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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/227,289	07/11/2023	11700597	B-9587CON1 633097-4	1040

158747 7590 06/21/2023
LADAS & PARRY
E-MAIL
4525 WILSHIRE BOULEVARD
SUITE 240
LOS ANGELES, CA 90010

ISSUE NOTIFICATION

The projected patent number and issue date are specified above. The patent will issue electronically. The electronically issued patent is the official patent grant pursuant to 35 U.S.C. § 153. The patent may be accessed on or after the issue date through Patent Center at <https://patentcenter.uspto.gov/>. The patent will be available in both the public and the private sides of Patent Center. Further assistance in electronically accessing the patent, or about Patent Center, is available by calling the Patent Electronic Business Center at 1-888-217-9197.

The USPTO is implementing electronic patent issuance with a transition period, during which period the USPTO will mail a ceremonial paper copy of the electronic patent grant to the correspondence address of record. Additional copies of the patent (i.e., certified and presentation copies) may be ordered for a fee from the USPTO's Certified Copy Center at <https://certifiedcopycenter.uspto.gov/index.html>. The Certified Copy Center may be reached at (800)972-6382.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Patents Stakeholder Experience (OPSE), Stakeholder Support Division (SSD) at (571)-272-4200.

INVENTOR(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional inventors):

Geonjung KO, Gyeonggi-do, KOREA, REPUBLIC OF;
Juhjung Son, Gyeonggi-do, KOREA, REPUBLIC OF;
Woojin Ahn, Gyeonggi-do, KOREA, REPUBLIC OF;
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APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

WILUS INSTITUTE OF STANDARDS AND TECHNOLOGY INC., Gyeonggi-do, KOREA, REPUBLIC OF;
SK TELECOM CO., LTD., Seoul, KOREA, REPUBLIC OF;

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/227,289	04/10/2021	Geonjung KO	B-9587CON1 633097-4	1040
158747	7590	06/05/2023		
LADAS & PARRY E-MAIL 4525 WILSHIRE BOULEVARD SUITE 240 LOS ANGELES, CA 90010			EXAMINER TANG, KIET G	
			ART UNIT 2469	PAPER NUMBER
			NOTIFICATION DATE 06/05/2023	DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

LA_MAIL@la.ladas.com
achinaryan@la.ladas.com
ykoo@la.ladas.com

Corrected Notice of Allowability	Application No. 17/227,289	Applicant(s) KO et al.	
	Examiner KIET TANG	Art Unit 2469	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 05/28/2023.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☒ The allowed claim(s) is/are 21-36 which have been renumbered as claims 1-16. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov**.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
Certified copies:
 a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
 * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892) 2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date <u>05/28/2023</u> . 3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____. 4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____.	5. ☐ Examiner's Amendment/Comment 6. ☐ Examiner's Statement of Reasons for Allowance 7. ☐ Other _____.
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/KIET TANG/ Primary Examiner, Art Unit 2469	
--	--

Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-22)

Approved for use through 05/31/2024. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	17227289
	Filing Date	2021-04-10
	First Named Inventor	Geonjung KO
	Art Unit	2469
	Examiner Name	TANG, KIET G
	Attorney Docket Number	B-9587CON1 633097-4

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		17227289
	Filing Date		2021-04-10
	First Named Inventor	Geonjung KO	
	Art Unit	2469	
	Examiner Name	TANG, KIET G	
	Attorney Docket Number	B-9587CON1 633097-4	

1	Office Action dated April 18, 2023 for Korean Patent Application No. 10-2023-7006655 and its English machine translation provided by the KIPRIS.	×
2		□

If you wish to add additional non-patent literature document citation information please click the Add button

EXAMINER SIGNATURE

Examiner Signature	/KIET TANG/	Date Considered	06/01/2023
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	17227289
	Filing Date	2021-04-10
	First Named Inventor	Geonjung KO
	Art Unit	2469
	Examiner Name	TANG, KIET G
	Attorney Docket Number	B-9587CON1 633097-4

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

☒ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Young Seok Koo 76,255/	Date (YYYY-MM-DD)	2023-05-28
Name/Print	Young Seok Koo	Registration Number	76,255

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.



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Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)

(application filed on or after May 29, 2000)

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Jinsam Kwak, Gyeonggi-do, KOREA, REPUBLIC OF;

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WILUS INSTITUTE OF STANDARDS AND TECHNOLOGY INC., Gyeonggi-do, KOREA, REPUBLIC OF;
SK TELECOM CO., LTD., Seoul, KOREA, REPUBLIC OF;

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PATENT**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

First Named Inventor: Geonjung KO	)	Examiner: Tang, Kiet G
	)	
Application No.: 17/227,289	)	Group: 2469
	)	
Filing Date: April 10, 2021	)	Our Ref.: B-9587CON1 633097-4
	)	
For: "WIRELESS COMMUNICATION	)	Date: April 10, 2023
METHOD AND WIRELESS	)	
COMMUNICATION TERMINAL IN	)	Re: Amendment After Notice of
BASIC SERVICE SET	)	Allowance under 37 C.F.R. §1.312
OVERLAPPING WITH ANOTHER	)	
BASIC SERVICE SET"	)	

Mail Stop Issue Fee
 Commissioner for Patents
 P.O. Box 1450
 Alexandria, Virginia 22313-1450

AMENDMENTS AFTER NOTICE OF ALLOWANCE UNDER 37 C.F.R. §1.312

Sir:

This paper is timely submitted in response to the Notice of Allowance mailed on January 11, 2023 for the subject application. Please amend the application as follows and consider the Remarks set forth below.

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 6 of this paper.

All Amendments and Remarks are made without prejudice or disclaimer.



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SUITE 240			PAPER NUMBER	
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			NOTIFICATION DATE	
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			04/20/2023	
			ELECTRONIC	

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LA_MAIL@la.ladas.com
achinaryan@la.ladas.com
ykoo@la.ladas.com

Corrected Notice of Allowability	Application No. 17/227,289	Applicant(s) KO et al.	
	Examiner KIET TANG	Art Unit 2469	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

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1. ☒ This communication is responsive to 04/07/2023.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☒ The allowed claim(s) is/are 21-36 which have been renumbered as claims 1-16. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov**.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
Certified copies:
 a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
 * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
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5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

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/KIET TANG/ Primary Examiner, Art Unit 2469	
--	--

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: WILUS INSTITUTE OF STANDARDS
AND TECHNOLOGY INC. & SK TELECOM CO.,
LTD.

Serial No.: 17/227,289

Filing Date: April 10, 2021

For: "WIRELESS COMMUNICATION METHOD
AND WIRELESS COMMUNICATION TERMINAL
IN BASIC SERVICE SET OVERLAPPING WITH
ANOTHER BASIC SERVICE SET"

Date: April 7, 2023

Examiner: Tang, Kiet G

Art Unit: 2469

Conf. No.: 1040

Our Ref: B-9587CON1 633097-4

Re: *Information Disclosure Statement*

INFORMATION DISCLOSURE STATEMENT**Mail Stop Amendment**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir/Madam:

In the "List of References cited by applicant and considered by examiner" mailed on September 15, 2022, the Examiner lined through Reference Number 21 (Document Number 104380683; Publication Date: February 25, 2015, Country: CN) which was included in the IDS filed on December 20, 2021. The Examiner stated that Reference Number 21 was lined through because the year of the publication date of Reference Number 21 is missing, but the Applicant noted that the year of the publication date of Reference Number 21 is written in the next page (page 5) as copied below. Then, the Examiner indicated that if Reference Number 21 (Document Number 104380683; Publication Date: February 25, 2015, Country: CN) is refiled as the IDS without the statement and official fee, the Examiner will consider it because the IDS of December 20, 2021 was timely filed. Therefore, the Applicant files the IDS for Reference Number 21 (Document Number 104380683; Publication Date: February 25, 2015, Country: CN) filed on December 20, 2021 as discussed with the Examiner on the phone, and respectfully requests to consider this IDS.

	21.	104380683	Feb. 25,	CN			Espacenet
			2015				

I hereby certify that this document is being
transmitted to the Patent and Trademark Office via
electronic filing.

April 7, 2023

(Date of Transmission)

Young Seok Koo

(Name of Person Transmitting)

/ Young Seok Koo /

(Signature)

Respectfully submitted,

/ Young Seok Koo 76,255 /

Young Seok Koo

Attorney for Applicant

Registration No. 76,255

LADAS & PARRY LLP

Customer 158747

4525 Wilshire Blvd., Suite 240

Los Angeles, CA 90010

(323) 934-2300 voice

April 7, 2023

Form PTO-1449 (Modified) Page 1 of 1	ATTY DOCKET NO. B-9587CON1 633097-4	U.S. SERIAL NO. 17/227,289
LIST OF PATENTS AND PUBLICATIONS STATEMENT	APPLICANT WILUS INSTITUTE OF STANDARDS AND TECHNOLOGY INC. & SK TELECOM CO., LTD.	FILING DATE April 10, 2021
		GROUP NO. 2469

U.S. PATENT DOCUMENTS

EXAMINER INITIAL	REFERENCE NUMBER	DOCUMENT NUMBER	ISSUE/PUBL. DATE	NAME	CLASS	SUB- CLASS	REMARKS

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL	REFERENCE NUMBER	DOCUMENT NUMBER	PUBLICATION DATE	COUNTRY	CLASS	SUB- CLASS	TRANSLATION
	1.	104380683	Feb. 25, 2015	CN			Espacenet

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

EXAMINER INITIAL	REFERENCE NUMBER	DOCUMENT
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EXAMINER	DATE CONSIDERED
/KIET TANG/	04/17/2023

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

April 9, 2021

Form PTO-1449 (Modified) Page 1 of 1	ATTY DOCKET NO. B-9587CON1 633097-4	U.S. SERIAL NO. N/A
LIST OF PATENTS AND PUBLICATIONS STATEMENT	APPLICANT WILUS INSTITUTE OF STANDARDS AND TECHNOLOGY INC. and SK TELECOM CO., LTD.	FILING DATE OR 371 © DATE Concurrently Herewith
		GROUP NO. N/A

U.S. PATENT DOCUMENTS

EXAMINER INITIAL	REFERENCE NUMBER	DOCUMENT NUMBER	ISSUE/PUBL. DATE	NAME	CLASS	SUB-CLASS	REMARKS
	1.	2015/0264617	Sep. 17, 2015	Choudhury et al.			
	2.	2015/0110093	Apr. 23, 2015	Asterjadhi et al.			
	3.	2017/0251432	Aug. 31, 2017	PARK et al.			
	4.	2016/0374087	Dec. 22, 2016	Liu et al.			
	5.	2017/0289987	Oct. 5, 2017	SEOK			
	6.	2017/0105143	Apr. 13, 2017	SEOK			
	7.	2019/0028898	Jan. 24, 2019	KO et al.			
	8.	2016/0353275	Dec. 1, 2016	Liu et al.			
	9.	2017/0006661	Jan. 5, 2017	Huang et al.			
	10.	2017/0294949	Oct. 12, 2017	Zhang et al.			
	11.	2017/0041798	Feb. 9, 2017	LI et al.			
	12.	2017/0006661	Jan. 5, 2017	Huang et al.			
	13.	2013/0148609	Jun. 13, 2013	RAM et al.			
	14.	2016/0150569	May 26, 2016	Benveniste			
	15.	2016/0088558	Mar. 24, 2016	CHU et al.			
	16.	2015/0359008	Dec. 10, 2015	WANG et al.			
	17.	2016/0081132	Mar. 17, 2016	LEE et al.			
	18.	2015/0341750	Nov. 26, 2015	Hayes et al.			
	19.	2015/0124774	May 7, 2015	KAUSHIK et al.			
	20.	2014/0050210	Feb. 20, 2014	Waters et al.			
	21.	2018/0227952	Aug. 9, 2018	KIM et al.			

Change(s) applied
to document,
/N.W.S./
1/17/2023

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

158747 7590 01/11/2023
LADAS & PARRY
E-MAIL
4525 WILSHIRE BOULEVARD
SUITE 240
LOS ANGELES, CA 90010

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/227,289	04/10/2021	Geonjung KO	B-9587CON1 633097-4	1040

TITLE OF INVENTION: WIRELESS COMMUNICATION METHOD AND WIRELESS COMMUNICATION TERMINAL IN BASIC SERVICE SET
OVERLAPPING WITH ANOTHER BASIC SERVICE SET

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1200	\$0.00	\$0.00	\$1200	04/11/2023

EXAMINER	ART UNIT	CLASS-SUBCLASS
TANG, KIET G	2469	370-338000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,

(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Ladas & Parry, LLP

2 _____

3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

1. WILUS INSTITUTE OF STANDARDS AND TECHNOLOGY INC. GYEONGGI-DO, REPUBLIC OF KOREA
2. SK TELECOM CO., LTD. SEOUL, REPUBLIC OF KOREA

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. Fees submitted: ☒ Issue Fee ☐ Publication Fee (if required) ☐ Advance Order - # of Copies _____

4b. Method of Payment: (Please first reapply any previously paid fee shown above)

☒ Electronic Payment via EFS-Web ☐ Enclosed check ☐ Non-electronic payment by credit card (Attach form PTO-2038)

☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. 12-0415

5. **Change in Entity Status** (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /Young Seok Koo 76,255/

Date April 10, 2023

Typed or printed name Young Seok Koo

Registration No. 76,255

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor: Geonjung KO	)	Examiner: Tang, Kiet G
	)	
Application No.: 17/227,289	)	Group: 2469
	)	
Filing Date: April 10, 2021	)	Our Ref.: B-9587CON1 633097-4
	)	
For: "WIRELESS COMMUNICATION	)	Date: April 10, 2023
METHOD AND WIRELESS	)	
COMMUNICATION TERMINAL IN	)	Re: Amendment After Notice of
BASIC SERVICE SET	)	Allowance under 37 C.F.R. §1.312
OVERLAPPING WITH ANOTHER	)	
BASIC SERVICE SET"	)	

Mail Stop Issue Fee
Commissioner for Patents
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Alexandria, Virginia 22313-1450

AMENDMENTS AFTER NOTICE OF ALLOWANCE UNDER 37 C.F.R. §1.312

Sir:

This paper is timely submitted in response to the Notice of Allowance mailed on January 11, 2023 for the subject application. Please amend the application as follows and consider the Remarks set forth below.

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 6 of this paper.

All Amendments and Remarks are made without prejudice or disclaimer.

AMENDMENTS TO THE CLAIMS

Please amend the claims to read as indicated in the following list of claims:

Listing of claims

1-20. (Canceled).

21. (Currently Amended) A wireless communication terminal communicating wirelessly, the wireless communication terminal comprising:

a transceiver; and

a processor,

wherein the processor is configured to receive a physical layer convergence procedure (PLCP) Protocol ~~Processing~~ Data Unit (PPDU) by using the transceiver, and not to use a Basic Service Set (BSS) color indicated by the PPDU when signaling information indicates that an operation based on the BSS color is not allowed,

wherein the BSS color is an identifier of a BSS,

wherein the signaling information is transmitted from a base wireless communication terminal to which the wireless communication terminal is associated.

22. (Previously Presented) The wireless communication terminal of claim 21, wherein the processor is configured not to set an Intra-BSS Network Allocation Vector (NAV) by using the BSS color indicated by a signaling field of the PPDU when the signaling information indicates that the operation based on the BSS color is not allowed,

wherein the Intra-BSS NAV is different from a Basic NAV and is a NAV which is set based on an Intra-BSS PPDU,

wherein the Basic NAV is set based on an Inter-BSS PPDU or a PPDU which is not able to be identified as the Inter-BSS PPDU or the Intra-BSS PPDU.

23. (Previously Presented) The wireless communication terminal of claim 22, wherein the PPDU includes a TXOP Duration field in the signaling field of the PPDU and a medium access control (MAC) frame which includes a duration field,

wherein the TXOP Duration field indicates information used for setting the Intra-BSS NAV and the Basic NAV,

wherein the duration field indicates information used for setting the Intra-BSS NAV and the Basic NAV,

wherein the processor is configured not to use the TXOP Duration field for setting the Intra-BSS NAV or the Basic NAV when the wireless communication terminal gets a valid signaling field of the MAC frame.

24. (Previously Presented) The wireless communication terminal of claim 21, wherein the processor is configured to signal that the operation based on the BSS color is not allowed when the wireless communication terminal recognizes that a BSS color collision has occurred,

wherein the BSS color collision represents that different BSSs correspond to one BSS color.

25. (Previously Presented) The wireless communication terminal of claim 24, wherein the processor is configured to determine that BSS color collision has occurred based on address fields of a medium access control (MAC) frame.

26. (Previously Presented) The wireless communication terminal of claim 21, wherein the operation based on the BSS color includes entering a doze state of a power save operation based on a BSS color indicated by a signaling field of the PPDU,

wherein the power save operation is an operation for the wireless communication terminal to enter the doze state until an end of a received PPDU which is an Intra-BSS PPDU.

27. (Currently Amended) The wireless communication terminal of claim 21, wherein the processor is configured not to perform a spatial reuse operation when the BSS color indicated by a the signaling field of the PPDU is a predetermined value.

28. (Previously Presented) The wireless communication terminal of claim 27, wherein the predetermined value is 0.

29. (Currently Amended) ~~An operation method of~~ A method of operating a wireless communication terminal communicating wirelessly, the method comprising:
receiving a physical layer convergence procedure (PLCP) Protocol ~~Processing~~ Data Unit (PPDU); and
not using a Basic Service Set (BSS) color indicated by the PPDU when signaling information indicates that an operation based on the BSS color is not allowed,
wherein the BSS color is an identifier of a BSS,
wherein the signaling information is transmitted from a base wireless communication terminal to which the wireless communication terminal is associated.

30. (Previously Presented) The method of claim 29, wherein the method further comprises not setting an Intra-BSS Network Allocation Vector (NAV) by using the BSS color indicated by a signaling field of the PPDU when the signaling information indicates that the operation based on the BSS color is not allowed,
wherein the Intra-BSS NAV is different from a Basic NAV and is a NAV which is set based on an Intra-BSS PPDU,
wherein the Basic NAV is set based on an Inter-BSS PPDU or a PPDU which is not able to be identified as the Inter-BSS PPDU or the Intra-BSS PPDU.

31. (Previously Presented) The method of claim 30, wherein the PPDU includes a TXOP Duration field in the signaling field of the PPDU and a medium access control (MAC) frame which includes a duration field,
wherein the TXOP Duration field indicates information used for setting the Intra-BSS NAV and the Basic NAV,
wherein the duration field indicates information used for setting the Intra-BSS NAV and the Basic NAV,
wherein the method further comprises not using the TXOP Duration field for setting the Intra-BSS NAV or the Basic NAV when the wireless communication terminal gets a valid signaling field of the MAC frame.

32. (Previously Presented) The method of claim 29, wherein the method further comprises signal that the operation based on the BSS color is not allowed when the wireless communication terminal recognizes that a BSS color collision has occurred, wherein the BSS color collision represents that different BSSs correspond to one BSS color.

33. (Previously Presented) The method of claim 32, wherein the signaling that a BSS color collision has occurred comprises determining that BSS color collision has occurred based on address fields of a medium access control (MAC) frame.

34. (Previously Presented) The method of claim 29, wherein the operation based on the BSS color includes entering a doze state of a power save operation based on a BSS color indicated by the signaling field of the PPDU, wherein the power save operation is an operation for the wireless communication terminal to enter the doze state until an end of a received PPDU which is an Intra-BSS PPDU.

35. (Currently Amended) The method of claim 29, wherein the method further comprises not performing a spatial reuse operation when the BSS color indicated by a ~~[[the]]~~ signaling field of the PPDU is a predetermined value.

36. (Previously Presented) The method of claim 35, wherein the predetermined value is 0.

REMARKS

In this Amendment, claims 21, 27, 29 and 35 are amended for clarification purposes only. Claims 1-20 were canceled previously. No new matter is presented as a result of these amendments. No claim is added or canceled. Therefore, the Applicant respectfully requests approval of the amendment to claims 21, 27, 29 and 35.

The Commissioner is authorized to charge any additional fees which may be required or credit overpayment to deposit account no. 12-0415.

I hereby certify that this document is being
transmitted to the Patent and Trademark Office via
electronic filing.

April 10, 2023
(Date of Transmission)

Azatuhi Chinaryan
(Name of Person Transmitting)

/ Azatuhi Chinaryan /
(Signature)

Respectfully submitted,

/ Young Seok Koo 76255 /

Young Seok Koo
Attorney for Applicants
Registration No. 76,255
LADAS & PARRY LLP
4525 Wilshire Blvd., Suite 240
Los Angeles, CA 90010
Tel No.: (323) 934-2300
Fax No.: (323) 266-0373



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/227,289	04/10/2021	Geonjung KO	B-9587CON1 633097-4	1040
158747	7590	03/28/2023	EXAMINER	
LADAS & PARRY			TANG, KIET G	
E-MAIL				
4525 WILSHIRE BOULEVARD			ART UNIT	
SUITE 240			PAPER NUMBER	
LOS ANGELES, CA 90010			2469	
			NOTIFICATION DATE	
			DELIVERY MODE	
			03/28/2023	
			ELECTRONIC	

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

LA_MAIL@la.ladas.com
achinaryan@la.ladas.com
ykoo@la.ladas.com

Corrected Notice of Allowability	Application No. 17/227,289	Applicant(s) KO et al.	
	Examiner KIET TANG	Art Unit 2469	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 03/11/2023.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☒ The allowed claim(s) is/are 21-36 which have been renumbered as claims 1-16. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov**.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
Certified copies:
 a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
 * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892) 2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date <u>03/11/2023</u> . 3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____. 4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____.	5. ☐ Examiner's Amendment/Comment 6. ☐ Examiner's Statement of Reasons for Allowance 7. ☐ Other _____.
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/KIET TANG/ Primary Examiner, Art Unit 2469	
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March 11, 2023

Form PTO-1449 (Modified) Page 1 of 1	ATTY DOCKET NO. B-9587CON1 633097-4	U.S. SERIAL NO. 17/227,289
LIST OF PATENTS AND PUBLICATIONS STATEMENT	APPLICANT WILUS INSTITUTE OF STANDARDS AND TECHNOLOGY INC. & SK TELECOM CO., LTD.	FILING DATE April 10, 2022
		GROUP NO. 2469

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FOREIGN PATENT DOCUMENTS

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OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

EXAMINER INITIAL	REFERENCE NUMBER	DOCUMENT
	1.	Office Action dated December 15, 2022 for Korean Patent Application No. 10-2022-7034781 and its English translation provided by the Applicant's foreign counsel.
	2.	Extended European Search Report dated February 3, 2023 for European Patent Application No. 22204381.2.
	3.	Notice of Allowance dated March 3, 2023 for U.S. Patent Application No. 17/395,384.

EXAMINER	DATE CONSIDERED
/KIET TANG/	03/24/2023

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.



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NOTICE OF ALLOWANCE AND FEE(S) DUE

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SUITE 240
LOS ANGELES, CA 90010

EXAMINER

TANG, KIET G

ART UNIT

PAPER NUMBER

2469

DATE MAILED: 01/11/2023

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/227,289	04/10/2021	Geonjung KO	B-9587CON1 633097-4	1040

TITLE OF INVENTION: WIRELESS COMMUNICATION METHOD AND WIRELESS COMMUNICATION TERMINAL IN BASIC SERVICE SET
OVERLAPPING WITH ANOTHER BASIC SERVICE SET

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1200	\$0.00	\$0.00	\$1200	04/11/2023

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 40% the amount of undiscounted fees, and micro entity fees are 20% the amount of undiscounted fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

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P.O. Box 1450
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CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

158747 7590 01/11/2023
LADAS & PARRY
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4525 WILSHIRE BOULEVARD
SUITE 240
LOS ANGELES, CA 90010

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/227,289	04/10/2021	Geonjung KO	B-9587CON1 633097-4	1040

TITLE OF INVENTION: WIRELESS COMMUNICATION METHOD AND WIRELESS COMMUNICATION TERMINAL IN BASIC SERVICE SET
OVERLAPPING WITH ANOTHER BASIC SERVICE SET

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1200	\$0.00	\$0.00	\$1200	04/11/2023

EXAMINER	ART UNIT	CLASS-SUBCLASS
TANG, KIET G	2469	370-338000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,

(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____

2 _____

3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. Fees submitted: ☐ Issue Fee ☐ Publication Fee (if required) ☐ Advance Order - # of Copies _____

4b. Method of Payment: (Please first reapply any previously paid fee shown above)

☐ Electronic Payment via EFS-Web ☐ Enclosed check ☐ Non-electronic payment by credit card (Attach form PTO-2038)

☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. Change in Entity Status (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____

Date _____

Typed or printed name _____

Registration No. _____



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/227,289	04/10/2021	Geonjung KO	B-9587CON1 633097-4	1040
158747	7590	01/11/2023	EXAMINER	
LADAS & PARRY			TANG, KIET G	
E-MAIL			ART UNIT	
4525 WILSHIRE BOULEVARD			2469	
SUITE 240			DATE MAILED: 01/11/2023	
LOS ANGELES, CA 90010				

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.** Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 17/227,289	Applicant(s) KO et al.	
	Examiner KIET TANG	Art Unit 2469	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 12/14/2022.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☒ The allowed claim(s) is/are See Continuation Sheet. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov**.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
Certified copies:
a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892) 2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date <u>12/21/2022</u> . 3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____. 4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____.	5. ☐ Examiner's Amendment/Comment 6. ☒ Examiner's Statement of Reasons for Allowance 7. ☐ Other _____.
---	--

/KIET TANG/ Primary Examiner, Art Unit 2469	
--	--

Continuation of 3. The allowed claim(s) is/are: 21-36 which have been renumbered as claims 1-16

DETAILED ACTION

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.
2. Applicant's request for reconsideration of the non-finality of the rejection of the last Office action is persuasive and, therefore, the non-finality of that action is withdrawn.
3. The arguments submitted on 12/14/2022 have been entered to the record.

Terminal Disclaimer

4. The terminal disclaimer filed on 12/14/2022 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of U.S. Patent No. 11129163 has been reviewed and is accepted. The terminal disclaimer has been recorded.

Response to Arguments

5. Applicant's arguments, please see pages 2-3, filed on 12/14/2022, with respect to claims 21-36 have been fully considered and persuasive. The previous rejections have been withdrawn.

Allowable Subject Matter

6. **Claims 21-36** are allowed.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to KIET TANG whose telephone number is (571)270-7193. The examiner can normally be reached on M-F 8:00-5:00.

8. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, IAN MOORE can be reached on (571) 272-3085. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

9. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KIET TANG/
Primary Examiner, Art Unit 2469

Issue Classification 	Application/Control No. 17/227,289	Applicant(s)/Patent Under Reexamination KO et al.
	Examiner KIET TANG	Art Unit 2469

CPC						
Symbol					Type	Version
H04W	/	72	/	0453	F	2013-01-01
H04W	/	74	/	002	I	2013-01-01
H04W	/	48	/	18	I	2013-01-01
H04W	/	24	/	02	A	2013-01-01
H04W	/	88	/	06	A	2013-01-01
H04W	/	84	/	12	A	2013-01-01

CPC Combination Sets					
Symbol		Type	Set	Ranking	Version
	/				

NONE (Assistant Examiner) _____ (Date) _____		Total Claims Allowed: 16	
/KIET TANG/ Primary Examiner, Art Unit 2469 (Primary Examiner) _____ (Date) 17 December 2022		O.G. Print Claim(s) 1	O.G. Print Figure 1

Issue Classification 	Application/Control No. 17/227,289	Applicant(s)/Patent Under Reexamination KO et al.
	Examiner KIET TANG	Art Unit 2469

INTERNATIONAL CLASSIFICATION			
CLAIMED			
H04W		72	04

NON-CLAIMED			

US ORIGINAL CLASSIFICATION	
CLASS	SUBCLASS

CROSS REFERENCES(S)						
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	16	
/KIET TANG/ Primary Examiner, Art Unit 2469	17 December 2022	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

Issue Classification 	Application/Control No. 17/227,289	Applicant(s)/Patent Under Reexamination KO et al.
	Examiner KIET TANG	Art Unit 2469

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☒ T.D. ☐ R.1.47															
CLAIMS															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
	1		10		19	8	28								
	2		11		20	9	29								
	3		12	1	21	10	30								
	4		13	2	22	11	31								
	5		14	3	23	12	32								
	6		15	4	24	13	33								
	7		16	5	25	14	34								
	8		17	6	26	15	35								
	9		18	7	27	16	36								

NONE (Assistant Examiner) _____ (Date) _____		Total Claims Allowed: 16	
/KIET TANG/ Primary Examiner, Art Unit 2469 (Primary Examiner) _____ (Date) 17 December 2022		O.G. Print Claim(s) 1	O.G. Print Figure 1

<i>Search Notes</i> 	Application/Control No. 17/227,289	Applicant(s)/Patent Under Reexamination KO et al.
	Examiner KIET TANG	Art Unit 2469

CPC - Searched*		
Symbol	Date	Examiner
H04W72/0453 OR H04W48/18 OR H04W74/002 OR H04W24/02 OR H04W84/12 OR H04W88/06 OR H04B7/2612 OR H04L27/2601 OR H04W28/06 OR H04W74/0825 OR H04W74/0841	09/07/2022 (Updated on 12/17/22, 1/6/23)	kt
CPC Cross Search (H04W 72/044, H04W 48/00, H04W 74/00, H04W 24/00)	09/07/2022 (Updated on 12/17/22)	kt

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
Inventor and assignee search in East and PALM	09/07/2022 (Updated on 12/17/22)	kt
Google Scholar Search	09/07/2022 (Updated on 12/17/22)	kt

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
	intererence search history printout	12/17/2022	kt

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<i>Search Notes</i> 	Application/Control No. 17/227,289	Applicant(s)/Patent Under Reexamination KO et al.
	Examiner KIET TANG	Art Unit 2469

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<i>Index of Claims</i> 	Application/Control No. 17/227,289	Applicant(s)/Patent Under Reexamination KO et al.
	Examiner KIET TANG	Art Unit 2469

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS									
☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☒ T.D. ☐ R.1.47									
CLAIM		DATE							
Final	Original	09/07/2022	12/17/2022						
	1	-	-						
	2	-	-						
	3	-	-						
	4	-	-						
	5	-	-						
	6	-	-						
	7	-	-						
	8	-	-						
	9	-	-						
	10	-	-						
	11	-	-						
	12	-	-						
	13	-	-						
	14	-	-						
	15	-	-						
	16	-	-						
	17	-	-						
	18	-	-						
	19	-	-						
	20	-	-						
1	21	✓	=						
2	22	✓	=						
3	23	✓	=						
4	24	✓	=						
5	25	✓	=						
6	26	✓	=						
7	27	✓	=						
8	28	✓	=						
9	29	✓	=						
10	30	✓	=						
11	31	✓	=						
12	32	✓	=						
13	33	✓	=						
14	34	✓	=						
15	35	✓	=						
16	36	✓	=						

An Energy Efficient Channel Access with Target Wake Time Scheduling for **Overlapping** 802.11 ax **Basic Service Sets**

Q Chen - IEEE Internet of Things Journal, 2022 - [ieeexplore.ieee.org](#)

... of uplink multiuser **transmission** in a ... two **different** APs and not located in the **overlapping** coverage can be scheduled to make a parallel **transmission** without interfering with each **other**. ...

☆ Save  Cite Related articles

Overlapping impacts and resource coordination for high-density **wireless** communication

L Zheng, DS Hoang - ... on Computing and Communication ... 2009 - [ieeexplore.ieee.org](#)

... -density **wireless** environment could not avoid cell/BSS (**Basic Service Set**) **overlapping**, which ... On the **other** hand, hidden **terminal** problem becomes worse as the entire system serves ...

☆ Save  Cite Cited by 13 Related articles All 4 versions

Interferential packet detection scheme for a solution to **overlapping** BSS issues in IEEE 802.11 WLANs

T Tandai, K Toshimitsu... - ... Radio Communications, 2006 - [ieeexplore.ieee.org](#)

... **another Basic Service Set** (BSS) is **overlapping** domestic BSS, some Stations (STAs) may suffer from interference from a hidden **terminal** in **overlapping** ... **overlapping Basic Service Sets** (...)

☆ Save  Cite Cited by 9 Related articles All 2 versions

A new admission control scheme for the **overlapping** BSS issues in the 802.11 WLANs

Y Yin, T Jiang - ... International Symposium on Communications ... 2014 - [ieeexplore.ieee.org](#)

... the questions of the **overlapping basic service set** (OBSS) by ... When **another** BSS is **overlapping** the existing one, it forms ... to suffer from interference from the hidden **terminal**. Then, the ...

☆ Save  Cite Cited by 4 Related articles All 2 versions

A study on **transmission** power control for **wireless** LAN under **overlapping** BSS environment

I Shilara, T Hiraguri, K Yano, N Egashira... - IEICE Communications ... 2018 - [jstage.jst.go.jp](#)

... **overlapping basic service set** (OBSS) environment that brings an interference with each **other**... In this evaluation, we have assumed APs are densely employed such as a railway **terminal** ...

☆ Save  Cite Cited by 8 Related articles All 4 versions 

A redundant neighborhood approach to tolerate access point failure in IEEE 802.11 WLAN

MN Sahoo, PM Khilar, B Majhi - 2009 International Conference ... 2009 - [ieeexplore.ieee.org](#)

... increasing demands for **mobile communications**. Therefore since ... to any **other basic service set**. An Infrastructure BSS can ... [5] describes **another** technique called **overlapping** coverage ...

☆ Save  Cite Cited by 13 Related articles All 5 versions

Survivability of IEEE 802.11 **wireless** LAN against AP failure

MN Sahoo, PM Khilar - 2009 - [dspace.nitrkl.ac.in](#)

... increasing demands for **mobile communications**. Thus WDS is ... Access Points in an **extended service set**. A distribution ... [5] describes **another** technique called **overlapping** coverage ...

☆ Save  Cite Cited by 5 Related articles All 2 versions 

Performance evaluation of VoIP technology in an **extended service set**, in concordance with IEEE 802.11 g

MDN Cuadrado, CAJ Huicapi... - Sistemas y ... 2017 - [webcache.icsl.edu.co](#)

... P.910 indicates that the utility tests in **terminals** or **services** ... For this reason, an **overlapping** in the channels was present, ... in research are **wireless communications** and data networks / ...

☆ Save  Cite Cited by 2 Related articles All 10 versions 

New Progress in Power Management for Current WiFi 6 Networks

Q Chen · ijscience.org

... journals in the field of **wireless communication** (eg, INFOCOM... efficiency TWT scheduling within **overlapping** BSS, focusing ... research on the **overlapping basic service set** scenarios.In ...

☆ Save  Cite Related articles 

An overlay algorithm to improve the support of multi-hopping in the IEEE 802.11 WLANs

HA Eladiy, TM Chen · ... on Communications (IEEE Cat. No ... , 2004 · ieeexplore.ieee.org

... multiple **overlapping** IBSSs (Independent **Basic Service Sets**) ... platforms and **wireless communication** technology has led to ... The **terminal** will have to work with dual transceivers to tune ...

☆ Save  Cite Cited by 1 Related articles All 9 versions 

December 20, 2022

Form PTO-1449 (Modified) Page 1 of 1	ATTY DOCKET NO. B-9587CON1 633097-4	U.S. SERIAL NO. 17/227,289
LIST OF PATENTS AND PUBLICATIONS STATEMENT	APPLICANT WILUS INSTITUTE OF STANDARDS AND TECHNOLOGY INC. & SK TELECOM CO., LTD.	FILING DATE April 10, 2022
		GROUP NO. OPAP

U.S. PATENT DOCUMENTS

EXAMINER INITIAL	REFERENCE NUMBER	DOCUMENT NUMBER	ISSUE/PUBL. DATE	NAME	CLASS	SUB-CLASS	REMARKS
	1.	2018/0336499	Nov. 22, 2018	Kneckt et al.			
	2.	9,974,040	May 15, 2018	Chu et al.			
	3.	2022/0345341	Oct. 27, 2022	LEE et al.			
	4.	2020/0267741	Aug. 20, 2020	KWON et al.			
	5.	2019/0335394	Oct. 31, 2019	KIM et al.			
	6.	2018/0248646	Aug. 30, 2018	WIKSTRÖM et al.			
	7.	2018/0220488	Aug. 2, 2018	Huang et al.			
	8.	2022/0239578	Jul. 28, 2022	Raleigh et al.			

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL	REFERENCE NUMBER	DOCUMENT NUMBER	PUBLICATION DATE	COUNTRY	CLASS	SUB-CLASS	TRANSLATION

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

EXAMINER INITIAL	REFERENCE NUMBER	DOCUMENT
	9.	Hearing Notice dated November 6, 2022 for Indian Patent Application No. 201827033017.
	10.	Office Action dated November 14, 2022 for U.S. Patent Application No. 17/395,384.
	11.	Office Action dated November 15, 2022 for Korean Patent Application No. 10-2022-7032149 and its English translation provided by the Applicant's foreign counsel
	12.	Notice of Allowance dated November 24, 2022 for Korean Patent Application No. 10-2021-7029783 and its English translation provided by Applicant's foreign counsel.

EXAMINER	DATE CONSIDERED
/KIET TANG/	01/06/2023

December 20, 2022

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: WILUS INSTITUTE OF STANDARDS AND
TECHNOLOGY INC. & SK TELECOM CO., LTD.

Serial No.: 17/227,289

Filing Date: April 21, 2021

For: "WIRELESS COMMUNICATION METHOD AND
WIRELESS COMMUNICATION TERMINAL IN BASIC
SERVICE SET OVERLAPPING WITH ANOTHER
BASIC SERVICE SET"

Date: December 20, 2022

Examiner: Central, Docket

Art Unit: OPAP

Conf. No.: 1040

Our Ref: B-9587CON1 633097-4

Re: *Information Disclosure Statement*

INFORMATION DISCLOSURE STATEMENT

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir/Madam:

This information disclosure statement is filed in accordance with 37 C.F.R. §§ 1.56, 1.97 and 1.98 to disclose information that may be relevant to the above-identified patent application. The Applicant requests the Examiner consider the documents listed on the enclosed form PTO-1449 (modified) in the examination of this application.

The filing of this Information Disclosure Statement (IDS) shall not be construed as a representation that a search has been made (37 C.F.R. 1.97(g)), an admission that the information cited is, or is considered to be, material to patentability, or that no other material information exists.

The filing of this Information Disclosure Statement shall not be construed as an admission against interest in any manner (37 C.F.R. § 1.97(h)).

If any additional fee is required for this filing, the Applicant requests the Examiner contact a practitioner associated with the Customer Number listed below for authorization.

This information disclosure statement also includes the statements marked below. Failure to mark a statement should not be construed as a negative assertion.

Timing and Fees

This IDS is being filed:

- ☐ Concurrently with the application, and no fee is due.
- ☐ Within three months of the filing of the national application, other than a continued prosecution application under § 1.53(d), and no fee is due.

December 20, 2022

- ☐ Within three months of the date of entry of the national stage as set forth in § 1.491 in an international application, and no fee is due.
 - ☐ Before the mailing of a first Office Action on the merits, and no fee is due.
 - ☐ Before the mailing of a first Office Action after the filing of a request for continued examination under § 1.114, and no fee is due.
-
- ☒ After the periods described above, and before a final Office Action under § 1.113, a Notice of Allowance under § 1.311, or an action that otherwise closes prosecution in the application, and is
- ☐ accompanied by the fee set forth in § 1.17(p), or
 - ☒ filed with the statement set forth in 37 C.F.R. 1.97(e)(1): That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement; or
 - ☐ filed with the statement set forth in 37 C.F.R. 1.97(e)(2): That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in § 1.56(c) more than three months prior to the filing of the information disclosure statement.
-
- ☐ After the periods described above, and is accompanied by the fee set forth in § 1.17(p), and is
- ☐ filed with the statement set forth in 37 C.F.R. 1.97(e)(1), that each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement; or
 - ☐ filed with the statement set forth in 37 C.F.R. 1.97(e)(2), that no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in § 1.56(c) more than three months prior to the filing of the information disclosure statement.
- ☐ Concurrently with a Request for Continued Examination, and no additional fee is due for this IDS.

Items Disclosed

At least one item listed on the enclosed form PTO-1449 (modified) was

December 20, 2022

- ☒ Cited in an Office Action for a related application, the application number of the related application and the issue date of the Office Action are provided below and the Office Action is enclosed.

Please see the enclosed form PTO-1449 (modified) for related application number(s) and issue date(s)

- ☐ Cited in an International Search Report (ISR) or an International Preliminary Report on Patentability (IPRP) or a Written Opinion (WO) of the International Searching Authority (ISA) for the related PCT Application, the PCT application number and the issue date of the ISR/IPRP/WO are provided below and the ISR/IPRP/WO is enclosed.
-

Additional Information

- ☒ Translations of the foreign-language documents are also enclosed as machine-translations, human-translations, or counterpart applications as noted. Machine translations were provided by the Japanese Patent Office, ESPACENET, Google Documents, Patent Fetcher® /ESPACENET, Google Translate or Google Translator Toolkit as noted and with OCR by Adobe Acrobat 9 or ABBYY PDF Transformer 3 if needed.
- ☐ English-language abstracts of foreign-language documents are provided.
- ☒ Documents listed on the enclosed ISR/IPRP/WO or the Office Action have relevance at least as described therein.
- ☐ The documents with the following reference numbers were described in the specification of the present application; omission of a reference from this list does not indicate that it was not discussed in the specification of the present application.
-

- ☒ At least one of the references cited in the Office Action listed on the attached PTO-1449 (modified) were previously submitted in an IDS or cited by the Examiner for the present application on April 10, 2021 and therefore are not submitted in this IDS.

- ☐ Other:

I hereby certify that this document is being transmitted to the Patent and Trademark Office via electronic filing.

December 20, 2022

(Date of Transmission)

Azatuhi Chinaryan

(Name of Person Transmitting)

/ Azatuhi Chinaryan /

(Signature)

Respectfully submitted,

/ Young Seok Koo 76255 /

Young Seok Koo
Attorney for Applicant
Registration No. 76,255
LADAS & PARRY LLP
4525 Wilshire Blvd., Suite 240
Los Angeles, CA 90010
(323) 934-2300 voice

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor: Geonjung KO	) Examiner: Tang, Kiet G
	)
Application No.: 17/227,289	) Confirmation No.: 1040
	)
Filing Date: April 10, 2021	) Group Art Unit: 2469
	)
Title: WIRELESS COMMUNICATION METHOD AND WIRELESS COMMUNICATION TERMINAL IN BASIC SERVICE SET OVERLAPPING WITH ANOTHER BASIC SERVICE SET	) Attorney Docket: B-9587CON1 633097-4
	)
	) Date: December 14, 2022
	)
	) Re: Response to Non-Final Office Action of September 15, 2022
	)

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

RESPONSE TO OFFICE ACTION

Sir:

This paper is timely submitted in response to the non-Final Office Action mailed on September 15, 2022 for the subject application. Please consider the Remarks/Arguments set forth below.

Remarks/Arguments begin on page 2 of this paper.

All Remarks/Arguments are made without prejudice or disclaimer.

REMARKS/ARGUMENTS

The following Remarks/Arguments are in response to the non-Final Office Action mailed on September 15, 2022 (hereinafter “Office Action”) for the subject application. Pending in the application are claims 21-36.

In the Office Action, claims 21-36 stand rejected on the ground of non-statutory obviousness-type double patenting as allegedly being unpatentable over claims 1-16 of U.S. Patent No. 11,129,163.

In this response, no claim is amended, added or canceled. Claims 1-20 were previously canceled. Accordingly, the claims pending in this application after entry of this response are claims 21-36.

For at least the following reasons, this application should be considered in condition for allowance and passed to issuance.

Double Patenting

In the Office Action, claims 21-36 stand rejected on the ground of non-statutory obviousness-type double patenting as allegedly being unpatentable over claims 1-16 of U.S. Patent No. 11,129,163 (See Office Action: item 6 at page 3). Although the Applicant respectfully questions the position taken by the Examiner, solely to expedite prosecution of the present disclosure and allowance of the claims, the terminal disclaimer to obviate the double patenting rejections over U.S. Patent No. 11,129,163 is filed herewith. Accordingly, the Applicant respectfully requests reconsideration and withdrawal of the double patenting rejections of claims 21-36.

CONCLUSION

It is believed that all of the grounds of rejection have been properly traversed, accommodated, or rendered moot. The Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (323) 934-2300.

The Commissioner is authorized to charge any additional fees which may be required or credit overpayment to deposit account no. 12-0415. In particular, if this response is not timely filed, then the Commissioner is authorized to treat this response as including a petition to extend the time period pursuant to 37 CFR 1.136 (a) requesting an extension of time of the number of months necessary to make this response timely filed and the petition fee due in connection therewith may be charged to deposit account no. 12-0415.

I hereby certify that this document is being transmitted electronically to the United States Patent and Trademark Office via electronic filing.

December 14, 2022
(Date of Transmission)

Azatuhi Chinaryan
(Name of Person Transmitting)

/ Azatuhi Chinaryan /
(Signature)

Respectfully submitted,

/ Young Seok Koo 76,255 /

Young Seok Koo
Attorney for Applicant
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4525 Wilshire Blvd., Suite 240
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Tel No.: (323) 934-2300
Fax No.: (323) 934-0202

Doc Code: DIST.E.FILE Document Description: Electronic Terminal Disclaimer - Filed		PTO/SB/26 U.S. Patent and Trademark Office Department of Commerce
Electronic Petition Request	TERMINAL DISCLAIMER TO OBVIATE A DOUBLE PATENTING REJECTION OVER A "PRIOR" PATENT	
Application Number	17227289	
Filing Date	10-Apr-2021	
First Named Inventor	Geonjung KO	
Attorney Docket Number	B-9587CON1 633097-4	
Title of Invention	WIRELESS COMMUNICATION METHOD AND WIRELESS COMMUNICATION TERMINAL IN BASIC SERVICE SET OVERLAPPING WITH ANOTHER BASIC SERVICE SET	
☒ Filing of terminal disclaimer does not obviate requirement for response under 37 CFR 1.111 to outstanding Office Action ☒ This electronic Terminal Disclaimer is not being used for a Joint Research Agreement.		
Owner	Percent Interest	
WILUS INSTITUTE OF STANDARDS AND TECHNOLOGY INC.	100%	
SK TELECOM CO., LTD.	100%	
The owner(s) with percent interest listed above in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of prior patent number(s) 11129163		

as the term of said prior patent is presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the prior patent are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the owner does not disclaim the terminal part of the term of any patent granted on the instant application that would extend to the expiration date of the full statutory term of the prior patent, "as the term of said prior patent is presently shortened by any terminal disclaimer," in the event that said prior patent later:

- expires for failure to pay a maintenance fee;
- is held unenforceable;
- is found invalid by a court of competent jurisdiction;
- is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;
- has all claims canceled by a reexamination certificate;
- is reissued; or
- is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

☒ Terminal disclaimer fee under 37 CFR 1.20(d) is included with Electronic Terminal Disclaimer request.

☐ I certify, in accordance with 37 CFR 1.4(d)(4), that the terminal disclaimer fee under 37 CFR 1.20(d) required for this terminal disclaimer has already been paid in the above-identified application.

Applicant claims the following fee status:

- ☐ Small Entity
- ☐ Micro Entity
- ☒ Regular Undiscounted

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

THIS PORTION MUST BE COMPLETED BY THE SIGNATORY OR SIGNATORIES

I certify, in accordance with 37 CFR 1.4(d)(4) that I am:

☒ An attorney or agent registered to practice before the Patent and Trademark Office who is of record in this application

Registration Number 76255

☐ A sole inventor

☐ A joint inventor; I certify that I am authorized to sign this submission on behalf of all of the inventors as evidenced by the power of attorney in the application

☐ A joint inventor; all of whom are signing this request

Signature

/Young Seok Koo/

Name

Young Seok Koo

*Statement under 37 CFR 3.73(b) is required if terminal disclaimer is signed by the assignee (owner).
Form PTO/SB/96 may be used for making this certification. See MPEP § 324.

Doc Code: DISQ.E.FILE

Document Description: Electronic Terminal Disclaimer – Approved

Application No.: 17227289

Filing Date: 10-Apr-2021

Applicant/Patent under Reexamination: KO et al.

Electronic Terminal Disclaimer filed on December 14, 2022

☒ APPROVED

This patent is subject to a terminal disclaimer

☐ DISAPPROVED

Approved/Disapproved by: Electronic Terminal Disclaimer automatically approved by EFS-Web

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/227,289	04/10/2021	Geonjung KO	B-9587CON1 633097-4	1040
158747	7590	09/15/2022	EXAMINER	
LADAS & PARRY			TANG, KIET G	
E-MAIL				
4525 WILSHIRE BOULEVARD			ART UNIT	
SUITE 240			PAPER NUMBER	
LOS ANGELES, CA 90010			2469	
			NOTIFICATION DATE	
			DELIVERY MODE	
			09/15/2022	
			ELECTRONIC	

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

LA_MAIL@la.ladas.com
achinaryan@la.ladas.com
ykoo@la.ladas.com

Continuation of Attachment(s) 2) Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)
Paper No(s)/Mail Date: 04/10/2021, 05/05/2021, 05/27/2021, 07/05/2021, 10/29/2021, 12/20/2021, 01/13/
2022, 03/02/2022, 07/14/2022, 09/07/2022

DETAILED ACTION

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.
2. Claims 21-36 are pending.

Double Patenting

3. The non-statutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A non-statutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

4. A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a non-statutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

5. Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

6. Claims 21-36 are rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1-16 of Patent No.: US 11129163.

7. Although the conflicting claims are not identical, they are not patentably distinct from each other because claims 1-16 of Patent No.: US 11129163 contain all the limitations of instant claims 21-36. The instant application claims 21-36 are broader in every aspect than claims 1-16 of Patent No.: US 11129163 and are therefore an obvious variant thereof.

8. **Regarding claim 1 of the instant application, 11129163** discloses A wireless communication terminal communicating wirelessly, the wireless communication terminal comprising: a transceiver; and a processor, wherein the processor is configured to

receive a physical layer convergence procedure (PLCP) Processing Data Unit (PPDU) by using the transceiver, and not to use a Basic Service Set (BSS) color indicated by the PPDU when signaling information indicates that an operation based on the BSS color is not allowed, wherein the BSS color is an identifier of a BSS, wherein the signaling information is transmitted from a base wireless communication terminal to which the wireless communication terminal is associated (claim 1).

9. **Regarding claim 22 of the instant application, 11129163** discloses The wireless communication terminal of claim 21, wherein the processor is configured not to set an Intra-BSS Network Allocation Vector (NAV) by using the BSS color indicated by a signaling field of the PPDU when the signaling information indicates that the operation based on the BSS color is not allowed, wherein the Intra-BSS NAV is different from a Basic NAV and is a NAV which is set based on an Intra-BSS PPDU, wherein the Basic NAV is set based on an Inter-BSS PPDU or a PPDU which is not able to be identified as the Inter-BSS PPDU or the Intra-BSS PPDU (claim 2).

10. **Regarding claim 23 of the instant application, 11129163** discloses The wireless communication terminal of claim 22, wherein the PPDU includes a TXOP Duration field in the signaling field of the PPDU and a medium access control (MAC) frame which includes a duration field, wherein the TXOP Duration field indicates information used for setting the Intra-BSS NAV and the Basic NAV, wherein the duration field indicates information used for setting the Intra-BSS NAV and the Basic NAV, wherein the processor is configured not to use the TXOP Duration field for setting the

Intra-BSS NAV or the Basic NAV when the wireless communication terminal gets a valid signaling field of the MAC frame (claim 3).

11. **Regarding claim 24 of the instant application, 11129163** discloses The wireless communication terminal of claim 21, wherein the processor is configured to signal that the operation based on the BSS color is not allowed when the wireless communication terminal recognizes that a BSS color collision has occurred, wherein the BSS color collision represents that different BSSs correspond to one BSS color (claim 4).

12. **Regarding claim 25 of the instant application, 11129163** discloses The wireless communication terminal of claim 24, wherein the processor is configured to determine that BSS color collision has occurred based on address fields of a medium access control (MAC) frame (claim 5).

13. **Regarding claim 26 of the instant application, 11129163** discloses The wireless communication terminal of claim 21, wherein the operation based on the BSS color includes entering a doze state of a power save operation based on a BSS color indicated by a signaling field of the PPDU, wherein the power save operation is an operation for the wireless communication terminal to enter the doze state until an end of a received PPDU which is an Intra-BSS PPDU (claim 6).

14. **Regarding claim 27 of the instant application, 11129163** discloses The wireless communication terminal of claim 21, wherein the processor is configured not to perform a spatial reuse operation when the BSS color indicated by the signaling field of the PPDU is a predetermined value (claim 7).

15. **Regarding claim 28 of the instant application, 11129163** discloses The wireless communication terminal of claim 27, wherein the predetermined value is 0 (claim 8).

16. **Regarding claim 29 of the instant application, 11129163** discloses An operation method of a wireless communication terminal communicating wirelessly, the method comprising: receiving a physical layer convergence procedure (PLCP) Processing Data Unit (PPDU); and not using a Basic Service Set (BSS) color indicated by the PPDU when signaling information indicates that an operation based on the BSS color is not allowed, wherein the BSS color is an identifier of a BSS, wherein the signaling information is transmitted from a base wireless communication terminal to which the wireless communication terminal is associated (claim 9).

17. **Regarding claim 30 of the instant application, 11129163** discloses The method of claim 29, wherein the method further comprises not setting an Intra-BSS Network Allocation Vector (NAV) by using the BSS color indicated by a signaling field of the PPDU when the signaling information indicates that the operation based on the BSS color is not allowed, wherein the Intra-BSS NAV is different from a Basic NAV and is a

NAV which is set based on an Intra-BSS PPDU, wherein the Basic NAV is set based on an Inter-BSS PPDU or a PPDU which is not able to be identified as the Inter-BSS PPDU or the Intra-BSS PPDU (claim 10).

18. **Regarding claim 31 of the instant application, 11129163** discloses The method of claim 30, wherein the PPDU includes a TXOP Duration field in the signaling field of the PPDU and a medium access control (MAC) frame which includes a duration field, wherein the TXOP Duration field indicates information used for setting the Intra-BSS NAV and the Basic NAV, wherein the duration field indicates information used for setting the Intra-BSS NAV and the Basic NAV, wherein the method further comprises not using the TXOP Duration field for setting the Intra-BSS NAV or the Basic NAV when the wireless communication terminal gets a valid signaling field of the MAC frame (claim 11).

19. **Regarding claim 32 of the instant application, 11129163** discloses The method of claim 29, wherein the method further comprises signal that the operation based on the BSS color is not allowed when the wireless communication terminal recognizes that a BSS color collision has occurred, wherein the BSS color collision represents that different BSSs correspond to one BSS color (claim 12).

20. **Regarding claim 33 of the instant application, 11129163** discloses The method of claim 32, wherein the signaling that a BSS color collision has occurred

comprises determining that BSS color collision has occurred based on address fields of a medium access control (MAC) frame (claim 13).

21. **Regarding claim 34 of the instant application, 11129163** discloses The method of claim 29, wherein the operation based on the BSS color includes entering a doze state of a power save operation based on a BSS color indicated by the signaling field of the PPDU, wherein the power save operation is an operation for the wireless communication terminal to enter the doze state until an end of a received PPDU which is an Intra-BSS PPDU (claims 14).

22. **Regarding claim 35 of the instant application, 11129163** discloses The method of claim 29, wherein the method further comprises not performing a spatial reuse operation when the BSS color indicated by the signaling field of the PPDU is a predetermined value (claim 15).

23. **Regarding claim 36 of the instant application, 11129163** discloses The method of claim 35, wherein the predetermined value is 0 (claim 16).

Allowable Subject Matter

24. Claims 21-36 are allowed.

The following is an examiner's statement of reasons for allowance:

Claims 21-36 are allowed over prior arts of record because the arts of record fail to reasonably suggest, or render obvious the following italic limitations:

In claims 21 and 29, not to use a Basic Service Set (BSS) color indicated by the PPDU when signaling information indicates that an operation based on the BSS color is not allowed, wherein the signaling information is transmitted from a base wireless communication terminal to which the wireless communication terminal is associated in combination with other limitations recited in claims 21 and 29.

The first closest prior art, NOH et al. (Pub. No.: US 20170094685 A1), hereinafter NOH, discloses A method is implemented by a station (STA) in a Wireless Local Area Network (WLAN) to update a Network Allocation Vector (NAV) maintained by the STA. The method includes receiving a first Physical Layer Protocol Data Unit (PPDU), determining whether a duration indicated in a control field of a preamble portion of the first PPDU is greater than a current NAV value, determining whether the first PPDU is received as an immediate response to a second PPDU previously transmitted by the STA, and updating the NAV maintained by the STA using the duration in response to a determination that the duration is greater than the current NAV value and the first PPDU is not received as an immediate response to the second PPDU previously transmitted by the STA (see abstract). However, NOH fails to disclose or render obvious the above italic as claimed.

The second closest prior art, Chu et al. (Patent No.: US 10045340 A1), hereinafter Chu, discloses A method is carried out on a device capable of utilizing a high efficiency wireless local area network (HEW) communication protocol and a legacy

communication protocol, and includes wirelessly receiving a communication frame; when the measured energy level of the frame exceeds a static clear channel assessment (CCA) energy level, identifying the BSS to which the frame corresponds, wherein identifying the BSS to which the frame corresponds comprises utilizing a BSS identifier included in the frame when the frame is an HEW frame or utilizing a MAC address included in the frame when the frame is a legacy frame; when the frame corresponds to the same BSS as the device, processing the frame utilizing the static CCA energy level; and when the frame corresponds to an overlapping OBSS, processing the frame utilizing a dynamic CCA energy level (see abstract). However, Chu fails to disclose or render obvious the above italic as claimed.

The third closest prior art, SEOK (Pub. No.: US 20170289987 A1), hereinafter SEOK, discloses Methods and apparatus for processing Physical layer Protocol Data Unit (PPDU) based on Basic Service Set (BSS) identification information in a High Efficiency WLAN (HEW) are described. An embodiment is a method for processing a PPDU by a station (STA) in a wireless local area network. The method may include determining whether the PPDU is transmitted from a different Basic Service Set (BSS) from a BSS to which the STA belongs or a same BSS as the BSS to which the STA belongs; and processing the PPDU using a first type of Clear Channel Assessment (CCA) threshold when the PPDU is determined to be transmitted from the different BSS, wherein the first type of CCA threshold is greater than a second type of CCA threshold which is used when the PPDU is determined to be transmitted from the same BSS (see

abstract). However, SEOK fails to disclose or render obvious the above italic as claimed.

In view of the above, the combined system of NOH, Chu, and SEOK does not disclose or render obvious the above italic and underlined limitations as claimed.

25. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance." as argued by the applicant as set forth above which examiner considered as persuasive.

Conclusion

26. Any inquiry concerning this communication or earlier communications from the examiner should be directed to KIET TANG whose telephone number is (571)270-7193. The examiner can normally be reached on M-F 8:00-5:00.

27. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, IAN MOORE can be reached on (571) 272-3085. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

28. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KIET TANG/
Primary Examiner, Art Unit 2469

<i>Notice of References Cited</i>	Application/Control No. 17/227,289		Applicant(s)/Patent Under Reexamination KO et al.	
	Examiner KIET TANG		Art Unit 2469	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20170094685-A1	03-2017	NOH; Yujin	H04W74/0816	1/1
*	B	US-10045340-B1	08-2018	Chu; Liwen	H04W74/0816	1/1
*	C	US-20170289987-A1	10-2017	SEOK; Yongho	H04W84/12	1/1
	D					
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	J					
	K					
	L					
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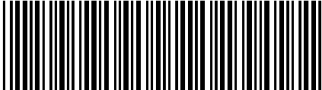
FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

<i>Index of Claims</i> 	Application/Control No. 17/227,289	Applicant(s)/Patent Under Reexamination KO et al.
	Examiner KIET TANG	Art Unit 2469

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS									
☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47									
CLAIM		DATE							
Final	Original	09/07/2022							
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	27	✓							
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	32	✓							
	33	✓							
	34	✓							
	35	✓							
	36	✓							

<i>Search Notes</i> 	Application/Control No. 17/227,289	Applicant(s)/Patent Under Reexamination KO et al.
	Examiner KIET TANG	Art Unit 2469

CPC - Searched*		
Symbol	Date	Examiner
H04W72/0453 OR H04W48/18 OR H04W74/002 OR H04W24/02 OR H04W84/12 OR H04W88/06 OR H04B7/2612 OR H04L27/2601 OR H04W28/06 OR H04W74/0825 OR H04W74/0841	09/07/2022	kt
CPC Cross Search (H04W 72/044, H04W 48/00, H04W 74/00, H04W 24/00)	09/07/2022	kt

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
Inventor and assignee search in East and PALM	09/07/2022	kt
Google Scholar Search	09/07/2022	kt

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

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PE2E SEARCH - Search History (Prior Art)

/K.T./

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Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L196	187	((("WILUS") near3 ("INSTITUTE") near3 ("OF") near3 ("STANDARDS") near3 ("AND") near3 ("TECHNOLOGY") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2022/09/07 11:35 AM
L197	824	((("SK") near3 ("TELECOM") near3 ("CO") near3 ("LTD"))).AS,AANM.	(USPAT)	OR	ON	ON	2022/09/07 11:35 AM
L199	747	((("KO") near3 ("Geonjung")) OR ((("SON") near3 ("Juhjung")) OR ((("AHN") near3 ("Woojin")) OR ((("KWAK") near3 ("Jinsam"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/09/07 11:39 AM
L200	2	(physical layer convergence Processing Data Unit Basic Service Set color allow\$4).clm.	(USPAT)	AND	ON	ON	2022/09/07 11:43 AM
L201	2	200 AND 196	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/09/07 11:43 AM
L202	2	200 AND 197	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO,	OR	ON	ON	2022/09/07 11:43 AM

			NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L203	2	200 AND 199	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/09/07 11:44 AM
L204	264	((Basic and Service and Set) BSS) near3 color) same PPDU	(USPAT)	OR	ON	ON	2022/09/07 12:40 PM
L205	263	204 AND (@AD<"20160304" OR @RLAD<"20160304")	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/09/07 12:41 PM
L206	49	("20150282043" OR "10524290" OR "10863502" OR "20070081477" OR "20190029038" OR "20040166851" OR "20040203688" OR "20070041334" OR "20120178407" OR "20130301553" OR "10785795" OR "20180295567" OR "20180317166" OR "20200221388" OR "20060085543" OR "20130121293" OR "20160050691" OR "20160157195" OR "20170048785" OR "20180242394" OR "20180270038" OR "20180270863" OR "20200221088" OR "10045340" OR "20130148609" OR "20140050210" OR "20150110093" OR	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/07 12:42 PM

		"20150124774" OR "20150264617" OR "20150341750" OR "20150359008" OR "20160081132" OR "20160088558" OR "20160150569" OR "20160353275" OR "20160374087" OR "20170006661" OR "20170041798" OR "20170094685" OR "20170105143" OR "20170251432" OR "20170289987" OR "20170294949" OR "20170367078" OR "20180213565" OR "20180227952" OR "20180324859" OR "20190028898" OR "8483741").pn.					
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L208	74	206 AND 207	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/09/07 01:36 PM
L209	392	207 AND 205	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY,	OR	ON	ON	2022/09/07 01:39 PM

			CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L210	158	((Basic adj Service adj Set) (BSS)) with color) with allow\$4	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/07 01:40 PM
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L220	31807	H04W72/044.cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/09/07 01:47 PM
L221	4608	H04W48/00.cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/09/07 01:47 PM
L222	18407	H04W74/00.cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU,	OR	ON	ON	2022/09/07 01:47 PM

			CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L223	71001	H04W24/00.cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/09/07 01:47 PM
L224	8	205 AND 220	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/09/07 01:47 PM
L225	0	205 AND 221	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/09/07 01:48 PM

			VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L226	24	205 AND 222	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/09/07 01:48 PM
L227	1	205 AND 223	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/09/07 01:48 PM
L228	1063	((Basic adj Service adj Set) (BSS)) with color) with (us\$4 perform\$4)	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/07 01:49 PM
L229	439	228 AND (@AD<"20160304" OR @RLAD<"20160304")	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/09/07 01:49 PM
L230	572	207 AND 229	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO;	OR	ON	ON	2022/09/07 01:50 PM

			JPO; DERWENT; IBM_TDB)				
L231	94	Basic adj NAV	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/09/07 01:51 PM
L232	399	(mac adj frame) with Duration adj field	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/09/07 01:51 PM
L233	313	((Basic ADJ Service ADJ Set) (BSS)) WITH color) SAME allow\$4	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/07 01:52 PM
L234	84	233 AND (@AD<"20160304" OR @RLAD<"20160304")	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/09/07 01:52 PM
L235	0	231 AND 234	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/09/07 01:52 PM
L236	19	((Basic adj Service adj Set) (BSS)) with color) with (mac adj frame)	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/07 01:53 PM
L237	41	((Basic adj Service adj Set) (BSS)) with color) same (mac adj frame)	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/07 01:53 PM
L238	1	237 AND (@AD<"20160304" OR @RLAD<"20160304")	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/09/07 01:53 PM

PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

July 5, 2021

Form PTO-1449 (Modified) Page 1 of 1	ATTY DOCKET NO. B-9587CON1 633097-4	U.S. SERIAL NO. 17/227,289
LIST OF PATENTS AND PUBLICATIONS STATEMENT	APPLICANT WILUS INSTITUTE OF STANDARDS AND TECHNOLOGY INC. & SK TELECOM CO., LTD.	FILING DATE April 10, 2021
		GROUP NO. 2469

U.S. PATENT DOCUMENTS

EXAMINER INITIAL	REFERENCE NUMBER	DOCUMENT NUMBER	ISSUE/PUBL. DATE	NAME	CLASS	SUB- CLASS	REMARKS

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL	REFERENCE NUMBER	DOCUMENT NUMBER	PUBLICATION DATE	COUNTRY	CLASS	SUB- CLASS	TRANSLATION
	1.	101374321	Feb. 25, 2009	CN			Espacenet
	2.	101616408	Dec. 30, 2009	CN			Espacenet
	3.	101647299	Feb. 10, 2010	CN			Espacenet
	4.	104641683	Jul. 31, 2018	CN			Espacenet

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

EXAMINER INITIAL	REFERENCE NUMBER	DOCUMENT
	5.	Office Action dated April 23, 2021 for Chinese Patent Application No. 201680061366.7 and its English translation provided by Applicant's foreign counsel

EXAMINER	DATE CONSIDERED
/KIET TANG/	09/07/2022

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

December 17, 2021

Form PTO-1449 (Modified) Page 1 of 1	ATTY DOCKET NO. B-9587CON1 633097-4	U.S. SERIAL NO. 17/227,289
LIST OF PATENTS AND PUBLICATIONS STATEMENT	APPLICANT WILUS INSTITUTE OF STANDARDS AND TECHNOLOGY INC. & SK TELECOM CO., LTD.	FILING DATE April 10, 2021
		GROUP NO. OPAP

U.S. PATENT DOCUMENTS

EXAMINER INITIAL	REFERENCE NUMBER	DOCUMENT NUMBER	ISSUE/PUBL. DATE	NAME	CLASS	SUB-CLASS	REMARKS
	1.	2012/0178407	Jul. 12, 2012	Rudolf et al.			
	2.	2007/0041334	Feb. 22, 2007	Song et al.			
	3.	2004/0203688	Oct. 14, 2004	Backes et al.			
	4.	2004/0166851	Aug. 26, 2004	Backes et al.			
	5.	2013/0301553	Nov. 14, 2013	Klein			

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL	REFERENCE NUMBER	DOCUMENT NUMBER	PUBLICATION DATE	COUNTRY	CLASS	SUB-CLASS	TRANSLATION
	6.	105379331	Mar. 2, 2016	CN			Espacenet
	7.	2011/025145	Mar. 3, 2011	WO			
	8.	104956735	Sep. 30, 2015	CN			Espacenet
	9.	102771059	Nov. 7, 2012	CN			Espacenet
	10.	104335510	Feb. 4, 2015	CN			Espacenet
	11.	103228046	Jul. 31, 2013	CN			Espacenet
	12.	103516461	Jan. 15, 2014	CN			Espacenet
	13.	103096492	May 8, 2013	CN			Espacenet
	14.	102761938	Oct. 31, 2012	CN			Espacenet
	15.	104272797	Jan. 7, 2015	CN			Espacenet
	16.	103178931	Jun. 26, 2013	CN			Espacenet
	17.	103167471	Jun. 19, 2013	CN			Espacenet
	18.	1777169	May 24, 2006	CN			Espacenet
	19.	1917462	Feb. 21, 2007	CN			Espacenet
	20.	1894914	Jan. 10, 2007	CN			Espacenet
	21.	104380683	Feb. 25, 2013	CN			Espacenet

December 17, 2021

			2015				
	22.	101336540	Dec. 31, 2008	CN			Espacenet
	23.	2 451 200	May 9, 2012	EP			

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

EXAMINER INITIAL	REFERENCE NUMBER	DOCUMENT
	24.	First Office Action dated October 15, 2021 for Chinese Patent Application No. 201780015247.2 and its English translation provided by the Applicant's foreign counsel
	25.	Notice of Allowance dated November 3, 2021 for Chinese Patent Application No. 201680071981.6 and its English translation provided by the Applicant's foreign counsel
	26.	Global System for Mobile Communications: "3GPP TR 45.820 v2.0.0_revmarked", 3 rd Generation Partnership Project; Technical Specification Group GSM/EDGE Radio Access Network; Cellular System Support for Ultra Low Complexity and Low Throughput Internet of Things; (Release 13), August 20, 2015, pp. 1-514.
	27.	Han Lihong: "Research on DRX Algorithm based on LTE/LTE-Advanced System", Thesis defense date May 2014, Wuhan University of Technology, China, April 1, 2014, pp. 1-74.
	28.	Global System for Mobile Communications: "3GPP TR 45.820 v2.0.0_clean", 3 rd Generation Partnership Project; Technical Specification Group GSM/EDGE Radio Access Network; Cellular System Support for Ultra Low Complexity and Low Throughput Internet of Things; (Release 13), August 20, 2015, pp. 1-509.
	29.	Mahmoud Elsaadany et al.: "Cellular LTE-A Technologies for the Future Internet-of-Things: Physical Layer Features and Challenges", December 7, 2015, pp. 1-28.

EXAMINER	DATE CONSIDERED
/KIET TANG/	09/07/2022

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

October 28, 2021

Form PTO-1449 (Modified) Page 1 of 1	ATTY DOCKET NO. B-9587CON1 633097-4	U.S. SERIAL NO. 17/227,289
LIST OF PATENTS AND PUBLICATIONS STATEMENT	APPLICANT WILUS INSTITUTE OF STANDARDS AND TECHNOLOGY INC. & SK TELECOM CO., LTD.	FILING DATE April 10, 2021
		GROUP NO. OPAP

U.S. PATENT DOCUMENTS

EXAMINER INITIAL	REFERENCE NUMBER	DOCUMENT NUMBER	ISSUE/PUBL. DATE	NAME	CLASS	SUB- CLASS	REMARKS
	1.	10,785,795	Sep. 22, 2020	Son et al.			
	2.	2018/0317166	Nov. 1, 2018	Huang et al.			
	3.	2018/0295567	Oct. 11, 2018	KO et al.			

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL	REFERENCE NUMBER	DOCUMENT NUMBER	PUBLICATION DATE	COUNTRY	CLASS	SUB- CLASS	TRANSLATION

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

EXAMINER INITIAL	REFERENCE NUMBER	DOCUMENT
	4.	Office Action dated September 29, 2021 for US Patent Application No. 16/945,937.

EXAMINER	DATE CONSIDERED
/KIET TANG/	09/07/2022

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

March 2, 2022

Form PTO-1449 (Modified) Page 1 of 1	ATTY DOCKET NO. B-9587CON1 633097-4	U.S. SERIAL NO. 17/227,289
LIST OF PATENTS AND PUBLICATIONS STATEMENT	APPLICANT WILUS INSTITUTE OF STANDARDS AND TECHNOLOGY INC. & SK TELECOM CO., LTD.	FILING DATE April 10, 2021
		GROUP NO. OPAP

U.S. PATENT DOCUMENTS

EXAMINER INITIAL	REFERENCE NUMBER	DOCUMENT NUMBER	ISSUE/PUBL. DATE	NAME	CLASS	SUB- CLASS	REMARKS
	1.	2015/0282043	Oct. 1, 2015	Fang et al.			

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL	REFERENCE NUMBER	DOCUMENT NUMBER	PUBLICATION DATE	COUNTRY	CLASS	SUB- CLASS	TRANSLATION

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

EXAMINER INITIAL	REFERENCE NUMBER	DOCUMENT
	2.	Office Action dated January 25, 2022 for Japanese Patent Application No. 2020-200512 and its English translation provided by Applicant's foreign counsel

EXAMINER	DATE CONSIDERED
/KIET TANG/	09/07/2022

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

An Energy Efficient Channel Access with Target Wake Time Scheduling for **Overlapping** 802.11 ax **Basic Service Sets**

Q Chen - IEEE Internet of Things Journal, 2022 - [ieeexplore.ieee.org](#)

... of uplink multiuser **transmission** in a ... two **different** APs and not located in the **overlapping** coverage can be scheduled to make a parallel **transmission** without interfering with each **other**. ...

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Overlapping impacts and resource coordination for high-density **wireless** communication

L Zheng, DS Hoang - ... on Computing and Communication ..., 2009 - [ieeexplore.ieee.org](#)

... -density **wireless** environment could not avoid cell/BSS (**Basic Service Set**) **overlapping**, which ... On the **other** hand, hidden **terminal** problem becomes worse as the entire system serves ...

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Interferential packet detection scheme for a solution to **overlapping** BSS issues in IEEE 802.11 WLANs

T Tandai, K Toshimitsu... - ... Radio Communications, 2006 - [ieeexplore.ieee.org](#)

... **another Basic Service Set** (BSS) is **overlapping** domestic BSS, some Stations (STAs) may suffer from interference from a hidden **terminal** in **overlapping** ... **overlapping Basic Service Sets** (...)

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A new admission control scheme for the **overlapping** BSS issues in the 802.11 WLANs

Y Yin, T Jiang - ... International Symposium on Communications ..., 2014 - [ieeexplore.ieee.org](#)

... the questions of the **overlapping basic service set** (OBSS) by ... When **another** BSS is **overlapping** the existing one, it forms ... to suffer from interference from the hidden **terminal**. Then, the ...

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A study on **transmission** power control for **wireless** LAN under **overlapping** BSS environment

I Shilara, T Hiraguri, K Yano, N Egashira... - IEICE Communications ..., 2018 - [jstage.jst.go.jp](#)

... **overlapping basic service set** (OBSS) environment that brings an interference with each **other**... In this evaluation, we have assumed APs are densely employed such as a railway **terminal** ...

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A redundant neighborhood approach to tolerate access point failure in IEEE 802.11 WLAN

MN Sahoo, PM Khilar, B Majhi - 2009 International Conference ..., 2009 - [ieeexplore.ieee.org](#)

... increasing demands for **mobile communications**. Therefore since ... to any **other basic service set**. An Infrastructure BSS can ... [5] describes **another** technique called **overlapping** coverage ...

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Survivability of IEEE 802.11 **wireless** LAN against AP failure

MN Sahoo, PM Khilar - 2009 - [dspace.nitrkl.ac.in](#)

... increasing demands for **mobile communications**. Thus WDS is ... Access Points in an **extended service set**. A distribution ... [5] describes **another** technique called **overlapping** coverage ...

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New Progress in Power Management for Current WiFi 6 Networks

Q Chen - [ijscience.org](#)

... journals in the field of **wireless communication** (eg, INFOCOM... efficiency TWT scheduling within **overlapping** BSS, focusing ... research on the **overlapping basic service set** scenarios.In ...

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Performance evaluation of VoIP technology in an **extended service set**, in concordance with IEEE 802.11 g

MDN Cuadrado, CAJ Huicapi, RAL Cueva - Sistemas y Telemática, 2017 - 200.3.192.46

... P.910 indicates that the utility tests in **terminals** or **services** ... For this reason, an **overlapping** in the channels was present, ... in research are **wireless communications** and data networks / ...

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An overlay algorithm to improve the support of multi-hopping in the IEEE 802.11 WLANs

HA Eladiy, TM Chen - ... on Communications (IEEE Conf. No. ...), 2004 - ieeexplore.ieee.org

... multiple **overlapping** IBSSs (Independent **Basic Service Sets**) ... platforms and **wireless communication** technology has led to ... The **terminal** will have to work with dual transceivers to tune ...

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January 12, 2022

Form PTO-1449 (Modified) Page 1 of 1	ATTY DOCKET NO. B-9587CON1 633097-4	U.S. SERIAL NO. 17/227,289
LIST OF PATENTS AND PUBLICATIONS STATEMENT	APPLICANT WILUS INSTITUTE OF STANDARDS AND TECHNOLOGY INC. & SK TELECOM CO., LTD.	FILING DATE April 10, 2021
		GROUP NO. OPAP

U.S. PATENT DOCUMENTS

EXAMINER INITIAL	REFERENCE NUMBER	DOCUMENT NUMBER	ISSUE/PUBL. DATE	NAME	CLASS	SUB-CLASS	REMARKS
	1.	10,524,290	Dec. 31, 2019	Chu et al.			
	2.	10,863,502	Dec. 8, 2020	Chu et al.			
	3.	2019/0029038	Jan. 24, 2019	KIM et al.			
	4.	2007/0081477	Apr. 12, 2007	Jakkahalli et al.			

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL	REFERENCE NUMBER	DOCUMENT NUMBER	PUBLICATION DATE	COUNTRY	CLASS	SUB-CLASS	TRANSLATION

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

EXAMINER INITIAL	REFERENCE NUMBER	DOCUMENT
	5.	Office Action dated December 17, 2021 for U.S. Patent Application No. 16/945,934
	6.	Office Action dated December 27, 2021 for Korean Patent Application No. 10-2021-7018658 and its English translation provided by the Applicant's foreign counsel
	7.	Office Action dated December 30, 2021 for Korean Patent Application No. 10-2021-7041433 and its English translation provided by the Applicant's foreign counsel
	8.	Office Action dated January 4, 2022 for Korean Patent Application No. 10-2021-7041428 and its English translation provided by the Applicant's foreign counsel

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/KIET TANG/	09/07/2022

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May 27, 2021

Form PTO-1449 (Modified) Page 1 of 1	ATTY DOCKET NO. B-9587CON1 633097-4	U.S. SERIAL NO. 17/227,289
LIST OF PATENTS AND PUBLICATIONS STATEMENT	APPLICANT WILUS INSTITUTE OF STANDARDS AND TECHNOLOGY INC. & SK TELECOM CO., LTD.	FILING DATE April 10, 2021
		GROUP NO. 2469

U.S. PATENT DOCUMENTS

EXAMINER INITIAL	REFERENCE NUMBER	DOCUMENT NUMBER	ISSUE/PUBL. DATE	NAME	CLASS	SUB-CLASS	REMARKS
	1.	2020/0221388	Jul. 9, 2020	Oteri et al.			

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL	REFERENCE NUMBER	DOCUMENT NUMBER	PUBLICATION DATE	COUNTRY	CLASS	SUB-CLASS	TRANSLATION

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

EXAMINER INITIAL	REFERENCE NUMBER	DOCUMENT
	2.	Notice of Allowance dated April 29, 2021 for U.S. Patent Application No. 16/792,166
	3.	Office Action dated January 25, 2021 for U.S. Patent Application No. 16/792,166

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May 4, 2021

Form PTO-1449 (Modified) Page 1 of 1	ATTY DOCKET NO. B-9587CON1 633097-4	U.S. SERIAL NO. 17/227,289
LIST OF PATENTS AND PUBLICATIONS STATEMENT	APPLICANT WILUS INSTITUTE OF STANDARDS AND TECHNOLOGY INC. & SK TELECOM CO., LTD.	FILING DATE April 10, 2021
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U.S. PATENT DOCUMENTS

EXAMINER INITIAL	REFERENCE NUMBER	DOCUMENT NUMBER	ISSUE/PUBL. DATE	NAME	CLASS	SUB-CLASS	REMARKS
	1.	2020/0221088	Jul. 9, 2020	Tourapis			
	2.	2018/0270863	Sep. 20, 2018	Oteri et al.			
	3.	2018/0270038	Sep. 20, 2018	Oteri et al.			
	4.	2018/0242394	Aug. 23, 2018	Wong et al.			
	5.	2017/0048785	Feb. 16, 2017	GE et al.			
	6.	2016/0157195	Jun. 2, 2016	Wang et al.			
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	9.	2016/0050691	Feb. 18, 2016	Jauh et al.			

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	10.	2015/061472	Apr. 30, 2015	WO			
	11.	103081539	May 1, 2013	CN			Espacenet
	12.	102844999	Dec. 26, 2012	CN			Espacenet
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May 4, 2021

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EXAMINER INITIAL	REFERENCE NUMBER	DOCUMENT
	22.	Office Action dated October 12, 2020 for Chinese Patent Application No. 201680061366.7 and its English translation provided by Applicant's foreign counsel
	23.	Office Action dated January 25, 2021 for U.S. Patent Application No. 16/792,163
	24.	Notice of Allowance dated April 28, 2021 for U.S. Patent Application No. 16/792,163
	25.	Office Action dated January 25, 2021 for Chinese Patent Application No. 201680071981.6 and its English translation provided by Applicant's foreign counsel
	26.	Office Action dated March 17, 2021 for Korean Patent Application No. 10-2018-7025837 and its English translation provided by Applicant's foreign counsel
	27.	Office Action dated March 23, 2021 for Indian Patent Application No. 201827021492
	28.	Office Action dated April 5, 2021 for Indian Patent Application No. 201827033017
	29.	Notice of Grant dated March 17, 2021 for Korean Patent Application No. 10-2020-7028167 and its English translation provided by Applicant's foreign counsel
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July 14, 2022

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OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

EXAMINER INITIAL	REFERENCE NUMBER	DOCUMENT
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	2.	Notice of Allowance dated July 20, 2021 for U.S Patent Application No. 16/792,166.
	3.	Office Action dated January 13, 2022 for Korean Patent Application No. 10-2021-7029783 and its English translation provided by Applicant's foreign counsel.
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April 9, 2021

Form PTO-1449 (Modified) Page 1 of 1	ATTY DOCKET NO. B-9587CON1 633097-4	U.S. SERIAL NO. N/A
LIST OF PATENTS AND PUBLICATIONS STATEMENT	APPLICANT WILUS INSTITUTE OF STANDARDS AND TECHNOLOGY INC. and SK TELECOM CO., LTD.	FILING DATE OR 371 © DATE Concurrently Herewith
		GROUP NO. N/A

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EXAMINER INITIAL	REFERENCE NUMBER	DOCUMENT NUMBER	ISSUE/PUBL. DATE	NAME	CLASS	SUB-CLASS	REMARKS
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	2.	2015/0110093	Apr. 23, 2015	Asterjadhi et al.			
	3.	2017/0251432	Aug. 31, 2017	PARK et al.			
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	43.	2012/077859	Jun. 14, 2012	WO			Espacenet
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48.	International Preliminary Report on Patentability (Chapter I) for PCT/KR2017/002407 issued on September 4, 2018 and its English translation from WIPO
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57.	Office Action dated June 27, 2019 for U.S. Patent Application No. 16/000,883 (now published as US 2018/0295567)
58.	Notice of Allowance dated April 29, 2020 for US Patent Application No. 15/953,404
59.	Office Action dated May 27, 2020 for Indian Patent Application No. 201827014271
60.	Office Action dated May 6, 2020 for European Patent Application No. 16857801.1
61.	Notice of Allowance dated July 1, 2020 for Korean Patent Application No. 10-2018-7016103 and its English translation provided by Applicant's foreign counsel
62.	Office Action dated July 28, 2020 for Japanese Patent Application No. 2019-142262 and its English translation provided by Applicant's foreign counsel
63.	Notice of Allowance dated July 24, 2020 for Korean Patent Application No. 10-2018-7010293 and its English translation provided by Applicant's foreign counsel
64.	Notice of Allowance dated January 13, 2021 for U.S. Patent Application No. 16/121,546 (now published as U.S. 2019/0021091)
65.	Final Office Action dated September 3, 2020 for U.S. Patent Application No. 16/121,546 (now published as U.S. 2019/0021091)
66.	Office Action dated March 5, 2020 for U.S. Patent Application No. 16/121,546 (now published as U.S. 2019/0021091)

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September 6, 2022

Form PTO-1449 (Modified) Page 1 of 1	ATTY DOCKET NO. B-9587CON1 633097-4	U.S. SERIAL NO. 17/227,289
LIST OF PATENTS AND PUBLICATIONS STATEMENT	APPLICANT WILUS INSTITUTE OF STANDARDS AND TECHNOLOGY INC. & SK TELECOM CO., LTD.	FILING DATE April 10, 2022
		GROUP NO. 2469

U.S. PATENT DOCUMENTS

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FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL	REFERENCE NUMBER	DOCUMENT NUMBER	PUBLICATION DATE	COUNTRY	CLASS	SUB-CLASS	TRANSLATION
	1.	2015/042018	Mar. 26, 2015	WO			

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

EXAMINER INITIAL	REFERENCE NUMBER	DOCUMENT
	2.	Notice of Allowance dated July 6, 2022 for Korean Patent Application No. 10-2021-7018658 and its English translation provided by Applicant's foreign counsel.
	3.	Notice of Allowance dated July 26, 2022 for Korean Patent Application No. 10-2021-7041428 and its English translation provided by Applicant's foreign counsel.
	4.	Notice of Allowance dated August 2, 2022 for Japanese Patent Application No. 2020-200512 and its English translation provided by Applicant's foreign counsel.

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Bibliographic Data

Application No: 17/227,289

Foreign Priority claimed: ☒ Yes ☐ No

35 USC 119 (a-d) conditions met: ☒ Yes ☐ No ☐ Met After Allowance

Verified and Acknowledged:

/KIET TANG/

Examiner's Signature

Initials

Title:

WIRELESS COMMUNICATION METHOD AND WIRELESS
COMMUNICATION TERMINAL IN BASIC SERVICE SET
OVERLAPPING WITH ANOTHER BASIC SERVICE SET

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
04/10/2021	370	2469	B-9587CON1 633097-4
RULE			

APPLICANTS

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CONTINUING DATA

This application is a CON of 16121546 09/04/2018 PAT 11129163
16121546 is a CON of PCT/KR2017/002407 03/06/2017

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KOREA, REPUBLIC OF KR10-2016-0044465 04/11/2016
KOREA, REPUBLIC OF KR10-2016-0057597 05/11/2016
KOREA, REPUBLIC OF KR10-2016-0114821 09/07/2016

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	B-9587CON1 633097-4
		Application Number	
Title of Invention	WIRELESS COMMUNICATION METHOD AND WIRELESS COMMUNICATION TERMINAL IN BASIC SERVICE SET OVERLAPPING WITH ANOTHER BASIC SERVICE SET		
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.			

Secrecy Order 37 CFR 5.2:

☐	Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)
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Inventor Information:

Inventor 1					Remove
Legal Name					
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Residence Information (Select One) ☐ US Residency ☒ Non US Residency ☐ Active US Military Service					
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Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
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Residence Information (Select One) ☐ US Residency ☒ Non US Residency ☐ Active US Military Service					
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Address 2					
City	Gyeonggi-do	State/Province			
Postal Code	16024	Country ⁱ	KR		
Inventor 3					Remove
Legal Name					

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	B-9587CON1 633097-4
		Application Number	
Title of Invention	WIRELESS COMMUNICATION METHOD AND WIRELESS COMMUNICATION TERMINAL IN BASIC SERVICE SET OVERLAPPING WITH ANOTHER BASIC SERVICE SET		

Prefix	Given Name	Middle Name	Family Name	Suffix
	Woojin		AHN	
Residence Information (Select One) ☐ US Residency ☒ Non US Residency ☐ Active US Military Service				
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Residence Information (Select One) ☐ US Residency ☒ Non US Residency ☐ Active US Military Service				
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All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button. Add 				

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).	
☐ An Address is being provided for the correspondence information of this application.	
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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	B-9587CON1 633097-4
		Application Number	
Title of Invention	WIRELESS COMMUNICATION METHOD AND WIRELESS COMMUNICATION TERMINAL IN BASIC SERVICE SET OVERLAPPING WITH ANOTHER BASIC SERVICE SET		

Application Information:

Title of the Invention	WIRELESS COMMUNICATION METHOD AND WIRELESS COMMUNICATION TERMINAL IN BASIC SERVICE SET OVERLAPPING WITH ANOTHER BASIC SERVICE SET		
Attorney Docket Number	B-9587CON1 633097-4	Small Entity Status Claimed	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	37	Suggested Figure for Publication (if any)	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)
☐ Request Not to Publish. I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application has not and will not be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.			
Please Select One:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	B-9587CON1 633097-4
		Application Number	
Title of Invention	WIRELESS COMMUNICATION METHOD AND WIRELESS COMMUNICATION TERMINAL IN BASIC SERVICE SET OVERLAPPING WITH ANOTHER BASIC SERVICE SET		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending	Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Continuation of	16121546	2018-09-04
Prior Application Status		Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
16121546	Continuation of	PCT/KR2017/002407	2017-03-06
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.			

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)ⁱ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ⁱ (if applicable)	Remove
10-2016-0026684	KR	2016-03-04		
Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ⁱ (if applicable)	Remove
10-2016-0029975	KR	2016-03-12		
Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ⁱ (if applicable)	Remove
10-2016-0044465	KR	2016-04-11		
Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ⁱ (if applicable)	Remove
10-2016-0057597	KR	2016-05-11		

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	B-9587CON1 633097-4	
		Application Number		
Title of Invention	WIRELESS COMMUNICATION METHOD AND WIRELESS COMMUNICATION TERMINAL IN BASIC SERVICE SET OVERLAPPING WITH ANOTHER BASIC SERVICE SET			

Application Number	Country ^j	Filing Date (YYYY-MM-DD)	Access Code ^k (if applicable)	Remove
10-2016-0114821	KR	2016-09-07		
Additional Foreign Priority Data may be generated within this form by selecting the Add button.				

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐	This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013. NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.
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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	B-9587CON1 633097-4
		Application Number	
Title of Invention	WIRELESS COMMUNICATION METHOD AND WIRELESS COMMUNICATION TERMINAL IN BASIC SERVICE SET OVERLAPPING WITH ANOTHER BASIC SERVICE SET		

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	B-9587CON1 633097-4
		Application Number	
Title of Invention	WIRELESS COMMUNICATION METHOD AND WIRELESS COMMUNICATION TERMINAL IN BASIC SERVICE SET OVERLAPPING WITH ANOTHER BASIC SERVICE SET		

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.			
Applicant 1			
If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.			
Clear			
☒ Assignee		☐ Legal Representative under 35 U.S.C. 117	
☐ Person to whom the inventor is obligated to assign.		☐ Person who shows sufficient proprietary interest	
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:			
Name of the Deceased or Legally Incapacitated Inventor:			
If the Applicant is an Organization check here. ☒			
Organization Name	WILUS INSTITUTE OF STANDARDS AND TECHNOLOGY INC.		
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Phone Number		Fax Number	
Email Address			
Additional Applicant Data may be generated within this form by selecting the Add button.			

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	B-9587CON1 633097-4
	Application Number	
Title of Invention WIRELESS COMMUNICATION METHOD AND WIRELESS COMMUNICATION TERMINAL IN BASIC SERVICE SET OVERLAPPING WITH ANOTHER BASIC SERVICE SET		

Applicant 2			
If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section. Clear			
☒ Assignee		☐ Legal Representative under 35 U.S.C. 117	☐ Joint Inventor
☐ Person to whom the inventor is obligated to assign.		☐ Person who shows sufficient proprietary interest	
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:			
Name of the Deceased or Legally Incapacitated Inventor: 			
If the Applicant is an Organization check here. ☒			
Organization Name		SK TELECOM CO., LTD.	
Mailing Address Information For Applicant:			
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Address 2			
City		Seoul	State/Province
Country	KR	Postal Code	04539
Phone Number		Fax Number	
Email Address			
Additional Applicant Data may be generated within this form by selecting the Add button.			

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Assignee 1
Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.
If the Assignee or Non-Applicant Assignee is an Organization check here. ☒

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	B-9587CON1 633097-4
		Application Number	
Title of Invention	WIRELESS COMMUNICATION METHOD AND WIRELESS COMMUNICATION TERMINAL IN BASIC SERVICE SET OVERLAPPING WITH ANOTHER BASIC SERVICE SET		

Organization Name	
-------------------	--

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		State/Province	
Country ¹		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.

Signature:

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). However, if this Application Data Sheet is submitted with the **INITIAL** filing of the application and either box A or B is **not** checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).

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See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Young Seok Koo 76255/		Date (YYYY-MM-DD)	2021-04-09	
First Name	Young Seok	Last Name	Koo	Registration Number	76,255

Additional Signature may be generated within this form by selecting the Add button.

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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

[DESCRIPTION]

[Invention Title]

WIRELESS COMMUNICATION METHOD AND WIRELESS COMMUNICATION TERMINAL IN BASIC SERVICE SET OVERLAPPING WITH ANOTHER BASIC SERVICE SET

[Technical Field]

The present invention relates to a wireless communication method and a wireless communication terminal in a situation where a basic service set overlaps.

[Background Art]

In recent years, with supply expansion of mobile apparatuses, a wireless communication technology that can provide a rapid wireless Internet service to the mobile apparatuses has been significantly spotlighted. The wireless communication technology allows mobile apparatuses including a smart phone, a smart pad, a laptop computer, a portable multimedia player, an embedded apparatus, and the like to wirelessly access the Internet in home or a company or a specific service providing area.

One of most famous wireless communication technology is wireless LAN technology. Institute of Electrical and Electronics Engineers (IEEE) 802.11 has commercialized or developed various technological standards since an initial wireless LAN technology is supported using frequencies of 2.4 GHz. First, the IEEE 802.11b supports a communication speed of a maximum of 11 Mbps while using frequencies of a 2.4 GHz band. IEEE 802.11a which is commercialized after the IEEE 802.11b uses frequencies of not the 2.4 GHz band but a 5 GHz band to reduce an influence by interference as compared with the frequencies of the 2.4 GHz band which are significantly congested and improves the communication speed up to a maximum of 54 Mbps by using an Orthogonal Frequency Division Multiplexing (OFDM) technology. However, the IEEE 802.11a has a disadvantage in that a communication distance is shorter than the IEEE 802.11b. In addition, IEEE 802.11g uses the frequencies of the 2.4 GHz band similarly to the IEEE 802.11b to implement the communication speed of a maximum of 54 Mbps and satisfies backward compatibility to significantly come into the spotlight and further, is superior to the IEEE 802.11a in terms of the communication distance.

Moreover, as a technology standard established to overcome a limitation of the communication speed which is pointed out as a weak point in a wireless LAN, IEEE 802.11n has been provided. The IEEE 802.11n aims at increasing the speed and reliability of a network and extending an operating distance of a wireless network. In more detail, the IEEE 802.11n supports a high throughput (HT) in which a data processing speed is a maximum of 540 Mbps or more and further, is based on a multiple inputs and multiple outputs (MIMO) technology in which multiple antennas are used at both sides of a transmitting unit and a receiving unit in order to minimize a transmission error and optimize a data speed. Further, the standard can use a coding scheme that transmits multiple copies which overlap with each other in order to increase data reliability.

As the supply of the wireless LAN is activated and further, applications using the wireless LAN are diversified, the need for new wireless LAN systems for supporting a higher throughput (very high throughput (VHT)) than the data processing speed supported by the IEEE 802.11n has come into the spotlight. Among them, IEEE 802.11ac supports a wide bandwidth (80 to 160 MHz) in the 5 GHz frequencies. The IEEE 802.11ac standard is defined only in the 5 GHz band, but initial 11ac chipsets will support even operations in the 2.4 GHz band for the backward compatibility with the existing 2.4 GHz band products. Theoretically, according to the standard, wireless LAN speeds of multiple stations are enabled up to a minimum of 1 Gbps and a maximum single link speed is enabled up to a minimum of 500 Mbps. This is achieved by extending concepts of a wireless interface accepted by 802.11n, such as a wider wireless frequency bandwidth (a maximum of 160 MHz), more MIMO spatial streams (a maximum of 8), multi-user MIMO, and high-density modulation (a maximum of 256 QAM). Further, as a scheme that transmits data by using a 60 GHz band instead of the existing 2.4 GHz/5 GHz, IEEE 802.11ad has been provided. The IEEE 802.11ad is a transmission standard that provides a speed of a maximum of 7 Gbps by using a beamforming technology and is suitable for high bit rate moving picture streaming such as massive data or non-compression HD video. However, since it is difficult for the 60 GHz frequency band to pass through an obstacle, it is disadvantageous in that the 60 GHz frequency band can be used only among devices in a short-distance space.

Meanwhile, in recent years, as next-generation wireless communication technology standards after the 802.11ac and 802.11ad, discussion for providing a high-efficiency and high-performance wireless communication technology in a high-density environment is continuously performed. That is, in a next-generation wireless communication technology environment, communication having high frequency efficiency needs to be provided indoors/outdoors under the presence of high-density terminals and base terminals and various technologies for implementing the communication are required.

Especially, as the number of devices using a wireless communication technology increases, it is necessary to efficiently use a predetermined channel. Therefore, required is a technology capable of efficiently using bandwidths by simultaneously transmitting data between a plurality of terminals and base terminals.

[Disclosure]

[Technical Problem]

An embodiment of the present invention is to provide a wireless communication method and a wireless communication terminal in a situation where a basic service set overlaps.

[Technical Solution]

According to an embodiment of the present invention, a wireless communication terminal that communicates wirelessly includes: a transceiver; and a processor. The processor is configured to transmit a BSS color indicating a BSS including the wireless communication terminal when communicating with another wireless communication terminal through the transceiver, and transmit a predetermined value as the BSS color when the wireless communication terminal fails to receive information signaling the BSS color.

When the wireless communication terminal fails to make any association with a wireless communication terminal, which is an AP, the processor may transmit a predetermined value as the BSS color.

When the wireless communication terminal receives signaling information indicating that an operation based on the BSS color is not allowed, the processor may be configured to transmit a predetermined value as the BSS color.

The predetermined value may be 0.

A PLCP Protocol Data Unit (PPDU) signaling the predetermined value as the BSS color may not be identified as an Inter-BSS PPDU or an Intra-BSS PPDU based on the BSS color, which is the predetermined value, the Intra-BSS PPDU may indicate a PPDU transmitted from the same BSS as the BSS including the wireless communication terminal, and the Inter-BSS PPDU may indicate a PPDU transmitted from a BSS other than the BSS including the wireless communication terminal.

According to an embodiment of the present invention, a wireless communication terminal that communicates wirelessly includes: a transceiver; and a processor. The processor is configured to receive a PLCP Protocol Data Unit (PPDU) through the transceiver and access a channel based on whether the PPDU is an Inter-BSS PPDU or an Intra-BSS PPDU, the Intra-BSS PPDU indicates a PPDU transmitted from the same BSS as the BSS including the wireless communication terminal, and the Inter-BSS PPDU indicates a PPDU transmitted from a BSS other than the BSS including the wireless communication terminal.

When the PPDU satisfies both an Inter-BSS PPDU condition and an Intra-BSS PPDU condition, the PPDU may be identified as an Inter-BSS PPDU.

When the PPDU is not identified as the Inter-BSS PPDU or the Intra-BSS PPDU, the processor may set a Basic NAV instead of an Intra-BSS Network Allocation Vector (NAV) based on the PPDU, the Intra-BSS NAV may be set based on the PPDU transmitted from the same BSS as the wireless communication terminal, and the Basic NAV may be set

based on the PPDU transmitted from the BSS other than that of the wireless communication terminal

When the wireless communication terminal is not able to identify whether the PPDU is the Intra-BSS PPDU or the Inter-BSS PPDU based on the BSS color, the processor may be configured not to set an Intra-BSS Network Allocation Vector (NAV) based on the BSS color and a TXOP Duration field of an HE-SIG-A field of the PPDU, and the Intra-BSS NAV may be set based on the PPDU transmitted from the same BSS as that of the wireless communication terminal.

When receiving signaling information indicating that an operation based on the BSS color is not allowed, the processor may be configured not to set the Intra-BSS NAV based on the BSS color and the TXOP Duration field of the HE-SIG-A field of the PPDU.

When the wireless communication terminal is recognize that the BSS color of the BSS including the wireless communication terminal is the same as the BSS color of another BSS, an Intra-BSS NAV may not be set based on the BSS color and the TXOP Duration field of the HE-SIG-A field of the PPDU.

When the wireless communication terminal is not able to identify whether the PPDU is the Intra-BSS PPDU or the Inter-BSS PPDU based on the BSS color, the processor may be configured not to enter a power save mode based on the BSS color.

When the wireless communication terminal is an AP and the PPDU is a trigger-based PPDU transmitted from a wireless communication terminal that is not triggered by the wireless communication terminal, the processor may be configured to determine that the PPDU is an Inter-BSS PPDU.

When the wireless communication terminal is an AP and the PPDU is a PPDU including a trigger frame, the processor may be configured to determine that the PPDU is

an Inter-BSS PPDU.

The processor may be configured to determine whether the PPDU includes the trigger frame based on information related to a Spatial Reuse (SR) operation included in the PPDU.

Based on that information related to the SR operation included in the PPDU indicates whether the SR operation is restrictively allowed or the SR operation is delayed while the PPDU is transmitted, the processor may be configured to determine whether the PPDU includes the trigger frame.

According to an embodiment of the present invention, a wireless communication terminal that communicates wirelessly includes: a transceiver; and a processor. The processor is configured to receive a PLCP Processing Data Unit (PPDU) through the transceiver, and not to perform an operation based on the BSS color when the BSS color indicated by the PPDU is a predetermined value.

When the BSS color indicated by the PPDU is a predetermined value, the processor may not perform the SR operation for the PPDU.

When the BSS color indicated by the PPDU is a predetermined value, the processor may regard the PPDU as an Intra-BSS PPDU.

The predetermined value may be a reserved value that is not used in the BSS color when the AP selects the BSS color.

[Advantageous Effects]

An embodiment of the present invention provides a wireless communication method and a wireless communication terminal in a situation where a basic service set overlaps.

[Description of Drawings]

FIG. 1 shows a wireless LAN system according to an embodiment of the present

invention.

FIG. 2 shows a wireless LAN system according to another embodiment of the present invention.

FIG. 3 shows a block diagram illustrating a configuration of a station according to an embodiment of the inventive concept.

FIG. 4 shows a block diagram illustrating a configuration of an access point according to an embodiment of the present invention.

FIG. 5 shows a process that a station sets an access point and a link according to an embodiment of the present invention.

FIG. 6 shows that a wireless communication terminal according to an embodiment of the present invention enters a power save mode based on a BSS color.

FIG. 7 shows that a wireless communication terminal according to an embodiment of the present invention enters a power save mode during inter-BSS color collision.

FIG. 8 shows the operation of setting a NAV by a wireless communication terminal according to an embodiment of the present invention when a BSS color collision occurs.

FIG. 9 shows a NAV setting operation of a wireless communication terminal according to another embodiment of the present invention when a BSS color collision occurs.

FIG. 10 shows an operation of a wireless communication terminal according to an embodiment of the present invention to determine whether to reset a NAV based on a CF-End frame when a BSS color collision occurs.

FIG. 11 shows an operation of a wireless communication terminal according to another embodiment of the present invention to determine whether to reset a NAV based on a CF-End frame when a BSS color collision occurs.

FIG. 12 shows an operation of a wireless communication terminal recognizing a BSS color collision according to an embodiment of the present invention.

FIG. 13 shows a MAC frame format of a Clear To Send (CTS) frame and an ACK frame according to an embodiment of the present invention.

FIG. 14 shows an operation in which a wireless communication terminal according to an embodiment of the present invention sets a NAV based on an RTS frame and a CTS

frame.

FIG. 15 shows a format of an 802.11a PPDU according to an embodiment of the present invention.

FIG. 16 shows a format of a service field of a PPDU according to an embodiment of the present invention.

FIG. 17 shows an operation of setting a NAV according to an embodiment of FIG. 15 to FIG. 16 by a wireless communication terminal according to an embodiment of the present invention.

FIG. 18 shows a method of setting a partial AID and a Group ID field of VHT-SIG-A by a wireless communication terminal according to an embodiment of the present invention.

FIG. 19 shows a method of determining whether a corresponding PPDU is an Inter-BSS PPDU or an Intra-BSS PPDU based on whether a PPDU received by a wireless communication terminal is a downlink PPDU according to an embodiment of the present invention.

FIG. 20 shows a method for identifying whether a MAC frame received is an Intra-BSS frame or an Inter-BSS frame based on SR-related information by a wireless communication terminal according to an embodiment of the present invention.

FIG. 21 shows a method for a wireless communication terminal to determine whether the corresponding PPDU is an Inter-BSS PPDU or an Intra-BSS PPDU when the PPDU received by the wireless communication terminal according to the embodiment of the present invention satisfies both the Inter-BSS PPDU condition and the Intra-BSS PPDU condition.

FIG. 22 shows a case where a wireless communication terminal according to an embodiment of the present invention enters a power save state based on a MAC header of a frame received by the wireless communication terminal.

FIG. 23 shows a case where, when a wireless communication terminal according to an embodiment of the present invention is included in a BSS corresponding to a multiple BSSID set, the wireless communication terminal enters a power save state based on a MAC header of a frame received by the wireless communication terminal.

FIG. 24 shows the format of the HE-SIG-B field according to an embodiment of the present invention.

FIG. 25 is a view illustrating a MAC frame format according to an embodiment of the present invention.

FIG. 26 is a view illustrating a variant of an HT Control field according to an embodiment of the present invention.

FIG. 27 shows the format of the A-Control subfield according to an embodiment of the present invention.

FIG. 28 shows the format of an A-Control sub-field of a control sub-field according to another embodiment of the present invention.

FIGS. 29 to 33 show a frame format and an HE variant format of an HT Control field according to another embodiment of the present invention.

FIG. 34 shows a format of a trigger frame according to an embodiment of the present invention.

FIG. 35 shows the format of a Common Info field and a Per User Info field of a trigger frame according to the embodiment of the present invention.

FIG. 36 shows a Common Info field and a Per User Info field of a trigger frame according to another embodiment of the present invention.

FIG. 37 shows a Trigger Dependent Common Info field and a Trigger Dependent Per User Info field of an MU-BAR type trigger frame according to an embodiment of the present invention.

FIG. 38 shows the format of the Trigger Dependent Common Info field of the MU-BAR type trigger frame according to an embodiment of the present invention.

FIG. 39 shows a format of an MU-BAR type trigger frame for GCR according to an embodiment of the present invention.

FIG. 40 shows a format of an MU-BAR type trigger frame for GCR according to an embodiment of the present invention.

FIG. 41 shows the format of the BAR Control field and the encoding value of the BlockACKReq variant according to an embodiment of the present invention.

FIG. 42 shows the format of the BAR Information field according to an

embodiment of the present invention.

FIG. 43 shows a BAR Information field according to another embodiment of the present invention.

FIG. 44 shows a trigger frame structure according to another embodiment of the present invention.

FIG. 45 shows the operation of a wireless communication terminal according to an embodiment of the present invention.

[Mode for Carrying out the Invention]

Preferred embodiments of the present invention will be described below in more detail with reference to the accompanying drawings. The present invention may, however, be embodied in different forms and should not be constructed as limited to the embodiments set forth herein. Parts not relating to description are omitted in the drawings in order to clearly describe the present invention and like reference numerals refer to like elements throughout.

Furthermore, when it is described that one comprises (or includes or has) some elements, it should be understood that it may comprise (or include or has) only those elements, or it may comprise (or include or have) other elements as well as those elements if there is no specific limitation.

This application claims priority to and the benefit of Korean Patent Application Nos. 10-2016-0026684 (2016.03.04), Nos. 10-2016-0029975 (2016.03.12), Nos. 10-2016-0044465 (2016.04.11), Nos. 10-2016-0057597(2016.05.11), and Nos. 10-2016-0114821 (2016.09.07) filed in the Korean Intellectual Property Office and the embodiments and mentioned items described in the respective applications are included in the Detailed Description of the present application.

FIG. 1 is a diagram illustrating a wireless communication system according to an embodiment of the present invention. For convenience of description, an embodiment of the present invention is described through the wireless LAN system. The wireless LAN system includes one or more basic service sets (BSS) and the BSS represents a set of apparatuses which are successfully synchronized with each other to communicate with

each other. In general, the BSS may be classified into an infrastructure BSS and an independent BSS (IBSS) and FIG. 1 illustrates the infrastructure BSS between them.

As illustrated in FIG. 1, the infrastructure BSS (BSS1 and BSS2) includes one or more stations STA1, STA2, STA3, STA4, and STA5, access points PCP/AP-1 and PCP/AP-2 which are stations providing a distribution service, and a distribution system (DS) connecting the multiple access points PCP/AP-1 and PCP/AP-2.

The station (STA) is a predetermined device including medium access control (MAC) following a regulation of an IEEE 802.11 standard and a physical layer interface for a wireless medium, and includes both a non-access point (non-AP) station and an access point (AP) in a broad sense. Further, in the present specification, a term 'terminal' may be used to refer to a concept including a wireless LAN communication device such as non-AP STA, or an AP, or both terms. A station for wireless communication includes a processor and a transceiver and according to the embodiment, may further include a user interface unit and a display unit. The processor may generate a frame to be transmitted through a wireless network or process a frame received through the wireless network and besides, perform various processing for controlling the station. In addition, the transceiver is functionally connected with the processor and transmits and receives frames through the wireless network for the station.

The access point (AP) is an entity that provides access to the distribution system (DS) via wireless medium for the station associated therewith. In the infrastructure BSS, communication among non-AP stations is, in principle, performed via the AP, but when a direct link is configured, direct communication is enabled even among the non-AP stations. Meanwhile, in the present invention, the AP is used as a concept including a personal BSS coordination point (PCP) and may include concepts including a centralized controller, a base station (BS), a node-B, a base transceiver system (BTS), and a site controller in a broad sense.

A plurality of infrastructure BSSs may be connected with each other through the distribution system (DS). In this case, a plurality of BSSs connected through the distribution system is referred to as an extended service set (ESS).

FIG. 2 illustrates an independent BSS which is a wireless communication system

according to another embodiment of the present invention. For convenience of description, another embodiment of the present invention is described through the wireless LAN system. In the embodiment of FIG. 2, duplicative description of parts, which are the same as or correspond to the embodiment of FIG. 1, will be omitted.

Since a BSS3 illustrated in FIG. 2 is the independent BSS and does not include the AP, all stations STA6 and STA7 are not connected with the AP. The independent BSS is not permitted to access the distribution system and forms a self-contained network. In the independent BSS, the respective stations STA6 and STA7 may be directly connected with each other.

FIG. 3 is a block diagram illustrating a configuration of a station 100 according to an embodiment of the present invention.

As illustrated in FIG. 3, the station 100 according to the embodiment of the present invention may include a processor 110, a transceiver 120, a user interface unit 140, a display unit 150, and a memory 160.

First, the transceiver 120 transmits and receives a wireless signal such as a wireless LAN physical layer frame, or the like and may be embedded in the station 100 or provided as an exterior. According to the embodiment, the transceiver 120 may include at least one transmit and receive module using different frequency bands. For example, the transceiver 120 may include transmit and receive modules having different frequency bands such as 2.4 GHz, 5 GHz, and 60 GHz. According to an embodiment, the station 100 may include a transmit and receive module using a frequency band of 6 GHz or more and a transmit and receive module using a frequency band of 6 GHz or less. The respective transmit and receive modules may perform wireless communication with the AP or an external station according to a wireless LAN standard of a frequency band supported by the corresponding transmit and receive module. The transceiver 120 may operate only one transmit and receive module at a time or simultaneously operate multiple transmit and receive modules together according to the performance and requirements of the station 100. When the station 100 includes a plurality of transmit and receive modules, each transmit and receive module may be implemented by independent elements or a plurality of modules may be integrated into one chip.

Next, the user interface unit 140 includes various types of input/output means provided in the station 100. That is, the user interface unit 140 may receive a user input by using various input means and the processor 110 may control the station 100 based on the received user input. Further, the user interface unit 140 may perform output based on a command of the processor 110 by using various output means.

Next, the display unit 150 outputs an image on a display screen. The display unit 150 may output various display objects such as contents executed by the processor 110 or a user interface based on a control command of the processor 110, and the like. Further, the memory 160 stores a control program used in the station 100 and various resulting data. The control program may include an access program required for the station 100 to access the AP or the external station.

The processor 110 of the present invention may execute various commands or programs and process data in the station 100. Further, the processor 110 may control the respective units of the station 100 and control data transmission/reception among the units. According to the embodiment of the present invention, the processor 110 may execute the program for accessing the AP stored in the memory 160 and receive a communication configuration message transmitted by the AP. Further, the processor 110 may read information on a priority condition of the station 100 included in the communication configuration message and request the access to the AP based on the information on the priority condition of the station 100. The processor 110 of the present invention may represent a main control unit of the station 100 and according to the embodiment, the processor 110 may represent a control unit for individually controlling some component of the station 100, for example, the transceiver 120, and the like. The processor 110 may be a modulator and/or demodulator which modulates wireless signal transmitted to the transceiver 120 and demodulates wireless signal received from the transceiver 120. The processor 110 controls various operations of wireless signal transmission/reception of the station 100 according to the embodiment of the present invention. A detailed embodiment thereof will be described below.

The station 100 illustrated in FIG. 3 is a block diagram according to an embodiment of the present invention, where separate blocks are illustrated as logically

distinguished elements of the device. Accordingly, the elements of the device may be mounted in a single chip or multiple chips depending on design of the device. For example, the processor 110 and the transceiver 120 may be implemented while being integrated into a single chip or implemented as a separate chip. Further, in the embodiment of the present invention, some components of the station 100, for example, the user interface unit 140 and the display unit 150 may be optionally provided in the station 100.

FIG. 4 is a block diagram illustrating a configuration of an AP 200 according to an embodiment of the present invention.

As illustrated in FIG. 4, the AP 200 according to the embodiment of the present invention may include a processor 210, a transceiver 220, and a memory 260. In FIG. 4, among the components of the AP 200, duplicative description of parts which are the same as or correspond to the components of the station 100 of FIG. 2 will be omitted.

Referring to FIG. 4, the AP 200 according to the present invention includes the transceiver 220 for operating the BSS in at least one frequency band. As described in the embodiment of FIG. 3, the transceiver 220 of the AP 200 may also include a plurality of transmit and receive modules using different frequency bands. That is, the AP 200 according to the embodiment of the present invention may include two or more transmit and receive modules among different frequency bands, for example, 2.4 GHz, 5 GHz, and 60 GHz together. Preferably, the AP 200 may include a transmit and receive module using a frequency band of 6 GHz or more and a transmit and receive module using a frequency band of 6 GHz or less. The respective transmit and receive modules may perform wireless communication with the station according to a wireless LAN standard of a frequency band supported by the corresponding transmit and receive module. The transceiver 220 may operate only one transmit and receive module at a time or simultaneously operate multiple transmit and receive modules together according to the performance and requirements of the AP 200.

Next, the memory 260 stores a control program used in the AP 200 and various resulting data. The control program may include an access program for managing the access of the station. Further, the processor 210 may control the respective units of the AP 200 and control data transmission/reception among the units. According to the embodiment

of the present invention, the processor 210 may execute the program for accessing the station stored in the memory 260 and transmit communication configuration messages for one or more stations. In this case, the communication configuration messages may include information about access priority conditions of the respective stations. Further, the processor 210 performs an access configuration according to an access request of the station. The processor 210 may be a modulator and/or demodulator which modulates wireless signal transmitted to the transceiver 220 and demodulates wireless signal received from the transceiver 220. The processor 210 controls various operations such as radio signal transmission/reception of the AP 200 according to the embodiment of the present invention. A detailed embodiment thereof will be described below.

FIG. 5 is a diagram schematically illustrating a process in which a STA sets a link with an AP.

Referring to FIG. 5, the link between the STA 100 and the AP 200 is set through three steps of scanning, authentication, and association in a broad way. First, the scanning step is a step in which the STA 100 obtains access information of BSS operated by the AP 200. A method for performing the scanning includes a passive scanning method in which the AP 200 obtains information by using a beacon message (S101) which is periodically transmitted and an active scanning method in which the STA 100 transmits a probe request to the AP (S103) and obtains access information by receiving a probe response from the AP (S105).

The STA 100 that successfully receives wireless access information in the scanning step performs the authentication step by transmitting an authentication request (S107a) and receiving an authentication response from the AP 200 (S107b). After the authentication step is performed, the STA 100 performs the association step by transmitting an association request (S109a) and receiving an association response from the AP 200 (S109b).

Meanwhile, an 802.1X based authentication step (S111) and an IP address obtaining step (S113) through DHCP may be additionally performed. In FIG. 5, the authentication server 300 is a server that processes 802.1X based authentication with the STA 100 and may be present in physical association with the AP 200 or present as a

separate server.

In a specific embodiment, the AP 200 may be a wireless communication terminal that allocates a communication medium resource and performs scheduling in an independent network, such as an ad-hoc network, which is not connected to an external distribution service. In addition, the AP 200 may be at least one of a base station, an eNB, and a transmission point TP.

Due to the spread of mobile devices and the supply of wireless communication, wireless communication terminals are increasingly communicating in a dense environment. Particularly, the number of cases where a wireless communication terminal communicates in an environment in which a plurality of BSSs are overlapped is increasing. When multiple BSSs are overlapped, the communication efficiency of the wireless communication terminal may be degraded due to interference with other wireless communication terminals. In particular, when a frequency band is used through a contention procedure, a wireless communication terminal may not secure even a transmission opportunity due to interference with other wireless communication terminals. To solve this problem, a wireless communication terminal may perform a spatial reuse (SR) operation. Specifically, the SR operation may include an operation of accessing the channel depending on whether the received frame is a MAC frame transmitted from a BSS including a wireless communication terminal or a MAC frame transmitted from another BSS. For convenience of description, when a frame is used without any description in the following description, it is assumed to refer to a MAC frame.

In a specific embodiment, the operation of accessing the channel may include a setting NAV and resetting NAV operation, a CCA operation, and a deferral operation. For example, the wireless communication terminal may adjust a Clear Channel Assessment (CCA) threshold value according to whether a frame received by the wireless communication terminal is a frame transmitted from a BSS including a wireless communication terminal or a frame transmitted from an OBSS. Also, the wireless communication terminal may adjust the transmission power of the PPDU to be transmitted according to the CCA threshold value adjustment during the SR operation.

Specifically, the wireless communication terminal may apply the CCA threshold value according to whether the received PPDU is Inter-BSS PPDU or Intra-BSS PPDU while the received PPDU is being transmitted. In the specific embodiment, the CCA threshold value according to whether the received PPDU is Inter-BSS PPDU or Intra-BSS PPDU while the payload of the received PPDU is being transmitted may be applied. Also, the wireless communication terminal may receive the first PPDU and receive the second PPDU while applying the CCA threshold according to whether the first PPDU is the Inter-BSS PPDU or the Intra-BSS PPDU. Specifically, the wireless communication terminal may apply the CCA threshold value according to whether the received PPDU is Inter-BSS PPDU or Intra-BSS PPDU while the received PPDU is being transmitted. Specifically, when the wireless communication terminal receives the Inter-BSS PPDU and applies the CCA threshold value corresponding to the Inter-BSS PPDU, it may receive the Intra-BSS PPDU. At this time, the wireless communication terminal may apply the CCA threshold value corresponding to the Intra-BSS PPDU instead of the CCA threshold value corresponding to the Inter-BSS PPDU. However, when the wireless communication terminal receives the Intra-BSS PPDU and applies the CCA threshold value corresponding to the Intra-BSS PPDU, and the wireless communication terminal may receive the Inter-BSS PPDU while the transmission of the Intra-BSS PPDU is not completed. At this time, the wireless communication terminal may maintain the CCA threshold value corresponding to the Intra-BSS PPDU until the transmission of the intra-BSS PPDU is completed. Specifically, the wireless communication terminal may not apply the CCA threshold value corresponding to the inter-BSS PPDU until the transmission of the Intra-BSS PPDU is completed. In the above-described operations, the CCA threshold value corresponding to the Inter-BSS PPDU may be equal to or greater than the CCA threshold value corresponding to the Intra-BSS PPDU.

In addition, the wireless communication terminal may enter the power save mode depending on whether the frame received by the wireless communication terminal is a frame transmitted from a BSS including a wireless communication terminal or a frame transmitted from an OBSS.

For convenience of explanation, a BSS including a wireless communication

terminal is referred to as Intra-BSS, and a basic service set overlapped with Intra-BSS is referred to as an Overlapped Basic Service Set (OBSS). In addition, a BSS different from the Intra-BSS is referred to as Inter-BSS. In addition, a frame transmitted in the Intra-BSS is referred to as an Intra-BSS frame, and a frame transmitted in the OBSS is referred to as an OBSS frame or an Inter-BSS frame. In addition, the PPDU transmitted from the Intra-BSS is referred to as an Intra-BSS PPDU, and the PPDU transmitted from the OBSS is referred to as an OBSS PPDU or an Inter-BSS PPDU.

FIG. 6 shows that a wireless communication terminal according to an embodiment of the present invention enters a power save mode based on a BSS color.

The non-AP wireless communication terminal may enter the power save mode when the recipient of the PPDU transmitted in the Intra-BSS does not include the non-AP wireless communication terminal. Specifically, the non-AP wireless communication terminal may enter the power save mode under the following conditions. When the PPDU received by the non-AP wireless communication terminal is the HE-MU-PPDU, the BSS color value signaled by the corresponding PPDU indicates the BSS associated with the wireless communication terminal, the corresponding PPDU is not an uplink PPDU, the non-AP wireless communication terminal is not included in the address of the receiving wireless communication terminal which is signaled by the PPDU, and it is not a broadcast address indicating a non-AP wireless communication terminal, the non-AP wireless communication terminal may enter the power save mode. Also, when the PPDU received by the non-AP wireless communication terminal is any one of the HE-MU-PPDU, the HE-SU-PPDU, and the HE-extended range SU-PPDU, the BSS color value signaled by the corresponding PPDU indicates the BSS with which the non-AP wireless communication terminal is associated, and the corresponding PPDU is an uplink PPDU, the non-AP wireless communication terminal may enter the power save mode. Also, when the PPDU received by the non-AP wireless communication terminal is a trigger-based PPDU and the BSS color value signaled by the PPDU indicates a BSS associated with a non-AP wireless communication terminal, the non-AP wireless communication terminal may enter the power save mode. In a specific embodiment, the non-AP wireless communication terminal

may determine whether the PPDU is a PPDU for uplink transmission according to the UL_FLAG value of the RXVECTOR. In addition, the non-AP wireless communication terminal may determine whether the wireless communication terminal is included in the address of the receiving wireless communication terminal that the PPDU signals according to the STA_ID_LIST of the RXVECTOR. Also, the non-AP wireless communication terminal may leave the power save mode at the time when the corresponding PPDU is not transmitted. At this time, the RXVECTOR is a parameter set indicating the information of the PPDUs received from the module of the physical layer by the module of the MAC layer when the wireless communication terminal receives the PPDU.

Also, the non-AP wireless communication terminal may determine that the wireless medium is busy in a power save state. Accordingly, the wireless communication terminal does not access the wireless medium in the power save state. In addition, the non-AP wireless communication terminal may operate a network allocation vector (NAV) timer in a power save mode and access the wireless medium when the NAV timer expires. Also, when the power save mode option of the non-AP wireless communication terminal is activated and the current state of the non-AP wireless communication terminal is not in the power save mode, the non-AP wireless communication terminal may enter the power save mode. At this time, the state where the power save mode option is activated may be a case where the value of dot11IntraPPDUPowerSaveOptionActivated is True. Also, the power save mode is referred to as a doze state, and a state that is not a power save mode may be referred to as an awake state.

In the embodiment of FIG. 6, the station STA detects a PPDU signaling the same BSS color as that of the BSS in which the station is included. At this time, the station STA identifies the detected PPDU as Intra-BSS PPDU based on the BSS color. Thus, the station STA may enter the power save mode. Specifically, when at least one of the above conditions is satisfied, the station STA may enter the power save mode. In addition, the station STA leaves the power save mode at the time when transmission of the corresponding PPDU is terminated.

Since the size of the field indicating the BSS color is limited, different BSSs may

be set to the same BSS color. For convenience of description, a case where different BSSs correspond to the same BSS color is referred to as Inter-BSS color collision or BSS color collision.

FIG. 7 shows that a wireless communication terminal according to an embodiment of the present invention enters a power save mode during Inter-BSS color collision.

When Inter-BSS color collision occurs and the non-AP wireless communication terminal receives the Inter-BSS PPDU signaling the same BSS color as that of the BSS associated with the non-AP wireless communication terminal, the non-AP wireless communication terminal may enter the power save mode. Accordingly, the non-AP wireless communication terminal may not receive the PPDU transmitted by the AP associated with the non-AP wireless communication terminal as in the embodiment of FIG. 7. At this time, the BSS color signaled by the PPDU may be the BSS color signaled by the BSS color field of the PPDU. Specifically, the BSS color that the PPDU signals may be the BSS color that the BSS color field of the HE-SIG-A of the PPDU signals.

Therefore, when the wireless communication terminal is not able to identify the BSS to which the corresponding PPDU is transmitted based on the BSS color signaled by the PPDU, the wireless communication terminal may not perform the operation based on the BSS color. Specifically, when the wireless communication terminal is not able to identify the BSS based on the BSS color signaled by the PPDU, the wireless communication terminal may not perform an operation based on the BSS color that is the same as that of the inter-BSS. For example, when the wireless communication terminal is not able to identify the BSS based on the BSS color signaled by the PPDU, even when the wireless communication terminal receives the PPDU indicating the same BSS color as that of the Inter-BSS, the wireless communication terminal may not treat the PPDU as Inter-BSS PPDU.

When the non-AP wireless communication terminal is not able to identify whether the PPDU is an Inter-BSS PPDU or an Intra-BSS PPDU based on the BSS color signaled by the PPDU, the non-AP wireless communication terminal may not enter the power save mode based on the BSS color signaled by the PPDU. Specifically, when the non-AP wireless communication terminal recognizes a BSS color collision, the non-AP wireless

communication terminal may not enter the power save mode based on the BSS color signaled by the PPDU. In a specific embodiment, the non-AP wireless communication terminal may not enter the power save mode based on the BSS color value from a time when the BSS color collision is recognized to a predetermined time point. In another specific embodiment, the non-AP wireless communication terminal may not operate in the Intra-PPDU power save mode based on the BSS color value from a time when the BSS color collision is recognized to a predetermined time point. Also, the predetermined time point may indicate a time point at which the BSS color collision is resolved. In another specific embodiment, the predetermined time point may be a time point at which the association of the AP with the non-AP wireless communication terminal is disassociated. In yet another specific embodiment, the non-AP wireless communication terminal may stop entering power save mode from when the non-AP wireless communication terminal detects a BSS color collision.

In addition, when the wireless communication terminal is not able to identify whether the PPDU is an Inter-BSS PPDU or an Intra-BSS PPDU based on the BSS color signaled by the PPDU, the wireless communication terminal may not set the NAV based on the BSS color. Specifically, when the wireless communication terminal is not able to identify whether the PPDU is the Inter-BSS PPDU or the Intra-BSS PPDU based on the BSS color signaled by the PPDU, the wireless communication terminal may not set the Intra-BSS NAV based on the BSS color and the TXOP Duration field of the HE-SIG-A field. First, the operation of the wireless communication terminal to set two NAVs will be described, and when the wireless communication terminal is not able to identify whether the PPDU is the Inter-BSS PPDU or the Intra-BSS PPDU based on the BSS color signaled by the PPDU, a method of setting the NAV by the wireless communication terminal will be described.

The wireless communication terminal may maintain two NAVs, that is, an Intra-BSS NAV set based on the PPDU identified as the Intra-BSS PPDU and a Basic NAV set based on the PPDU identified as the Inter-BSS PPDU. At this time, the wireless communication terminal may set the Basic NAV based on the PPDU that may not be identified as the Inter-BSS PPDU or the Intra-BSS PPDU. Specifically, the wireless

communication terminal may maintain two NAVs through the following operations.

When the wireless communication terminal receives at least one valid frame from the PSDU and identifies the frame as an Intra-BSS frame, the wireless communication terminal may set the Intra-BSS NAV based on the valid Duration field value of the PSDU. In addition, when the wireless communication terminal receives at least one valid frame from the PSDU and identifies the frame as an Inter-BSS frame, the wireless communication terminal may set the Basic NAV based on the valid Duration field value of the PSDU. Also, when the wireless communication terminal receives at least one valid frame from the PSDU and may not determine the frame as an Intra-BSS frame or Inter-BSS frame, the wireless communication terminal may set the Basic NAV based on the valid Duration field value of the PSDU.

The wireless communication terminal receives the signaling field of the PPDU including the BSS identification information from the PPDU, and the wireless communication terminal may set two NAVs based on the BSS identification information that the signaling field of the PPDU signals. At this time, the PPDU may be the HE-PPDU, and the signaling field of the PPDU may be the HE-SIG-A field. In addition, the BSS identification information may be a BSS color. Also, the wireless communication terminal may set the NAV based on the TXOP Duration field of the HE-SIG-A field. Specifically, when the wireless communication terminal receives the signaling field of the PPDU including the BSS identification information from the PPDU and the BSS identification information that the signaling field of the PPDU signals is identified as Intra-BSS, the wireless communication terminal may set the Intra-BSS NAV based on the signaling field of the PPDU. Further, when the wireless communication terminal receives the signaling field of the PPDU including the BSS identification information from the PPDU, and the BSS identification information that the signaling field of the PPDU signals is identified as Inter-BSS, the wireless communication terminal may set the Basic NAV based on the signaling field of the PPDU.

When the Receiver Address RA of the frame received by the wireless communication terminal is the same as the MAC address of the wireless communication terminal, the wireless communication terminal may not set the Intra-BSS NAV or the Basic

NAV from the Duration field of the corresponding frame. In addition, when the wireless communication terminal receives the valid signaling field of the PPDU from the PPDU and receives a valid PSDU from the corresponding PPDU, the wireless communication terminal may not set the Intra-BSS NAV or the Basic NAV based on the TXOP Duration field included in the signaling field of the corresponding PPDU.

When the value of the duration field of the frame identified as the Intra-BSS frame by the wireless communication terminal is larger than the value of the current Intra-BSS NAV, the wireless communication terminal may set the Intra-BSS NAV based on the value of the duration field of the frame. When the value of the Duration field of the frame in which the wireless communication terminal is not able to identify whether the frame is the Intra-BSS frame or the Inter-BSS frame is larger than the value of the current basic NAV, the wireless communication terminal may set the Basic NAV based on the Duration field value of the frame.

When the value of the TXOP Duration field of the signaling field of the PPDU identified by the wireless communication terminal as Intra-BSS PPDU is larger than the value of the current intra-BSS NAV, the wireless communication terminal may set the Intra-BSS NAV based on the TXOP Duration field value of the signaling field of the PPDU identified as the Intra-BSS PPDU. In addition, when the value of the TXOP Duration field of the signaling field of the PPDU identified by the wireless communication terminal as the Inter-BSS PPDU is larger than the value of the current basic NAV, the wireless communication terminal may set the Basic NAV based on the TXOP Duration field value of the signaling field of the corresponding PPDU.

When the wireless communication terminal receives the CF-End frame, the wireless communication terminal may reset the NAV. At this time, the wireless communication terminal may determine whether to reset the NAV according to the BSS from which the CF-End frame is transmitted. Specifically, the wireless communication terminal may reset the currently set NAV when the BSS from which the PPDU setting the currently set NAV is transmitted and the BSS from which the CF-End frame is transmitted are the same. Additionally, the wireless communication terminal may not reset the NAV when the BSS from which the PPDU setting the currently set NAV is transmitted and the

BSS from which the CF-End frame is transmitted are different. In a specific embodiment, when the wireless communication terminal receives the CF-End frame from the BSS which does not correspond to the BSS indicated by the multiple BSSID set including Inter-BSS or the BSSID of the Intra-BSS, and the latest NAV is set by the PPDU transmitted from any of the BSSs indicated by the multiple BSSID set including the Intra-BSS or the BSSID of the Intra-BSS, the wireless communication terminal may not reset the NAV. In another specific embodiment, when the wireless communication terminal receives the CF-End frame from the BSS, which is one of the BSSs indicated by the multiple BSSID sets including the Intra-BSS or Intra-BSS BSSID and the most recent NAV is set by a PPDU that does not correspond to the BSS indicated by the set of multiple BSSIDs including the BSSID of the Inter-BSS or the Intra-BSS, the wireless communication terminal may not reset the NAV.

The trigger frame transmitted by the AP may trigger the uplink transmission of the wireless communication terminal receiving the trigger frame. At this time, the wireless communication terminal may start UL MU transmission based on the trigger frame without considering the NAV according to a certain condition. Specifically, when the NAV is set by the frame transmitted by the AP that transmitted the trigger frame, the wireless communication terminal may start the UL MU transmission based on the trigger frame without considering the NAV. Also, when the response to be transmitted by the wireless communication terminal includes an ACK frame or a Block ACK frame and the duration of the trigger-based PPDU is smaller than a predetermined value, the wireless communication terminal may start the UL MU transmission based on the trigger frame without considering the NAV. Further, when the NAV is set by a frame transmitted by another wireless communication terminal included in the Intra-BSS, the wireless communication terminal may start the UL MU transmission based on the trigger frame without considering the NAV. Also, when a field indicating whether or not channel sensing is required of the trigger frame indicates that channel sensing is not required, the wireless communication terminal may start the UL MU transmission based on the trigger frame without considering the NAV. Specifically, the field indicating whether or not the trigger frame requires channel sensing may be a CS Required field.

However, when NAV is set as in the above embodiments, BSS color collision may occur. The NAV setting and transmission operation of the wireless communication terminal may be a problem. This will be described with reference to FIGS. 8 to 9.

FIG. 8 shows the operation of setting a NAV by a wireless communication terminal according to an embodiment of the present invention when a BSS color collision occurs.

In the embodiment of FIG. 8, the BSS color of the first BSS BSS1 including the first station STA1 and the BSS color of the second BSS BSS2 including the second station STA2 and the third station STA3 are the same. The first station STA1 receives the Inter-BSS frame transmitted by the second station STA2 included in the first BSS BSS1. At this time, the station STA identifies the Inter-BSS frame as an Intra-BSS frame based on the BSS color indicated by the HE-SIG-A field of the PPDU including the Inter-BSS frame. The first station STA1 sets the Intra-BSS NAV according to the value of the TXOP Duration field of the signaling field of the PPDU including the Inter-BSS frame. Then, the first station STA1 receives the trigger frame from the Intra-BSS AP of the Intra-BSS. As described above, when the NAV is set by a frame transmitted by another wireless communication terminal included in the Intra-BSS, the wireless communication terminal may start the UL MU transmission based on the trigger frame without considering the NAV. Therefore, the first station STA1 may start the uplink transmission based on the trigger frame transmitted by the AP of the first BSS BSS1. At this time, since the frame is being transmitted from the third station STA3 to the second station STA2, interference occurs in the second BSS BSS2 due to a Trigger-based UL Frame based on the trigger frame transmitted by the first station STA1. Therefore, there is a need for a method of operating a wireless communication terminal capable of minimizing the influence of a BSS color collision when the BSS color collision occurs. For example, in the embodiment of FIG. 8, when the first station STA1 sets the Basic NAV instead of the Intra-BSS NAV based on the frame transmitted by the second station STA2, it is possible to prevent interference occurring in the second BSS BSS2 by transmission of the first station STA1. This will be described with reference to FIG. 9.

FIG. 9 shows a NAV setting operation of a wireless communication terminal according to another embodiment of the present invention when a BSS color collision occurs.

When the wireless communication terminal is not able to identify whether the PPDU is the Intra-BSS PPDU or the Inter-BSS PPDU based on the BSS color value indicated by the signaling field of the PPDU, the wireless communication terminal may not set the intra-BSS NAV based on the TXOP Duration field indicated by the signaling field of the PPDU. As described above, the BSS color that the PPDU signals may be the BSS color that the BSS color field of the PPDU signals. Specifically, the BSS color that the PPDU signals may be the BSS color that the BSS color field of the HE-SIG-A of the PPDU signals. Specifically, when the wireless communication terminal may not determine whether the PPDU is the Intra-BSS PPDU or the Inter-BSS PPDU based on the BSS color value indicated by the signaling field of the PPDU, the wireless communication terminal may recognize the BSS color collision. Also, when the wireless communication terminal is not able to identify whether the PPDU is the Intra-BSS PPDU or the Inter-BSS PPDU based on the BSS color value indicated by the signaling field of the PPDU and other parameters and other conditions of the RXVECTOR, the wireless communication terminal may not set the Intra-BSS NAV based on the TXOP Duration field indicated by the signaling field of the PPDU. In a specific embodiment, when the wireless communication terminal is not able to identify whether the PPDU is the Intra-BSS PPDU or the Inter-BSS PPDU based on the BSS color value indicated by the signaling field of the PPDU, the wireless communication terminal may set the Basic NAV based on the TXOP Duration field indicated by the signaling field of the PPDU. At this time, when the wireless communication terminal is not able to identify whether the PPDU is the Intra-BSS PPDU or the Inter-BSS PPDU based on the BSS color value indicated by the signaling field of the PPDU and other parameters and other conditions of the RXVECTOR, the wireless communication terminal may set the Basic NAV based on the TXOP Duration field indicated by the signaling field of the PPDU. That is, when the wireless communication terminal is not able to identify whether the PPDU received is the Intra-BSS PPDU or the Inter-BSS PPDU, the wireless communication terminal may set the Basic NAV based on

the PPDU. Specifically, when the PPDU received by the wireless communication terminal may not be identified as Intra-BSS PPDU or Inter-BSS PPDU, the wireless communication terminal may set the Basic NAV based on the TXOP Duration field of the corresponding PPDU. At this time, the TXOP Duration field of the PPDU may be the TXOP Duration field of the HE-SIG-A field.

Also, when the wireless communication terminal is not able to identify whether the PPDU is the Intra-BSS PPDU or the Inter-BSS PPDU based on the BSS color value indicated by the signaling field of the PPDU and is able to identify whether the PPDU is an Intra-BSS PPDU or an Inter-BSS PPDU based on other parameters and other conditions of the RXVECTOR, the wireless communication terminal may set Intra-BSS NAV or Basic NAV based on other parameters or other conditions of the RXVECTOR. A case where the corresponding PPDU is not identified, based on other parameters and other conditions of the RXVECTOR, as Intra-BSS PPDU or Inter-BSS PPDU may include a case where the MAC frame included in the PPDU is not decoded. Also, a case where the corresponding PPDU is not identified, based on other parameters and other conditions of the RXVECTOR, as Intra-BSS PPDU or Inter-BSS PPDU may include a case where the corresponding PPDU is not identified as Intra-BSS PPDU or Inter-BSS PPDU through at least one of the format and use of the PPDU. The wireless communication terminal may prevent interference with transmission in the OBSS, which may occur with BSS color collision, through these embodiments.

In the embodiment of FIG. 9, the BSS color of the first BSS BSS1 including the first station STA1 and the BSS color of the second BSS BSS2 including the second station STA2 and the third station STA3 are the same. At this time, the first station STA1 may determine that the PPDU may not be identified whether the PPDU is the Intra-BSS PPDU or the Inter-BSS PPDU based on the BSS color value indicated by the HE-SIG-A field of the PPDU. For example, the first station STA1 may determine that a BSS color collision occurs. The first station STA1 receives the Inter-BSS frame transmitted by the second station STA2 included in the first BSS BSS1. However, since the first station STA1 may not be able to identify whether the PPDU is the Intra-BSS PPDU or the Inter-BSS PPDU based on the BSS color value indicated by the signaling field of the PPDU, the first station

STA1 sets a Basic NAV. Therefore, since the Basic NAV is set even when the first station STA1 receives the trigger frame from the AP of the first BSS BSS1, the first station STA1 does not start the uplink transmission based on the trigger.

As described above, when the wireless communication terminal maintains two NAVs, the wireless communication terminal may reset the NAV according to the BSS in which the CF-End frame is transmitted and the BSS in which the frame that sets the NAV is transmitted. Therefore, when the BSS color collision occurs, the operation of the wireless communication terminal may be problematic when the NAV is reset through the CF-End frame. This will be described with reference to FIGS. 10 and 11.

FIG. 10 shows an operation of a wireless communication terminal according to an embodiment of the present invention to determine whether to reset a NAV based on a CF-End frame when a BSS color collision occurs.

In the embodiment of FIG. 10, the first station STA1 and the second station STA2 are included in the first BSS BSS1. The third station STA3 is included in the second BSS BSS2. At this time, a BSS color collision occurs from which the first BSS BSS1 and the second BSS BSS2 use the same BSS color. The first station STA1 receives a frame (Intra-BSS Frame) from the second station STA2. The first station STA1 sets the intra-BSS NAV based on the frame transmitted from the second station STA2. Also, the first station STA1 receives a frame (Inter-BSS Frame) from the third station STA3. However, since the first BSS BSS1 and the second BSS BSS2 have the same BSS color, the first station STA1 identifies the frame received from the third station STA3 as an Intra-BSS frame. Therefore, the first station STA1 sets the intra-BSS NAV based on the frame received from the third station STA3. However, when the value of the Duration field indicated by the frame received from the third station STA3 is smaller than the value of the currently set NAV, the first station STA1 does not set the intra-BSS NAV. Then, the first station STA1 receives the CF-End frame from the second station STA2. The first station STA1 resets the Intra-BSS NAV based on the CF-End frame received from the second station STA2. Thereafter, the first station STA1 may transmit a frame even while attempting the transmission of the third station STA3. Therefore, the transmission of the first station STA1 may collide with the

transmission of the third station STA3.

The problems described in the embodiment of FIG. 10 may be solved through the embodiments described with reference to FIG. 10. However, even if the embodiments described with reference to FIG. 9 are followed, the operation of the wireless communication terminal receiving the CF-End frame may be a problem. This will be described with reference to FIG. 11.

FIG. 11 shows an operation of a wireless communication terminal according to another embodiment of the present invention to determine whether to reset a NAV based on a CF-End frame when a BSS color collision occurs.

As described above, the wireless communication terminal may determine whether to reset the NAV according to the BSS in which the CF-End frame is transmitted. Specifically, the wireless communication terminal may reset the currently set NAV when the BSS from which the PPDU setting the currently set NAV is transmitted and the BSS from which the CF-End frame is transmitted are the same. Additionally, the wireless communication terminal may not reset the NAV when the BSS from which the PPDU setting the currently set NAV is transmitted and the BSS from which the CF-End frame is transmitted are different.

Also, when the NAV is set by the PPDU that is not identified whether the PPDU is the Intra-BSS PPDU or the Inter-BSS PPDU based on the BSS color value indicated by the signaling field of the PPDU, the wireless communication terminal may not reset the NAV based on the CF-End frame transmitted from the Intra-BSS. Also, when the NAV is set by the PPDU that is not identified whether the PPDU is the Intra-BSS PPDU or the Inter-BSS PPDU based on the BSS color value indicated by the signaling field of the PPDU, the wireless communication terminal may not reset the NAV based on the CF-End frame transmitted from the BSS corresponding to the multiple-BSSID set including the BSSID corresponding to the BSS of the wireless communication terminal. Through this embodiment, the wireless communication terminal may prevent interference with transmission in the OBSS, which is caused by BSS color collision. In addition, as described above, the BSS color that the PPDU signals may be the BSS color that the BSS

color field of the PPDU signals. Specifically, the BSS color that the PPDU signals may be the BSS color that the BSS color field of the HE-SIG-A of the PPDU signals.

As described above, a case where the wireless communication terminal is not be able to identify whether the PPDU is the Intra-BSS PPDU or the Inter-BSS PPDU based on the BSS color value indicated by the signaling field of the PPDU may include a case where the wireless communication terminal recognizes a BSS color collision. A method of determining whether a wireless communication terminal collides with a BSS color will be described in detail with reference to FIG. 12.

FIG. 12 shows an operation of a wireless communication terminal recognizing a BSS color collision according to an embodiment of the present invention.

The wireless communication terminal may determine the BSS color collision based on the MAC header. Specifically, the wireless communication terminal may determine the BSS color collision based on the Address field of the MAC header. In a specific embodiment, if there are two or more MAC address fields in the MAC header, at least one of the MAC address fields corresponds to the BSSID of the Intra-BSS, or at least one of the MAC address fields corresponds to a multiple BSSID set in the BSSID including the BSSID of the Intra-BSS, the wireless communication terminal may determine the corresponding PPDU as an Intra-BSS PPDU. This is because in case of BSS color, collision may occur due to size limitation of BSS color field but the MAC address indicated by the Address field of the MAC header is a unique value for each wireless communication terminal and there is no possibility of collision.

However, the wireless communication terminal may determine that the destination of the MAC frame included in the PPDU is not the wireless communication terminal based on at least one of the signaling field of the PPDU and the PPDU format, and may not decode the MAC header. Specifically, when the non-AP wireless communication terminal receives the HE Single User (SU) PPDU, the BSS color indicated by the signaling field of the corresponding PPDU is equal to the BSS color of the Intra-BSS, and the corresponding PPDU is the downlink transmission PPDU, the non-AP wireless communication terminal may continue decoding. At this time, the non-AP wireless communication terminal may

determine that the corresponding PPDU is an SU PPDU through L-SIG signaling. Also, the non-AP wireless communication terminal may determine that the corresponding PPDU is an extended range SU PPDU based on the L-SIG signaling and the HE-SIG-A modulation method. Also, the non-AP wireless communication terminal may determine whether the corresponding PPDU is a PPDU for downlink transmission based on the DL/UL field of the HE-SIG-A field.

However, when the PPDU received by the non-AP wireless communication terminal is an uplink transmission PPDU, the non-AP wireless communication terminal may not decode the MAC frame included in the corresponding PPDU. This is because it is clear that the PPDU is a PPDU for uplink transmission and that the destination of the PPDU is not a non-AP wireless communication terminal. Also, when the PPDU received by the non-AP wireless communication terminal is an MU PPDU and the identifier of the non-AP wireless communication terminal is not included in the wireless communication terminal identifier (STAID) field of the signaling field of the PPDU, the non-AP wireless communication terminal may not decode the MAC frame included in the corresponding PPDU. At this time, the signaling field of the PPDU may be HE-SIG-B. Also, a case where the wireless communication terminal identifier (STAID) field of the signaling field of the PPDU does not include the identifier of the non-AP wireless communication terminal may include a case where the wireless communication terminal (STAID) field of the signaling field of the PPDU does not include a broadcast address/multicast address including a non-AP wireless communication terminal.

The non-AP wireless communication terminal may decode the MAC frame included in the corresponding PPDU even when it is clear that the destination of the MAC frame included in the PPDU is not a wireless communication terminal. Specifically, even when the destination of the MAC frame included in the PPDU is not a wireless communication terminal, the non-AP wireless communication terminal may decode the header of the MAC frame included in the PPDU. Specifically, a case where it is clear that the destination of the MAC frame included in the PPDU is not the wireless communication terminal may include a case where the corresponding PPDU described above is a HE Single User (SU) PPDU, the BSS color indicated by the signaling field of the

corresponding PPDU is the same as the BSS color of the Intra-BSS, and the corresponding PPDU is a downlink PPDU. In addition, a case where it is clear that the destination of the MAC frame included in the PPDU is not the wireless communication terminal may include a case where as described above, the identifier of the non-AP wireless communication terminal is not included in the wireless communication terminal identifier (STAID) field of the signaling field of the PPDU.

When the wireless communication terminal is not be able to identify whether the PPDU is the Intra-BSS PPDU or the Inter-BSS PPDU based on the BSS color value indicated by the signaling field of the PPDU, the other wireless communication terminals may not identify whether the PPDU transmitted from the corresponding BSS is the Intra-BSS PPDU or the Inter-BSS PPDU, so that it may malfunction. In addition, another wireless communication terminal is not able to identify whether the PPDU transmitted by the wireless communication terminal is the Intra-BSS PPDU or the Inter-BSS PPDU, so that the PPDU transmitted by the wireless communication terminal may cause malfunction of other wireless communication terminals. In order to prevent such a malfunction problem, the wireless communication terminal may operate as in the following embodiments.

Specifically, the wireless communication terminal may transmit the PPDU by including signaling information indicating that the operation based on the BSS color is not allowed in the signaling field of the PPDU. At this time, the wireless communication terminal receiving the PPDU including the signaling information indicating that the operation based on the BSS color is not allowed may not perform the operation based on the BSS color. In a specific embodiment, the wireless communication terminal may transmit the BSS color value indicated by the signaling field of the PPDU by setting it to a predetermined value. At this time, the predetermined value may be a reserved value which is not used in the BSS color when the BSS color is selected by the AP. For example, the predetermined value may be zero.

Further, when the wireless communication terminal receives the signaling information indicating that the operation based on the BSS color is not allowed, the

wireless communication terminal may not perform the operation based on the BSS color value. Specifically, when the BSS color value indicated by the signaling field of the PPDU received by the wireless communication terminal is a predetermined value, the wireless communication terminal may not perform the SR operation described above based on the BSS color value. In addition, the wireless communication terminal may transmit the PPDU by including the signaling information in the signaling field of the PPDU indicating that operation based on the BSS color is not allowed through the legacy PPDU. Specifically, the wireless communication terminal may transmit signaling information indicating that the operation based on the BSS color is not allowed even by using the BW signaling method of the MAC address or using the reserved bit of the MAC header.

In addition, when the wireless communication terminal receives the PPDU indicating the predetermined value in the BSS color, the wireless communication terminal may not perform the operation based on the BSS color. Specifically, when the wireless communication terminal receives a PPDU indicating a predetermined value as a BSS color, the wireless communication terminal may not perform the SR operation on the corresponding PPDU. In a specific embodiment, when the wireless communication terminal receives a PPDU indicating a predetermined value as a BSS color, the wireless communication terminal may treat the PPDU as an Intra-BSS PPDU. Accordingly, when the wireless communication terminal receives a PPDU indicating a predetermined value as a BSS color, the wireless communication terminal may not discard the corresponding PPDU.

In addition, the wireless communication terminal receiving the signaling information indicating that the operation based on the BSS color is not allowed may access the channel without using the SR operation. Specifically, the wireless communication terminal receiving the signaling information indicating that the operation based on the BSS color is not allowed may access the channel without using the BSS color value.

Even if the non-AP wireless communication terminal that does not receive the signaling signal for the BSS color arbitrarily selects the BSS color, this may cause the malfunction of the wireless communication terminal operating based on the BSS color. There is a need for a method to prevent this.

An AP operating a BSS may select a BSS color corresponding to the BSS. The non-AP wireless communication terminal may obtain the BSS color allocated to the non-AP wireless communication terminal from the BSS Color field included in the HE Operation element received from the AP. Specifically, the non-AP wireless communication terminal may receive the management frame from the AP associated with the non-AP wireless communication terminal, and obtain the BSS color allocated to the non-AP wireless communication terminal from the BSS Color field of the HE Operation element included in the received management frame. At this time, the management frame may be any one of a beacon frame, an association request frame, an association response frame, a reassociation request frame, a reassociation response frame, a probe request frame, and a probe response frame.

When the non-AP wireless communication terminal fails to receive information signaling the BSS color, the non-AP wireless communication terminal may use a predetermined value as a BSS color value when communicating with another wireless communication terminal. At this time, the predetermined value may be a reserved value which is not used in the BSS color when the BSS color is selected by the AP. For example, the predetermined value may be zero. Specifically, if the non-AP wireless communication terminal does not receive the information signaling the BSS color, the non-AP wireless communication terminal may set the BSS color value that the PPDU transmitted by the non-AP wireless communication terminal signals to a predetermined value. Also, when the non-AP wireless communication terminal fails to receive information signaling the BSS color, the non-AP wireless communication terminal may set the BSS color value which is signaled by the frame transmitted by the non-AP wireless communication terminal to a predetermined value. When the non-AP wireless communication terminal does not receive information signaling the BSS color, this is because there is no BSS color. Specifically, when the non-AP wireless communication terminal does not receive the information signaling the BSS color, the non-AP wireless communication terminal may not associate with any AP. In addition, a case where the non-AP wireless communication terminal does not receive the information signaling the BSS color may include a case where the non-AP wireless communication terminal may establish a tunneled direct link setup (TDLS) link, a

direct link setup (DLS) link, or an IBSS (Independent) membership. Also, a case where the non-AP wireless communication terminal does not receive information signaling the BSS color may include a case where the non-AP wireless communication terminal does not receive the information on the changed BSS color value after receiving the signaling information indicating that the operation based on the BSS color value is not allowed from the AP.

In a specific embodiment, when the non-AP wireless communication terminal fails to receive the HE Operation element, the non-AP wireless communication terminal may set the BSS color value included in the PPDU transmitted by the non-AP wireless communication terminal to a predetermined value. For example, the non-AP wireless communication terminal may use a predetermined value as a BSS color value when transmitting a probe request frame. Specifically, the non-AP wireless communication terminal may set the value of the BSS color field included in the HE Operation element to a predetermined value when transmitting a probe request frame. When transmitting the probe request frame, the non-AP wireless communication terminal may set the value of the BSS color field of the HE-SIG-A field of the PPDU including the probe request frame to a predetermined value.

In another specific embodiment, when transmitting a PPDU to a wireless communication terminal of an Inter-BSS, the wireless communication terminal may set a BSS color value indicated by the PPDU to a predetermined value. There is a high possibility that the wireless communication terminal may not know the BSS color of the Inter-BSS. In addition, this is because the wireless communication terminal of the Inter-BSS may ignore the PPDU indicating the BSS color of the BSS including the wireless communication terminal.

In addition, when the wireless communication terminal receives the PPDU indicating the predetermined value as the BSS color, the wireless communication terminal may not perform the operation based on the BSS color. Specifically, when the wireless communication terminal receives a PPDU indicating a predetermined value as a BSS color, the wireless communication terminal may not perform the SR operation on the corresponding PPDU. In a specific embodiment, when the wireless communication

terminal receives a PPDU indicating a predetermined value as a BSS color, the wireless communication terminal may treat the PPDU as an Intra-BSS PPDU. Accordingly, when the wireless communication terminal receives a PPDU indicating a predetermined value as a BSS color, the wireless communication terminal may not discard the corresponding PPDU.

The non-legacy PPDU includes a signaling field indicating a BSS color, e.g., a HE-SIG-A field, and the wireless communication terminal may perform various SR operations described above based on the signaling field indicating the BSS color. However, the legacy PPDU does not include a signaling field that indicates the BSS color. Therefore, the wireless communication terminal receiving the legacy PPDU must perform the SR operation based on the MAC frame included in the PPDU. However, there is a MAC frame including only a Receiver Address RA without including a Transmitter Address TA. When an operation based on BSS color may not be performed because a MAC frame including only a receiver address is transmitted via a legacy PPDU or a BSS color collision occurs, the SR operation for the MAC frame including only the receiver address may be a problem. An embodiment of the wireless communication terminal related thereto will be described with reference to FIG. 13 and FIG. 14.

FIG. 13 shows a MAC frame format of a Clear To Send (CTS) frame and an ACK frame according to an embodiment of the present invention. FIG. 14 shows an operation in which a wireless communication terminal according to an embodiment of the present invention sets a NAV based on an RTS frame and a CTS frame.

The MAC frame of the CTS frame and the ACK frame may include a Frame Control field including information on frame control. In addition, the MAC frame of the CTS frame and the ACK frame may include a duration field used for NAV setting. In addition, the MAC frame of the CTS frame and the ACK frame may include an RA field indicating a receiver address. In addition, the MAC frame of the CTS frame and the ACK frame may include an FCS field indicating whether the MAC frame includes an error.

The RA field of the CTS frame may be set based on the TA field of the RTS frame.

Specifically, the value of the TA field of the RA field RTS frame of the CTS frame may be a value that sets the Individual/Group bit to zero. Also, when the CTS frame is the first frame of the transmission sequence, the RA field may be set to the MAC address of the transmitter.

The RA field of the ACK frame may be set based on the Address 2 field of a data frame, a management frame, a BlockACKReq frame, a BlockACK frame, or a PS-Poll frame, which is transmitted to one wireless communication terminal. Specifically, the RA field of the ACK frame may set the Address 2 field value of a data frame, a management frame, a BlockACKReq frame, a BlockACK frame, or a PS-Poll frame, which is transmitted to one wireless communication terminal, to the non-bandwidth signaling TA value. Also, the RA field of the ACK frame may be set to the MAC address of the recipient.

When the wireless communication terminal may not determine whether the frame is an Intra-BSS frame or an Inter-BSS frame based on the CTS frame or the Address field of the ACK frame, the wireless communication terminal may set the Basic NAV based on the corresponding frame. Specifically, when the wireless communication terminal may not determine whether the frame is an Intra-BSS frame or an Inter-BSS frame based on a PPDU including a CTS frame or an ACK frame and may not determine whether the frame is an Intra-BSS frame or an Inter-BSS frame based on the CTS frame or the Address field of the ACK frame, the wireless communication terminal may set the Basic NAV based on the frame. Also, the case where the wireless communication terminal may not determine whether the frame is an Intra-BSS frame or an Inter-BSS frame based on the CTS frame or the Address field of the ACK frame may be a case where the address field of the CTS frame or the ACK frame is one, and the corresponding address field does not indicate the AP address or the BSSID. In a specific embodiment, the non-AP wireless communication terminal may receive a downlink (DL) CTS frame. At this time, the address field of the corresponding CTS frame may include the address of the non-AP wireless communication terminal and may not include the address or the BSSID of the wireless communication terminal that is the AP. Accordingly, the wireless communication terminal receiving the corresponding CTS frame may not determine whether the corresponding CTS frame is an

Inter-BSS frame or an Intra-BSS frame based on the Address field of the corresponding CTS frame. Also, when the wireless communication terminal may not determine whether the frame is an Intra-BSS frame or an Inter-BSS frame based on a PPDU including a CTS frame or an ACK frame, the corresponding PPDU may be a legacy PPDU. This is because the legacy PPDU may not include information indicating the BSS color. In addition, a case where the wireless communication terminal may not be able to determine whether the frame is an Intra-BSS frame or an Inter-BSS frame based on a PPDU including a CTS frame or an ACK frame may be a case where the wireless communication terminal may not be able to determine whether the frame is an Intra-BSS frame or an Inter-BSS frame based on the BSS color indicated by the signaling field of the corresponding PPDU as in the above-described embodiments.

In another specific embodiment, when the wireless communication terminal receives one frame, the wireless communication terminal may set the Basic NAV based on the frame regardless of the value of the address field of the frame. For example, when receiving a downlink (DL) CTS frame or an uplink (UL) CTS frame, the wireless communication terminal may set a Basic NAV based on the frame.

Also, when the wireless communication terminal maintains one NAV, the wireless communication terminal may regard that the NAV set by the corresponding frame is not set by the Intra-BSS frame, instead of setting the Basic NAV based on the corresponding frame in the above-described embodiments. Specifically, when the wireless communication terminal may not determine whether the frame is an Intra-BSS frame or an Inter-BSS frame based on the CTS frame or the Address field of the ACK frame, the wireless communication terminal may regard that the NAV set on the basis of the frame is not set by the Intra-BSS frame. In addition, when the wireless communication terminal receives one frame, the wireless communication terminal may regard that the NAV set based on the frame is not set by the Intra-BSS frame regardless of the value of the address field of the frame.

In the embodiment of FIG. 14, the first to third stations STA1 to STA3 are all included in the same BSS. The first station STA1 transmits the RTS frame and the second station STA2 transmits the CTS frame in response to the RTS frame. The third station

STA3 sets the Intra-BSS NAV based on the RTS frame. Since the address field of the CTS frame transmitted by the second station STA2 includes only the address of the first station STA1, the third station STA3 may not clearly determine whether the CTS frame transmitted by the second station STA2 is transmitted from the Intra-BSS frame. Therefore, the third station STA3 sets the basic NAV based on the CTS frame transmitted by the second station STA2 as in some embodiments described above.

At this time, when the third station STA3 receives the CF-End frame transmitted from the first station STA1 or the second station STA2, the third station STA3 identifies the received CF-End frame as an Intra-BSS frame. Therefore, even if the third station STA3 receives the CF-End frame transmitted from the first station STA1 or the second station STA2, the third station STA3 resets only the intra-NAV based on the received CF-End frame, and the basic NAV is maintained. When the third station STA3 does not receive the RTS frame but receives the CF-End frame from the Inter-BSS in a state where only the CTS frame is received, the third station STA3 may initiate transmission during the transmission procedure of the first station STA1 and the second station STA2 to cause interference.

To solve this problem, the wireless communication terminal may transmit a PPDU including only one address field in a format of a PPDU signaling a BSS color. However, when the PPDU signaling the BSS color is transmitted, the legacy wireless communication terminal may not decode the PPDU. Also, the wireless communication terminal may infer the BSS of the CTS frame and the ACK frame from the frame transmitted before the CTS frame or ACK frame. For this, there is a problem that a wireless communication terminal may be required to receive a previously transmitted frame and store information on the received frame. Therefore, the wireless communication terminal may transmit information identifying the BSS through the legacy PPDU. This will be described with reference to FIGS. 15 to 17.

FIG. 15 shows a format of an 802.11a PPDU according to an embodiment of the present invention.

The 802.11a PPDU includes a Short Training field including a relatively short

training signal, a Long Training field including a relatively long training signal, a Signal field including signaling information, and a Data field including data. The data field may include a Service field, a PSDU, and a tail bit. The data field may also include a Padding bit as needed. Specifically, the format of the 802.11a PPDU may be the same as that of FIG. 15.

At this time, the wireless communication terminal may transmit information identifying the BSS using the service field. Specifically, the wireless communication terminal may transmit information identifying the BSS using the reserved bits of the service field. Specifically, the bits from the first bit B0 to the seventh bit B6 of the service field may be scrambler initialization bits. The remaining nine bits except the scrambler initialization bit are reserved. Therefore, the wireless communication terminal may transmit information identifying the BSS using part or all of the nine reserved bits.

Further, the information identifying the BSS may be any one of a BSS color, a BSSID, and a partial BSS color. In addition, the information identifying the BSS may be a partial AID generated based on the BSS color. In addition, the information identifying the BSS may be part of the BSSID or information generated based on the BSSID. At this time, the information generated based on the BSSID may be a value obtained by calculating a partial value of the BSSID or a value obtained by calculating the BSSID.

The wireless communication terminal may also transmit information identifying a BSS through a field other than a service field according to another specific embodiment. Specifically, the wireless communication terminal may transmit information identifying the BSS through a signal field.

Further, the wireless communication terminal may transmit information identifying the BSS by combining a plurality of reserved fields.

In these embodiments, the wireless communication terminal receiving the PPDU may obtain information identifying the BSS based on the reserved field of the PPDU. In addition, the wireless communication terminal receiving the PPDU may determine whether the corresponding PPDU is the Inter-BSS PPDU or the Intra-BSS PPDU based on the obtained information identifying the BSS.

FIG. 16 shows a format of a service field of a PPDU according to an embodiment

of the present invention.

As described with reference to FIG. 15, the wireless communication terminal may transmit information identifying the BSS using the reserved bits of the service field. Specifically, the wireless communication terminal may transmit information identifying the BSS using the eighth bit B7 to the thirteenth bit B12 of the service field. Since the reserved bits are used in the embodiments described with reference to FIG. 15 to FIG. 16, a legacy wireless communication terminal that does not support the embodiment of the present invention may not decode information identifying the BSS, but may successfully receive a PPDU according to an embodiment of the present invention.

The wireless communication terminal may apply the embodiment described with reference to FIG. 15 to FIG. 16 when the address field of the MAC frame is one. However, the embodiment described with reference to FIGS. 15 to 16 is not limited thereto, and the wireless communication terminal may also apply the embodiments described with reference to FIGS. 15 to 16 even when the number of address fields of the MAC frame is two or more.

FIG. 17 shows an operation of setting a NAV according to an embodiment of FIG. 15 to FIG. 16 by a wireless communication terminal according to an embodiment of the present invention.

In the embodiment of FIG. 17, the first to third stations STA1 to STA3 are all included in the same BSS. The first station STA1 transmits the RTS frame and the second station STA2 transmits the CTS frame in response to the RTS frame. The third station STA3 sets the Intra-BSS NAV based on the RTS frame. The address field of the CTS frame transmitted by the second station STA2 includes only the address of the first station STA1, but as in the embodiments described with reference to FIGS. 15 to 16, the reserved field of the PPDU including the CTS frame transmitted by the second station STA2 includes information identifying the BSS. At this time, the reserved field may be the reserved bit in the service field. The third station STA3 obtains information identifying the BSS based on the reserved field. The third station STA3 may set the Intra-BSS NAV based on the information identifying the BSS. In the embodiment of FIG. 17, the third station STA3

does not set the value of Intra-BSS NAV because the value of the Intra-BSS NAV already set is equal to the value of NAV indicated by the duration field of the CTS frame.

Therefore, the third station STA3 may correctly set the intra-BSS NAV and the basic NAV even when the address field of the MAC frame is one. Thereafter, when the third station STA3 receives the CF-End frame from the Intra-BSS, the third station STA3 may reset the Intra-BSS NAV. In addition, when the third station STA3 receives the CF-End frame from the Inter-BSS, the third station STA3 may not reset the Intra-BSS NAV.

FIG. 18 shows a method of setting a partial AID and a Group ID field of VHT-SIG-A by a wireless communication terminal according to an embodiment of the present invention.

The VHT-SIG-A field may include a partial AID field and a Group ID field. The partial AID field may indicate information identifying the connection between the AP and the wireless communication terminal and information identifying the BSS. Specifically, the partial AID field of the PPDU transmitted to the AP may indicate the BSSID of the AP. Also, the partial AID field of the PPDU transmitted to the non-AP wireless communication terminal may be an identifier obtained by combining the AID of the non-AP wireless communication terminal and the BSSID of the AP associated with the non-AP wireless communication terminal. Also, when the PPDU is transmitted to the mesh station, the value of the partial AID field may be a value corresponding to the last 9 bits of the receiver address. In a specific embodiment, the partial AID field may be a 9-bit field.

The Group ID field may indicate whether the data in the data field is for multiple user (MU). Specifically, when the data of the data field is for a single user (SU), the value of the Group ID field may be 0 or 63. In a specific embodiment, if the PPDU is transmitted to the AP, the value of the Group ID field may be zero. Also, when the PPDU is transmitted to the non-AP wireless communication terminal, the value of the Group ID field may be 63. In addition, when the PPDU is transmitted to the mesh station, the value of the Group ID field may be zero. In a specific embodiment, the Group ID field may be a 6-bit field.

The wireless communication terminal may transmit information identifying the BSS through the Partial AID field and the Group ID field of VHT-SIG-A. Specifically, a

wireless communication terminal, which is an AP, may set a partial AID field value to a non-AP wireless communication terminal according to the following equation.

$$(\text{dec}(\text{AID}[0:8]) + \text{dec}(\text{BSSID}[44:47] \text{ XOR } \text{BSSID}[40:43]) * 2^5) \bmod 2^9$$

XOR represents an exclusive OR operation of the bit operation, mod X represents the remaining value when divided by X, and dec (A [b: c]) represents the number of binary digits from b+1th bit to c+1th bit of A in decimal again.

At this time, the wireless communication terminal, which is an AP, may set the Group ID field to 63.

Also, the wireless communication terminal may set the partial AID field of the PPDU according to the above formula when the wireless communication terminal is a Direct Link Setup (DLS) station or a Tunneled Direct Link Setup (TDLS) station, and the wireless communication terminal transmits the PPDU in a direct path, and the receiver of the PPDU or PSDU is a DLS station or a TDLS station. At this time, the wireless communication terminal may set the Group ID field to 63.

FIGS. 19 to 20 show a method of determining whether a frame received by a wireless communication terminal is an Inter-BSS frame or an Intra-BSS frame according to an embodiment of the present invention.

FIG. 19 shows a method of determining whether a corresponding PPDU is an Inter-BSS PPDU or an Intra-BSS PPDU based on whether a PPDU received by a wireless communication terminal is a downlink PPDU according to an embodiment of the present invention.

As described above, the wireless communication terminal may perform identification based on the BSS color indicated by the signaling field of the PPDU. Also, the wireless communication terminal may identify whether the frame received based on the MAC header of the frame is an Inter-BSS frame or an Intra-BSS frame. Specifically, when the receiver address RA or the transmitter address TA of the MAC header of the frame received by the wireless communication terminal is a BSSID of a BSS including a wireless communication terminal or a bandwidth signaling variant of a BSSID, the wireless communication terminal may identify the received frame as an Intra-BSS frame.

The wireless communication terminal may identify whether the received PPDU is an Inter-BSS PPDU or an Intra-BSS PPDU based on information other than the BSS color value indicated by the MAC address and the signaling field of the PPDU. Specifically, the wireless communication terminal may identify whether the received PPDU is an Inter-BSS PPDU based on other parameter values of the RXVECTOR. In particular, when a BSS color collision occurs, the wireless communication terminal may identify whether the PPDU received is an Inter-BSS PPDU or an Intra-BSS PPDU based on information other than the BSS color value indicated by the signaling field of the PPDU. Specifically, when the frame received by the wireless communication terminal is a downlink frame, the wireless communication terminal may identify the frame as an inter-BSS frame. In a specific embodiment, even if the BSS color value indicated by the BSS color field of the signaling field of the PPDU or the BSS color indicated by the partial AID field is the same as the BSS color of the BSS including the wireless communication terminal, when the frame received by the wireless communication terminal, which is an AP, is a downlink frame, the wireless communication terminal may identify the frame as an Inter-BSS frame. For example, in the embodiment of FIG. 19, the AP receives a PPDU for downlink transmission and determines the PPDU as an Inter-BSS frame.

In addition, when the value of the Group ID field of the VHT-SIG-A field of the PPDU received by the wireless communication terminal is 63, the wireless communication terminal may identify the received PPDU as an Inter-BSS PPDU. This is because, as described with reference to FIG. 18, the Group ID field of the PPDU transmitted to the non-AP wireless communication terminal is set to 63. At this time, the wireless communication terminal, which is an AP, may identify the received PPDUs as Inter-BSS PPDUs only when the DLS protocol or the TDLS protocol is not used. As described above, this is because even when a DLS wireless communication terminal or a TDLS wireless communication terminal transmits a PPDU to a DLS wireless communication terminal or a TDLS wireless communication terminal through a direct path, the value of the Group ID field is set to 63.

Also, the wireless communication terminal, which is an AP, may identify whether the VHT PPDU is the Inter-BSS PPDU or the Intra-BSS PPDU based on the partial AID

field of the VHT PPDU. Specifically, the wireless communication terminal, which is an AP, may identify whether the VHT PPDU is an Inter-BSS PPDU or an Intra-BSS PPDU based on the partial AID field and the Group ID field of the VHT PPDU. In the specific embodiment, when the value of the partial AID field is a value that does not exist in the BSS operated by the wireless communication terminal, the AP may identify the corresponding PPDU as an Inter-PPDU.

In addition, when the wireless communication terminal, which is an AP, receives the VHT MU PPDU, the wireless communication terminal may identify the PPDU as an Inter-PPDU. This is because the VHT MU PPDU may only be used for downlink transmission. Specifically, the wireless communication terminal, which is an AP, may determine that the corresponding PPDU is a VHT MU PPDU through auto detection and the VHT-SIG-A field. In addition, If the group ID of the VHT-SIG-A is not 0 or 63, the wireless communication terminal, which is an AP, may identify the corresponding PPDU as the MU PPDU.

Also, when the wireless communication terminal, which is an AP, receives the HE PPDU and the UL/DL field of the HE-SIG-A field indicates downlink transmission, the wireless communication terminal, which is an AP, may identify the corresponding PPDU as the Inter-BSS PPDU. At this time, the value of the UL/DL field may be zero. At this time, the wireless communication terminal, which is an AP, may identify the received PPDUs as Inter-BSS PPDUs only when the DLS protocol or the TDLS protocol is not used.

When the wireless communication terminal of the AP receives the HE PPDU and the corresponding PPDU is not transmitted to the wireless communication terminal included in the IBSS and the UL_FLAG field of the HE-SIG-A field indicates the downlink transmission, the wireless communication terminal, which is an AP, may identify the PPDU as an Inter-BSS PPDU. At this time, the wireless communication terminal, which is an AP, may determine whether the DLS protocol or the TDLS protocol is used, and thus may determine whether the received PPDU is not transmitted to the wireless communication terminal included in the IBSS.

When a wireless communication terminal, which is an AP, receives a trigger-based

PPDU from a wireless communication terminal that is not triggered by the wireless communication terminal, which is an AP may identify the corresponding PPDU as an Inter-BSS PPDU. Specifically, when a wireless communication terminal, which is an AP, receives a trigger-based PPDU without transmitting a trigger frame, the wireless communication terminal, which is an AP, may identify the PPDU as an Inter-BSS PPDU.

FIG. 20 shows a method for identifying whether a MAC frame received is an Intra-BSS frame or an Inter-BSS frame based on SR-related information by a wireless communication terminal according to an embodiment of the present invention.

As described above, when a wireless communication terminal that is an AP receives a PPDU for downlink transmission, the wireless communication terminal that is an AP may identify the PPDU as an Inter-PPDU. This is because the PPDU that is the destination of the wireless communication terminal, which is an AP in the Intra-BSS, is the PPDU for the uplink transmission. In addition, the AP, which is an AP, may identify whether the corresponding PPDU is the Inter-BSS PPDU based on the SR-related information indicated by the PPDU. The SR-related information included in the PPDU may indicate that the PPDU includes a trigger frame. Also, the trigger frame is used only for downlink transmission. Therefore, the wireless communication terminal, which is an AP, may determine whether the corresponding PPDU is a PPDU for downlink transmission based on whether the PPDU includes a trigger frame. Therefore, the wireless communication terminal may identify whether the corresponding PPDU is an Inter-BSS PPDU based on the SR-related information.

At this time, the SR related information may be the SR field of the signaling field of the PPDU. Specifically, the signaling field of the PPDU may indicate whether or not the SR operation is allowed while the corresponding PPDU is being transmitted, and may indicate an allowable condition. At this time, the signaling field may be the HE-SIG-A field. Specifically, the SR field may indicate an SR_Delay indicating that the SR operation is to be delayed. If the PPDU is a HE SU PPDU or a HE extended range SU PPDU, and the corresponding PPDU includes a trigger frame, the SR field indicates SR_Delay.

In addition, the SR field may indicate SR_Restricted, which indicates that SR

operation is restrictively allowed. Specifically, when the SR field of the PPDU has the SR_Restricted value, during the SR operation of the Inter-BSS wireless communication terminal, the TXOP duration of the transmission of the Inter-BSS wireless communication terminal may be restricted to the PPDU including the trigger frame. Also, when the PPDU is an HE MU PPDU and the corresponding PPDU includes a trigger frame, the SR field indicates SR_Restricted.

Also, the SR field may indicate SR_Disallowed indicating that the SR operation is not allowed. A wireless communication terminal transmitting a PPDU including a trigger frame indicates that the PPDU includes a trigger frame through the SR field of the PPDU and may protect the transmission sequence based on the trigger frame.

Therefore, when the SR field value of the PPDU received by the wireless communication terminal, which is an AP, is SR_Restricted or SR_Delay, the wireless communication terminal, which is an AP, may identify the PPDU as an Inter-BSS PPDU based on the type of the PPDU and the SR field. Specifically, when the PPDU received by the wireless communication terminal AP is a HE Single User (SU) PPDU or a HE extended range SU PPDU, and the SR field signaled by the corresponding PPDU indicates SR_Restricted, the wireless communication terminal, which is an AP, may identify the PPDU as an Inter-BSS PPDU. Also, when the PPDU received by the wireless communication terminal is an HE MU PPDU and the value of the SR field signaled by the PPDU indicates SR_Delayed, the wireless communication terminal, which is an AP, may identify the PPDU as an Inter-BSS PPDU. At this time, the HE SU PPDU indicates a PPDU for transmission to a single wireless communication terminal. Also, the HE extended range SU PPDU indicates a PPDU for transmission to a single wireless communication terminal. Also, the HE MU PPDU indicates a PPDU for a plurality of wireless communication terminals.

Also, in a specific embodiment, when the PPDU received by the non-AP wireless communication terminal is an Inter-BSS PPDU or an Intra-BSS PPDU, the non-AP wireless communication terminal may prioritize the determination based on the SR-related information indicated by the PPDU over the determination based on the BSS color value indicated by the PPDU signaling field.

In the embodiment of FIG. 20, the first AP AP1 transmits a trigger frame for triggering the transmission of the first station STA1 and the second station STA2. At this time, the second AP AP2 receives the PPDU including the trigger frame transmitted by the first AP AP1. The second AP AP2 may recognize that the corresponding PPDU is the PPDU including the trigger frame through the SR field value of the PPDU including the trigger frame transmitted by the first AP AP1. Accordingly, the second AP AP2 may identify the PPDU including the trigger frame transmitted by the first AP AP1 as the Inter-BSS PPDU. Particularly, even when the BSS color x of the BSS operated by the second AP AP2 is the same as the BSS color x of the BSS operated by the first AP AP1, the second AP AP2 may identify the PPDU including the trigger frame transmitted by the first AP AP1 as the Inter-BSS PPDU.

FIG. 21 shows a method for a wireless communication terminal to determine whether the corresponding PPDU is an Inter-BSS PPDU or an Intra-BSS PPDU when the PPDU received by the wireless communication terminal according to the embodiment of the present invention satisfies both the Inter-BSS PPDU condition and the Intra-BSS PPDU condition.

When the frame received by the wireless communication terminal satisfies both the Inter-BSS frame condition and the Intra-BSS frame condition, the wireless communication terminal may identify the frame as an Inter-BSS frame. Specifically, when the frame received by the wireless communication terminal satisfies both the Inter-BSS frame condition and the Intra-BSS frame condition and the wireless communication terminal is not able to identify whether the frame is an Inter-BSS frame or an Intra-BSS frame based on the MAC address, the wireless communication terminal may identify the frame as an Inter-BSS frame. In this case, a case where the wireless communication terminal is not able to identify the Inter-BSS frame or the Intra-BSS frame based on the MAC address may include a case where the wireless communication terminal is not able to decode the MAC header of the corresponding frame.

In addition, the Inter-BSS frame condition and the Intra-BSS frame condition may include all conditions for identifying whether the wireless communication terminal is an

Inter-BSS frame or an Intra-BSS frame in the above-described embodiments. For example, the wireless communication terminal may identify whether the frame is an Inter-BSS frame or an Intra-BSS frame based on the BSS color value indicated by the BSS color field of the signaling field of the PPDU including the MAC frame. As described above, the BSS color that the PPDU signals may be the BSS color that the BSS color field of the PPDU signals. Specifically, the BSS color that the PPDU signals may be the BSS color that the BSS color field of the HE-SIG-A of the PPDU signals.

Also, the wireless communication terminal may identify whether the frame is an Inter-BSS frame or an Intra-BSS frame based on the value of the partial AID field of the signaling field of the PPDU including the frame. Also, the wireless communication terminal may identify whether the frame is an Inter-BSS frame or an Intra-BSS frame based on the Address field of the frame. In addition, when the wireless communication terminal is an AP and the wireless communication terminal receives a downlink transmission PPDU, the wireless communication terminal may identify a frame included in the corresponding PPDU as an Inter-BSS frame.

If the PPDU includes a BSS color field, the partial AID field is less likely to include information on the BSS color. Therefore, a case where the Intra-BSS frame condition and Inter-BSS color condition are satisfied at the same time may include a case where when the wireless communication terminal performs determination based on the BSS color field or the partial AID field, the corresponding PPDU is identified as an Intra-BSS PPDU, and when the wireless communication terminal performs determination based on the address field of the frame, the corresponding PPDU may be identified as an Inter-BSS PPDU. Or, when the wireless communication terminal performs determination based on the BSS color field or the partial AID field, the corresponding MAC frame is identified as an Intra-BSS frame, and when the wireless communication terminal performs determination based on whether the PPDU including the MAC frame is an uplink transmission format, the corresponding PPDU is identified as an Inter-BSS PPDU. Since the number of bits representing the BSS color is limited, a BSS color collision may occur as described above. Therefore, when the frame received by the wireless communication terminal satisfies both the Inter-BSS frame condition and the Intra-BSS frame condition,

the wireless communication terminal may identify whether the frame received based on a condition other than the BSS color indicated by the PPDU is an Inter-BSS frame or an Intra-BSS frame. Specifically, when the frame received by the wireless communication terminal satisfies both the Inter-BSS frame condition and the Intra-BSS frame condition, the wireless communication terminal may identify whether the received frame is an Inter-BSS frame or an Intra-BSS frame based on a condition other than the BSS color field or the partial AID field of the PPDU. At this time, other conditions may be identified based on the Address field of the MAC header described above. Further, another condition may be that the PPDU including the frame is a PPDU for downlink transmission.

In the embodiment of FIG. 21, the first AP AP1 transmits an HE MU PPDU including a trigger frame to the first station STA1 and the second station STA2. At this time, the second AP AP2 receives the HE MU PPDU including the trigger frame transmitted by the first AP AP1. The BSS color of the BSS operated by the first AP AP1 and the second AP is equal to x. Therefore, the BSS color indicated by the HE-SIG-A field of the HE MU PPDU transmitted by the first AP AP1 satisfies the Intra-BSS color condition. However, when the HE MU PPDU transmitted by the first AP AP1 is the PPDU for downlink transmission including the trigger frame and as in the above-described embodiment, since the determination based on whether or not the PPDU for downlink transmission is prior to the determination based on the BSS color when the wireless communication terminal determine that the frame received by the wireless communication terminal is an Inter-BSS frame or an Intra-BSS frame, the second AP AP2 identifies the HE MU PPDU transmitted by the first AP AP1 as an Inter-BSS PPDU.

The wireless communication terminal may identify the received frame as an Intra-BSS frame according to any one condition, and then, identify the received frame as an Inter-BSS frame according to the determination priority order described above. At this time, the wireless communication terminal may use the enhanced CCA level. Specifically, the wireless communication terminal may use the CCA level corresponding to the inter-BSS frame. In a specific embodiment, the CCA level corresponding to the Inter-BSS frame may be referred to as the OBSS PD level.

As described above, the wireless communication terminal may enter the power save state based on the MAC header. At this time, the specific operation of the wireless communication terminal will now be described in detail with reference to FIGS. 22 to 23.

FIG. 22 shows a case where a wireless communication terminal according to an embodiment of the present invention enters a power save state based on a MAC header of a frame received by the wireless communication terminal. Also, FIG. 23 shows a case where, when a wireless communication terminal according to an embodiment of the present invention is included in a BSS corresponding to a multiple BSSID set, the wireless communication terminal enters a power save state based on a MAC header of a frame received by the wireless communication terminal.

When a Transmitter Address TA or a Receiver Address RA indicated by a MAC header of a received frame corresponds to another BSSID of a multiple BSSID set that includes a BSSID of a BSS including a wireless communication terminal, the wireless communication terminal may determine the received frame as an Intra-BSS frame. When the frame received by the wireless communication terminal is an Intra-BSS frame and the wireless communication terminal is not the recipient of a received frame, the wireless communication terminal may enter the power save state. At this time, the wireless communication terminal may maintain the power save state until the end of the duration of the PPDU including the received frame.

In the embodiment of FIG. 22, the first station STA1 and the second station STA2 are associated with the same access point AP. When the access point AP transmits the PPDU to the first station STA1, the second station STA2 may receive the PPDU. At this time, the second station STA2 determines whether the received PPDU is an intra-BSS frame. When the received PPDU is an Intra-BSS frame, the second station STA2 determines whether the recipient of the received PPDU is the second station STA2. Specifically, the second station STA2 may determine whether the receiver of the PPDU received based on the MAC header is the second station STA2. At this time, when the second station STA2 is not the receiver of the received PPDU, the second station STA2 may enter the power save state.

When entering the power save state, the wireless communication terminal may

determine whether the Receiver Address RA of the frame indicates a plurality of wireless communication terminals including the corresponding wireless communication terminal. Specifically, when the received frame is an Intra-BSS frame, the Receiver Address RA of the received frame is not the MAC address of the wireless communication terminal, and the Receiver Address RA of the received frame does not correspond to the broadcast address, the wireless communication terminal may enter the power save state. At this time, when the Receiver Address RA of the received frame does not correspond to the multicast address that the wireless communication terminal is required to receive and the Receiver Address RA of the received frame does not correspond to the group address that the wireless communication terminal is required to receive, the wireless communication terminal may enter the power save state.

In a specific embodiment, even when the Receiver Address RA of the trigger frame or the Receiver Address RA of a multi-station block ACK (Multi-STA BlockACK) frame does not match the MAC address of the wireless communication terminal, the wireless communication terminal may be required to receive a trigger frame or a multi-station block ACK frame. Specifically, when the receiver of the trigger frame is a plurality of wireless communication terminals, the Receiver Address RA of the trigger frame may be a broadcast address. At this time, the number of User Info fields of the trigger frame may be two or more. Also, when the receiver of the multi-station block ACK frame is a plurality of wireless communication terminals, the Receiver Address RA of the multi-station block ACK may be a broadcast address. At this time, the number of AID fields in the Per STA Info subfield of the multi-station block ACK may be two or more. At this time, the broadcast address may indicate a plurality of wireless communication terminals or one wireless communication terminal.

Accordingly, when the received frame is an Intra-BSS frame, the Receiver Address RA of the received frame is not the MAC address of the wireless communication terminal, the received frame is a trigger frame, and the Receiver Address RA of the received frame does not correspond to the broadcast address, the wireless communication terminal may enter the power save state. In addition, when the received frame is an Intra-BSS frame, the Receiver Address RA of the received frame is not the MAC address of the wireless

communication terminal, the received frame is a trigger frame, and the Receiver Address RA of the multi-station block ACK frame does not correspond to the broadcast address, the wireless communication terminal may enter the power save state.

Specifically, when the receiver of the trigger frame or the multi-station block ACK frame is a plurality of wireless communication terminals, the Receiver Address RA may be a multicast address or a group address. Therefore, when the wireless communication terminal receives the trigger frame or the multi-station block ACK frame and the Receiver Address RA of the received frame is not a multicast address and a group address including the wireless communication terminal, the wireless communication terminal may enter the power save state.

When any one of the BSSIDs included in the multiple BSSID set is set to the Receiver Address RA of the frame or the Transmitter Address TA of the frame, only the wireless communication terminal included in the BSS identified by the corresponding BSSID may be a recipient or a transmitter of the corresponding frame. Specifically, for a frame transmitted to a plurality of wireless communication terminals included in each of two or more BSSs corresponding to a multiple BSSID set, a modified value may be set based on the BSSID in the Transmitter Address of the frame. At this time, the wireless communication terminal may not separately determine whether the Receiver Address RA and the Transmitter Address TA are the broadcast address or the multicast address including the address of the wireless communication terminal. For convenience of explanation, the BSSID of the BSS including the wireless communication terminal is referred to as a first BSSID, and the first BSSID and a different BSSID are referred to as a second BSSID. Specifically, when the second BSSID is included in the multiple BSSID set including the first BSSID and the Receiver Address RA or the Transmitter Address TA of the frame received by the wireless communication terminal matches the second BSSID, the wireless communication terminal may enter the power save state.

In the embodiment of FIG. 23, the multiple BSSID set includes a first BSSID BSSID(1) and a second BSSID BSSID(2). The first station STA1 is included in the BSS identified by the second BSSID BSSID(2) and the second station STA2 is included in the BSS identified by the first BSSID BSSID(1). At this time, the virtual access point having

the second BSSID BSSID(2) transmits the PPDU to the first station STA1. The second station STA2 receives the corresponding PPDU. The second station STA2 determines whether the received PPDU is an intra-BSS frame. Specifically, the second station STA2 may determine whether the MAC address signaled by the MAC header of the received PPDU is the BSSID of the multiple BSSID set including the first BSSID. Since the Transmitter Address TA of the received PPDU is the second BSSID BSSID(2), the second station STA2 determines the received PPDU as an intra-BSS frame. Also, since the receiver of the received PPDU is a wireless communication terminal included in the BSS identified by the second BSSID BSSID(2), the second station STA2 enters the power save state.

When the received PPDU is an Inter-BSS frame, the second station STA2 determines whether the recipient of the received PPDU is the second station STA2. Specifically, the second station STA2 may determine whether the recipient of the PPDU received based on the MAC header is the second station STA2. At this time, when the second station STA2 is not the receiver of the received PPDU, the second station STA2 may enter the power save state.

In another specific embodiment, if the reference BSSID is set to the Transmitter Address TA of the frame, it may indicate that the Transmitter Address TA is transmitted to a plurality of wireless communication terminals included in two or more BSSs corresponding to the multiple BSSID set. When the second BSSID is included in the multiple BSSID set including the first BSSID, the second BSSID is not the reference BSSID, and the Receiver Address RA or the Transmitter Address TA of the frame received by the wireless communication terminal is transmitted from the second BSSID, the wireless communication terminal may enter the power save state.

As described above, the wireless communication terminal may signal various information through the signaling field of the PPDU. The format of the signaling field will be described with reference to FIG. 24.

FIG. 24 shows the format of the HE-SIG-B field according to an embodiment of the present invention.

The HE MU PPDU may include a HE-SIG-B field that signals information necessary for multi-user transmission. Specifically, the HE-SIG-B field may be classified into a common field for signaling information commonly applied to wireless communication terminals participating in multi-user transmission and a user-specific field for signaling information for each of a plurality of wireless communication terminals participating in multi-user transmission. Both the common field and the user-specific field may be encoded based on 20 MHz. Specifically, the common field may include information on resource allocation such as a resource unit RU allocated to a plurality of wireless communication terminals participating in multi-user transmission and a number of users in the MU-MIMO. Further, in the user-specific field, information on each of the plurality of wireless communication terminals may be arranged in the order listed in the RU allocation field in the common field.

Specifically, the user-specific field includes information on a station identifier (STAID), a number of spatial streams, a transmit beamforming (TxBF), a modulation and coding scheme (MCS), a dual sub-carrier modulation (DCM), and Coding. In addition, the user-specific field may include information on Spatial Configuration Fields, MCS, DCM, and Coding when a plurality of wireless communication terminals are allocated to one RU. At this time, information on coding may indicate whether LDPC is used or not. The common field may include one Binary Block Code (BCC) block. The user-specific field includes information on the two wireless communication terminals in one BCC block. At this time, the last BCC block may include information on one wireless communication terminal. Also, the information on the individual wireless communication terminals may be referred to as Per-user content. One BCC block may include CRC and Tail bits. In addition, the HE-SIG-B field may also include padding to align the OFDM symbol boundaries. The format of the specific HE-SIG-B field may be as shown in FIG. 24(a).

When a wireless communication terminal transmits a PPDU over a frequency bandwidth of 40 MHz or more, the wireless communication terminal may repeatedly transmit two HE-SIG-B fields each having a frequency bandwidth of 20 MHz every 40 MHz by the entire frequency bandwidth. At this time, the two HE-SIG-B fields may include different information. In addition, each of the two HE-SIG-B fields may include

information on an RU included in the frequency bandwidth in which the corresponding HE-SIG-B field is transmitted. The wireless communication terminal receiving the PPDU may recognize the configuration of the entire MU PPDU by decoding two HE-SIG-B fields. Specifically, the wireless communication terminal may transmit the HE-SIG-B field in the form as shown in FIG. 24(b).

In a specific embodiment, the wireless communication terminal may indicate a wireless communication terminal corresponding to per-user content through an identifier of the wireless communication terminal in a user-specific field of the HE-SIG-B field. At this time, the identifier of the wireless communication terminal may be an association identifier (AID). If multiple BSSID sets are used, the wireless communication terminal uses the assigned AID according to the group addressed AID assignment method in the multiple BSSID TIM Operation so that it is possible to broadcast a PPDU to wireless communication terminals included in any one of a plurality of BSSs corresponding to multiple BSSIDs. For example, there are N BSSs corresponding to a set of multiple BSSIDs, and each of the N BSSs may have one of the values from 0 to N-1 as an AID. At this time, the wireless communication terminal may broadcast the PPDU to the wireless communication terminal of the BSS corresponding to the AID of 0 by designating the wireless communication terminal identifier as 0 in the per-user content of the user-specific field. When multiple BSSID sets are used, the wireless communication terminal may broadcast PPDU to wireless communication terminals included in all BSSs corresponding to multiple BSSID sets using a specific AID. At this time, the specific AID may be an unassigned value in a multiple BSSID TIM operation. In a specific embodiment, the specific AID may be 2047.

A frame to be transmitted to a plurality of wireless communication terminals and a frame to be transmitted to any one wireless communication terminal may be included in one MU PPDU. At this time, a plurality of RUs to which the PPDU is transmitted may be divided into RUs used for a plurality of wireless communication terminals and RUs used for transmission to any one wireless communication terminal. When the wireless communication terminal receives the MU PPDU, the wireless communication terminal may determine whether the per-user content indicates information corresponding to the

wireless communication terminal or based on the wireless communication identifier included in the per-user content. At this time, the wireless communication terminal may determine whether the wireless communication terminal identifier indicates the wireless communication terminal based on the range of the wireless communication terminal indicated by the wireless communication terminal identifier. Specifically, the wireless communication terminal may be identified from a wireless communication terminal identifier indicating a small range of wireless communication terminals. For example, the HE-SIG-B field may include N wireless communication terminal identifiers from a wireless communication terminal identifier indicating the first group to a wireless communication terminal identifier indicating the Nth group. At this time, the first group includes a smaller number of wireless communication terminals than the second group, and the second group includes a smaller number of wireless communication terminals than the third group. In this case, the wireless communication terminal may confirm the wireless communication terminal identifier indicating the (N-1)th group from the wireless communication terminal identifier indicating the (N)th group.

When multiple BSSID sets are used, the wireless communication terminal may determine the wireless communication terminal identifier included in the HE-SIG-B field in the following order. When a wireless communication terminal identifier indicating only the wireless communication terminal is included in the per-user content, the wireless communication terminal may receive the payload of the PPDU transmitted through the RU indicated by the per-user content. When the wireless communication terminal identifier indicating only the wireless communication terminal is not included in the per-user content and the wireless communication identifier indicating a broadcast to the wireless communication terminals of the BSS with which the wireless communication terminal is associated is included in the per-user content, the wireless communication terminal may receive the payload of the PPDU transmitted through the RU indicated by the per-user content. The wireless communication terminal identifier indicating only the wireless communication terminal is not included in the per-user content, the wireless communication identifier indicating the broadcast to the wireless communication terminals of the BSS with which the wireless communication terminal is associated is not included in

the per-user content, and the wireless communication terminal identifier indicating a broadcast to wireless communication terminals included in all BSSs may be included in the per-user content. At this time, the wireless communication terminal may receive the payload of the PPDU transmitted through the RU indicated by the per-user content including the wireless communication terminal identifier indicating the broadcast to the wireless communication terminals included in all the BSSs. If all of the above cases are not satisfied, the wireless communication terminal may stop decoding the corresponding PPDU. This is because the payload of the PPDU to be decoded by the wireless communication terminal is not included in the PPDU. For convenience of explanation, the wireless communication terminal identifiers are described in three ranges but depending on the number or inclusion relationship of the wireless communication terminals, there may be more range types. In such a case, as described above, the wireless communication terminal may determine the wireless communication terminal identifier according to the size of the range indicated by the wireless communication terminal identifier.

When multiple BSSID sets are not used, the wireless communication terminal may confirm the wireless communication terminal identifier included in the HE-SIG-B field in the following order. When a wireless communication terminal identifier indicating only the wireless communication terminal is included in the per-user content, the wireless communication terminal may receive the payload of the PPDU transmitted through the RU indicated by the per-user content. When the wireless communication terminal identifier indicating only the wireless communication terminal is not included in the per-user content, and a wireless communication identifier indicating at least one of broadcast, group cast, and multicast for a group including a wireless communication terminal is included in the per-user content, the wireless communication terminal may receive the payload of the PPDU transmitted through the RU indicated by the per-user content. The wireless communication terminal identifier indicating only the wireless communication terminal is not included in the per-user content, the wireless communication identifier indicating at least one of broadcast, group cast, and multicast for a group including a wireless communication terminal is not included in the per-user content, and the wireless communication terminal identifier indicating a broadcast to the wireless communication

terminals included in the BSS may be included in the per-user content. At this time, the wireless communication terminal may receive the payload of the PPDU transmitted through the RU indicated by the per-user content including the wireless communication terminal identifier indicating the broadcast to the wireless communication terminals included in the BSS. If all of the above cases are not satisfied, the wireless communication terminal may stop decoding the corresponding PPDU. This is because the payload of the PPDU to be decoded by the wireless communication terminal is not included in the PPDU. For convenience of explanation, the wireless communication terminal identifiers are described in three ranges but depending on the number or inclusion relationship of the wireless communication terminals, there may be more range types. In such a case, as described above, the wireless communication terminal may determine the wireless communication terminal identifier according to the size of the range indicated by the wireless communication terminal identifier.

In order for the wireless communication terminal receiving the MAC frame to effectively control the MAC frame, the wireless communication terminal may transmit information on the MAC frame control through the MAC frame header. At this time, there is a need for a method for efficiently transmitting information on MAC frame control. This will be described with reference to FIGS. 25 and 33.

FIG. 25 is a view illustrating a MAC frame format according to an embodiment of the present invention.

The MAC frame may include a Frame Control field indicating information on frame control. Also, the MAC frame may indicate a duration used for NAV setting according to the frame type, or may include a Duration/ID field indicating the AID of the wireless communication terminal transmitting the frame. In addition, the MAC frame may include four Address fields indicating information related to the address. Further, the MAC frame may include a Sequence Control field indicating information on sequence control. In addition, the MAC frame may include a QoS Control field indicating information on Quality of Service (QoS) control. In addition, the MAC frame may include a Frame Body field indicating a payload of the MAC frame. In addition, the MAC frame may include an

FCS field indicating whether the MAC frame includes an error. The MAC frame may not include the fields described above depending on the frame type or subtype. Also, the MAC frame may include a Frame Control field, a Duration/ID field, an Address 1 field, and an FCS field regardless of a frame type and a subtype.

FIG. 26 is a view illustrating a variant of an HT Control field according to an embodiment of the present invention.

The wireless communication terminal may transmit and modify various HT Control fields. Specifically, the wireless communication terminal may transmit the HT Control field in the format of an HT variant, a VHT variant, or an HE variant. Also, the HT Control field may be a 32-bit field. At this time, the first bit B0 and the second bit B1 of the HT Control field may indicate the type of the HT Control field. When the first bit B0 of the HT Control field is 0, the HT Control field may be an HT variant. At this time, the bits below the second bit B1 of the HT Control field may include the HT Control Middle, the AC Constraint, and the RDG/More PPDU subfields as shown in FIG. 26. Also, when the first bit B0 of the HT Control field is 1 and the second bit B1 is 0, the HT Control field may be a VHT variant. At this time, the bits below the second bit B1 of the HT Control field may include the VHT Control Middle, the AC Constraint, and the RDG/More PPDU subfields as shown in FIG. 26. When the first bit B0 of the HT Control field is 1 and the second bit B1 is 1, the HT Control field may be an HE variant. At this time, the bits below the second bit B1 of the HT Control field may include an aggregated control (A-Control) subfield as shown in FIG. 26. The A-Control subfield may include Control information. The control information included in the A-Control and the format of the A-Control subfield will be described with reference to FIGS. 27 to 33.

FIG. 27 shows the format of the A-Control subfield according to an embodiment of the present invention.

The wireless communication terminal according to the embodiment of the present invention may insert one or a plurality of control subfields into the A-Control subfield to transmit the same. At this time, the number of Control subfields included in the A-Control

subfield may be differently applied depending on at least one of the type and the subtype of the MAC frame. At this time, the A-Control sub-field may include a padding bit to match the length of the sub-field. In a specific embodiment, the A-Control subfield may be a 30-bit field. Also, the HE variant may be a 32-bit field. The A-Control subfield may include zeros as padding bits. The A-Control subfield may include control subfields consecutively.

In addition, the Control sub-field may include a Control ID sub-field indicating the type of information included in the Control sub-field. In addition, the Control sub-field may include a Control Information sub-field indicating Control information. In a specific embodiment, the Control ID field may be a 4-bit field. The contents and length of the Control Information subfield may be determined according to the Control ID subfield. Specifically, the A-Control subfield may be in the format shown in FIG. 27(a). In addition, the Control sub-field included in the A-Control sub-field may have a format as shown in FIG. 27(b).

The Control subfield may include information related to at least one of UL MU response scheduling, Receive operation mode indication, HE link adaptation, UL PPDU triggering, BlockACK request, and Buffer Status Report Requests. When a bit corresponding to the length of the A-Control sub-field is decoded, the wireless communication terminal that decodes the Control subfield may determine that there is no additional Control information to be decoded. However, when the number of Control subfields included in the A-Control subfield is variable and the length of the A-Control sub-field remains, the wireless communication terminal that decodes the A-Control subfield may not determine whether the current decoding bit is a padding bit or a control subfield. Therefore, there is a need for a method of a wireless communication terminal that decodes the A-Control subfield to determine whether the currently decoded bit is a padding bit.

The wireless communication terminal may insert the Control subfields of the A-Control subfield into the A-Control subfield in the order in which they are arranged according to the Control ID. Specifically, the wireless communication terminal may insert the control subfields of the A-control subfield into the A-control subfields in ascending order of the Control ID. In another specific embodiment, the wireless communication

terminal may insert control sub-fields of the A-Control sub-field into the A-Control sub-field in a descending order of the Control ID. When the Control subfields are inserted into the A-Control subfield in the order in which they were sorted according to the Control ID, the wireless communication terminal decoding the A-Control sub-field may determine the corresponding bit as a padding bit when the value of the Control ID field in the A-Control sub-field is continuously 0. In a specific embodiment, after the Control ID subfield with 0 is decoded, when 0 is decoded again at the position corresponding to the Control ID subfield, the wireless communication terminal that decodes the A-Control sub-field may determine that there is no additional Control information to be decoded. Also, when 0 is decoded at the position corresponding to the Control ID subfield contrary to the Control ID sort order, the wireless communication terminal that decodes the Control subfield may determine that there is no Control information to be decoded further.

In another specific embodiment, the wireless communication terminal may indicate that there is no Control sub-field after the corresponding field via a specific Control ID sub-field value. At this time, when the Control ID subfield having the specific Control ID subfield value is decoded, the wireless communication terminal that decodes the A-Control sub-field may determine that there is no additional Control information to be decoded.

FIG. 28 shows the format of an A-Control sub-field of a control sub-field according to another embodiment of the present invention.

The Control sub-field included in the A-Control sub-field may include information indicating whether the corresponding Control field is the last Control sub-field included in the A-Control sub-field. Specifically, the information indicating whether the corresponding Control field is the last Control sub-field included in the A-Control sub-field may be a 1-bit field. Also, the information indicating whether the corresponding Control field is the last Control sub-field included in the A-Control sub-field may be referred to as an End of Control field. In this embodiment, the wireless communication terminal that decodes the A-Control sub-field may stop decoding the A-Control sub-field based on the End of Control field. Specifically, when the End of Control field indicates that the corresponding

Control sub-field is the last Control sub-field of the A-Control sub-field, the wireless communication terminal decoding the A-Control sub-field may determine that there is no Control information to be additionally decoded after the field of the corresponding Control sub-field. Specifically, the format of the control subfield may be as shown in FIG. 28.

The length of the HE variant transmitted by the wireless communication terminal according to the embodiment of the present invention may be variable. This is because when the field of the HE variant is fixed, the wireless communication terminal may not be able to insert all the necessary Control information into the HE variant field. This will be described with reference to FIGS. 29 to 32.

FIG. 29 shows a frame format and an HE variant format of an HT Control field according to another embodiment of the present invention.

Specifically, the wireless communication terminal may insert a plurality of HE variants into the HT Control field to transmit the HT Control field. At this time, the wireless communication terminal may insert a field indicating that there are more HE variants to be decoded in the HE variant. A field indicating that there is more HE variant may be referred to as a More A-Control subfield. For example, when the value of the More A-Control subfield is 1, the wireless communication terminal that decodes the HT Control field may decode the following bits into an HE variant after the corresponding HE variant. The More A-Control subfield may be placed in the last bit of the HE variant. Also, the More A-Control sub-field may be placed in the first bit of the A-Control sub-field. Further, the More A-Control sub-field may be placed immediately after two bits indicating the variant included in the A-Control sub-field. In addition, the More A-Control subfield may be placed in front of the extended HE variant.

In a specific embodiment, the length of the A-Control subfield may be extended in units of 32 bits. Also, even if the A-Control subfield is extended, the first bit B0 and the second bit B1 of the A-Control subfield indicating the variant included in the HT Control field may not be repeated. Also, in a specific embodiment, the length of the HE variant added after the first HE variant may be 30 bits. The specific format of the HT Control field and the concrete form of the HE Variant may be as shown in FIG. 29.

FIG. 30 shows a frame format and an HE variant format of an HT Control field according to another embodiment of the present invention.

When the HE Control subfield is an HE variant, the wireless communication terminal may insert a specific Control ID value indicating the end of the HE variant. At this time, the wireless communication terminal that decodes the HE Control subfield may determine the end of the HE Control subfield by decoding a specific Control ID value indicating the end of the HE variant. The format of the specific HE Control subfield may be as shown in FIG. 30.

FIG. 31 shows a frame format and an HE variant format of an HT Control field according to another embodiment of the present invention.

When the length of the HE variant transmitted by the wireless communication terminal is variable, the wireless communication terminal may transmit the HE variant by inserting the End of Control field described above into the Control subfield. The wireless communication terminal that decodes the HT Control field may determine the end of the HT Control field based on the End of Control field. The format of the specific HE Control subfield may be as shown in FIG. 31.

FIG. 32 shows a frame format and an HE variant format of an HT Control field according to another embodiment of the present invention.

When the length of the HE variant transmitted by the wireless communication terminal is variable, the wireless communication terminal may insert a Length subfield indicating the length of the A-control field into the HE variant and transmit the HE subfield. Specifically, the Length sub-field may indicate -1 , which is the number of Control sub-fields following the Length sub-field. At this time, the Length subfield may have the same number of bits as the Control ID. In another specific embodiment, the Length subfield may indicate the number of unit lengths with which the A-Control subfield extends. For example, when the A-Control subfield is extended in units of bytes, the Length subfield may indicate the total number of bytes of the A-Control subfield or the number of bytes of the extended A-Control subfield. In another specific embodiment, when the A-Control sub-field is extended in units of 32 bits or 30 bits, the Length subfield may indicate a value obtained by dividing the length of the extended A-Control subfield by 32

bits or 30 bits, or may indicate a value obtained by dividing the total length of the A-Control subfield by 32 bits or 30 bits.

FIG. 33 shows a frame format and an HE variant format of an HT Control field according to another embodiment of the present invention.

The wireless communication terminal may transmit the control information through the body of the frame. Specifically, the wireless communication terminal may transmit Control information that is included in the A-Control field through the body of the frame. The total length of the MAC header or the length of the HT Control field may be limited, and in this case, this is because there is Control information required for a wireless communication terminal receiving a frame without being included in the HT Control. In a specific embodiment, the wireless communication terminal transmits the Control ID field through the HT Control field and transmits the Control Information field corresponding to the Control ID field through the body of the frame. Specifically, the wireless communication terminal transmits the Control ID field corresponding to the specific value through the HT Control field and transmits the Control Information field corresponding to the Control ID field through the body of the frame. In another specific embodiment, when the length of the Control Information field is greater than or equal to the reference value, the wireless communication terminal transmits the Control ID field through the HT Control field and transmits the Control Information field corresponding to the Control ID field through the body of the frame. For example, when the length of the Control Information field is long, such as information on BlockAck or information on BlockAck Request, the wireless communication terminal may transmit the Control Information field through the frame Body. At this time, when a plurality of Control ID fields are transmitted through the HT Control field and a plurality of Control Information fields corresponding to the plurality of Control ID fields are transmitted through the frame Body, the wireless communication terminal may insert a Control Information field corresponding to the Control ID field into the body of the frame according to the sort order of the Control ID field. In the embodiment of FIG. 33, there are Control ID m and Control ID $m+1$ in the HT Control field, and the wireless communication terminal inserts them into the HT Control field in the order of Control ID m and Control ID $m+1$. Since the Control Information

length corresponding to a plurality of Control IDs is long, the wireless communication terminal inserts the Control Information corresponding to the Control ID into the frame Body. At this time, the wireless communication terminal inserts Control Information into the frame Body in the order of Control Information corresponding to Control ID m and Control Information corresponding to Control ID $m+1$.

In another specific embodiment, if the HT Control field is of limited length, the wireless communication terminal transmits the Control ID field through the HT Control field and transmits the Control Information field corresponding to the Control ID field through the body of the frame. In addition, the length of the HT Control field may be fixed to 32 bits (4 bytes). In addition, the wireless communication terminal may transmit information indicating that a Control Information field corresponding to the Control ID field is included in the body of the frame. In addition, the wireless communication terminal may transmit information indicating that a Control Information field corresponding to the Control ID field is included in the body of the frame. In another specific embodiment, the wireless communication terminal may transmit information indicating the end of the Control subfield. At this time, the information indicating the end of the Control subfield may be a 1-bit field. At this time, the wireless communication terminal may transmit information indicating the end of the Control subfield as in the embodiment described with reference to FIG. 28 to FIG. 32.

In these embodiments, the wireless communication terminal receiving the frame may obtain the Control ID field in the HT Control field and obtain the Control Information field corresponding to the Control ID field from the Body of the frame.

Any one of the wireless communication terminals may transmit a trigger frame for triggering the transmission of the plurality of wireless communication terminals to the plurality of wireless communication terminals. At this time, the plurality of wireless communication terminals may transmit a response frame to the trigger frame to the wireless communication terminal that transmits the trigger frame based on the trigger frame. Through this operation, a plurality of wireless communication terminals may simultaneously transmit frames to one wireless communication terminal. Operations based

on the trigger frame of the wireless communication terminal will be described with reference to FIGS. 34 to 44.

FIG. 34 shows a format of a trigger frame according to an embodiment of the present invention.

The trigger frame may include a Frame Control field indicating information on frame control. Further, the trigger frame may include a Duration/ID field indicating a duration used for NAV setting. In addition, the trigger frame may include an RA field indicating a receiver address and a TA field indicating a transmitter address. When the trigger frame triggers a plurality of wireless communication terminals, the RA field may be a multicast address or a broadcast address indicating a plurality of wireless communication terminals. When the trigger frame triggers one wireless communication terminal, the RA field may indicate the MAC address of the corresponding wireless communication terminal. Further, the trigger frame may include an FCS field indicating whether or not the trigger frame includes an error.

In addition, the trigger frame may include a Common Info field and one or more Per User Info fields. The Common Info field may indicate information that is commonly applied to a plurality of wireless communication terminals triggered by the trigger frame. The Per User Info field may indicate information applied to each of a plurality of wireless communication terminals triggered by the trigger frame. At this time, the number of Per User Info fields may be determined according to the number of the plurality of wireless communication terminals triggered by the trigger frame. The trigger frame may include a Padding field. At this time, the Padding field may allow time for the wireless communication terminal receiving the trigger frame to process the trigger frame. The format of the specific trigger frame may be as shown in FIG. 34.

FIG. 35 shows the format of a Common Info field and a Per User Info field of a trigger frame according to the embodiment of the present invention.

The Common Info field may include a length of the trigger-based PPDU or a Length field indicating the L-SIG Length field of the trigger-based PPDU. At this time, the Length field may be a 12-bit field. In addition, the Common Info field may include a

Cascade Indication field indicating that there is a subsequent trigger frame after the trigger frame. The Common Info field may include a CS Required field indicating whether channel sensing is required when transmitting a trigger-based PPDU. At this time, the channel sensing may include virtual channel sensing and energy detection (ED) for determining whether NAV is set or not. In addition, the trigger frame may include a HE-SIG-A Info field indicating information to be inserted in the HE-SIG-A field of the trigger-based PPDU. At this time, the information that the wireless communication terminal receiving the trigger frame may recognize by itself may be omitted in the trigger frame. In addition, the trigger frame may include a CP and LTF Type field indicating a combination of LTF and Cyclic Prefix (CP) of the trigger-based PPDU. In addition, the trigger frame may include a Trigger Type field indicating the type of the trigger frame. At this time, the type of the trigger frame may indicate any one of a basic trigger, a beamforming report, a poll trigger, an MU-BAR, and an MU-RTS. In addition, the trigger frame may include a Trigger Dependent Common Info field whose format is determined according to the trigger type. A specific form of the Common Info field may be the same as that shown in FIG. 35(a).

The Per User Info field may include a User Identifier field indicating a wireless communication terminal corresponding to Per User Info. At this time, the User Identifier field may indicate the AID of the wireless communication terminal corresponding to Per User Info. Also, the Per User Info field may include an RU Allocation field indicating information on an RU allocated to a wireless communication terminal corresponding to the User Identifier field. Also, the Per User Info field may include a Coding Type field to be used by the corresponding wireless communication terminal when the wireless communication terminal corresponding to the User Identifier field transmits the trigger-based PPDU. Specifically, the Coding Type field may indicate either BCC or LDPC. Also, when the wireless communication terminal corresponding to the User Identifier field transmits the trigger-based PPDU, the Per User Info field may include a DCM field indicating whether the corresponding wireless communication terminal uses Dual Carrier Modulation (DCM). In addition, the Per User Info field may include an SS Allocation field indicating a spatial stream to be used by the wireless communication terminal when the

wireless communication terminal corresponding to the User Identifier field transmits the trigger-based PPDU. Also, the Per User Info field may include a Trigger Dependent Per User Info field which format is determined according to the type of the trigger frame. Specifically, the format of the Per User Info field may be the same as that shown in FIG. 35(b).

FIG. 36 shows a Common Info field and a Per User Info field of a trigger frame according to another embodiment of the present invention.

When a wireless communication terminal triggered by a trigger frame transmits a trigger-based PPDU, the Common Info field may include a Spatial Reuse field indicating a value of a Spatial Reuse field to be inserted in the HE-SIG-A field of the PPDU by the corresponding wireless communication terminal. Also, when a wireless communication terminal triggered by a trigger frame transmits a trigger-based PPDU, the Common Info field may include a BW field indicating a value to be inserted in the BW field of the HE-SIG-A by the corresponding wireless communication terminal. Also, when a wireless communication terminal triggered by a trigger frame transmits a trigger-based PPDU, the Common Info field may include an MU MIMO LTF Mode field indicating an MU MIMO LTF mode to be used by the corresponding wireless communication terminal. Also, when a wireless communication terminal triggered by a trigger frame transmits a trigger-based PPDU, the Common Info field may include a Number of LTFs field indicating the number of LTFs to be used by the corresponding wireless communication terminal. Also, when a wireless communication terminal triggered by a trigger frame transmits a trigger-based PPDU, the Common Info field may include an STBC field indicating whether the wireless communication terminal uses the STBC. Also, when a wireless communication terminal triggered by a trigger frame transmits a trigger-based PPDU, the Common Info field may include an LDPC Extra Symbol field indicating whether or not the LDPC additional symbol is present when the corresponding wireless communication terminal is used. Also, when a wireless communication terminal triggered by a trigger frame transmits a trigger-based PPDU, the Common Info field may include an AP TX Power field indicating the transmission power to be used by the wireless communication terminal. Also, when a

wireless communication terminal triggered by a trigger frame transmits a trigger-based PPDU, the Common Info field may include a Packet Extension field indicating information on a packet extension of a PPDU transmitted by the corresponding wireless communication terminal. Other fields included in the Common Info field may be the same as the embodiment described with reference to FIG. 35(a). Specifically, the Common Info field may be the same as the embodiment of FIG. 35(a).

When a wireless communication terminal corresponding to the User Identifier field transmits a trigger-based PPDU, the Per User Info field or the Target RSSI field may include an RSSI field indicating an RSSI value to be targeted by the wireless communication terminal.

FIG. 37 shows a Trigger Dependent Common Info field and a Trigger Dependent Per User Info field of an MU-BAR type trigger frame according to an embodiment of the present invention.

The wireless communication terminal, which is an AP, may transmit a data frame to a plurality of wireless communication terminals and request transmission of an ACK frame for the corresponding data frame. Specifically, a wireless communication terminal, which is an AP, may trigger ACK frame transmission of a plurality of wireless communication terminals through a trigger frame. At this time, the trigger frame type may be MU-BAR type.

Also, when a wireless communication terminal, which is an AP, transmits a group cast frame to a plurality of wireless communication terminals and one of the non-AP wireless communication terminals fails to receive a group cast frame, Group Cast Retries (GCR) BlockACK may be transmitted. At this time, the wireless communication terminal, which is an AP, may trigger GCR BlockACK transmission of a plurality of wireless communication terminals through a trigger frame. For this, the Common Info field of the trigger frame may include information related to the GCR. At this time, the trigger frame type may be MU-BAR type or MU-BAR type for GCR. Specifically, when the type of the trigger frame is MU-BAR type or MU-BAR type for GCR, the Common Info field of the trigger frame may include a GCR Indication field indicating whether the trigger frame is an

MU-BAR for GCR. In addition, the Common Info field of the trigger frame may include a GCR Address field indicating the address of the GCR group triggered by the trigger frame. Specifically, the Common Info field included in the trigger frame of the MU-BAR type may be the same as the embodiment of FIG. 37(a).

In addition, the Trigger Dependent Per User Info field of the trigger frame may include a BAR control field including information about the BAR frame control. In addition, the Trigger Dependent Per User Info field of the trigger frame may include a BAR Information field including information on the BAR frame. In the specific embodiment, the BAR Control field and the BAR Information field may be the same as the format of the trigger frame of the BlockAckReq type. In another specific embodiment, the BAR Control field and the BAR Information field may be a structure in which one or more fields are omitted from the field format of the Trigger of the BlockAckReq type. For example, the wireless communication terminal may use the MU-BAR type or the MU-BAR type trigger frame for the GCR by omitting the information included in the Trigger Dependent Common Info of the Trigger Frame of the BlockAckReq type. Specifically, the wireless communication terminal inserts a GCR Indication field in Trigger Dependent Common Info of a Trigger Frame of BlockAckReq type and omits the GCR Indication field in the BAR Control field. In another specific embodiment, the wireless communication terminal may insert a GCR Address field in the Trigger Dependent Common Info field and omit the GCR Address field in the BAR Information field. In another specific embodiment, even when the wireless communication terminal requests the GCR BlockAck, the wireless communication terminal inserts the GCR Address field in the Trigger Dependent Common Info field and omits the GCR Address field in the BAR Information field.

FIG. 38 shows the format of the Trigger Dependent Common Info field of the MU-BAR type trigger frame according to an embodiment of the present invention.

In a specific embodiment of the present invention, when the type of trigger frame is MU-BAR type or MU-BAR type for GCR, the Trigger Dependent Common Info field of the trigger frame may include only the GCR Address field. At this time, the wireless

communication terminal may set the value of the GCR Address field to a predetermined value and indicate that it is not a MU-BAR type trigger frame for GCR. Specifically, the predetermined value may be zero. The wireless communication terminal receiving the trigger frame may determine whether the corresponding trigger frame is the MU-BAR type trigger frame for GCR based on the value of the GCR Address field. Specifically, the wireless communication terminal receiving the trigger frame may determine whether the corresponding trigger frame is a MU-BAR type trigger frame for GCR, according to whether the value of the GCR Address field is a predetermined value.

In another specific embodiment, the wireless communication terminal may indicate that the MU-BAR trigger frame is a MU-BAR type trigger frame for the GCR through a Starting Sequence Control value or a TID value requested by the MU-BAR. At this time, the wireless communication terminal receiving the trigger frame may determine whether the trigger frame is a trigger frame of MU-BAR type for GCR through the Starting Sequence Control value or the TID value requested by the MU-BAR.

Also, even if the wireless communication terminal receiving the trigger frame corresponds to the address indicated by the GCR Address field, when the STA Identifier field in the Per User Info field does not indicate the wireless communication terminal receiving the trigger frame, the wireless communication terminal receiving the trigger frame may determine that the transmission is not triggered by the GCR BlockACK.

The format of the Trigger Dependent Common Info field of the specific MU-BAR type trigger frame may be the same as the embodiment of FIG. 38.

FIG. 39 shows a format of an MU-BAR type trigger frame for GCR according to an embodiment of the present invention.

The wireless communication terminal may set the RA field of the MU-BAR type trigger frame for GCR to the GCR address. Specifically, the wireless communication terminal may set the RA field of the trigger frame to the GCR address and indicate that the type of the trigger frame is the MU-BAR type for GCR. Therefore, the wireless communication terminal may omit the GCR Address field in the Common Info field. In another specific embodiment, the wireless communication terminal may not set a value in

the GCR Address field in the Common Info field. Also, when the wireless communication terminal sets the RA field of the MU-BAR type trigger frame for GCR to the GCR address, the wireless communication terminal may insert only the information related to the wireless communication terminal corresponding to the GCR address in the Per User Info field of the trigger frame. The specific trigger frame format may be the same as the embodiment of FIG. 39.

FIG. 40 shows a format of an MU-BAR type trigger frame for GCR according to an embodiment of the present invention.

The wireless communication terminal may set the RA field of the MU-BAR type trigger frame for GCR to the broadcast address. At this time, the wireless communication terminal may set the GCR Address field to the GCR address in the Common Info field. In addition, when the wireless communication terminal sets the RA field of the MU-BAR type trigger frame for GCR to the broadcast address, the wireless communication terminal may request an ACK frame other than GCR BlockACK with the GCR BlockACK via the corresponding trigger frame. Therefore, when the wireless communication terminal sets the RA field of the MU-BAR type trigger frame for GCR to the broadcast address,

the wireless communication terminal may insert information on the wireless communication terminal corresponding to the GCR address and information on the wireless communication terminal not corresponding to the GCR address in the Per User Info field of the trigger frame. The specific trigger frame format may be the same as the embodiment of FIG. 40.

FIG. 41 shows the format of the BAR Control field and the encoding value of the BlockACKReq variant according to an embodiment of the present invention.

As described above, when the trigger frame is the MU-BAR type, the Trigger Dependent Per User Info field of the trigger frame may include a BAR Control field. At this time, a plurality of bits included in the Trigger Dependent Per User Info field may indicate a Variant of BlockACKReq. Specifically, the Multi-TID subfield, the Compressed Bitmap subfield, and the GCR subfield included in the Trigger Dependent Per User Info

field may indicate Variants of BlockACKReq. For example, the type of the trigger frame may be GCR BlockACKReq, when the value of the Multi-TID subfield is 0, the value of the Compressed Bitmap subfield is 1, and the value of the GCR subfield is 1.

As described above, when a trigger frame of MU-BAR type requests GCR BlockAck, the trigger frame of MU-BAR type may request a GCR BlockAck frame and another ACK frame together. Specifically, the wireless communication terminal may request an ACK for a plurality of TIDs from the wireless communication terminal receiving the trigger frame through the MU-BAR type trigger frame. In a specific embodiment, the wireless communication terminal may request an ACK for a plurality of TIDs including a GCR BlockACK frame from a wireless communication terminal receiving a trigger frame through a trigger frame of an MU-BAR type. For example, the wireless communication terminal may set the Multi-TID Saab field to 1, set the GCR subfield to 1, request a GCR BlockAck, and request an ACK of another TID together. At this time, the value of the Compressed Bitmap subfield may be 0 or 1. In a specific embodiment, the format of the BAR Control field may be the same as in FIG. 41(a). Also, the encoding value of the BlockACKReq variant may be as shown in FIG. 41(b).

When the trigger frame requests a GCR BlockAck frame and another ACK frame together, the wireless communication terminal may transmit a Multi-TID BlockACK frame in response to the trigger frame. Also, when the trigger frame requests a GCR BlockAck frame and another ACK frame together, the wireless communication terminal may transmit BlockACK frames for a plurality of TIDs together with other MPDUs. Specifically, the wireless communication terminal may transmit a BlockACK frame for a plurality of TIDs and another MPDU through the A-MDPU. At this time, the BlockACK frame may be a Compressed BlockACK frame.

FIG. 42 shows the format of the BAR Information field according to an embodiment of the present invention.

As described above, when the type of the trigger frame is the MU-BAR type, the Trigger Dependent User Info field may include a BAR Information field. At this time, the BAR information field includes a Block ACK Starting Sequence Control field and may not

include a GCR Address field. In particular, even when the type of the trigger frame is the MU-BAR type for GCR, the BAR Information field includes the Block ACK Starting Sequence Control field and may not include the GCR Address field. Also, when the type of the trigger frame is the MU-BAR type, the Common Info field may include a GCR Address field. Specifically, when the type of the trigger frame is the MU-BAR type, the Trigger Dependent Common Info field may include a GCR Address field. This is because the GCR Address field is information commonly applied to a plurality of wireless communication terminals through which GCR BlockACK transmission is triggered via the MU-BAR. Specifically, the format of the BAR Information field may be the same as the embodiment of FIG. 42.

FIG. 43 shows a BAR Information field according to another embodiment of the present invention.

When the type of the trigger frame is the MU-BAR type and the wireless communication terminal requests an ACK for a plurality of TIDs, the wireless communication terminal may generate and transmit a BAR Information field classified by TID. Specifically, when the type of the trigger frame is the MU-BAR type for GCR and the wireless communication terminal requests an ACK for a plurality of TIDs, the wireless communication terminal may generate and transmit a BAR information field for each TID. At this time, the BAR information field may include a Per TID Info field and a Block ACK Starting Sequence field by TID. At this time, the Per TID Info field may include a TID subfield indicating the TID. For example, the concrete format of the BAR Information field may be the same as the embodiment of FIG. 43. The length of the BAR Information field may vary depending on the number of TIDs requesting an ACK. Specifically, the length of the Trigger Dependent Per User Info field may vary depending on the number of TIDs requesting ACK. Therefore, the length of the Per User Info field may vary depending on the number of TIDs requesting ACK. The wireless communication terminal transmitting the trigger frame may signal the number of TIDs through the TID_INFO field of the BAR Control field of the trigger frame. The wireless communication terminal receiving the trigger frame may determine the length of the Per User Info field based on the TID_INFO

field of the BAR Control field of the trigger frame.

FIG. 44 shows a trigger frame structure according to another embodiment of the present invention.

The trigger frame may have a format as described in FIG. 34. At this time, the format of the Common Info field and the Per User Info field may be the same as any of the embodiments described with reference to FIGS. 35 to 36. In addition, the format of the Trigger Dependent Per User Info field may be the same as the embodiment described with reference to FIG. 37. Also, the format of the Trigger Dependent Common Info field may be the same as the embodiment described with reference to FIG. 37 and FIG. 38. In addition, the format of the BAR Information field may be the same as the embodiment described with reference to FIG. 43.

FIG. 45 shows the operation of a wireless communication terminal according to an embodiment of the present invention.

The wireless communication terminal receives the PPDU (S4501).

The wireless communication terminal identifies whether the PPDU is an Inter-BSS PPDU or an Intra-BSS PPDU (S4503). In addition, when the PPDU received by the wireless communication terminal is not identified as Inter-BSS PPDU or Intra-BSS PPDU, this may be a case where the received PPDU lacks information for determining a BSS from which the received PPDU is transmitted. As described above, the wireless communication terminal may identify whether the received PPDU is an Inter-BSS PPDU or an Intra-BSS PPDU based on the MAC header of the MAC frame included in the PPDU. When a wireless communication terminal, which is an AP, receives a trigger-based PPDU from a wireless communication terminal that is not triggered by the wireless communication terminal, which is an AP, the wireless communication terminal, which is an AP, may identify the corresponding PPDU as an Inter-BSS PPDU. In a specific embodiment, when the wireless communication terminal, which is an AP, does not transmit the trigger frame but receives the trigger-based PPDU, the wireless communication terminal, which is an AP, may identify the PPDU as an Inter-BSS PPDU. Also, based on whether the received PPDU

includes a trigger frame, the wireless communication terminal, which is an AP, may determine whether the corresponding PPDU is a PPDU for downlink transmission. Specifically, the wireless communication terminal, which is an AP, may identify whether the corresponding PPDU is an Inter-BSS PPDU based on the SR-related information. At this time, the SR-related information may be an SR field signaled by the PPDU described above. The wireless communication terminal may identify whether the PPDU received through at least one of the above conditions is an Inter-BSS PPDU or an Intra-BSS PPDU.

Also, when the PPDU received by the wireless communication terminal satisfies both the Inter-BSS PPDU condition and the Intra-BSS PPDU condition, the wireless communication terminal may identify whether the corresponding PPDU is an Inter-BSS PPDU or an Intra-BSS PPDU based on conditions other than BSS color. As described above, this is because the BSS color value may have a BSS color collision due to the limitation of the value. In a specific embodiment, the wireless communication terminal may identify whether the received PPDU is an Inter-BSS PPDU or an Intra-BSS PPDU according to the embodiments described with reference to FIGS. 6 to 23. Specifically, when the PPDU received by the wireless communication terminal satisfies both the Inter-BSS PPDU condition and the Intra-BSS PPDU condition, the wireless communication terminal may identify the corresponding PPDU as an Inter-BSS PPDU.

The wireless communication terminal may perform an operation related to channel access according to whether the received PPDU is an Inter-BSS PPDU or an Intra-BSS PPDU. In addition, the wireless communication terminal may enter a power save mode depending on whether the received PPDU is an Inter-BSS PPDU or an Intra-BSS PPDU (S4505). At this time, the operation related to the channel access may include at least one of the operation for setting the CCA threshold value and the operation for setting/resetting the NAV.

In addition, when the PPDU received by the wireless communication terminal may not identify the Inter-BSS PPDU or the Intra-BSS PPDU, the following operation may be performed. When the PPDU received by the wireless communication terminal is not identified as Inter-BSS PPDU or Intra-BSS PPDU, the wireless communication terminal may regard the PPDU as an Inter-BSS PPDU. Specifically, when the PPDU received by

the wireless communication terminal is not identified as Inter-BSS PPDU or Intra-BSS PPDU, the wireless communication terminal may set Basic NAV based on the received PPDU. For example, when the PPDU received by the wireless communication terminal may not be identified as Inter-BSS PPDU or Intra-BSS PPDU, the wireless communication terminal may set the Basic NAV based on the TXOP Duration field indicated by the HE-SIG-A field of the corresponding PPDU.

When the PPDU received by the wireless communication terminal may not be identified as Inter-BSS PPDU or Intra-BSS PPDU, the wireless communication terminal may not enter the power save mode based on the BSS color signaled by the PPDU.

The wireless communication terminal may reset the currently set NAV when the BSS from which the PPDU setting the currently set NAV is transmitted and the BSS from which the CF-End frame is transmitted are the same. Additionally, the wireless communication terminal may not reset the NAV when the BSS from which the PPDU setting the currently set NAV is transmitted and the BSS from which the CF-End frame is transmitted are different.

Also, when the NAV is set by the PPDU that is not able to identify whether the PPDU is the Intra-BSS PPDU or the Inter-BSS PPDU based on the BSS color value indicated by the signaling field of the PPDU, the wireless communication terminal may not reset the NAV based on the CF-End frame transmitted from the Intra-BSS or the CF-End frame transmitted from the BSS corresponding to the multiple-BSSID set including the BSSID corresponding to the BSS of the wireless communication terminal.

A case where the PPDU received by the wireless communication terminal may not be identified as Inter-BSS PPDU or Intra-BSS PPDU may be a case where it may be impossible to identify whether the PPDU received by the wireless communication terminal based on the BSS color is an Inter-BSS PPDU or an Intra-BSS PPDU, due to the BSS color collision. If the wireless communication terminal is not able to identify whether the PPDU received based on the BSS color is the Inter-BSS PPDU or the Intra-BSS PPDU, the wireless communication terminal may not operate on the basis of the BSS color that the received PPDU signals. Specifically, if the wireless communication terminal is not able to

identify whether the PPDU received based on the BSS color is the Inter-BSS PPDU or the Intra-BSS PPDU, the wireless communication terminal may not set the Intra-BSS NAV based on the BSS color and the TXOP Duration field that the HE-SIG-A field of the received PPDU signals. Specifically, when the wireless communication terminal recognizes the BSS color collision, the wireless communication terminal may not set the intra-BSS NAV based on the TXOP Duration field indicated by the HE-SIG-A field. When the wireless communication terminal receives the signaling information indicating that the operation based on the BSS color is not allowed, the wireless communication terminal may not set the Intra-BSS NAV based on the BSS color and the TXOP Duration field of the HE-SIG-A field of the PPDU.

In addition, when the wireless communication terminal is not be able to identify whether the PPDU received is the Inter-BSS PPDU or the Intra-BSS PPDU based on the BSS color, the wireless communication terminal may set the Basic NAV based on the BSS color and the TXOP Duration field that the HE-SIG-A field of the received PPDU signals. Specifically, when the wireless communication terminal recognizes the BSS color collision, the wireless communication terminal may set the Basic NAV based on the TXOP Duration field indicated by the HE-SIG-A field. When the wireless communication terminal receives the signaling information indicating that the operation based on the BSS color is not allowed, the wireless communication terminal may set the Basic NAV based on the BSS color and the TXOP Duration field of the HE-SIG-A field of the PPDU.

Specifically, if the wireless communication terminal is not able to identify whether the PPDU received based on the BSS color is the Inter-BSS PPDU or the Intra-BSS PPDU, the wireless communication terminal may not enter the power save mode based on the BSS color that the HE-SIG-A field of the received PPDU signals.

In addition, when the PPDU received by the wireless communication terminal may not be identified as Inter-BSS PPDU or Intra-BSS PPDU, this may be a case where the received PPDU lacks information for determining the transmitted BSS. Specifically, when the PPDU received by the wireless communication terminal is not identified as Inter-BSS PPDU or Intra-BSS PPDU, the wireless communication terminal may not decode the MAC header of the MAC frame included in the PPDU. Also, a case where the PPDU received by

the wireless communication terminal is not identified as Inter-BSS PPDU or Intra-BSS PPDU may be a case where it may be impossible to identify whether the received PPDU is an Inter-BSS PPDU or an Intra-BSS PPDU according to various methods described above.

In addition, the wireless communication terminal may transmit the PPDU by including signaling information indicating that the operation based on the BSS color is not allowed in the signaling field of the PPDU. At this time, the wireless communication terminal receiving the PPDU including the corresponding signaling information may not perform the operation based on the BSS color. In a specific embodiment, the wireless communication terminal may transmit the BSS color value indicated by the signaling field of the PPDU by setting it to a predetermined value. At this time, the predetermined value may be a reserved value which is not used in the BSS color when the BSS color is selected by the AP. For example, the predetermined value may be zero. In addition, when the wireless communication terminal receives the PPDU indicating the predetermined value as the BSS color, the wireless communication terminal may not perform the operation based on the BSS color. Specifically, when the wireless communication terminal receives a PPDU indicating a predetermined value in a BSS color, the wireless communication terminal may not perform the SR operation on the corresponding PPDU. In a specific embodiment, when the wireless communication terminal receives a PPDU indicating a predetermined value in a BSS color, the wireless communication terminal may treat the PPDU as an Intra-BSS PPDU. Accordingly, when the wireless communication terminal receives a PPDU indicating a predetermined value in a BSS color, the wireless communication terminal may not discard the corresponding PPDU.

As described above, the wireless communication terminal may transmit the BSS color indicating the BSS including the wireless communication terminal when communicating with another wireless communication terminal. At this time, when the wireless communication terminal does not receive the information signaling the BSS color, the wireless communication terminal may transmit the predetermined value as the BSS color. At this time, the predetermined value may be a reserved value which is not used in the BSS color when the BSS color is selected by the AP. For example, the predetermined value may be zero. Specifically, when the wireless communication terminal does not

receive the information signaling the BSS color, the non-AP wireless communication terminal may transmit a predetermined value as the BSS color when communicating with other wireless communication terminals. In a specific embodiment, if the wireless communication terminal does not receive the information signaling the BSS color, the wireless communication terminal may set the BSS color value that the PPDU transmitted by the wireless communication terminal signals, to a predetermined value. Also, when the wireless communication terminal does not receive information signaling the BSS color, the wireless communication terminal may set the BSS color value that the frame transmitted by the wireless communication terminal signals, to a predetermined value. When the wireless communication terminal does not receive the information that signals the BSS color, there is no BSS color. Specifically, when the wireless communication terminal does not receive the information signaling for the BSS color, the wireless communication terminal may not associate with any AP. Also, a case where the wireless communication terminal does not receive the information signaling the BSS color may include a case where the wireless communication terminal fails to establish a Tunneled Direct Link Setup (TDLS) link, a Direct Link Setup (DLS) link, or an IBSS (Independent) membership. Also, a case where the wireless communication terminal does not receive the information signaling the BSS color may include a case where the wireless communication terminal may not receive information on the changed BSS color value after receiving the information indicating that the operation based on the BSS color value is not allowed. Also, the PPDU signaling the predetermined value as the BSS color may not be identified as the Inter-BSS PPDU or the Intra-BSS PPDU based on the predetermined value of the BSS color.

In a specific embodiment, when the wireless communication terminal does not receive the HE Operation element, the wireless communication terminal may set the BSS color value included in the PPDU transmitted by the wireless communication terminal to a predetermined value. For example, the wireless communication terminal may use a predetermined value as a BSS color value when transmitting a probe request frame. Specifically, when the wireless communication terminal transmits a probe request frame, the wireless communication terminal may set the value of the BSS color field included in

the HE Operation element to a predetermined value. Also, when the wireless communication terminal transmits a probe request frame, the value of the BSS color field of the HE-SIG-A field of the PPDU including the probe request frame may be set to a predetermined value.

At this time, when the wireless communication terminal receives the PPDU indicating the predetermined value as the BSS color, the wireless communication terminal may not perform the operation based on the BSS color. Specifically, when the wireless communication terminal receives a PPDU indicating a predetermined value as a BSS color, the wireless communication terminal may not perform the SR operation on the corresponding PPDU. In a specific embodiment, when the wireless communication terminal receives a PPDU indicating a predetermined value as a BSS color, the wireless communication terminal may treat the PPDU as an Intra-BSS PPDU. Accordingly, when the wireless communication terminal receives a PPDU indicating a predetermined value as a BSS color, the wireless communication terminal may not discard the corresponding PPDU.

When the wireless communication terminal accesses the channel or enters the power save mode, the specific operation of the wireless communication terminal may be the same as the embodiments through the embodiments described with reference to FIG. 6 to FIG. 23.

Although the present invention is described by using wireless LAN communication as an example, it is not limited thereto and may be applied to other communication systems such as cellular communication. Additionally, while the method, device, and system of the present invention are described in relation to specific embodiments thereof, some or all of the components or operations of the present invention may be implemented using a computer system having a general purpose hardware architecture.

The features, structures, and effects described in the above embodiments are included in at least one embodiment of the present invention and are not necessary limited to one embodiment. Furthermore, features, structures, and effects shown in each

embodiment may be combined or modified in other embodiments by those skilled in the art. Therefore, it should be interpreted that contents relating to such combination and modification are included in the range of the present invention.

While the present invention is described mainly based on the above embodiments but is not limited thereto, it will be understood by those skilled in the art that various changes and modifications are made without departing from the spirit and scope of the present invention. For example, each component specifically shown in the embodiments may be modified and implemented. It should be interpreted that differences relating to such modifications and application are included in the scope of the present invention defined in the appended claims.

[Claims]

1. A wireless communication terminal communicating wirelessly, the terminal comprising:

a transceiver; and

a processor,

wherein the processor is configured to transmit a BSS color indicating a BSS including the wireless communication terminal when communicating with another wireless communication terminal by using the transceiver, and

when the wireless communication terminal fails to receive information signaling the BSS color, the processor is configured to transmit a predetermined value as the BSS color.

2. The wireless communication terminal of claim 1, wherein when the wireless communication terminal fails to make any association with a wireless communication terminal, which is an AP, the processor is configured to transmit a predetermined value as the BSS color.

3. The wireless communication terminal of claim 1, wherein when receiving signaling information indicating that an operation based on the BSS color is not allowed, the processor is configured to transmit a predetermined value as the BSS color.

4. The wireless communication terminal of claim 1, wherein the predetermined value is 0.

5. The wireless communication terminal of claim 1, wherein a PLCP Protocol Data Unit (PPDU) signaling the predetermined value as the BSS color is not identified as an Inter-BSS PPDU or an Intra-BSS PPDU based on the BSS color, which is the predetermined value,

wherein the Intra-BSS PPDU indicates a PPDU transmitted from the same BSS as the BSS including the wireless communication terminal, and

wherein the Inter-BSS PPDU indicates a PPDU transmitted from a BSS other than the BSS including the wireless communication terminal.

6. A wireless communication terminal communicating wirelessly, the wireless communication terminal comprising:

a transceiver; and

a processor,

wherein the processor is configured to receive a PLCP Protocol Data Unit (PPDU) through the transceiver and access a channel based on whether the PPDU is an Inter-BSS PPDU or an Intra-BSS PPDU,

the Intra-BSS PPDU indicates a PPDU transmitted from the same BSS as the BSS including the wireless communication terminal, and

the Inter-BSS PPDU indicates a PPDU transmitted from a BSS other than the BSS including the wireless communication terminal.

7. The wireless communication terminal of claim 6, wherein if the PPDU satisfies both an Inter-BSS PPDU condition and an Intra-BSS PPDU condition, the PPDU is identified as an Inter-BSS PPDU.

8. The wireless communication terminal of claim 6, wherein when the PPDU is not identified as the Inter-BSS PPDU or the Intra-BSS PPDU, the processor is configured to set a Basic NAV instead of an Intra-BSS Network Allocation Vector (NAV) based on the PPDU,

the Intra-BSS NAV is set based on the PPDU transmitted from the same BSS as the wireless communication terminal, and

the Basic NAV is set based on the PPDU transmitted from the BSS other than that of the wireless communication terminal

9. The wireless communication terminal of claim 6, wherein when the wireless communication terminal is not able to identify whether the PPDU is the Intra-BSS PPDU or the Inter-BSS PPDU based on the BSS color, the processor is configured not to set an Intra-BSS Network Allocation Vector (NAV) based on the BSS color and a TXOP Duration field of an HE-SIG-A field of the PPDU,

wherein the Intra-BSS NAV is set based on the PPDU transmitted from the same BSS as that of the wireless communication terminal.

10. The wireless communication terminal of claim 9, wherein when receiving signaling information indicating that an operation based on the BSS color is not allowed, the processor is configured not to set the Intra-BSS NAV based on the BSS color and the TXOP Duration field of the HE-SIG-A field of the PPDU.

11. The wireless communication terminal of claim 10, wherein when the wireless

communication terminal recognize that the BSS color of the BSS including the wireless communication terminal is the same as the BSS color of another BSS, an Intra-BSS NAV is not set based on the BSS color and the TXOP Duration field of the HE-SIG-A field of the PPDU.

12. The wireless communication terminal of claim 6, wherein when the wireless communication terminal is not able to identify whether the PPDU is the Intra-BSS PPDU or the Inter-BSS PPDU based on the BSS color, the processor is configured not to enter a power save mode based on the BSS color and the PPDU.

13. The wireless communication terminal of claim 6, wherein when the wireless communication terminal is an AP and the PPDU is a trigger-based PPDU transmitted from a wireless communication terminal that is not triggered by the wireless communication terminal, the processor is configured to determine that the PPDU is an Inter-BSS PPDU.

14. The wireless communication terminal of claim 6, wherein when the wireless communication terminal is an AP and the PPDU is a PPDU including a trigger frame, the processor is configured to determine that the PPDU is an Inter-BSS PPDU.

15. The wireless communication terminal of claim 14, wherein the processor is configured to determine whether the PPDU includes the trigger frame based on information related to a Spatial Reuse (SR) operation included in the PPDU.

16. The wireless communication terminal of claim 15, wherein based on that

information related to the SR operation included in the PPDU indicates whether the SR operation is restrictively allowed or the SR operation is delayed while the PPDU is being transmitted, the processor is configured to determine whether the PPDU comprises the trigger frame.

17. A wireless communication terminal communicating wirelessly, the wireless communication terminal comprising:

a transceiver; and

a processor,

wherein the processor is configured to receive a PLCP Processing Data Unit (PPDU) through the transceiver, and not to perform an operation based on the BSS color when the BSS color indicated by the PPDU is a predetermined value.

18. The wireless communication terminal of claim 17, wherein when the BSS color indicated by the PPDU is a predetermined value, the processor is configured not to perform the SR operation for the PPDU.

19. The wireless communication terminal of claim 18, wherein when the BSS color indicated by the PPDU is a predetermined value, the processor is configured to regard the PPDU as an Intra-BSS PPDU.

20. The wireless communication terminal of claim 17, wherein the predetermined value is a reserved value that is not used in the BSS color when an AP selects the BSS color.

[ABSTRACT]

Provided is a wireless communication terminal that communicates wirelessly. The terminal includes: a transceiver; and a processor. The processor is configured to receive a frame through the transceiver, determine whether the frame is classified into an Intra-Basic Service Set (BSS) frame or an Inter-BSS frame according to a BSS from which the frame is transmitted, and access a channel according to whether the frame is an Intra-BSS frame or an Inter-BSS frame.

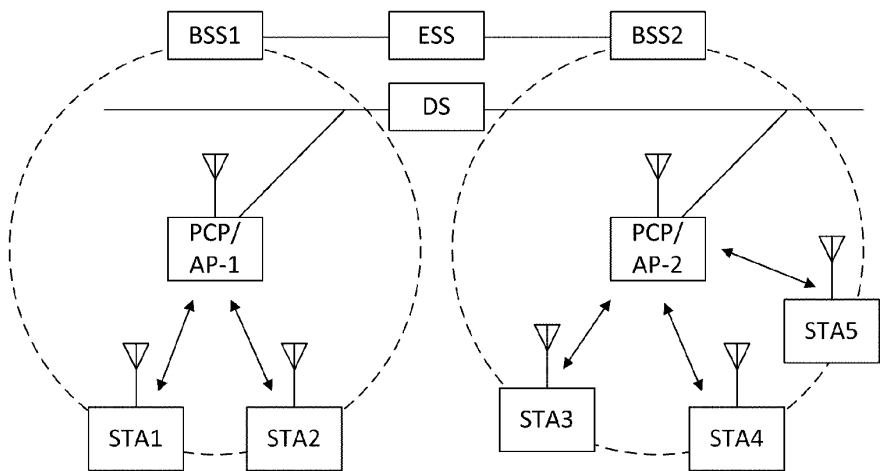


FIG. 1

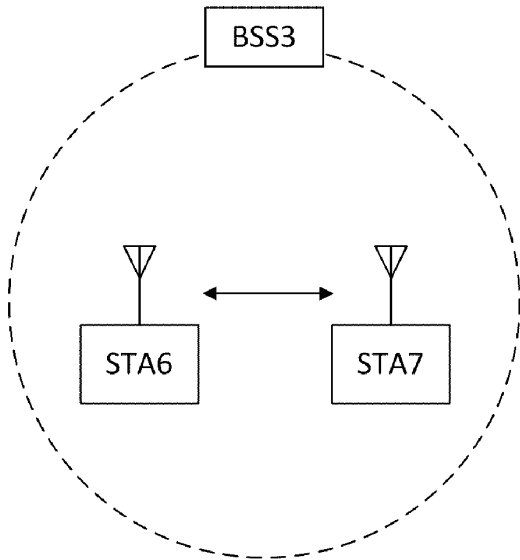


FIG. 2

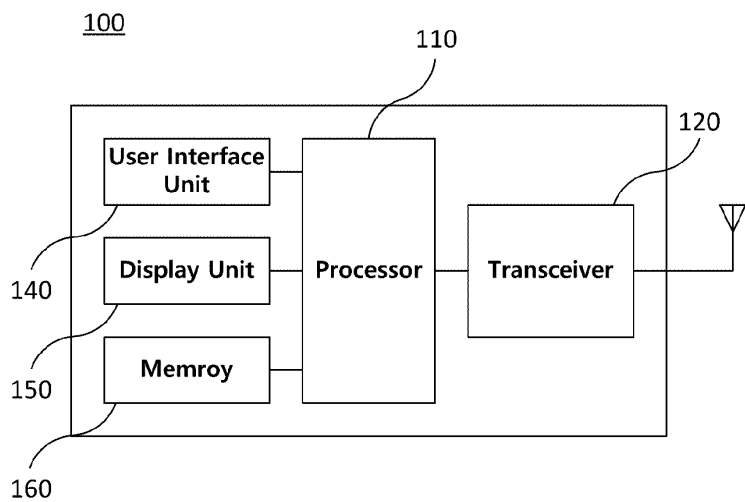


FIG. 3

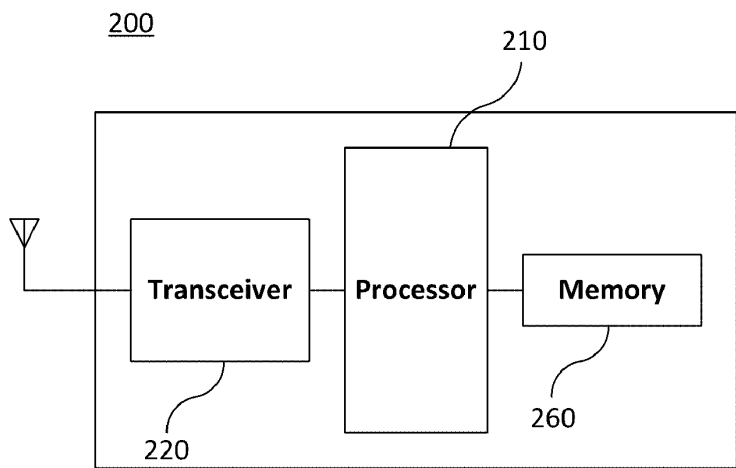


FIG. 4

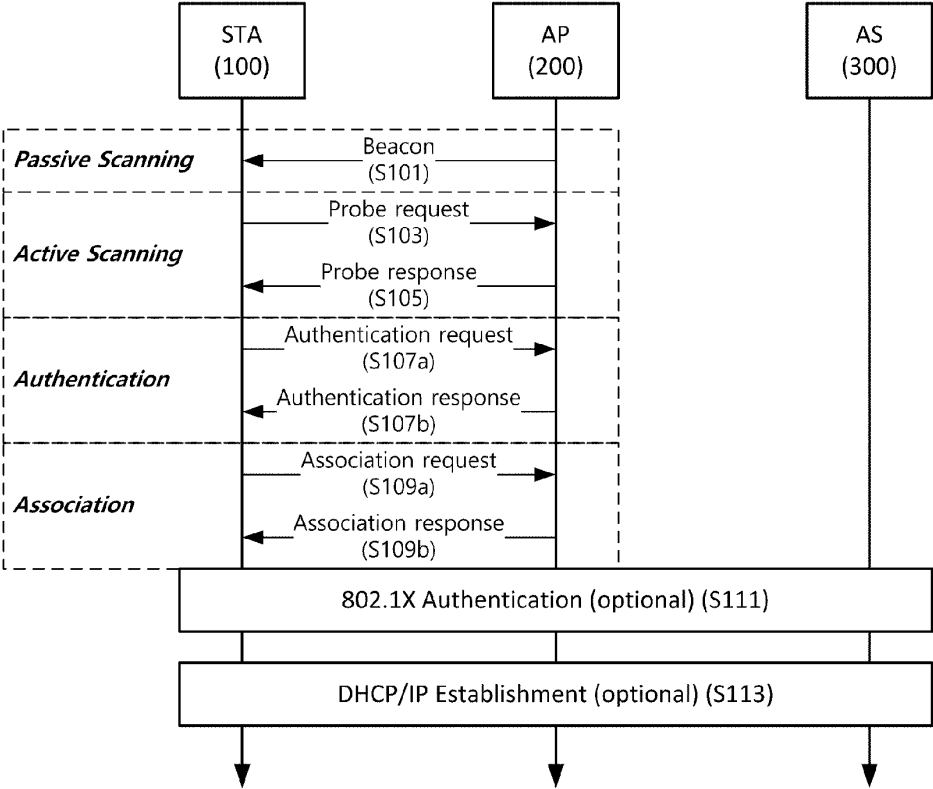
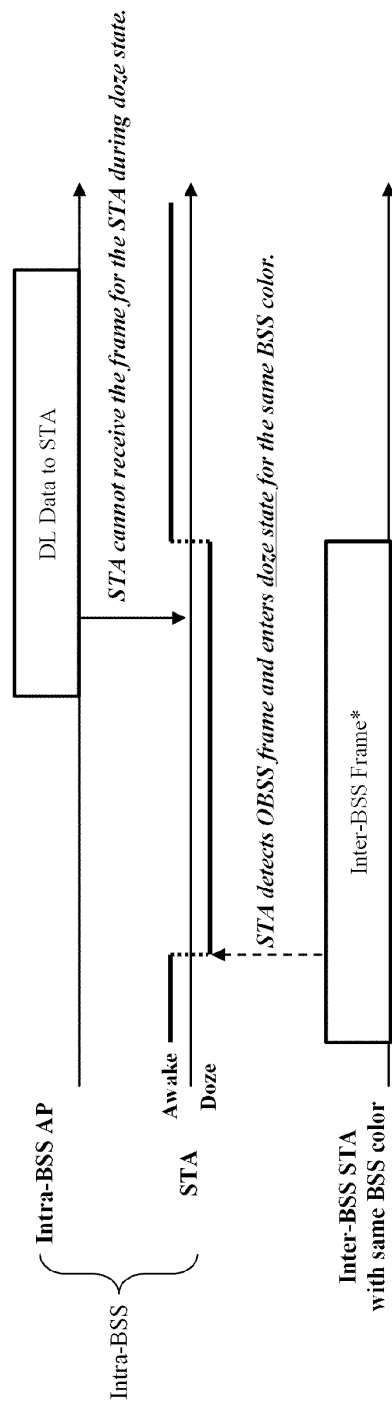


FIG. 5

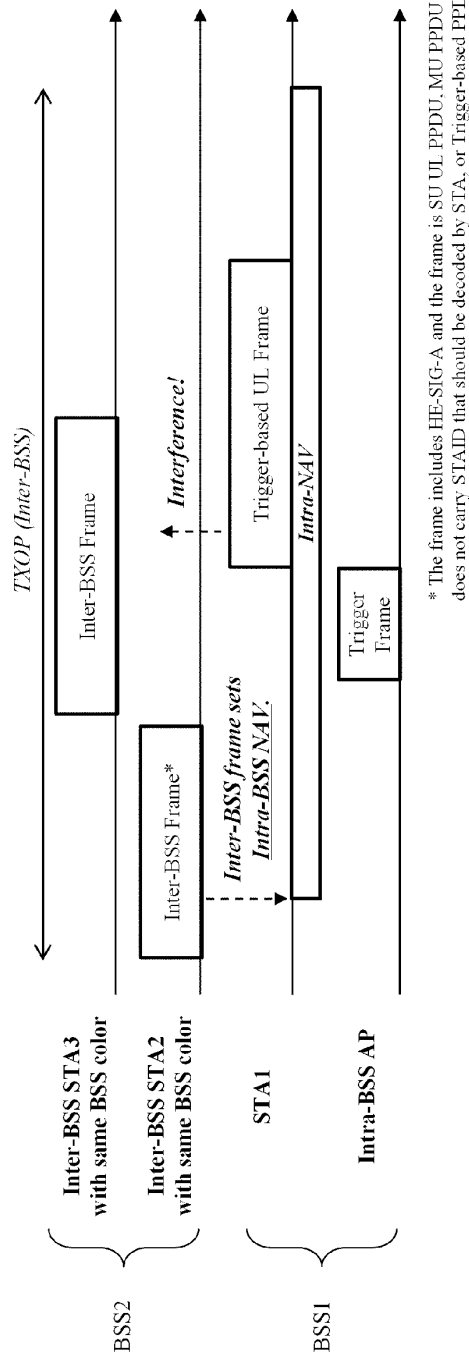


FIG. 6



* The frame includes HE-SIG-A and the frame is SU UL PPDU, MU PPDU which does not carry STAID that should be decoded by STA, or Trigger-based PPDU.

FIG. 7



* The frame includes HE-SIG-A and the frame is SU UL PPDU, MU PPDU which does not carry STAID that should be decoded by STA, or Trigger-based PPDU.

FIG. 8

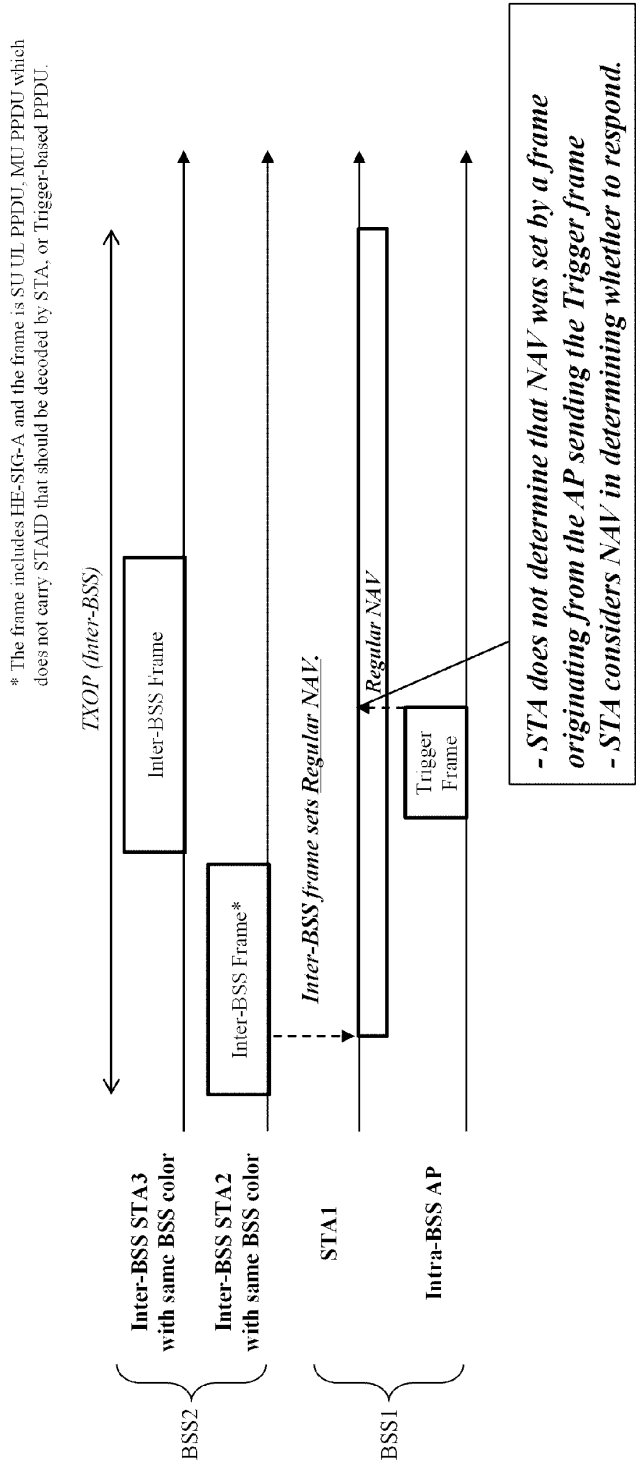
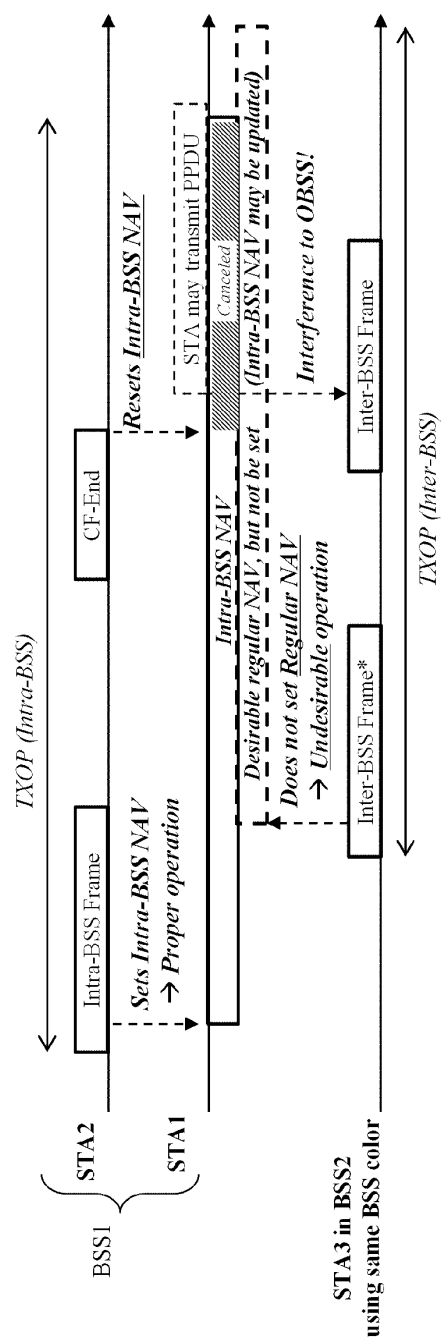


FIG. 9



* The frame includes HE-SIG-A and the frame is SU UL PPDU, MU PPDU which does not carry STAID that should be decoded by STA, or Trigger-based PPDU.

FIG. 10

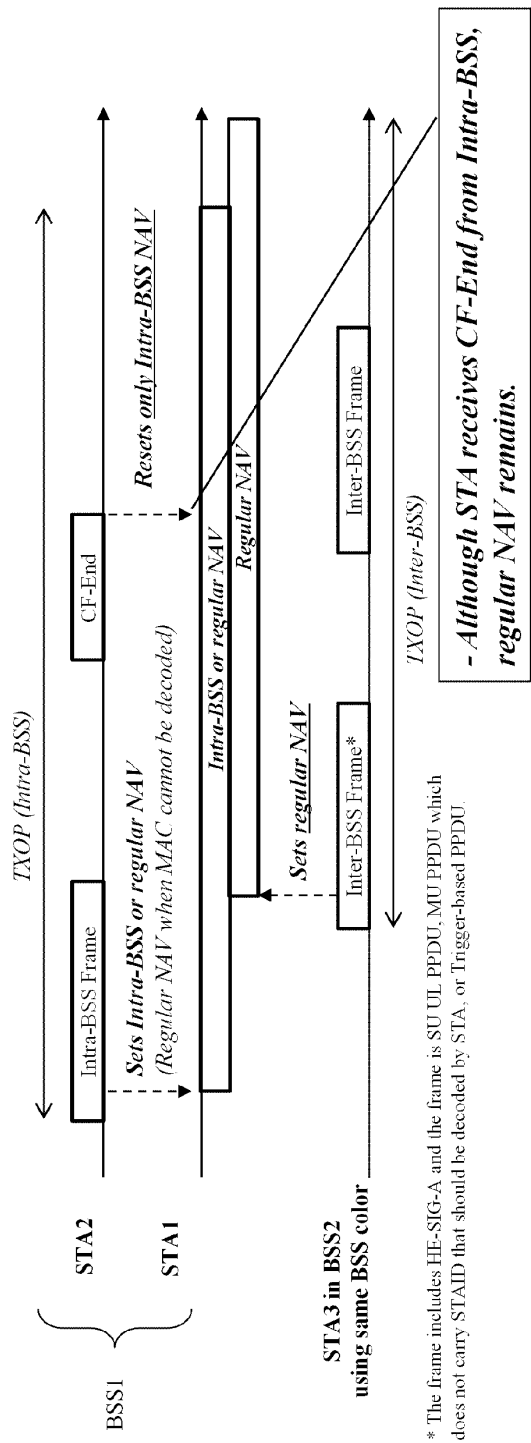


FIG. 11

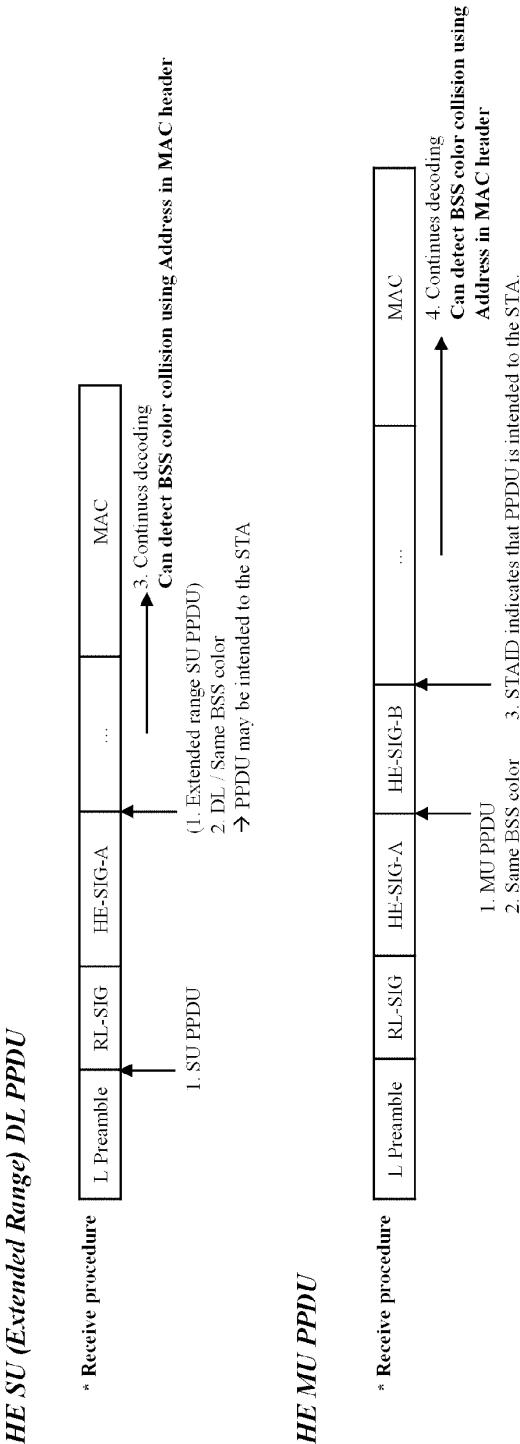


FIG. 12

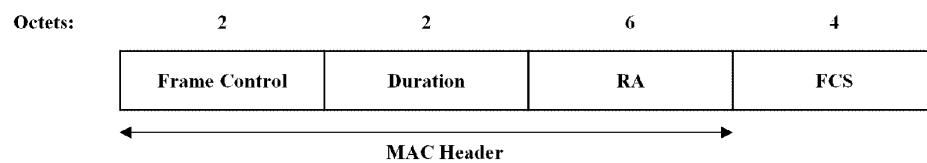


FIG. 13

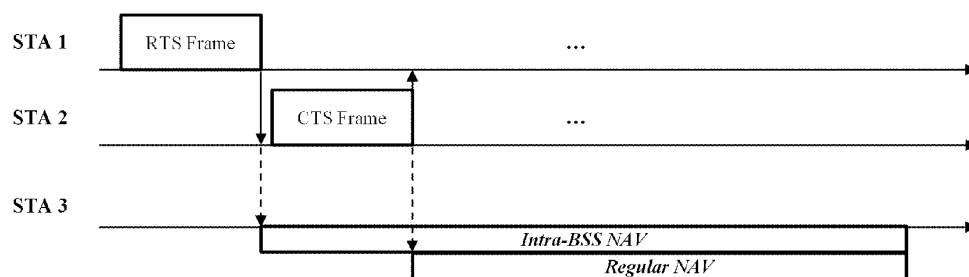


FIG. 14

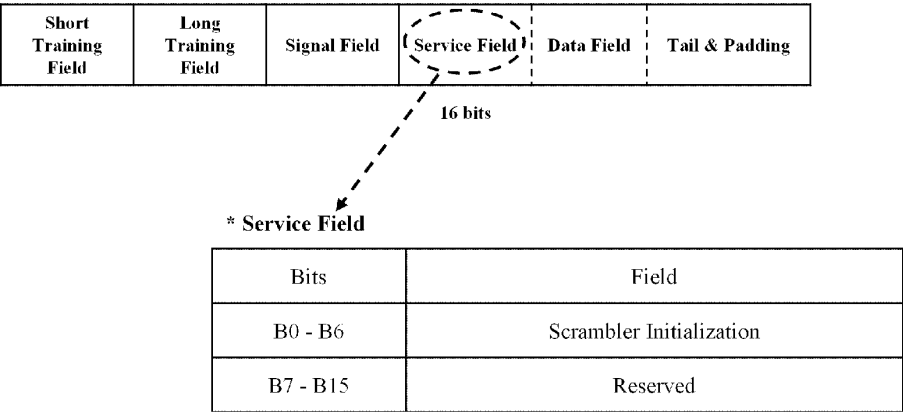


FIG. 15

Bits	Field
B0 - B6	Scrambler Initialization
B7 - B12	BSS Color
B13 - B15	Reserved

FIG. 16

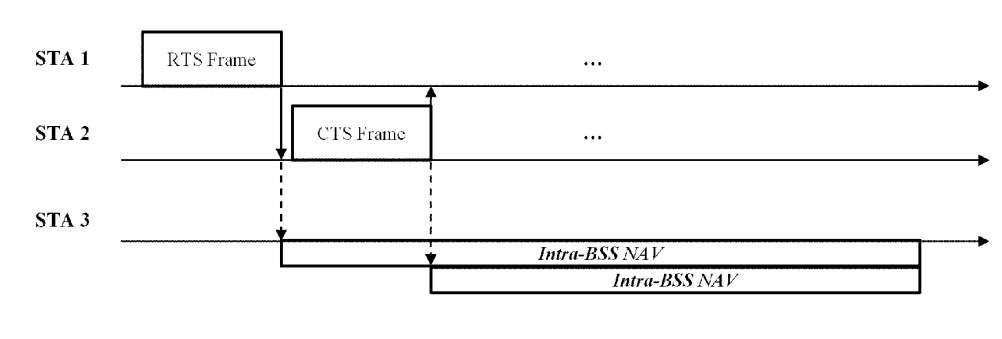


FIG. 17

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	$(\text{dec}(\text{AID}[0:8]) + \text{dec}(\text{BSSID}[44:47] \text{ XOR } \text{BSSID}[40:43]) * 2^5) \bmod 2^9$ where XOR is a bitwise exclusive OR operation mod X indicates the X-modulo operation $\text{dec}(A[b:e])$ is the cast to decimal operator where b is scaled by 2^0 and e by $2^{(e-b)}$
Otherwise	63	0

FIG. 18

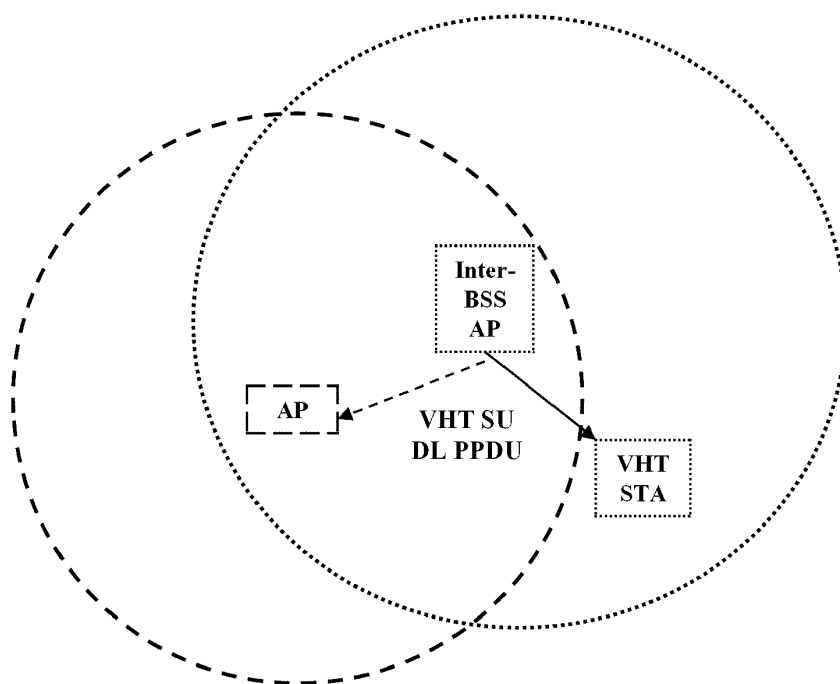


FIG. 19

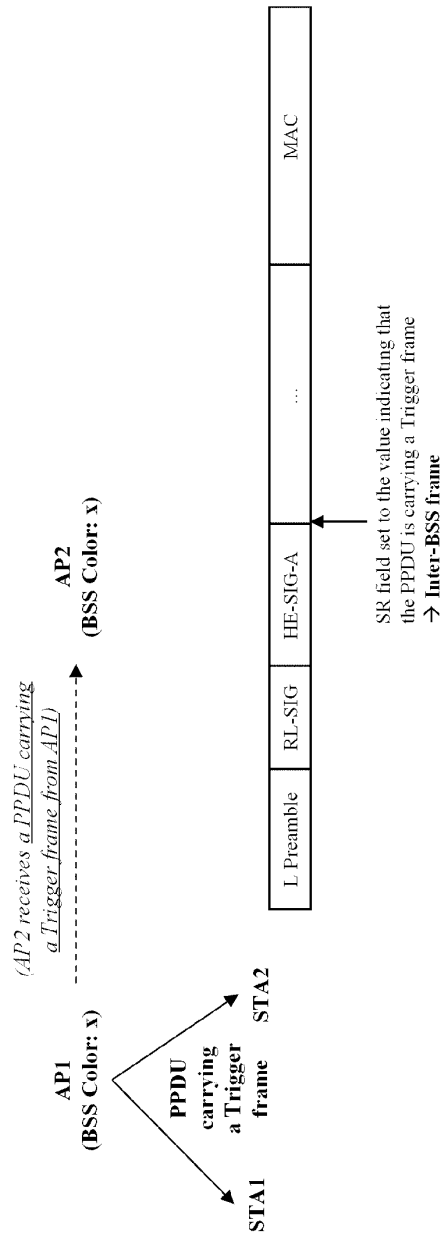


FIG. 20

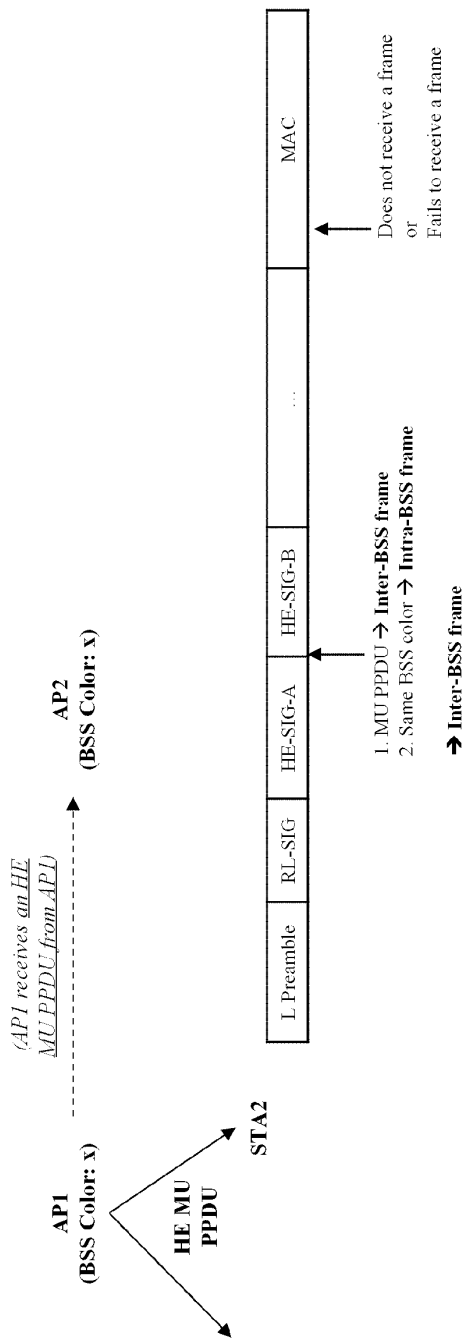


FIG. 21

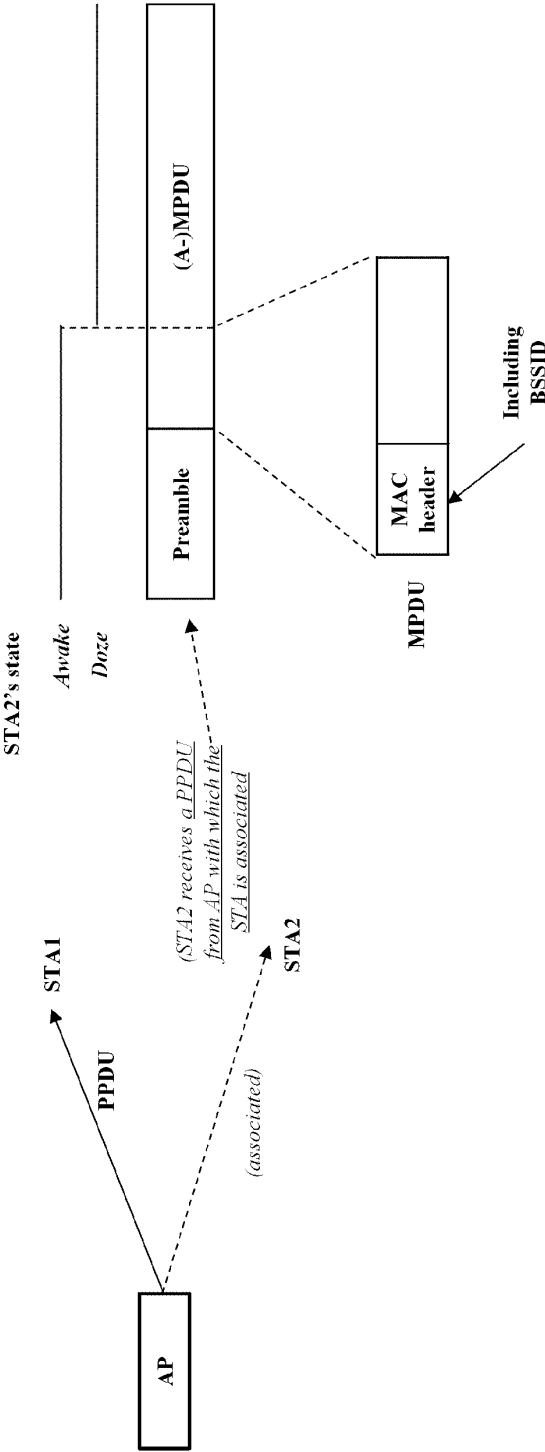


FIG. 22

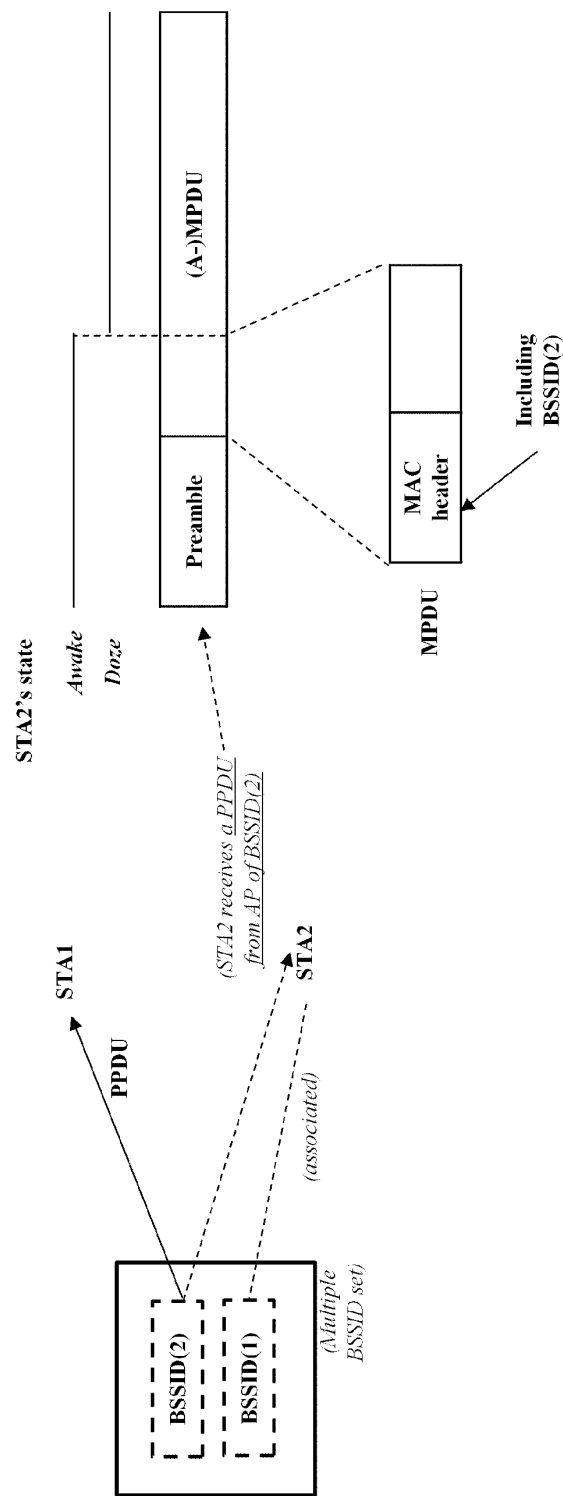


FIG. 23

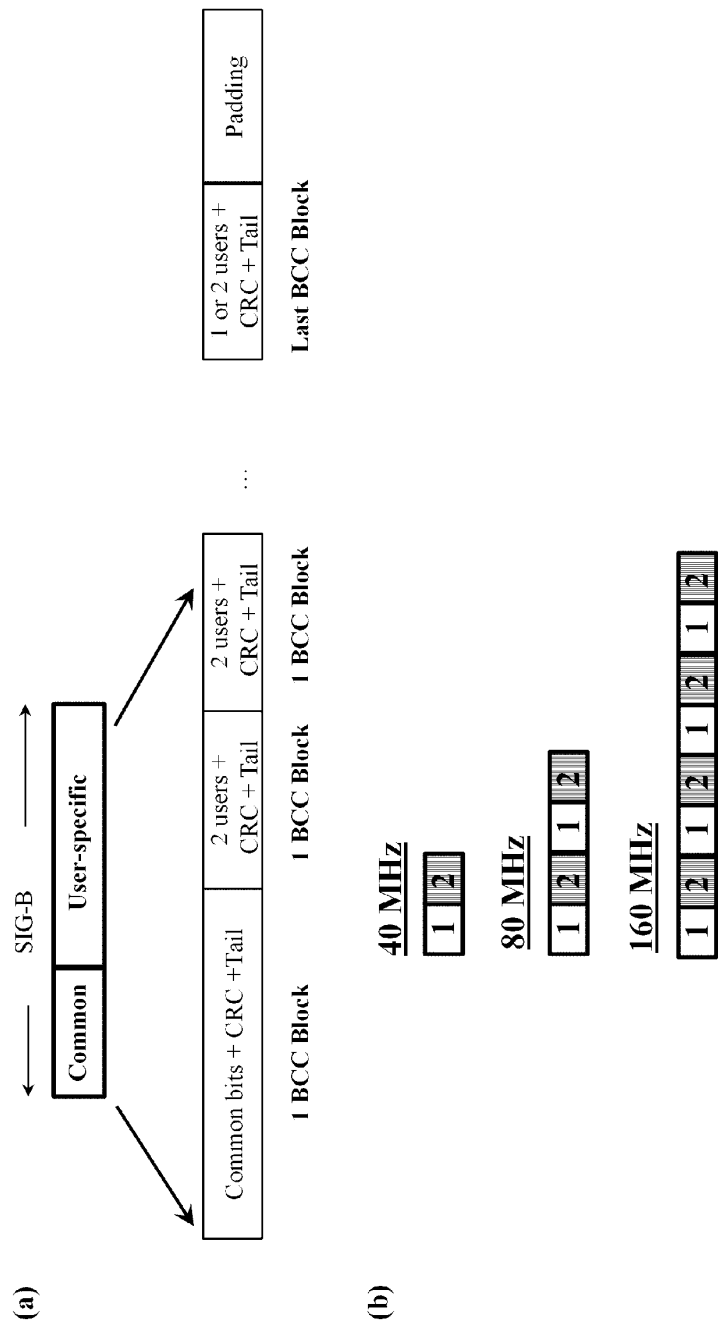


FIG. 24

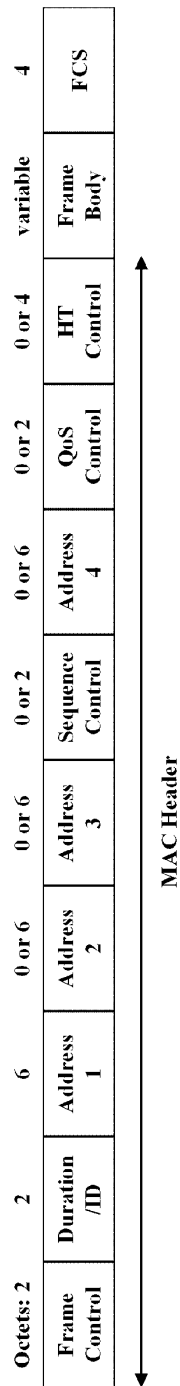
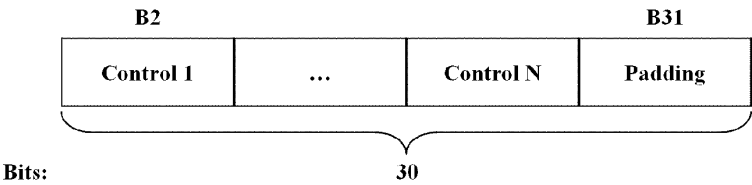


FIG. 25

Variant	B0 (value)	B1 (value)	B2 - B29	B30	B31
HT variant	VHT (0)	HT Control Middle		AC Constraint	RDG/More PPDU
VHT variant	VHT (1)			AC Constraint	RDG/More PPDU
HE variant	VHT (1)	HE (1)	Aggregated Control		

FIG. 26

(a) Aggregated Control



(b) Control

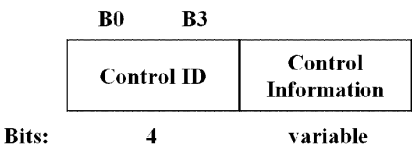


FIG. 27

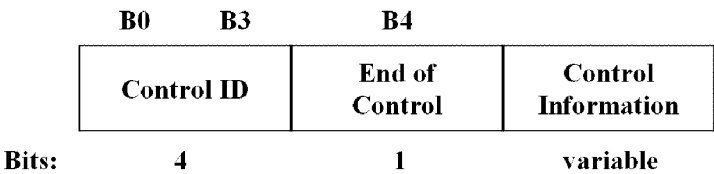


FIG. 28

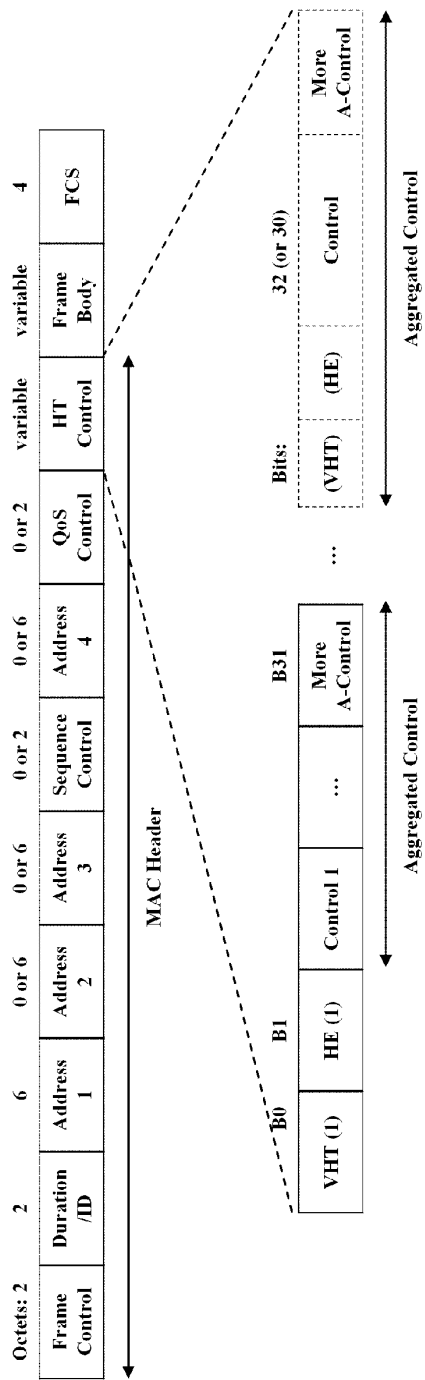


FIG. 29

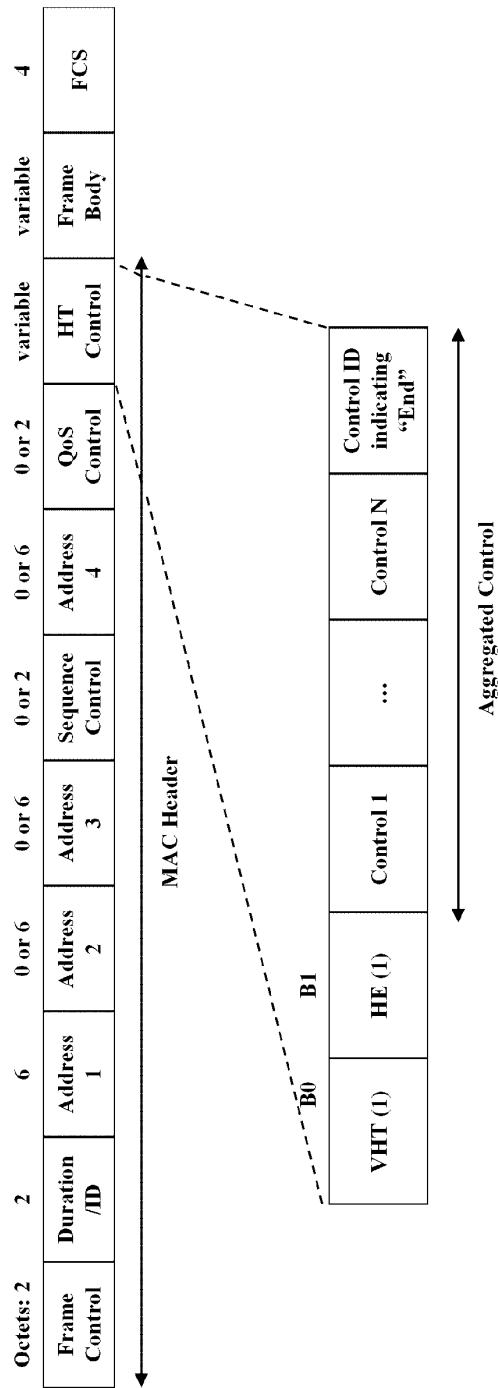


FIG. 30

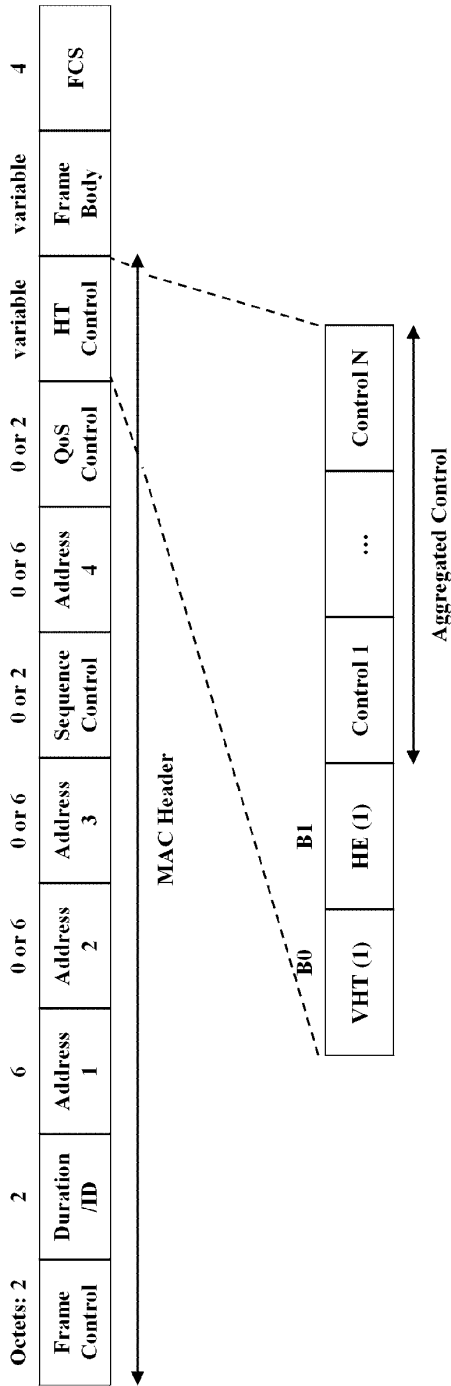


FIG. 31

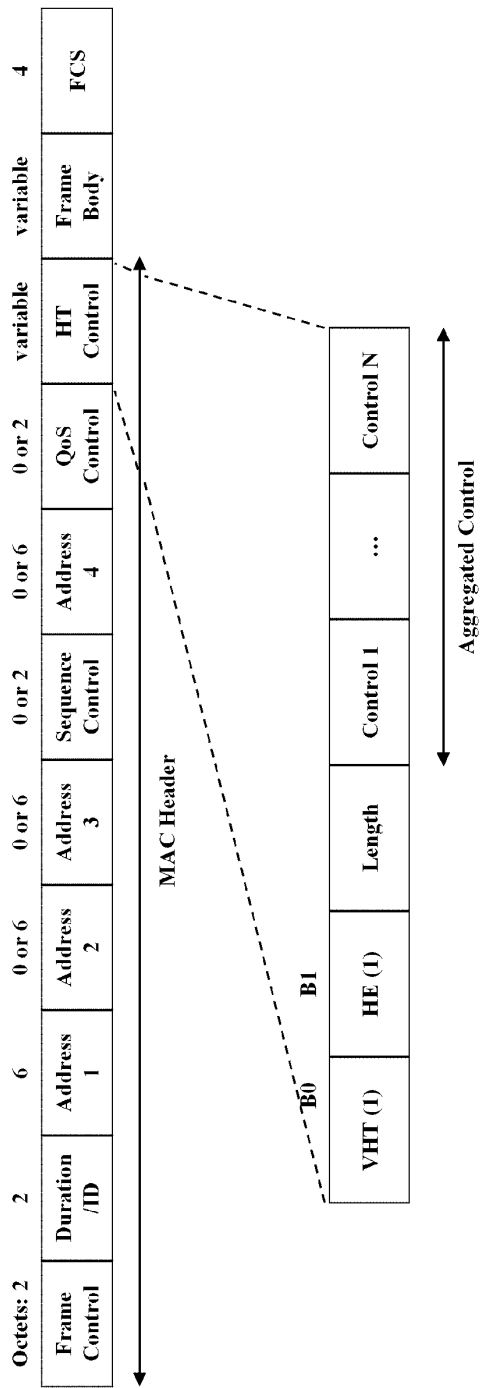


FIG. 32

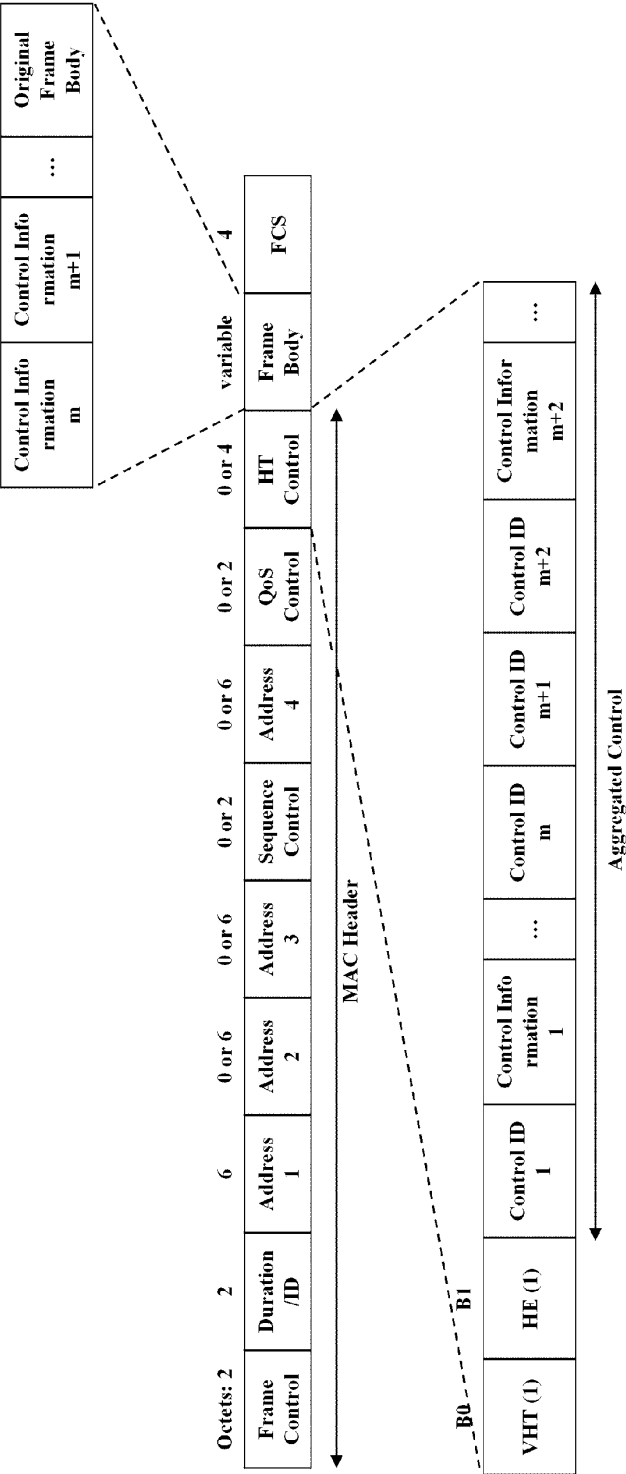


FIG. 33

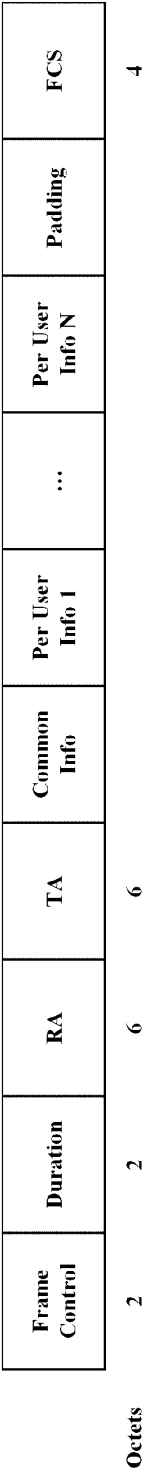
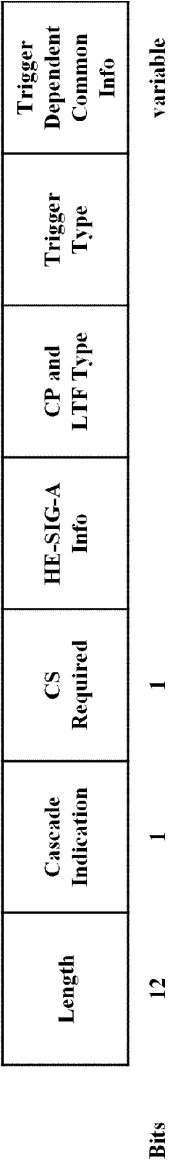


FIG. 34

(a) Common Info field



(b) Per User Info field

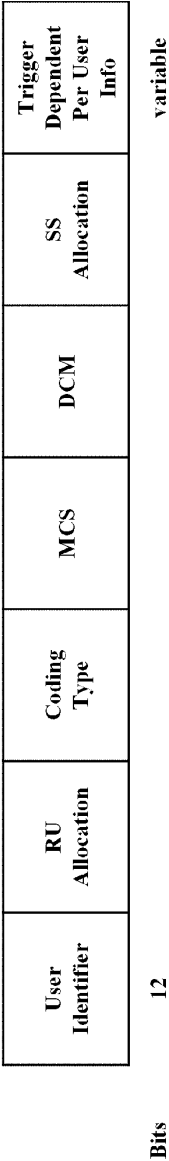


FIG. 35

(a) Common Info field

Length	Cascade Indication	CS Required	Spatial Reuse	BW	CP and LTF Type	MU-MIMO LTF Mode	Number of LTFs	STBC	LDPC Extra Symbol	AP TX Power	Packet Extension	Trigger Type	Trigger Dependent Common Info
12	1	1	≥ 2			1	3	1	1		≥ 3	4	variable

Bits

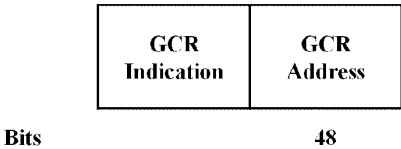
(b) Per User Info field

User Identifier	RU Allocation	Coding Type	MCS	DCM	SS Allocation	Target RSSI	Trigger Dependent Per User Info
12	8	1	4	1			variable

Bits

FIG. 36

(a) Trigger Dependent Common Info field



(b) Trigger Dependent Per User Info field

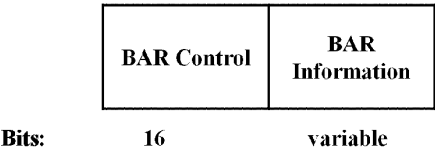


FIG. 37

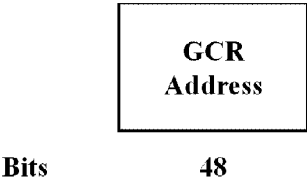


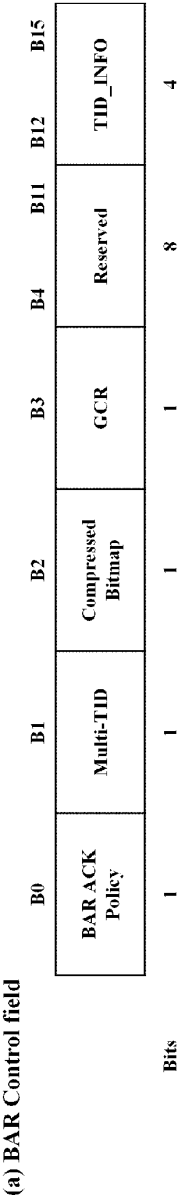
FIG. 38

Frame Control	2	Duration	2	RA (GCR Address)	6	TA	6	Common Info	6	Per User Info 1 (GCR Group)	6	...	6	Per User Info N (GCR Group)	6	Padding	4	FCS	4
Octets																			

FIG. 39

Frame Control	2	Duration	2	RA (Broadcast)	6	TA	6	Common Info	Per User Info 1 (GCR Group)	...	Per User Info N1 (GCR Group)	...	Per User Info N2	Padding	FCS	4
Octets																

FIG. 40



(b) BlockACKReq variant encoding

Multi-TID subfield value	Compressed Bitmap subfield value	GCR subfield value	BlockACKReq variant
0	0	0	Basic BlockACKReq
0	1	0	Compressed BlockACKReq
1	0	0	Extended Compressed BlockACKReq
1	1	0	Multi-TID BlockACKReq
0	0	1	Reserved
0	1	1	GCR BlockACKReq
1	0	1	<i>Reserved</i>
1	1	1	<i>Reserved</i>

FIG. 41

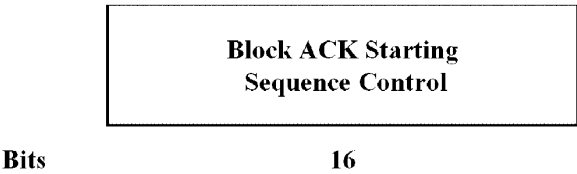


FIG. 42

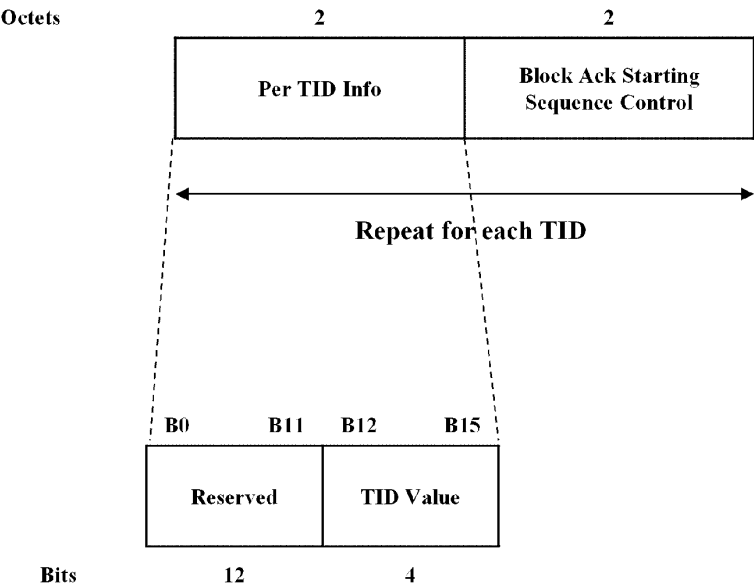


FIG. 43

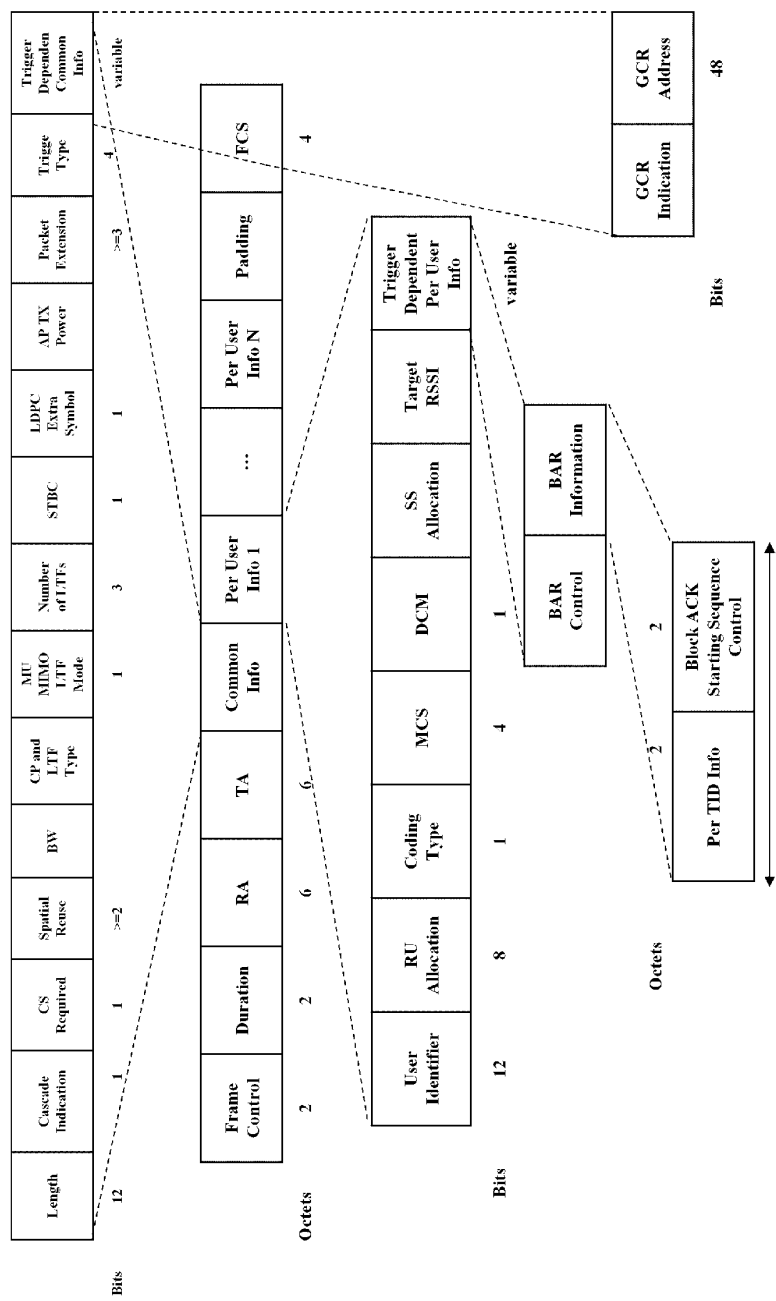


FIG. 44

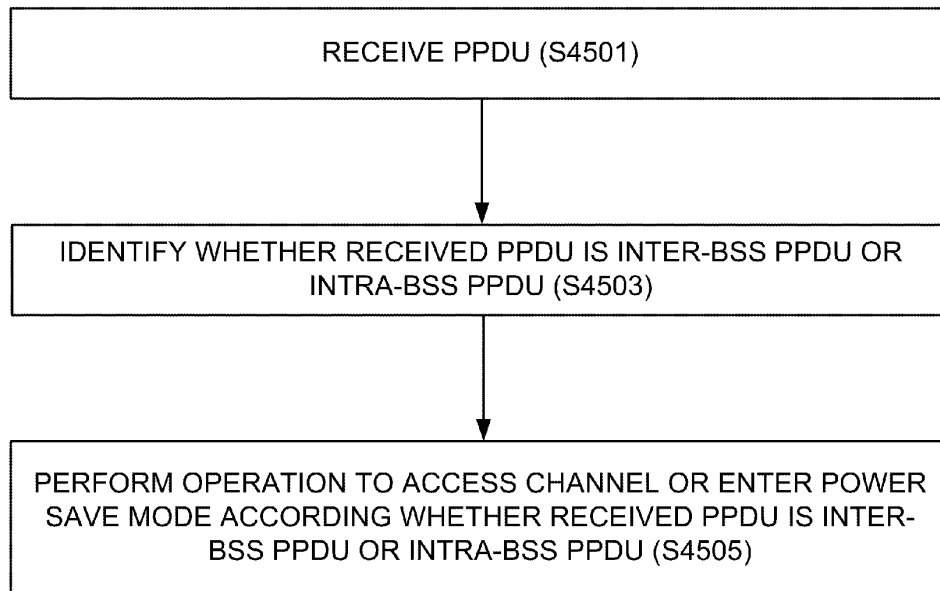


FIG. 45

NOTE: 37 CFR 1.63(c) states, "A person may not execute an oath or declaration unless the person has reviewed and understands the contents of the application, including the claims and is aware of the duty to disclose to the Office all information known to be material to patentability as defined in § 1.56."

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	WIRELESS COMMUNICATION METHOD AND WIRELESS COMMUNICATION TERMINAL IN BASIC SERVICE SET OVERLAPPING WITH ANOTHER BASIC SERVICE SET
---------------------------	---

As the below named inventor, I hereby declare that:

This declaration ☒ The attached application, or
is directed to: ☐ United States application or PCT international application number _____ filed on _____.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

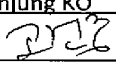
I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

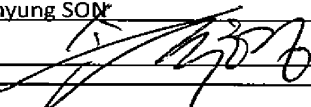
LEGAL NAME OF INVENTOR (1)

Inventor: Geonjung KO Date (Optional): Aug 28 2018

Signature: 

LEGAL NAME OF INVENTOR (2)

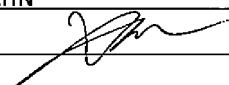
Inventor: Juhyung SON Date (Optional): 28-Aug-2018

Signature: 

LEGAL NAME OF INVENTOR (3)

Inventor: Woojin AHN

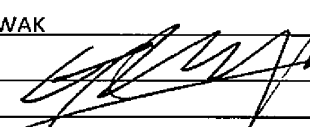
Date (Optional): 28. Aug - 2018

Signature: 

LEGAL NAME OF INVENTOR (4)

Inventor: Jinsam KWAK

Date (Optional): Aug. 28. 2018

Signature: 

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE Patent

Applicant: WILUS INSTITUTE OF	)	<i>Re.: Preliminary Amendment</i>
STANDARDS AND TECHNOLOGY	)	
INC. & SK TELECOM CO., LTD.	)	Group: Not yet assigned
	)	
USSN: Not yet assigned	)	Examiner: Not yet assigned
	)	
Filing Date: Concurrently herewith	)	Our Ref.: B-9587CON1 633097-4
	)	
For: "WIRELESS COMMUNICATION	)	Date: April 9, 2021
METHOD AND WIRELESS	)	
COMMUNICATION TERMINAL IN	)	
BASIC SERVICE SET	)	
OVERLAPPING WITH ANOTHER	)	
BASIC SERVICE SET"	)	

PRELIMINARY AMENDMENT

Sir:

Prior to examination of the above-identified U.S. patent application, please enter the following amendments and remarks into the prosecution history of the above-identified U.S. patent application without prejudice or disclaimer.

Amendments to the Specification begin on page 2 of this paper.

Amendments to the Claims begin on page 3 of this paper.

Remarks begin on page 7 of this paper.

AMENDMENTS TO THE SPECIFICATION

Please insert the following paragraph and section entitled “CROSS-REFERENCE TO RELATED APPLICATIONS” on page 1, immediately after the title section entitled “WIRELESS COMMUNICATION METHOD AND WIRELESS COMMUNICATION TERMINAL IN BASIC SERVICE SET OVERLAPPING WITH ANOTHER BASIC SERVICE SET” and before the section entitled “Technical Field”, to read as follows:

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. Patent Application No. 16/121,546 filed on September 4, 2018, which is a continuation of International Patent Application No. PCT/KR2017/002407 filed on March 6, 2017, which claims the priority to Korean Patent Application No. 10-2016-0026684 filed in the Korean Intellectual Property Office on March 4, 2016, Korean Patent Application No. 10-2016-0029975 filed in the Korean Intellectual Property Office on March 12, 2016, Korean Patent Application No. 10-2016-0044465 filed in the Korean Intellectual Property Office on April 11, 2016, Korean Patent Application No. 10-2016-0057597 filed in the Korean Intellectual Property Office on May 11, 2016, and Korean Patent Application No. 10-2016-0114821 filed in the Korean Intellectual Property Office on September 7, 2016, the entire contents of which are incorporated herein by reference.

* * *

AMENDMENTS TO THE CLAIMS

Please amend the claims to read as indicated in the following list of claims:

Listing of claims

1-20. (Cancelled).

21. (New) A wireless communication terminal communicating wirelessly, the wireless communication terminal comprising:
a transceiver; and
a processor,
wherein the processor is configured to receive a physical layer convergence procedure (PLCP) Processing Data Unit (PPDU) by using the transceiver, and not to use a Basic Service Set (BSS) color indicated by the PPDU when signaling information indicates that an operation based on the BSS color is not allowed,
wherein the BSS color is an identifier of a BSS,
wherein the signaling information is transmitted from a base wireless communication terminal to which the wireless communication terminal is associated.

22. (New) The wireless communication terminal of claim 21, wherein the processor is configured not to set an Intra-BSS Network Allocation Vector (NAV) by using the BSS color indicated by a signaling field of the PPDU when the signaling information indicates that the operation based on the BSS color is not allowed,
wherein the Intra-BSS NAV is different from a Basic NAV and is a NAV which is set based on an Intra-BSS PPDU,
wherein the Basic NAV is set based on an Inter-BSS PPDU or a PPDU which is not able to be identified as the Inter-BSS PPDU or the Intra-BSS PPDU.

23. (New) The wireless communication terminal of claim 22, wherein the PPDU includes a TXOP Duration field in the signaling field of the PPDU and a medium access control (MAC) frame which includes a duration field,

wherein the TXOP Duration field indicates information used for setting the Intra-BSS NAV and the Basic NAV,

wherein the duration field indicates information used for setting the Intra-BSS NAV and the Basic NAV,

wherein the processor is configured not to use the TXOP Duration field for setting the Intra-BSS NAV or the Basic NAV when the wireless communication terminal gets a valid signaling field of the MAC frame.

24. (New) The wireless communication terminal of claim 21, wherein the processor is configured to signal that the operation based on the BSS color is not allowed when the wireless communication terminal recognizes that a BSS color collision has occurred,

wherein the BSS color collision represents that different BSSs correspond to one BSS color.

25. (New) The wireless communication terminal of claim 24, wherein the processor is configured to determine that BSS color collision has occurred based on address fields of a medium access control (MAC) frame.

26. (New) The wireless communication terminal of claim 21, wherein the operation based on the BSS color includes entering a doze state of a power save operation based on a BSS color indicated by a signaling field of the PPDU,

wherein the power save operation is an operation for the wireless communication terminal to enter the doze state until an end of a received PPDU which is an Intra-BSS PPDU.

27. (New) The wireless communication terminal of claim 21, wherein the processor is configured not to perform a spatial reuse operation when the BSS color indicated by the signaling field of the PPDU is a predetermined value.

28. (New) The wireless communication terminal of claim 27, wherein the predetermined value is 0.

29. (New) An operation method of a wireless communication terminal communicating wirelessly, the method comprising:

receiving a physical layer convergence procedure (PLCP) Processing Data Unit (PPDU); and

not using a Basic Service Set (BSS) color indicated by the PPDU when signaling information indicates that an operation based on the BSS color is not allowed,

wherein the BSS color is an identifier of a BSS,

wherein the signaling information is transmitted from a base wireless communication terminal to which the wireless communication terminal is associated.

30. (New) The method of claim 29, wherein the method further comprises not setting an Intra-BSS Network Allocation Vector (NAV) by using the BSS color indicated by a signaling field of the PPDU when the signaling information indicates that the operation based on the BSS color is not allowed,

wherein the Intra-BSS NAV is different from a Basic NAV and is a NAV which is set based on an Intra-BSS PPDU,

wherein the Basic NAV is set based on an Inter-BSS PPDU or a PPDU which is not able to be identified as the Inter-BSS PPDU or the Intra-BSS PPDU.

31. (New) The method of claim 30, wherein the PPDU includes a TXOP Duration field in the signaling field of the PPDU and a medium access control (MAC) frame which includes a duration field,

wherein the TXOP Duration field indicates information used for setting the Intra-BSS NAV and the Basic NAV,

wherein the duration field indicates information used for setting the Intra-BSS NAV and the Basic NAV,

wherein the method further comprises not using the TXOP Duration field for setting the Intra-BSS NAV or the Basic NAV when the wireless communication terminal gets a valid signaling field of the MAC frame.

32. (New) The method of claim 29, wherein the method further comprises signal that the operation based on the BSS color is not allowed when the wireless communication terminal recognizes that a BSS color collision has occurred,

wherein the BSS color collision represents that different BSSs correspond to one BSS color.

33. (New) The method of claim 32, wherein the signaling that a BSS color collision has occurred comprises determining that BSS color collision has occurred based on address fields of a medium access control (MAC) frame.

34. (New) The method of claim 29, wherein the operation based on the BSS color includes entering a doze state of a power save operation based on a BSS color indicated by the signaling field of the PPDU,

wherein the power save operation is an operation for the wireless communication terminal to enter the doze state until an end of a received PPDU which is an Intra-BSS PPDU.

35. (New) The method of claim 29, wherein the method further comprises not performing a spatial reuse operation when the BSS color indicated by the signaling field of the PPDU is a predetermined value.

36. (New) The method of claim 35, wherein the predetermined value is 0.

REMARKS

In this Preliminary Amendment, the section of the “CROSS-REFERENCE TO RELATED APPLICATIONS” is inserted to include reference to the earlier applications. This amendment is to comply with 37 C.F.R. §1.77. A substitute specification should not be required as this amendment only adds a benefit or priority claim.

Claims 1-20 are cancelled and new claims 21-36 are added.

Amendment of the subject application is respectfully requested.

* * *

No Disclaimers or Disavowals

Although the present communication may include alterations to the application or claims, or may contain characterizations of claim scope or referenced art, the Applicant is not conceding that any previously pending claims are unpatentable in view of the cited reference(s). Rather, any alterations or characterizations are being made to facilitate expeditious prosecution of this application. The Applicant reserves the right to pursue at a later date any previously pending or other broader or narrower claims that capture any subject matter supported by the present disclosure, including subject matter found to be specifically disclaimed herein or by any prior prosecution. Accordingly, reviewers of this or any parent child or related prosecution history shall not reasonably infer that the Applicant has made any disclaimers or disavowals of any subject matter supported by the present application.

Very truly yours,

/Young Seok Koo 76,255/

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: WILUS INSTITUTE OF STANDARDS
AND TECHNOLOGY INC. and SK TELECOM CO.,
LTD.

Serial No.: Not Yet Assigned

Filing or 371 (c) Date: Concurrently Herewith

For: "WIRELESS COMMUNICATION METHOD
AND WIRELESS COMMUNICATION TERMINAL
IN BASIC SERVICE SET OVERLAPPING WITH
ANOTHER BASIC SERVICE SET"

Date: April 9, 2021

Examiner: Not Yet Assigned

Art Unit: N/A

Conf. No.: N/A

Our Ref: B-9587CON1 633097-4

Re: *Information Disclosure Statement*

INFORMATION DISCLOSURE STATEMENT

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir/Madam:

This information disclosure statement is filed in accordance with 37 C.F.R. §§ 1.56, 1.97 and 1.98 to disclose information that may be relevant to the above-identified patent application. The Applicant requests the Examiner consider the documents listed on the enclosed form PTO-1449 (modified) in the examination of this application.

The filing of this Information Disclosure Statement (IDS) shall not be construed as a representation that a search has been made (37 C.F.R. 1.97(g)), an admission that the information cited is, or is considered to be, material to patentability, or that no other material information exists.

The filing of this Information Disclosure Statement shall not be construed as an admission against interest in any manner (37 C.F.R. § 1.97(h)).

If any additional fee is required for this filing, the Applicant requests the Examiner contact a practitioner associated with the Customer Number listed below for authorization.

This information disclosure statement also includes the statements marked below. Failure to mark a statement should not be construed as a negative assertion.

Timing and Fees

This IDS is being filed:

- ☒ Concurrently with the application, and no fee is due.
- ☐ Within three months of the filing of the national application, other than a continued prosecution application under § 1.53(d), and no fee is due.

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- ☐ Within three months of the date of entry of the national stage as set forth in § 1.491 in an international application, and no fee is due.
 - ☐ Before the mailing of a first Office Action on the merits, and no fee is due.
 - ☐ Before the mailing of a first Office Action after the filing of a request for continued examination under § 1.114, and no fee is due.
-
- ☐ After the periods described above, and before a final Office Action under § 1.113, a Notice of Allowance under § 1.311, or an action that otherwise closes prosecution in the application, and is
 - ☐ accompanied by the fee set forth in § 1.17(p), or
 - ☐ filed with the statement set forth in 37 C.F.R. 1.97(e)(1): That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement; or
 - ☐ filed with the statement set forth in 37 C.F.R. 1.97(e)(2): That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in § 1.56(c) more than three months prior to the filing of the information disclosure statement.
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- ☐ After the periods described above, and is accompanied by the fee set forth in § 1.17(p), and is
 - ☐ filed with the statement set forth in 37 C.F.R. 1.97(e)(1), that each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement; or
 - ☐ filed with the statement set forth in 37 C.F.R. 1.97(e)(2), that no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in § 1.56(c) more than three months prior to the filing of the information disclosure statement.
- ☐ Concurrently with a Request for Continued Examination, and no additional fee is due for this IDS.

Items Disclosed

At least one item listed on the enclosed form PTO-1449 (modified) was

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- [x] Cited in an Office Action for a related application, the application number of the related application and the issue date of the Office Action are provided below and the Office Action is enclosed.

Please see the enclosed form PTO-1449 (modified) for related application number(s) and issue date(s).

- [x] Cited in an International Search Report (ISR) or an International Preliminary Report on Patentability (IPRP) or a Written Opinion (WO) of the International Searching Authority (ISA) for the related PCT Application, the PCT application number and the issue date of the ISR/IPRP/WO are provided below and the ISR/IPRP/WO is enclosed.

Please see the enclosed form PTO-1449 (modified) for related application number(s) and issue date(s).

Additional Information

- [x] Translations of the foreign-language documents are also enclosed as machine-translations, human-translations, or counterpart applications as noted. Machine translations were provided by the Japanese Patent Office, ESPACENET, Google Documents, Patent Fetcher® /ESPACENET, Google Translate or Google Translator Toolkit as noted and with OCR by Adobe Acrobat 9 or ABBYY PDF Transformer 3 if needed.
- [x] English-language abstracts of foreign-language documents are provided.
- [x] Documents listed on the enclosed ISR/IPRP/WO or the Office Action have relevance at least as described therein.
- [] The documents with the following reference numbers were described in the specification of the present application; omission of a reference from this list does not indicate that it was not discussed in the specification of the present application.
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- [] At least one of the references cited in the Office Action listed on the attached PTO-1449 (modified) were previously submitted in an IDS or cited by the Examiner for the present application on _____ and therefore are not submitted in this IDS.

- [x] Other: **In the attached Form PTO-1449 (modified), documents from the parent application (USSN: 16/121,546 (now published as U.S. 2019/0021091) are being cited.**

Please further note that the foreign references and non-patent documents listed in the attached were cited in the parent application, USSN 16/121,546 (now published as U.S. 2019/0021091). In accordance with 37 C.F.R. §1.98(d) (1) and (2), copies of the foreign references and non-patent documents listed in the enclosed Form PTO-1449 (modified) are not enclosed.

April 9, 2021

Respectfully submitted,

/ Young Seok Koo 76255 /

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