCellToAddModList" field "indicates the index of the secondary serving cell to be added 'SCellIndex.'"); 26:31-35 ("[I]f the secondary serving cell configuration information includes a field 'sCellToAddModList', the secondary serving cell configuration information is for adding the secondary serving cell."); EX1003, ¶289. Accordingly, TS36.331 discloses and renders obvious Element [1b].

**(d) Element [1c]**

The TS36.311-Sharp combination discloses and renders obvious an identifier of a timing advance group (TAG) associated with the one or more SCell as recited in Element [1c]. EX1003, ¶¶291-297. As an initial matter, as recognized in the '776 patent, the concept of a Timing Advance Group (a TAG) was known to a POSA at the time of the earliest priority date of the '776 patent. *See* EX1001, 1:54-65; EX1003, ¶¶292-293. Using a unique identifier to identify a specific TAG (e.g., TAG #1, TAG #2, etc.) would have been readily appreciated by a POSA as a suitable technique to identify one of several TAGs each associated

with one or more SCells having the same time advance value. This approach was already being used at that time for purposes of identifying each SCell using the *SCellIndex* discussed in Elements [1a] and [1b] above. See Sections X.D.2.(b), (c); EX1003, ¶293. Using a TAG identifier as recited in Element [1c] is a simple extension of the same well-understood principle of using an index to identify an SCell. *Id.*

Additionally, Sharp discloses Element [1c]. Sharp teaches “the way to handle TA group in a multi-TA scenario.” EX1006, 1. Sharp discloses the known problem of “how to realize the association between SCell and TA group” when RRC signaling is used. *Id.* Sharp notes that in Rel-11 “one or more TA groups can be configured with the SCells only (sTAG),” and, thus, “it is necessary to provide some kind of identifier (i.e. TAG-ID) to create an association between the SCell(s) and the sTAG to which the SCell will align the UL timing.” *Id.* Sharp discloses that “TA group and UL of SCell in sTAG are mapped by TAG-ID.” *Id.*

Sharp further discloses that “TAG-ID configuration should be included in UL configuration of *PhysicalConfigDedicatedSCell*.” EX1006, 3. A POSA would have understood that the *PhysicalConfigDedicatedSCell* is part of an RRC message. See e.g., EX1005, 58 (“if the received *radioResourceConfigDedicated* includes the *physicalConfigDedicated: 2* > reconfigure the physical channel configuration as specified in 5.3.10.6”), 126-127 (“SCellAdd ...

radioResourceConfigDedicatedSCell-r10”), 174 (*PhysicalConfigDedicated*), 184 (*RadioResourceConfigDedicated*). EX1003, ¶295.

A POSA would have also found it obvious to include the TAG-ID disclosed in Sharp to the sCellToAddModList field of TS36.331 such that the TAG-ID is in the field adding the SCell. EX1003, ¶296. A POSA would have recognized that the sCellToAddModList is one of a finite number of equally-suitable RRC messages for the TAG-ID. *Id.* The Dinan provisional demonstrates the knowledge of a POSA at the time of the ’776 patent. EX1010, 30-31 (“TAG configuration may be included in sCellToAddModlist and a TAG ID may be included in the TAG configuration. The TA group could be configured when an SCell is added.”).

A POSA would have been motivated by the teachings of Sharp to modify TS36.311 to include an identifier of a TAG (in the form of a TAG-ID) associated with the SCell(s) being added and had a reasonable expectation of success. *See* Section X.D.1; EX1003, ¶297. Accordingly, the TS36.331-Sharp combination discloses and renders obvious Element [1c].

**(e) Element [1d]**

TS36.331 discloses a radio resource control (RRC) processor to release the SCell associated with the first SCellIndex as recited in Element [1d]. EX1003, ¶¶298-301. TS36.331 discloses the UE includes a radio resource control (RRC) processor to process RRC messages received by the UE. *Id.*, ¶298. TS36.331

discloses that the UE processes messages. EX1005, 23 (5.1.2 General requirements) (“The UE shall: 1> process the received messages in order of reception by RRC, i.e. the processing of a message shall be completed before starting the processing of a subsequent message.”). A POSA would have understood that the protocols TS36.331 described for releasing SCells would be performed by a processor in the UE because, for the UE to process “received messages,” it must have a RRC processor to process the RRC messages. EX1003, ¶298.

TS36.331 discloses, for each *SCellIndex* value included in the *sCellToReleaseList*, the UE shall release the SCell with the *SCellIndex* value. *Id.*, 60 (5.3.10.3a SCell release) (“The UE shall: if the release is triggered by reception of the *sCellToReleaseList*:... for each *sCellIndex* value included in the *sCellToReleaseList*: if the current UE configuration includes an SCell with value *sCellIndex*:... release the SCell”). Further details can be found in the discussion of Element [1a] above in Sections X.A.1.(b), X.D.2.(b), incorporated herein. A POSA would have understood that the UE includes an RRC processor that operates to release the SCell associated with the *SCellIndex* value in the *SCellToReleaseList*. EX1003, ¶¶298-301.

Accordingly, TS36.331 discloses and renders obvious Element [1d].

**(f) Element [1e]**

TS36.331 discloses adding the one or more SCell as an available SCell for use with the UE as recited in Element [1e]. EX1003, ¶¶302-306. TS36.331 discloses that the *sCellToAddModList* is included in a “RRCConnectionReconfiguration” message that is a “command to modify an RRC connection” sent by the base station to the UE. EX1005, 126-127. TS36.331 discloses, for each *SCellIndex* value included in the *SCellToAddModList* that is not part of the current configuration, the UE shall add the SCell with such *SCellIndex* value. *Id.*, 60 (5.3.10.3b SCell addition/modification) (“The UE shall: 1> for each *sCellIndex* value included in the *sCellToAddModList* that is not part of the current UE configuration (SCell addition): 2> add the SCell.”); *see also id.*, 126-127 (*RRCConnectionReconfiguration* message). Further details can be found in the discussion of Element [1b] above, which is incorporated herein. *See* Section.D.2.(c). A POSA would have understood that the protocols TS36.331 described for adding SCells would be performed by a processor in the UE. EX1003, ¶¶303-306.

Accordingly, TS36.331 discloses and renders obvious Element [1e]

**(g) Element [1f]**

The TS36.311-Sharp combination discloses and renders obvious associating the one or more SCell with another available SCell associated with same TAG

identifier as recited in Element [1f]. EX1003, ¶¶307-310. The discussion above with respect to Element 1[c] is incorporated herein. See Section X.D.2.(d) Sharp discloses “it is necessary to provide some kind of identifier (i.e. TAG-ID) to create an association between the SCell(s) and the sTAG to which the SCell will align the UL timing.” EX1006, 1. Sharp discloses that “TA group and UL of SCell in sTAG are mapped by TAG-ID.” *Id.*

Sharp further discloses that “TAG-ID configuration should be included in the UL configuration of *PhysicalConfigDedicatedSCell*.” *Id.*, 3. A POSA would have understood that the *PhysicalConfigDedicatedSCell* is a field of an RRC message described in TS36.331. *See e.g.*, EX1005, 58 (“if the received *radioResourceConfigDedicated* includes the *physicalConfigDedicated*: 2> reconfigure the physical channel configuration as specified in 5.3.10. 6”), 126-127 (“SCellAdd ... *radioResourceConfigDedicatedSCell-r10*”), 174 (*PhysicalConfigDedicated*), 184 (*RadioResourceConfigDedicated*). A POSA would have understood that the RRC processor of the UE would process the RRC message including the *PhysicalConfigDedicatedSCell* (or the *sCellToAddModList* in an obvious variant) to associate the one or more SCells being added with each other SCell available to the UE that itself is associated with same TAG identifier “to create an association between the SCell(s) and the sTAG to which the SCell will align the UL timing.” EX1006, 1; EX1003, ¶¶308-309.

A POSA would have been motivated by the teachings of Sharp to modify TS36.311 to associate the SCell(s) being added with each other available SCell associated with the same TAG identifier as recited in Element [1f] and had a reasonable expectation of success. *See* Section X.D.1; EX1003, ¶310.

Accordingly, the combination of TS36.331 with Sharp discloses Element [1f].

**(h) Element [1g]**

The TS36.331-Sharp combination discloses and renders obvious the TAG being associated with SCells having timing based on the same timing advance (TA) value as recited in Element [1g]. *See* Element [1f], above in Section X.D.2.(g); EX1003, ¶¶311-315.

As the '776 patent recognizes, it was known at the time of the earliest claimed priority date that a TAG is “a group of one or more serving cells having the same timing advance value” and was used in a multiple component carrier system “to effectively perform timing alignment.” EX1001, 1:54-58. It therefore would have been obvious to a POSA that the TAG is associated with SCells having timing based on the same TA value as recited in Element [1g]. EX1003, ¶312.

In addition, Sharp discloses the TAG is associated with SCells having timing based on the same TA value. *See, e.g.*, EX1006, 1 (“[I]t is necessary to provide some kind of identifier (i.e. TAG-ID) to create an association between the SCell(s) and the sTAG to which the SCell will align with UL timing... TA group and UL

of SCell in sTAG are mapped by TAG-ID”). Sharp’s Figure 2 shows “up to 4 TA groups” each having the same value for the TA command. EX1006, 2; EX1003.

¶313.

A POSA would have been motivated by the teachings of Sharp to modify TS36.311 such that the TAG identified by the TAG-ID is associated with SCells having timing based on a same timing advance (TA) value and had a reasonable expectation of success. *See* Section X.D.1; EX1003, ¶314. Accordingly, the TS36.331-Sharp combination discloses and renders obvious Element [1g].

Because it would have been obvious to a POSA to combine TS36.331 with Sharp to arrive at the purported invention recited in claim 1, and a POSA would have had a reasonable expectation of success in doing so, claim 1 is unpatentable.

### **3. Dependent Claim 2**

The TS36.331-Sharp combination discloses and renders obvious the added limitation of Claim 2 that the UE processor associates an SCell with a TAG associated with a primary serving cell (PCell) when the second field to add an SCell does not comprise identifier of the TAG. EX1003, ¶¶316-317. Sharp discloses “when the UE in Rel-11 is configured with a SCell that is not explicitly assigned a TAG-ID, the UE considers that the SCell belongs to pTAG, and the UE can consider the TAG-ID of pTAG to be assigned a default value of ‘0.’” EX1006, 1. Sharp explains that this feature can help provide backward compatibility: “we

prefer that the pTAG in a Rel-11 UE not be assigned such [a TAG] identifier to preserve backward compatibility (e.g. a Rel-11 UE that performs carrier aggregation without the multi-TA configuration, can adhere to the Rel-10 specification).” Potevio also explains that adopting a default value such as is described in Sharp can save signaling overhead. EX1007, 1 (“[A]dopting default TA group index can save signalling overload. Hence we recommend that default value 0 be always allocated to PCell TA group, which is similar to *ServCellIndex* in Rel-10”).

A POSA would have been motivated to modify TS36.331 with the teachings of Sharp such that the RRC processor associates an SCell with a TAG associated with a PCell when the second field to add an SCell does not comprise a TAG identifier in order to provide backward compatibility and to save overhead, and had a reasonable expectation of success. *See* Section X.D.1; EX1003, ¶¶316-317. Accordingly, the TS36.331-Sharp combination renders obvious claim 2.

#### **4. Dependent Claim 3**

TS36.331 discloses and renders obvious “the receiver receives the first and second field through a RRC connection reconfiguration message,” as recited in dependent claim 3. EX1003, ¶¶318-321. TS36.331 discloses the UE’s receiver receives RRC messages from the base station through the radio access network. *See, e.g.*, EX1005, 23 (5.1.2 General requirements) (“The UE shall: 1> process the

received messages in order of reception by RRC, i.e. the processing of a message shall be completed before starting the processing of a subsequent message.”), 126-127; EX1003, ¶318. As explained above with regard to Elements [1a] and [1b], TS36.331 discloses that the *sCellToReleaseList* and *sCellToAddModList* fields are both included in a “*RRCConnectionReconfiguration*” message, which is a “command to modify an RRC connection” sent from the base station to the UE. EX1005, 126-127, 24 (“Upon change of the relevant system information of a configured SCell, E-UTRAN releases and subsequently adds the concerned SCell, which may be done with a single *RRCConnectionReconfiguration* message.”); EX1003, ¶319. The *sCellToReleaseList* field contains a serving cell index (*SCellIndex*) associated with an SCell to be released, and the *sCellToAddModList* field contains an *SCellIndex* associated with an SCell to be added. See Sections X.A.1(b), X.D.2(b), (c), incorporated herein; EX1003, ¶¶319-320. Accordingly, the TS36.331-Sharp combination renders obvious claim 3.

#### **5. Dependent Claim 4**

TS36.331 discloses and renders obvious “the receiver receives, from the base station, the first field comprising an indication to remove an SCell from SCells available to the UE,” as recited in dependent claim 4. EX1003, ¶¶322-327. See discussion of Element [1a] in Sections X.A.1.(b), X.D.2.(b), incorporated herein.

TS36.331 discloses a UE's receiver receiving from a base station an RRC message ("*RRCConnectionReconfiguration*") with a field ("*sCellToReleaseList*") including an *SCellIndex* to identify an associated SCell to be released. EX1005, 46 (5.3.5.3 Reception of an *RRCConnectionReconfiguration* ... by the UE) ("[T]he UE shall:... 1>if the received *RRCConnectionReconfiguration* includes the *sCellToReleaseList*. 2> perform SCell release as specified in 5.3.10.3a."), 60 (5.3.10.3a SCell release), 126-127 (*RRCConnectionReconfiguration* message is a "command to modify an RRC connection" sent in the direction from base station to UE). TS36.331 discloses, for each *SCellIndex* value included in the *sCellToReleaseList*, the UE shall release the SCell with the *SCellIndex* value. *Id.*, 60 (5.3.10.3a SCell release) ("The UE shall: if the release is triggered by reception of the *sCellToReleaseList*:... for each *sCellIndex* value included in the *sCellToReleaseList*: if the current UE configuration includes an SCell with value *sCellIndex*:... release the SCell").

Removing an sCell from the sCells available to the UE was well known to a POSA before the claimed priority of the '776 patent. EX1003, ¶326 (citing EX1015, 625). A POSA would have understood that releasing an SCell according to the *sCellReleaseList* has the effect of removing it from the SCells available to the UE. EX1005, 23-24 (5.1.2 General requirements) ("The UE shall:...1>upon receiving a choice value set to *release*: 2> clear the corresponding configuration

and stop using the associated resource.”); EX1003, ¶326. Accordingly, the TS36.331-Sharp combination renders obvious claim 4.

## 6. Claims 5-8

The TS36.331-Sharp combination renders claims 5-8 obvious for the same reasons as claims 1-4, respectively. *See* Sections X.D.2-5. EX1003, ¶328.

## XI. CONCLUSION

Based on the foregoing, Petitioner respectfully requests that trial be instituted and that claims 1, 3 and 4 of the ’776 patent be canceled.

Respectfully submitted,

The logo for Leydig, featuring the word "Leydig" in a bold, sans-serif font. The letter "i" in "Leydig" has a small blue star above it.

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## CERTIFICATE OF WORD COUNT COMPLIANCE

Pursuant to 37 C.F.R. § 42.24 (d), I hereby certify that this Petition complies with the type-volume limits of 37 C.F.R. § 42.24 (a)(1)(i). As calculated by the word count feature of the word-processing system used to prepare this Petition, it contains 13,763 words, excluding the parts of this Petition that are exempted by 37 C.F.R. § 42.24 (a) (including a table of contents, a table of authorities, mandatory notices under 37 C.F.R. § 42.8, a certificate of service or word count, and appendix of exhibits or claim listing).

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## CERTIFICATE OF SERVICE

I hereby certify that, on May 18, 2025, a true and correct copy of this Petition for *Inter Partes* Review of U.S. Patent No. 9,769,776 under 35 U.S.C. §§ 311-319 and 37 C.F.R. § 42.100 *et Seq.*, including all exhibits thereto, was served in its entirety via Federal Express and/or additionally by electronic mail, upon the following attorney of record as listed on USPTO Patent Center and the listed attorneys of record for Plaintiffs in the concurrent litigation matter:

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