

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ZYXEL COMMUNICATIONS CORPORATION AND
ZYXEL NETWORKS CORPORATION
Petitioners

v.

ATLAS GLOBAL TECHNOLOGIES LLC
Patent Owner

Case IPR2023-00877
U.S. Patent No. 9,917,679

**PETITION FOR *INTER PARTES* REVIEW OF
U.S. PATENT NO. 9,917,679
PURSUANT TO 35 U.S.C. §§ 311-319 AND 37 C.F.R. § 42**

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PETITIONER’S EXHIBIT LIST

Exhibit No.	Description
EX-1001	U.S. Patent No. 9,917,679
EX-1002	Prosecution History for U.S. Patent No. 9,917,679
EX-1003	Declaration of Paul Min, Ph.D.
EX-1004	U.S. Patent No. 10,230,497 (“Merlin”)
EX-1005	U.S. Patent Appln. Pub. 2016/0065466 (“Abraham466”)
EX-1006	U.S. Patent No. 10,257,806 (“Chu806”)
EX-1007	U.S. Patent No. 9,462,607 (“Ma”)
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EX-1011	IEEE Std. 802.11-2012 (March 2012)
EX-1012	“Status of Project IEEE 802.11ax,” Background https://www.ieee802.org/11/Reports/tgax_update.htm , retrieved on April 13, 2023).
EX-1013	Gast, M, <u>802.11[®] Wireless Networks: The Definitive Guide</u> , 2 nd Ed. (2005). ISBN: 978-0-596-10052-0 (“Gast”)
EX-1014	U.S. Patent No. 9,924,512 (“Zhang”)
EX-1015	Nee, R.V. & Prasad R., <u>OFDM For Wireless Multimedia Communications</u> (2000), ISBN: 0-89006-530-6 (“Nee”)
EX-1016	WiMAX Forum, “Mobile WiMax – Part 1: A Technical Overview and Performance Evaluation” (2006).
EX-1017	Etemad, K. & Lai, M.-Y. <u>WiMAX Technology and Network Evolution</u> (2010) (pages xxiii-xxxiv, 83-120). ISBN: 978-0-470-34387-6 (“Etemad”)
EX-1018	“DL-OFDMA for Mixed Clients,” 11-10-0317-01-00ac-dl-ofdma-for-mixed-clients (March 6, 2010), https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwjuiuHOG6z-AhWLM1kFHd-kBXMqFnoECA8QAQ&url=https%3A%2F%2Fmentor.ieee.org

Exhibit No.	Description
	%2F802.11%2Fdcn%2F10%2F11-10-0317-01-00ac-dl-ofdma-for-mixed-clients.ppt&usg=AOvVaw3oGSoj8tUEhXCZ8Z6Kvq8V , retrieved on April 15, 2023.
EX-1019	“Uplink multi-user transmission,” 11-13-1388-00-0hew-ul-mu-transmission (November 11, 2013), https://mentor.ieee.org/802.11/dcn/13/11-13-1388-00-0hew-ul-mu-transmission.pptx , retrieved on April 15, 2023.
EX-1020	“Consideration on UL MU Transmission,” 11-14-0802-00-00ax-consideration-on-ul-mu-transmission (July 14, 2014), https://mentor.ieee.org/802.11/dcn/14/11-14-0802-00-00ax-consideration-on-ul-mu-transmission.pptx , retrieved on April 15, 2023
EX-1021	“Frame Exchange Control for Uplink Multi-user Transmission,” 11-14-1190-03-00ax-frame-exchange-control-for-uplink-multi-user-transmission (September 15, 2014), https://mentor.ieee.org/802.11/dcn/14/11-14-1190-03-00ax-frame-exchange-control-for-uplink-multi-user-transmission.pptx , retrieved on April 15, 2023.
EX-1022	Index of Claims 1-10 of U.S. Patent No. 9,917,679
EX-1023	Provisional Application No. 62/074,514 of ’679 Patent
EX-1024	Provisional Application No. 62/080,026 of ’679 Patent
EX-1025	Provisional Application No. 62/043,061 of Abraham466 (“Abraham466_Provisional”)
EX-1026	Provisional Application No. 61/902,413 of Chu806 (“Chu806_Provisional_1”)
EX-1027	Provisional Application No. 61/947,922 of Chu806 (“Chu806_Provisional_2”)
EX-1028	U.S. Patent No. 8,395,997 (“Banerjea”)

TABLE OF ACRONYMS IN THE '679 PATENT

		679 Patent (EX-1001) Citation
ACK	acknowledgement/acknowledgment	Col. 4:21
AP	access point	Col. 1:45-46
DL	downlink	Col. 4:15
IEEE	Institute for Electrical and Electronics Engineers	Col. 1:37-38
IFS	interframe space	Col. 7:27-28
MAC	medium access control	Col. 4:47-48
MCS	modulation and coding scheme	Col. 23:18
MPDU	MAC Protocol Data Unit	Col. 3:62; Col. 8:64-65
MIMO	multiple-input multiple output	Col. 1:39
MU	multi-user	Col. 2:17
MU-MIMO	multi-user multiple-input multiple output	Col. 5:26-27
OFDMA	Orthogonal Frequency Division Multiple Access	Col. 4:15-16
PDU	Protocol Data Unit	Col. 3:62
PHY	physical	Col. 4:48
QoS	Quality of Service	Col. 7:55
STA	station	Col. 2:12
SU	single-user	Col. 2:16
UL	uplink	Col. 4:22
WLAN	Wireless local area network	Col. 1:19-20

I. INTRODUCTION AND RELIEF REQUESTED

ZyXEL Communications Corporation and ZyXEL Networks Corporation (collectively, “Petitioners”) hereby petition for *inter partes* review (“IPR”) under 35 U.S.C. §§ 311–319 and 37 C.F.R. § 42 of Claims 1-10 (“the Challenged Claims”) of U.S. Patent No. 9,917,679 (the “’679 Patent”) (EX-1001). Atlas Global Technologies LLC (“Patent Owner”) is the assignee of record with the U.S. Patent and Trademark Office (“USPTO”).

As explained below, there exists a reasonable likelihood that Petitioners will prevail in demonstrating unpatentability of at least one of the Challenged Claims based on teachings set forth in the references presented in this Petition. Indeed, the claims of the ’679 Patent recite nothing more than a well-known technique for indicating in a downlink (DL) frame how an acknowledgment response is to be transmitted in an available format, for example an uplink (UL) multi-user (MU) format or a single-user (SU) format, in a wireless network. Every aspect of the claims was a well-known technique or technology that operates in its known and intended manner to produce an obvious result.

II. MANDATORY NOTICES UNDER 37 C.F.R. § 42.8(B)(1)-(4)

A. Real Party-In-Interest

ZyXEL Communications Corporation and ZyXEL Networks Corporation are the real parties-in-interest.

B. Related Matters

The '679 Patent has been asserted by Patent Owner against Petitioners in 6:22-cv-00355 (WDTX) (“Texas Litigation”). The patent is also asserted against Sercomm Corporation in 6:21-cv-00818-ADA (WDTX); ASUSTek Computer Inc. in 6:21-cv-00820-ADA (WDTX); OnePlus Technology in 6:21-cv-01217-ADA (WDTX); TP-Link Technologies Co., Ltd. et al. in 2:21-cv-00430 (EDTX); D-Link Corporation in 6:22-cv-00520-ADA (WDTX); and Acer Inc. in 6:22-cv-00259 (EDTX).

Petitioners filed an IPR petition re. U.S. Patent No. 9,531,520 in IPR2023-00863.

C. Designation of Counsel and Service Information

Petitioners designate the following Lead Counsel. Filed concurrently with this Petition is a Power of Attorney pursuant to 37 C.F.R. § 42.10(b). Service may be made via hand-delivery at the postal mailing address below or electronically by e-mail at ZyXEL_AGT679_IPR@sjclawpc.com.

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III. GROUNDS FOR STANDING UNDER 37 CFR § 42

A. Grounds for Standing under 37 CFR § 42.104(a)

Petitioners certify that the '679 Patent is available for review under 35 U.S.C. § 311(c) and that Petitioners are not barred or estopped from requesting an IPR challenging Claims 1-10 on the grounds identified herein.

B. Challenge Under 37 CFR § 42.104(b) and Relief Requested

The following chart demonstrates the proposed grounds and the prior art applied against the Challenged Claims. With the present grounds of obviousness and the evidence submitted herein, Petitioners have established a reasonable likelihood that they will prevail in establishing unpatentability of Claims 1-10 and request the institution of IPR and cancellation of these claims.

Ground	Claims	Basis	References
1	1-10	§ 103	U.S. Patent No. 10,230,497 (“Merlin”)
2	1-10	§ 103	Appln. Pub. 2016/0065466 (“Abraham466”)
3	1-10	§ 103	Merlin in view of Abraham466, U.S. Patent No. 10,257,806 (“Chu806”), or U.S. Patent No. 9,462,607 (“Ma”)

C. Prior Art Offered for the Present Unpatentability Challenges

The Petition provides patentability challenges under 35 U.S.C. § 103 using the following patents as understood by a person of ordinary skill in the art:

Merlin: U.S. Patent No. 10,230,497, entitled “Protocols for Multiple User Frame Exchanges”, and claimed priority to a Provisional Application No.

61/899,121 filed on November 1, 2013, was filed on October 30, 2014, and issued on March 12, 2019, to Merlin et al. (“Merlin”) (EX-1004). Merlin is prior art to the ’679 Patent under AIA 35 U.S.C. § 102 (a)(2). Merlin discloses “multi user [block acknowledgment request (bar)] protocols and frames” providing acknowledgment (ACK) policies to request the recipient STAs, *inter alia*, whether to transmit UL acknowledgment in a MU or single-user (SU) format. EX-1004; Abstract, 12:55-65.

Abraham466: U.S. Patent Application Publication No. 2016/0065466, entitled “Systems and Methods for Signaling Multi-Destination Aggregated Multi-User Media Access Control Protocol Data Units in A Wireless Network”, and claimed priority to a Provisional Application No. 62/043,061 filed on August 28, 2014, was filed on August 26, 2015, by Abraham et al. (“Abraham466”) (EX-1005). Abraham466 is prior art to the ’679 Patent under AIA 35 U.S.C. § 102 (a)(2). Abraham466 discloses “[e]mbodiments... relate to transmitting and signaling the presence of multiple destination (MD) A-MPDUs and relate to acknowledgments by stations receiving the MD-AMPDU,” where the STAs may transmit ACKs in MU-MIMO format or at different times. EX-1005, [0050], [0071], [0074].

Chu806: U.S. Patent No. 10,257,806, entitled “Medium Access Control for Multi-Channel OFDM in a Wireless Local Area Network”, and claimed priority to

Provisional Application No. 61/902,413 filed on November 11, 2013, and No. 61/947,922 filed on March 4, 2014, was filed on November 11, 2014, and issued on April 9, 2019, to Chu et al. (EX-1006). Chu806 is prior art to the '679 Patent under AIA 35 U.S.C. § 102 (a)(2). Chu806 discloses an access point (AP) “allocates sub-channels of an [OFDM] channel to two or more second communication devices for uplink [OFDMA] transmission from the...second communication devices.” EX-1006, Abstract.

Ma: U.S. Patent No. 9,462,607, entitled “Apparatus, Method, and System of Multi-User”, was filed on August 28, 2014, by Ma et al. (“Ma”) (EX-1006). Ma is prior art to the '679 Patent under AIA 35 U.S.C. § 102 (a)(2). Ma discloses an AP “may transmit a downlink MU-MIMO transmission to two or more of devices 132, 160 and 170” and “may receive an uplink MU-MIMO transmission from two or more of devices 132, 160 and 170.” EX-1007, 5:59-60, 8:30-33.

IV. DISCRETIONARY CONSIDERATIONS FAVOR INSTITUTION—35 U.S.C. §§ 314(a) AND 325(d)

A. Relevant Facts

Petitioners executed a waiver of service on May 27, 2022, thereby accepting service of the Complaint filed by the Patent Owner in the United States District Court for the Western District of Texas. EX-1008. This Petition would be the first IPR petition of the '679 Patent.

B. The *Advanced Bionics* Test Favors Institution—§ 325(d)

The Examiner did not consider the prior art references advanced in this Petition during prosecution. *See* Section V.C. Prosecution concluded prematurely, and the obviousness analysis in this Petition proves that allowance was unwarranted. When, as here, new and non-cumulative prior art demonstrates unpatentability, the Board’s precedent compels institution. *See Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6 at 8-9 (PTAB Feb. 13, 2020) (precedential).

C. The *General Plastic* Factors Favor Institution—§ 314(a)

The Board’s “intent in formulating the [*General Plastic*] factors was to take undue inequities and prejudices to P.O. into account” when evaluating second-in-time petitions. *General Plastic Indus. Co. v. Cannon Kabushiki Kaisha*, IPR2016-01357, Paper 19 at 16 (PTAB Sep. 6, 2017) (precedential). This Petition is the first IPR petition of the ’679 Patent. Therefore, none of the *General Plastic* factors favor denial. For example, the Board’s finite resources are well spent here. Careful vetting of the ’679 Patent’s claims did not occur during prosecution, and it is fully consistent with the AIA’s goals for the Board to rectify that mistake when prompted by parties accused of infringement. *General Plastic*, p.16. The *General Plastic* factors, therefore, favor institution.

D. The *Fintiv* Factors Favor Institution—§ 314(a)

Consistent with *Fintiv I*, Petitioners ask that the Board alone consider the

grounds raised in this Petition. *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 at 6 (PTAB Mar. 20, 2020) (precedential) (“*Fintiv I*”). As explained above and below, Petitioners’ efforts to support fairness and efficiency, paired with the strong merits of Grounds 1-3, provide compelling reasons to institute. *See id.*; *Sotera Wireless, Inc. v. Masimo Corp.*, IPR2020-01019 Paper 12 at 20-21 (PTAB Dec. 1, 2020) (precedential); *Snap, Inc. v. SRK Technology LLC*, IPR2020-00820 Paper 15 at 19 (PTAB Oct. 21, 2020) (precedential).

Factor 1 (Stay): This factor is neutral because no party has, as of yet, approached the Texas Court with a motion to stay regarding the ’679 Patent. *See Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 15 at 12 (PTAB May 13, 2020) (declining to “infer” how the district court “would rule should a stay be requested”) (informative) (“*Fintiv II*”); *Sand Revolution II, LLC v. Cont’l Intermodal Group—Trucking LLC*, IPR2019-01393, Paper 24 at 7 (PTAB Jun. 16, 2020) (“*Sand Revolution*”) (informative).

Factor 2 (Trial Date): The Texas Court currently sets the trial date on May 16, 2024, or as soon as practicable, which precedes the Board’s projected October 2024 final written decision at most by 5-6 months. Even taken at face value, the Board’s analysis in *Fintiv II* suggests that a six-month advanced trial date should weigh no more than “*somewhat in favor* of discretionary denial” in *Fintiv II*. *See Fintiv II* at 13. And the trial date’s significance is mitigated here compared to

Fintiv II given Petitioners’ stipulation to avoid coincident obviousness grounds in the Texas Litigation (*see* Factor 4). But, regardless, the Board should not take the current trial date from the Texas Court at face value because the Texas Court also indicates “as soon as practicable” and is intrinsically infirm. *See, e.g., Intel Corp., v. FG SRC LLC*, IPR2020-01449, Paper 13 at 15 (PTAB Mar. 3, 2021) (explaining that estimated trial dates are not firm trial dates); *MediaTek Inc. et al v. Nippon Telegraph and Telephone Corp.*, IPR2020-01404, Paper 14 at 10-11 (PTAB Feb. 16, 2021) (noting statistics regarding trial date extensions in the Texas Court, and also finding that the district court’s “estimated” trial date “does not support that [the] trial date is certain”). With no certainty as to when trial will actually occur, Factor 2 is either neutral or favors institution.

Factor 3 (Investment): The Texas Litigation is currently in its infancy. Petitioners received preliminary infringement contentions eight months ago. *Markman* hearing is currently scheduled on May 1, 2023. At the projected date of institution (October 2023), the fact discovery period will be open, and expert reports will not yet be due. Beyond a *Markman* order, the Texas Court will almost certainly have not issued any substantive orders relevant to validity by the time of institution.

The facts here compare favorably to *Fintiv II*. In that case, as here, “[a]t the time of filing the Petition, the parties were in the midst of preparations for the *Markman* hearing.” *Fintiv II* at 9.

The “informative” guidance in *Sand Revolution* is telling here too. By the time of institution in this proceeding, the Texas Litigation will be at a similar posture where “aside from the district court’s *Markman* Order, much of the district court’s investment relates to ancillary matters untethered to the validity issue itself.” *Sand Revolution* at 10-11. The parallels are also notable because:

[M]uch work remains in the district court case as it relates to invalidity: fact discovery is still ongoing, expert reports are not yet due, and substantive motion practice is yet to come. Thus, although the parties and the district court have invested effort in the related district court litigation to date, further effort remains to be expended in this case before trial.

Id. at 11 (internal citation omitted). Given the alignment with *Sand Revolution*, Factor 3 should weigh “only marginally, *if at all*, in favor of exercising discretion to deny.” *Id.* (emphasis added). Alternatively, it is reasonable to characterize this factor as firmly neutral given Petitioners’ even greater diligence.

Factor 4 (Overlap): This factor favors institution. To start, if *inter partes* review is instituted on Grounds 1-3 in this proceeding, Petitioners will not pursue Grounds 1-3 in the Texas Litigation. Thus, there will be no overlap with the prior art issues before the Board with invalidity grounds in an earlier jury trial (if any). As explained in *Sand Revolution*, a stipulation to avoid using instituted grounds in co-pending litigation “mitigates to some degree the concerns of duplicative efforts between the district court and the Board, as well as concerns of potentially conflicting decisions.” *Sand Revolution* at 12.

Factor 5 (Parties): The parties here and in the Texas Litigation are the same. As explained in *Sand Revolution*, Factor 5 is often neutral because it is “far from an unusual circumstance that a petitioner in *inter partes* review and a defendant in a parallel district court proceeding are the same.” *Sand Revolution* at 24. Particularly in view of that the actual date of a jury trial is uncertain, Factor 5 could be deemed neutral.

But viewed holistically, the present circumstances favor institution. Indeed, institution offers a unique opportunity to adjudicate the grounds of this Petition exclusively at the PTAB.

Factor 6 (Merits): The merits of this Petition are particularly strong. Section VII below presents two independent prior art combinations (Merlin, and Abraham466) against the Challenged Claims. As discussed, the prior art and arguments at issue here are materially different from those considered by the Examiner during prosecution. The strength of the merits alone is enough to outweigh any inefficiencies born of parallel litigation. *See Fintiv* at 15.

In addition, the Texas Litigation involves nine patents. If *inter partes* review is instituted in this proceeding, the IPR could simplify the Texas Litigation by removing a patent from a complex case. *Apple v. Seven*, IPR2020-00156, Paper 10, 22 (PTAB June 15, 2020).

V. BACKGROUND

A. The State of the Art in November 2014

WLAN communications systems were well-known in the art at the time of the '679 Patent and were in use and standardized. For example, the Institute for Electrical and Electronics Engineers (IEEE) has adopted techniques to provide parallel, simultaneous transmission, such as OFDM in the 802.11 standards since at least 1999. EX-1003, ¶¶ 42-60. *See also* EX-1011, EX-1013.

As acknowledged by the '679 inventor, the IEEE already had a task group that was discussing the standardization “simultaneous access of [STAs]” at the time of the '679 Patent. *See* EX-1001, 1:58-64. Particularly, the IEEE website indicates the High Efficiency WLAN Study Group (HEW SG) started in May 2013, and the 802.11ax project started in May 2014. *See* EX-1012, 1.

As was typical during the standardization discussion, it was already known for an AP to manage the timing and format of responsive frames, including simultaneous UL ACK or Block ACK frames from multiple STAs. For example, Merlin discloses “frame structures and protocols for uplink multiple user (MU) frame exchanges,” and “provides example frame exchanges and ACK signaling policy to enable sending ACKs/BAs with UL MU-MIMO/FDMA by [STAs] receiving a DL MU-MIMO/FDMA PPDU.” EX-1004, 1:15-17, 12:49-52.

As another example, Chu806 discusses that “the AP 14 and the client stations 25 contend for communication medium using carrier sense multiple access with collision avoidance (CSMA/CA) protocol or another suitable medium access protocol.... In an embodiment, communication between the AP 14 and a legacy client station (e.g., the legacy client station 25-4) occur in a primary channel of the WLAN 10.... On the other hand, communication between the AP 14 and a non-legacy client station 25 (e.g., the client station 25-1) can occur in one or more communication channels that do not include the primary channel, in an embodiment....” EX-1006, 6:51-67. *See also* EX-1003, ¶¶ 42-85; 90-100.

Moreover, the advantages of having an AP to support different protocol versions to simultaneously communicate with multiple receiving STAs were widely known and widely employed. For example, Merlin describes that it was known that an AP may be configured to accommodate a first protocol and a second, legacy communication protocol. Similarly, Chu806 discloses that it was known to configure an AP “to operate with client stations according to at least a first communication protocol. The first communication protocol is sometimes referred to herein as “high efficiency WiFi,” “high efficiency WLAN,” “HEW” communication protocol, or *802.11 ax communication protocol*.... In some embodiments, different client stations in the vicinity of the AP are configured to operate according to one or more *other communication protocols* that define

operation in the same frequency band as the HEW communication protocol but with generally lower data throughputs.” EX-1006, 5:31-42 (*italic added*). *See also* EX-1003, ¶¶ 86-89.

B. Description of the ’679 Patent

The ’679 Patent claims priority to Provisional Application No. 62/074,514 filed on November 3, 2014, and No. 62/080,026 filed on November 14, 2014, with November 3, 2014, being the purported earliest effective filing date. EX-1001, cover. The ’679 Patent is directed to a method for transmitting a response frame by a STA to an AP in a format as requested by the AP, where there are multiple formats available in the network. *See* EX-1001, 1:19-23. For example, FIG. 23 of the ’679 Patent illustrates an AP may transmit a DL frame to multiple STAs, where “[t]he DL frame may include information about the type of a UL frame transmitted as [a] response,” and “[t]he type of the UL frame may be an SU type or an MU type.” EX-1001, *See also* EX-1001, FIG. 23.

C. The ’679 Prosecution History

The USPTO issued an Office Action rejected all original claims as being unpatenable over U.S. Publication No. 2013/0188627 (Cheong) in view of U.S. Publication No. 2015/0085836 (Kang). The Examiner indicated that “Cheong discloses...receiving, from the AP, a downlink frame including information related to a type of the uplink frame, the type of the uplink frame including a single-user

(SU) type and a multiple-user (MU) type [Cheong] [0069],” and “Kang et al. teaches for UL MU-MIMO transmission.”

In response to the Office Action, ten claims were canceled, and the reminding claims were amended. The inventor further argued, *inter alia*, that *Cheong* is not seen to disclose or suggest the amended limitations of claim 1.

The USPTO later issued a Notice of Allowance without a Statement for Allowance. *See* EX-1003, ¶¶39-41.

D. Level of Ordinary Skill

The '679 Patent is directed to a method by an AP to transmit an acknowledge policy to a plurality of STAs and solicit the STAs to respond with acknowledgment messages in an UL MU or UL SU format in a wireless network. A person of ordinary skill in the art (“POSITA”) as of November 3, 2014, would have: (1) a bachelor’s degree in electrical engineering or a closely related field, and (2) a minimum of 2-3 years of industry or academic experience with wireless communication physical layer protocols. However, an individual with an advanced degree in a relevant field, such as electrical engineering, would require less industry or academic experience (*e.g.*, 1-2 years). EX-1003, ¶ 42.

VI. CLAIM CONSTRUCTION

The Challenged Claims are interpreted using the same standard used in federal district court. 37 C.F.R. § 42.100(b). This standard is the *Philips* standard.

The “words of a claim ‘are generally given their ordinary and customary meaning.’” *Phillips v. AWII Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc) (quoting *Vitronics Corp v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)). “[T]he ordinary and customary meaning of a claim term is the meaning that the term would have to a [POSITA] in question at the time of the invention.” *Id.* at 1313. The [POSITA] is deemed to have read the claim term in the context of the entire patent. *Id.* To ascertain the meaning of a claim, a court must look to the claim, the specification, and the prosecution history. *Id.* at 1314-17. Petitioners submit constructions for the terms proposed herein below. All remaining terms should be given their ordinary and customary meaning in view of the specification and file history as understood by a POSITA.¹

A. Independent claim preambles are limiting

Each of claims 1 and 6 introduces elements in the preamble and states such preamble element(s) in subsequent claim limitations. As such, the preambles are presumed limiting. EX-1003, ¶ 106. In addition, the Patent Owner had agreed in the Texas Litigation that the claim preambles are limiting.

¹ Petitioners reserve the right to seek specific construction for other terms before the district court.

VII. DETAILED EXPLANATION AND SUPPORTING EVIDENCE

A. Overview of the Cited Prior Art

As explained below, each of Merlin, Abraham466, Chu806, and Ma relates to wireless transmission methods that support a DL MU frame from an AP to STAs and UL response frames in MU-format or SU-format from STAs. *See* EX-1003, ¶¶ 107-120, 260-265.

1. Merlin discloses a method where an AP transmits to STAs acknowledgment policies in a DL MU frame and the STAs transmit UL acknowledgment in a MU or SU format.

Merlin relates to frame structures and protocols for supporting both uplink (UL) multiple-user (MU) and UL single-user SU frame exchanges from multiple STAs. *See* EX-1004, 2:1-13, 28-42; 3:45-53; FIG. 4; FIG. 22. For example, Merlin discloses “setting of ACK policies and signaling for allocating MU-MIMO or FDMA resources to the recipient STAs for the replies. Such signaling may include... which mode is to be used for the replies (e.g., UL SU-MIMO, UL MU-MIMO, or UL MU FDMA), and which parameters to use for MU-MIMO or FDMA transmissions.” EX-1004, 12:57-65.

2. Abraham466 discloses a method where an AP transmits to STAs acknowledgment policies in a DL MU frame and the STAs transmit UL acknowledgment in a MU or SU format.

Abraham466 is directed to wireless transmission method including “sending, by an [AP], a corresponding [DL] data frame to each [STA] of the multiple [STAs]; and receiving, by the [AP] after the [AP] sends the corresponding [DL]

data frame to each [STA], acknowledgment messages concurrently sent by the [STAs] on channel resources allocated by the [AP] to the [STAs].” EX-1005, Abstract.

Abraham466 also discloses that “the AP 104 may set an acknowledgment policy for stations receiving MD-AMPDUs... To coordinate acknowledgements from each of the STAs, one or more of the A-MPDU sub-frames... may include one or more fields defining an acknowledgement policy (e.g., transmission parameters of acknowledgment frames transmitted from each of the STAs in response to the A-MPDU 400)...” EX-1005, [0062]. *See* EX-1025, [0059].

Abraham466 is entitled to an effective filing date of August 28, 2014, because Abraham466 Provisional provides support for at least one of Abraham466’s claims (e.g., claim 1) and all disclosures from Abraham466 relied on in this petition are supported in those provisional applications. *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375 (Fed. Cir. 2015).

3. Chu806 discloses a method where an AP transmits to STAs acknowledgment policies in a DL MU frame and the STAs transmit UL acknowledgment in a MU or SU format.

Chu806 relates to a WLAN that supports DL MU and UL MU/SU transmissions. For example, Chu806 discloses that “[d]uring a time t2, in an embodiment, client stations 25 that successfully receive data in the respective sub-channels allocated to the client stations 25 transmit respective acknowledgement

(ACK or BlkAck) frames 606 to the AP 14. In an embodiment, each client station 25 transmits its acknowledgement (ACK or BlkAck) frame 606 in the respective sub-channel allocated to the client station 25.” EX-1006, 13:4-10. *See also* EX-1026, 16; EX-1027, 14.

Chu806 is a prior art against the ’679 claims because the ’679 Challenged Claims should not be entitled to the earliest possible priority date of November 3, 2014 (*see* Section VIII below) and because Chu806’s non-provisional application was filed before the ’679’s other priority claim. *See* EX-1003, ¶¶ 315-328.

Even assuming the Challenged Claims are determined to be entitled to the ’679 earliest possible priority claim, Chu806 is entitled to the filing dates of its provisional applications. Specifically, Chu806_Provisional_1 and Chu806_Provisional_2 provide support for at all disclosures from Chu806 relied on in this petition. *Dynamic Drinkware*, 800 F.3d 1375 (Fed. Cir. 2015).

4. Ma discloses a method where an AP transmits to STAs acknowledgment policies in a DL MU frame and the STAs transmit UL acknowledgment in a MU or SU format.

Ma is directed to “an apparatus may include a transmitter to transmit a multi-user (MU) downlink transmission to [STAs]; a receiver to receive from the [STAs] a plurality of acknowledgement (ACK) frames.” EX-1007, Abstract. For example, Ma discloses that “AP 500 may transmit a MU ACK request 510, e.g., a Block ACK Request (BAR), to wireless stations 502, 504 and 506,” and the “wireless

stations 502, 504 and 506 may simultaneously transmit a plurality of ACK frames 512, e.g., each including an EACK 200 (FIG. 2), in response to the ACK request 510.” EX-1007, 15:50-56. Ma also discloses that “the plurality of ACK frames may be communicated in a sequential manner or in a simultaneous manner.” EX-1007, 11:24-26.

B. Ground 1: Merlin renders obvious Claims 1-10.

As set forth below, Merlin renders Claims 1-10 obvious and unpatentable.

1. Claim 1.

- a. [1pre] A method for transmitting an acknowledgement frame for notifying successful data reception by a station (STA) to an access point (AP) in a wireless local area network, the method comprising:

Merlin discloses [1pre]. For example, Merlin discloses a method where “[i]n DL-MU-MIMO transmissions, multiple packets are sent at the same time toward different STAs. *If all the acknowledgments (ACKs) [or block ACKs (BAs)] are received, the transmission may be considered successful.*” EX-1004, 11:35-38 (*italic added*); FIG. 4; FIG. 10; FIG. 22; FIG. 25. EX-1003 ¶¶ 122-125.

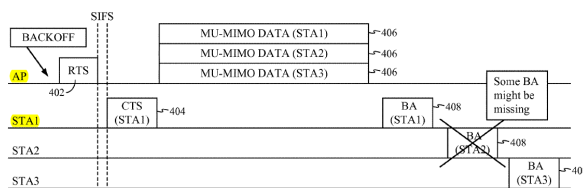


FIG. 4

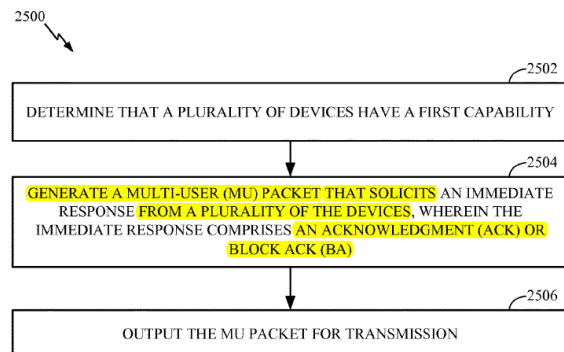


FIG. 25

- b. [1a] receiving, from the AP, a downlink frame including a quality of service (QoS) control field including acknowledgement information representing whether the STA is requested to transmit the acknowledgement frame in a single-user (SU) format or in a multiple-user (MU) format at a Short Inter-Frame Space (SIFS) time after the downlink frame; and**

Merlin discloses [1a]. Merlin discloses “setting of ACK policies and signaling for allocating MU-MIMO or FDMA resources to the recipient STAs for the replies. Such signaling may include which STAs should be solicited for immediate response (e.g., for immediate BAs), which STAs may use existing ACK policy indications, which mode is to be used for the replies (e.g., UL SU-MIMO, UL MU-MIMO, or UL MU FDMA), and which parameters to use for MU-MIMO or FDMA transmissions.” EX-1004, 12:57-65.

Merlin also discloses that “*the requested STA may know or be indicated whether to reply with SU-MIMO, MU-MIMO, or FDMA....*” EX-1004, 14:12-18 (italics added). For example, Merlin teaches “a response type indication for each STA may be added in each MPDU or PSDU. For example, 1 or 2 bits may indicate which mode of response is to be used (e.g., UL SU-MIMO, UL MU-MIMO, or UL FDMA). For a response type indication in each MPDU, the indication *may be included in the Quality of Service (QoS) control field....*” EX-1004, 14:26-32 (italics added).

Further, Merlin discloses that “[t]he *STA BA transmissions may be separated by SIFS. The order and timing for the STA BA transmissions may be sent in the DL-MU-MIMO data 406.*” EX-1004, 11:32-34 (italics added).

See also EX-1004, 4:26-28, 18:11-33, 18:67-19:5, FIG. 9, FIG. 12; EX-1003

¶¶ 126-137.

- c. [1b] transmitting, to the AP, the acknowledgement frame based on the acknowledgement information at the SIFS time after the downlink frame,

Merlin discloses [1b]. For example, Merlin discloses that “[t]he *STA BA transmissions may be separated by SIFS. The order and timing for the STA BA transmissions may be sent in the DL-MU-MIMO data 406.*” EX-1004, 11:32-34 (italics added). See also EX-1004, FIG. 4 (annotated below); EX-1003 ¶¶ 138-139.

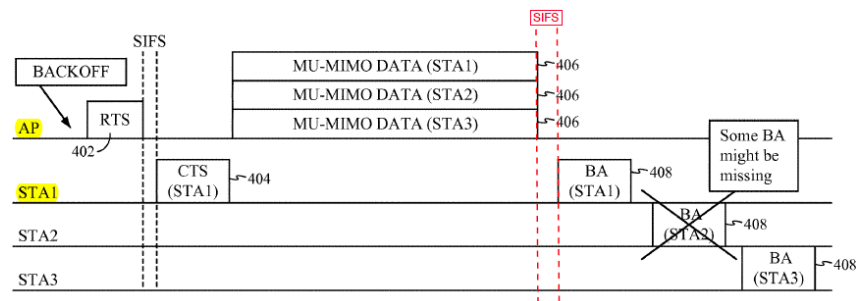


FIG. 4

- d. **[1c] wherein transmitting the acknowledgment frame comprises: when the acknowledgment information represents that the STA is requested to transmit the acknowledgement frame in the MU format and the STA is allocated a resource, transmitting the acknowledgement frame in the MU format on the allocated resource simultaneously with transmission of at least one acknowledgement frame from at least one other STA, and**

Merlin discloses [1c]. For example, Merlin discloses that “if a STA determines (e.g., receives an indication...) that UL MU-MIMO or FDMA is to be used for an immediate response, the STA may also know which parameters to use for the response. Response parameters may include, for example, *which spatial streams/channels to use, what duration to use, and what power to use for the immediate response....*” EX-1004, 15:26-41 (italics added). Also, Merlin discloses that an “option for indicating the response type may be to aggregate an additional “special” frame into the A-MPDU from which the STA can know the *response type and parameters*. For example, if the special subframe is received, *the STA may reply according to an allocation defined by the special subframe.*” EX-1004, 14:39-45 (italics added). Merlin further discloses that “[i]f the 1 or 2 bits indicate that the response type is SU-MIMO, the STA may reply with a SU transmission. However, *if the 1 or 2 bits indicate that the response type is MU-MIMO/FDMA, and if a special frame is received (e.g., as in the second option), the STA may reply according to the allocation defined by the special subframe.*

Alternatively, if the 1 or 2 bits indicate that the response type is MU and if a special frame is not received, then the STA may know not to reply.” EX-1004, 14:55-63 (*italics added*). *See*, EX-1004, FIG. 22 (annotated below).

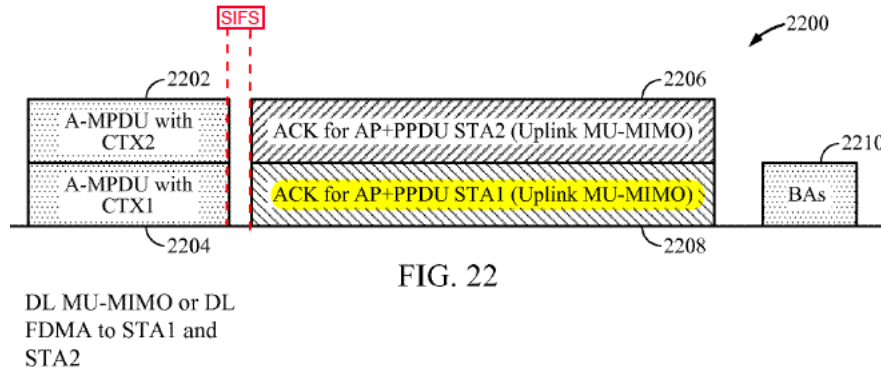


FIG. 22

Merlin also discloses that “FIG. 12 illustrates an example format for a multi-TID [block acknowledgment request] BAR, in accordance with certain aspects of the present disclosure,” and “[t]he multi-STA BAR may use some of the reserved bits in the BAR control field... *to indicate*: that the BAR is a *multi-STA BAR*, which STAs are the recipients, the duration of the allowed response, and *resource allocation for the replies in UL MU-MIMO or UL FDMA*.” EX-1004, 4:26-28; 18:67-19:5 (*italic added*); FIG. 12. EX-1003 ¶¶ 140-143.

- e. **[1d] [wherein transmitting the acknowledgment frame comprises:...] when the acknowledgment information represents that the STA is requested to transmit the acknowledgement frame in the SU format, transmitting the acknowledgement frame in SU format.**

Merlin discloses [1d]. For example, Merlin discloses “[a]ccording to certain aspects, *multiple simultaneous responses may be solicited, even if one of the STAs*

does not support UL FDMA or UL MU-MIMO (e.g., a legacy STA or a HEW STA not supporting UL FDMA or UL MU-MIMO). For example, a legacy STA may respond with a regular SU transmission on a primary channel, while other capable STAs may respond at the same time on other channels.” EX-1004, 13:64-14:3 (italic added). As an example, Merlin discloses that “[i]f the 1 or 2 bits indicate that the response type is SU-MIMO, the STA may reply with a SU transmission.” EX-1004, 14:55-57 (italics added). See EX-1003 ¶¶ 144-145.

For the foregoing reasons, claim 1 of the '679 Patent is unpatentable as obvious in view of Merlin. See EX-1003 ¶¶ 122-146.

2. Claim 2.

[2] The method according to claim 1, wherein the downlink frame further includes Modulation and Coding Scheme (MCS) information for the acknowledgement frame.

Merlin discloses [2]. For example, Merlin discloses that “if a STA determines (e.g., receives an indication, derives, statically agrees, or is configured) that UL MU-MIMO or FDMA is to be used for an immediate response, the STA may also know which parameters to use for the response. Response parameters may include, for example, which spatial streams/channels to use.... *a first option to indicate response parameters may be to extend existing rules for the immediate response bandwidth (BW) and modulation and coding schemes (MCSs).*” EX-1004, 15:26-41 (italics added).

Accordingly, claim 2 is unpatentable as obvious in view of Merlin. *See* EX-1003 ¶¶ 147-151.

3. Claim 3.

[3] The method according to claim 2, wherein a same MCS based on the MCS information is applied to the acknowledgement frame by the STA and the at least one other STA.

Merlin renders [3] obvious. For example, Merlin discloses that “Uplink (UL) MU-MIMO... can be used to transmit multiple block acknowledgements (BAs) at the same time, for example, in response to a downlink (DL) MU physical protocol data unit (PPDU).” EX-1004, 12:30-34. Since the ’679 Patent describes that “[t]he same transmission time of the block ACK frames transmitted by the plurality of STAs may mean the same transmission MCS of the block ACK frames transmitted by the plurality of STAs,” (EX-1001, 39:51-54) and since Merlin discloses simultaneous UL MU-MIMO acknowledgements by STAs, a POSITA would readily understand that Merlin discloses or renders obvious the [3] limitation.

Alternatively, Patent Owners states in its preliminary infringement contention that “Two STAs receiving the same trigger frame can be assigned the same MCS.” EX-1009, 48. *See* also EX-1009, 48-50. Since the Patent Owner’s own contention of same MCS being used by STAs receiving a same trigger frame (EX-1009, 48-50) and since Merlin discloses STAs receiving and sending

acknowledgement frames to the same DL MU frame, a POSITA would readily understand that Merlin discloses or renders obvious the [3] limitation.

Alternatively or in addition, Merlin mentions that “the MCS... may also account for the bandwidth.” EX-1004, 15:54-58. Merlin discloses that “as an example, *the bandwidth may be set to a value equal for all responders.*” EX-1004, 15:61-62 (italic added). Merlin further illustrates, for example, in FIG. 6, 7, 8 or 10, that the BA by STA1 and STA2 have the same width of bandwidth. From at least Merlin’s disclosure of the MCS indication to account for the bandwidth or setting equal bandwidth value to STAs, a POSITA would readily understand that Merlin renders obvious the [3] limitation. *See also* EX-1003 ¶¶ 152-158.

4. Claim 4.

[4] The method according to claim 1, wherein the downlink frame includes downlink data for a plurality of STAs including the STA and the at least one other STA.

Merlin discloses [4]. For example, Merlin discloses that “[t]he order and timing for the STA BA transmissions may be sent in *the DL-MU-MIMO data 406,*” and “[i]n DL-MU-MIMO transmissions, multiple packets are sent at the same time toward different STAs.” EX-1004, 11:33-36 (italics added). Merlin also discloses that “in FIG. 4, MU-MIMO data 406 was sent to STA1, STA2, and STA3 (access terminals 120).” EX-1004, 11:45-46. *See also* EX-1004, FIG. 4,

FIG. 22. *See* Section VII.B.1.b (discussion of Limitation [1a]); EX-1003 ¶¶ 159-

161. Accordingly, claim 4 is unpatentable as obvious in view of Merlin.

5. Claim 5.

[5] The method according to claim 1, wherein the downlink frame includes block acknowledgement (ACK) requests for a plurality of STAs including the STA and the at least one other STA.

Merlin discloses [5]. For example, Merlin discloses that “a multi-STA BAR frame may be used to request BAs from multiple STA.” EX-1004, 18:57-58.

Further, “FIG. 12 illustrates an example format for a multi-TID [*block acknowledgment request*] BAR,” and “[t]he multi-STA BAR may use some of the reserved bits in the BAR control field... to indicate: that *the BAR is a multi-STA BAR, which STAs are the recipients*, the duration of the allowed response, and *resource allocation for the replies in UL MU-MIMO or UL FDMA*.” EX-1004, 4:26-28; 18:67-19:5 (*italic added*); FIG. 12.

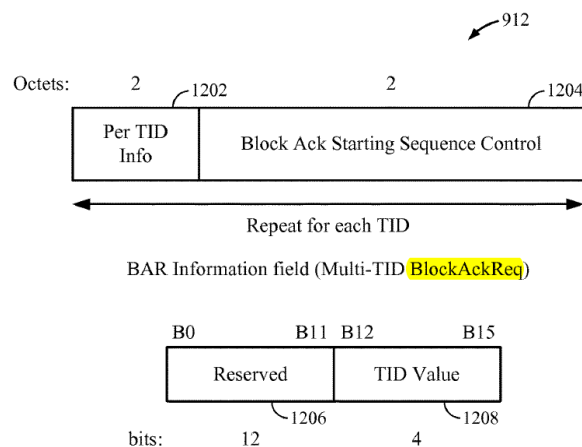


FIG. 12

As a further example, Merlin discloses that “FIG. 10 illustrates an example frame exchange 1000 of a DL A-MPDU including a BAR frame per each STA, in accordance with certain aspects of the present disclosure. As shown in FIG. 10, a different BAR frame for each STA may be aggregated in the DL A-MPDUs for each STA. For example, BAR frame 1002 (DL STA2+BAR2) and BAR frame 1004 (DL STA1+BAR1) may be aggregated into A-MPDU and may solicit BAs 1006 (BA STA2) and 1008 (BA STA1) from STAs 2 and 1, respectively.” EX-1004, 18:35-43; FIG. 10. EX-1003 ¶¶ 162-165.

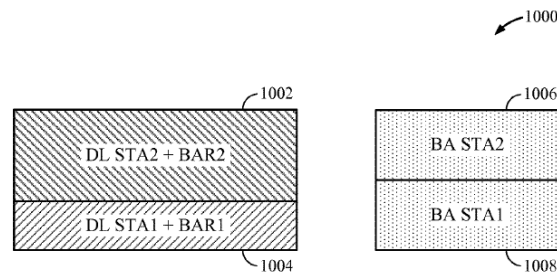


FIG. 10

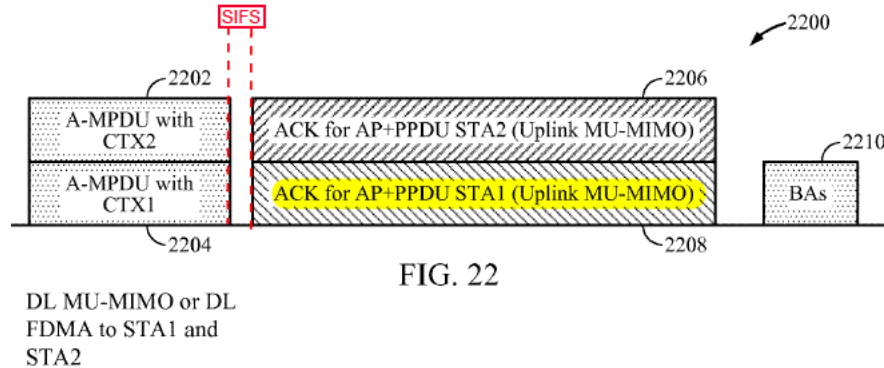
Accordingly, claim 5 is unpatentable as obvious in view of Merlin.

6. Claim 6.

- a. [6pre] A method for receiving an acknowledgement frame for notifying successful data reception by an access point (AP) from a station (STA) in a wireless local area network, the method comprising:**

Merlin discloses [6pre]. For example, Merlin discloses that “FIG. 4 illustrates an example [DL-MU-MIMO] between an [AP] and a plurality of [STAs],” “the AP may send DL-MU-MIMO data 406 to STAs selected by the

scheduler (typically part of the processing system of the AP, such as scheduler 234 in FIG. 2),” “[t]he STAs receiving the MU-MIMO data 406 may transmit BAs 408 in the uplink (UL),” and “[i]n DL-MU-MIMO transmissions, multiple packets are sent at the same time toward different STAs. *If all the acknowledgments (ACKs) [or block ACKs (BAs)] are received, the transmission may be considered successful.*” EX-1004, 11:10-12; 11:26-28; 11:29-30; 11:35-38 (italic added). See EX-1004, FIG. 22 (annotated below).



See also Section VII.B.1.a (discussion of Limitation [1pre]); EX-1003 ¶¶

166-167.

- b. [6a] transmitting, to the STA, a downlink frame including a quality of service (QoS) control field including acknowledgement information representing whether the STA is requested to transmit the acknowledgement frame in a single-user (SU) format or in a multiple-user (MU) format at a Short Inter-Frame Space (SIFS) time after the downlink frame; and

Merlin discloses or renders [6a] obvious.

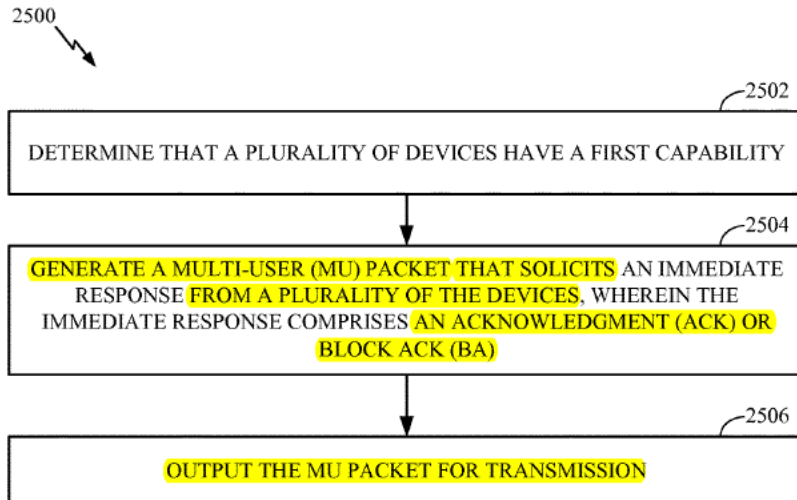


FIG. 25

For example, Merlin discloses “[a]ccording to certain aspects, each recipient STA that is requested to send an immediate response may know—or be indicated—how the immediate reply (e.g., ACK/BA) should be sent. For example, *the requested STA may know or be indicated whether to reply with SU-MIMO, MU-MIMO, or FDMA.*” EX-1004, 14:12-18 (italics added). Merlin also teaches “a response type indication for each STA may be added in each MPDU or PSDU. For example, 1 or 2 bits may indicate which mode of response is to be used (e.g., UL SU-MIMO, UL MU-MIMO, or UL FDMA). For *a response type indication* in each MPDU, the indication *may be included in the Quality of Service (QoS) control field....*” EX-1004, 14:26-32 (italics added). Further, Merlin discloses that “[t]he STA BA transmissions may be separated by SIFS. The order and timing for the STA BA transmissions may be sent in the DL-MU-MIMO data 406.” EX-1004,

11:32-34 (*italics added*). See EX-1004, FIG. 4; EX-1003 ¶¶ 168-171; Section VII.B.1.b (discussion of Limitation [1a]).

- c. [6b] receiving, from the STA, the acknowledgement frame based on the acknowledgement information at the SIFS time after the downlink frame,

Merlin discloses [6b]. Merlin discloses that “[t]he *STA BA transmissions may be separated by SIFS*. The order and *timing for the STA BA transmissions may be sent in the DL-MU-MIMO data 406*.” EX-1004, 11:32-34 (*italics added*). See also EX-1004, FIGs. 4 and 22 (annotated below); EX-1003, ¶ 172; Section VII.B.1.c (discussion of Limitation [1b]).

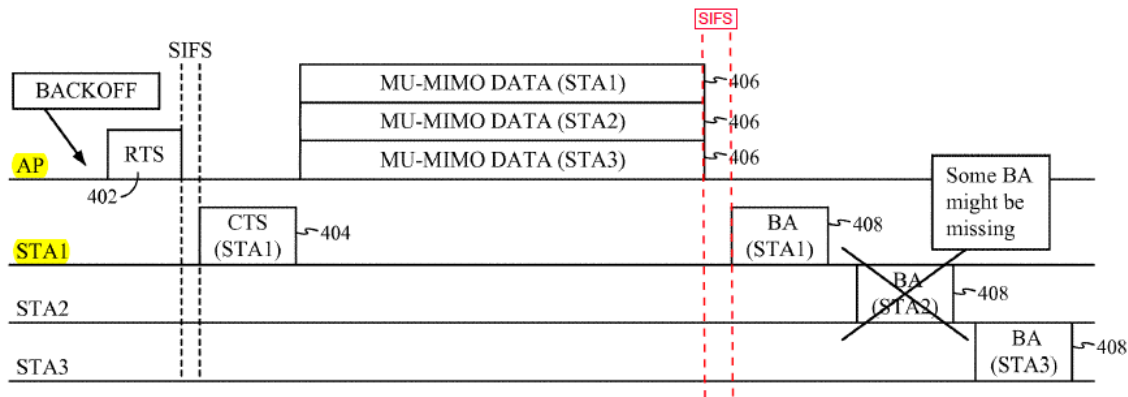


FIG. 4

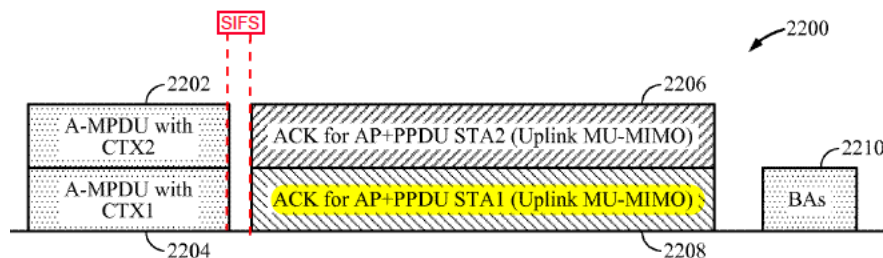


FIG. 22

DL MU-MIMO or DL
FDMA to STA1 and
STA2

- d. **[6c] wherein receiving the acknowledgment frame comprises: when the acknowledgment information represents that the STA is requested to transmit the acknowledgement frame in the MU format, receiving the acknowledgement frame in the MU format on an allocated resource simultaneously with transmission of at least one acknowledgement frame from at least one other STA, and**

Merlin discloses [6c]. *See also* EX-1004, FIG. 22; Section VII.B.1.d

(discussion of Limitation [1c]).

- e. **[6d] [wherein receiving the acknowledgment frame comprises:...] when the acknowledgment information represents that the STA is requested to transmit the acknowledgement frame in the SU format, receiving the acknowledgement frame in SU format.**

Merlin discloses [6d]. *See also* EX-1004, FIG. 4; Section VII.B.1.e

(discussion of Limitation [1d]).

For the foregoing reasons, claim 6 of the '679 Patent is unpatentable as obvious in view of Merlin. *See* Section VII.B.1 (discussion of [1]); EX-1003 ¶¶ 166-175.

7. Claim 7.

- [7] The method according to claim 6, wherein the downlink frame further includes Modulation and Coding Scheme (MCS) information for the acknowledgement frame.**

Merlin discloses [7]. *See* Section VII.B.2 (discussion of Limitation [2]);

EX-1003, ¶ 176.

8. Claim 8.

[8] The method according to claim 7, wherein a same MCS based on the MCS information is applied to the acknowledgement frame by the STA and the at least one other STA.

Merlin discloses or renders [8] obvious. *See* Section VII.B.3 (discussion of Limitation [3]); EX-1003, ¶ 177.

9. Claim 9.

[9] The method according to claim 6, wherein the downlink frame includes downlink data for a plurality of STAs including the STA and the at least one other STA.

Merlin discloses or renders [9] obvious. *See* Section VII.B.4 (discussion of Limitation [4]); EX-1003 ¶ 178.

10. Claim 10.

[10] The method according to claim 6, wherein the downlink frame includes block acknowledgement (ACK) requests for a plurality of STAs including the STA and the at least one other STA.

Merlin discloses [10]. *See* Section VII.B.5 (discussion of Limitation [5]); EX-1003 ¶ 179.

C. Ground 2: Abraham466 renders obvious Claims 1-10.

As set forth below, Abraham466 renders Claims 1-10 obvious and unpatentable.

1. Claim 1.

- a. [1pre] A method for transmitting an acknowledgement frame for notifying successful data reception by a station (STA) to an access point (AP) in a wireless local area network, the method comprising:**

Abraham466 discloses [1pre]. For example, Abraham466 discloses that “[d]ata frames may be used for transmitting data from an AP and/or a STA to other APs and/or STAs. Control frames may be used together with data frames for performing various operations and for reliably delivering data (e.g., *acknowledging receipt of data....*)” EX-1005, [0049] (italics added). Abraham466 also discloses that “*method 1100 may be performed by the STA 106a or any suitable device. At block 1105, the STA 106a may receive a message containing ACK information.... At block 1110, the STA 106a may then determine when and how to send its ACK message transmission based on the ACK information.... At block 1115, the STA 106 a may then generate the ACK message. In some embodiments, the ACK message is generated based on the determination in block 1110. At block 1120, the STA 106 a transmits to the ACK message to the AP 104 based on the determined transmission.*” EX-1005, [0074] (italic added). *See also* EX-1005, FIG. 11, EX-1025, [0046], [0071], FIG 11; EX-1003 ¶¶ 180-186.

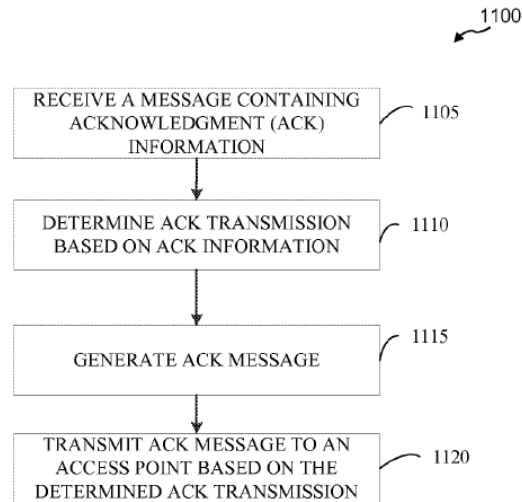


FIG. 11

- b. **[1a] receiving, from the AP, a downlink frame including a quality of service (QoS) control field including acknowledgement information representing whether the STA is requested to transmit the acknowledgement frame in a single-user (SU) format or in a multiple-user (MU) format at a Short Inter-Frame Space (SIFS) time after the downlink frame; and**

Abraham466 renders [1a] obvious. For example, Abraham466 discloses that “[a]t block 1105, *the STA 106 a may receive a message containing ACK information.*” EX-1005, [0074] (italic added).

Abraham466 also discloses that “[i]n order to set the acknowledgment, *the AP 104 may include an indication of the acknowledgment policy in the MAC header portion of a frame.*” EX-1005, [0063] (italics added).

Abraham466 discloses that “*the acknowledgement policy may indicate whether an acknowledgement for the A-MPDU sub-frame should be transmitted by an addressed receiver, the type of acknowledgement that should be transmitted*

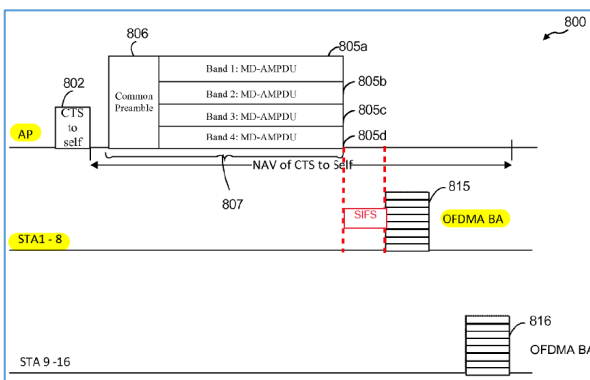
(e.g., whether an acknowledgement or block acknowledgement should be transmitted) and/or a delay time period between when the A-MPDU frame 304 is received and when an acknowledgement to any MPDU sub-frame included in the A-MPDU frame 304 is transmitted.” EX-1005, [0062]. *See* EX-1025, [0059].

Abraham466 illustrates an embodiment whether the bits of QoS control field indicate the existence of acknowledgment policy in the DL MU frame. For example, Abraham466 discusses that “[i]n some embodiments, *the presence of the ACK control field 765 may be indicated using a reserved bit/bit combination in the frame control field 710, QoS control field 755 or the HT/VHT control field 760.*” EX-1005, [0064] (*italic added*). *See* EX-1025, [0061].

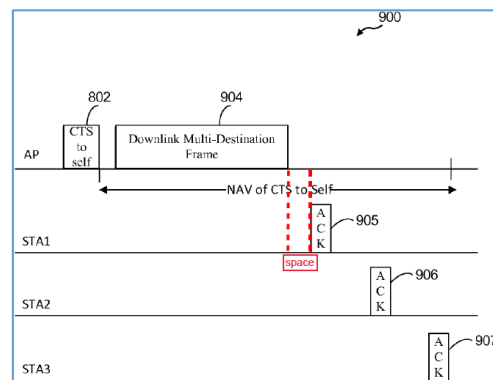
It has been known to use QoS control field bits to indicate ACK policy directly. *See* EX-1003 ¶ 193. Particularly in view of the known techniques to utilize bits of a DL MU frame to convey transmission management by an AP, a POSITA would have understood that Abraham466’s disclosed “indication of the presence of ACK policy” in the QoS control field can represent the ACK policy directly. For example, a POSITA would understand that as long as both the AP and the receiving STAs agree on what the bits in QoS control field can represent whether the information of the existence of ACK policy or a specific ACK request, the bits in QoS control field can either represent the existence of ACK policy or an explicit ACK instruction.

It also has been known that additional bits/frames may be considered as “overhead” to the systems. For example, Ma mentions that “dedicated frames may introduce extra overhead” (EX-1006, 9:35-36), while other POSITA system designers may not consider additional bits/frames inefficient. *See*, for example, EX-1026, 11 (“It is allowed to add padding [bits] for OFMDA PPDU’s....”). Thus, a POSITA would understand that QoS control field can be utilized to represent either the existence of ACK policy or the specific ACK instruction as a design choice, for example, whether to reserve additional frames for another purpose/function depending on the system parameters and preferences.

In addition, Abraham466 discloses that “the STA 106a may then determine based on such information the specific time to transmit the ACK and type of transmission (e.g., BA, MU-MIMO, FDMA, OFDMA, etc.).” EX-1005, [0074]. *See also* EX-1005, FIG. 8 and FIG. 9. *See also* Abraham466_Provisional, EX-1025, [0065], [0071], FIG. 8, FIG. 9; *See* EX-1003 ¶¶ 187-208.



EX-1005, FIG. 8 (annotated).



EX-1005, FIG. 9 (annotated).

- c. **[1b] transmitting, to the AP, the acknowledgement frame based on the acknowledgement information at the SIFS time after the downlink frame,**

Abraham466 discloses [1b]. Abraham466 discloses multiple STAs to transmit acknowledgement frames based on the acknowledgement information in the DL MU frame from the AP at a SIFS time after the DL MU frame. For example, Abraham466 discloses that “[a]t block 1120, the STA 106 *a* transmits to the ACK message to the AP 104 based on the determined transmission.” EX-1005, [0074]. *See* EX-1005, FIG. 11.

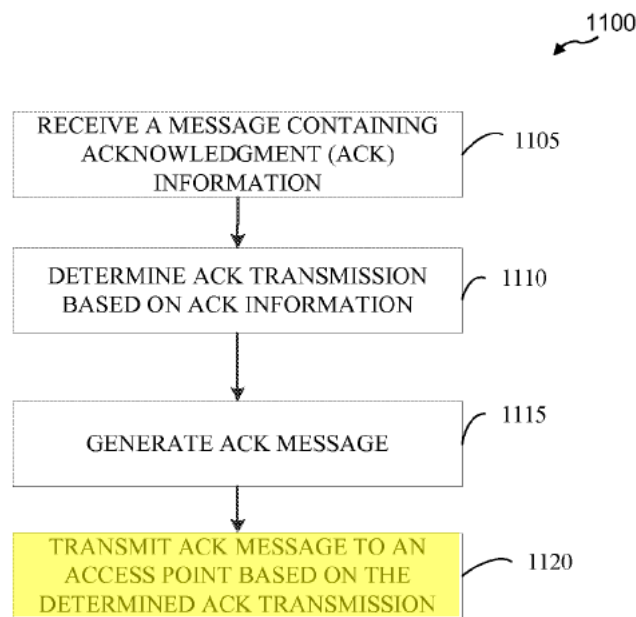
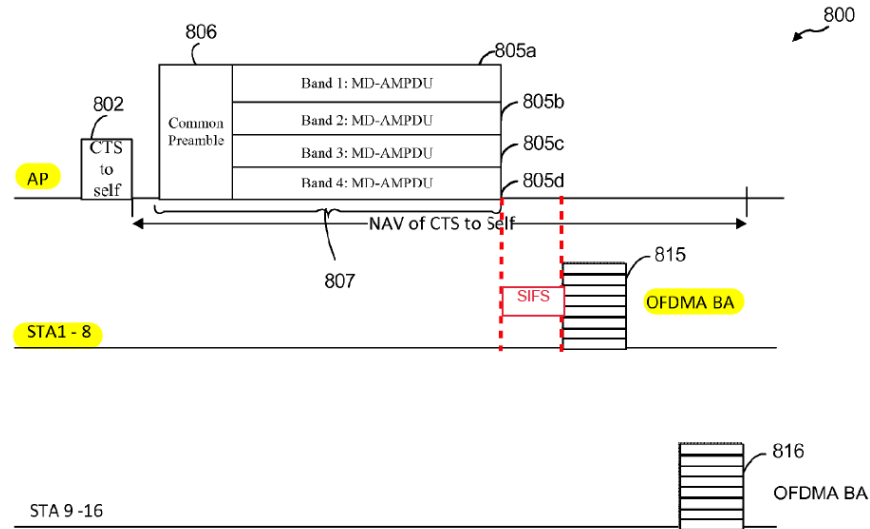


FIG. 11

Abraham466 further discloses that “[a]s shown, 8 STAs (e.g., STAs 1-8) send uplink BAs 815 over 8 different bandwidths a short time (e.g., SIFS) after receiving

MD-AMPDUs 805 a-d.” EX-1005, [0068] (italics added). *See* EX-1005, FIG. 8 (annotated below). *See also* EX-1025, [0065], [0071], FIG. 8, FIG. 9, FIG. 11. EX-1003 ¶¶ 209-212.



- d. [1c] wherein transmitting the acknowledgment frame comprises: when the acknowledgment information represents that the STA is requested to transmit the acknowledgement frame in the MU format and the STA is allocated a resource, transmitting the acknowledgement frame in the MU format on the allocated resource simultaneously with transmission of at least one acknowledgement frame from at least one other STA, and

Abraham466 discloses [1c].

Abraham466 discloses the acknowledgement information contained in the DL MU frame from AP to indicate resources allocated to the STAs and the STAs to transmit BAs in the MU format using the allocated resources based on the acknowledgement information in the DL MU frame from the AP. For example,

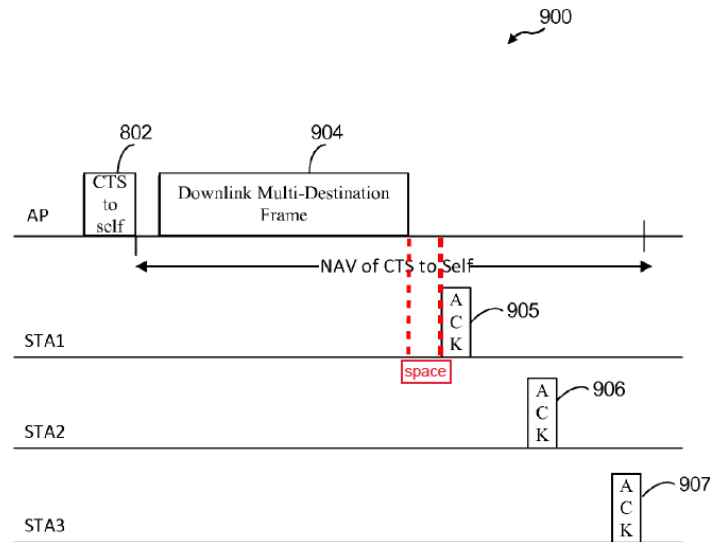
Abraham466 discloses that “[a]t block 1110, the STA 106 *a* may then determine when and how to send its ACK message transmission based on the ACK information. For example, the ACK control field 765 may include a MCS, a bandwidth allocated to the STA 106 *a*, and an order of when the STA should send its ACK message. The STA 106 *a* may then determine based on such information the specific time to transmit the ACK and type of transmission (e.g., BA, MU-MIMO, FDMA, OFDMA, etc.).” EX-1005, [0074]. *See also* EX-1005, FIG. 8; EX-1025, [0071], FIG. 8; EX-1003 ¶¶ 213-217.

- e. **[1d] [wherein transmitting the acknowledgment frame comprises:...] when the acknowledgment information represents that the STA is requested to transmit the acknowledgement frame in the SU format, transmitting the acknowledgement frame in SU format.**

Abraham466 discloses [1d]. Abraham466 illustrates an embodiment where the STAs transmit BAs sequentially in the SU format. For example, Abraham466 discloses that “[a]t block 1110, the STA 106*a* may then determine when and how to send its ACK message transmission based on the ACK information.

Abraham466 further discloses that “[u]sing the information in the ACK control field 765 (e.g., BA MCS, total uplink bandwidth, per STA bandwidth, total uplink spatial streams, BA index, etc.) the *STAs 1-3 can determine when to send ACK messages 905, 906, and 907 so that they don't interfere with each other and fit within the time reserved by the network allocation vector (NAV) of the CTS to*

self 802..” EX-1005, [0071] (*italic added*). *See also* EX-1005, FIG. 9 (annotated below).



See also EX-1025, [0068], FIG. 8; EX-1003 ¶¶ 218-224.

For the foregoing reasons, claim 1 of the '679 Patent is unpatentable as obvious in view of Abraham466. *See* EX-1003 ¶¶ 180-224.

2. Claim 2.

[2] The method according to claim 1, wherein the downlink frame further includes Modulation and Coding Scheme (MCS) information for the acknowledgement frame.

Abraham466 discloses [2]. Abraham466 discloses that “*the ACK control field 765 may include: BA modulation and coding scheme (MCS)....*” EX-1005, [0064] (*italics added*).

As a further example, Abraham466 further discloses “[i]n some embodiments, *the BA MCS is to be set to MCS of the downlink PPDU.*” EX-1005, [0065] (*italic added*).

Accordingly, claim 2 is unpatentable as obvious in view of Abraham466.

See also EX-1025, [0061], [0062]; EX-1003 ¶¶ 225-229.

3. Claim 3.

[3] The method according to claim 2, wherein a same MCS based on the MCS information is applied to the acknowledgement frame by the STA and the at least one other STA.

Abraham466 renders [3] obvious. For example, Abraham466 discloses that “[a]s shown, 8 STAs (e.g., STAs 1-8) send uplink BAs 815 ... after receiving MD-AMPDUs 805 a-d.” EX-1005, [0068]. *See also* EX-1005, FIG. 8; EX-1025, [0065], FIG. 8.

The ’679 Patent describes that “[t]he same transmission time of the block ACK frames transmitted by the plurality of STAs may mean the same transmission MCS of the block ACK frames transmitted by the plurality of STAs.” EX-1001, 39:51-54. Since Abraham466 discloses simultaneous UL ACKs by STAs, a POSITA would readily understand that Abraham466 discloses or renders obvious the [3] limitation in light of the ’679 Patent specification.

Alternatively, Patent Owners states in its preliminary infringement contention that “Two STAs receiving the same trigger frame can be assigned the same MCS.” EX-1009, 48. *See also* EX-1009, 48-50. Since the Patent Owner’s contention of same MCS being used by STAs receiving a same trigger frame (EX-1009, 48-50) and since Abraham466 discloses simultaneous UL ACKs by STAs in

response to the same DL MU AMPDU frame, a POSITA would readily understand that Abraham466 discloses or renders obvious the [3] limitation.

Abraham466 also discloses that “[t]he MD-AMPDU messages 805c and 805d may be addressed to STAs 9-16 and may have an indication in a MAC header of a MDPDU that indicates that the STAs 9-16 should send their ACK messages.... The specific time may be determined by the AP 104 by calculating the transmission time for the PPDU 810 based on *the MCS of the STAs* and based on the estimated transmission time of the ACK messages from STAs 1-8....” EX-1005, [0068] (*italic added*). *See also* EX-1025, [0065]. In view of at least Abraham466’s disclosure of a single “MCS of the [multiple] STAs,” a POSITA would readily understand that Abraham466 discloses one MCS for multiple STAs and Abraham466 renders obvious the [3] limitation.

See Section VII.C.2 (discussion of Limitation [2]); EX-1003 ¶¶ 230-239.

4. Claim 4.

[4] The method according to claim 1, wherein the downlink frame includes downlink data for a plurality of STAs including the STA and the at least one other STA.

Abraham466 discloses [4]. Abraham466 discloses that “[d]ata frames may be used for transmitting data from an AP [to] STAs. *Control frames may be used together with data frames* for performing various operations and for reliably delivering data (e.g., *acknowledging receipt of data....*).” EX-1005, [0049] (*italics*

added). For example, Abraham466 discloses that “*ACK control field 765 may indicate that one or more stations should send a BA a Short Interframe Space (SIFS) time period after the PPDU carrying the MPDU frame 700.*” EX-1005, [0064] (italics added). *See also* EX-1005, FIG. 8, FIG. 9; Section VII.C.1.b (discussion of Limitation [1a]).

Accordingly, claim 4 is unpatentable as obvious in view of Abraham466. *See also* Abraham466_Provisional, EX-1025, [0046], [0061], FIG. 8 and FIG. 9; EX-1003 ¶¶ 240-244.

5. Claim 5.

[5] The method according to claim 1, wherein the downlink frame includes block acknowledgement (ACK) requests for a plurality of STAs including the STA and the at least one other STA.

Abraham466 renders [5] obvious. Abraham466 discloses that “*ACK control field 765 may indicate that one or more stations should send a BA a Short Interframe Space (SIFS) time period after the PPDU...*” EX-1005, [0064] (italics added). *See also* EX-1005, FIG. 8, FIG. 9; EX-1025, [0061], FIG. 8, FIG. 9; Section VII.C.1.b (discussion of Limitation [1a]).

Accordingly, claim 5 is unpatentable as obvious in view of Abraham466. *See* EX-1003 ¶¶ 245-248.

6. Claim 6.

a. [6pre] A method for receiving an acknowledgement frame for notifying successful data reception by an

access point (AP) from a station (STA) in a wireless local area network, the method comprising:

Abraham466 discloses [6pre]. See Section VII.C.1.a (discussion of Limitation [1pre]); EX-1003 ¶ 249.

- b. [6a] transmitting, to the STA, a downlink frame including a quality of service (QoS) control field including acknowledgement information representing whether the STA is requested to transmit the acknowledgement frame in a single-user (SU) format or in a multiple-user (MU) format at a Short Inter-Frame Space (SIFS) time after the downlink frame; and**

Abraham466 renders [6a] obvious. See also EX-1003 ¶ 250; Section VII.C.1.b (discussion of Limitation [1a]).

- c. [6b] receiving, from the STA, the acknowledgement frame based on the acknowledgement information at the SIFS time after the downlink frame,**

Abraham466 discloses [6b]. See EX-1003 ¶ 251; Section VII.C.1.c (discussion of Limitation [1b]).

- d. [6c] wherein receiving the acknowledgment frame comprises: when the acknowledgment information represents that the STA is requested to transmit the acknowledgement frame in the MU format, receiving the acknowledgement frame in the MU format on an allocated resource simultaneously with transmission of at least one acknowledgement frame from at least one other STA, and**

Abraham466 discloses [6c]. EX-1003 ¶ 252; Section VII.C.1.d (discussion of Limitation [1c]).

- e. **[6d] [wherein receiving the acknowledgment frame comprises:...] when the acknowledgment information represents that the STA is requested to transmit the acknowledgement frame in the SU format, receiving the acknowledgement frame in SU format.**

Abraham466 discloses [6d]. EX-1003 ¶ 253; Section VII.C.1.e (discussion of Limitation [1d]).

For the foregoing reasons, claim 6 of the '679 Patent is unpatentable as obvious in view of Abraham466. *See* Section VII.C.1 (discussion of [1]); EX-1003 ¶¶ 249-254.

7. Claim 7.

[7] The method according to claim 6, wherein the downlink frame further includes Modulation and Coding Scheme (MCS) information for the acknowledgement frame.

Abraham466 discloses [7]. *See* Section VII.C.2 (discussion of Limitation [2]); EX-1003 ¶ 255.

8. Claim 8.

[8] The method according to claim 7, wherein a same MCS based on the MCS information is applied to the acknowledgement frame by the STA and the at least one other STA.

Abraham466 renders [8] obvious. *See* Section VII.C.3 (discussion of Limitation [3]); EX-1003 ¶ 256.

9. Claim 9.

[9] The method according to claim 6, wherein the downlink frame includes downlink data for a plurality of STAs including the STA and the at least one other STA.

Abraham466 discloses [9]. *See* Section VII.C.4 (discussion of Limitation [4]); EX-1003 ¶ 257.

10. Claim 10.

[10] The method according to claim 6, wherein the downlink frame includes block acknowledgement (ACK) requests for a plurality of STAs including the STA and the at least one other STA.

Abraham466 renders [10] obvious. *See* Section VII.C.5 (discussion of Limitation [5]); EX-1003 ¶ 258.

D. Ground 3: Merlin in view of Abraham466, Chu806, or Ma renders obvious Claims 1-10.

As set forth below, Merlin in view of Abraham466, Chu806, or Ma renders Claims 1-10 obvious and unpatentable.

1. Motivation to Combine Merlin with Abraham466, Chu806 or Ma

Merlin, Abraham 466, Chu806 and Ma relate to the same field of technology. Each of Merlin, Abraham 466, Chu806 and Ma discusses how an AP provide acknowledgement information/policy to STAs in an 802.11 system. See, e.g., EX-1004, 1:19-45; EX-1005, [0005], [0028]-[0031]; EX-1006, 1:23-43, 5:31-45; EX-1007, 1:11-27, 3:10-40, 4:63-55.

Also, each of Merlin, Abraham 466, Chu806 and Ma discusses the AP employing OFDMA or MU-MIMO to provide acknowledgement information to STAs.

In addition, each of Merlin, Abraham 466, Chu806 and Ma how an AP manages UL acknowledgement frames by non-legacy STAs and legacy STAs or different STAs with different capabilities.

For example, Merlin discloses frame structures, where “the DL MU-MIMO/FDMA PPDU may be addressed to a mix of legacy (e.g., non-HEW) STAs and HEW STAs (i.e., some of the addressed STAs support UL MU-MIMO, UL FDMA, or both, and some of the addressed STAs do not).” EX-1004, 13:24-28.

At the time of the '679 Patent, a POSITA would have been motivated to combine Merlin's DL MU frame with a portion or the DL MU frame of Abraham466 in light of the "need to more efficiently transmit messages and frames across various communication schemes" as *expressly stated in Abraham466*. EX-1005, [0006].

Also, at the time of the '679 Patent, a POSITA would have been motivated to combine Merlin's DL MU frame with a portion or the DL MU frame of Chu806 in light of the additional "standards [] to provide even greater throughputs" as *expressly stated in Chu806*. EX-1006, 1:36-38.

In addition, at the time of the '679 Patent, a POSITA would have been motivated to combine Merlin's DL MU frame with a portion or the DL MU frame of Ma, in light of Ma's express teaching that "[f]unctions, operations, components and/or features described herein with reference to one or more embodiments, may be combined with, or may be utilized in combination with, one or more other functions, operations, components and/or features described herein with reference to one or more other embodiments, or vice versa." EX-1007: 27:32-37.

As such, a POSITA would have a strong expectation of success in combining Merlin's DL MU frame including ACK information/policy for multiple STAs with the Abraham466's DL MU frame, Chu806's DL MU frame, or Ma's

DL MU frame, and would also have a strong expectation of having success in the marketplace by offering such a product. *See* EX-1003 ¶¶ 259-271.

2. Claim 1.

- a. [1pre] A method for transmitting an acknowledgement frame for notifying successful data reception by a station (STA) to an access point (AP) in a wireless local area network, the method comprising:**

As indicated in Section VII.B.1 above, Merlin discloses [1pre].

Alternatively, Merlin in view of Abraham466, Chu806, or Ma renders [1pre] obvious. Abraham466 discloses [1pre]. *See* Section VII.C.1.

Further, Chu806 discloses “[d]uring a time t2, in an embodiment, [STAs] 25 that successfully receive data in the respective sub-channels allocated to the [STAs] 25 transmit respective acknowledgement (ACK or BlkAck) frames 606 to the AP 14.” EX-1006, 13:4-8 (italic added). *See also* EX-1026, 16; EX-1027, 14.

Similarly, Ma discloses that “[i]n some demonstrative embodiments, transmitter 134 may transmit to device 102 an ACK frame, e.g., an EACK frame, to acknowledge receipt of the downlink data.” EX-1007, 10:65-67. For example, Ma discloses that “the plurality of STAs 304 may send to AP 302 a respective plurality of EACK frames 308 to confirm receipt of the DL MU data frames.” EX-1007, 14:6-9. *See also* EX-1007, FIGs. 3, 4, 5 and 8; EX-1003 ¶¶ 272-274.

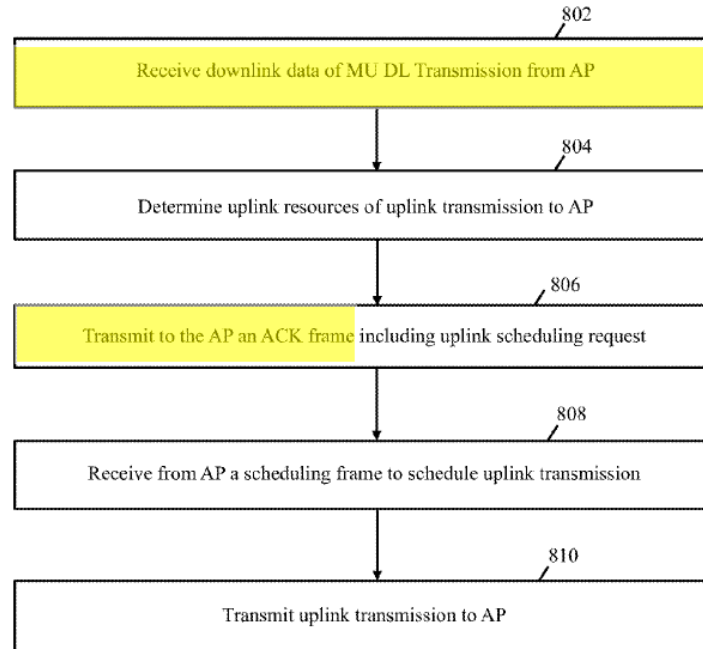


Fig. 8

- b. **[1a] receiving, from the AP, a downlink frame including a quality of service (QoS) control field including acknowledgement information representing whether the STA is requested to transmit the acknowledgement frame in a single-user (SU) format or in a multiple-user (MU) format at a Short Inter-Frame Space (SIFS) time after the downlink frame; and**

As indicated in Section VII.B.1 above, Merlin discloses [1a]. Alternatively, Merlin in view of Abraham466, Chu806, or Ma renders [1a] obvious.

Abraham466 discloses [1a]. See Section VII.C.1.

Further, Chu806 discloses an example where “a PHY preamble *or a MAC header of the OFDM data unit* directed to the first client station *includes an ACK policy field* set to indicate that an immediate acknowledgement of the data unit is

not required, in an embodiment. On the other hand, the OFDM data unit directed to the second client station indicates that an immediate acknowledgement is required, in an embodiment.” EX-1006, 29:37-43 (italics added). Chu806 also discloses that “the AP 14 allocates different sub-channels to different client [STAs] and forms the OFDMA data unit that includes OFDM data units directed to by modulating the different client [STAs] in sub-channel blocks corresponding to the sub-channels assigned to the client [STAs].” EX-1006, 7:11-15. *See also* EX-1006, 9:10-16; FIG. 20A. EX-1026, 10-11, 15, 16, 24; EX-1027, 8, 9, 13, 14, 22.

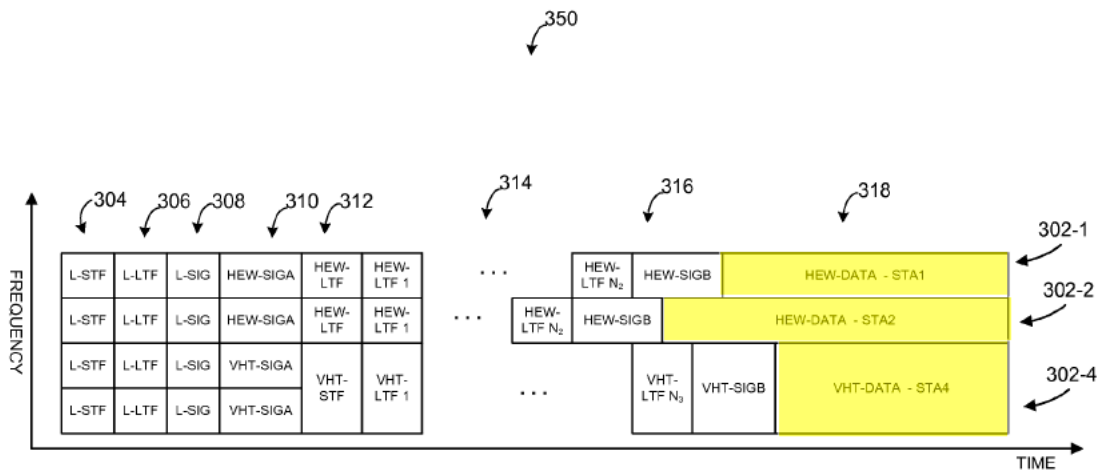


FIG. 4

Similarly, Ma discloses that “AP 302 may transmit a DL MU data transmission 306 to the plurality of STAs 304. For example, transmitter 104 (FIG. 1) may transmit DL MU data frames to devices 132, 160, and/or 170 (FIG. 1).” EX-1007, 13:65-14:1. Ma also discloses that “[a]s indicated at block 802, the method may include receiving downlink data of a MU downlink transmission from

an AP.” EX-1007, 17:54-57. Ma discloses that “[i]n some demonstrative embodiments, the plurality of EACK frames 308 may be transmitted separately, e.g., sequentially, or concurrently, e.g., using an OFDMA scheme.” EX-1007, 14:11-14 (*italics added*). *See also* EX-1007, FIGs. 3, 4, 5 and 8; EX-1003 ¶¶ 275-281.

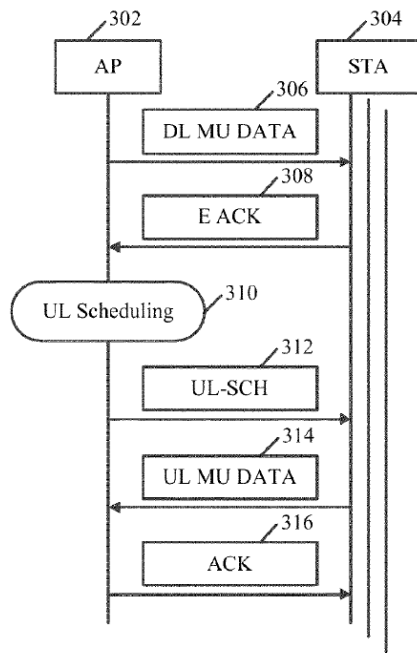


Fig. 3

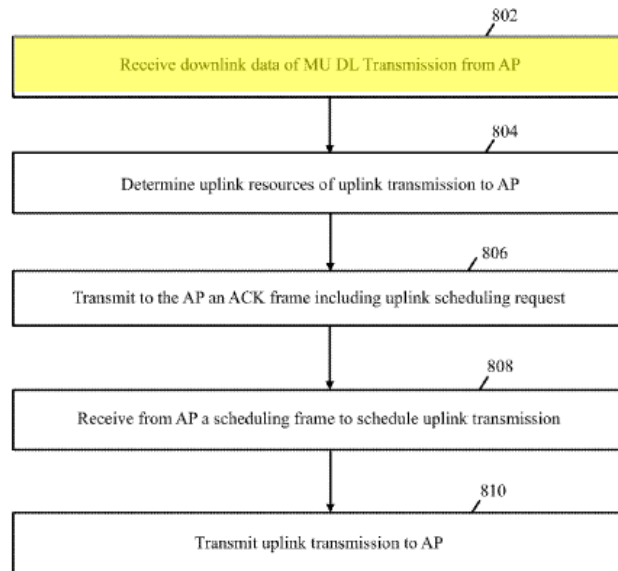


Fig. 8

- c. **[1b] transmitting, to the AP, the acknowledgement frame based on the acknowledgement information at the SIFS time after the downlink frame,**

As indicated in Section VII.B.1 above, Merlin discloses [1b]. Alternatively, Merlin in view of Abraham466, Chu806, or Ma renders [1b] obvious. Abraham466 discloses [1b]. *See* Section VII.C.1.

Further, Chu806 discloses “[i]n various frame changes described above with respect to FIG. 6 and FIGS. 8-19, the time t1 generally at the beginning of a TXOP.... Subsequent times, such as time t2, time t3, time t4, etc. during which certain frames or data units are transmitted the AP 14 or the [STAs] 25, generally begin upon expiration of a predetermined time interval, such as a time interval corresponding to a short *inter-frame space* (SIFS), after completion of transmission or reception of the previous frame or data unit transmitted in the frame exchange.... Accordingly, consecutive frames and data units in the described frame exchanges are generally separated, in time, by certain predetermined time intervals....” EX-1006, 34:31-46 (*italic added*). *See* EX-1006, FIG. 6 (annotated below). *See also* EX-1026, 16; EX-1027, 14.

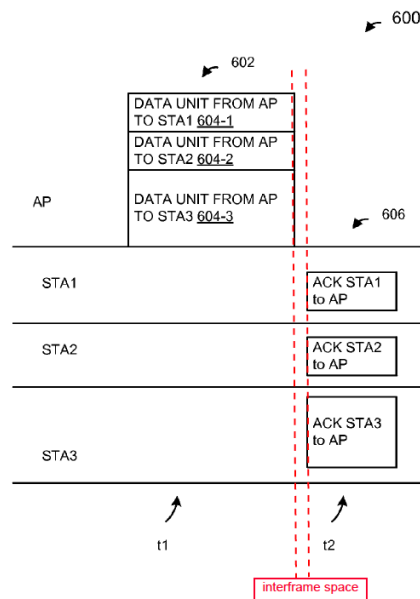


FIG. 6

Similarly, Ma discloses that “[i]n some demonstrative embodiments, receiver 136 may be configured to transmit to device 102 an ACK message (“the extended ACK message” or EACK) to acknowledge a MU downlink transmission from device 102.” EX-1007, 10:1-4. Ma also discloses that “the plurality of STAs 304 may send to AP 302 a respective plurality of EACK frames 308 to confirm receipt of the DL MU data frames.” EX-1007, 14:6-9. *See*, EX-1006, FIGs. 3 and 5 (annotated below); EX-1003 ¶¶ 282-286.

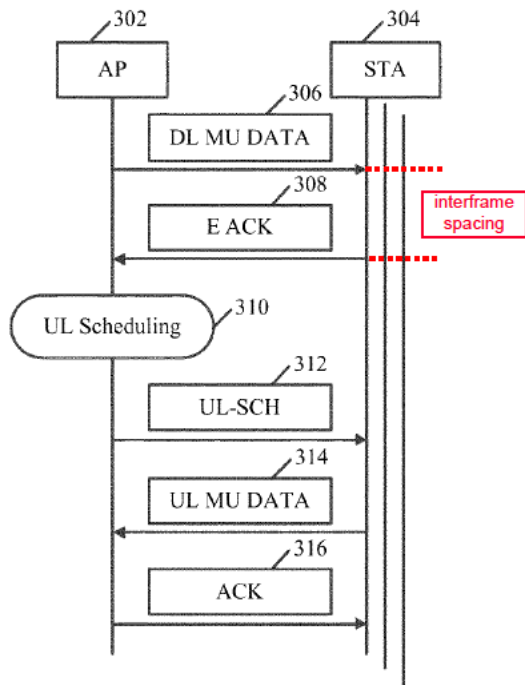


Fig. 3

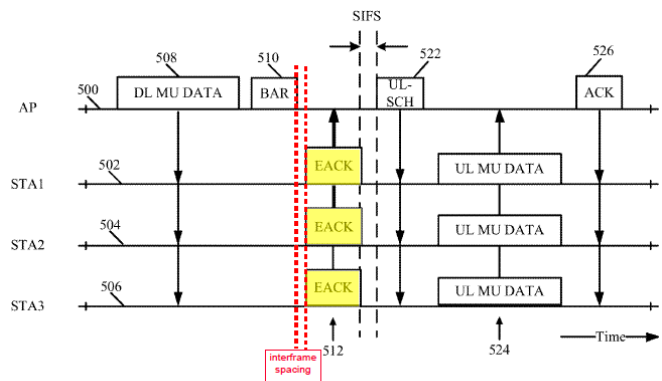


Fig. 5

- d. **[1c] wherein transmitting the acknowledgment frame comprises: when the acknowledgment information represents that the STA is requested to transmit the acknowledgement frame in the MU format and the STA is allocated a resource, transmitting the acknowledgement frame in the MU format on the allocated resource simultaneously with transmission of at least one acknowledgement frame from at least one other STA, and**
- e. **[1d] [wherein transmitting the acknowledgment frame comprises:...] when the acknowledgment information represents that the STA is requested to transmit the acknowledgement frame in the SU format, transmitting the acknowledgement frame in SU format.**

As indicated in Section VII.B.1 above, Merlin discloses [1c] and [1d].

Alternatively, Merlin in view of Abraham466, Chu806, or Ma renders [1c] and [1d] obvious.

For example, Abraham466 discloses [1c] and [1d]. *See* Section VII.C.1.

Also, Chu806 illustrates in FIG. 6 that “[d]uring a time t1, the AP 14 transmits an OFDMA data unit 602 directed to a plurality of [STAs].” EX-1006, 11:59-60. Also, Chu806 discloses “[d]uring a time t2, in an embodiment, [STAs] 25 that successfully receive data in the respective sub-channels allocated to *the [STAs] 25 transmit respective acknowledgement (ACK or BlkAck) frames 606 to the AP 14.*” EX-1006, 13:4-8 (italic added); FIG. 6. Chu806 further discloses that “[f]or example, *transmission of the ACK frames 506 is staggered among the client stations 25, in an embodiment. For example, the AP provides to*

the client stations 25 indications of different specific times at which to transmit their respective ACK frames 606, or a specific order in which to transmit their respective ACK frames 606, and the client stations 25 transmit the ACK frames 606 at the specific times or in the specific order indicated by the AP, in an embodiment.” EX-1006, 13:29-37 (*italic added*). *See also* EX-1026, 19, 24; EX-1027, 17, 22.

Similarly, Ma discloses that “[i]n some demonstrative embodiments, the plurality of *EACK frames 308 may be transmitted separately, e.g., sequentially, or concurrently, e.g., using an OFDMA scheme.*” EX-1007, 14: 11-14. *See also* EX-1007, FIG. 3 (*italic added*). *See also* EX-1006, FIGs. 4 and 5; EX-1003 ¶¶ 287-291.

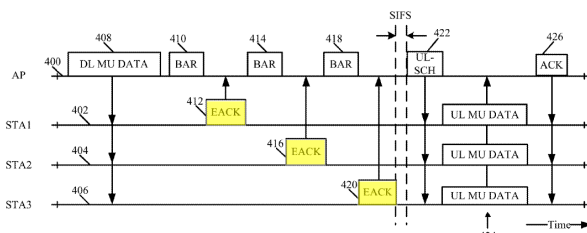


Fig. 4

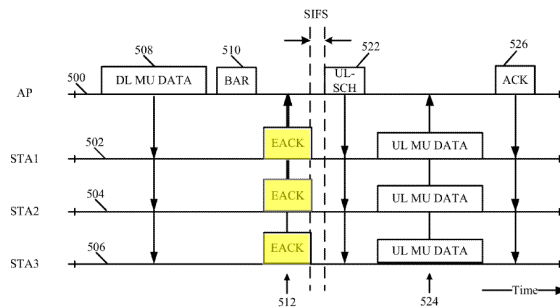


Fig. 5

For the foregoing reasons, claim 1 of the '679 Patent is unpatentable as obvious in view of Merlin in view of Abraham466, Chu806, or Ma. *See* EX-1003 ¶¶ 259-292.

3. **Claim 2.**

[2] The method according to claim 1, wherein the downlink frame further includes Modulation and Coding Scheme (MCS) information for the acknowledgement frame.

4. **Claim 3.**

[3] The method according to claim 2, wherein a same MCS based on the MCS information is applied to the acknowledgement frame by the STA and the at least one other STA.

As indicated in Sections VII.B.2 and VII.B.3 above, Merlin discloses [2] and [3]. Alternatively, Merlin in view of Abraham466, Chu806, or Ma renders [2] and [3] obvious.

For example, Abraham466 discloses [2] and [3]. *See* Section VII.C.2, VII.C.3.

Also, Chu806 discloses that “[i]n an embodiment, the scheduling frame 1308 includes other *information related to uplink transmission by the client stations 25, such as an MCS, or respective MCSs, to be used for the uplink transmissions, transmission power level, or respective transmission power levels, to be used for the uplink transmissions, etc.*” EX-1006, 28:37-42 (*italic added*). *See also* EX-1026, 15; EX-1027, 13.

Similarly, Ma discloses “*a chosen Modulation and Coding Scheme (MCS), and Time_{DL+UL} denotes a transmission time, e.g., including control frames, data*

frames, ACK frames, and interframe spaces, of a DL/UL period.: EX-1007, 16:51-54 (*italic added*).

Accordingly, claim 2 and claim 3 are unpatentable as obvious in view of Merlin in view of Abraham466, Chu806, or Ma. *See* EX-1003 ¶¶ 293-299.

5. Claim 4.

[4] The method according to claim 1, wherein the downlink frame includes downlink data for a plurality of STAs including the STA and the at least one other STA.

As indicated in Section VII.B.4 above, Merlin discloses [4]. Alternatively, Merlin in view of Abraham466, Chu806, or Ma renders [4] obvious.

For example, Abraham466 discloses [4]. *See* Section VII.C.4.

Also, Chu806 discloses that “*each OFDM data unit 302 includes a high efficiency WLAN data portion (HEW-DATA) 318*” and that “FIG. 4 is a diagram of an example OFDMA data unit 350, according to another embodiment. The OFDMA data unit 350 is similar to the OFDMA data unit 300 of FIG. 3 except that the OFDMA data unit 350 includes an OFDMA data unit 302-4 formatted according to a legacy communication protocol that does not support OFDMA communication (e.g., the IEEE 802.11ac Standard).” EX-1006, 8:31-33 (*italic added*); 9:10-16; FIG. 20A. *See also* EX-1026, 10-11, 15, 16, 24; EX-1027, 8, 9, 13, 14, 22.

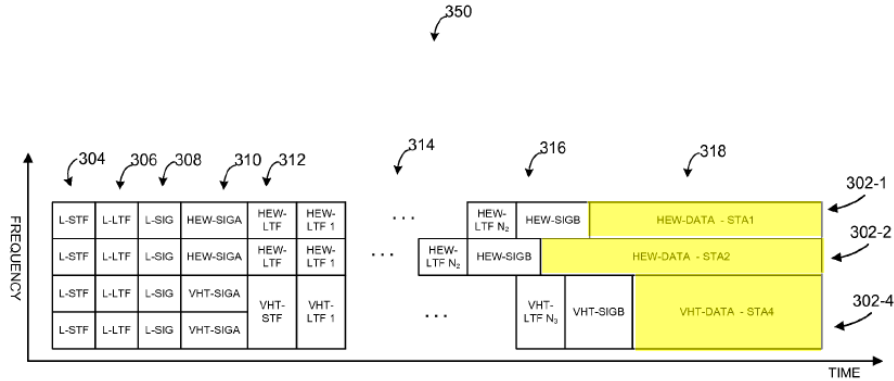


FIG. 4

Similarly, Ma discloses that “[i]n some demonstrative embodiments, AP 302 may transmit a DL MU data transmission 306 to the plurality of STAs 304.” EX-1007, 13:65-67 (*italic added*). Ma also discloses that “[i]n some demonstrative embodiments, AP 400 may transmit a DL MU data transmission 408 to wireless stations 402, 404 and 406.” EX-1007, 14:61-63. As a further example, Ma discloses “[i]n some demonstrative embodiments, AP 500 may transmit a DL MU data transmission 508 to wireless stations 502, 504 and 506.” EX-1007, 15:47-49.

Accordingly, claim 4 is unpatentable as obvious in view of Merlin in view of Abraham466, Chu806, or Ma. *See* EX-1003 ¶¶ 300-304.

6. Claim 5.

[5] The method according to claim 1, wherein the downlink frame includes block acknowledgement (ACK) requests for

a plurality of STAs including the STA and the at least one other STA.

As indicated in Section VII.B.5 above, Merlin discloses [5]. Alternatively, Merlin in view of Abraham466, Chu806, or Ma renders [5] obvious.

For example Abraham466 discloses [5]. *See* Section VII.C.5.

Also, Chu806 illustrates in FIG. 6 that “[d]uring a time t1, the AP 14 transmits an OFDMA data unit 602 directed to a plurality of [STAs].” EX-1006, 11:59-60. Also, Chu806 discloses “[d]uring a time t2, in an embodiment, [STAs] 25 that successfully receive data in the respective sub-channels allocated to the [STAs] 25 transmit respective acknowledgement (ACK or BlkAck) frames 606 to the AP 14.” EX-1006, 13:4-8. *See also* EX-1006, FIG. 6; EX-1026, 16, 19; EX-1027, 14, 17.

Chu806 also illustrates a further embodiment in FIG. 11B. As a further embodiment, Chu806 discloses “in the frame exchange 1130 scheduling for the uplink OFDMA transmission 1110 is provided to the client stations 25 as part of the downlink OFDMA transmission 1134 to the client stations 25. For example, respective scheduling frames 1138 are appended to the OFDM data units 1106 of the OFDMA transmission 1134,” and “[a]s another example, respective scheduling frames 1138 are prepended to the OFDM data units 1106 of the OFDMA transmission 1134.” EX-1006, 23:60-66; 23:67-24:2.

Similarly, Ma discloses that “[i]n one example, transmitter 104 may transmit a unicast acknowledgement request, e.g., a *unicast Block ACK Request (BAR)*, to each wireless station of the plurality of stations....” EX-1007, 11:27-30 (italic added). As a further example, Ma discloses “[i]n some demonstrative embodiments, AP 500 may transmit a MU ACK request 510, e.g., a *Block ACK Request (BAR)*, to wireless stations 502, 504 and 506.” EX-1007, 15:50-52 (italic added).

Accordingly, claim 5 is unpatentable as obvious in view of Merlin in view of Abraham466, Chu806, or Ma. *See* EX-1003 ¶¶ 305-309.

7. Claim 6.

See Section VII.D.2 (discussion of claim 1); EX-1003 ¶ 310.

8. Claim 7.

See Section VII.D.3 (discussion of claim 2); EX-1003 ¶ 311.

9. Claim 8.

See Section VII.D.4 (discussion of claim 3); EX-1003 ¶ 312.

10. Claim 9.

See Section VII.D.5 (discussion of claim 4); EX-1003 ¶ 313.

11. Claim 10.

See Section VII.D.6 (discussion of claim 5); EX-1003 ¶ 314.

VIII. ANALYSIS OF THE '679 PATENT'S PRIORITY CLAIM

A claim can only be entitled to an earlier filing date if the claim is disclosed in the earlier priority document(s). However, the [1a] and [6a] claim limitations relating to “acknowledgement information representing whether the STA is requested to transmit the acknowledgement frame in a single-user (SU) format or in a multiple-user (MU) format...” are not disclosed in Provisional Application No. 62/074,514. Similarly, the [1c] and [6c] claim limitations relating to “transmitting the acknowledgement frame in the MU format on the allocated resource simultaneously with transmission of at least one acknowledgement frame from at least one other STA” are not disclosed in Provisional Application No. 62/074,514. *See* EX-1003 ¶¶ 315-328.

Petitioners therefore challenge the '679 Patent's priority claim and submit that claim 1 or claim 6 should not be entitled to the ' 679 earliest possible priority date of November 3, 2014.

IX. SUMMARY OF CITATIONS TO ABRAHAM466 AND CHU806 IN RELATION TO THEIR RESPECTIVE PROVISIONAL APPLICATIONS

Abraham466 and Abraham466 Provisional share substantially the same disclosures. The content of the abstract and the 90 numbered paragraphs of Abraham466 is substantially the same as those in Abraham466 Provisional. *See* also EX-1003 ¶¶ 330-336.

The following table shows the representative support in Abraham466

Provisional Application for specific Abraham466 citations.

EX-1005, Abraham466	EX-1025, Abraham466_Provisional
Abstract.	Abstract; [0001], [0005], FIG. 4B
[0031]	[0028]
[0036]	[0033]
[0049]	[0046]
[0050]	[0047]
[0060]	[0057]
[0062]	[0059]
[0063]	[0060]
[0064]	[0061]
[0065]	[0062]
[0068]	[0065]
[0071]	[0068], [0071]
[0072]	[0069]
[0074]	[0071], FIG. 9
FIG. 6 – FIG. 9, FIG. 11	FIG. 6 – FIG. 9, FIG. 11
FIG. 11.	FIG. 11

See also EX-1003 ¶ 336.

The table below shows where the representative support can be found in
Abraham466 Provisional Application for Abraham466 claim 1.

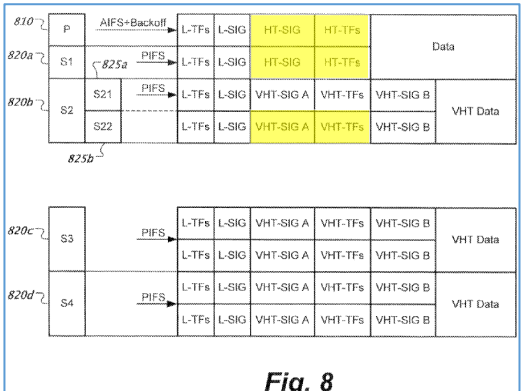
EX-1005, Abraham466, claims 1-2	EX-1025, Abraham466_Provisional
What is claimed is: 1. A method of wireless communication, comprising: generating, by an apparatus, an aggregated media access control protocol data unit (A-MPDU) frame within a physical layer convergence procedure (PLCP) protocol data unit (PPDU), the A-MPDU frame comprising a plurality of A-MPDU sub-frames, wherein at least one A-MPDU sub-frame of the plurality of A-MPDU sub-frames is addressed to at least a first device and at least one other A-MPDU sub-frame of the plurality of A-MPDU sub-frames is addressed to at least a second device; and inserting an indication that the A-MPDU frame is addressed to at least the first and second devices into a field of the PPDU. 2. The method of claim 1, wherein the at least one A-MPDU sub-frame comprises a media access control protocol data unit (MPDU) delimiter field, wherein the indication comprises a value in the MPDU delimiter field.	146852P1 PATENT WHAT IS CLAIMED IS: 1. A method of wireless communication, comprising: generating, by an apparatus, an aggregated media access control protocol data unit (A-MPDU) frame comprising a plurality of A-MPDU sub-frames, wherein at least one sub-frame of the plurality of A-MPDU sub-frames is addressed to at least a first device and at least one other sub-frame of the plurality of A-MPDU sub-frames is addressed to at least a second device; and inserting an indication that the A-MPDU frame is addressed to at least the first and second devices into a physical layer data unit (PPDU) field. 2. The method of claim 1, wherein the A-MPDU sub-frame, comprises a media access control protocol data unit (MPDU) delimiter field, wherein the indication comprises a value in the MPDU delimiter field. EX-1025, 45. <i>See also</i> EX-1025, [0047]-[0054], [0073], FIG. 3, 4A, 4B, 13.

See EX-1003 ¶ 337.

Chu806 and Chu806_Provisionals

For the particular Chu806 citations identified above, the table below summarizes where these citations or representative support can be found in Chu806 Provisional Applications.

Chu806_Provisional_1 and Chu806_Provisional_2 include a list of References. EX-1026, 31, EX-1027, 29. U.S. Patent No. 8,395,997 (“Banerjea”) (EX-1028) is identified as a reference by Chu806_Provisional_1 and Chu806_Provisional_2.

EX-1006, Chu806	EX-1026, Chu806_Provisional_1 EX-1027, Chu806_Provisional_2
Abstract	EX-1026, 11-12; EX-1027, 9-10
1:47-2:9	EX-1026, 19, EX-1027, 17
13:4-10, 13:29-37, 11:59-60	EX-1026, 16, EX-1027, 14 EX-1026, 19, EX-1027, 17 EX-1026, 27, EX-1027, 25
8:31-33; 9:10-16	EX-1026, 11-12; EX-1027, 9; Banerjea, EX-1028, FIG. 8  Fig. 8

EX-1006, Chu806	EX-1026, Chu806_Provisional_1 EX-1027, Chu806_Provisional_2
	EX-1028, FIG. 8.
16:13-14	EX-1026, 15-16, EX-1027, 13-14
29:37-43	EX-1026, 24, EX-1027, 22
34:31-46	EX-1026, 16, EX-1027, 14 Banerjea, EX-1028, 8:32-34. Based on obtaining a TXOP, the device can send one or more frames continuously with a SIFS duration gap between the frames. In this example, based on a duration corresponding to EX-1028, 8:32-34.
28:37-42	EX-1026, 15; EX-1027, 13
FIG. 4	EX-1026, 10; EX-1027, 8
FIG. 6	EX-1026, 14, EX-1027, 12
FIG. 8A	EX-1026, 16, EX-1027, 14
FIG. 14A	EX-1026, 24, EX-1027, 22
FIG. 20A	EX-1026, 19, EX-1027, 17

See also EX-1003 ¶¶ 338-339.

Correlations Between Chu806 Claim 41 and Chu806 Provisionals

The table below summarizes where the representative support can be found in Chu806 Provisional Applications for Chu806 claim 41.

EX-1006, Chu806	EX-1026, Chu806_Provisional_1 EX-1027, Chu806_Provisional_2
41. A first communication device, comprising: a network interface configured to: allocate respective sub-channels of an orthogonal frequency division multiplexing (OFDM) channel to two or more second communication devices for downlink orthogonal frequency division multiple access (OFDMA) transmission to the two or more second communication devices, including: (i) allocating non-contiguous sub-channels by skipping a particular sub-channel of the OFDM channel, when the particular sub-channel is determined to be unavailable for transmission, and (ii) allocating a first sub-channel to a first one of the two or more second communication devices and a second sub-channel to a second one of the two or more communication devices; generate a signal field of an OFDMA data unit to include indications of the respective sub-channels allocated for downlink OFDMA transmission from the two or more second communication devices, including indications of the non-contiguous sub-channel allocation; generate the OFDMA data unit to include (i) the signal field, (ii) a first OFDM data unit directed to the first one of the two or more second communication devices and (iii) a second OFDM data unit directed to the second one of the two or more second communication devices, wherein the first OFDM data unit is to be transmitted in the first sub-channel and the second OFDM data unit is to be transmitted in the second sub-channel; and transmit the OFDMA data unit to the two or more second communication devices.	EX-1026, 19, EX-1027, 17 (e.g., “Combination of DL+UL OFDMA”, “SCHED [frame] includes DL channel bandwidth allocation, UL channel bandwidth allocation...,” “A-MPDU to STA1,” “A-MPDU to STA2,” “A-MPDU to STA3”) EX-1026, 29, EX-1027, 27 (e.g., “Non continuous transmission”; “AP detects 3rd 20MHz channel busy”)

See also EX-1003 ¶ 340.

X. PAYMENT OF FEES

The undersigned authorizes to charge Deposit Account No. 60-0381 for the fee in 37 CFR § 42.15(a) for this Petition and for any other required fees.

XI. CONCLUSION

For the reasons set forth above, Petitioners respectfully request institution of IPR for each of the grounds presented herein and a final written decision finding the Challenged Claims unpatentable.

Respectfully submitted,

Dated: April 21, 2023

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CERTIFICATION UNDER 37 C.F.R. § 42.11

Under the provisions of 37 C.F.R. § 42.11, the undersigned hereby certifies that this Petition and accompanying evidence including Exhibits 1001-1028 are not being presented for an improper purpose and that all legal contentions, allegations, and denials are warranted and have evidentiary support.

Dated: April 21, 2023

/s/Victoria Hao

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

Under the provisions of 37 C.F.R. § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Petition for *Inter Partes* Review contains, as measured by the word-processing system used to prepare this paper, 12,235 words. This word count does not include the table of contents, the table of authorities, the list of exhibits, the table of acronyms, certificates or appendix of exhibits.

Dated: April 21, 2023

/s/Victoria Hao

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§ 42.6(e)(4)(i) et seq. and 42.105(b), the undersigned certifies that on April 21, 2023, a complete and entire copy of this Petition for *Inter Partes* Review and all supporting exhibits were provided via Federal Express, to the Patent Owner by serving the correspondence address of record as follows:

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A courtesy copy of this Petition and accompanying exhibits were also served via electronic mail on April 21, 2023, on the Patent Owner's counsel of record in a related District Court litigation at AtlasTT@hpcllp.com.

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