

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent of: Geonjung Ko, et. al.
U.S. Patent No.: 12,004,262 Attorney Docket No. 39843-0201IP1
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Filing Date: February 11, 2022
Title: WIRELESS COMMUNICATION METHOD USING BSS
 IDENTIFIER AND WIRELESS COMMUNICATION TERMINAL
 USING SAME

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**PETITION FOR *INTER PARTES* REVIEW OF UNITED STATES PATENT
NO. 12,004,262 PURSUANT TO 35 U.S.C. §§ 311–319, 37 C.F.R. § 42**

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LIST OF EXHIBITS

SAMSUNG-1001	U.S. Patent No. 12,004,262 (“the ’262 Patent”)
SAMSUNG-1002	File History of the ’262 Patent
SAMSUNG-1003	Declaration and Curriculum Vitae of Dr. Christopher J. Hansen, Ph.D.
SAMSUNG-1004	Complaint, <i>Wilus Institute of Standards and Technology Inc., v. Samsung Electronics Co., LTD., et al</i> , 2:25-cv-00070 (E.D. Tex.), filed January 23, 2025
SAMSUNG-1005	IEEE P802.11ax/D1.0, IEEE Computer Society (November 2016), (“802.11ax/D1.0”)
SAMSUNG-1006	U.S. Patent Publication No. 2017/0367129 A1 to Yang (“Yang”)
SAMSUNG-1007	Patil et. al, IEEE 802.11-17/0250r2 (March 2017) (“802.11-17/0250r2”)
SAMSUNG-1008	Patil et al, IEEE 802.11-16/1415r0 (November 2016) (“802.11-16/1415r0”)
SAMSUNG-1009	U.S. Patent Publication No. 2018/0048427 A1 to Lou, et al. (“Lou”)
SAMSUNG-1010	IEEE Std 802.11-2016, IEEE Standard for Information Technology—Telecommunications and information exchange between systems, Local and metropolitan area networks—Specific requirements - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications, IEEE Computer Society (December 2016) (“802.11-2016”)
SAMSUNG-1011	Patil et al., IEEE 802.11-17-0230r1 (March 2017) (“802.11-17-0230r1”)

SAMSUNG-1012	Official IEEE 802.11 Working Group Project Timelines, https://ieee802.org/11/Reports/802.11_Timelines.htm
SAMSUNG-1013	Stanley, IEEE 802.11-16-1094r2 (September 2016)
SAMSUNG-1014	IEEE P802.11-REVmc/D8.0, IEEE Computer Society (August 2016) (“P802.11-REVmc/D8.0”)
SAMSUNG-1015	Second Declaration and Curriculum Vitae of Dr. Christopher J. Hansen, Ph.D.
SAMSUNG-1016	Declaration of June Ann Munford
SAMSUNG-1017	<i>Fintiv</i> Stipulation

LISTING OF CLAIMS

Claim 1	
[1.pre]	A wireless communication terminal wirelessly communicating with a base wireless communication terminal, the wireless communication terminal comprising:
[1.1]	a transceiver configured to transmit and receive wireless signals; and
[1.2]	a processor configured to process the wireless signals,
[1.3]	wherein the processor is configured to: receive a physical layer protocol data unit (PPDU) including a trigger frame for triggering transmission to the base wireless communication terminal, wherein the trigger frame indicates a resource unit (RU) which is allocated to the wireless communication terminal,
[1.4]	when a format of the PPDU including the trigger frame is a PPDU format in which at least one of physical layer signaling fields including a field for indicating a Basic Service Set (BSS) color is included, set a value of a BSS color to be indicated by a trigger-based PPDU based on the BSS color indicated by the field,
[1.5]	when the format of the PPDU including the trigger frame is a PPDU format in which any physical layer signaling field including the field for indicating the BSS color is not included, set the value of the BSS color to be indicated by the trigger-based PPDU according to an active BSS color of the wireless communication terminal, and
[1.6]	transmit the trigger-based PPDU based on the trigger frame,
[1.7]	wherein the active BSS color is a BSS color actually used by the wireless communication terminal and set by an Operation element,

[1.8]	wherein when the wireless communication terminal receives information on a BSS color change from the base wireless communication terminal and a BSS color change time point indicated by the information on the BSS color change is reached, the active BSS color is set to a value of a BSS color indicated by the information on the BSS color change, and
[1.9]	wherein the BSS color is one of identifiers identifying a BSS.
Claim 2	
[2]	The wireless communication terminal of claim 1, wherein the BSS color change time point is set based on a target beacon transmission time transmitted by the base wireless communication terminal.
Claim 3	
[3]	The wireless communication terminal of claim 1, wherein if the PPDU indicates a partial Basic Service Set (BSS) color using a Partial Association ID (AID) field, the processor determines whether the PPDU is an Intra-BSS PPDU or an Inter-BSS PPDU based on the partial BSS color when the value of the partial AID field is non-zero, wherein the partial AID field is a signaling field used to indicate a value obtained based on an AID value.
Claim 4	
[4.pre]	A method of operating a wireless communication terminal wirelessly communicating with a base wireless communication terminal, the method comprising:
[4.1]	receiving a physical layer protocol data unit (PPDU) including a trigger frame for triggering transmission to the base wireless communication terminal, wherein the trigger frame indicates a resource unit (RU) which is allocated to the wireless communication terminal,

[4.2]	when a format of the PPDU including the trigger frame is a PPDU format in which at least one of physical layer signaling fields including a field for indicating a Basic Service Set (BSS) color is included, setting a value of a BSS color to be indicated by a trigger-based PPDU based on the BSS color indicated by the field,
[4.3]	when the format of the PPDU including the trigger frame is a PPDU format in which any physical layer signaling field including the field for indicating the BSS color is not included, setting the value of the BSS color to be indicated by the trigger-based PPDU according to an active BSS color of the wireless communication terminal, and
[4.4]	transmitting the trigger-based PPDU based on the trigger frame,
[4.5]	wherein the active BSS color is a BSS color actually used by the wireless communication terminal and set by an Operation element,
[4.6]	wherein when the wireless communication terminal receives information on a BSS color change from the base wireless communication terminal and a BSS color change time point indicated by the information on the BSS color change is reached, the active BSS color is set to a value of a BSS color indicated by the information on the BSS color change, and
[4.7]	wherein the BSS color is one of identifiers identifying a BSS.

I. INTRODUCTION

Samsung Electronics Co., Ltd. (“Petitioner” or “Samsung”) petitions for IPR of claims 1-4 (“the Challenged Claims”) of U.S. Patent No. 12,004,262 (“the ’262 Patent”). Compelling evidence presented in this Petition demonstrates at least a reasonable likelihood that Samsung will prevail with respect to at least one of the Challenged Claims.

II. REQUIREMENTS FOR IPR UNDER 37 C.F.R. § 42.104

A. Grounds for Standing Under 37 C.F.R. § 42.104(a)

Petitioner certifies that the ’262 Patent is available for IPR. The present Petition is being filed within one year of service of a complaint in *Wilus Institute of Standards and Technology Inc., v. Samsung Electronics Co., LTD., et al*, 2:25-cv-00070 (E.D. Tex.), filed January 23, 2025. Petitioner is not barred or estopped from requesting this review challenging the Challenged Claims on the below-identified grounds.

B. Challenge Under 37 C.F.R. § 42.104(b) and Relief Requested

Petitioner requests an IPR of the Challenged Claims on the grounds set forth in the table shown below, and requests that each of the Challenged Claims be found unpatentable. Additional explanation and support for each ground of rejection is set forth in the Declaration of Dr. Christopher Hansen, Ph.D. (“Expert Declaration”), referenced throughout this Petition. *See* SAMSUNG-1003.

Ground	'262 Patent Claims	Basis for Rejection	Prior Art
1A	1-4	§ 103	802.11ax/D1.0
1B	1-4	§ 103	802.11ax/D1.0, Yang, 802.11-2016
2A	1, 2, 4	§ 103	Yang, 802.11-17/0250r2, 802.11-16/1415r0
2B	3	§ 103	Yang, 802.11-17/0250r2, 802.11-16/1415r0, 802.11-2016, and 802.11-17-0230r1

The '262 Patent is a continuation of an application filed October 1, 2019, which in turn is a continuation of an application filed April 16, 2018. SAMSUNG-1001, 1:9-20. The '262 Patent claims priority from several Korean applications respectively filed on April 14, 2017 or November 7, 2017. *Id.*

As discussed in further detail below (*infra*, Section V), each prior art reference that forms the basis of Grounds 1A-2B of this Petition qualifies as prior art with respect to the '262 Patent's earliest alleged priority date (April 14, 2017). Petitioner does not concede that any of the Challenged Claims are entitled to the benefit of the filing date of any of the alleged priority applications, but solely for purposes of this Petition, Petitioner treats April 14, 2017 as the Critical Date. SAMSUNG-1003, ¶¶24-307.

C. Claim Construction

Petitioner submits that no formal claim constructions are necessary because “claim terms need only be construed to the extent necessary to resolve the controversy.” *Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011). Petitioner reserves the right to respond to any constructions offered by Patent Owner or adopted by the Board. Petitioner is not conceding that each challenged claim satisfies all statutory requirements, nor is Petitioner waiving any arguments concerning claim scope or grounds that can only be raised in district court. For this petition, Petitioner applies prior art in a manner consistent with Patent Owner’s allegations of infringement before the district court. SAMSUNG-1003, ¶33; SAMSUNG-1013.

D. Level of Ordinary Skill in the Art

For purposes of this IPR, a person of ordinary skill in the art (“POSITA”) would have had a Bachelor’s degree in electrical engineering, computer engineering, computer science, or a related field, and at least 3 years of experience in the research, design or development of wireless communication devices, systems, and/or networks, or the equivalent, as of the Critical Date. SAMSUNG-1003, ¶30. Increased educational experience can make up for less work experience, and vice versa. *Id.*

III. SUMMARY OF THE '262 PATENT

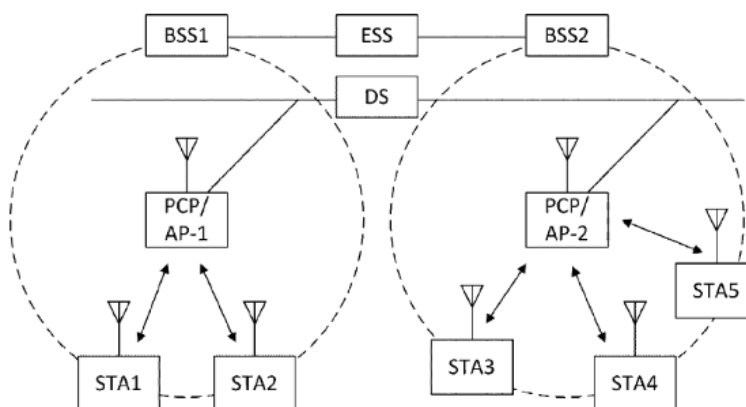
A. Brief Description

The '262 Patent relates to wireless LAN technology and generally describes “a wireless communication method and a wireless communication terminal using a BSS identifier.” SAMSUNG-1001, 1:24-26; SAMSUNG-1003, ¶¶56-66.

According to the '262 Patent, a “wireless LAN system includes one or more basic service sets (BSS),” where each “BSS represents a set of apparatuses which are successfully synchronized with each other to communicate with each other.”

SAMSUNG-1001, 7:20-8:17, FIGS 1-2.

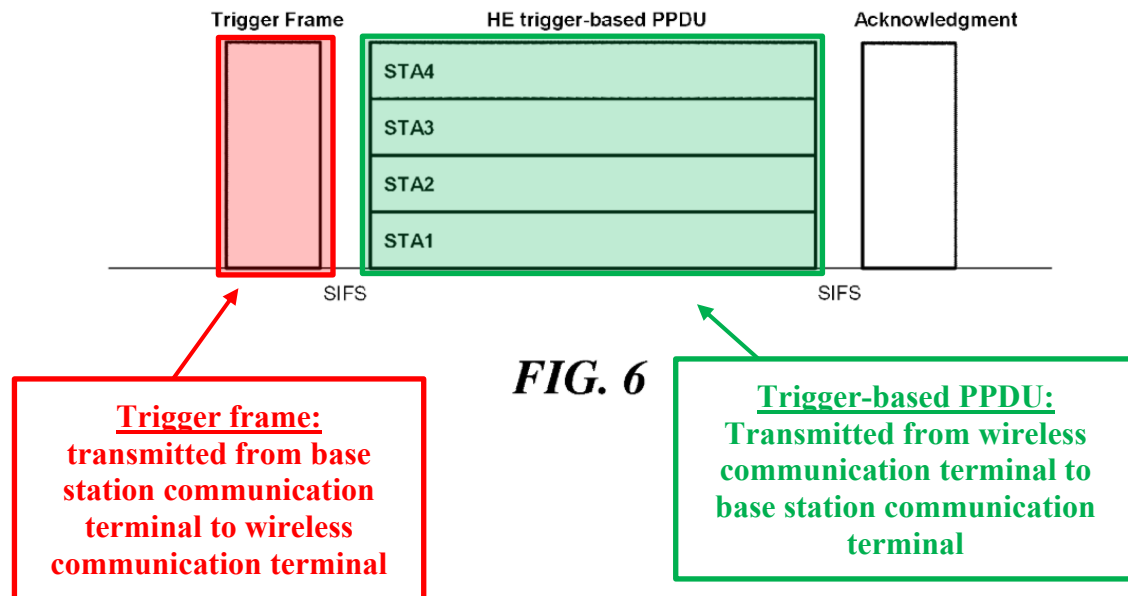
For instance, in an example “infrastructure BSS” shown in FIG. 1, an AP STA “AP-1” and three non-AP STAs “STA1,” “STA2,” and “STA3” are members of a first BSS “BSS1, and an AP STA “AP-2” and three non-AP “STA3,” STA4,” “STA5” are members of a second, different “BSS2.” SAMSUNG-1001, 7:31-36, FIG. 1.



SAMSUNG-1001, FIG. 1

The '262 Patent describes that a STA (e.g., an AP STA) can solicit data transmission from another STA (e.g., a non-AP STA) through the use of a trigger frame. SAMSUNG-1001, 11:31-12:8, FIG. 6.

For example, FIG. 6 shows example transmissions between a “base wireless communication terminal” (an alternative term for an AP STA) and a “wireless communication terminal” (an alternative term for a non-AP STA). *Id.*



SAMSUNG-1001, FIG. 6 (annotated)

In this example, “[t]he base wireless communication terminal may transmit a trigger frame including trigger information for triggering transmission of at least one wireless communication terminal.” SAMSUNG-1001, 11:35-38.

In response, “[a]t least one wireless communication terminal receiving the trigger frame ... may transmit a trigger based PPDU [physical layer protocol data unit] based on the trigger information,” such as “an HE [high efficiency] trigger-

based PPDU.” SAMSUNG-1001, 11:39-52.

Further, a PPDU having a trigger frame can include information regarding the identity of a specific BSS (referred to as the “BSS color”) for transmitting a responsive trigger-based PPDU. SAMSUNG-1001, 30:6-67, FIG. 14. *See also id.*, 20:1-2 (“the BSS color is one kind of BSS identifier”).

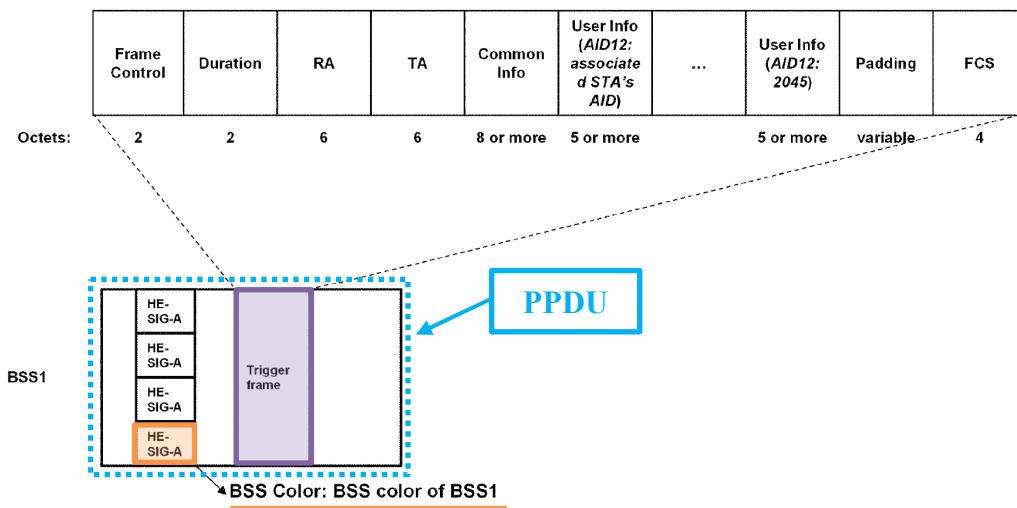


FIG. 14

SAMSUNG-1001, FIG. 14 (annotated)

For example, “[w]hen the PPDU including the trigger frame indicates a Basic Service Set (BSS) color, [a] wireless communication terminal ... may set a value of the BSS color indicated by the trigger-based PPDU based on the value of the BSS color indicated by the PPDU including the trigger frame.” SAMSUNG-1001, 54:25-30.

Alternatively, “[i]f the PPDU containing the trigger frame does not indicate

BSS color, the wireless communication terminal ... may set a value of the BSS color indicated by the trigger-based PPDU according to the active BSS color of the wireless communication terminal” (i.e., “the BSS color actually used by the wireless communication terminal”). SAMSUNG-1001, 54:30-37.

Further, the '262 Patent describes that a base communication terminal can initiate a change in BSS color. For example, “the wireless communication terminal ... may receive information on the BSS color change from the base wireless communication terminal,” including a “BSS color change time point.” SAMSUNG-1001, 54:37-44. “[W]hen the BSS color change time point indicated by the information on the BSS color change is reached, the wireless communication terminal ... may set the active BSS color to a value of the BSS color indicated by the information on the BSS color change.” *Id.*

B. Summary of the Prosecution History of the '262 Patent

The '262 Patent issued on June 4, 2024 from U.S. Patent Application No. 17/670,419 (“the '419 application”), which was filed on February 11, 2022 with four claims. SAMSUNG-1002, 746-751, 774-910; SAMSUNG-1003, ¶¶67-74.

After multiple rounds of rejections, the Examiner agreed to allow the '419 Application in view of (i) Applicant filing a terminal disclaimer with respect to parent patents, and (ii) Applicant’s assertion that the cited references failed to disclose or render obvious at least the following limitations recited in each of the

independent claims:

- (i) “when the format of the PPDU including the trigger frame is a PPDU format in which a physical layer signaling field including the field for indicating the BSS is not included, set the value of the BSS color indicated by the trigger-based PPDU according to an active BSS color of the wireless communication terminal,” and
- (i) “the active BSS color is a BSS color actually used by the wireless communication terminal and set by an Operation element.” SAMSUNG-1002, 218-220, 223-233, 245-436.

The Examiner also entered Applicant’s post-allowance amendment amending each of the independent claims as follows:

when a format of the PPDU including the trigger frame is a PPDU format in which at least one of physical layer signaling fields including a field for indicating a Basic Service Set (BSS) color is included, set a value of a BSS color to be indicated by a trigger-based PPDU based on ~~the value of the BSS color indicated by the PPDU including the trigger frame field,~~

when the format of the PPDU including the trigger frame is a PPDU format in which any physical layer signaling field including the field for indicating the BSS color is not included, set the value of the BSS color to be indicated by the trigger-based PPDU according to an active BSS color of the wireless communication terminal, and

SAMSUNG-1002, 18-19, 26-30.

Despite the allowance, there is no indication that the Examiner considered 802.11ax/D1.0, which renders obvious the Challenged Claims as set forth in Ground 1A. *See* Section IV.A.5. Further, although the Examiner indicated that he

considered Yang, there is no indication that the Examiner considered Yang in combination with 802.11ax/D1.0 and 802.11-2016, which renders obvious the Challenged Claims as set forth in Ground 1B. Indeed, the limitations that purportedly were not described in the references cited during prosecution are rendered obvious in view of at least 802.11ax/D1.0. *See* Section IV.A.5.a [1.5], [1.7].

Further, although the Examiner indicated that he had considered Yang and 802.11-16/1415r2 (a revised version of 802.11-16/1415r0 cited in this Petition), there is no indication that the Examiner considered Yang and either of 802.11-16/1415r0 or 802.11-16/1415r2 in combination 802.11-17/0250r2, 802.11-2016, or 802.11-17-0230r1, which renders obvious the Challenged Claims as set forth in Grounds 2B and/or 2C. Indeed, the limitations that purportedly were not described in the references cited during prosecution are rendered obvious in view of at least 802.11-17/0250r2. *See* Section IV.B.5.a [1.5], [1.7].

IV. THE CHALLENGED CLAIMS ARE UNPATENTABLE

A. [GROUNDS 1A-1B] – CLAIMS 1-4 ARE RENDERED OBVIOUS BY 802.11AX/D1.0 ALONE (GROUND 1A) OR IN COMBINATION WITH YANG AND 802.11-2016 (GROUND 1B)

802.11ax/D1.0 renders obvious all limitations of claims 1-4, either alone (Ground 1A) or in combination with Yang and 802.11-2016 (Ground 1B).

SAMSUNG-1003, ¶¶98-213.

1. Overview of 802.11ax/D1.0

802.11ax/D1.0 is a draft specification “[p]repared by the 802.11 Working Group of the LAN/MAN Standards Committee of the IEEE Computer Society,” and represents a proposed amendment to the then-existing “IEEE P802.11REVmc/D8.0” draft standard (e.g., to facilitate “high efficiency operation in frequency bands between 1 GHz and 6 GHz”), later finalized as 802.11-2016. SAMSUNG-1005, 1:1-2:7; SAMSUNG-1012 (“IEEE Std P802.11-2016” receiving final approval from the revision committee (“RevCom”) in December 2016 after ballot approval of draft D8.0 in September 2016); SAMSUNG-1013, Introduction (“P802.11REVmc Draft 8.0 ... approved by the 802.11 working group on 2016-09-14”); SAMSUNG-1003, ¶75. *See generally* SAMSUNG-1014 (having similar disclosure as 802.11-2016).

Among other features, 802.11ax/D1.0 proposes enhancements relating to basic service set (BSS) color. SAMSUNG-1003, ¶¶76-78. 802.11ax/D1.0 explains that “BSS Color is an identifier of the BSS and is used to assist a receiving STA [station] in identifying the BSS from which a PPDU originates,” and can be signaled between STAs in order to coordinate communications between them. SAMSUNG-1005, 36-39. A BSS can include a group of wireless devices that communicate with each other using a single access point (AP) (e.g., in

infrastructure mode) or directly with each other (e.g., in ad-hoc mode).

SAMSUNG-1003, ¶76.

For example, 802.11ax/D1.0 discloses that a first STA (e.g., an AP STA) can transmit a PPDU including a trigger frame to a second STA (e.g., a non-AP STA), which triggers the transmission of a responding “trigger-based PPDU” from the second STA to the first STA. SAMSUNG-1005, 167:42-170:16; SAMSUNG-1003, ¶77. *See also* SAMSUNG-1005, Section 27.5.2.3. Among other information, the trigger frame can include a field signaling the BSS color of the first STA, which allows the second STA to synchronize its communications with the first STA (e.g., by using the signaled BSS color for the trigger-based PPDU in responding to the first STA). SAMSUNG-1005, 226:22-27, 196:33-197-28.

802.11ax/D1.0 also discloses specific techniques that allow STAs to dynamically change BSS colors during operation (e.g., when an AP STA detects that other neighboring AP STAs are using the same BSS color). SAMSUNG-1005, 206:22-60; SAMSUNG-1003, ¶78. For example, 802.11ax/D1.0 discloses techniques that allow an AP STA to “announce” a BSS color change to one or more non-AP STAs, including timing information that coordinate the change in BSS color. *Id.*

2. Summary of Yang

Yang discloses “a system and method for digital communications,”

including “changing an identifier of a basic service set (BSS).” SAMSUNG-1006, [0001]; SAMSUNG-1003, ¶¶79-83.

Yang discloses an example “processing system” inducing a “processor” for performing these methods. SAMSUNG-1006, [0095], FIG. 12.

Yang also discloses a “host device” including “a transceiver” that is “adapted to transmit and receive signaling over a telecommunications network.” SAMSUNG-1006, [0098], FIG. 13.

3. Summary of 802.11-2016

802.11-2016 is a specification “[p]repared by the 802.11 Working Group of the LAN/MAN Standards Committee of the IEEE Computer Society.” SAMSUNG-1010, p.1; SAMSUNG-1003, ¶84. 802.11-2016 details, among other features, “[t]echnical corrections and clarifications to IEEE Std 802.11 for wireless local area networks (WLANs) as well as enhancements to the existing medium access control (MAC) and physical layer (PHY) functions,” and “gives users, in one document, the IEEE 802.11 standard for wireless local area networks (WLANs) with all of the amendments that have been published to date” (i.e., December 2016). SAMSUNG-1010, p.2, 10.

As discussed above, 802.11-2016 was published after the preceding “P802.11REVmc/D8.0” draft standard received (i) ballot approval from the 802.11 working group in September 2016 and (ii) final approval from the revision

committee in December 2016. Section IV.A.1; SAMSUNG-1005, 1:1-2:7;
SAMSUNG-1012; SAMSUNG-1013, Introduction; SAMSUNG-1003, ¶¶75, 85.

4. Combination of 802.11ax/D1.0, Yang, and 802.11-2016 (“D1.0-Yang-802.11-2016 Combination”) (Ground 1B)

Integration of Yang

As discussed in Section IV.A.1, 802.11ax/D1.0 proposes, among other features, enhancements relating to basic service set (BSS) color, including (i) configuring a trigger frame to include a field signaling the BSS color of a first STA, which allows a second STA to synchronize its communications with the first STA), and (ii) allowing STAs to dynamically change BSS colors during operation (e.g., by configuring an AP STA to “announce” a BSS color change to one or more non-AP STAs).

A POSITA would have understood that a STA as described in 802.11ax/D1.0 would be equipped with certain conventional components such as a transceiver configured to transmit and receive wireless signals and a processor configured to process the wireless signals, which would allow the STA to carry out the capabilities described in 802.11ax/D1.0. SAMSUNG-1003, ¶¶171-174. Such features are thus rendered obvious by 802.11ax/D1.0 alone. *Id.* Nonetheless, to the extent details of these components are not expressly disclosed in 802.11ax/D1.0, these features also would have been obvious in view of Yang. *Id.*

Like 802.11ax/D1.0, Yang describes techniques “for changing an identifier of a basic service set (BSS).” SAMSUNG-1006, [0001]. Further, Yang discloses specific components for performing these techniques, including (i) a “processing system” including a “processor” (SAMSUNG-1006, [0095], FIG. 12), and (ii) “a transceiver” that “may be installed in a host device” (SAMSUNG-1006, [0098], FIG. 13).

In view of Yang, a POSITA would have found it obvious to implement the techniques described by 802.11ax/D1.0 using conventional components like those described in Yang (e.g., a “processing system” and a “transceiver”). SAMSUNG-1003, ¶¶173-174. A POSITA would have sought to implement 802.11ax/D1.0’s STAs with such components as described in Yang to enhance and facilitate the processing and communication capabilities of the STAs. *Id.* Indeed, such components were commonly used to perform operations such as processing data in connection with wireless transmissions and/or transmitting and receiving wireless signals, and the components would have been beneficial to enable the STAs to implement the functions and capabilities described in 802.11ax/D1.0. *Id.* A POSITA would have reasonably expected success since these components were well known and commonly implemented in such STAs by the Critical Date. *Id.*

Integration of 802.11-2016

As discussed in Section IV.A.1, 802.11ax/D1.0 is a draft specification

representing a proposed amendment to the P802.11REVmc/D8.0 draft standard, which was later finalized as 802.11-2016. SAMSUNG-1005, 1:1-2:7; SAMSUNG-1012; SAMSUNG-1013. The proposed amendment at least in part “defines modifications to both the 802.11 physical layer (PHY) and the medium access control (MAC) sublayer for high efficiency operation in frequency bands between 1 GHz and 6 GHz.” SAMSUNG-1005, 2:1-3.

In view of 802.11ax/D1.0 and 802.11-2016, a POSITA would have understood that 802.11ax/D1.0 was specifically intended to modify certain features described in 802.11-2016 and/or include additional features beyond those described in 802.11-2016 (e.g., in order to provide “high efficiency operation in frequency bands between 1 GHz and 6 GHz, as described by 802.11-2016). SAMSUNG-1005, 2:1-3. Accordingly, a POSITA would have found it obvious to look to 802.11-2016 for details regarding pre-existing features not explicitly described in 802.11ax/D1.0 (e.g., by using 802.11-2016 as a starting point, and modifying and/or adding certain features as specified by 802.11ax/D1.0). SAMSUNG-1003, ¶¶175-176. The disclosures of 802.11ax/D1.0 and 802.11-2016 are complementary to each other, and it would have been obvious to combine their teachings to implement a more complete system. *Id.* A POSITA would have reasonably expected success combining 802.11ax/D1.0 and 802.11-2016, along with Yang, because the teachings of the references were well known and directed

to a common WLAN system. SAMSUNG-1003, ¶¶176.

5. Analysis

(a) Claim 1

802.11ax/D1.0 and the D1.0-Yang-802.11-2016 combination each independently render obvious claim 1 in Grounds 1A and 1B, respectively. SAMSUNG-1003, ¶¶99-145, 177-194. Petitioner addresses both grounds together in the analysis below for efficiency.

[1.pre]

To the extent that the preamble is limiting, 802.11ax/D1.0 and the D1.0-Yang-802.11-2016 combination render obvious [1.pre]. SAMSUNG-1003, ¶¶178-180, 230-231.

For example, 802.11ax/D1.0 discloses a “[h]igh efficiency (HE) STA”¹ configured to conduct wireless communications. SAMSUNG-1005, 9:1-65. *See also* SAMSUNG-1005, Section 28 “High Efficiency (HE) PHY specification” (e.g., SAMSUNG-1005, 212:45-58, describing “protocol functions” pertaining to “transmitting and receiving data through a wireless medium between two or more

¹ The term “STA” would be understood to include a “station” or device for wireless communications. SAMSUNG-1003, ¶101. *See also* SAMSUNG-1005, 6:41-42.

STAs”). As 802.11ax/D1.0 explains, the term “HE STA” can refer either to “an AP STA”² (*base wireless communication terminal*) or “a non-AP STA”³ (*wireless communication terminal wirelessly communicating with the base wireless communication terminal*). SAMSUNG-1005, 209:54; SAMSUNG-1003, ¶101.

Additionally, with respect to Ground 1B, Yang explains that “[t]he Institute of Electrical and Electronics Engineers (IEEE) Standard 802.11 is a set of physical (PHY) layer and media access control (MAC) layer specifications for implementing wireless fidelity (Wi-Fi) communications in the 2.4 GHz, 5 GHz, and 60 GHz frequency bands.” SAMSUNG-1006, [0002]. Further, Yang discloses that “[a] basic service set (BSS) provides the basic building-block of an 802.11 communications system,” and that “[i]n an infrastructure mode of 802.11,” a BSS may be formed by “an access point (AP)” (*a base wireless communication terminal*) and “one or more associated stations (STAs)” (*one or more wireless communication terminals wirelessly communicating with the base wireless communication terminal*). *Id.* See also SAMSUNG-1006, [0030]-[0031], FIG. 1.

² The term “AP STA” would be understood by a POSITA to refer to an “access point station” for wireless communications. SAMSUNG-1003, ¶101.

³ The term “non-AP STA” would be understood by a POSITA to refer to a station other than an access point station, such as a client device. SAMSUNG-1003, ¶101.

In view of Yang, a POSITA would have found it obvious to implement the features described in 802.11ax/D1.0, at least in part using STAs like those described in Yang. SAMSUNG-1003, ¶¶179-180.

[1.1]

802.11ax/D1.0 and the D1.0-Yang-802.11-2016 combination render obvious [1.1]. SAMSUNG-1003, ¶¶102-105, 181-183.

For example, 802.11ax/D1.0 discloses techniques that allow multiple “STAs” (e.g., a non-AP STAs) “to transmit simultaneously over the same frequency resource to the receiver,” a concept that is “very similar to SU-MIMO where multiple space-time streams are transmitted simultaneously over the same frequency resource utilizing spatial multiplexing through multiple antennas at the transmitter and receiver”) (*a transceiver configured to transmit and receive wireless signals*). SAMSUNG-1005, 239:56-62. Further, 802.11ax/D1.0 provides several “transmitter block diagrams,” each depicting example configurations of “blocks” or functional modules for transmitting wireless signals. *See generally* SAMSUNG-1005, 242:32-249:38.

To the extent that 802.11ax/D1.0 does not expressly disclose a “transceiver,” a POSITA would have found it obvious in view of 802.11ax/D1.0 to configure a STA (e.g., a non-AP STA) to include a transceiver, e.g., including “multiple antennas,” a “transmitter,” and a “receiver,” in order to facilitate the transmission

of wireless signals to and the reception of wireless signals from other devices, such as in accordance with 802.11ax/D1.0's example "transmitter block diagrams."

SAMSUNG-1005, 242:32-249:38; SAMSUNG-1003, ¶¶103-104.

Further, a POSITA would have appreciated that it was well-known by the Critical Date for a wireless device to include "a transceiver adapted to transmit and receive signaling over the telecommunications network," for example by "transmit[ting] and receiv[ing] signaling over a wireless medium" (*a transceiver configured to transmit and receive wireless signals*), as described by Yang.

SAMSUNG-1003, ¶¶105, 181-183; SAMSUNG-1006, [0098]-[0099], FIG. 13.

This would have been within the knowledge of a POSITA reviewing 802.11ax/D1.0 alone (Ground 1A) and is expressly addressed by the combination with Yang (Ground 1B). SAMSUNG-1003, ¶¶105, 181-183.

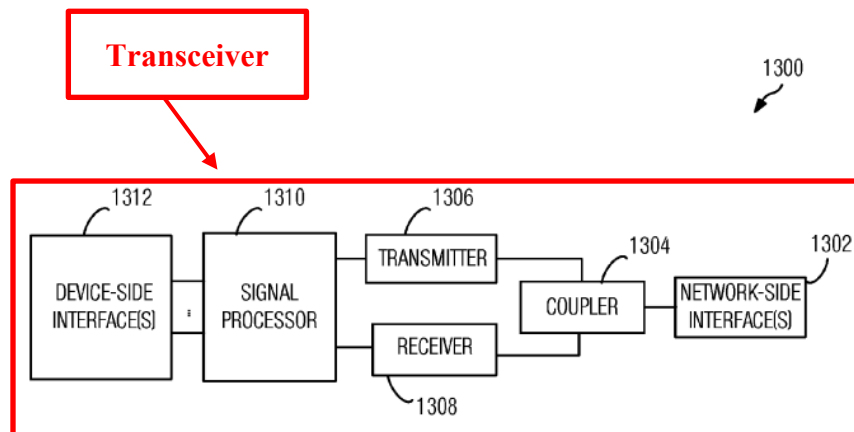


Fig. 13

SAMSUNG-1006, FIG. 13 (annotated)

To the extent that Yang does not expressly describe that the aforementioned components are included in a STA (wireless communication terminal), a POSITA would have found it obvious to configure a STA to include these components in order to facilitate wireless communications between the STA and other devices (e.g., an AP), such as to perform the methods described in Yang and/or 802.11ax/D1.0. SAMSUNG-1003, ¶183.

[1.2]

802.11ax/D1.0 and the D1.0-Yang-802.11-2016 combination render obvious [1.1]. SAMSUNG-1003, ¶¶106-109, 184-188.

As discussed with respect to [1.1], 802.11ax/D1.0 provides several “transmitter block diagrams,” each depicting example configurations of “blocks” or functional modules for transmitting wireless signals. *See generally* SAMSUNG-1005, Section 28.3.5.

To the extent that 802.11ax/D1.0 does not expressly disclose a “processor” configured to process wireless signals, a POSITA would have understood that it was commonplace to use one or more processors to perform computer operations like those recited in claim 1, as taught by Yang. SAMSUNG-1003, ¶¶107-108; SAMSUNG-1006, [0095] (“processor 1204”), [0098] (“signal processor 1310”). FIGS. 12-13. This would have been within the knowledge of a POSITA reviewing 802.11ax/D1.0 alone (Ground 1A) and is expressly addressed by the combination

with Yang (Ground 1B). SAMSUNG-1003, ¶¶184-187.

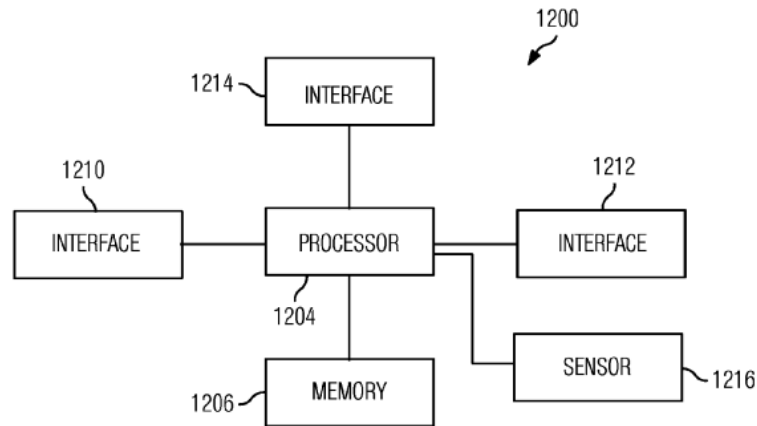


Fig. 12

SAMSUNG-1006, FIG. 12 (annotated)

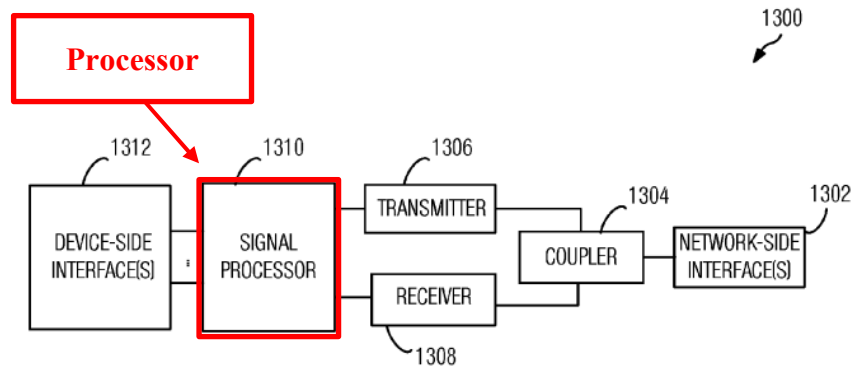


Fig. 13

SAMSUNG-1006, FIG. 13 (annotated)

A POSITA would have found it obvious in view of 802.11ax/D1.0 and also in view of Yang to configure a STA (e.g., a non-AP STA) to include a “*processor*” to facilitate at least the transmission of wireless signals to other devices, such as in

accordance with the operations depicted in 802.11ax/D1.0's "transmitter block diagrams." SAMSUNG-1003, ¶¶108, 187.

Further, a POSITA would have found it obvious in view of 802.11ax/D1.0 and also in view of the D1.0-Yang-802.11-2016 combination to configure such a processor to perform each of the operations recited in claim 1. *See* [1.3]-[1.7]; SAMSUNG-1003, ¶¶109, 188.

[1.3]

802.11ax/D1.0 and the D1.0-Yang-802.11-2016 combination render obvious [1.3]. SAMSUNG-1003, ¶¶110-115, 189.

802.11ax/D1.0 discloses that an HE AP (*base wireless communication terminal*) "uses [a] Trigger frame to initiate MU OFDMA or MU-MIMO transmissions in the UL direction." Further, 802.11ax/D1.0 discloses specific operation modes whereby a STA (e.g., a non-AP STA) (*wireless communication terminal*) sends a HE-trigger based PPDU in response to the Trigger frame. SAMSUNG-1005, 167:42-170:16 (e.g., "A STA shall not send an HE trigger-based PPDU unless it is explicitly triggered by an AP in one of the operation modes described in this subclause").

Specifically, "[t]he "Trigger frame identifies non-AP STAs [*wireless communication terminals*] participating in the MU UL transmissions and assigns transmission resources." SAMSUNG-1005, 9:60-65. For instance, a "Trigger

frame solicits and allocates resources for UL MU transmissions a SIFS after the PPDU that carries the Trigger frame” and “carries other information required by the responding STA to send an HE trigger-based PPDU.” SAMSUNG-1005, 41:36-39 (emphasis added).

In view of 802.11ax/D1.0, a POSITA would have understood that 802.11ax/D1.0’s STA (e.g., non-AP STA) *receives a PPDU including a trigger frame*, and in response to the trigger frame “send[s] a HE trigger-based PPDU (*...for triggering transmission to the base wireless communication terminal*). SAMSUNG-1003, ¶¶111-113. *See also* SAMSUNG-1005, 42:56-57 (describing the signaling of example parameters of a “HE trigger-based PPDU that is the response to the Trigger frame”); 43:7-48:17.

Further, a POSITA would have understood that such a trigger frame *indicates specific resource units that are allocated to the STA* (e.g., by “solicit[ing] and allocat[ing] resources” for the transmission of the trigger-based PPDU). SAMSUNG-1005, 41:36-39; SAMSUNG-1003, ¶114. For example, 802.11ax/D1.0 discloses that “[t]he frame format for the Trigger frame” includes one or more “User Info” fields. SAMSUNG-1005, 41:37-54, FIG. 9-52c.

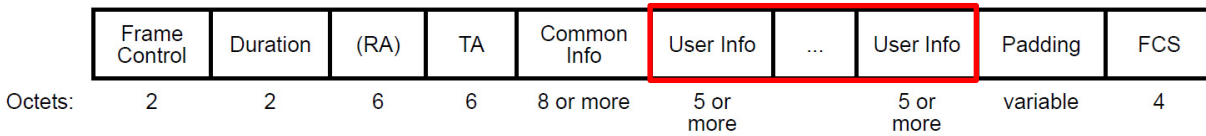


Figure 9-52c—Trigger frame

SAMSUNG-1005, FIG. 9-52c (annotated)

Further, 802.11ax/D1.0 discloses that a “User Info” field of the trigger frame includes a “RU Allocation subfield” that “indicates the RU used by the HE trigger-based PPDU” (*the trigger frame indicates a resource unit which is allocated to the wireless communication terminal*). SAMSUNG-1005, 45-19-46:56; FIG. 9-52e.

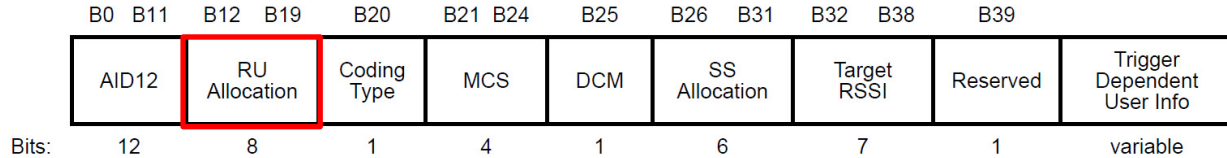


Figure 9-52e—User Info field

SAMSUNG-1005, FIG. 9-52e (annotated)

See also SAMSUNG-1005, Section 28.3.3.2 (defining specific “resource units (RUs)” for downlink and uplink transmission, such as for “HE trigger-based PPDU formats”); 172:32-34 (describing that, in certain “random access” use cases, a STA can “randomly select resource units (RUs) assigned by an AP in a soliciting Trigger frame that contains RUs for random access”); 45:34-43 (describing a “User Info field” in the trigger frame that “identifies an RU for random access” and a

“RU Allocation subfield in the User Info field” that “indicates that RU used by the HE-trigger-based PPDU”).

[1.4], [1.9]

802.11ax/D1.0 and the D1.0-Yang-802.11-2016 combination render obvious [1.4] and [1.9]. SAMSUNG-1003, ¶¶116-125, 190-193.

802.11ax/D1.0 discloses several different formats for a PPDU, including several “high efficiency” (HE) *physical layer PPDU formats*. SAMSUNG-1005, Sections 28.1.1 (“Clause 28 specifies the PHY entity for a high efficiency (HE) orthogonal frequency division multiplexing (OFDM) system”); Section 28.3.4 (describing several “HE PPDU formats”). *See also* SAMSUNG-1005, Section 28.1.4 (describing “PPDU formats” generally).

For example, 802.11ax/D1.0 discloses that HE physical layer PPDU formats (e.g., including an “HE SU PPDU,” an “HE extended range SU PPDU,” and “HE MU PPDU”) include an HE-SIG-A field including a “BSS Color field” indicating “an identifier of the BSS” (*at least one of physical layer signaling fields including a field for indicating a Basic Service Set (BSS) color is included ... wherein the BSS color is one of identifiers identifying a BSS*). SAMSUNG-1005, Table 28-16 (273:63), Table 28-17 (276:38).

B8-B13	BSS Color	6	The BSS Color field is an identifier of the BSS
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SAMSUNG-1005, Table 28-16 (HE-SIG-A field of an HE SU PPDU and HE
extended range SU PPDU) (273:63) (annotated)

B5-B10	BSS Color	6	The BSS Color field is an identifier of the BSS
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SAMSUNG-1005, Table 28-17 (HE-SIG-A field of an HE MU PPDU)
(276:38) (annotated)

For these HE PPDU formats, “[t]he structure of the PPDU transmitted by an HE STA is determined by TXVECTOR parameters” generated by the HE STA. SAMSUNG-1005, 213:31-35. Specifically, “[u]sing the TXVECTOR, the MAC [Media Access Control layer] supplies the PHY [Physical layer] with per-PPDU transmit parameters.” SAMSUNG-1005, 214, 11-12.

Further, a device (e.g., a STA) receiving a PPDU generates a corresponding RXVECTOR reporting the contents of the received PPDU. Specifically, “[u]sing the RXVECTOR, the PHY informs the MAC of the received PPDU parameters.” SAMSUNG-1005, 214, 11-12.

In view of 802.11ax/D1.0, a POSITA would have recognized that a device transmitting a PPDU would refer to a TXVECTOR for specific parameters to

include in the PPDU, and would include such parameters in one or more physical layer signaling fields in the PPDU (e.g., a HE-SIG-A field, including a BSS Color field). SAMSUNG-1003, ¶¶117-121.

Further, a POSITA would have recognized that a device receiving the PPDU generates an RXVECTOR reporting the parameters included in the received PPDU (e.g., the contents of a HE-SIG-A field, including a BSS Color field).

SAMSUNG-1003, ¶¶122, 192. *See also* SAMSUNG-1005, 369:33-37 (describing that a STA's "PHY entity shall report TXOP, BSS Color and check Format field" from a received HE-SIG-A); SAMSUNG-1010, Section 8.3.5.13 (describing that a "PHY-RXSTART.indication" primitive is used to "indicat[e] by the PHY to the local MAC entity that the PHY has received a valid start of a PPDU, including a valid PHY header" and includes a parameter "RXVECTOR" that "represents a list of parameters that the PHY provides the local MAC entity upon receipt of a valid PHY header."). The teachings from 802.11-2016 would have been within the knowledge of a POSITA thereby informing an understanding of 802.11ax/D1.0 (Ground 1A), and further would have been obvious to combine with 802.11ax/D1.0 (Ground 1B) for the reasons discussed above. *Supra*, §IV.A.4; SAMSUNG-1003, ¶¶122, 192.

Specifically, 802.11ax/D1.0 discloses that the TXVECTOR and the RXVECTOR can each include a field "BSS_COLOR," which "is an identifier of

the BSS and is used to assist a receiving STA in identifying the BSS from which a PPDU originates.” SAMSUNG-1005, 226:22-27, 196:33-197-28.

BSS_COLOR	FORMAT is HE_SU, HE_MU, HE_EXT_SU or HE_TRIG	Set to a value of the AP's choosing within the range 0 to 63 (see 27.11 (Setting TXVECTOR parameters for an HE PPDU)).	Y	Y
	Otherwise	Not present	N	N

SAMSUNG-1005, Table 28-1 (226:22-27) (annotated)

In view of 802.11ax/D1.0, a POSITA would have recognized that the “BSS_COLOR” field indicates either the contents of the BSS Color field of a PPDU that will be transmitted by the device (e.g., in the case of BSS_COLOR in a TXVECTOR) or the contents of the BSS Color field of a PPDU that was received by the device (e.g., in the case of BSS_COLOR in a RXVECTOR). SAMSUNG-1003, ¶¶123-124. The BSS_COLOR in an RXVECTOR at a non-AP STA, for example, would be set according to the BSS_COLOR provided in the trigger frame including the corresponding HE-SIG-A field having a BSS_COLOR field. *Id.*

802.11ax/D1.0 further discloses that a STA transmits a trigger-based PPDU differently, depending on whether the RXVECTOR includes the “BSS_COLOR” field (representing whether the trigger frame includes the corresponding HE-SIG-A field having a BSS Color field). SAMSUNG-1005, Section 27.5.2.3 (“STA behavior”). For example, “[a] STA transmitting an HE trigger-based PPDU in response to a Trigger frame sets the TXVECTOR parameter” of the HE trigger-

based PPDU differently based on criteria specified in 802.11ax/D1.0. *Id.* For the “BSS_COLOR” parameter specifically, “[i]f the preceding Trigger frame was received in an HE PPDU” (*when a format of the PPDU including the trigger frame is a PPDU format in which at least one of physical layer signaling fields including a field for indicating a Basic Service Set (BSS) color is included*), 802.11ax/D1.0 explains that the “BSS_COLOR” parameter of the TXVECTOR for the trigger-based PPDU is “set to the value of the RXVECTOR parameter BSS_COLOR of the HE PPDU” (*...set a value of a BSS color to be indicated by a trigger-based PPDU based on the BSS color indicated by the field*). That is, upon receiving a trigger frame having a BSS_COLOR parameter, the STA (i) reports the received BSS_COLOR parameter in an RXVECTOR, and (ii) generates a TXVECTOR for the responsive HE trigger-based PPDU that includes the same BSS_COLOR parameter. SAMSUNG-1003, ¶125.

[1.5], [1.7]

802.11ax/D1.0 and the D1.0-Yang-802.11-2016 combination render obvious [1.5] and [1.7]. SAMSUNG-1003, ¶¶126-133, 194.

As discussed above with respect to [1.4], 802.11ax/D1.0 discloses that a STA transmits a trigger-based PPDU differently depending on whether the RXVECTOR includes the “BSS_COLOR” field (representing whether the trigger frame includes the corresponding HE-SIG-A field having a BSS Color field).

SAMSUNG-1005, Section 27.5.2.3 (“STA behavior”).

In particular, 802.11ax/D1.0 discloses that in the RXVECTOR for a received PPDU, the “BSS_COLOR” field is included in HE PPDU formats (i.e., “HE_SU,” “HE_MU,” “HE_EXT_SU,” and “HE_TRIG”), and is otherwise “[n]ot present.”

SAMSUNG-1005, 226:23-27.

BSS_COLOR	FORMAT is HE_SU, HE_MU, HE_EXT_SU or HE_TRIG	Set to a value of the AP's choosing within the range 0 to 63 (see 27.11 (Setting TXVECTOR parameters for an HE PPDU)).	Y	Y
	Otherwise	Not present	N	N

SAMSUNG-1005, Table 28-1 (226:22-27) (annotated)

Further, “[i]f the Trigger frame was received in a non-HE PPDU” (i.e., in which the “BSS_COLOR” field of the RXVECTOR is “[n]ot present,” indicating an absence of a BSS Color field in the PPDU) (*when the format of the PPDU including the trigger frame is a PPDU format in which any physical layer signaling field including the field for indicating the BSS color is not included*), the “BSS_COLOR” parameter of the TXVECTOR for the trigger-based PPDU is “set to the value of the BSS Color subfield of the most recently received HE Operation element for that BSS.” (*...set the value of the BSS color to be indicated by the trigger-based PPDU according to an active BSS color of the wireless communication terminal, where the active BSS color is a BSS color actually used by the wireless communication terminal and set by an Operation element*).

SAMSUNG-1005, 168:15-16.

A POSITA would have understood that “the value of the BSS Color subfield of the most recently received HE Operation element for that BSS” (as disclosed by 802.11ax/D1.0), would have been “the active BSS color” that is “actually used by the wireless communication terminal and set by an Operation element,” as called for in [1.5]. SAMSUNG-1003, ¶¶127-130.

In particular, according to 802.11ax/D1.0, upon receiving a trigger frame with a HE-SIG-A field with a BSS Color field, a STA would transmit a trigger-based PPDU using the BSS color indicated by that BSS Color field, thereby “actually using” the indicated BSS color. *See* [1.4]; SAMSUNG-1003, ¶131. This BSS color also would have been indicated in a “BSS Color subfield of the HE Operation” transmitted to the STA. *See, e.g.,* SAMSUNG-1005, 196:36-52 (“[a]n HE STA transmitting an HE Operation element shall select a value in the range 1 to 63 to include in the BSS Color subfield of the HE Operation element that it transmits and shall maintain that single value of the BSS Color subfield for the lifetime of the BSS. An HE STA that transmitted an HE Operation element shall set the TXVECTOR parameter BSS_COLOR of an HE PPDU to the value indicated in the BSS Color subfield of its HE Operation element.”).

Further, 802.11ax/D1.0 teaches that if no further trigger frames having the BSS Color field are subsequently received (e.g., if the subsequent trigger frames

were non-HE PPDU that do not include the BSS Color Field in the HE-SIG-A field), the STA would continue using the most recently indicated BSS Color subfield in an “HE Operation element” transmitted to the STA, as 802.11ax/D1.0 teaches that the indicated BSS color subfield is intended to be “maintained ... for the lifetime of the BSS.” SAMSUNG-1005, 168:15-16, 196:36-52; SAMSUNG-1003, ¶132.

Petitioner’s mapping of [1.5] to 802.11ax/D1.0 is also consistent with the disclosure of the ’262 Patent regarding the use of an “active BSS color,” which may be set to “the value of the BSS Color field of the HE-SIG-A field of the PPDU and the value of the BSS Color field of the HE Operation element.” SAMSUNG-1005, 20:29-49; SAMSUNG-1003, ¶133.

[1.6]

802.11ax/D1.0 and the D1.0-Yang-802.11-2016 combination render obvious [1.6]. SAMSUNG-1003, ¶¶134-135, 195.

As discussed with reference to [1.3], 802.11ax/D1.0 discloses that a STA (e.g., a non-AP STA) (*wireless communication terminal*) sends a HE-trigger based PPDU in response to the Trigger frame (*transmit the trigger-based PPDU based on the trigger frame*). SAMSUNG-1005, 167:42-170:16 (e.g., “A STA shall not send an HE trigger-based PPDU unless it is explicitly triggered by an AP in one of the operation modes described in this subclause”). *See also* SAMSUNG-

1005, Section 27.5.2.3 (“A STA transmitting an HE trigger-based PPDU in response to a Trigger frame sets the TXVECTOR parameter as follows ...”).

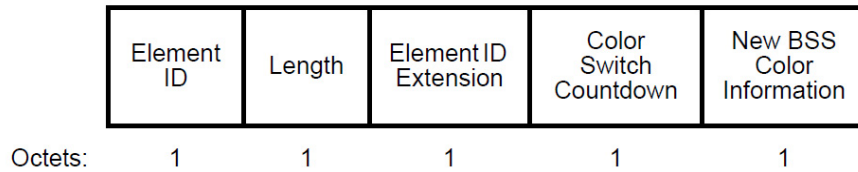
[1.8]

802.11ax/D1.0 and the D1.0-Yang-802.11-2016 combination render obvious [1.8]. SAMSUNG-1003, ¶¶136-145, 196.

802.11ax/D1.0 discloses “a HE AP [*base wireless communication terminal*] that sets up a BSS selects a BSS Color as defined in 27.11.4 (BSS_COLOR),” and “may choose to change the BSS Color under certain conditions” (e.g., when an “OBSS [overlapping BSS] AP in the neighborhood ... uses the same color as the BSS Color of its BSS”). SAMSUNG-1005, 206:24-27. *See also* SAMSUNG-1005, 190:6-9 (referring to “Overlapping basic service sets (OBSSs)”).

Specifically, “[a]n HE AP shall announce its decision to change the BSS Color via the BSS Color Change Announcement element which is carried in the Beacon, Probe Response and (Re)Association Response frames” and “may also advertise the BSS Color change event via the HE BSS Color Change announcement frame.” SAMSUNG-1005, 206:31-37.

An example of a “BSS Color Change Announcement element” is provided in 802.11ax/D1.0, Section 9.4.2.222. SAMSUNG-1005, 94:1-46.



SAMSUNG-1005, FIG. 9-589cx

Among other fields, “BSS Color Change Announcement element” includes a “Color Switch Countdown” field that “is set to the number of TBTTs that remain until the STA sending the BSS Color Change Announcement element switches to the new BSS Color.” SAMSUNG-1005, 94:22-26.

Further, 802.11ax/D1.0 discloses a specific mechanism for synchronizing the change in BSS color between an AP STA (*base wireless communication terminal*) and a non-AP STA (*wireless communication terminal*) based on the information included in the “BSS Color Change Announcement element.”

SAMSUNG-1005, 206:39-56. In particular:

BSS Color change TBTT is the one at which the Color Switch Countdown time has reached 0 and the BSS switches to the new color.

During the time leading up to the BSS Color change TBTT, an HE AP shall continue to advertise the existing BSS Color via the BSS Color subfield in HE Operation element.

At the BSS Color change TBTT, an HE AP shall:

- Set the BSS Color Disabled subfield in the HE Operation element to 0
- Start advertising the new BSS Color via BSS Color subfield in the HE Operation element
- Start using the new BSS color

A HE non-AP STA that receives a BSS Color Change Announcement element shall start using the BSS Color specified in the received BSS Color Change Announcement element subsequent to the BSS Color change TBTT.

SAMSUNG-1005, 206:39-56.

That is, 802.11ax/D1.0 discloses that a non-AP STA receives an announcement from an AP STA advertising a new BSS Color (e.g., via the “BSS Color Change Announcement”) (*the wireless communication terminal receives information on a BSS color change from the base wireless communication terminal*). SAMSUNG-1003, ¶¶137-142.

Further, when advertising the new BSS Color, the AP STA also provides the non-AP STA with timing information regarding when the BSS Color change information occurs (e.g., such that the non-AP STA can synchronize the BSS color change with the AP STA in order to maintain communications between them). SAMSUNG-1003, ¶143. In particular, the non-AP STA receives a “Color Switch Countdown” field that “is set to the number of TBTTs that remain until the STA sending the BSS Color Change Announcement element switches to the new BSS Color” (*a BSS color change time point*), and uses this field to determine the “BSS Color change TBTT ... at which the Color Switch Countdown time has reached 0 and the BSS switches to the new color.” SAMSUNG-1005, 206: 40-41; *see also infra*, Claim [2]; SAMSUNG-1005, 141:30-51; SAMSUNG-1010, pp. 694, 724.

Based on these teachings from 802.11ax/D1.0, a POSITA would have understood that upon receipt by the non-AP STA of the BSS color change announcement and upon reaching the indicated BSS color change time (*when the wireless communication terminal receives information on a BSS color change*

from the base wireless communication terminal and a BSS color change time point indicated by the information on the BSS color change is reached), the non-AP STA would start using the new BSS color (*...the active BSS color is set to a value of a BSS color indicated by the information on the BSS color change*). SAMSUNG-1003, ¶144. Indeed, as taught by 802.11ax/D1.0, this synchronized change in BSS color would allow devices to avoid BSS collisions (e.g., when neighboring AP STAs are using the same BSS color). SAMSUNG-1005, 206:22-60.

Petitioner's mapping of [1.8] to 802.11ax/D1.0 is also consistent with the disclosure of the '262 Patent regarding the changing of BSS color. *See, e.g.*, SAMSUNG-1005, 20:49-60. SAMSUNG-1003, ¶145.

(b) Claim 2

802.11ax/D1.0 and the D1.0-Yang-802.11-2016 combination render obvious [2]. SAMSUNG-1003, ¶¶146-148, 197-200.

As discussed with reference to [1.8], 802.11ax/D1.0 discloses that a non-AP STA receives, from a AP STA, a “BSS Color Change Announcement element” including a “Color Switch Countdown” field that “is set to the number of TBTTs that remain until the STA sending the BSS Color Change Announcement element switches to the new BSS Color” (*a target beacon transmission time transmitted by the base wireless communication terminal*), and uses this field to determine the

“BSS Color change TBTT ... at which the Color Switch Countdown time has reached 0 and the BSS switches to the new color” (*BSS color change time point is set based on a target beacon transmission time transmitted by the base wireless communication terminal*). SAMSUNG-1005, 94:22-26; 206:39-56.

Further, a POSITA would have recognized that it was commonplace for an AP STA to signal the TBTT to a non-AP STA. For example, 802.11ax/D1.0 discloses that “[a]n HE AP may transmit beacon frames” that indicate a “Beacon interval” representing the occurrence of each TBTT,” where “[t]he TBTT repeats every Beacon interval as indicated in the Beacon frame.” SAMSUNG-1005, 141:30-51; SAMSUNG-1003, ¶148. As confirmed by 802.11-2016, an AP STA transmits one or more beacon frames indicating a “Beacon interval,” which “represents the number of time units (TUs) between target beacon transmission times (TBTTs).” SAMSUNG-1010, p.694 (“Beacon frame format”); p.724 (“Beacon Interval field”); SAMSUNG-1003, ¶148. This would have been known and recognized by a POSITA reviewing 802.11ax/D1.0 (Ground 1A), and in any event, is explicitly addressed in the combination with 802.11-2016 (Ground 1B). SAMSUNG-1003, ¶¶148, 197-200.

In view of 802.11ax/D1.0, either alone in combination with 802.11-2016, a POSITA would have found it obvious for an AP STA to explicitly signal the TBTT to a non-AP STA, such that the non-AP STA can determine a specific time for a

BSS color change. SAMSUNG-1003, ¶¶146-148, 197-200.

(c) **Claim 3**

802.11ax/D1.0 and the D1.0-Yang-802.11-2016 combination render obvious [3]. SAMSUNG-1003, ¶¶149-165, 201-214.

First, 802.11ax/D1.0 discloses that, for some PPDU formats (e.g., formats other than “HE_SU,” “HE_MU,” HE_EXT_SU,” or “HE_TRIG”), a TXVECTOR and/or RXVECTOR parameter can include a field “PARTIAL_AID.”

SAMSUNG-1005, 223:11-17.

PARTIAL_AID	FORMAT is HE_SU, HE_MU, HE_EXT_SU or HE_TRIG	Not present	N	N
	Otherwise	See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters).		

SAMSUNG-1005, Table 28-1 (223:11-17) (annotated)

A POSITA would have recognized that by virtue of the “PARTIAL_AID” being present in the TXVECTOR used to populate parameters of a PPDU for transmission to another device (e.g., from an AP STA to a non-AP STA), the “PARTIAL_AID” would be included as a parameter in the transmitted PPDU to indicate the Partial AID (*a Partial Association ID (AID) field*). SAMSUNG-1003, ¶¶150-152. Similarly, a POSITA would have recognized that upon receipt of the PPDU, the receiving device (e.g., a non-AP STA) would report the Partial AID in the PPDU using the “PARTIAL_AID” in a RXVECTOR. SAMSUNG-1003,

¶¶150-152. *See also* [1.4], [1.9] *supra*.

Indeed, as confirmed by 802.11-2016, for a Very High Throughput (VHT) PPDU format (i.e., non-HE PPDU format), a PPDU includes a field VHT-SIG-A having a “NSTS/Partial AID” field for indicating a Partial AID in accordance with the TXVECTOR” (SAMSUNG-1010, Table 21-12 (p.2544).

B10-B21	NSTS/Partial AID	12	For a VHT MU PPDU: NSTS is divided into 4 user positions of 3 bits each. User position p, where $0 \leq p \leq 3$, uses bits $B(10 + 3p)$ to $B(12 + 3p)$. The number of space-time streams for user u are indicated at user position $p = \text{USER_POSITION}[u]$ where $u = 0, 1, \dots, \text{NUM_USERS} - 1$ and the notation $A[b]$ denotes the value of array A at index b. Zero space-time streams are indicated at positions not listed in the <code>USER_POSITION</code> array. Each user position is set as follows: - Set to 0 for 0 space-time streams - Set to 1 for 1 space-time stream - Set to 2 for 2 space-time streams - Set to 3 for 3 space-time streams - Set to 4 for 4 space-time streams - Values 5-7 are reserved For a VHT SU PPDU: B10-B12 - Set to 0 for 1 space-time stream - Set to 1 for 2 space-time streams - Set to 2 for 3 space-time streams - Set to 3 for 4 space-time streams - Set to 4 for 5 space-time streams - Set to 5 for 6 space-time streams - Set to 6 for 7 space-time streams - Set to 7 for 8 space-time streams B13-B21 Partial AID: Set to the value of the TXVECTOR parameter <code>PARTIAL_AID</code>. Partial AID provides an abbreviated indication of the intended recipient(s) of the PSDU (see 10.20).
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SAMSUNG-1010, Table 21-12 (annotated)

Further, in view of 802.11-2016, a POSITA would have recognized that a device receiving the PPDU would generate an RXVECTOR reporting the parameters included in the received PPDU (e.g., the contents of a VHT-SIG-A

field including “NSTS/Partial AID”). SAMSUNG-1003, ¶153; SAMSUNG-1010, p.2599 (first paragraph), Section 8.3.5.13 (describing that a “PHY-RXSTART.indication” primitive is used to “indicat[e] by the PHY to the local MAC entity that the PHY has received a valid start of a PPDU, including a valid PHY header” and includes a parameter “RXVECTOR” that “represents a list of parameters that the PHY provides the local MAC entity upon receipt of a valid PHY header.”), FIG. 21-37. This would have been known and recognized by a POSITA reviewing 802.11ax/D1.0 (Ground 1A), and in any event, is explicitly addressed in the combination with 802.11-2016 (Ground 1B). SAMSUNG-1003, ¶¶153, 202-204.

Further, a POSITA would have recognized that, as of the Critical Date, “PARTIAL_AID” in a TXVECTOR (an in turn, the value of the Partial AID field of a transmitted PPDU) was commonly determined based, at least in part, of a value of an AID field (*the partial AID field is a signaling field used to indicate a value obtained based on an AID value*). SAMSUNG-1003, ¶¶154-156, 205-207.

For example, 802.11ax/D1.0’s Table 28-1 refers to a “corresponding entry in Table 21-1”), which a POSITA would have understood to refer to Table 21-1 of P802.11-REVmc/D8.0 (and later, 802.11-2016) (SAMSUNG-1010), the base version of the 802.11 specification of which 802.11ax/D1.0 was intended to amend. SAMSUNG-1005, i:1-3; SAMSUNG-1003, ¶¶155-156, 206-207. The

relevant portion of Table 21-1 of 802.11-2016 is reproduced below:

Parameter	Condition	Value	TXVECTOR	RXVECTOR
GROUP_ID	FORMAT is VHT	Indicates the group ID. Integer: range 0-63 (see Table 21-12) A value of 0 or 63 indicates a VHT SU PPDU. A value in the range 1 to 62 indicates a VHT MU PPDU.	Y	Y
	Otherwise	Not present	N	N
PARTIAL_AID	FORMAT is VHT and GROUP_ID is 0 or 63	Provides an abbreviated indication of the intended recipient(s) of the PSDU (see 10.20). Integer: range 0-511.	Y	Y
	Otherwise	Not present	N	N

SAMSUNG-1010, Table 21-1 (p.2506)

As shown above, the “PARTIAL_AID” field, when present, “[p]rovides an abbreviated indication of the intended recipient(s) of the PSDU (see 10.20 (Group ID and partial AID in VHT PPDU)),” and includes an integer in a “range 0-511.” SAMSUNG-1010, Table 21-1 (p.2506). Further, as shown in Table 10-9 of 802.11-2016’s Section 10-20, the “PARTIAL_AID” (and in turn the Partial AID field of the transmitted PPDU) is calculated based on an “AID” field (*the partial AID field is a signaling field used to indicate a value obtained based on an AID value*) when a PPDU is either (i) “[s]ent by an AP and addressed to a STA associated with that AP,” or (ii) “sent by a DLS or TDLS STA in a direct path to a DLS or TDLS peer STA.” SAMSUNG-1010, Table 10-9 (p.1374). *See also* SAMSUNG-1009, [0081]-[0082], FIG. 6; SAMSUNG-1003, ¶157.

Table 10-9—Settings for the TXVECTOR parameters GROUP_ID and PARTIAL_AID

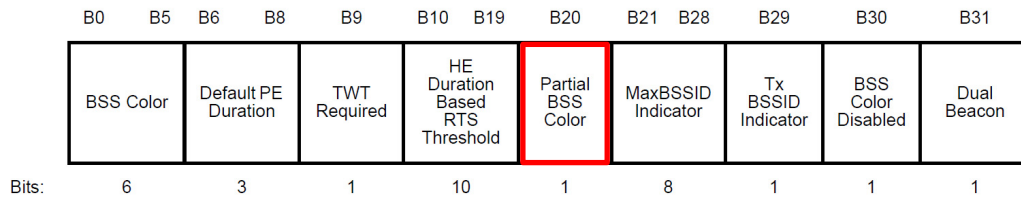
Condition	GROUP_ID	PARTIAL_AID
Addressed to AP	0	BSSID[39:47]
Addressed to Mesh STA	0	RA[39:47]
Sent by an AP and addressed to a STA associated with that AP or sent by a DLS or TDLS STA in a direct path to a DLS or TDLS peer STA	63	$(AID + (BSSID[44:47] \oplus BSSID[40:43]) \times 2^5) \bmod 2^9 (10-12)$
Otherwise (see NOTE)	63	0
NOTE—The last row covers the following cases: — A PPDU sent to an IBSS STA — A PPDU sent by an AP to a non associated STA — Any other condition not explicitly listed elsewhere in the table		

**Partial AID field obtained
based on an AID value**

SAMSUNG-1010, Table 10-9 (annotated)

Second, 802.11ax/D1.0 discloses that a non-AP STA can determine whether a PPDU is an Intra-BSS PPDU or an Inter-BSS PPDU based on a partial BSS color indicated with the “PARTIAL_AID” field. SAMSUNG-1003, ¶¶158-162, 208-212.

For example, 802.11ax/D1.0 discloses that a “HE Operation element” includes several fields for providing a STA (e.g., a non-AP STA) with parameters regarding BSS color, including a “Partial BSS Color field [that] indicates whether or not the BSS applies an AID assignment rule using the partial BSS color bits.” SAMSUNG-1005, 91:26-37, 92:1-5.



SAMSUNG-1005, FIG. 9-589cr (91:26-37)

Specifically, “[i]f the Partial BSS Color field is set to 1, then the 4 least significant bits of BSS color are used in AID assignment.” SAMSUNG-1005, 912:1-5. However, “[i]f the Partial BSS Color field is set to 0, no partial BSS color bits are used in the AID assignment.” *Id.*

Further, 802.11ax/D1.0 discloses that when “[t]he value of RXVECTOR parameter PARTIAL_AID [5:8] in the received VHT PPDU with the RXVECTOR parameter GROUP_ID equal to 63 is the same as the partial BSS color announced by the AP to which the STA is associated when the Partial BSS Color field in the most recently received HE Operation element is 1,” a frame is a “intra-BSS frame.” SAMSUNG-1005, 149:23-41. In view of 802.11ax/D1.0, a POSITA would have understood that, in such a situation, a received PPDU (including its constituent frames) would have been an intra-BSS PPDU. SAMSUNG-1003, ¶¶161, 211.

However, when “[t]he value of RXVECTOR parameter PARTIAL_AID [5:8] in the received VHT PPDU with the RXVECTOR parameter GROUP_ID equal to 63 is different from the partial BSS color announced by the AP to which

the STA is associated when the Partial BSS Color field in the most recently received HE Operation element is 1,” a frame is a “inter-BSS frame.”

SAMSUNG-1005, 149:46-150:8-12. In view of 802.11ax/D1.0, a POSITA would have understood that, in such a situation, a received PPDU (including its constituent frames) would have been an inter-BSS PPDU. SAMSUNG-1003, ¶¶162, 212.

Further, a POSITA would have understood or found it obvious to make the aforementioned determination whether a PPDU is an Intra-BSS PPDU or an Inter-BSS PPDU based on the partial BSS color, *specifically when the value of the partial AID field is non-zero*. SAMSUNG-1003, ¶¶163-165, 213-214. For example, as confirmed by 802.11-2016, a POSITA would have recognized that it was commonplace to set “PARTIAL_AID” to zero to indicate situations where “[a] PPDU [is] sent to an IBSS STA,” “[a] PPDU [is] sent by an AP to a non associated STA,” or “[a]ny other condition not explicitly listed elsewhere in the table.” SAMSUNG-1010, Table 10-9 (p.1374). *See, also* SAMSUNG-1009, [0081]-[0082], FIG. 6; SAMSUNG-1003, ¶157.

Table 10-9—Settings for the TXVECTOR parameters GROUP_ID and PARTIAL_AID

Condition	GROUP_ID	PARTIAL_AID
Addressed to AP	0	BSSID[39:47]
Addressed to Mesh STA	0	RA[39:47]
Sent by an AP and addressed to a STA associated with that AP or sent by a DLS or TDLS STA in a direct path to a DLS or TDLS peer STA	63	$(\text{AID} + (\text{BSSID}[44:47] \oplus \text{BSSID}[40:43]) \times 2^5) \bmod 2^9$ (10-12)
Otherwise (see NOTE)	63	0
NOTE—The last row covers the following cases: — A PPDU sent to an IBSS STA — A PPDU sent by an AP to a non associated STA — Any other condition not explicitly listed elsewhere in the table		

Partial AID field set to zero to signal specific edge cases

SAMSUNG-1010, Table 10-9

A POSITA would have recognized that in these specific situations identified by 802.11-2016, the “PARTIAL_AID” is set to a pre-determined value (i.e., zero) to indicate the occurrence of certain specific edge cases (e.g., a PPDU being sent by IBSS STA or to a non associated STA) rather than to indicate a value derived based on a BSSID and/or AID. Thus, a POSITA would have recognized that when the “PARTIAL_AID” is zero, it would not have been logical to use the aforementioned technique in 802.11ax/D1.0 (which relies on a PARTIAL_AID having a value derived based on a BSSID and/or AID) to determine whether a PPDU is an Intra-BSS PPDU or an Inter-BSS PPDU. SAMSUNG-1003, ¶¶165, 214.

(d) Claim 4

802.11ax/D1.0 and the D1.0-Yang-802.11-2016 combination render obvious

claim 4. SAMSUNG-1003, ¶¶166-168, 215.

To the extent that the preamble is limiting, 802.11ax/D1.0 and/or the D1.0-Yang-802.11-2016 combination render obvious [4.pre]. SAMSUNG-1003, ¶¶167-
.

As discussed with reference to [1.pre], 802.11ax/D1.0 discloses a “[h]igh efficiency (HE) STA” configured to conduct wireless communications, such as in “frequency bands between 1 GHz and 5 GHz. SAMSUNG-1005, 9:1-65. *See also* SAMSUNG-1005, Section 28 “High Efficiency (HE) PHY specification” (e.g., SAMSUNG-1005, 212:45-58, describing “protocol functions” pertaining to “transmitting and receiving data through a wireless medium between two or more STAs”). As 802.11ax/D1.0 explains, the term “HE STA” can refer either to “an AP STA” (*base wireless communication terminal*) or “a non-AP STA”⁴ (*wireless communication terminal wirelessly communicating with the base wireless communication terminal*). SAMSUNG-1005, 209:54; SAMSUNG-1003, ¶167.

Further, 802.11ax/D1.0 and the D1.0-Yang-802.11-2016 combination each renders obvious a method of operating a wireless communication terminal in accordance with claim 4 for the reasons described above with respect to claim 1

⁴ The term “non-AP STA” would be understood by a POSITA to refer to a station other than an access point station, such as a client device. SAMSUNG-1003, ¶167.

elements. *See* [1.3]-[1.9]. SAMSUNG-1003, ¶¶168, 215.

**B. [GROUND 2A] – CLAIMS 1, 2, AND 4 ARE RENDERED
OBVIOUS BY YANG IN VIEW OF 802.11-17/0250R2
AND 802.11-16/1415R0**

The combined teachings of Yang in view of 802.11-17/0250r2 and 802.11-16/1415r0 render obvious claims 1, 2, and 4. SAMSUNG-1003, ¶¶216-284.

1. Overview of Yang

As discussed with reference to Ground 1B, Yang discloses “a system and method for digital communications, and, in particular embodiments, to a system and method for changing an identifier of a basic service set (BSS).” SAMSUNG-1006, [0001]; *supra*, §IV.A.2; SAMSUNG-1003, ¶¶79-83.

Moreover, Yang discloses a technique whereby an AP triggers a transmission by a non-AP through the use of a trigger frame. Specifically, Yang discloses that an AP “may send a Trigger frame to [a] trigger station to transmit on the UL as a part of an UL MU transmission,” and “[s]ubsequently, [the] station ... transmits a HE Trigger-based PPDU.” SAMSUNG-1006, [0047], FIG. 2D. Further, the “Trigger frame” “grants the station a UL transmission opportunity” (e.g., to transmit a trigger-based PPDU to the AP in response to the trigger frame). SAMSUNG-1006, [0049].

Further, Yang discloses several different “high efficiency (HE) physical (PHY) protocol data unit (PPDU) formats,” each of which includes an “HE-SIG-A

field' with "a BSS Color subfield, which contains a 6-bit identifier of the BSS (referred to as a BSS Color) that the transmitting station or AP belongs to."

SAMSUNG-1006, [0032], [0034], FIGS. 2A-2D. Specifically, "[t]he BSS Color is used to assist a receiving station or AP in identifying the BSS from which the received PPDU originates so that the station may use the channel access rules for spatial reuse or may enter a doze state of a power save (PS) mode." SAMSUNG-1006, [0034].

2. Overview of 802.11-17/0250r2

802.11-17/0250r2 is a document submitted for consideration by the IEEE 802.11 working group in connection with the development of the IEEE 802.11ax standard. SAMSUNG-1007, Title, p.2; SAMSUNG-1005, Section 27.5.2; SAMSUNG-1003, ¶¶86-89.

Among other features, 802.11-17/0250r2 discloses specific techniques for signaling BSS color between an AP and a STA in the context of trigger-based PPDU transmissions. SAMSUNG-1007, p.17-20. In particular, as discussed in below, 802.11-17/0250r2 discloses that "[a] non-AP HE STA transmitting an HE trigger-based PPDU in response to a Trigger frame sets a TXVECTOR parameter" differently depending on certain conditions, such as whether the "Trigger frame" has a "BSS Color subfield." SAMSUNG-1007, p. 17.

3. Overview of 802.11-16/1415r0

802.11-16/1415r0 is a document submitted for consideration by the IEEE 802.11 working group in connection with the development of the 802.11ax standard. SAMSUNG-1008, Title, p.2; SAMSUNG-1003, ¶¶90-94.

Among other features, 802.11-16/1415r0 discloses a “BSS Color Change Procedure” that allows an AP to cause a new BSS color to be used at a specific time by each device of the BSS, and without requiring the use of an additional “Transitory BSS Color.” *See generally* SAMSUNG-1008.

In particular, 802.11-16/1415r0 discloses a “BSS Color Change Announcement element [that] is used by an HE AP to advertise a BSS Color change and the value of the new BSS color.” SAMSUNG-1008, p.6 (reproduced below).

	Element ID	Length	Element ID Extension	Color Switch Countdown	New BSS Color Information
Octet:	1	1	1	1	1

SAMSUNG-1005, p.6

Further, when advertising the new BSS Color, the AP STA also provides the non-AP STA with timing information (“Color Switch Countdown”) regarding when the BSS Color change information occurs (e.g., such that the non-AP STA can synchronize the BSS color change with the AP STA in order to maintain

communications between them). SAMSUNG-1003, ¶94.

4. Combination of Yang, 802.11-17/0250r2, and 802.11-16/1415r0

Integration of 802.11-17/0250r2

As discussed above, Yang discloses techniques for changing the BSS color that is used by an AP and a STA during communications (e.g., to avoid BSS color collisions with an “overlapping” BSS (OBSS)). *See, e.g.*, SAMSUNG-1006, [0050]-[0050]). To the extent that Yang does not expressly describe how a BSS color is initially selected by an AP and communicated to a STA, Yang nevertheless indicates that, in at least some circumstances, the BSS color indicated in the “Trigger frame” would be used in the responsive trigger-based PPDU transmitted by the STA to the AP. SAMSUNG-1006, [0047] (describing a scenario in which an AP transmits a trigger frame to a STA, which may be transmitted according to a HE PPDU format including a field indicating a BSS color, as discussed with reference to [1.3], and in response the STA transmits an HE Trigger-based PPDU with the BSS Color subfield in the HE-SIG-A field set to the BSS color of the AP).

In view of Yang, a POSITA would have looked to other references for specific guidance regarding how an initial BSS color can be signaled by an AP to a STA. SAMSUNG-1003, ¶¶217-219. One such reference is 802.11-17/0250r2, which discloses specific techniques for signaling BSS color between an AP and a

STA in the context of trigger-based PPDU transmissions. SAMSUNG-1007, p.17-20.

For example, as discussed above, 802.11-17/0250r2 discloses that “[a] non-AP HE STA transmitting an HE trigger-based PPDU in response to a Trigger frame sets a TXVECTOR parameter” differently, depending on whether the PPDU includes a “BSS_COLOR parameter.” SAMSUNG-1007, p. 17.

In view of 802.11-17/0250r2, a POSITA would have configured Yang’s system to perform initial BSS color signaling in accordance with 802.11-17/0250r2 technique (e.g., based on BSS color signaling in a PPDU having a trigger frame soliciting a trigger-based PPDU), in order to facilitate the coordination of BSS color between an AP and a STA. SAMSUNG-1003, ¶¶220-221.

For example, in view of 802.11-17/0250r2, a POSITA would have found it obvious to configure the STA such that, “[i]f the preceding Trigger frame was received in an HE PPDU,” the “BSS_COLOR” parameter of the TXVECTOR for the trigger-based PPDU is “set to the value of the RXVECTOR parameter BSS_COLOR of the HE PPDU” (representing the BSS color identified in the BSS Color subfield of the HE-SIG-A field of the received PPDU). SAMSUNG-1007, p. 17; SAMSUNG-1003, ¶222.

Further, view of 802.11-17/0250r2, a POSITA would have found it obvious to configure the STA such that, “[i]f the Trigger frame was received in a non-HE

PPDU” (i.e., in which the “HE-SIG-A field” with “a BSS Color subfield” is not present), the “BSS_COLOR” parameter of the TXVECTOR for the trigger-based PPDU is “set to the value of the BSS Color subfield of the most recently received HE Operation element for that BSS.” SAMSUNG-1007, p.17; SAMSUNG-1003, ¶223.

A POSITA would have recognized that employing such a technique in Yang’s system would be beneficial, as it allows an AP and STA to synchronize the use of BSS color between them under a wide variety of circumstances (e.g., in both situations in which the triggering PPDU explicitly indicates BSS color and situations in which the trigger PDDU does not explicitly indicate BSS color). Accordingly, the communications between the AP and STA can be maintained in a more reliable manner. A POSITA would have reasonably expected success implementing the combination because the techniques were well known and directed to a common WLAN system. SAMSUNG-1003, ¶224.

Integration of 802.11-16/1415r0

Yang discloses techniques that “allow an AP to change a BSS Color value used in the BSS that the AP serves, e.g., when a BSS Color collision occurs.” SAMSUNG-1006, [0050]. As an example, Yang discloses that “an AP initiates a BSS Color Change procedure when there is a need to change the current BSS Color value of the BSS that the AP serves,” which an example of which includes

two “stages.” SAMSUNG-1006, [0051].

During the first stage, “the AP uses a pre-specified Transitory BSS Color value to set the BSS Color subfield in the HE-SIG-A field of the DL HE PPDU transmitted by the AP as soon as the AP determines to change the BSS Color value, e.g., after the detection of a collision with the current BSS Color value.” SAMSUNG-1006, [0051].

During the second stage, “the AP uses the new BSS Color value to set the BSS Color subfield in the HE-SIG-A field of the DL HE PPDU that the AP transmits after the one or more conditions, as mentioned above, are met.” SAMSUNG-1006, [0054]. Yang discloses that one such condition can include the expiration of “a time T.” SAMSUNG-1006, [0053].

In view of Yang, a POSITA would have recognized that allowing an AP to switch BSS color is beneficial, as it allows the BSS to avoid collisions (e.g., with other BSSs having the same BSS color). SAMSUNG-1003, ¶¶225-228. However, a POSITA would have recognized several deficiencies in Yang’s BSS change color technique, including (i) requiring the use of a “Transitory BSS Color” (thereby increasing the number of BSS colors that are in use, which may be undesirable for a dense networking environment with many other BSSs in close proximity and many BSS colors may already be in use), and (ii) an inability for the AP to select a specific time at which the STAs switch to the new BSS. SAMSUNG-1003, ¶228.

To address these deficiencies, a POSITA would have looked to other references regarding alternative techniques for coordinating a BSS color switch between an AP and a STA. SAMSUNG-1003, ¶229. One such reference is 802.11-16/1415r0, which discloses a “BSS Color Change Procedure” that allows an AP to cause a new BSS color to be used at a specific time by each device of the BSS, and without requiring the use of an additional “Transitory BSS Color.” *See generally* SAMSUNG-1008.

In view of 802.11-16/1415r0, a POSITA would have found it obvious to modify Yang’s system to perform 802.11-16/1415r0’s “BSS Color Change Procedure” instead, in order to (i) avoid the use of “Transitory BSS Colors” (thereby reducing the number of BSS that are in use), and (ii) allow an AP to select specific time at which the STAs switch to a new BSS (thereby allowing the AP and STAs to remain synchronized in time with respect to BSS color changes). SAMSUNG-1003, ¶230. A POSITA would have reasonably expected success implementing the combination because the techniques were well known and directed to a common WLAN system. SAMSUNG-1003, ¶230.

5. Analysis

(a) Claim 1

Yang, 802.11-17/0250r2, and 802.11-16/1415r0 render obvious claim 1. SAMSUNG-1003, ¶¶231-275.

[1.pre]

To the extent that the preamble is limiting, the Yang-0250r2-1415r0 combination renders obvious [1.pre]. SAMSUNG-1003, ¶¶232-233. *See* Section IV.A.5.a [1.pre] (discussing Yang’s disclosure with respect to [1.pre]).

[1.1]

The Yang-0250r2-1415r0 combination renders obvious [1.1]. SAMSUNG-1003, ¶¶234-236. *See* Section IV.A.5.a [1.1] (discussing Yang’s disclosure with respect to [1.1]).

[1.2]

The Yang-0250r2-1415r0 combination renders obvious [1.2]. SAMSUNG-1003, ¶¶237-241. *See* IV.A.5.a [1.2] (discussing Yang’s disclosure with respect to [1.2]). In view of Yang, 802.11-17/0250r2, and 802.11-16/1415r0, a POSITA would have found it obvious to configure Yang’s processor(s) to perform each of the operations recited in claim 1. *See* [1.3]-[1.7]; SAMSUNG-1003, ¶241.

[1.3]

The Yang-0250r2-1415r0 combination renders obvious [1.3]. SAMSUNG-1003, ¶¶242-245.

For example, Yang discloses that an AP “may send a Trigger frame to [a] trigger station to transmit on the UL as a part of an UL MU transmission,” and “[s]ubsequently, [the] station ... transmits a HE Trigger-based PPDU.”

SAMSUNG-1006, [0047], FIG. 2D. Further, Yang discloses that a “Trigger frame” can be included in an “DL [downlink] HE PPDU” that is received by a STA from an AP. SAMSUNG-1006, [0066] (describing that a “DL HE PPDU” can “include a Trigger frame that triggers the UL MU transmission” from the STA to the AP) *(receive a physical layer protocol data unit (PPDU) including a trigger frame for triggering transmission to the base wireless communication terminal)*. SAMSUNG-1006, [0066].

Further, Yang discloses that a “Trigger frame” may “grant[] the station a UL transmission opportunity.” SAMSUNG-1006, [0049]. In view of Yang, a POSITA would have understood that a “transmission opportunity” would include specific network resources (e.g., time and/or frequency resources) that are allocated to the station for transmitting an uplink signal *(the trigger frame indicates a resource unit (RU) which is allocated to the wireless communication terminal)*. SAMSUNG-1003, ¶244.

Further, in view of 802.11-17/0250r2, a POSITA also would have understood that a “trigger frame” indicates one or more resource units allocated to a STA. SAMSUNG-1003, ¶245. Like Yang, 802.11-17/0250r2 discloses techniques relating to the transmission of a HE trigger-based PPDU in response to a received trigger frame. SAMSUNG-1007, p.17-20 (describing the trigger of a “HE trigger-based PPDU” by an AP). Further, 802.11-17/0250r2 discloses that an

“eliciting Trigger frame” may include a “RU [resource unit] Allocation field” (e.g., for indicating a resource unit allocation to a STA). SAMSUNG-1007, p.18. In view of 802.11-17/0250r2, a POSITA would have recognized Yang’s “Trigger unit” includes a field that explicitly indicates a resource unit allocation to the STA, and indeed this further would have been obvious to coordinate the transmission of a responsive HE trigger-based PPDU by the STA to the AP. SAMSUNG-1003, ¶245.

[1.4], [1.9]

The Yang-0250r2-1415r0 combination renders obvious [1.4] and [1.9]. SAMSUNG-1003, ¶¶246-252.

To start, Yang discloses several different “high efficiency (HE) physical (PHY) protocol data unit (PPDU) formats.” SAMSUNG-1006, [0032], FIGS. 2A-2D. Further, Yang discloses that each of the HE PHY PPDU formats includes an “HE-SIG-A field’ with “a BSS Color subfield, which contains a 6-bit identifier of the BSS (referred to as a BSS Color) that the transmitting station or AP belongs to” *(a format of the PPDU including the trigger frame is a PPDU format in which at least one of physical layer signaling fields including a field for indicating a Basic Service Set (BSS) color is included, where the BSS color is one of identifiers identifying a BSS)*. SAMSUNG-1006, [0034].

Although Yang discloses techniques for changing the BSS color that is used

by an AP and a STA during communications (e.g., to avoid BSS color collisions with an “overlapping” BSS (OBSS)) (*see, e.g.*, SAMSUNG-1006, [0050]-[0050]), Yang does not expressly describe how a BSS color is initially selected by an AP and communicated to a STA. Nevertheless, Yang indicates that, in at least some circumstances, the BSS color indicated in the “Trigger frame” would be used in the responsive trigger-based PPDU transmitted by the STA to the AP. SAMSUNG-1006, [0047].

In view of Yang, a POSITA would have looked to other references for specific guidance regarding how an initial BSS color can be signaled by an AP to a STA. SAMSUNG-1003, ¶¶247-250. One such reference is 802.11-17/0250r2, which discloses specific techniques for signaling BSS color between an AP and a STA in the context of trigger-based PPDU transmissions. SAMSUNG-1007, p.17-20. SAMSUNG-1003, ¶¶250-251.

For example, 802.11-17/0250r2 discloses that “[a] non-AP HE STA transmitting an HE trigger-based PPDU in response to a Trigger frame sets a TXVECTOR parameter” differently, depending on certain conditions.⁵

⁵ A POSITA would have understood that “TXVECTOR” and “RXVECTOR” refer to parameters indicate the contents to a PPDU transmitted by a device and the

SAMSUNG-1007, p. 17. For the “BSS_COLOR” parameter specifically, “[i]f the preceding Trigger frame was received in an HE PPDU” (*when a format of the PPDU including the trigger frame is a PPDU format in which at least one of physical layer signaling fields including a field for indicating a Basic Service Set (BSS) color is included*), the “BSS_COLOR” parameter of the TXVECTOR for the trigger-based PPDU is “set to the value of the RXVECTOR parameter BSS_COLOR of the HE PPDU” (representing the BSS color identified in the BSS Color subfield of the HE-SIG-A field of the received PPDU) (*...set a value of a BSS color to be indicated by a trigger-based PPDU based on the BSS color*

contents of a PPDU received by a device, respectively. SAMSUNG-1003, ¶251.

For example, according to the HE PPDU formats, “[t]he structure of the PPDU transmitted by an HE STA is determined by TXVECTOR parameters.”

SAMSUNG-1005, 213:31-35. Specifically, “[u]sing the TXVECTOR, the MAC [Media Access Control layer] supplies the PHY [Physical layer] with per-PPDU transmit parameters.” SAMSUNG-1005, 214, 11-12. Further, a device (e.g., a STA) receiving a PPDU generates a corresponding RXVECTOR reporting the contents of the received PPDU. Specifically, “[u]sing the RXVECTOR, the PHY informs the MAC of the received PPDU parameters.” SAMSUNG-1005, 214, 11-12.

indicated by the field). SAMSUNG-1007, p. 17.

In view of 802.11-17/0250r2, it would have been obvious to configure Yang's system to perform initial BSS color signaling in accordance with 802.11-17/0250r2 technique (e.g., based on BSS color signaling in a PPDU having a trigger frame soliciting a trigger-based PPDU), and a POSITA would have sought to do so to facilitate the coordination of BSS color between an AP and a STA. SAMSUNG-1003, ¶252; *supra*, §IV.B.4.

[1.5], [1.7]

The Yang-0250r2-1415r0 combination renders obvious [1.5] and [1.7]. SAMSUNG-1003, ¶¶253-260.

As discussed with reference to [1.4], Yang discloses several HE PPDU formats, each of which includes "HE-SIG-A field" with "a BSS Color subfield" for indicating a BSS color. SAMSUNG-1006, [0032], FIGS. 2A-2D. However, Yang does not explicitly discuss coordinating BSS color between an AP and a STA when a PPDU has a format that does not indicate BSS color (e.g., a non-HE PPDU format). *See generally* SAMSUNG-1006; SAMSUNG-1003, ¶254.

In view of Yang's gap in this regard, a POSITA would have looked to other references for specific guidance as to how to coordinate BSS color between an AP and a STA when a PPDU has a format that does not indicate BSS color (e.g., such that Yang's system would remain compatible with PPDUs of differing formats,

such as non-HE PPDU formats). SAMSUNG-1003, ¶255. One such reference is 802.11-17/0250r2, which discloses that a STA transmits a trigger-based PPDU differently, depending on whether the trigger frame includes the “BSS_COLOR” field. SAMSUNG-1007, p. 17. SAMSUNG-1003, ¶¶255-256.

Specifically, 802.11-17/0250r2 discloses that “[i]f the Trigger frame was received in a non-HE PPDU” (i.e., in which the “HE-SIG-A field” with “a BSS Color subfield” is not present) (*when the format of the PPDU including the trigger frame is a PPDU format in which any physical layer signaling field including the field for indicating the BSS color is not included*), the “BSS_COLOR” parameter of the TXVECTOR for the trigger-based PPDU is “set to the value of the BSS Color subfield of the most recently received HE Operation element for that BSS.” (*...set the value of the BSS color to be indicated by the trigger-based PPDU according to an active BSS color of the wireless communication terminal, where the active BSS color is a BSS color actually used by the wireless communication terminal and set by an Operation element*). SAMSUNG-1007, p.17. “[T]he value of the BSS Color subfield of the most recently received HE Operation element for that BSS,” as disclosed by 802.11-17/0250r2, constitutes “the active BSS color” that is “actually used by the wireless communication terminal and set by an Operation element,” as called for in [1.5]. SAMSUNG-1003, ¶¶256-257.

In particular, upon receiving a trigger frame with an HE-SIG-A field with a BSS Color subfield, a STA would transmit a trigger-based PPDU using the BSS color indicated by that BSS Color subfield, thereby “actually using” the indicated BSS color. *See* [1.4]. This BSS color is indicated in an “HE Operation element” transmitted by the AP to the STA (e.g., in order to announce or indicate BSS color information, such as the BSS color “currently being used by the BSS”).

SAMSUNG-1006, [0083]; SAMSUNG-1007, p.17; SAMSUNG-1003, ¶258.

If no further trigger frames having the “BSS_COLOR” field are subsequently received (e.g., if the subsequent trigger frames were non-HE PPDU that do not include the BSS Color subfield), a POSITA would have understood from 802.11-17/0250r2 that the STA would continue using its most recently indicated BSS Color subfield in an “HE Operation element” transmitted to the STA. SAMSUNG-1007, p.17; SAMSUNG-1003, ¶259.

Petitioner’s mapping of [1.5] to Yang and 802.11-17/0250r2 is also consistent with the disclosure of the ’262 Patent regarding the use of an “active BSS color.” SAMSUNG-1001, 20:29-49; SAMSUNG-1003, ¶260.

[1.6]

The Yang-0250r2-1415r0 combination renders obvious [1.6]. SAMSUNG-1003, ¶261-262. For example, as discussed with reference to [1.3], Yang discloses that that an AP “may send a Trigger frame to [a] trigger station to transmit on the

UL as a part of an UL MU transmission,” and “[s]ubsequently, [the] station ... transmits a HE Trigger-based PPDU (such as HE Trigger-based PPDU 260 in FIG. 2D) (*transmit the trigger-based PPDU based on the trigger frame*). *Supra*, [1.3]; SAMSUNG-1006, [0047].

[1.8]

The Yang-0250r2-1415r0 combination renders obvious [1.8]. SAMSUNG-1003, ¶263-275.

For example, Yang discloses an example two “stage” technique that “allow[s] an AP to change a BSS Color value used in the BSS that the AP serves, e.g., when a BSS Color collision occurs.” SAMSUNG-1006, [0050]-[0051].

During the first stage, “the AP uses a pre-specified Transitory BSS Color value to set the BSS Color subfield in the HE-SIG-A field of the DL HE PDUs transmitted by the AP as soon as the AP determines to change the BSS Color value, e.g., after the detection of a collision with the current BSS Color value.” SAMSUNG-1006, [0051].

During the second stage, “the AP uses the new BSS Color value to set the BSS Color subfield in the HE-SIG-A field of the DL HE PDUs that the AP transmits” after certain conditions are met, such as the expiration of “a time T.” SAMSUNG-1006, [0053]-[0054].

Based on these teachings from Yang, a POSITA would have recognized that

allowing an AP to switch BSS color is beneficial, as it allows the BSS to avoid collisions (e.g., with other BSSs having the same BSS color). SAMSUNG-1003, ¶¶264-267. However, a POSITA would have recognized several deficiencies in Yang's BSS change color technique, including (i) requiring the use of a "Transitory BSS Color" (thereby increasing the number of BSS colors that are in use, which may be undesirable for a dense networking environment with many other BSSs in close proximity and many BSS colors may already be in use), and (ii) an inability for the AP to select a specific time at which the STAs switch to the new BSS. SAMSUNG-1003, ¶267.

To at least partially address these deficiencies, a POSITA would have looked to other references regarding alternative techniques for coordinating a BSS color switch between an AP and a STA. SAMSUNG-1003, ¶268. One such reference is 802.11-16/1415r0, which discloses a "BSS Color Change Procedure" that allows an AP to instruct other devices of the BSS to use a new BSS color at a specific time, and without requiring the use of an additional "Transitory BSS Color." *See generally* SAMSUNG-1008.

In particular, 802.11-16/1415r0 discloses a "BSS Color Change Announcement element [that] is used by an HE AP to advertise a BSS Color change and the value of the new BSS color." SAMSUNG-1008, p.6 (reproduced below).

	Element ID	Length	Element ID Extension	Color Switch Countdown	New BSS Color Information
Octet:	1	1	1	1	1

SAMSUNG-1005, p.6

The “BSS Color Change Announcement element” includes a “Color Switch Countdown” field that “is set to the number of TBTTs that remain until the STA sending the BSS Color Change Announcement element switches to the new BSS Color.” SAMSUNG-1008, p.6.

Further, 802.11-16/1415r0 discloses a specific mechanism for synchronizing the change in BSS color between an AP STA (*base wireless communication terminal*) and a non-AP STA (*wireless communication terminal*) based on the information included in the “BSS Color Change Announcement element.”

SAMSUNG-1008, p.7. In particular:

BSS Color change TBTT is the one at which the Color Switch Countdown time has reached 0 and the BSS switches to the new color.

During the time leading up to the BSS Color change TBTT, an HE AP shall continue to advertise the existing BSS Color via the BSS Color subfield in HE Operation element.

At the BSS Color change TBTT, an HE AP shall:

- set the BSS Color Disable bit subfield value to 0 in HE Operation element
- start advertising the new BSS Color via BSS Color subfield in HE Operation element
- start using the new BSS Color

A non-AP STA that receives a BSS Color Change Announcement element shall start using the BSS Color specified in the received BSS Color Change Announcement element subsequent to the BSS Color change TBTT.

SAMSUNG-1008, p.7.

That is, 802.11-16/1415r0 discloses that a non-AP STA receives an

announcement from an AP STA advertising a new BSS Color (e.g., via the “BSS Color Change Announcement”) (*the wireless communication terminal receives information on a BSS color change from the base wireless communication terminal*). SAMSUNG-1003, ¶¶269-272.

Further, when advertising the new BSS Color, the AP STA also provides the non-AP STA with timing information regarding when the BSS Color change information occurs (e.g., such that the non-AP STA can synchronize the BSS color change with the AP STA in order to maintain communications between them). SAMSUNG-1003, ¶273. In particular, the non-AP STA would receive a “Color Switch Countdown” field that “is set to the number of TBTTs that remain until the STA sending the BSS Color Change Announcement element switches to the new BSS Color” (*a BSS color change time point*), and uses this field to determine the “BSS Color change TBTT ... at which the Color Switch Countdown time has reached 0 and the BSS switches to the new color.” SAMSUNG-1008, p.7.

Based on these teachings from 802.11-16/1415r0 in combination with Yang and 802.11-17/0250r2, a POSITA would have understood and found obvious that upon the non-AP STA receiving the BSS color change announcement and reaching the indicated BSS color change time (*when the wireless communication terminal receives information on a BSS color change from the base wireless communication terminal and a BSS color change time point indicated by the*

information on the BSS color change is reached), the non-AP STA would start using the new BSS color (*...the active BSS color is set to a value of a BSS color indicated by the information on the BSS color change*). SAMSUNG-1003, ¶274.

Petitioner's mapping of [1.8] to 802.11ax/D1.0 is also consistent with the disclosure of the '262 Patent regarding the changing of BSS color. *See, e.g.*, SAMSUNG-1001, 20:49-60; SAMSUNG-1003, ¶275.

(b) Claim 2

The Yang-0250r2-1415r0 combination renders obvious claim 2. SAMSUNG-1003, ¶¶276-278.

As discussed with reference to [1.8], 802.11-16/1415r0 discloses that a non-AP STA receives, from an AP STA, a "BSS Color Change Announcement element" including a "Color Switch Countdown" field that "is set to the number of TBTTs that remain until the STA sending the BSS Color Change Announcement element switches to the new BSS Color" (*a target beacon transmission time transmitted by the base wireless communication terminal*), and uses this field to determine the "BSS Color change TBTT ... at which the Color Switch Countdown time has reached 0 and the BSS switches to the new color" (*BSS color change time point is set based on a target beacon transmission time transmitted by the base wireless communication terminal*). SAMSUNG-1008, p.7.

Further, a POSITA also would have recognized that it was commonplace for

an AP STA to signal the TBTT to a non-AP STA. SAMSUNG-1003, ¶278. *See* IV.A.5.b; SAMSUNG-1005, 141:30-51; SAMSUNG-1010, pp.694, 724.

(c) Claim 4

The Yang-0250r2-1415r0 combination renders obvious claim 4. SAMSUNG-1003, ¶¶279-283.

[4.pre]

To the extent that the preamble is limiting, the Yang-0250r2-1415r0 combination renders obvious [4.pre]. SAMSUNG-1003, ¶¶280-282. *See* IV.A.5.a [1.pre] (discussing Yang's disclosure with respect to [1.pre]).

Further, as discussed below, Yang, 802.11-17/0250r2, and 802.11-16/1415r0 renders obvious operating a wireless communication terminal in accordance with claim 4. SAMSUNG-1003, ¶282.

[4.1]-[4.7]

The Yang-0250r2-1415r0 combination renders obvious [4.1]-[4.7] for each of the reasons discussed above with respect to the corresponding elements in claim 1. *See* [1.3]-[1.9]. SAMSUNG-1003, ¶283.

C. [GROUND 2B] – CLAIM 3 IS RENDERED OBVIOUS BY YANG IN VIEW OF 802.11-17/0250R2, 802.11-16/1415R0, 802.11AX/D1.0, 802.11-2016, AND 802.11-17-0230R1

The combined teachings of Yang in view of 802.11-17/0250r2, 802.11-16/1415r0, 802.11ax/D1.0, 802.11-2016, and 802.11-17-0230r1 render obvious

claim 3. SAMSUNG-1003, ¶¶284-308.

1. Overviews of 802.11ax/D1.0, 802.11-2016, 802.11-17/0250R2, and 802.11-16/1415R0

See Sections IV.A.1, IV.A.3, IV.B.2-3.

2. Overview of 802.11-17-0230r1

802.11-17-0230r1 is a document submitted for consideration by the IEEE 802.11 working group in connection with the development of the IEEE 802.11ax standard. SAMSUNG-1011, Title, p.2; SAMSUNG-1003, ¶¶95-97.

Among other features, 802.11-17-0230r1 discloses a technique for determining whether a PPDU is an inter-BSS PPDU or an intra-BSS PPDU based at least the PARTIAL_AID, as discussed in further detail below. SAMSUNG-1011, p.10.

3. Combination of Yang, 802.11-17/0250r2, 802.11-16/1415r0, 802.11ax/D1.0, 802.11-2016, and 802.11-17-0230r1

Yang discloses several different “high efficiency (HE) physical (PHY) protocol data unit (PPDU) formats.” SAMSUNG-1006, [0032], FIGS. 2A-2D. However, Yang does not expressly address certain legacy non-HE PPDU formats, such as Very High Throughput (VHT) formats.

In view of Yang, a POSITA would have looked to other references for specific guidance regarding how to perform operations pertaining to signaling and synchronizing BSS color between devices in the context of non-HE PPDU formats,

such that wireless devices can reliably signal and synchronize BSS color between them in a variety of network environments (e.g., legacy network environments that do not utilize HE PPDU). SAMSUNG-1003, ¶¶285-286.

Three such references are 802.11ax/D1.0, 802.11-2016, and 802.11-17-0230r1. As discussed in further detail below, each of these references includes specific teaching regarding the signaling and synchronization of BSS color between wireless devices using legacy PPDU formats, such as VHT PPDU formats. In view of these references, a POSITA would have found it obvious to modify the Yang-802.11-17/0250r2-802.11-16/1415r0 system to additionally incorporate the VHT PPDU-based techniques in these references, such that the resulting system maintains communications compatibility with both HE-based systems and legacy VHT-based systems. SAMUNSG-1003, ¶287. A POSITA would have reasonably expected success implementing the combination because the techniques were well known and directed to a common WLAN system. SAMSUNG-1003, ¶287.

4. Analysis

(a) Claim 3

The combination of Yang in view of 802.11-17/0250r2, 802.11-16/1415r0, 802.11ax/D1.0, 802.11-2016, and 802.11-17-0230r1 renders obvious claim 3. SAMSUNG-1003, ¶¶288-307.

As discussed with reference to [1.4], Yang discloses several different “high efficiency (HE) physical (PHY) protocol data unit (PPDU) formats.” SAMSUNG-1006, [0032], FIGS. 2A-2D. SAMSUNG-1003, ¶289.

Further, as discussed in Section IV.A.5.c (Grounds 1A-1B, Claim 3), 802.11ax/D1.0 either alone or in combination with 802.11-2016 renders obvious claim 3. SAMSUNG-1003, ¶¶290-302, 305-307.

In addition, 802.11-17-0230r1 discloses a similar technique as in 802.11ax/D1.0 for determining whether a PPDU is an inter-BSS PPDU or an intra-BSS PPDU based at least the PARTIAL_AID. For example, 802.11-17-0230r1 discloses that when “[t]he value of RXVECTOR parameter PARTIAL_AID [5:8] in the received VHT PPDU with the RXVECTOR parameter GROUP_ID equal to 63 is the same as the partial BSS color announced by the AP to which the STA is associated when the Partial BSS Color field in the most recently received HE Operation element is 1, a frame is a “intra-BSS frame.” SAMSUNG-1011, p.10. In view of 802.11-17-0230r1, a POSITA would have understood that, in such a situation, a received PPDU would have been an intra-BSS PPDU. SAMSUNG-1003, ¶¶303.

However, when “[t]he value of RXVECTOR parameter PARTIAL_AID [5:8] in the received VHT PPDU with the RXVECTOR parameter GROUP_ID equal to 63 is different from the partial BSS color announced by the AP to which

the STA is associated when the Partial BSS Color field in the most recently received HE Operation element is 1,” a frame (e.g., a PPDU frame) is a “inter-BSS frame.” SAMSUNG-1011, p.10. In view of 802.11-17-0230r1, a POSITA would have understood that, in such a situation, a received PPDU would have been an inter-BSS PPDU. SAMSUNG-1003, ¶304.

Accordingly, in view of 802.11ax/D1.0, 802.11-2016, and 802.11-17-0230r1, a POSITA would have found it obvious to configure Yang’s processor to *determine a PPDU is an Intra-BSS PPDU or an Inter-BSS PPDU based on the partial BSS color when the value of the partial AID field is non-zero*, in order to differentiate between intra-BSS PPDUs and inter-BSS PPDU in a wider array of use cases than those explicitly described by Yang (e.g., when the PPDU is in a format other than an HE PPDU). *Supra*, §IV.C.3; SAMSUNG-1003, ¶290-302, 305-307.

V. PRIOR ART PRINTED PUBLICATIONS

1. 802.11ax/D1.0 Qualifies as Prior Art Under 35 U.S.C. § 102(a)(1)

Petitioner submits evidence here showing that 802.11ax/D1.0 published at least as early as December 1, 2016—i.e., more than four months before the alleged Critical Date of the ’262 Patent (April 14, 2017). See SAMSUNG-1015, ¶¶17-37, 49-70. As Dr. Hansen explains in detail, 802.11ax/D1.0 was developed by the

IEEE 802.11ax Task Group (TGax), and was the culmination of work on a series of earlier draft amendments to the 802.11 wireless standard. SAMSUNG-1015, ¶¶49-51. TGax created and submitted 802.11ax/D1.0 to letter balloting for consideration and approval by the broader IEEE 802.11 Working Group, and 802.11ax_D1.0 was officially released on December 1, 2016, when it was made available online to members of the IEEE 802.11 Working Group, who were notified by email of the same. SAMSUNG-1015, ¶¶52-56. Interested and ordinarily skilled members of the relevant public would have gained access to 802.11ax/D1.0 either by following IEEE's straightforward procedures for joining the ranks of voting members of the IEEE 802.11 Working Group by the Critical Date of the '262 Patent, or simply by obtaining a copy of 802.11ax/D1.0 from a voting member (or an intermediary who obtained a copy from a voting member). SAMSUNG-1015, ¶¶57-70.

To this point, IEEE invited any interested member of the public to be involved in development of the 802.11 standard, and any such interested individual could become a voting a member, thereby obtaining direct access to drafts such as 802.11ax/D1.0, merely by attending three public IEEE standards meetings, which occurred every two months leading up to the Critical Date. SAMSUNG-1015, ¶¶57-63. Indeed, ~600 IEEE 802 Working Group members would have received notice of and access to 802.11ax/D1.0, immediately upon its posting on December

1, 2016. SAMSUNG-1015, ¶¶55, 66.

Moreover, voting members of the IEEE 802.11 Working Group commonly shared standard amendment drafts with non-voting members, as well as individuals who did not attend 802.11 Working Group or task group meetings at all.

SAMSUNG-1015, ¶¶64-70. Dr. Hansen, who has decades of experience participating in the activities of the IEEE Standards Association (“IEEE-SA”), explains that it was common for voting members to share draft standards with academic colleagues or industry engineers who were not voting members, nor even IEEE members at all. SAMSUNG-1015, ¶¶64-70. For example, beyond the ~600 IEEE 802 Working Group members who would have had direct access to 802.11ax/D1.0 on the IEEE’s website when it was posted on December 1, 2016, the document would have been freely distributed to many more interested and ordinarily skilled members of the relevant public by the Critical Date.

SAMSUNG-1015, ¶¶66-69. There was no expectation of confidentiality with respect to 802.11ax/D1.0. SAMSUNG-1015, ¶¶65-67.

Moreover, there was a clear motivation for broadly distributing draft standard amendments like 802.11ax_D1.0 in that Wi-Fi standardization impacts a broad range of stakeholders (manufacturers, researchers, inventors, etc.) that may not be able to actively participate in the standardization process. SAMSUNG-1015, ¶¶66. IEEE’s standardization process is meant to be open and collaborative,

and the goals of Wi-Fi standardization are (1) to create a high-quality technical specification and (2) garner support for the standard from key stakeholders.

SAMSUNG-1015, ¶66. These goals are most effectively achieved by soliciting input from stakeholders that were unable to actively participate in the standardization process, and members facilitated this process by sharing draft amendments with broader audiences of the interested public beyond those who could personally participate in the standards meetings. This understanding is reflected in the IEEE-SA's permissive policy toward sharing drafts with non-voting members. SAMSUNG-1015, ¶66. For at least these reasons, and as described in further detail by Dr. Hansen, 802.11ax/D1.0 was publicly accessible and qualified as a printed publication at least as early as December 1, 2016. SAMSUNG-1015, ¶67.

2. 802.11-2016 Qualifies as Prior Art Under 35 U.S.C. § 102(a)(1)

As explained in the Declaration of June Ann Munford, 802.11-2016 was published and publicly accessible, at least via the IEEE Explore website, on December 14, 2016. SAMSUNG-1016, ¶¶1-14; SAMSUNG-1015, ¶71.

3. Yang Qualifies as Prior Art Under 35 U.S.C. § 102(a)(2)

Yang is a publication of a patent application that was filed on June 20, 2016, which predates the alleged Critical Date.

4. Each of 802.11-17/0250r2, 802.11-17-0230r1, and 802.11-16/1415r0 Qualifies as Prior Art Under 35 U.S.C. § 102(a)(1)

Each of 802.11-17/0250r2, 802.11-17-0230r1, and 802.11-16/1415r0 were published before the alleged Critical Date of the '262 Patent (April 14, 2017). *See* SAMSUNG-1015, ¶¶38-48.

As Dr. Hansen explains in detail, each of these documents were published on a well-known public website maintained by IEEE named “Mentor.” SAMSUNG-1015, ¶¶38-47. In particular, the Mentor website shows that 802.11-17/0250r2, 802.11-16/1415r0, and 802.11-17/0230r1 were uploaded to the Mentor website on March 6, 2017, November 6, 2016, and March 6, 2017, respectively, each of which occurred before the alleged Critical Date of the '262 Patent (April 14, 2017). SAMSUNG-1015, ¶¶46-48.

As explained by Dr. Hansen, any interested member of the relevant public could locate each of these documents upon their upload to the Mentor website by (i) performing a search on the Mentor website by document control number (“DCN”), title, author, or author affiliation based on specific keywords pertaining to the subject matter of the wireless standards, (ii) downloading local copies of the documents on the Mentor website and performing an offline text search based these keywords, and/or (iii) attending meetings that were open to the public in which these documents were freely discussed. SAMSUNG-1015, ¶¶46-48. Thus,

each of these documents were published no later than their aforementioned upload dates to the Mentor website. SAMSUNG-1015, ¶¶46-48.

VI. PTAB DISCRETION SHOULD NOT PRECLUDE INSTITUTION

Petitioner believes that discretionary denial is unwarranted, and yet, Petitioner intends to utilize the bifurcated briefing process contemplated by the March 26, 2025, Stewart Memorandum to rebut contentions if offered by Patent Owner to the contrary. SAMSUNG-1017 (stipulation).

VII. PAYMENT OF FEES – 37 C.F.R. § 42.103

Petitioner authorizes the Patent and Trademark Office to charge any fees to Deposit Account No. 06-1050.

VIII. CONCLUSION AND FEES

The Challenged Claims are unpatentable. Petitioner respectfully requests institution of IPR and cancellation of all Challenged Claims.

IX. MANDATORY NOTICES UNDER 37 C.F.R. § 42.8(a)(1)

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

Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. (collectively, “Samsung”) are the real parties-in-interest.

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

Petitioner is not aware of any disclaimers, reexamination certificates or petitions for *inter partes* review for the '262 Patent.

The '262 Patent is the subject of civil actions including: *Wilus Institute of Standards and Technology Inc., v. Samsung Electronics Co., LTD., et al*, 2:25-cv-00070 (E.D. Tex.), filed January 23, 2025 and *Wilus Institute of Standards and Technology Inc., v. HP Inc.*, 2:25-cv-00069 (E.D. Tex.), filed January 23, 2025.

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

Petitioner provides the following designation of counsel.

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D. Service Information

Please address all correspondence and service to the address listed above.

Petitioner consents to electronic service by email at IPR39843-0201IP1@fr.com.

Respectfully submitted,

Dated 06/30/2025

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CERTIFICATION UNDER 37 CFR § 42.24

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Petition for *Inter Partes* Review totals 13,976 words, which is less than the 14,000 allowed under 37 CFR § 42.24.

Dated 06/30/2025

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CERTIFICATE OF SERVICE

Pursuant to 37 CFR §§ 42.6(e)(4)(i) *et seq.* and 42.105(b), the undersigned certifies that on June 30, 2025, a complete and entire copy of this Petition for *Inter Partes* Review, Power of Attorney, and all supporting exhibits were provided by Express Mail, to the Patent Owner by serving the correspondence address of record as follows:

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