

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TOYOTA MOTOR CORP., and
CONTINENTAL AUTOMOTIVE SYSTEMS, INC.,
Petitioners,

v.

INTELLECTUAL VENTURES II LLC,
Patent Owner.

Case No. IPR2022-01130
U.S. Patent No. 8,811,356

**PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 8,811,356**

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 - c. 43[b] the processor is further configured to send data over the physical uplink shared channel in assigned time intervals; 82
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LIST OF EXHIBITS

Exhibit	Description
Ex. 1001	U.S. Patent No. 8,811,356 (“the ’356 patent”)
Ex. 1002	Prosecution History of U.S. Patent No. 8,811,356
Ex. 1003	Declaration of Dr. Robert Akl, D.Sc.
Ex. 1004	Curriculum Vitae of Dr. Robert Akl, D.Sc.
Ex. 1005	IEEE Std 802.16-2004, IEEE Standard for Local and metropolitan area networks, Part 16: Air Interface for Fixed Broadband Wireless Access Systems (“the Standard”)
Ex. 1006	Declaration of Randall Schwartz
Ex. 1007	Complaint for Patent Infringement Against Toyota Motor Corporation et al., <i>Intellectual Ventures I LLC et al. v. Toyota Motor Corp. et al.</i> , No. 2:21-cv-00389, Dkt. 1 (E.D. Tex.).
Ex. 1008	Jeffrey G. Andrews et al., Fundamentals of WiMAX: Understanding Broadband Wireless Networking (2007)
Ex. 1009	Mohanty et al., U.S. Patent App. Pub. No. 2007/0105600
Ex. 1010	Docket Control Order in <i>Intellectual Ventures I LLC and Intellectual Ventures II LLC, v. Toyota Motor Corp., Toyota Motor North America, Inc., Toyota Motor Engineering & Manufacturing North America, Inc., and Toyota Motor Sales, U.S.A., Inc.</i> , 2:21-cv-00390 (EDTX).
Ex. 1011	Plaintiff’s Infringement Contentions served in <i>Intellectual Ventures I LLC and Intellectual Ventures II LLC, v. Toyota Motor Corp., Toyota Motor North America, Inc., Toyota Motor Engineering & Manufacturing North America, Inc., and Toyota Motor Sales, U.S.A., Inc.</i> , 2:21-cv-00390 (EDTX).
Ex. 1012	Order Consolidating Proceedings in <i>Intellectual Ventures I LLC and Intellectual Ventures II LLC, v. Toyota Motor Corp., Toyota Motor North America, Inc., Toyota Motor Engineering & Manufacturing North America, Inc., and Toyota Motor Sales, U.S.A., Inc.</i> , 2:21-cv-00389 (EDTX).
Ex. 1013	Case Management Order, <i>Intellectual Ventures I LLC et al. v. G.M. Company et al.</i> , Case Number 6:21-cv-01088-ADA (W.D. Tex.)
Ex. 1014	Defendants’ Motion to Transfer Venue, <i>Intellectual Ventures I LLC et al. v. G.M. Company et al.</i> , Case Number Case Number 6:21-cv-01088-ADA (W.D. Tex.)

Ex. 1015	Joint Stipulation Regarding Amendment of Deadline, <i>Intellectual Ventures I LLC et al., v. G.M. Company et al.</i> , Case Number 6:21-cv-01088-ADA (W.D. Tex.)
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I. PRELIMINARY STATEMENT

Petitioners Toyota Motor Corp. and Continental Automotive Systems, Inc. request *inter partes* review of claims 1-7, 22-28, and 43-46 (“Challenged Claims”) of U.S. Patent No. 8,811,356 (Ex. 1001), purportedly assigned to Patent Owner Intellectual Ventures II, LLC (“IV”).

The claims recite four “channels” between a “user equipment,” such as a cell phone, and a “network device,” such as a base station:

- (i) an **uplink data channel** (“physical uplink shared channel”) for sending “data” from the user equipment to the network device;
- (ii) an **uplink control channel** (“uplink physical control channel”) for sending a “signal” from the user equipment to the network device;
- (iii) a **downlink data channel** (“physical downlink shared channel”) for sending “data” from the network device to the user equipment; and
- (iv) a “**downlink control channel**” for sending “feedback information” from the network device to the user equipment.

The examiner found (i)-(iii) in the prior art, and the claims were allowed only when amended to include (iv) as well. Ex. 1002, 450-53, 522-42, 665. But (iv)—and, indeed, (i)-(iii) as well—were not only known but standardized before

December 27, 2006, the earliest claimed priority date of the '356 patent¹, as the 802.16 Standard of the Institute of Electrical and Electronics Engineers ("IEEE") shows. As explained below, IEEE's 802.16 Standard would have rendered obvious everything in the Challenged Claims.

II. PRECISE RELIEF REQUESTED

A. Claims for Which Review Is Requested

Petitioners respectfully request *inter partes* review under 35 U.S.C. § 311 of the Challenged Claims and cancellation of those claims as unpatentable.

B. Statutory Grounds

Each asserted reference identified below is prior art under at least the pre-AIA statute indicated in parentheses, based on either the '356 patent's earliest claimed priority date of December 27, 2006, or its earliest claimed invention date of November 29, 2006.

¹ The application leading to the '356 patent claims priority to and was a continuation of U.S. Patent App. Serial No. 11/646,692, filed December 27, 2006. In addition, during prosecution, inventor Paul Howard submitted a declaration under 37 C.F.R. § 1.131 declaring he "conceived of and completed the invention" of the '356 patent "[p]rior to November 29, 2006." Ex. 1002, 618-20. The Standard predates this date as well. Section V.A.6.

Prior Art References
IEEE Std 802.16-2004, IEEE Standard for Local and metropolitan area networks, Part 16: Air Interface for Fixed Broadband Wireless Access Systems (Ex. 1005), publicly available and accessible at least as early as November 23, 2004 (§§ 102(a), (b)); Ex. 1006 (date declaration).
Mohanty (Ex. 1009), U.S. Patent App. Pub. No. 2007/0105600, filed November 8, 2005, and published May 10, 2007 (§ 102(e)).

The Challenged Claims are unpatentable under pre-AIA U.S.C. §§ 102 and/or 103 based on the following grounds:

Ground	References	Basis	Claims
1	802.16 Standard	§ 102	22, 23, 25-28, 45, 46
2	802.16 Standard	§ 103	1-7, 24, 43, 44
3	802.16 Standard and Mohanty	§ 103	1-7, 43, 44

III. THE BOARD SHOULD NOT EXERCISE DISCRETION TO DENY INSTITUTION

IV has separately asserted the '356 patent against Petitioner Toyota in EDTX ("the related litigation"), General Motors Company ("GM") in WDTX ("the GM litigation"), and Honda Motor Co., Ltd. et al. ("Honda") in NDTX ("the Honda litigation"). *See* Section XI.B. The most relevant *Fintiv* factors demonstrate that the Board should not deny institution of this Petition under 35 U.S.C. § 314(a)

and *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020) (precedential).

Regarding Factor 1, where, as here, a stay has been neither requested nor granted, “[t]his factor does not weigh for or against discretionary denial.” *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 15, 12 (PTAB May 13, 2020). Thus, Factor 1 is neutral.

Regarding Factor 2, the Docket Control Order (Ex. 1010) in the related litigation sets trial on July 24, 2023, which is before the Board’s anticipated statutory deadline for final written decision. In light of the Board’s holistic analysis balancing all the *Fintiv* factors, however, the litigation trial date is not determinative but weighed in concert with the other relevant factors. *See e.g.*, *Netmut Ltd., v. Bright Data Ltd.*, IPR2021-01492, Paper 12, 9-16 (PTAB March 21, 2022) (instituting review with related litigation trial date six months before final written decision deadline); *Coolit Sys., Inc., v. Asetek Danmark A/S*, IPR2021-01195, Paper 10, 11, 14 (PTAB Dec. 28, 2021) (same by five months), *Align Tech., Inc., v. 3Shape A/S*, IPR2021-01313, Paper 11, 16-19 (PTAB Feb. 10, 2022) (same by four months), *STMicroelectronics, Inc., v. Ocean Semiconductor LLC*, IPR2021-01349, Paper 13, 10, 13 (PTAB March 4, 2022) (same by three months); *STMicroelectronics, Inc., v. Optical Licensing, LLC*, IPR2021-01593, Paper 9, 12-17 (PTAB March 17, 2022) (same by three months); *Micron Technology, Inc., v.*

Vervain, LLC, IPR2021-01550, Paper 11, 9-13 (PTAB April 11, 2022) (same by three months); *Volkswagen Grp. Am., Inc., v. Arigna Tech. Ltd.*, IPR2021-01531, Paper 7, 8-10 (PTAB Feb. 15, 2022) (same by four months (ITC)).

Moreover, because the Docket Control Order requires IV to narrow its case to no more than five claims per patent and 16 claims total, not all of the currently asserted 11 patents and 108 claims will go to trial. Indeed, by the expected institution date, it is possible that the '356 Patent will be withdrawn from the related litigation, rendering factor 2 moot. *See* Ex. 1010, 4 (Nov. 22, 2022, narrowing date). Furthermore, as of this Petition filing, the Honda litigation (which IV refiled in April 2022 in NDTX) does not have a case schedule or trial date. In the GM litigation, a docket control order (Ex. 1013) also sets trial in July 2023, and a motion to transfer venue is pending, with additional briefing scheduled for June 2022. Ex. 1014; Ex. 1015.

Under Factor 3, Petitioners' timeliness in filing the petition favors institution. *Fintiv*, Paper 15 at 11. Here, Petitioners moved with speed and diligence in bringing this challenge (and nine others)—within three and a half months after IV's infringement contentions—mitigating against the investment of the parties. Notably, IV waited to narrow the number of claims and issues until service of its infringement contentions (Ex. 1007; Ex. 1011)—and even then, still asserted 108 claims from 11 patents against dozens of accused products. *Samsung*

Elecs. Co., Ltd., v. Acorn Semi, LLC, IPR2020-01183, Paper 17, 40 (PTAB Feb. 10, 2021) (finding petitioner acted diligently where it filed the petition and nine others in less than four months after IV identified the full set of asserted claims); *Fintiv*, Paper 15 at 11.

The Board also considers, under Factor 3, “the amount and type of work already completed in the parallel litigation by the court and the parties at the time of the institution decision.” *Fintiv*, Paper 15 at 9. Here, by institution, the district court’s investment regarding the patentability of the ’356 Patent will be nominal. In the related litigation, the *Markman* hearing is expected after institution, as is the completion of fact discovery, expert discovery, and dispositive motions. Ex. 1010; *Protect Animals with Satellites LLC, v. OnPoint Sys., LLC*, IPR2021-01483, Paper 11, 14-15 (PTAB Mar. 4, 2022); *Fintiv*, Paper 15 at 9-10; *Netnut*, Paper 12 at 11; *Ford Motor Company, v. Safe Driving Technologies LLC*, IPR2021-01446, Paper 11 at 41-42 (PTAB March 14, 2022). Furthermore, as of this Petition filing, the Honda litigation does not have a case schedule. And although the GM litigation is at a slightly more advanced stage (Ex. 1013) than the related litigation, the completion of fact discovery, expert discovery, and dispositive motions of the GM litigation is still expected after institution. *Bose Corp., v. Koss Corp.*, IPR2021-00680, Paper 15, 16-17 (PTAB Oct. 13, 2021).

Regarding Factor 4, Petitioner Toyota stipulates that, if this IPR is instituted,

it will not pursue in the related litigation the grounds raised in this Petition. This favors institution. *Sand Revolution II, LLC, v. Cont'l Intermodal Grp. – Trucking LLC*, IPR2019-01393, Paper 24 at 12 (PTAB June 16, 2020) (informative). This stipulation mitigates concerns of both duplicative efforts between the district court and the Board and potentially conflicting decisions. *See, e.g., Coolit*, Paper 10 at 2, 11, 12-13 (instituting review with related litigation trial date five months before final written decision and *Sand* stipulation), *Align*, Paper 11 at 2, 16, 17-18 (same by four months with *Sand* stipulation), *STMicroelectronics*, IPR2021-01349, Paper 13 at 2, 10, 12 (same by three months and non-assertion of specific petition grounds in related litigation); *Micron*, Paper 11 at 11-12 (same by three months with *Sand* stipulation); *see also Netnut*, Paper 12 at 12 (instituting review with related litigation trial date six months before final written decision and *no* stipulation); *Volkswagen*, Paper 7 at 9-10 (same by four months (ITC) with *no* stipulation).

Furthermore, as of this Petition filing, the Honda litigation does not have a case schedule or trial date, and a motion to transfer venue is pending in the GM litigation. Moreover, even if prior art references asserted in this Petition are part of Honda and GM's invalidity contentions, the references constitute a subset of the references identified in the contentions and may not be relied upon at trial in the Honda and GM litigations, as invalidity theories and prior art references are subject

to narrowing before trial. *The Data Company Technologies Inc., v. Bright Data Ltd.*, IPR2022-00138, Paper 12, 13-14 (PTAB May 11, 2022). And Petitioners are neither a party to the Honda or GM litigations nor otherwise related to Honda or GM, and Honda and GM are not RPIs of this Petition. *Bose*, Paper 15 at 17-18. Thus, this Factor favors institution.

This Petition also challenges *seven* additional claims not asserted against Petitioner Toyota Motor Corp. in district court (claims 6, 27–28 and 43–46), creating additional nonoverlapping issues. *3Shape A/S v. Align Tech., Inc.*, IPR2020-00223, Paper 12, 34 (PTAB May 26, 2020); *Apple Inc. v. Neodron, Ltd.*, IPR2020-00778, Paper 10, 19 (PTAB Sept. 14, 2020); *Volkswagen*, Paper 7 at 10; *STMicroelectronics*, IPR2021-01349, Paper 13 at 12; *STMicroelectronics*, IPR2021-01593, Paper 9 at 14-15; *Netnut*, Paper 12 at 12; *Micron*, Paper 11 at 11-12. And by the expected institution date, the number of claims (and potentially patents) in the related litigation will be significantly narrowed (*see* Ex. 1012, 3-4), further “reducing the overlap” between the proceedings. *Apple Inc., v. Koss Corp.*, IPR2021-00600 Paper 9 at 18 (PTAB Sept. 1, 2021).

Factor 5 looks to “whether the petitioner and the defendant in the parallel proceeding are the same party.” *Fintiv*, Paper 15 at 13. Petitioner Toyota is a defendant in the related litigation but is not a party in the GM or Honda litigations. Petitioner Continental is not a party in any of the district court litigations.

Furthermore, Honda and GM are not RPIs of this Petition. *Bose*, Paper 15 at 18-19; *TCL Industries Holdings Co., Ltd. and Hisense Co., Ltd., v. Parkervision, Inc.*, IPR2021-00990, Paper 9 at 28-29 (PTAB Nov. 22, 2021); *Data Company*, Paper 12 at 14-15.

Factor 6 favors institution because the merits of this Petition are strong. The Standard is materially different from and non-cumulative of those considered during prosecution.

Accordingly, the *Fintiv* factors favor institution of this IPR.

IV. TECHNICAL BACKGROUND

In 1998, the IEEE 802 Committee established a working group called 802.16 to develop a protocol standard for a type of broadband wireless access commonly known as WiMAX. Declaration of Robert Akl (Ex. 1003) (“Akl”), ¶42; Ex. 1008, 8. In 2004, the working group published IEEE Standard 802.16-2004, titled “IEEE Standard for Local and metropolitan area networks, Part 16: Air Interface for Fixed Broadband Wireless Access Systems” (Ex. 1005) (“the Standard”), which “formed the basis for the first WiMAX solution.” Ex. 1008, 34.

WiMAX involves transmission between user components called subscriber stations (“SS”) and network components called base stations (“BS”). Akl, ¶43; Standard, 7, 11. Transmission from a BS to an SS occurs on a “downlink” channel, while transmission from an SS to a BS occurs on an “uplink” channel. Akl, ¶43;

Standard, 8, 11. Accordingly, an SS's transmission to the BS is called an "uplink burst," while the BS's transmission to an SS is called a "downlink burst." Ak1, ¶43; Standard, 9, Figure 218.

A significant feature of WiMAX is its use of orthogonal frequency division multiple access ("OFDMA"), which supports both frequency-division multiple access ("FDMA") and time-division multiple access ("TDMA"). Ak1, ¶44 (citing Ex. 1008, 35, 203).

OFDMA is a transmission scheme that divides the frequency versus time spectrum into so-called "symbols," each having a delineated frequency called a "subchannel" and duration called a "symbol time" or "symbol duration." Ak1, ¶45; Standard, 494. The symbols are arranged into "slots," with each slot consisting of one subchannel extended over one or more symbol times. Ak1, ¶45; Standard, 496.

A "frame" consists of contiguous slots over a particular number of subchannels and symbol durations. Ak1, ¶46; Standard, 8. Within a frame, slots in contiguous subchannels across contiguous symbol durations can be collected into "regions," as Figure 215 shows, with each region including one or more slots. Ak1, ¶46.

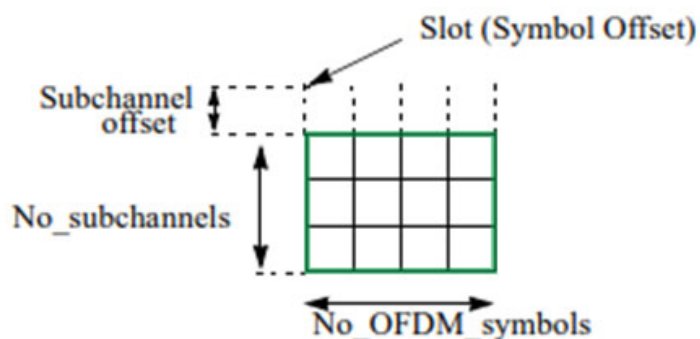


Figure 215—Example of the data region which defines the OFDMA allocation

Standard, Figure 215 (annotated); Ak1, ¶46.

The symbol durations of a frame are divided into an uplink “subframe,” a downlink “subframe.” Ak1, ¶47; Standard, 11. A sample frame structure, including a Downlink (“DL”) Subframe and an Uplink (“UL”) Subframe, is shown below. Ak1, ¶47.

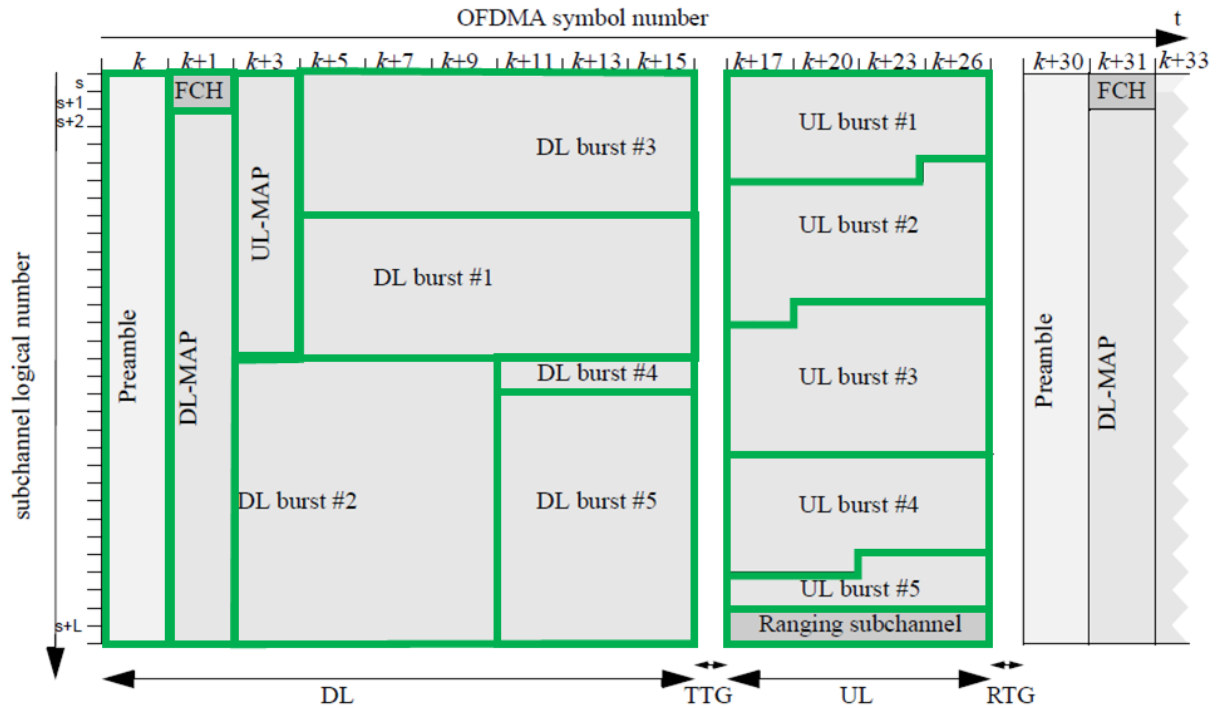


Figure 218—Time plan - one TDD time frame (with only mandatory zone)

Standard, Figure 218 (annotated); Ak1, ¶47.

As shown, the symbols in the uplink and downlink subframes have been allocated, or “mapped,” into **regions**, such as downlink **regions** “UL-MAP” and “DL Burst #2,” and uplink **regions** “Ranging” and “UL Burst #1.” Ak1, ¶48. The BS informs SSs of how the **regions** are mapped so that the SSs may transmit, and expect to receive, certain transmissions in certain **regions**. *Id.* For example, as shown, the BS maps certain **regions** for control transmissions, like the “UL-MAP” and “Ranging subchannel” **regions**, both of which are further discussed in connection with the Standard in Section V.A. *Id.* Other regions are mapped by the BS for data transmission between the BS and the SSs, like the “DL Burst #4” and

“UL Burst #1” **regions**, both of which are likewise further discussed in connection with the Standard in Section V.A. *Id.*

V. OVERVIEW OF PRIOR ART

A. The Standard

The technical requirements for WiMAX are standardized in the Standard. As one aspect of this standardization, the Standard describes how a BS allocates regions of the uplink and downlink subframes to facilitate communications between an SS and a BS, including in OFDMA. Ak1, ¶49; Standard, ii, iv.

As Figure 218 shows, the BS allocates regions of the downlink subframe for both data transmissions, like the “**Downlink Burst[s]**,” and control transmissions, like the “**UL-MAP**.” Ak1, ¶50; Standard, 496. Similarly, the BS allocates regions of the uplink subframe for both data transmissions, like the “**Uplink Burst[s]**,” and control transmissions, like the “**Ranging Subchannel**.” Ak1, ¶50; Standard, 496-98, 505.

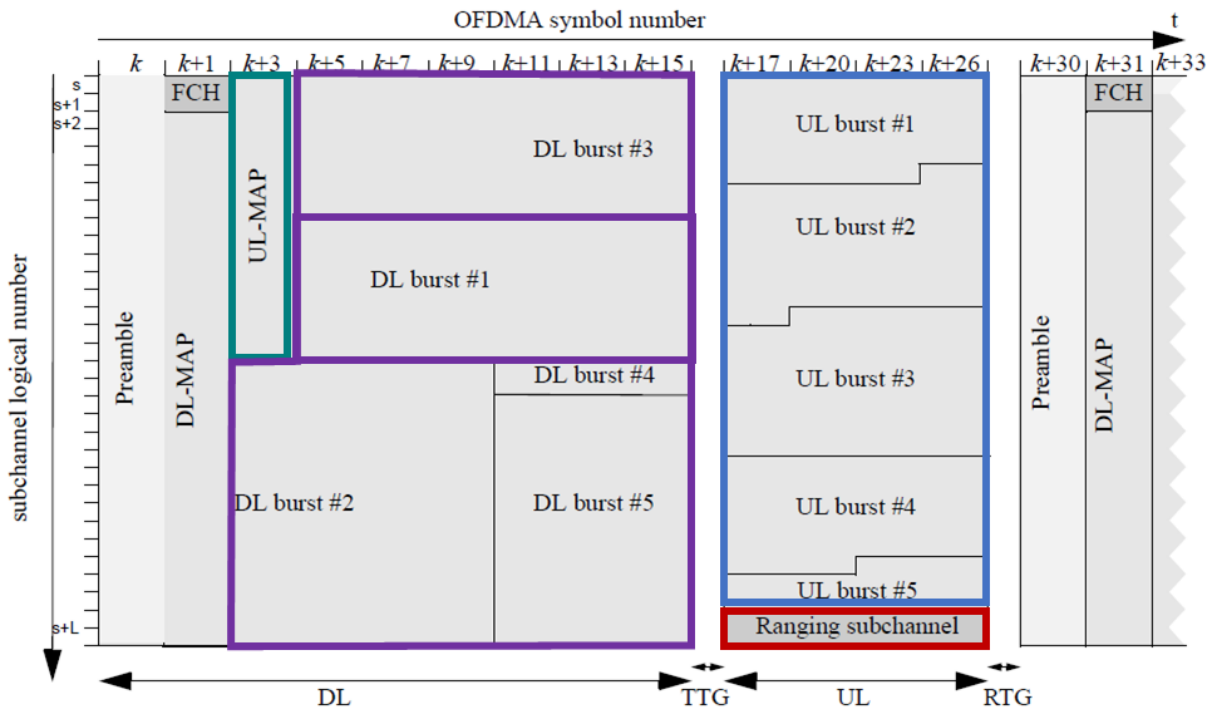


Figure 218—Time plan - one TDD time frame (with only mandatory zone)

Standard, Figure 218 (annotated); Ak1, ¶50.

The Standard describes the process by which an SS learns the allocated regions on the uplink and downlink subframes from the BS so that the SS can communicate with the BS. Ak1, ¶51. This process involves five messages: a first Uplink Map message, a Ranging Code message, a Ranging Response message, a second Uplink Map message, and a Downlink Map message. *Id.*

1. First Uplink Map (“UL-MAP”) Message

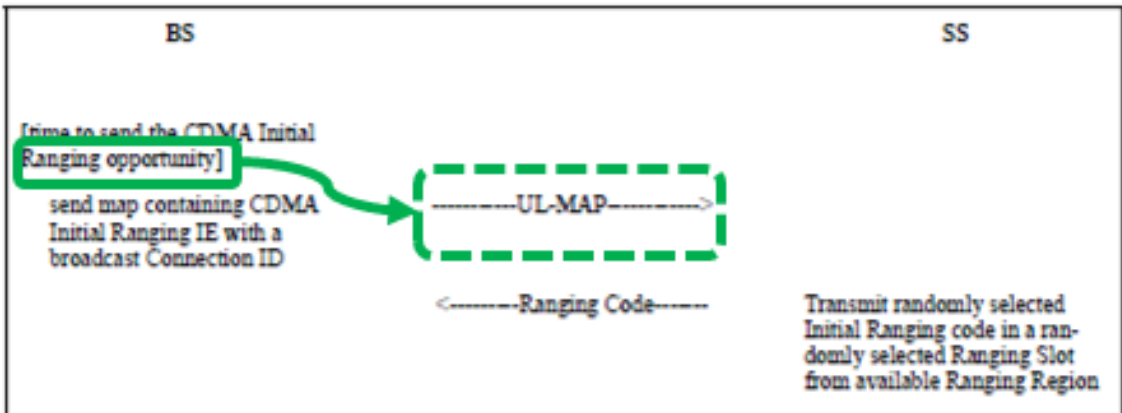
Some UL-MAP messages sent by the BS include an “Initial Ranging IE [information element]” that “specifies an interval,” called the “Initial Ranging Interval” or “Ranging Region,” “in which new stations may join the network.”

Standard, 154, 205-06. This “interval” or “region” is an “**opportunity**”—that is, an allocated **region** on the uplink subframe—for the SS to transmit to the BS.

Standard, 154, 167; Akl, ¶52. When an SS seeks to gain access to the BS, the SS waits for a UL-MAP message including the Initial Ranging **opportunity** from which the SS identifies the Ranging Region. Standard, 174, 178.

The UL-MAP, including the “Ranging opportunity,” is sent from the BS to the SS, as Table 121 shows.

Table 121—CDMA initial Ranging and automatic adjustments procedure



Standard, Table 121 (cropped and annotated); Akl, ¶52.

The **region** allocated to the Initial Ranging Interval is called the “Ranging Subchannel.” Standard, 51, 500, 577, 578, 666. As Figure 218 shows, the **Ranging Subchannel** is an allocated region of the uplink subframe, while the **UL-MAP** is transmitted in an allocated region of the downlink subframe, as shown. *Id.*, 500.

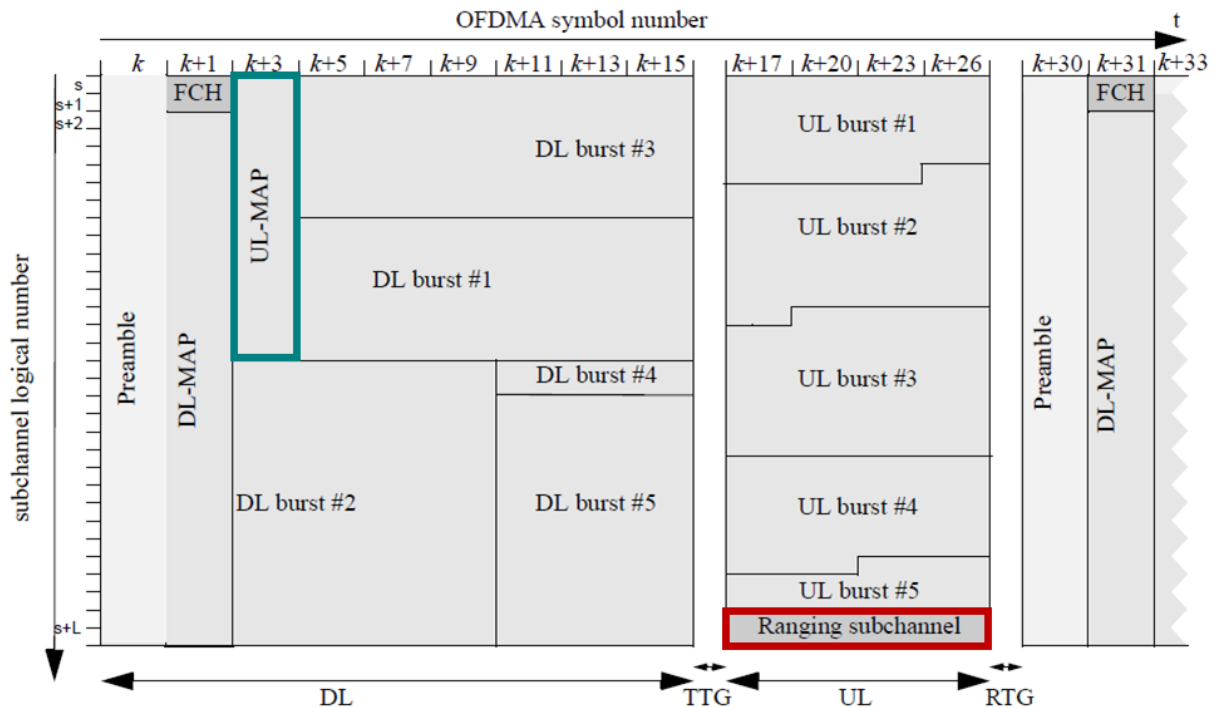


Figure 218—Time plan - one TDD time frame (with only mandatory zone)

Standard, Figure 218 (annotated); Ak1, ¶54.

2. Ranging Code Message

The SS then transmits a **Ranging Code message** in the Initial Ranging **opportunity**—that is, on the **Ranging Subchannel**—identified in the **UL-MAP**, as Table 121 shows. Standard, 49, 154, 175, 666.

Table 121—CDMA initial Ranging and automatic adjustments procedure

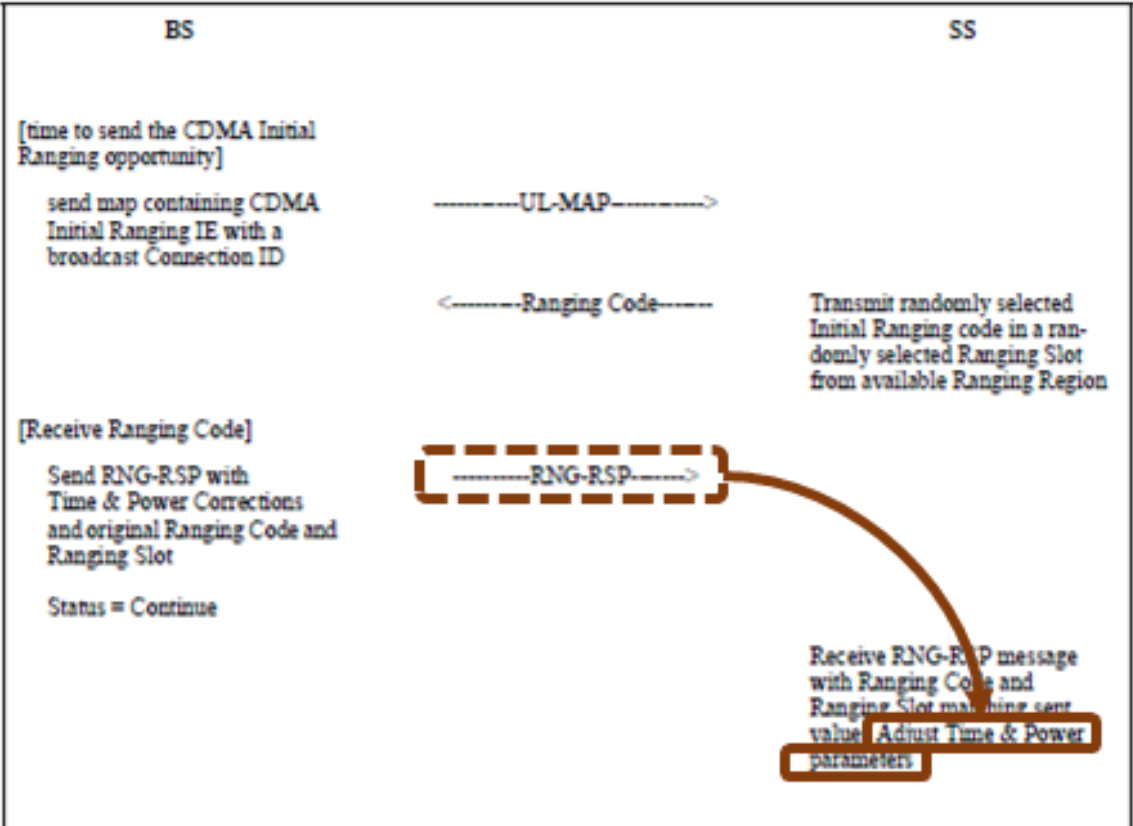


Standard, Table 121 (cropped and annotated); Ak1, ¶55.

3. Ranging Response (RNG-RSP) Message

Following the Ranging Code message from the SS, the BS transmits a RNG-RSP message, as Table 121 shows. Standard, 50-51. The RNG-RSP provides the SS with, among other **parameters**, “Power Adjust Information.” *Id.*, 50. As Table 121 shows, the SS will, upon receipt of the RNG-RSP message, adjust its uplink transmission according to these **parameters**. *Id.*, 178, 205-06; Ak1, ¶56.

Table 121—CDMA initial Ranging and automatic adjustments procedure

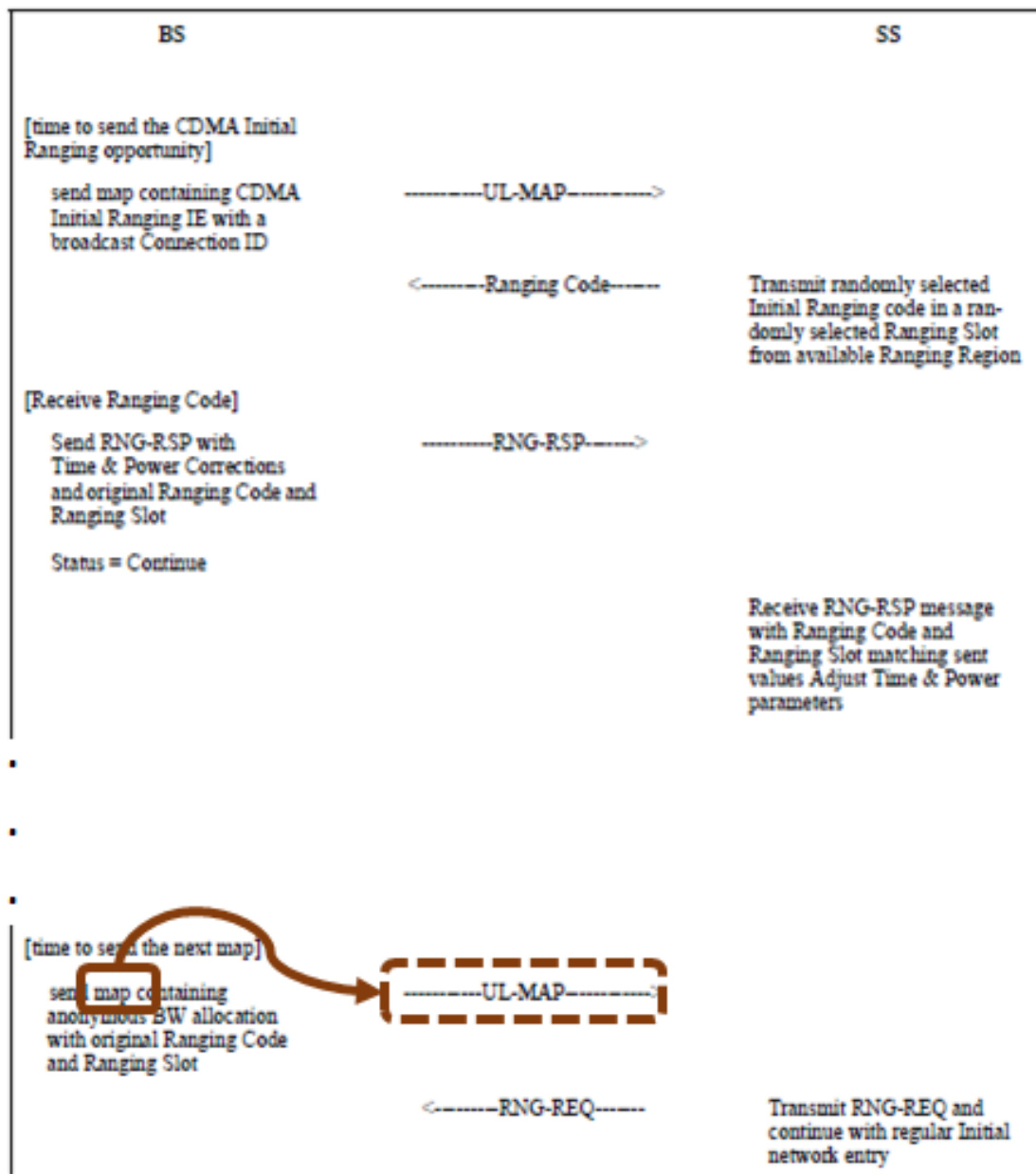


Standard, Table 121 (cropped); Ak1, ¶56.

4. Second UL-MAP Message

At some point after the RNG-RSP message, the SS receives another UL-MAP message from the BS, as Table 121 shows.

Table 121—CDMA initial Ranging and automatic adjustments procedure



Standard, Table 121 (cropped and annotated); Akl, ¶57.

This second UL-MAP message “allocates access to the uplink channel.”

Standard, 47; *see also id.*, 11, 43. To this end, as Table 18 shows, the UL-MAP message includes a “Map IE,” shown as UL-MAP_IE(). *Id.*, 48.

Table 18—UL-MAP message format

Syntax	Size	Notes
UL-MAP_Message_Format() {		
Management Message Type = 3	8 bits	
Uplink Channel ID	8 bits	
UCD Count	8 bits	
Allocation Start Time	32 bits	
Begin PHY Specific Section {		See applicable PHY section.
for ($i = 1; i \leq n; i++$) {		For each UL-MAP element 1 to n .
UL-MAP_IE()	variable	See corresponding PHY specification.
}		
}		
if !(byte boundary) {		
Padding Nibble	4 bits	Padding to reach byte boundary.
}		
}		

Standard, Table 18 (cropped and annotated); Ak1, ¶58.

The uplink **Map IE** “define[s] uplink bandwidth allocations” for the SS. Standard, 48. An uplink **Map IE** for OFDMA is shown in Table 287. As shown, the uplink **Map IE** indicates the subchannels of the allocated region through a “Subchannel offset,” which is “[t]he lowest index subchannel used for carrying the burst,” and a “No. subchannels” in the allocated region. *Id.*, 532-33. In addition, the uplink **Map IE** indicates the symbol durations of the allocated region through an “OFDMA Symbol offset,” which is “the OFDMA symbol in which the burst starts”; a “No. OFDMA Symbols,” which indicates “[t]he number of OFDMA

symbols that are used to carry the uplink Burst”; and a “Duration,” which
“[i]ndicates the duration, in units of OFDMA slots, of the allocation.” *Id.*, 533.

Table 287—OFDMA UL-MAP IE format		
Syntax	Size	Notes
UL-MAP_IE() {		
CID	16 bits	
UIUC	4 bits	
if (UIUC == 12) {		
OFDMA Symbol offset	8 bits	
Subchannel offset	7 bits	
No. OFDMA Symbols	7 bits	
No. Subchannels	7 bits	
Ranging Method	2 bits	0b00 – Initial Ranging over two symbols 0b01 – Initial Ranging over four symbols 0b10 – BW Request/Periodic Ranging over one symbol 0b11 – BW Request/Periodic Ranging over three symbols
reserved	1 bit	Shall be set to zero
} else if (UIUC == 14) {		
CDMA_Allocation_IE()	32 bits	
else if (UIUC == 15) {		
Extended UIUC dependent IE	variable	See subclauses following 8.4.5.4.3
} else {		
Duration	10 bits	In OFDMA slots (see 8.4.3.1)
Repetition coding indication	2 bits	0b00 – No repetition coding 0b01 – Repetition coding of 2 used 0b10 – Repetition coding of 4 used 0b11 – Repetition coding of 6 used
}		
Padding nibble, if needed	4 bits	Completing to nearest byte, shall be set to 0.
}		

Standard, Table 90 (annotated); Ak1, ¶59.

In this manner, the Map IE allocates a region of the uplink subframe as an
uplink burst in which the SS can send uplink transmissions, as Figure 218 shows.

Ak1, ¶60; Standard, 500. As shown, subchannels of the uplink subframe

accommodate several **uplink bursts**, in addition to the **Ranging subchannel**.

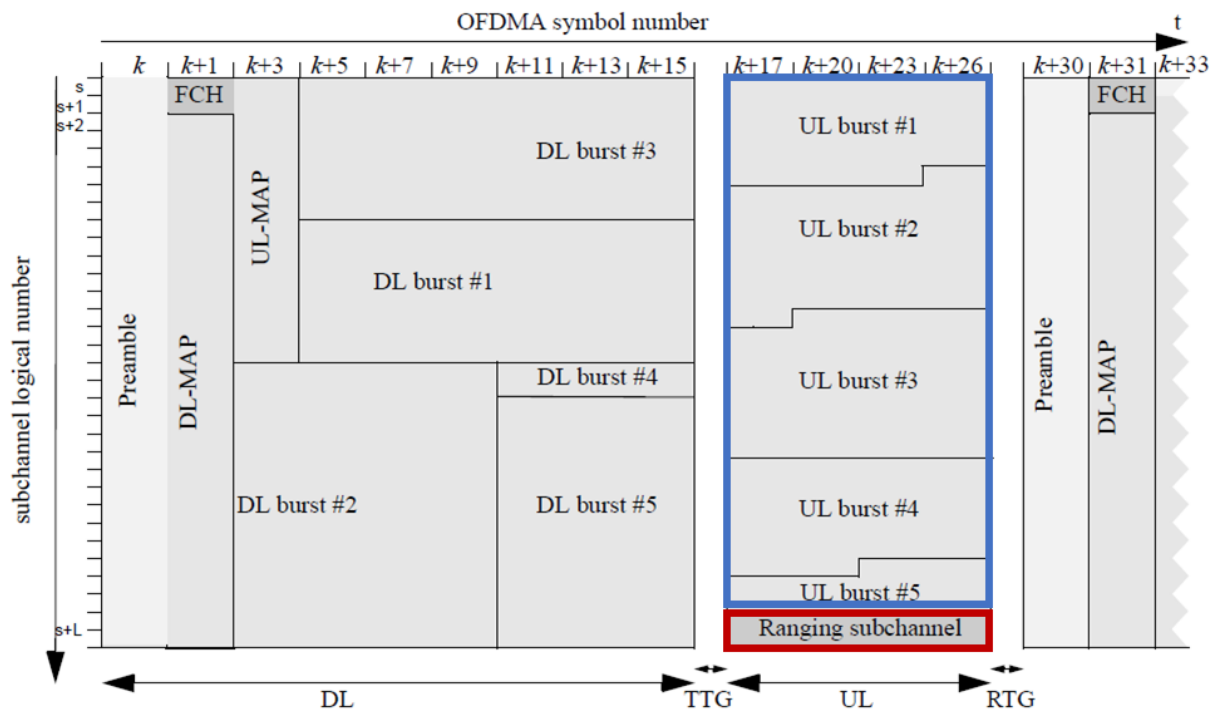


Figure 218—Time plan - one TDD time frame (with only mandatory zone)

Standard, Figure 218 (annotated); Ak1, ¶60.

5. Downlink Map (“DL-MAP”) Message

The BS also sends to the SS a DL-MAP message, which “defines access to the downlink information.” Standard, 44; *see also id.*, 8. To this end, as Table 16 shows, the DL-MAP message includes a “Map IE,” shown as DL-MAP_IE(). *Id.*, 46.

Table 16—DL-MAP message format

Syntax	Size	Notes
DL-MAP_Message_Format() {		
Management Message Type = 2	8 bits	
PHY Synchronization Field	<i>variable</i>	See appropriate PHY specification.
DCD Count	8 bits	
Base Station ID	48 bits	
Begin PHY Specific Section {		See applicable PHY section.
for ($i = 1; i \leq n; i++$) {		For each DL-MAP element 1 to n .
DL-MAP_IE()	<i>variable</i>	See corresponding PHY specification.
}		
}		
if !(byte boundary) {		
Padding Nibble	4 bits	Padding to reach byte boundary.
}		
}		

Standard, Table 16.

A downlink Map IE for OFDMA is shown in Table 275. As shown, the downlink Map IE indicates the subchannels of the allocated region through a “Subchannel offset,” which is “[t]he lowest index subchannel used for carrying the burst,” and a “No. of subchannels” in the allocated region. *Id.*, 521-22. In addition, the downlink Map IE indicates the symbol durations of the allocated region through an “OFDMA Symbol offset,” which is “the OFDMA symbol in which the burst starts”; a “No. OFDMA Symbols,” which indicates “[t]he number of OFDMA symbols that are used (fully or partially) to carry the downlink PHY

Burst.” *Id.*, 533.

Table 275—OFDMA DL-MAP_IE format

Syntax	Size	Notes
DL-MAP_IE {		
DIUC	4 bits	
if (DIUC == 15) {		
Extended DIUC dependent IE	<i>variable</i>	See subclauses following 8.4.5.3.1
} else {		
if (INC_CID == 1) {		The DL-MAP starts with INC_CID=0. INC_CID is toggled between 0 and 1 by the CID-SWITCH_IE (8.4.5.3.7)
N_CID	8 bits	Number of CIDs assigned for this IE
for (n=0; n<N_CID; n++) {		
CID	16 bits	
}		
}		
OFDMA Symbol offset	8 bits	
Subchannel offset	6 bits	
Boosting	3 bits	000: normal (not boosted); 001: +6dB; 010: -6dB; 011: +9dB; 100: +3dB; 101: -3dB; 110: -9dB; 111: -12dB;
No. OFDMA Symbols	7 bits	
No. Subchannels	6 bits	
Repetition Coding Indication	2 bits	0b00 – No repetition coding 0b01 – Repetition coding of 2 used 0b10 – Repetition coding of 4 used 0b11 – Repetition coding of 6 used
}		
}		

Standard, Table 275.

In this manner, the Map IE allocates a region of the downlink subframe as a **downlink burst** in which the SS can receive downlink transmissions. Ak1, ¶63, Standard, 500. As Figure 218 shows, subchannels of the downlink subframe accommodate several **downlink bursts**, in addition to the **UL-MAP** and DL-MAP.

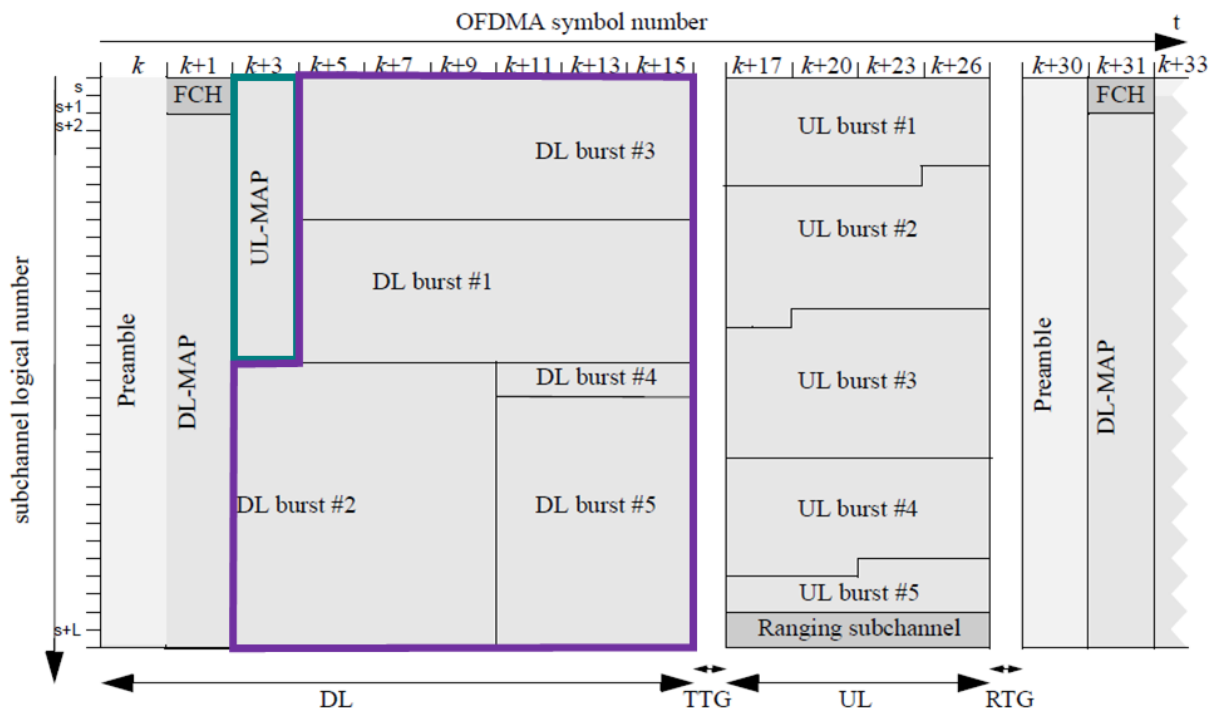


Figure 218—Time plan - one TDD time frame (with only mandatory zone)

Standard, Figure 218 (annotated); Ak1, ¶63.

6. Public Availability of the Standard

The Standard was publicly available at least as early as November 23, 2004, making it prior art to the '356 patent under at least pre-AIA 35 U.S.C. §§ 102(a) and (b).

Mr. Randall Schwartz, who participated in the IEEE 802.16 Working Group at the relevant time, has submitted a declaration regarding the accessibility and distribution of the Standard. *See* Ex. 1006 (Declaration of Randall Schwartz). As Mr. Schwartz declares, the Standard is a document that was published at least as early as November 23, 2004, by way of IEEE's www.WirelessMAN.org website,

without any restriction on its dissemination. *Id.*, ¶¶ 6, 14, 16. Members of the relevant public could and would have located the Standard by November 23, 2004. As Mr. Schwartz explains, the www.WirelessMAN.org website was regularly viewed by those in the cellular industry, and those in the cellular industry would have consulted the Standard in implementing a cellular network or device. *Id.*, ¶¶ 15, 17. *See also* Ex. 1008, 9-10 (describing use of the Standard by the “WiMAX Forum,” which “enjoys broad participation from the entire cross-section of the industry, including semiconductor companies, equipment manufacturers, system integrators, and service providers”); *id.*, 33 (explaining the WiMAX Forum, “[a] broad industry consortium, ... has begun certifying wireless products for interoperability and compliance with” the Standard).

IEEE publications like the Standard have been found publicly accessible by the Board. In *Ericsson, Inc. v. Intellectual Ventures I LLC*, for example, the Board stated IEEE is a “well-known, reputable compiler and publisher of scientific and technical publications” and “t[ook] Official Notice that members in the scientific and technical communities who both publish and engage in research rely on the information published on the copyright line of IEEE publications.” IPR2014-00527, Paper 41 at 11 (PTAB May 18, 2015). As the Board explained, “[a]llowing IPR petitioners to rely on the IEEE publication date in an IPR proceeding, which is an administrative proceeding designed and intended to afford expedited and

efficient relief, serves the interests of justice.” *Id.* at 12. Consistent with *Ericsson*, the Board should find the Standard was a publicly available printed publication by at least November 23, 2004, before the purported invention date of November 29, 2006, and the earliest claimed priority date of December 27, 2006, of the ’356 patent.

B. Mohanty

Mohanty et al., U.S. Patent App. Pub. No. 2007/0105600 (Ex. 1009) (“Mohanty”), was filed November 8, 2005, and published May 10, 2007, making it prior art at least under 35 U.S.C. § 102(e).

Mohanty describes wireless communication systems to “operate in accordance with protocols and standards that comply with the IEEE 802.16 series of protocols,” including “WiMAX” and the Standard. Mohanty, [0002]; *see also id.*, [0030]. Mohanty specifically envisions its network supporting OFDMA. *Id.*, [0026]. As Figure 1A shows, Mohanty’s system includes “multiple nodes,” including “a base station (BS)” and some of which may be “a subscriber station (SS).” *Id.*, [0017].

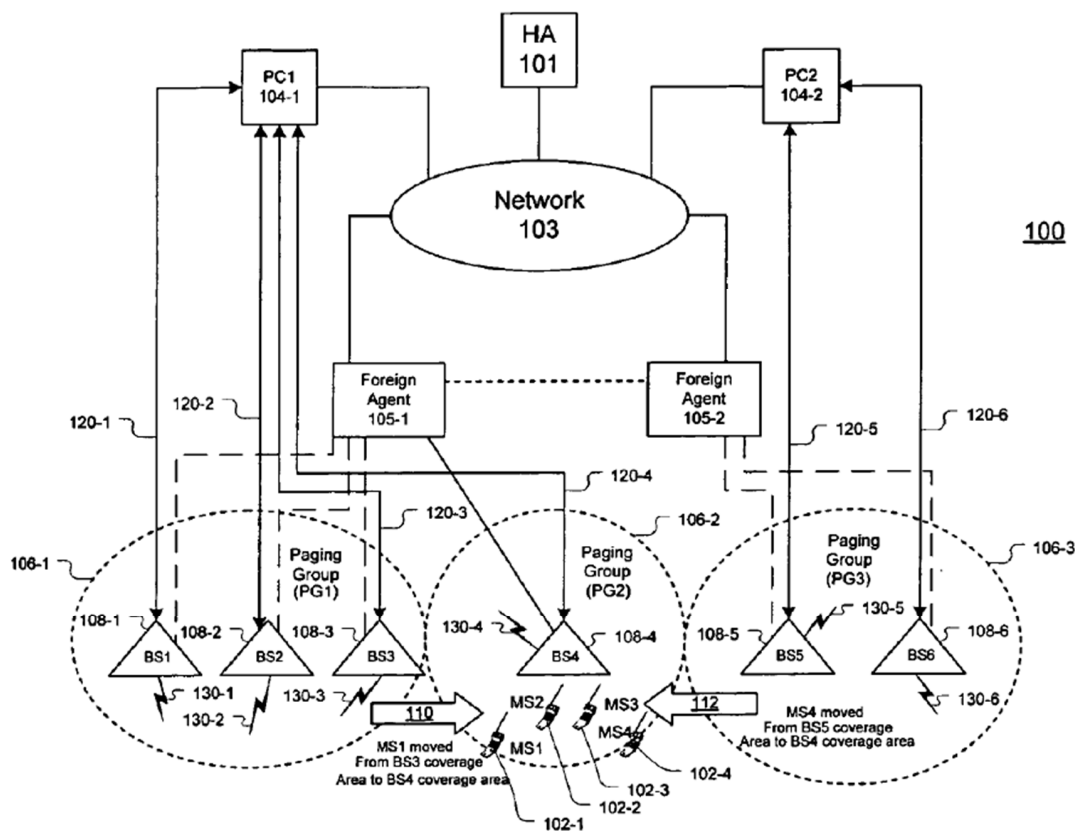


FIG. 1A

Mohanty, Figure 1A.

According to Mohanty, each node may “comprise, or be implemented as” any of “a microprocessor, an integrated circuit such as an application specific integrated circuit (ASIC), a programmable logic device (PLD), a processor such as a general purpose processor, a digital signal processor (DSP) and/or a network processor,” or “a circuit.” *Id.*, [0018]. Mohanty also envisions that each node “may comprise, or be implemented as, software, a software module, an application, a program, a subroutine, an instruction set, computing code, words, values, symbols

or combination thereof” and “may be implemented according to a predefined computer language, manner or syntax, for instructing a processor to perform a certain function.” *Id.*, [0018]. Mohanty provides, as “[e]xamples of a computer language[,] ... C, C++, Java, BASIC, Perl, Matlab, Pascal, Visual BASIC, assembly language, machine code, micro-code for a network processor, and so forth.” *Id.*

Mohanty’s nodes, including a BS and an SS, are illustrated in Figure 2. *Id.*, [0059]. As shown, each node includes “a processor 202-1, a memory 202-2, and a data bus 202-3 to connect processor 202-1 with memory 202-2.” *Id.* “Processor 202-1,” Mohanty states, “may be implemented as any processor,” such as “a processor implementing a combination of instruction sets, or other processor device[,]” “a general purpose processor, ... a dedicated processor, such as a controller, microcontroller, embedded processor, a digital signal processor (DSP), a network processor, a media processor, an input/output processor, and so forth.” *Id.*, [0060].

Processing System 200

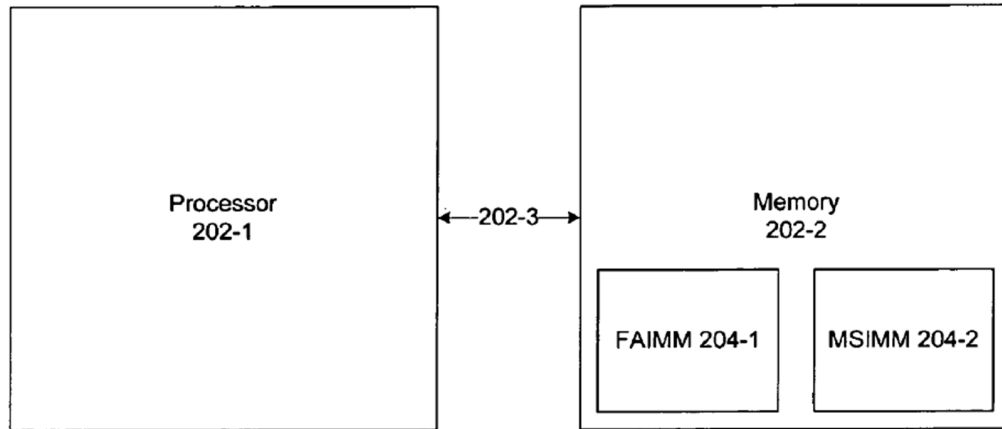


FIG. 2

Ex. 1009, Figure 2.

VI. THE '356 PATENT

The '356 patent describes a technique for “active feedback control” between a “user equipment (UE),” such as a “cell phone,” and a “network device,” such as a BS. '356 patent, 2:17-18, 7:46-55. As in the Standard, in the '356 patent the BS allocates regions of the downlink subframe for both **downlink data transmissions** and **downlink control transmissions** and regions of the uplink subframe for both **uplink data transmissions** and **uplink control transmissions**, as Figure 2 shows.

'356 patent, 5:50-60; Akl, ¶68.

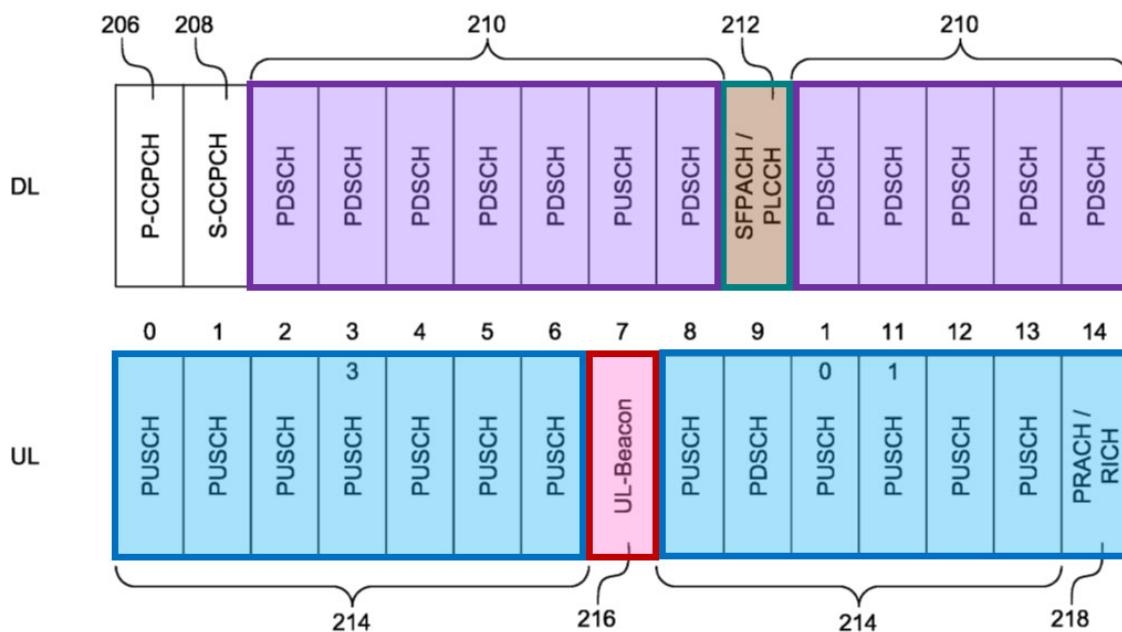


FIG. 2

’356 Patent, Figure 2 (annotated); Akl, ¶68.

The allocated regions for **downlink data transmissions** are called the “**physical downlink shared channel**,” shown as “PDSCH 210.” ’356 patent, 9:55-57. The allocated region for **downlink control transmissions** is called the “**downlink control channel**” or “**physical layer common control channel**,” shown as “PLCCH 212.” *Id.*, 2:35-48, 9:53-54. The allocated regions for **uplink data transmissions** are called the “**physical uplink shared channel**,” shown as “PUSCH 214.” *Id.*, 5:58-60, 9:43-44. Finally, the allocated region for **uplink control transmissions** is called the “**uplink physical control channel**,” shown as “UL-Beacon 216.” *Id.*, 5:58-60, 9:41-43.

In the '356 patent, the “**uplink physical control channel**” is used by the UE to send a “**signal**,” called the “**UL-Beacon**,” to the BS, and the BS uses the **downlink control channel** to send “**feedback information**” to the BS. *Id.*, 2:36-48; 4:35-40; 6:64-66. As one example, the BS may determine a received power from the **signal** and, based on the received power, send power control information as the **feedback information**. *Id.*, 4:61–65, 9:61–62. The UE additionally sends data, such as “normal traffic,” to the BS over the **physical uplink shared channel**, while the BS sends data to the UE over the **physical downlink shared channel**. *Id.*, 5:56-60.

VII. LEVEL OF ORDINARY SKILL IN THE ART

The level of ordinary skill in the art may be reflected by the prior art of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). A POSA would have had at least a Bachelor’s degree in Electrical Engineering, Computer Engineering, or related field, with at least three to four years of experience in wireless communication technology, or a Master’s degree in electrical engineering, computer engineering, or equivalent. Akl, ¶19. Additional education could substitute for professional experience and vice versa. *Id.*

VIII. CLAIM CONSTRUCTION

The Board construes claims in accordance with 37 C.F.R. § 42.200(b) and *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). Claims need only be construed to the extent necessary to resolve a controversy. *Nidec Motor*

Corp. v. Zhongshan Broad Ocean Motor Co., 868 F.3d 1013, 1017 (Fed. Cir.

2017). Here, no terms need construction because the claims read on the prior art under any construction consistent with *Phillips*.

IX. THE CHALLENGED CLAIMS ARE UNPATENTABLE

The Standard anticipates claims 22, 23, 25-28, 45, and 46 and the Standard alone or in combination with Mohanty would have rendered obvious claims 1-7, 24, and 43-44 the '356 patent.

A. Ground 1: The Standard Anticipates Claims 22, 23, 25-28, 45, and 46

1. Claim 22

- a. 22[p] A method performed by a user equipment (UE), the method comprising:

To the extent this preamble is limiting, the Standard discloses “[a] method performed by a user equipment” called a “subscriber station” or “SS.” Ak1, ¶72.

See, e.g., Standard, 11.

- b. 22[a] receiving, by the UE, **resource allocation information associated with an uplink physical control channel**, wherein the **uplink physical control channel** and a **physical uplink shared channel** have different **resources**;

The Standard discloses this limitation. Ak1, ¶73.

The Standard discloses “an **uplink physical control channel** and a **physical uplink shared channel**” that “have different **resources**.” *Id.* As Figure 218 shows, the uplink subframe in the Standard includes both a “**ranging subchannel**” and

uplink (shown as “UL”) bursts. Standard, 500. The ranging subchannel is an “uplink ... control channel” because it is part of the uplink subframe and is used by the SS to transmit the Ranging Code message, which a POSA would have recognized is control information, not data. Ak1, ¶73; Section V.A.2. The uplink bursts are an “uplink shared channel” because a POSA would have recognized that each uplink burst is an allocation of a region on the uplink subframe in which the SS may transmit data, such that the uplink bursts collectively share the uplink subframe. Ak1, ¶73; Section V.A.4. The ranging subchannel is a “physical ... channel” and the uplink bursts are a “physical ... channel” because a POSA would have recognized that both are channels transmitted over the air at actual frequencies and times (as opposed to, for example, transport and logical channels, which are not). Ak1, ¶73; Standard, Figure 218, 493 *et seq.*

The ranging subchannel and uplink bursts “have different resources” because, as shown, the uplink bursts and the ranging subchannel are allocated different regions—that is, symbols defined by subchannels and symbol duration—of the uplink subframe, Ak1, ¶74; Section IV.

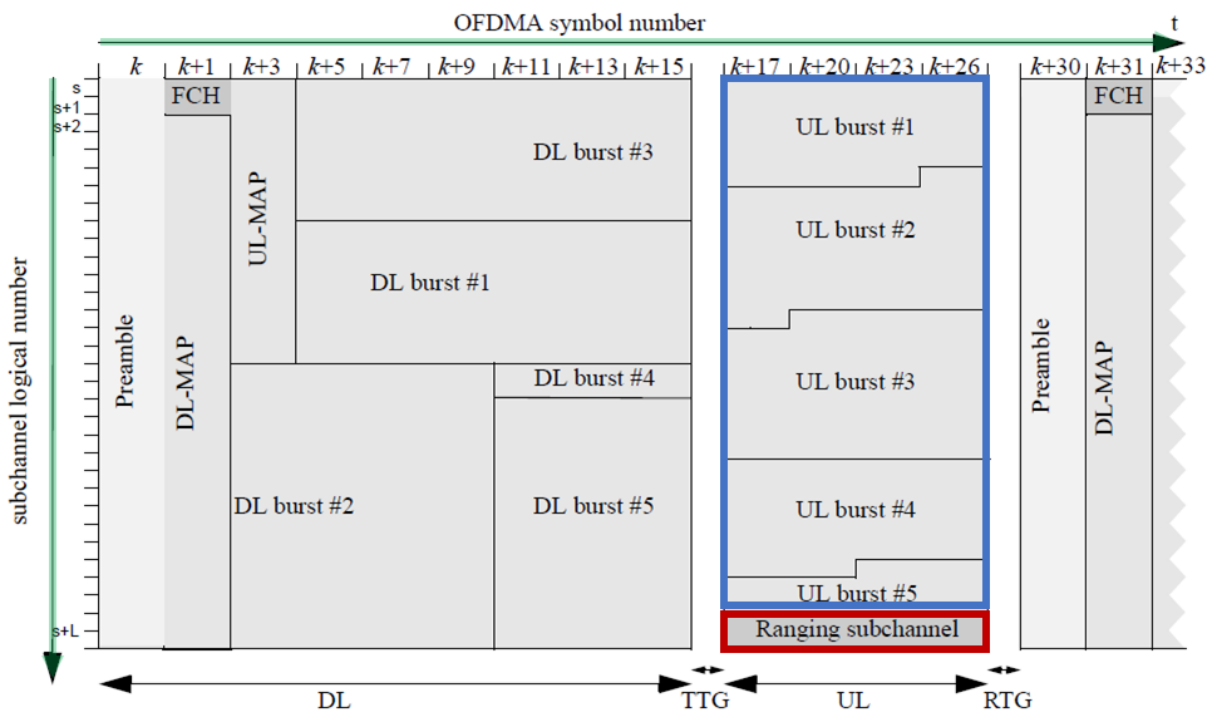
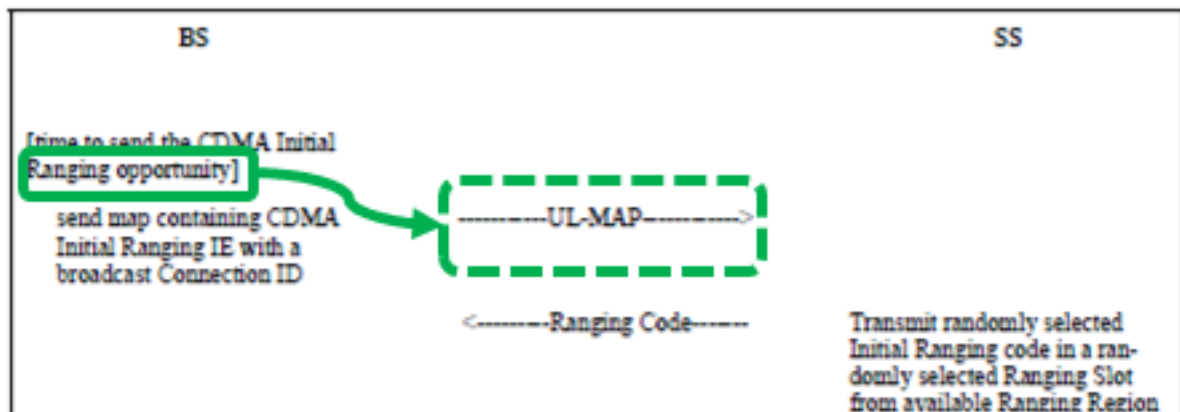


Figure 218—Time plan - one TDD time frame (with only mandatory zone)

Standard, Figure 218 (annotated); Ak1, ¶74.

The Standard also describes “receiving, by the UE, **resource** allocation information associated with an **uplink physical control channel**.” Ak1, ¶75. As explained in Section V.A.1, some UL-MAP messages sent by the BS include an “Initial Ranging IE” that “specifies an interval,” called the “Initial Ranging Interval,” “in which new stations may join the network.” Standard, 154. Accordingly, as Table 121 shows, when the SS seeks to gain access to the BS, the SS waits for the first UL-MAP message including the Initial Ranging IE (shown as the “Initial Ranging **opportunity**”), from which the SS identifies the Initial Ranging Interval. Standard, 174, 178.

Table 121—CDMA initial Ranging and automatic adjustments procedure



Standard, Table 121 (cropped and annotated); Ak1, ¶75.

The received Initial Ranging IE is “resource allocation information” because it indicates the Initial Ranging interval. Ak1, ¶76. This “interval” is an “opportunity”—that is, an allocated region of the uplink subframe—for the SS to transmit to the BS. Standard, 154, 167. The Initial Ranging IE is also “associated with an uplink physical control channel” because the Initial Ranging interval it indicates *is* the Ranging subchannel, that is, the allocated region of the uplink subframe to be used by the SS to transmit the Ranging Code message, which a POSA would have recognized is control information. Ak1, ¶76; Section V.A.2; Standard, 51, 500, 577, 578, 666; Figure 218.

Thus, by disclosing an SS that receives an Initial Ranging opportunity associated with a Ranging subchannel, and that the Ranging subchannel and uplink bursts are allocated different regions of the uplink subframe, the Standard discloses “receiving, by the UE, resource allocation information associated with an uplink

physical control channel, wherein the uplink physical control channel and a physical uplink shared channel have different resources.” Akl, ¶77.

c. 22[b] sending, by the UE, data over the physical uplink shared channel in assigned time intervals;

The Standard discloses this limitation because the Standard discloses the SS sending data in its allocated uplink burst and that the BS assigns the times at which the SS may transmit data in the allocated uplink burst. Akl, ¶78.

The Standard discloses that the SS “sends data over” the region of the uplink subframe allocated for its uplink burst. As explained in Section V.A.4, through a second UL-MAP message, the BS “allocates access to the uplink channel” by assigning the SS to a particular burst profile that can be used by” the SS to transmit uplink bursts. *Id.*, 8, 11, 103, 176. The allocated uplink burst is used by the SS to transmit data. Akl, ¶79; *see, e.g.*, Standard, 8 (a “burst profile . . . can be used” for “transmission”); 10 (describing a “transmitted burst” of data).

The Standard also explains that the SS “send[s]...data over” its uplink burst “in an assigned time interval” because the BS assigns the times at which the SS may transmit data in the allocated uplink burst. As Figure 218 shows, each uplink burst is assigned to particular symbol durations, $k+17$ to $k+26$, of the uplink subframe. Standard, 500.

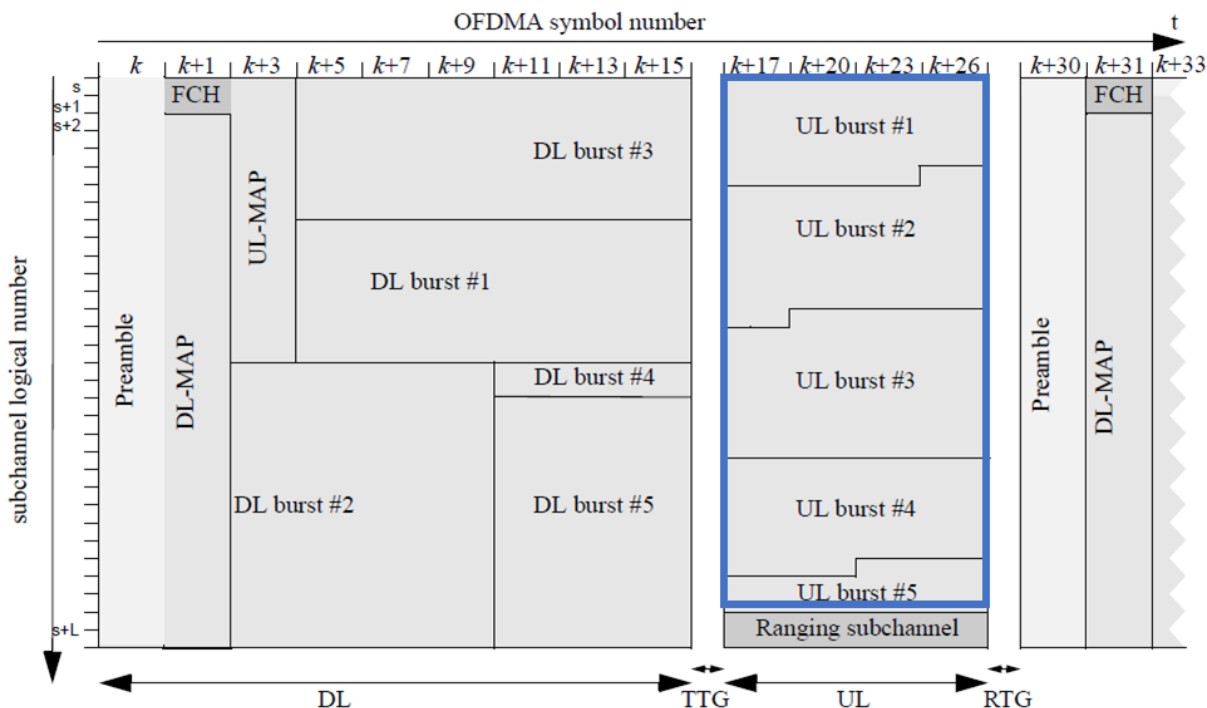


Figure 218—Time plan - one TDD time frame (with only mandatory zone)

Standard, Figure 218 (annotated); Ak1, ¶80.

As explained in Section V.A.4, the BS assigns the particular symbol durations at which the SS may transmit through the UL-MAP message, which includes an uplink Map IE of the format shown in Table 287. As shown, the uplink Map IE indicates the symbol durations of the allocated region through an “OFDMA Symbol offset,” which is “the OFDMA symbol in which the burst starts”; a “No. OFDMA Symbols,” which indicates “[t]he number of OFDMA symbols that are used to carry the uplink Burst”; and a “Duration,” which “[i]ndicates the duration, in units of OFDMA slots, of the allocation.” *Id.*, 533.

Table 287—OFDMA UL-MAP IE format

Syntax	Size	Notes
UL-MAP_IE() {		
CID	16 bits	
UTUC	4 bits	
if (UTUC == 12) {		
OFDMA Symbol offset	8 bits	
Subchannel offset	7 bits	
No. OFDMA Symbols	7 bits	
No. Subchannels	7 bits	
Ranging Method	2 bits	0b00 – Initial Ranging over two symbols 0b01 – Initial Ranging over four symbols 0b10 – BW Request/Periodic Ranging over one symbol 0b11 – BW Request/Periodic Ranging over three symbols
reserved	1 bit	Shall be set to zero
} else if (UTUC == 14) {		
CDMA_Allocation_IE()	32 bits	
else if (UTUC == 15) {		
Extended UTUC dependent IE	variable	See subclauses following 8.4.5.4.3
} else {		
Duration	10 bits	In OFDMA slots (see 8.4.3.1)
Repetition coding indication	2 bits	0b00 – No repetition coding 0b01 – Repetition coding of 2 used 0b10 – Repetition coding of 4 used 0b11 – Repetition coding of 6 used
}		
Padding nibble, if needed	4 bits	Completing to nearest byte, shall be set to 0.
}		

Standard, Table 287 (annotated).

Thus, in the Standard, the BS assigns symbol durations in which the SS may send data in its **uplink burst**, and the SS sends data at times corresponding to the assigned symbol durations of its **uplink burst** in the uplink subframe. In this manner, the SS “send[s]...data over” its **uplink burst** “in an assigned time interval.”

By disclosing the SS sending data in its allocated **uplink burst**, and that the BS assigns the times at which the SS may transmit data in the allocated **uplink**

burst, the Standard discloses “sending, by the UE, data over the **physical uplink shared channel** in assigned time intervals.” Ak1, ¶83.

- d. **22[c] sending, by the UE in a time interval that it is not sending information over the **physical uplink shared channel**, a **signal** over the **uplink physical control channel** based on the received **resource allocation information**; and**

The Standard discloses this limitation because the Standard discloses that, in a time interval that the SS is not sending information over the **uplink bursts**, the SS sends the **Ranging Code** over the **Ranging subchannel** based on the received Initial Ranging **opportunity**. Ak1, ¶84.

As explained in 22[a], the Standard discloses an “**uplink physical control channel**” called the **Ranging subchannel** and “**resource allocation information**” called the Initial Ranging **opportunity**. As explained in Section V.A.2, the SS transmits the **Ranging Code message** over the **Ranging Subchannel**. Standard, 49, 154, 175, 205-06, 666 (defining “**Ranging subchannel**” as “the OFDM subchannel . . . that [is] used to transmit the initial ranging message”). The **Ranging Code message** is sent over the **Ranging Subchannel** “based on” the Initial Ranging **opportunity** because the SS identifies the **Ranging Subchannel** over which to send the **Ranging Code message** from the Initial Ranging **opportunity** sent by the BS in the UL-MAP message, as Table 121 shows. Standard, 174, 178, 205-06.

Table 121—CDMA initial Ranging and automatic adjustments procedure



Standard, Table 121 (cropped and annotated); Ak1, ¶85.

The **Ranging Code message** is sent over the **Ranging Subchannel** in the Standard “in a time interval that [the SS] is not sending information over the” **uplink bursts** because the SS sends the **Ranging Code message** at a time that the SS is not sending data in its **uplink burst**. Ak1, ¶86. As explained in Section V.A, at the time the **Ranging Code message** is sent by the SS, the SS has only received the First UL-MAP message, from which the SS determines the **Ranging Subchannel** over which to send the **Ranging Code message**. *Id.* It is not until the SS receives the Second UL-MAP message that the SS is allocated its **uplink burst** in which to send information to the BS. *Id.* Thus, at the time that the SS sends the **Ranging Code message** over the **Ranging Subchannel**, the SS is not sending information in its **uplink burst**. *Id.* Put differently, the **Ranging Code message** is sent by the SS “at initialization” for “Initial Ranging,” that is, to allow a “new station[] [to] join the

network.” Standard, 49, 154. It is only once initial ranging is complete that the BS allocates the **uplink burst** to the SS and, only once the **uplink burst** is allocated to the SS that the SS can send information over the **uplink burst**. Akl, ¶86. Indeed, the SS cannot identify any **uplink burst** allocated to the SS in the First UL-MAP message, because the BS associates a MAP IE (indicating an **uplink burst**) with a particular SS using a “connection identifier”—something the BS does not assign to the SS until the RNG-RSP message sent *in response to* the **Ranging Code message**. Standard, 7, 48, 50-51, Table 121.

Because the Standard thus discloses that, in a time interval that the SS is not sending information over the **uplink bursts**, the SS sends the **Ranging Code** over the **Ranging subchannel** based on the received Initial Ranging **opportunity**, the Standard discloses “sending, by the UE in a time interval that it is not sending information over the **physical uplink shared channel**, a **signal** over the **uplink physical control channel** based on the received **resource** allocation information.” Akl, ¶87.

e. **22[d] receiving, by the UE, **feedback information** from a **downlink control channel**.**

The Standard discloses this limitation in two ways, either of which is sufficient to meet this claim limitation: (i) by disclosing the SS receiving **parameters**, like Power Adjust Information, in the RNG-RSP message sent in a specified **region of the downlink subframe**, and (ii) by disclosing the SS receiving

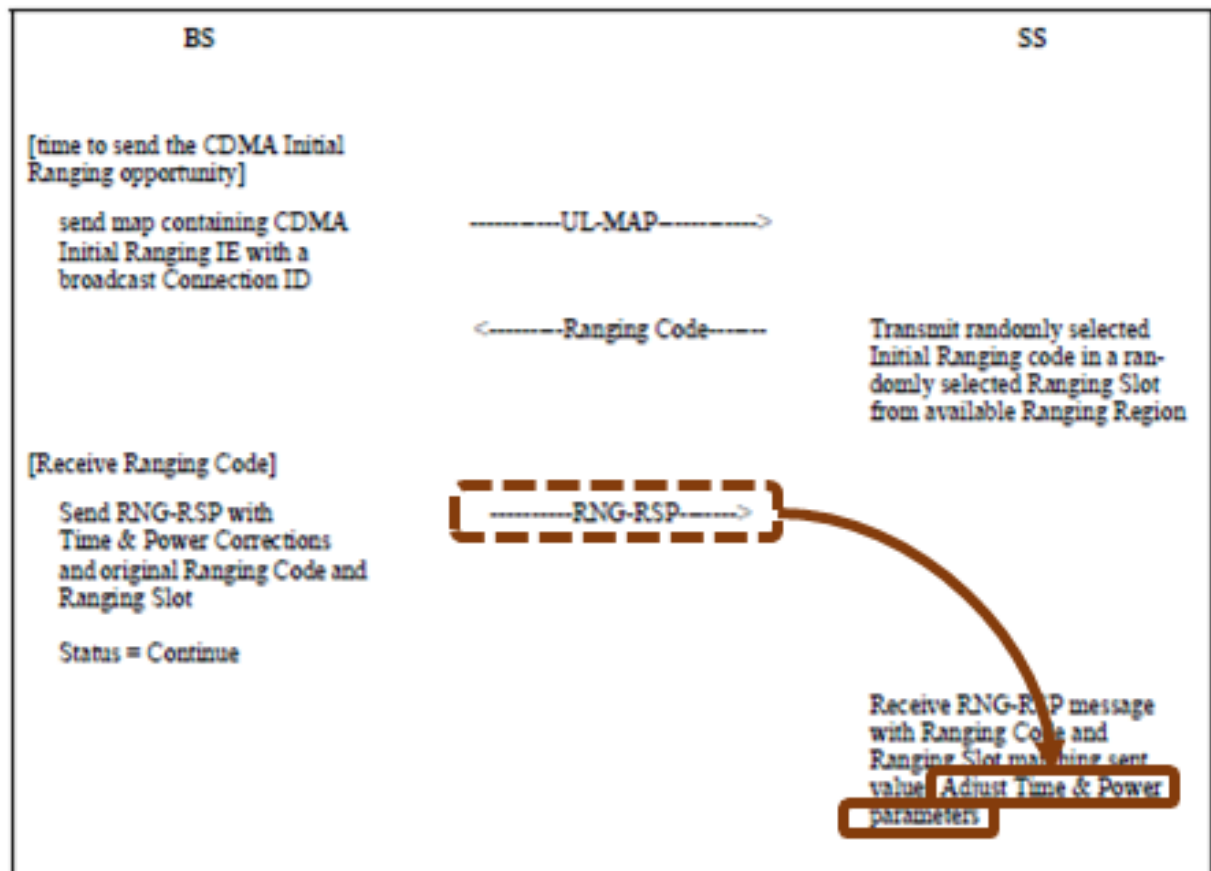
the uplink **MAP IE** in the second UL-MAP message sent in the **region of the downlink subframe allocated to the UL-MAP**. Ak1, ¶88.

- i. Receiving **parameters**, like Power Adjust Information, in the RNG-RSP message sent in a specified **region of the downlink subframe**

The Standard discloses that the SS receives **parameters**, like Power Adjust Information, in the RNG-RSP message. Ak1, ¶89. As explained in Section V.A.3, following the Ranging Code message from the SS, the SS receives a RNG-RSP message, as Table 121 shows. Standard, 50-51. The RNG-RSP provides the SS with, among other **parameters**, “Power Adjust Information.” *Id.*, 50. These **parameters** are “**feedback information**” because, as Table 121 shows, the BS sends these **parameters** in response to the Ranging Code message sent by the SS, and the SS uses these **parameters** to adjust its transmission according to the **parameters**. *Id.*, 178 (describing [a]djustment of local parameters (e.g., transmit power) in an SS as a result of the receipt ... of a RNG-RSP”), 205 (“[U]pon successfully receiving a CDMA Ranging Code, the BS broadcasts a Ranging Response message that advertises the received Ranging Code” and “contains all the needed adjustment (e.g., time, power, and possible frequency corrections)” for the SS); 620 (“The BS should be capable of providing accurate power measurements of the received burst signal. This value can then be compared against a reference level, and the resulting error can be fed back to the SS in a calibration message coming from the MAC ...

The total power control range consists of both a fixed portion and a portion that is automatically controlled by feedback.”); Ak1, ¶89. As one example, the SS may adjust its transmission power according to the Power Adjust Information **parameter**. Standard, 205 (describing “[a]justment of local parameters (e.g., transmit power) in an SS as a result of the receipt ... of a RNG-RSP,” and stating “[p]ower adjustment shall be capable of being reduced or increased by the specified amount in response to RNG-RSP messages”), Figure 90 (“Adjust local parameters per RNG-RSP”); Ak1, ¶89. This is consistent with one way that “**feedback information**” is described in the ’356 patent. *See, e.g.*, ’356 patent, 2:33-48 (in response to receiving the UL_Beacon, the BS sends the “**feedback information**” that “instructs the UE to adjust a transmission parameter”).

Table 121—CDMA initial Ranging and automatic adjustments procedure



Standard, Table 121 (cropped); Ak1, ¶89.

A POSA would have recognized from the Standard that RNG-RSP messages, like other downlink transmissions from the BS to the SS, are sent in a “channel,” namely, an allocated, or “mapped,” region of the downlink subframe. Ak1, ¶90. RNG-RSP messages, like the DL-MAP and UL-MAP messages, is a medium access control layer (“MAC”) Management message. *Id.*; Standard, Table 14 (showing UL-MAP, DL-MAP, and RNG-RSP messages are MAC Management messages).

As MAC Management messages, the RNG-RSP messages, like the UL-MAP and DL-MAP messages, are broadcast by the BS as a MAC protocol data unit (“PDU”) in the downlink subframe. Ak1, ¶91; Standard, 9, 31. The Standard explains that “MAC data,” like the MAC PDUs corresponding to the UL-MAP, DL-MAP, and RNG-RSP messages, are “mapped to an OFDMA Data Region” in the downlink subframe. Standard, 497. The first MAC Management message mapped is the DL-MAP message, which “immediately follows” the preamble and the frame control header (“FCH”), as Figure 218 shows. The mapping for the remaining MAC Management messages, as well as the user data to be transmitted, is indicated in the DL-MAP message through a Downlink Interval Usage Code (“DIUC”) identifying a mapped region of the downlink subframe. Standard, 45 (“Each interval [of the downlink subframe] is assigned a DIUC by the DL-MAP message.”), 46 (“The DL-MAP message defines the access to the downlink information.”), 123 (distinguishing “MAC Management messages” from “user data”), 522-23 (defining “DIUC values” for different purposes), 547 (“The DIUC value is used in the DL-MAP message to specify the Burst Profile to be used for a specific downlink burst.”).

Thus, from the Standard, a POSA would have understood that the RNG-RSP messages, like other MAC Management messages transmitted by the BS, are mapped to a region of the downlink subframe that is specifically for transmitting

RNG-RSP messages, as indicated by the assigned DIUC in the DL-MAP message.

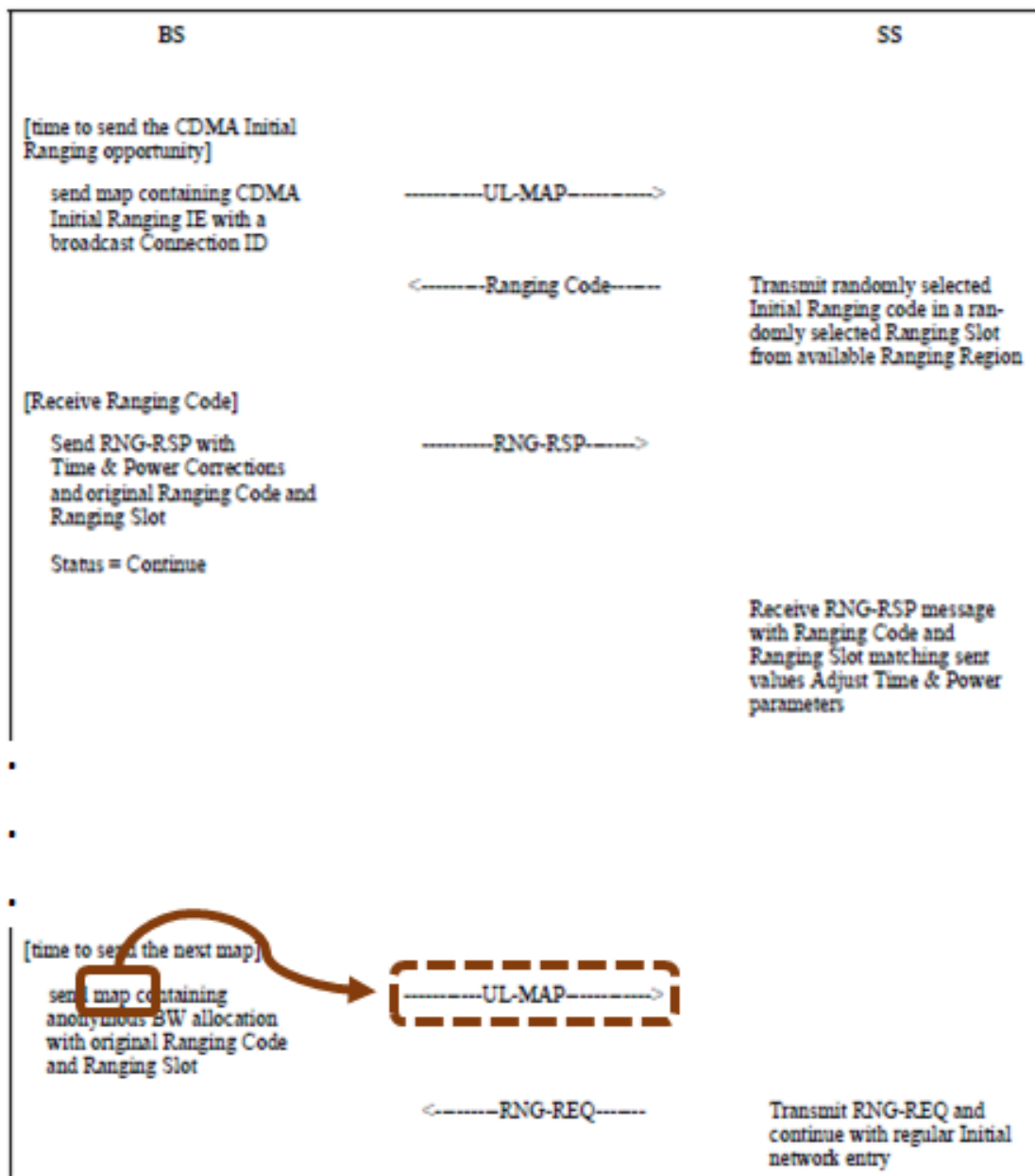
Akl, ¶92. This specifically assigned region of the downlink subframe for transmitting RNG-RSP messages would be understood by a POSA as a “channel.”

Id. A POSA would also have understood this specifically assigned region of the downlink subframe for transmitting RNG-RSP messages to be a “downlink control channel” because it is part of the downlink subframe and is used by the BS to transmit RNG-RSP messages, which a POSA would have recognized are control information, not data. Akl, ¶92; Section V.A.3; Standard, 123 (distinguishing “MAC Management messages” from “user data”).

- ii. Receiving the uplink MAP IE in the second UL-MAP message sent in the region of the downlink subframe allocated to the UL-MAP

The Standard also discloses that the SS receives the uplink MAP IE in the second UL-MAP message sent in the region of the downlink subframe allocated to the UL-MAP. Akl, ¶93. As explained in Section V.A.4, the SS receives a second UL-MAP Message from the BS, as Table 121 shows.

Table 121—CDMA initial Ranging and automatic adjustments procedure



Standard, Table 121 (cropped and annotated); Ak1, ¶93.

This second UL-MAP message “allocates access to the uplink channel” by including a “Map IE,” shown as UL-MAP_IE() in Table 18. Standard, 47-48.

Table 18—UL-MAP message format

Syntax	Size	Notes
UL-MAP_Message_Format() {		
Management Message Type = 3	8 bits	
Uplink Channel ID	8 bits	
UCD Count	8 bits	
Allocation Start Time	32 bits	
Begin PHY Specific Section {		See applicable PHY section.
for ($i = 1; i \leq n; i++$) {		For each UL-MAP element 1 to n .
UL-MAP_IE()	<i>variable</i>	See corresponding PHY specification.
}		
}		
if !(byte boundary) {		
Padding Nibble	4 bits	Padding to reach byte boundary.
}		
}		

Standard, Table 18 (cropped and annotated); Ak1, ¶94.

The uplink **Map IE** is “feedback information” because, as Table 121 shows, the BS sends the **Map IE** in response to the Ranging Code message sent by the SS, and the SS transmits information according to the **Map IE** to adjust its transmission. Ak1, ¶95. In particular, the **Map IE** is sent in response to the Ranging Code message because it identifies the SS to which it is addressed by including the Ranging Code and Ranging Slot of the Ranging Code message, as Table 121 shows. Further, as Table 287 shows, the uplink **MAP IE** allocates a region of the uplink subframe as an **uplink burst** in which the SS can send uplink transmissions.

Standard, 48, 532-33. Based on the **Map IE**, the SS sends its uplink transmissions in its allocated **uplink burst**, as Figure 218 shows. Ak1, ¶95, Standard, 500. This is consistent with one way that “**feedback information**” is described in the ’356 patent. *See, e.g.,* ’356 patent, 2:33-48, 5:5-6 (the BS sends **feedback information (the “PLCCH”)** that “corresponds to” a particular UL_Beacon and the UE adjusts its transmission based on the feedback information).

Table 287—OFDMA UL-MAP IE format		
Syntax	Size	Notes
UL-MAP_IE() {		
CID	16 bits	
UIUC	4 bits	
if (UIUC == 12) {		
OFDMA Symbol offset	8 bits	
Subchannel offset	7 bits	
No. OFDMA Symbols	7 bits	
No. Subchannels	7 bits	
Ranging Method	2 bits	0b00 – Initial Ranging over two symbols 0b01 – Initial Ranging over four symbols 0b10 – BW Request/Periodic Ranging over one symbol 0b11 – BW Request/Periodic Ranging over three symbols
reserved	1 bit	Shall be set to zero
} else if (UIUC == 14) {		
CDMA_Allocation_IE()	32 bits	
else if (UIUC == 15) {		
Extended UIUC dependent IE	variable	See subclauses following 8.4.5.4.3
} else {		
Duration	10 bits	In OFDMA slots (see 8.4.3.1)
Repetition coding indication	2 bits	0b00 – No repetition coding 0b01 – Repetition coding of 2 used 0b10 – Repetition coding of 4 used 0b11 – Repetition coding of 6 used
}		
Padding nibble, if needed	4 bits	Completing to nearest byte, shall be set to 0.
}		

Standard, Table 287 (annotated); Ak1, ¶95.

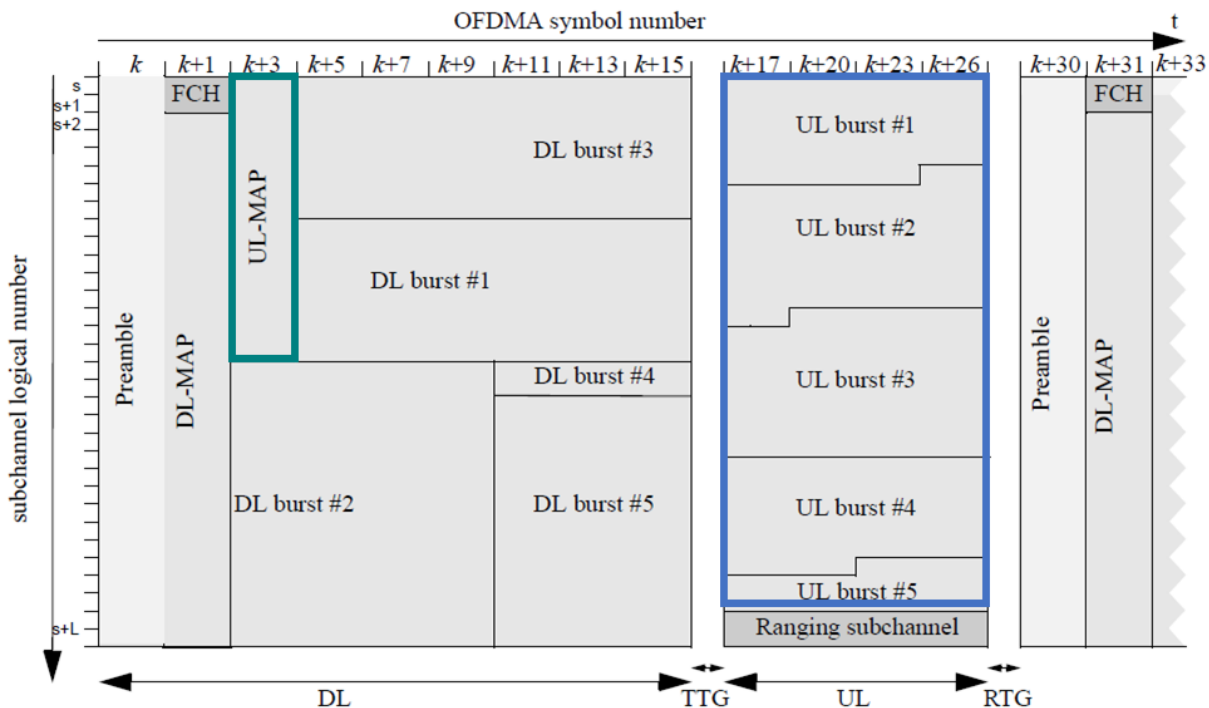


Figure 218—Time plan - one TDD time frame (with only mandatory zone)

Standard, Figure 218 (annotated); Ak1, ¶95.

Figure 218 further shows that the second UL-MAP message is sent in a “downlink control channel,” namely, the region of the downlink subframe allocated to the UL-MAP. The region of the downlink subframe allocated to the UL-MAP is a “downlink control channel” because it is part of the downlink subframe and is used by the BS to transmit the second UL-MAP message, which a POSA would have recognized is control information, not data. Ak1, ¶96; Section V.A.4.

Because the Standard thus discloses the SS (i) receiving parameters, like

Power Adjust Information, in the RNG-RSP message sent in a specified **region of the downlink subframe**, and (ii) receiving the uplink **MAP IE** in the second UL-MAP Message sent in the **region of the uplink subframe allocated to the UL-MAP**, the Standard discloses “receiving, by the UE, **feedback information** from a **downlink control channel**.” Ak1, ¶97.

2. Claim 23. The method of claim 22 further comprising: receiving, by the UE, data on a **physical downlink shared channel.**

The Standard discloses this claim because the Standard discloses the SS receives data on an allocated **downlink burst**. Ak1, ¶98.

As explained in Section V.A.5, the BS sends to the SS a DL-MAP message that “defines access to the downlink information” through a downlink Map IE, as Table 275 shows. Standard, 44, 46, 521-22.

Table 275—OFDMA DL-MAP_IE format

Syntax	Size	Notes
DL-MAP_IE {		
DIUC	4 bits	
if (DIUC == 15) {		
Extended DIUC dependent IE	<i>variable</i>	See subclauses following 8.4.5.3.1
} else {		
if (INC_CID == 1) {		The DL-MAP starts with INC_CID = 0. INC_CID is toggled between 0 and 1 by the CID-SWITCH_IE (8.4.5.3.7)
N_CID	8 bits	Number of CIDs assigned for this IE
for (n=0; n<N_CID; n++) {		
CID	16 bits	
}		
}		
OFDMA Symbol offset	8 bits	
Subchannel offset	6 bits	
Boosting	3 bits	000: normal (not boosted); 001: +6dB; 010: -6dB; 011: +9dB; 100: +3dB; 101: -3dB; 110: -9dB; 111: -12dB;
No. OFDMA Symbols	7 bits	
No. Subchannels	6 bits	
Repetition Coding Indication	2 bits	0b00 – No repetition coding 0b01 – Repetition coding of 2 used 0b10 – Repetition coding of 4 used 0b11 – Repetition coding of 6 used
}		
}		

Standard, Table 275.

The downlink Map IE allocates a region of the downlink subframe as a **downlink burst** in which the SS can receive downlink transmissions from the BS. Ak1, ¶100, Standard, 500. For example, the BS may allocate the region “**DL burst #4**” for the SS to receive downlink transmissions, as Figure 218 shows. The allocated **downlink burst** is a “**downlink shared channel**” because it is an allocation of a region on the downlink subframe in which the SS may receive data (not

control information) from the BS, and the **downlink burst** shares the downlink subframe with other **downlink bursts**, as Figure 218 shows. Ak1, ¶100; Section V.A.5. The **downlink burst** is a “**physical ... channel**” because a POSA would have recognized that it is a channel transmitted over the air at actual frequencies and times (as opposed to, for example, transport and logical channels, which are not). Ak1, ¶100; Standard, Figure 218 (illustrating frequencies and times for transmission of the **downlink burst**), 493 *et seq.* (describing OFDMA, including **downlink bursts**, as a “PHY” implementation, where PHY refers to “physical layer,” *id.*, 15).

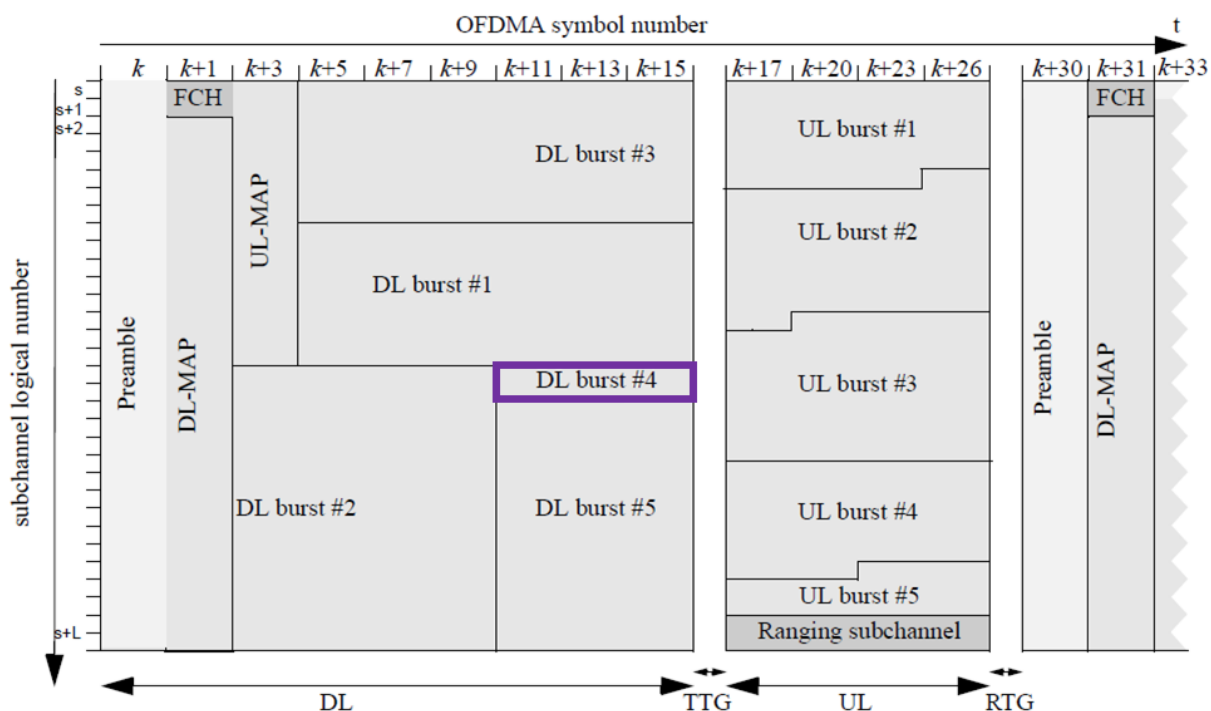


Figure 218—Time plan - one TDD time frame (with only mandatory zone)

Standard, Figure 218 (annotated); Akl, ¶100.

Because the Standard thus discloses the SS receiving data on an allocated **downlink burst**, the Standard discloses “receiving, by the UE, data on a **physical downlink shared channel**.” Akl, ¶101.

3. Claim 25. The method of claim 22 wherein the **feedback information includes power control information.**

The Standard discloses this claim because, in the Standard, the **parameters** in the RNG-RSP message include Power Adjust Information. Akl, ¶102.

As explained for claim 22[d], the RNG-RSP provides the SS with, among other **parameters**, “Power Adjust Information.” *Id.*, 50. The Power Adjust Information is “power control information” because the SS, upon receipt, adjusts its transmission power according to the Power Adjust Information **parameter**. Akl, ¶103; Standard, 176 (“Within the RNG-RSP message shall be ... information on RF power level adjustment ...”), 178 (describing [a]djustment of local parameters (e.g., transmit power) in an SS as a result of the receipt ... of a RNG-RSP”), 205 (the “Ranging Response message ... contains all the needed adjustment (e.g., time, power, and possible frequency corrections)” for the SS).

4. Claim 26. The method of claim 25 wherein the **downlink control channel includes power control information for a plurality of UEs using different bits.**

The Standard discloses this claim because each RNG-RSP message sent in the **region of the downlink subframe allocated to the RNG-RSP messages** uses

different bits and includes Power Adjust Information for a particular SS. Akl, ¶104.

As explained for claim 22[d], a POSA would have recognized from the Standard that RNG-RSP messages, like other MAC Management messages from the BS, are sent in a specifically allocated [region of the downlink subframe](#). Akl, ¶105. And as explained for claim 25, each RNG-RSP message includes “power control information” in the form of “Power Adjust Information.” Akl, ¶105.

The Standard envisions the BS sending RNG-RSP messages, each of which includes Power Adjust Information, to multiple SSs. Standard, 33 (discussing “RNG-RSP ... messages” for “[e]ach SS”); Akl, ¶106. To this end, each RNG-RSP message includes a number of bits, as Table 20 shows, including eight bits for an “Uplink Channel ID,” which is “[t]he identifier of the uplink channel on which the BS received the [Ranging Code message] to which this response refers.” Standard, 50, 51 (explaining that a ranging request (“RNG-REQ”) message in OFDMA is called a Ranging Code message). For OFDMA, the Uplink Channel ID is the ranging slot of the Ranging subchannel in which the Ranging Code message was sent by the SS. *Id.*, 205-06 (“[U]pon successfully receiving a CDMA Ranging Code, the BS broadcasts a Ranging Response message that advertises the received Ranging Code as well as the ranging slot ... where the CDMA Ranging code has been identified. This information is used by the SS that sent the CDMA ranging code to identify the Ranging Response message that corresponds to its ranging

request.”). That is, each RNG-RSP message includes an Uplink Channel ID indicating the particular SS to which the RNG-RSP message is addressed. Akl, ¶106.

Table 20—RNG-RSP message format

Syntax	Size	Notes
RNG-RSP_Message_Format() {		
Management Message Type = 5	8 bits	
Uplink Channel ID	8 bits	
TLV Encoded Information	variable	TLV specific
}		

Standard, Table 20.

Thus, the Standard discloses that each RNG-RSP message sent in the region of the downlink subframe allocated to the RNG-RSP messages uses different bits and includes Power Adjust Information for a particular SS. Akl, ¶107. In this manner, the Standard discloses that “the downlink control channel includes power control information for a plurality of UEs using different bits.” *Id.*

5. **Claim 27. The method of claim 22 wherein in the time interval that the signal on the uplink physical control channel is sent by the UE, a plurality of UEs each transmit on respective uplink physical control channels in the time interval.**

The Standard discloses this claim because in the Standard multiple SSs send Ranging Code messages to the BS on respective ranging slots of the Ranging subchannel. Akl, ¶108.

As explained for claim 22[c], in the Standard, the SS sends a **Ranging Code message** over the **Ranging subchannel**. *See* Section V.A.2, Standard, 49, 154, 175, 205-06, 666. The **Ranging subchannel**, the Standard explains, includes multiple “ranging slots.” Standard, 205. When an SS wishes to send a **Ranging Code message** over the **Ranging subchannel**, the SS will “choose randomly a Ranging Slot” of the **Ranging subchannel** over which to send the **Ranging Code message** to the BS. *Id.*; *see also id.*, 147-48. From this, a POSA would have recognized that, when multiple SSs send **Ranging Code messages** to the BS in the same time interval (as will happen, for example, when multiple SSs seek to access the BS in the same time interval), the SSs will send their respective **Ranging Code messages** to the BS in respective ranging slots of the **Ranging subchannel**. Akl, ¶109.

Because the Standard thus discloses that, in the time interval that **Ranging Code messages** on the **Ranging subchannel** is sent by the SS, multiple SSs each transmit **Ranging Code messages** on respective ranging slots of the **Ranging subchannel**, the Standard discloses that, “in the time interval that the **signal** on the **uplink physical control channel** is sent by the UE, a plurality of UEs each transmit on respective **uplink physical control channels** in the time interval” because in the Standard multiple SSs send **Ranging Code messages** to the BS on respective ranging slots of the **Ranging subchannel**. Akl, ¶110.

6. **Claim 28. The method of claim 22 further comprising the uplink physical control channel, the physical uplink shared**

channel, or the downlink control channel is any one of a time division multiple access (TDMA), code division multiple access (CDMA), time division duplex (TDD), frequency division duplex (FDD), time division-code division multiple access (TD-CDMA), or universal mobile telecommunication system (UMTS) physical channel.

The Standard discloses this claim because the Standard discloses that the **Ranging Subchannel** can be a CDMA channel, the **uplink bursts** can be TDMA channels, and the uplink and downlink subframes (including the **Ranging Subchannel** and the **uplink bursts** of the uplink subframe and the **regions** of the downlink subframe) are time division duplexed, and any one of these is sufficient to disclose this claim. Akl, ¶111.

The Standard discloses that, for OFDMA, the RNG-RSP message sent over the **Ranging Subchannel** may be “based on code division multiple access (CDMA).” Standard, 51; *see also id.* 147-48. The Standard also discloses that the **uplink bursts** of the uplink subframe may be TDMA bursts. *Id.*, 11 (defining a TMDA burst on “the uplink or downlink”). Finally, the Standard teaches that OFDMA supports TDD by the BS and the SS. *Id.*, 151-53. Figure 218 shows, for example, the uplink subframe and the downlink subframe are time division duplexed. Akl, ¶112. Because the uplink subframe includes the **Ranging Subchannel** and the **uplink bursts**, a POSA would have understood the Standard to teach that the **Ranging Subchannel** and the **uplink bursts** are TDD channels. *Id.* Similarly, because the downlink subframe includes, among others, the **region of**

the downlink subframe allocated to the RNG-RSP and the region of the downlink subframe allocated to the UL-MAP, a POSA would have understood the Standard to disclose that these regions are likewise TDD channels. *Id.*

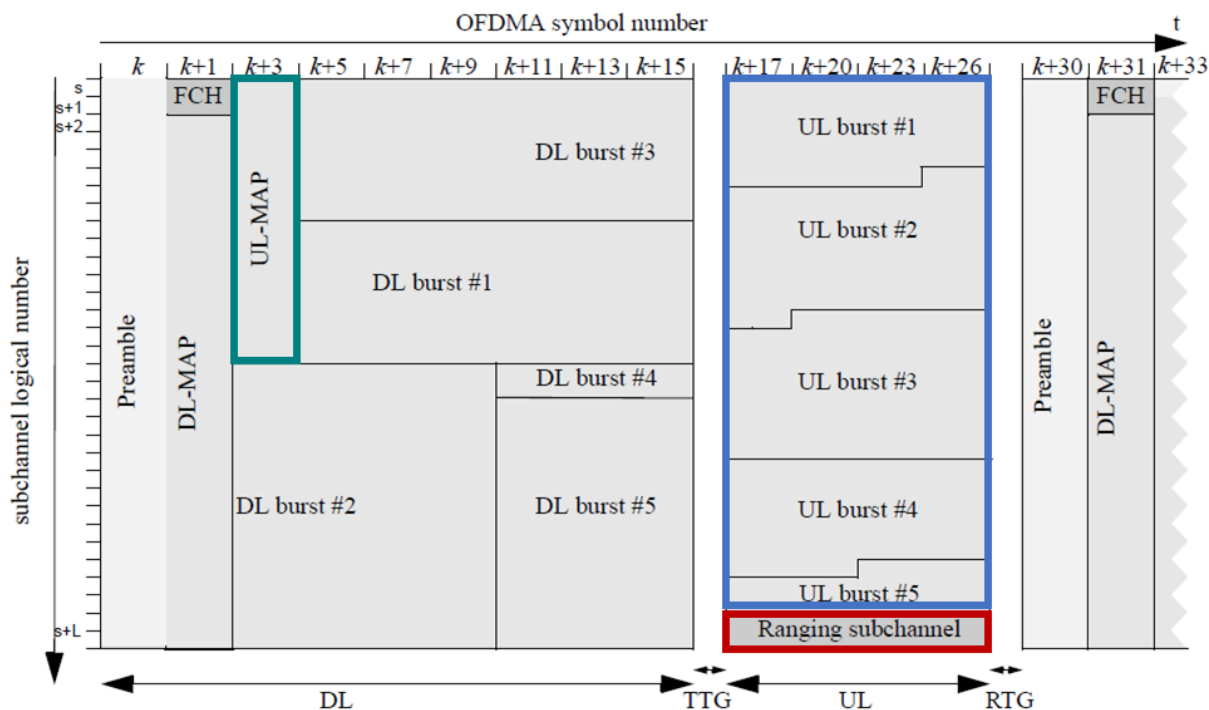


Figure 218—Time plan - one TDD time frame (with only mandatory zone)

Standard, Figure 218 (annotated); Akl, ¶112.

7. Claim 45

- a. 45[p] A method performed by a user equipment (UE), the method comprising:

To the extent this preamble is limiting, the Standard discloses this limitation, as explained for claim 22[p]. Akl, ¶113.

- b. 45[a] receiving, by the UE, resource allocation information associated with an uplink physical control channel, wherein the uplink physical control

channel and a physical uplink shared channel have different resources;

As explained for claim 22[a], the Standard discloses this limitation. Akl,

¶114.

- c. 45[b] sending, by the UE, data over the **physical uplink shared channel** in assigned time intervals;

As explained for claim 22[b], the Standard discloses this limitation. Akl,

¶115.

- d. 45[c] sending, by the UE in a time interval that it is not sending information over the **physical uplink shared channel**, a **signal** over the **uplink physical control channel** based on the received **resource allocation information**; and

As explained for claim 22[c], the Standard discloses this limitation. Akl,

¶116.

- e. 45[d] wherein in the time interval that the **signal** on the **uplink physical control channel** is sent by the UE, a plurality of UEs each send respective **signals** on respective **uplink physical control channels** in the time interval.

The Standard discloses this limitation because, as explained for claim 27, the Standard discloses that, in the time interval that the **Ranging Code message** on the **Ranging subchannel** is sent by the SS to the BS, multiple SSs send respective **Ranging Code messages** to the BS on respective ranging slots of the **Ranging subchannel**. Akl, ¶117.

8. Claim 46. The method of claim 45 further comprising the

uplink physical control channel, the respective uplink physical control channels, or the physical uplink shared channel is any one of a time division multiple access (TDMA), code division multiple access (CDMA), time division duplex (TDD), frequency division duplex (FDD), time division-code division multiple access (TD-CDMA), or universal mobile telecommunication system (UMTS) physical channel.

The Standard discloses this limitation because, as explained for claim 28, the Standard discloses that the **Ranging Subchannel** can be a CDMA channel, the **uplink bursts** can be TDMA channels, and the uplink and downlink subframes (including the **Ranging Subchannel** and the **uplink bursts** of the uplink subframe) are time division duplexed, and any one of these is sufficient to teach this claim. Akl, ¶118.

B. Grounds 2 and 3: The Standard Alone or in Combination with Mohanty Would Have Rendered Obvious Claims 1-7, 24, 43, and 44

1. Claim 1

The Standard alone or in combination with Mohanty would have rendered obvious claim 1. The Standard describes user equipment (UE) in the form of an SS that performs the functions performed by the claimed “processor” in 1[a]-1[d]. And a POSA would have been motivated and found it obvious to implement the SS in the Standard with a “processor configured to” perform the SS’s functions. Akl, ¶119.

From the Standard alone, a POSA would have found it obvious to

implement the SS in the Standard with a “processor configured to” perform the SS’s functions because the POSA would have known that SSs like that in the Standard were typically implemented this way. *Akl*, ¶120. As just one example, Mohanty shows that it was known to implement an SS using “a predefined computer language, manner or syntax, for instructing a processor to perform a certain function.” Mohanty, [0018]; *see also id.*, [0019] (listing known computer languages). Mohanty shows it was also known, for instance, for the “processor” to be “a processor such as a general purpose processor, a digital signal processor (DSP) and/or a network processor,” and to “instruct[] [the] processor to perform a certain function” using “software, a software module, an application, a program, a subroutine, an instruction set, computing code, words, values, symbols or combination thereof.” *Id.*, [0018].

Mohanty’s known implementation of an SS is illustrated in Figure 2, which shows a “processor 202-1” connected to a “memory-202-2.” *Id.*, [0059]. The processor may be “implemented as any processor, such as...a processor implementing a combination or instruction sets[,]” “a general purpose processor,” or “a dedicated processor, such as a controller, microcontroller, embedded processor, a digital signal processor (DSP), a network processor, a media processor, an input/output (I/O) processor, and so forth.” *Id.*, [0060]. The memory “may include any machine-readable or computer-readable media capable of storing

data.” *Id.*, [0061].

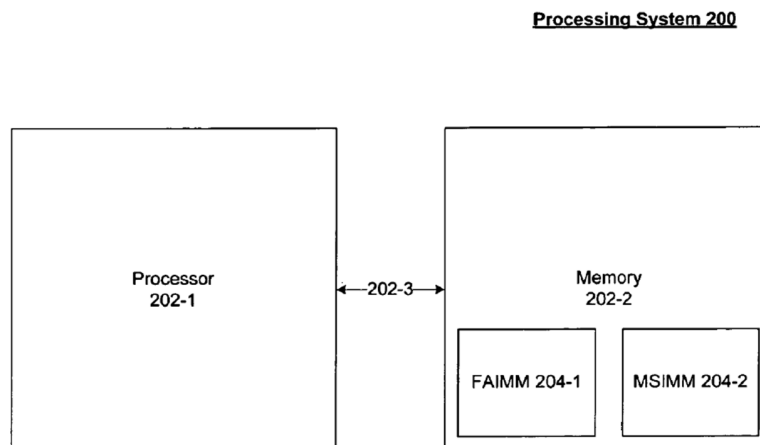


FIG. 2

Ex. 1009, Figure 2.

Mohanty’s known implementation of an SS is consistent with how the ’356 patent describes the “processor” being “configured to” carry out the functions of the “user equipment” in claim 1. Akl, ¶122. The ’356 patent envisions “that the operations...may be implemented using “processors or other digital circuitry under the control of software,” such as that “stored on computer-readable media.” ’356 patent, 7:29-43. Consistent with this, Figure 5 illustrates the “processor,” which is described as “a general or special purpose processing engine” and shown connected to a “main memory...for storing information and instructions to be executed by [the] processor[.]” *Id.*, 7:44-65. *See also id.* 8:51-9:5 (describing “instructions,” such as “computer program code” or “software instructions,” “for

use by processor 504, to cause the processor to perform specified operations”); 9:6-18 (stating invention is not limited to “a strict logical or physical structure or organization”).

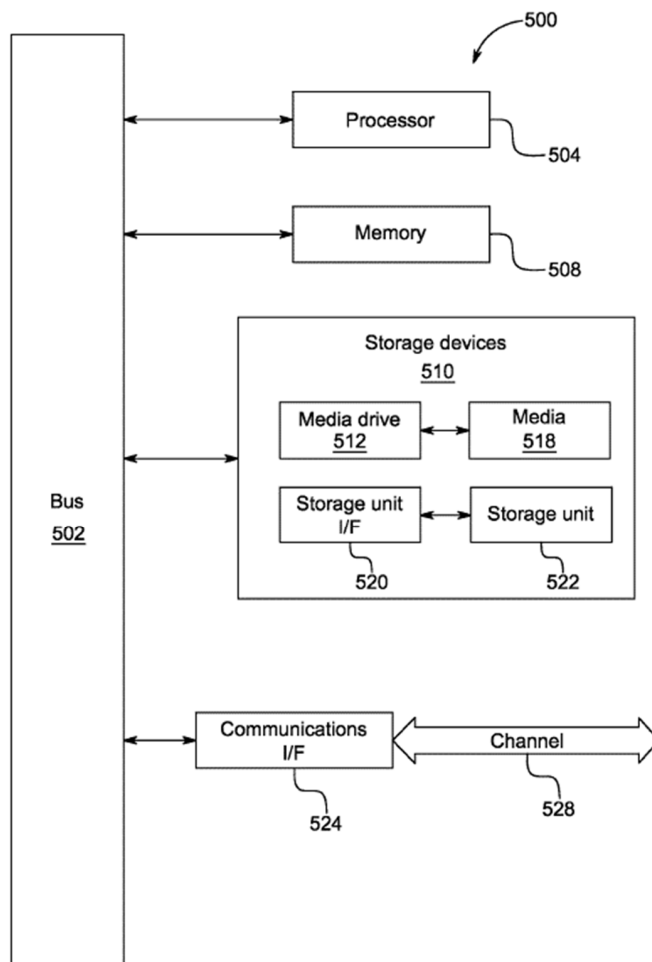


FIG. 5

’356 Patent, Figure 5.

Thus, as the example of Mohanty shows, a POSA would have known that SSs like that in the Standard were typically implemented with a “processor configured to” to perform the SS’s functions. Ak1, ¶123. From such typical

implementations, a POSA would have found it obvious to implement the SS of the Standard to include a “processor configured to” perform the functions described in the Standard, as this would have been within the skill of a POSA and would have yielded nothing more than predictable results. *Id.*

A POSA would have been motivated to use such a typical implementation by, for example, the widespread use and availability of processors at the time of the invention, as well as the POSA’s existing skill in their implementation. *Akl*, ¶124. A POSA would likewise have been motivated by the known technical advantages of processors, including efficient and powerful computing and their ability to be flexibly reprogrammed. *Id.* In particular, a POSA would have recognized that using a processor and software to implement the functions of an SS would allow the implemented functions to be updated or enhanced simply by using software updates. *Id.* A POSA would also have recognized that using the same processor or processors to collectively implement the SS’s functions would save on cost and simplify implementation complexity and design. *Id.*

Alternatively, from the Standard in combination with Mohanty, a POSA seeking to implement the Standard would have been motivated and found it obvious to implement the SS in the Standard with a “processor configured to” perform the SS’s functions, as Mohanty describes. *Akl*, ¶125. While the Standard describes an SS and the functions it performs, the Standard does not provide

implementation details for the SS. *Id.* Accordingly, a POSA seeking to implement the SS in the Standard would have been motivated to implement the SS according to known implementation details for SSs compatible with the Standard, such those described in Mohanty. *Id.* As explained in Section V.B, Mohanty describes an SS for use with the Standard that includes a “processor configured to” perform the SS’s functions. *See, e.g.*, Mohanty, [0018]-[0020], [0059]-[0061], Figure 2. Accordingly, from Mohanty, a POSA would have found it obvious to implement the SS in the Standard to, like Mohanty’s SS, include a “processor configured to” perform the SS’s functions. *Akl*, ¶125. Such a known implementation would have been within the skill of the POSA and would have yielded nothing more than predictable results. *Id.*

a. [1p] A user equipment (UE) comprising:

To the extent this preamble is limiting, the Standard teaches “a user equipment” called a “subscriber station” or “SS.” *Akl*, ¶126. *See, e.g.*, Standard, 11 (“subscriber station (SS): A generalized equipment set providing connectivity between subscriber equipment and a base station (BS).”).

b. 1[a] a processor configured to receive resource allocation information associated with an uplink physical control channel, wherein the uplink physical control channel and a physical uplink shared channel have different resources;

As explained for 22[a], the Standard discloses an SS “receiving...resource

allocation information associated with an **uplink physical control channel**, wherein the **uplink physical control channel** and a **physical uplink shared channel** have different **resources**.” Ak1, ¶127. As explained in Section IX.B.1, from the Standard, a POSA would have been motivated and found it obvious to implement the SS in the Standard with a “processor configured to” perform the SS’s functions because the POSA would have known that SSs like that in the Standard were typically implemented this way, this would have been within the skill of a POSA, and would have yielded nothing more than predictable results, and because the POSA would have been motivated by, for example, the known technical advantages of processors, including efficient and powerful computing and their ability to be flexibly reprogrammed. Ak1, ¶127. Mohanty’s known implementation of an SS for use with the Standard, for example, stored instructions for instructing a processor to carry out the SS’s functions. *See, e.g.*, Ex. 1009, [0018]-[0019], [0059]-[0061], Figure 2. Thus, a POSA would have been motivated and found it obvious to implement the SS in the Standard with the “processor configured to” perform the SS’s functions, including receiving the Initial Ranging **opportunity** associated with the **Ranging subchannel**. Ak1, ¶127. Alternatively, as explained in Section IX.B.1, a POSA would have been motivated and found it obvious from the Standard and Mohanty in combination to implement the SS of the Standard to include a “processor configured to” perform the functions of the SS, including receiving the

Initial Ranging **opportunity** associated with the **Ranging subchannel**. AkI, ¶127.

- c. **1[b] the processor is further configured to send data over the **physical uplink shared channel** in assigned time intervals;**

As explained for 22[b], the Standard discloses the SS “sending...data over the **physical uplink shared channel** in assigned time intervals.” As explained in Section IX.B.1 and for 1[a], from the Standard, a POSA would have been motivated and found it obvious to implement the SS in the Standard with a “processor configured to” perform the SS’s functions because the POSA would have known that SSs like that in the Standard were typically implemented this way, this would have been within the skill of a POSA, and would have yielded nothing more than predictable results, and because the POSA would have been motivated by, for example, the known technical advantages of processors, including efficient and powerful computing and their ability to be flexibly reprogrammed. AkI, ¶128. Mohanty’s known implementation of an SS for use with the Standard, for example, stored instructions for instructing a processor to carry out the SS’s functions. *See, e.g.*, Ex. 1009, [0018]-[0019], [0059]-[0061], Figure 2. Thus, a POSA would have been motivated and found it obvious to implement the SS in the Standard with the “processor configured to” perform the SS’s functions, including those of 1[a] and sending data in its allocated **uplink burst** at the times assigned by the BS. AkI, ¶128. Alternatively, as explained in Section IX.B.1 and

for 1[a], a POSA would have been motivated and found it obvious from the Standard and Mohanty in combination to implement the SS of the Standard to include the “processor configured to” perform the functions of the SS, including those of 1[a] and sending data in its allocated **uplink burst** at the times assigned by the BS. Akl, ¶128.

- d. **1[c] the processor is further configured, in a time interval that it is not sending information over the **physical uplink shared channel**, to send a **signal** over the **uplink physical control channel** based on the received **resource allocation information**; and**

As explained for 22[c], the Standard discloses “in a time interval that it is not sending information over the **physical uplink shared channel**,” the SS “sending a **signal** over the **uplink physical control channel** based on the received **resource allocation information**.”. Akl, ¶129. As explained in Section IX.B.1 and for 1[a] and 1[b], from the Standard, a POSA would have been motivated and found it obvious to implement the SS in the Standard with a “processor configured to” perform the SS’s functions because the POSA would have known that SSs like that in the Standard were typically implemented this way, this would have been within the skill of a POSA, and would have yielded nothing more than predictable results, and because the POSA would have been motivated by, for example, the known technical advantages of processors, including efficient and powerful computing and their ability to be flexibly reprogrammed. Akl, ¶129. Mohanty’s known

implementation of an SS for use with the Standard, for example, stored instructions for instructing a processor to carry out the SS's functions. *See, e.g.*, Ex. 1009, [0018]-[0019], [0059]-[0061], Figure 2. Thus, a POSA would have been motivated and found it obvious to implement the SS in the Standard with the “processor configured to” perform the SS's functions, including those of 1[a] and 1[b] and sending the **Ranging Code message** over the **Ranging subchannel** based on the received Initial Ranging **opportunity** in a time interval that the SS is not sending information over the **uplink bursts**. Akl, ¶129. Alternatively, as explained in Section IX.B.1 and for 1[a] and 1[b], a POSA would have been motivated and found it obvious from the Standard and Mohanty in combination to implement the SS of the Standard to include the “processor configured to” perform the functions of the SS, including those of 1[a] and 1[b] and sending the **Ranging Code message** over the **Ranging subchannel** based on the received Initial Ranging **opportunity** in a time interval that the SS is not sending information over the **uplink bursts**. Akl, ¶129.

- e. **1[d] the processor is further configured to receive **feedback information** from a **downlink control channel**.**

As explained for 22[d], the Standard discloses “receiving...**feedback information** from a **downlink control channel**” in two ways, either of which is sufficient to meet this claim limitation: (i) by disclosing the SS receiving

parameters, like Power Adjust Information, in the RNG-RSP message sent in a specified region of the downlink subframe, and (ii) by disclosing the SS receiving the uplink MAP IE in the second UL-MAP message sent in the region of the downlink subframe allocated to the UL-MAP. Akl, ¶130. As explained in Section IX.B.1 and for 1[a]-1[c], from the Standard, a POSA would have been motivated and found it obvious to implement the SS in the Standard with a “processor configured to” perform the SS’s functions because the POSA would have known that SSs like that in the Standard were typically implemented this way, this would have been within the skill of a POSA, and would have yielded nothing more than predictable results, and because the POSA would have been motivated by, for example, the known technical advantages of processors, including efficient and powerful computing and their ability to be flexibly reprogrammed. Akl, ¶130. Mohanty’s known implementation of an SS for use with the Standard, for example, stored instructions for instructing a processor to carry out the SS’s functions. *See, e.g.*, Ex. 1009, [0018]-[0019], [0059]-[0061], Figure 2. Thus, a POSA would have been motivated and found it obvious to implement the SS in the Standard with the “processor configured to” perform the SS’s functions, including those of 1[a]-1[c] and receiving parameters in the RNG-RSP message sent in a specified region of the downlink subframe and receiving the uplink Map IE in the second UL-MAP Message sent in the region of the uplink subframe

allocated to the UL-MAP. Akl, ¶130. Alternatively, as explained in Section IX.B.1IX.B.1 and for 1[a]-1[c], a POSA would have been motivated and found it obvious from the Standard and Mohanty in combination to implement the SS of the Standard to include the “processor configured to” perform the functions of the SS, including those of 1[a]-1[c] and receiving parameters in the RNG-RSP message sent in a specified region of the downlink subframe and receiving the uplink Map IE in the second UL-MAP Message sent in the region of the uplink subframe allocated to the UL-MAP. Akl, ¶130.

2. Claim 2. The UE of claim 1 wherein the processor is further configured to receive data on a physical downlink shared channel.

As explained for claim 23, the Standard discloses the SS “receiving data on a physical downlink shared channel.” Akl, ¶131. As explained in Section IX.B.1 and for claim 1, from the Standard, a POSA would have been motivated and found it obvious to implement the SS in the Standard with a “processor configured to” perform the SS’s functions because the POSA would have known that SSs like that in the Standard were typically implemented this way, and because the POSA would have been motivated by, for example, the known technical advantages of processors, including efficient and powerful computing and their ability to be flexibly reprogrammed. Akl, ¶131. Mohanty’s known implementation of an SS for use with the Standard, for example, stored instructions for instructing a processor

to carry out the SS's functions. *See, e.g.*, Ex. 1009, [0018]-[0019], [0059]-[0061], Figure 2. Thus, a POSA would have known that the SS of the Standard would include the “processor configured to” perform the functions of the SS, including those of claim 1 and receiving data on its allocated **downlink burst**, or would have at least found such inclusion to be obvious, as this would have been the typical implementation of an SS within the skill of a POSA and would have yielded nothing more than predictable results. Akl, ¶131. Alternatively, as explained in Section IX.B.1 and for claim 1, a POSA would have been motivated and found it obvious from the Standard and Mohanty in combination to implement the SS of the Standard to include the “processor configured to” perform the functions of the SS, including those of claim 1 and receiving data on its allocated **downlink burst**. Akl, ¶131.

3. Claim 3. The UE of claim 2 wherein the **downlink control channel and the **physical downlink shared channel** are time multiplexed.**

The Standard teaches that “the **downlink control channel** and the **physical downlink shared channel** are time multiplexed” in two ways, either of which is sufficient to meet this limitation: (i) a POSA would have been motivated by and found it obvious from the Standard for the BS to map the **region of the downlink subframe allocated to RNG-RSP messages** to span different symbol numbers than the SS's allocated **downlink burst** and (ii) the Standard teaches that the specified

region of the downlink subframe in which the UL-MAP message is transmitted by the BS is time multiplexed with the SS's allocated downlink burst. Ak1, ¶132.

- i. A POSA would have been motivated by and found it obvious from the Standard for the BS to map the region of the downlink subframe allocated to RNG-RSP messages to span different symbol numbers than, for example, the data region allocated to Downlink burst #4

As explained for claim 1[d], a POSA would have recognized from the Standard that RNG-RSP messages, like other MAC Management messages from the BS to the SS, are sent in a specifically allocated region of the downlink subframe. Ak1, ¶133. And as explained for claim [2], the Standard teaches that the SS receives data on an allocated downlink burst, such as Downlink burst #4 shown in Figure 218. Ak1, ¶133. A POSA would have been motivated by and found it obvious from the Standard to time multiplex the specifically allocated region of the downlink subframe for RNG-RSP messages and the SS's allocated downlink burst. Ak1, ¶133.

The POSA would have found it obvious because a specific kind of time multiplexing, TDMA, was a known technique supported by OFDMA and achieved by mapping certain transmissions to certain symbol times, as Figure 218 shows. Ak1, ¶134; *see* Section IV; Standard, 494, 496, Figure 215. For this reason, time multiplexing transmissions in the downlink subframe by mapping them to different symbol times would have been within the skill of the POSA and yielded nothing

more than predictable results. Akl, ¶134.

A POSA would have been motivated to time multiplex the specifically allocated **region of the downlink subframe for RNG-RSP messages** and the SS's allocated **downlink burst** for at least two reasons. Akl, ¶135. First, a POSA would have been motivated to map the RNG-RSP messages near other MAC Management messages in the downlink subframe, including the DL-MAP and UL-MAP. Akl, ¶135. One reason for this is to ensure the RNG-RSP messages are sent on a robust downlink burst: Because “bursts are transmitted in order of decreasing robustness” on the downlink subframe, the Standard directs that “broadcast control” information like the DL-MAP and UL-MAP messages be sent early in the downlink subframe. Akl, ¶135; Standard, 310. User data, like the SS's allocated **downlink burst**, are transmitted in later bursts, as these later bursts have a “different level of transmission robustness” than those used for the control information. Akl, ¶135; Standard, 310. A POSA would have recognized that the RNG-RSP messages are, like the DL-MAP and UL-MAP messages, broadcast control data and, accordingly, would have been motivated to map the RNG-RSP messages for transmission on a robust downlink burst, near to the DL-MAP and UL-MAP messages in the downlink subframe and at a different time in the downlink subframe than the user data, including the SS's allocated **downlink burst**. Akl, ¶135. Another reason for mapping the RNG-RSP messages near other MAC

Management messages in the downlink subframe, a POSA would have recognized, is the simplicity and efficiency of transmitting all control data (that is, the MAC Management messages including the RNG-RSP messages) together to allow the BS to take advantage of concatenation, in which PDUs are combined into a single transmission opportunity. Akl, ¶135 (citing Ex. 1008, 312); Standard, 7, 123. A POSA would have recognized that such concatenation efficiently uses transmission resources by allowing for transmission of multiple PDUs in a single transmission opportunity. Akl, ¶135; Standard, 123. Concatenating the MAC Management PDUs (including the DL-MAP, the UL-MAP, and the RNG-RSP messages), a POSA would have understood, improves efficiency of the BS by allowing the MAC layer (and, in particular, the MAC common part sublayer) of the BS to collectively schedule the MAC Management PDUs for transmission, before they are passed to the PHY layer to be transmitted. Akl, ¶135 (citing Ex. 1008, 307, 315); Standard, 123. Similarly, concatenating the PDUs of user data (including the user data of the SS's allocated [downlink burst](#)), a POSA would have understood, improves efficiency of the BS by allowing the MAC layer (and, in particular, the MAC common part sublayer) of the BS to collectively schedule these user data PDUs for transmission, before they are passed to the PHY layer to be transmitted. Akl, ¶135; Standard, 123. Thus, a POSA would have been motivated to map the RNG-RSP messages near other MAC Management messages in the downlink

subframe, including the DL-MAP and UL-MAP. Ak1, ¶135. In such a mapping, the specifically allocated **region of the downlink subframe for the RNG-RSP messages** would be mapped to different-in-time symbol times than the SS's allocated **downlink burst**, such that the specifically allocated **region of the downlink subframe for the RNG-RSP messages** and the SS's allocated **downlink burst** are "time multiplexed" in the downlink subframe. Ak1, ¶135.

The second reason a POSA would have been motivated to time multiplex the specifically allocated **region of the downlink subframe for the RNG-RSP messages** and the SS's allocated **downlink burst** is that such time multiplexing allows the SS to receive parameter corrections even in the same downlink subframe that it receives data over its allocated **downlink burst**. Ak1, ¶136. As the Standard explains, RNG-RSP messages are transmitted by the BS to the SS not only in response to a Ranging Code sent by the SS, but also "asynchronously to send corrections based on measurements that have been made." Standard, 50. For this reason, the Standard teaches, "the SS shall be prepared to receive an RNG-RSP at any time, not just following an RNG-REQ transmission." *Id.* To allow the SS to receive a RNG-RSP "at any time," a POSA would have been motivated to map the specifically allocated **region of the downlink subframe for the RNG-RSP messages** to different symbol times in the downlink subframe than the SS's allocated **downlink burst**, thereby ensuring the SS can receive both a RNG-RSP message and

user data of the **downlink burst** during the downlink subframe. AkI, ¶136. In such a mapping, the specifically allocated **region of the downlink subframe for the RNG-RSP messages** would be mapped to different time symbol times than the SS's allocated **downlink burst**, such that the specifically allocated **region of the downlink subframe for the RNG-RSP messages** and the SS's allocated **downlink burst** are “time multiplexed” in the downlink subframe. AkI, ¶136.

Because a POSA would thus have been motivated and found it obvious from the Standard for the **region of the downlink subframe allocated to the RNG-RSP messages** and the data region for **Downlink burst #1** to be mapped to different symbol times, meaning they are transmitted on the downlink subframe at different times, a POSA would have found it obvious for the specified **region of the downlink subframe allocated to the RNG-RSP messages** to be “time multiplexed” with the SS's allocated **downlink burst**. AkI, ¶137.

- ii. The Standard teaches that the specified **region of the downlink subframe** in which the UL-MAP message is transmitted by the BS is time multiplexed with the SS's allocated **downlink burst**

As explained for claim 1[d], the Standard teaches that the UL-MAP message is sent in a **region of the downlink subframe allocated to the UL-MAP**, as illustrated in Figure 218. AkI, ¶138. As shown, the **region of the downlink subframe allocated to the UL-MAP** is “time multiplexed” with, for example, “**Downlink burst #4**” because the **region of the downlink subframe allocated to the**

UL-MAP spans different symbol numbers than Downlink burst #4, meaning they are transmitted on the downlink subframe at different times. Ak1, ¶138; *see also* '356 patent at Figure 2 (showing the downlink control channel 212 and the physical downlink shared channel 210 being transmitted on the downlink subframe at different times).

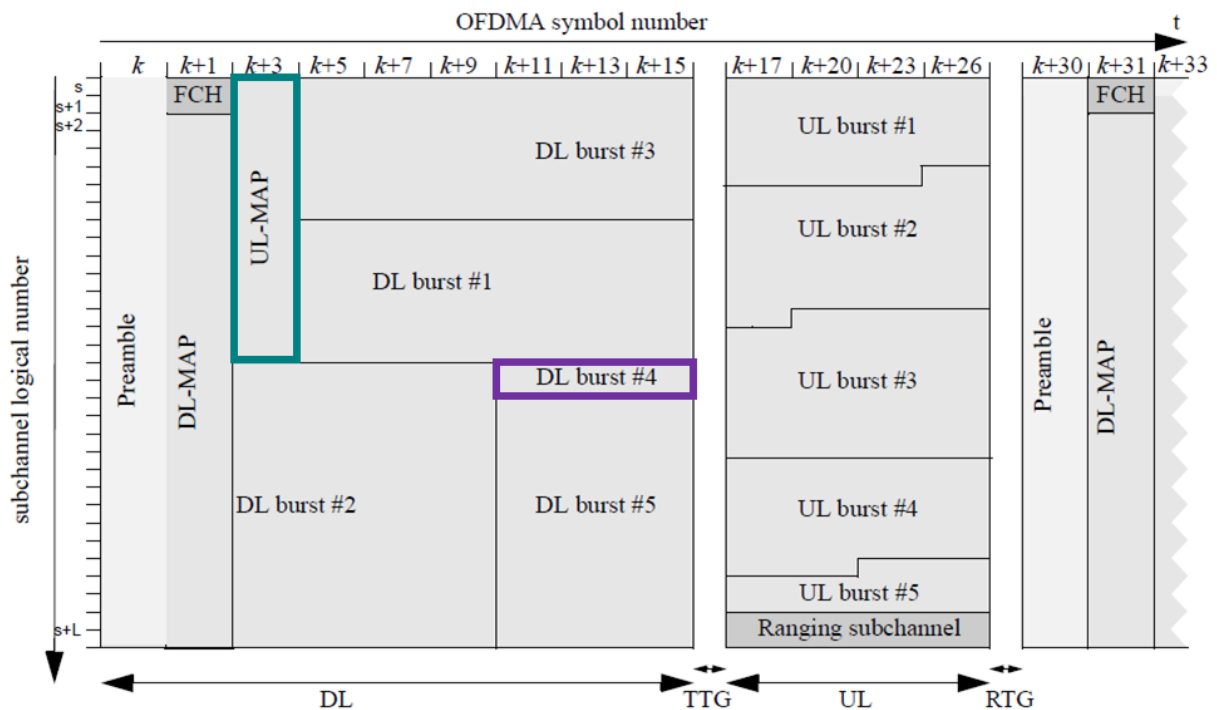


Figure 218—Time plan - one TDD time frame (with only mandatory zone)

Standard, Figure 218 (annotated); Ak1, ¶138.

4. **Claim 4.** The UE of claim 1 wherein the **feedback information** includes power control information.

As explained for claim 25, the Standard discloses this limitation. Ak1, ¶139.

5. **Claim 5.** The UE of claim 4 wherein the **downlink control channel** includes power control information for a plurality of UEs using different bits.

As explained for claim 26, the Standard discloses this limitation. Akl, ¶140.

6. **Claim 6. The UE of claim 1 wherein in the time interval that the signal on the uplink physical control channel is sent by the UE, a plurality of UEs each transmit on respective uplink physical control channels in the time interval.**

As explained for claim 27, the Standard discloses this limitation. Akl, ¶141.

7. **Claim 7. The UE of claim 1 further comprising the uplink physical control channel, the physical uplink shared channel, or the downlink control channel is any one of a time division multiple access (TDMA), code division multiple access (CDMA), time division duplex (TDD), frequency division duplex (FDD), time division-code division multiple access (TD-CDMA), or universal mobile telecommunication system (UMTS) physical channel.**

As explained for claim 28, the Standard discloses this limitation. Akl, ¶142.

8. **Claim 24. The method of claim 23 wherein the downlink control channel and the physical downlink shared channel are time multiplexed.**

As explained for claim 3, the Standard teaches this limitation. Akl, ¶143.

9. **Claim 43**

The Standard alone or in combination with Mohanty would have rendered obvious claim 43. The Standard describes an SS that performs the functions performed by the claimed “processor” in 43[a]-43[c]. And, as explained in Section IX.B.1, a POSA would have been motivated and found it obvious to implement the SS in the Standard with a “processor configured to” perform the SS’s functions or, alternatively, from the Standard in combination with Mohanty, a POSA seeking to implement the Standard would have been motivated and found it

obvious to implement the SS in the Standard with a “processor configured to” perform the SS’s functions, as Mohanty describes. Ak1, ¶144.

a. 43[p] A user equipment (UE) comprising:

To the extent this preamble is limiting, the Standard teaches this, as explained for claim 1[p]. Ak1, ¶145.

b. 43[a] a processor configured to receive resource allocation information associated with an uplink physical control channel, wherein the uplink physical control channel and a physical uplink shared channel have different resources;

As explained for claim 1[a], the Standard teaches this limitation. Ak1, ¶146.

c. 43[b] the processor is further configured to send data over the physical uplink shared channel in assigned time intervals;

As explained for claim 1[b], the Standard teaches this limitation. Ak1, ¶147.

d. 43[c] the processor is further configured, in a time interval that it is not sending information over the physical uplink shared channel, to send a signal over the uplink physical control channel based on the received resource allocation information; and

As explained for claim 1[c], the Standard teaches this limitation. Ak1, ¶148.

e. 43[d] wherein in the time interval that the signal on the uplink physical control channel is sent by the UE, a plurality of UEs each send respective signals on respective uplink physical control channels in the time interval.

As explained for 45[d], the Standard discloses this limitation. Ak1, ¶149.

10. Claim 44. The UE of claim 43 further comprising the uplink

physical control channel, the respective uplink physical control channels, or the physical uplink shared channel is any one of a time division multiple access (TDMA), code division multiple access (CDMA), time division duplex (TDD), frequency division duplex (FDD), time division-code division multiple access (TD-CDMA), or universal mobile telecommunication system (UMTS) physical channel.

As explained for claim 46, the Standard discloses this limitation. Ak1, ¶150.

X. GROUNDS FOR STANDING

Petitioners certify that the '356 Patent is available for IPR and that
Petitioners are not barred or estopped from requesting IPR challenging the patent
claims on the grounds identified herein.

XI. MANDATORY NOTICES

A. Real Parties-in-Interest Under 37 C.F.R. § 42.8(b)(1)

The real parties-in-interest are:

- Toyota Motor Corp., Toyota Motor North America, Inc., Toyota Motor Engineering & Manufacturing North America, Inc., and Toyota Motor Sales, U.S.A., Inc.
- Continental Automotive Systems, Inc., Continental Automotive GmbH, and Continental Automotive Technologies GmbH. Out of an abundance of caution, Continental Automotive, Inc., and its ultimate parent Continental AG are further identified as a real-parties-in-interest.

B. Related Matters Under 37 C.F.R. § 42.8(b)(2)

To the best of Petitioners' knowledge, the '356 Patent is, or has been, involved in the following district court litigations.

Name	Number	Court	Filed
<i>Intellectual Ventures I LLC and Intellectual Ventures II LLC, v. Toyota Motor Corp. et al.</i> ²	2:21-cv-00389	EDTX	Oct. 19, 2021
<i>Intellectual Ventures I LLC and Intellectual Ventures II LLC, v. Honda Motor Co., Ltd. et al.</i>	2:21-cv-00390	EDTX	Oct. 19, 2021
<i>Intellectual Ventures I LLC and Intellectual Ventures II LLC, v. General Motors Company</i>	6:21-cv-01088	WDTX	Oct. 19, 2021
<i>Intellectual Ventures I LLC and Intellectual Ventures II LLC, v. Honda Motor Co., Ltd. et al.</i> ³	3:22-cv-00761	NDTX	Apr. 4, 2021

C. Lead and Back-Up Counsel Under 37 C.F.R. § 42.8(b)(3)

Petitioners Toyota Motor Corporation and Continental Automotive Systems, Inc., provide the following counsel and service information. Pursuant to 37 C.F.R. § 42.10(b), Powers of Attorney accompany this Petition.

² See also Ex. 1007 (order consolidating -00389 Member Case with -00390 Lead Case).

³ On April 4, 2022, IV filed a notice of voluntary dismissal removing the Honda defendants from the consolidated EDTX litigation. IV refiled its complaint against Honda in the NDTX.

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D. Service Information Under 37 C.F.R. § 42.8(b)(4)

Please address all correspondence to counsel at the addresses above.

Petitioners consent to service by email at the above email addresses.

XII. CERTIFICATION UNDER 37 C.F.R. § 42.24(d)

Pursuant to 37 C.F.R. § 42.24(d), the undersigned hereby certifies that the foregoing Petition contains 13,991 words, excluding parts of this Petition exempted under § 42.24(a), as measured by the word-processing system used to prepare this paper.

XIII. CONCLUSION

Petitioners request that the Board institute *inter partes* review and cancel each challenged claim.

Respectfully submitted,

Dated: June 13, 2022

By: /David C. Reese/
David C. Reese, Reg. No. 67,942

CERTIFICATE OF SERVICE

The undersigned certifies that the foregoing **Petition for *Inter Partes* Review**, the associated **Powers of Attorney**, and **Exhibits 1001 through 1015** are being served on June 13, 2022, by FedEx Priority Overnight® at the following address of record for the subject patent.

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