PTO/AIA/15 (10-17)
Approved for use through 11/30/2020. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.	1426-136.301
First Named Inventor	Wei-Yu Chen
Title	Method and Apparatus for Improving MSG3 Transmission of Random...
Priority Mail Express® Label No.	

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

1. [✓] **Fee Transmittal Form** (PTO/SB/17 or equivalent)
2. [ ] **Applicant asserts small entity status.** See 37 CFR 1.27
3. [ ] **Applicant certifies micro entity status.** See 37 CFR 1.29. Applicant must attach form PTO/SB/15A or B or equivalent.
4. [✓] **Specification** [*Total Pages* 39] Both the claims and abstract must start on a new page. *(See MPEP § 608.01(a) for information on the preferred arrangement)*
5. [✓] **Drawing(s)** (35 U.S.C. 113) [*Total Sheets* 19]
6. **Inventor's Oath or Declaration** [*Total Pages* 2] *(including substitute statements under 37 CFR 1.64 and assignments serving as an oath or declaration under 37 CFR 1.63(e))*
   a. [ ] Newly executed (original or copy)
   b. [✓] A copy from a prior application (37 CFR 1.63(d))
7. [✓] **Application Data Sheet** ** See note below.* See 37 CFR 1.76 (PTO/AIA/14 or equivalent)
8. **CD-ROM or CD-R** in duplicate, large table, or Computer Program (*Appendix*)
   [ ] Landscape Table on CD
9. **Nucleotide and/or Amino Acid Sequence Submission** (*if applicable, items a. – c. are required*)
   a. [ ] Computer Readable Form (CRF)
   b. [ ] Specification Sequence Listing on:
      i. [ ] CD-ROM or CD-R (2 copies); or
      ii. [ ] Paper
   c. [ ] Statements verifying identity of above copies

ADDRESS TO:

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

ACCOMPANYING APPLICATION PAPERS

10. [ ] **Assignment Papers** (cover sheet & document(s))
    Name of Assignee _____
11. [ ] **37 CFR 3.73(c) Statement** (*when there is an assignee*) [✓] **Power of Attorney**
12. [ ] **English Translation Document** (*if applicable*)
13. [ ] **Information Disclosure Statement** (PTO/SB/08 or PTO-1449)
    [ ] Copies of citations attached
14. [ ] **Preliminary Amendment**
15. [ ] **Return Receipt Postcard** (*MPEP § 503*) (*Should be specifically itemized*)
16. [ ] **Certified Copy of Priority Document(s)** (*if foreign priority is claimed*)
17. [ ] **Nonpublication Request** Under 35 U.S.C. 122(b)(2)(B)(i). Applicant must attach form PTO/SB/35 or equivalent.
18. [ ] **Other:** _____

***Note:** (1) Benefit claims under 37 CFR 1.78 and foreign priority claims under 1.55 **must** be included in an Application Data Sheet (ADS).
(2) For applications filed under 35 U.S.C. 111, the application must contain an ADS specifying the applicant if the applicant is an assignee, person to whom the inventor is under an obligation to assign, or person who otherwise shows sufficient proprietary interest in the matter. See 37 CFR 1.46(b).

19. CORRESPONDENCE ADDRESS

[✓] The address associated with Customer Number: 106622 **OR** [ ] Correspondence address below

Name					
Address					
City		State		Zip Code	
Country		Telephone		Email	

Signature	/Sang N. Dang/	Date	August 1, 2018
Name (Print/Type)	Sang N. Dang	Registration No. (Attorney/Agent)	51,186

This collection of information is required by 37 CFR 1.53(b). 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 12 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, 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.

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM
First Named Inventor/Applicant Name:	Wei-Yu Chen
Filer:	Sang N. Dang/Sandy Kim
Attorney Docket Number:	1426-136.301

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
UTILITY APPLICATION FILING	1011	1	300	300
UTILITY SEARCH FEE	1111	1	660	660
UTILITY EXAMINATION FEE	1311	1	760	760
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**1720**

Electronic Acknowledgement Receipt	
EFS ID:	33350008
Application Number:	16052505
International Application Number:	
Confirmation Number:	1082
Title of Invention:	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM
First Named Inventor/Applicant Name:	Wei-Yu Chen
Customer Number:	106622
Filer:	Sang N. Dang/Sandy Kim
Filer Authorized By:	Sang N. Dang
Attorney Docket Number:	1426-136.301
Receipt Date:	01-AUG-2018
Filing Date:	
Time Stamp:	19:47:01
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$1720
RAM confirmation Number	080218INTEFSW19482900
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	WebADS.pdf	129221 c1df1fb46849f1aea1e854771a5f4400bbdad9b2	no	8
Warnings:					
Information:					
2		1426-136-301--DivPackage.pdf	1705845 363003b5c7ca32e214faa8553ec809cce2ba2076	yes	65

Multipart Description/PDF files in .zip description

Document Description	Start	End
Miscellaneous Incoming Letter	65	65
Power of Attorney	63	64
Oath or Declaration filed	61	62
Drawings-only black and white line drawings	42	60
Abstract	41	41
Claims	38	40
Specification	3	37
Fee Worksheet (SB06)	2	2
Transmittal of New Application	1	1

Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	34784 98b4faa52496c73690d9f73c5c0d6417f4c154fa	no	2

Warnings:	
Information:	
Total Files Size (in bytes):	1869850

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	1426-136.301
	Application Number	
Title of Invention	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM	

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.)

Inventor Information:

Inventor 1

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Wei-Yu		Chen	

Residence Information (Select One) ◯ US Residency ◉ Non US Residency ◯ Active US Military Service

City	Taipei City	Country of Residence i	TW

Mailing Address of Inventor:

Address 1	No. 15, Lite Rd., Peitou District		
Address 2			
City	Taipei City 112	State/Province	OT
Postal Code		Country i	TW

Inventor 2

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Li-Chih		Tseng	

Residence Information (Select One) ◯ US Residency ◉ Non US Residency ◯ Active US Military Service

City	Taipei City	Country of Residence i	TW

Mailing Address of Inventor:

Address 1	No, 15, Lite Rd., Peitou District		
Address 2			
City	Taipei City 112	State/Province	OT
Postal Code		Country i	TW

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Samsung Exhibit 1002, Page 7 of 564
Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

PTO/AIA/14 (08-15)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	1426-136.301
	Application Number	
Title of Invention	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM	

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.**			
Customer Number	106622		
Email Address		Add Email	Remove Email

Application Information:

Title of the Invention	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM		
Attorney Docket Number	1426-136.301	**Small Entity Status Claimed**	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	19	**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.

PTO/AIA/14 (08-15)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	1426-136.301
	Application Number	
Title of Invention	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM	

Please Select One:	(●) Customer Number	( ) US Patent Practitioner	( ) Limited Recognition (37 CFR 11.9)
Customer Number	106622		

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix	
					Remove
Registration Number					
Prefix	**Given Name**	Middle Name	**Family Name**	Suffix	
					Remove
Registration Number					

Additional Representative Information blocks may be generated within this form by selecting the **Add** button.

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)
	Division of	15/663674	2017-07-28

Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
15/663674	Claims benefit of provisional	62/367875	2016-07-28

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) 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).

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	1426-136.301
	Application Number	
Title of Invention	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM	

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)

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.

PTO/AIA/14 (08-15)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	1426-136.301
	Application Number	
Title of Invention	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM	

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.

PTO/AIA/14 (08-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	1426-136.301
	Application Number	
Title of Invention	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM	

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	○ 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	ASUSTek Computer Inc.

Mailing Address Information For Applicant:

Address 1	No. 15, Lite Rd., Peitou District		
Address 2			
City	Taipei City 112	**State/Province**	OT
Country[i]	TW	Postal Code	
Phone Number		Fax Number	
Email Address			

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

PTO/AIA/14 (08-15)
Approved for use through 04/30/2017. OMB 0651-0032
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.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	1426-136.301
	Application Number	
Title of Invention	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM	

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. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		**State/Province**	
Country i		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.

PTO/AIA/14 (08-15)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	1426-136.301
		Application Number	
Title of Invention	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM		

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).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e. g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

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

Signature	/Sang N. Dang/			Date (YYYY-MM-DD)	
First Name	Sang N.	Last Name	Dang	Registration Number	51186

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

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Wei-Yu Chen and Li-Chih Tseng	
Title:	METHOD AND APPARATUS FOR IMPROVING Msg3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM	
Serial No.:	TBD	Filed: Herewith
Examiner:	TBD	Group Art Unit: TBD

Attorney Docket No.: 1426-136.301 (1050153-US-P2)

CERTIFICATE OF EFS-WEB TRANSMISSION UNDER 37 CFR § 1.8

I hereby certify that the enclosed 1 Page Utility Transmittal Sheet; 1 Page Fee Transmittal; 8 Page Application Data Sheet Web-ADS; 39 Page Specification; 19 Page Drawings; 2 Page Executed Declaration; and 2 Page Power of Attorney are being transmitted to the United States Patent and Trademark Office via EFS-Web on August 1, 2018.

Date: August 1, 2018 /Sandy Kim/
Sandy Kim

Mailing Address:

BLUE CAPITAL LAW FIRM, P.C. (Customer No.: 106622)
650 Town Center Drive, Suite 1530
Costa Mesa, California 92626
Tel: 714-839-3800
Fax: 714-795-2995

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82A (07-13)
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TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	Not Yet Assigned
Filing Date	August 1, 2018
First Named Inventor	Wei-Yu Chen
Title	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM
Art Unit	Not Yet Assigned
Examiner Name	Not Yet Assigned
Attorney Docket Number	1426-136.301

SIGNATURE of Applicant or Patent Practitioner

Signature	/Sang N. Dang/	Date (Optional)	August 1, 2018
Name	Sang N. Dang	Registration Number	51,186
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ *Total of _____ forms are submitted.

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Document Description: Power of Attorney

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POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

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☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

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I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

☐ Inventor or Joint Inventor (title not required below)

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☑ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature	MING-HSIU HSU	Date (Optional)	Aug. 28, 2015
Name	MING-HSIU HSU		
Title	Director of ASUSTek Computer Inc.		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

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DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM

As the below named inventor, I hereby declare that:

This declaration is directed to:

- [x] The attached application, or
- [ ] 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.

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LEGAL NAME OF INVENTOR

Inventor: Chen, Wei-Yu Date (Optional): Jul. 27. 2017

Signature: Chen, Wei-Yu

Note: An application data sheet (PTO/AIA/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use an additional PTO/SB/AIA01 form for each additional inventor.

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DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM

As the below named inventor, I hereby declare that:

This declaration is directed to:

- [x] The attached application, or
- [ ] 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.

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LEGAL NAME OF INVENTOR

Inventor: Tseng, Li-Chih Date (Optional): Jul 27, 2017

Signature: Li-Chih Tseng

Note: An application data sheet (PTO/AIA/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use an additional PTO/SB/AIA01 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.**

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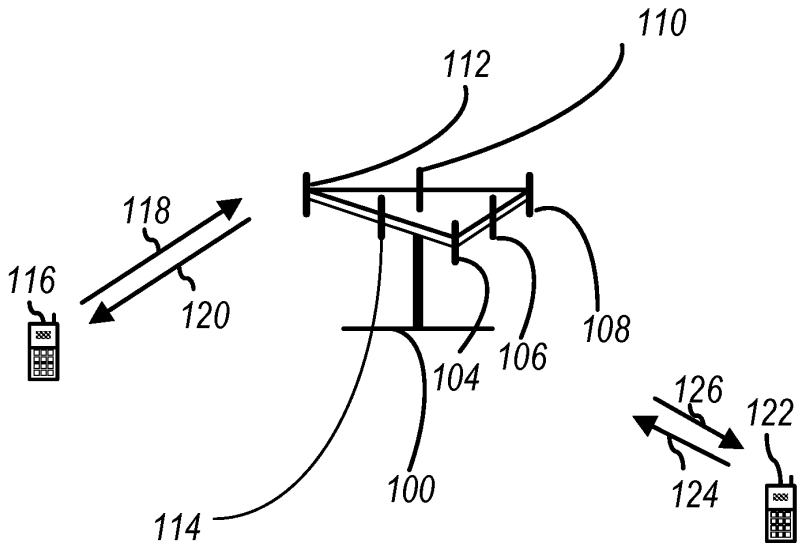


FIG. 1

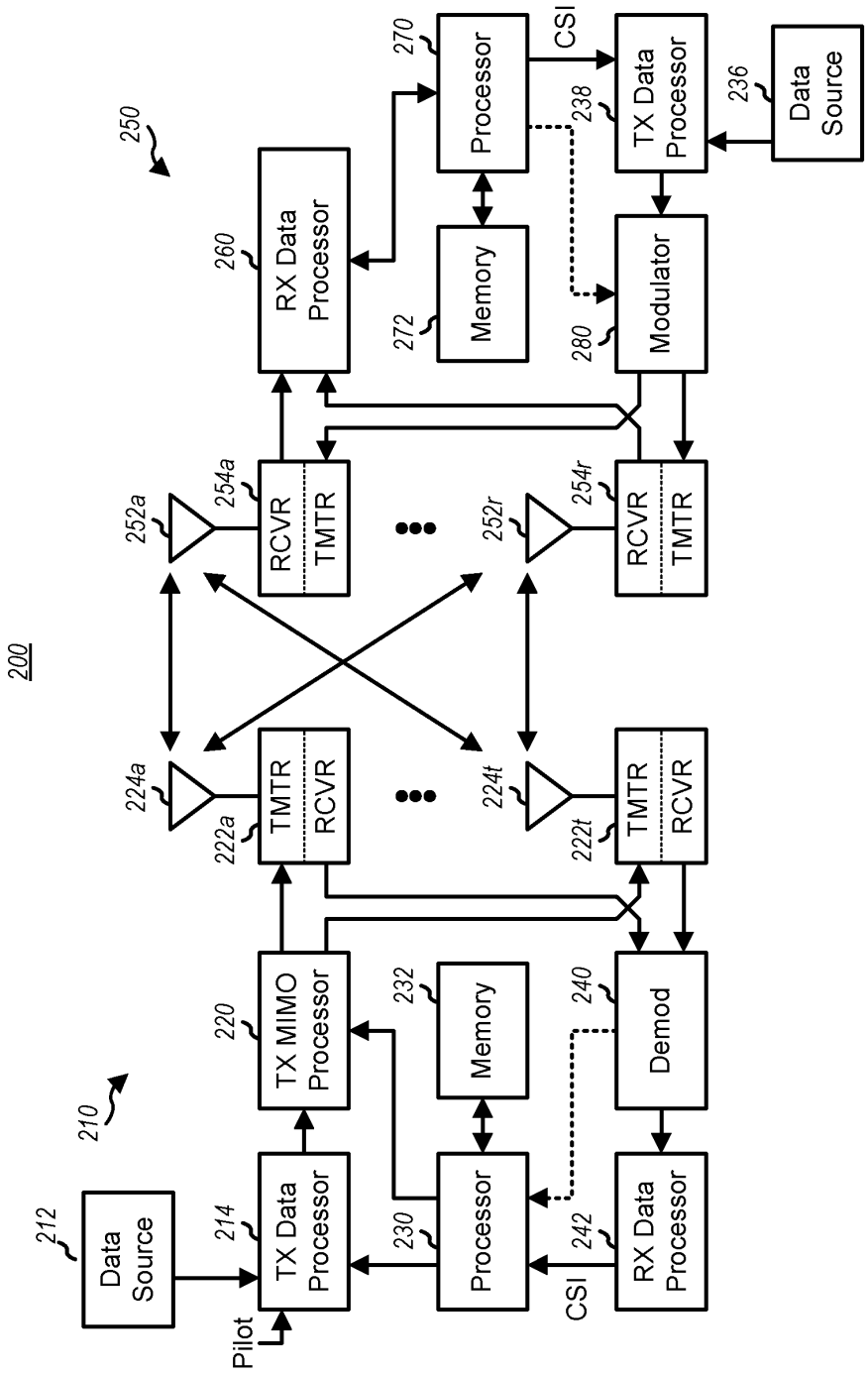

200
210
212
Data Source
214
TX Data Processor
Pilot
220
TX MIMO Processor
222a
TMTR
RCVR
224a
224t
222t
230
Processor
232
Memory
240
Demod
242
RX Data Processor
CSI
250
252a
252r
254a
254r
RCVR
TMTR
260
RX Data Processor
270
Processor
272
Memory
280
Modulator
238
CSI
TX Data Processor
236
Data Source

FIG. 2

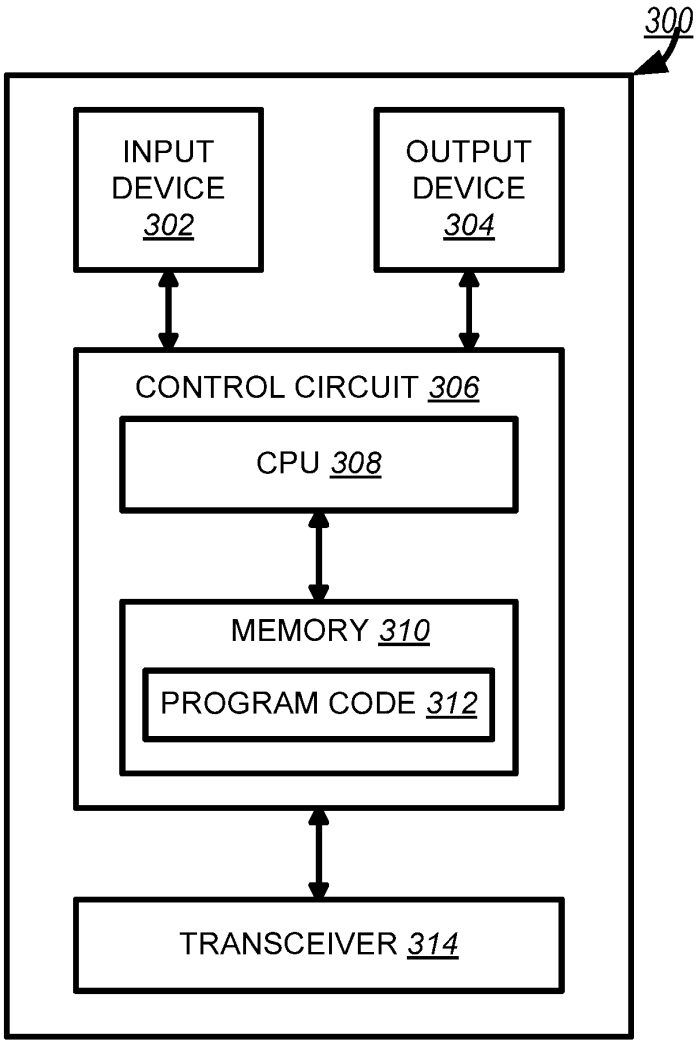

300
INPUT DEVICE 302
OUTPUT DEVICE 304
CONTROL CIRCUIT 306
CPU 308
MEMORY 310
PROGRAM CODE 312
TRANSCEIVER 314

FIG. 3

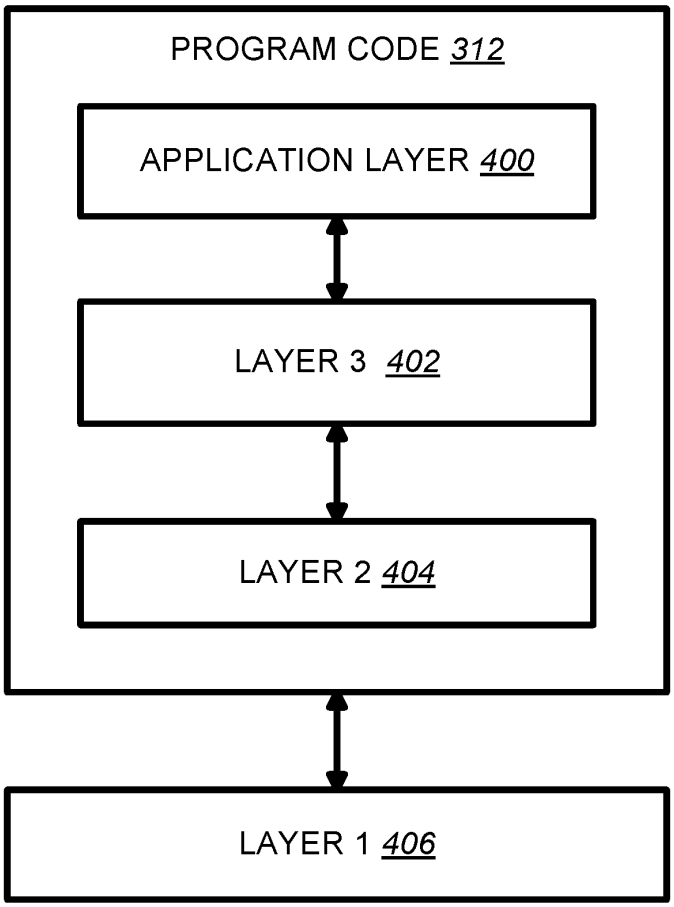

PROGRAM CODE 312
APPLICATION LAYER 400
LAYER 3 402
LAYER 2 404
LAYER 1 406

FIG. 4

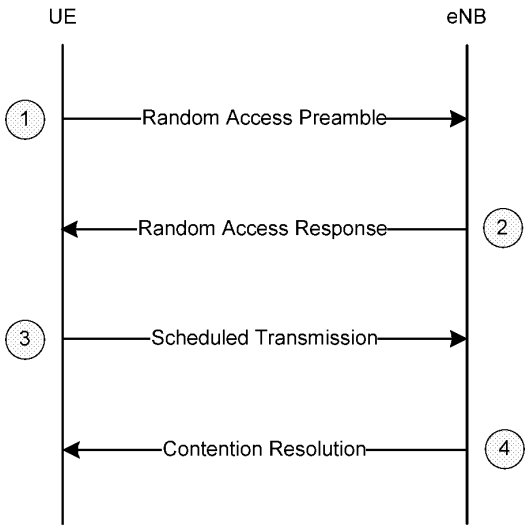


FIG. 5 (PRIOR ART)

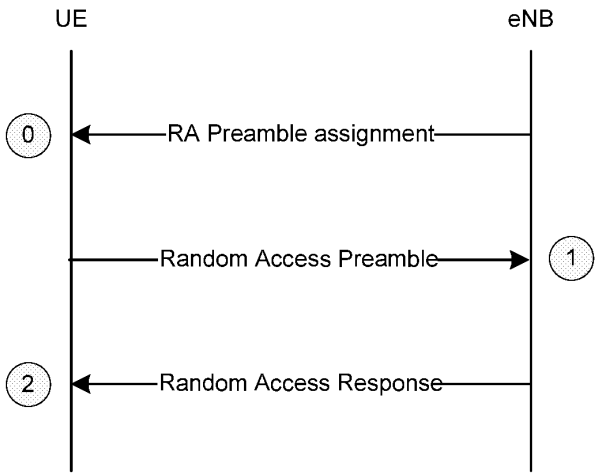


FIG. 6 (PRIOR ART)

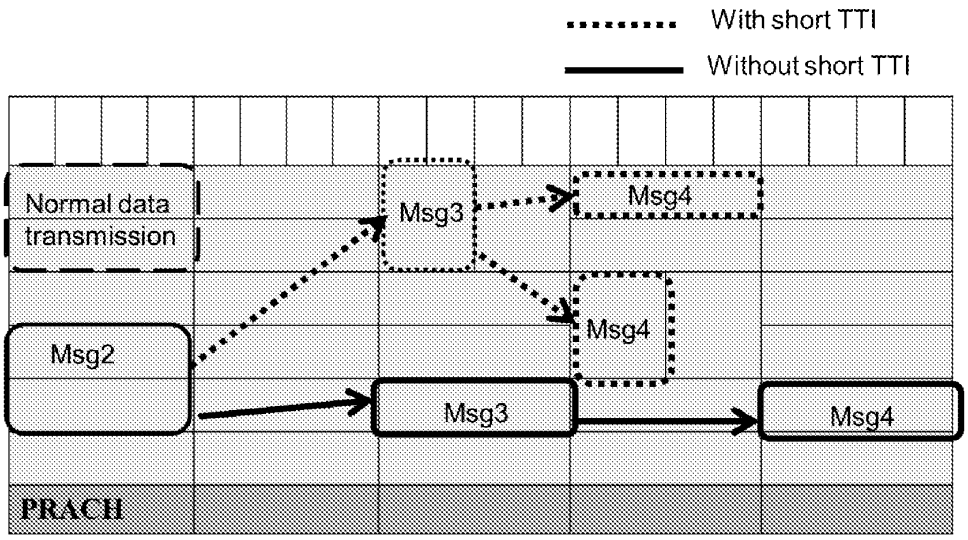

With short TTI
Without short TTI
Normal data transmission
Msg3
Msg4
Msg4
Msg2
Msg3
Msg4
PRACH

FIG. 7

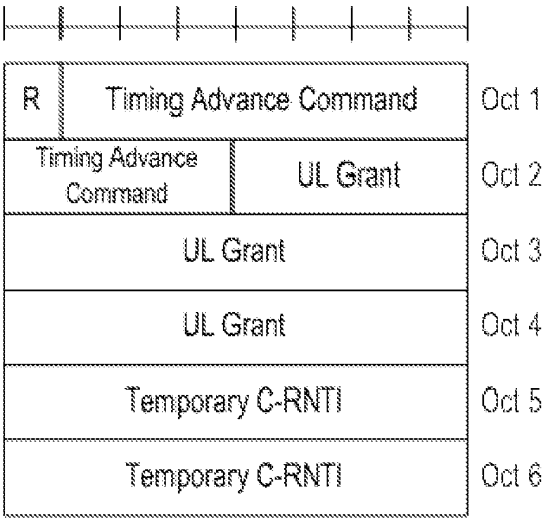

R
Timing Advance Command
Oct 1
Timing Advance Command
UL Grant
Oct 2
UL Grant
Oct 3
UL Grant
Oct 4
Temporary C-RNTI
Oct 5
Temporary C-RNTI
Oct 6

FIG. 8

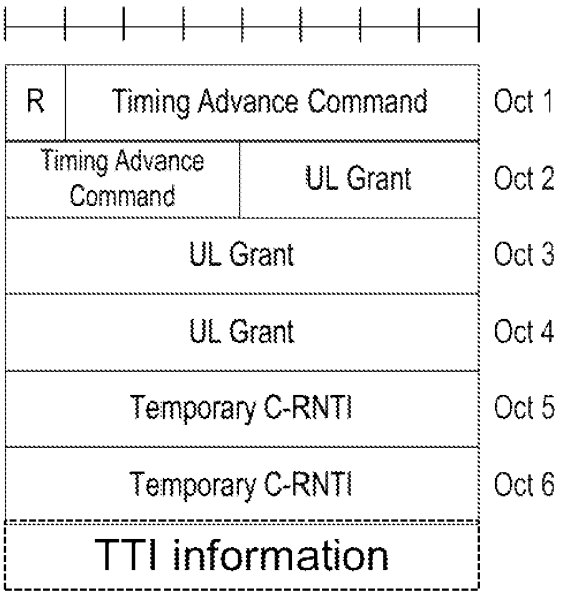

R
Timing Advance Command
Oct 1
Timing Advance Command
UL Grant
Oct 2
UL Grant
Oct 3
UL Grant
Oct 4
Temporary C-RNTI
Oct 5
Temporary C-RNTI
Oct 6
TTI information

FIG. 9

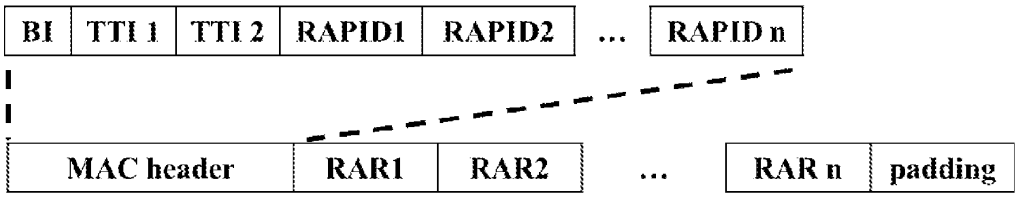

BI
TTI 1
TTI 2
RAPID1
RAPID2
…
RAPID n
MAC header
RAR1
RAR2
…
RAR n
padding

FIG. 10

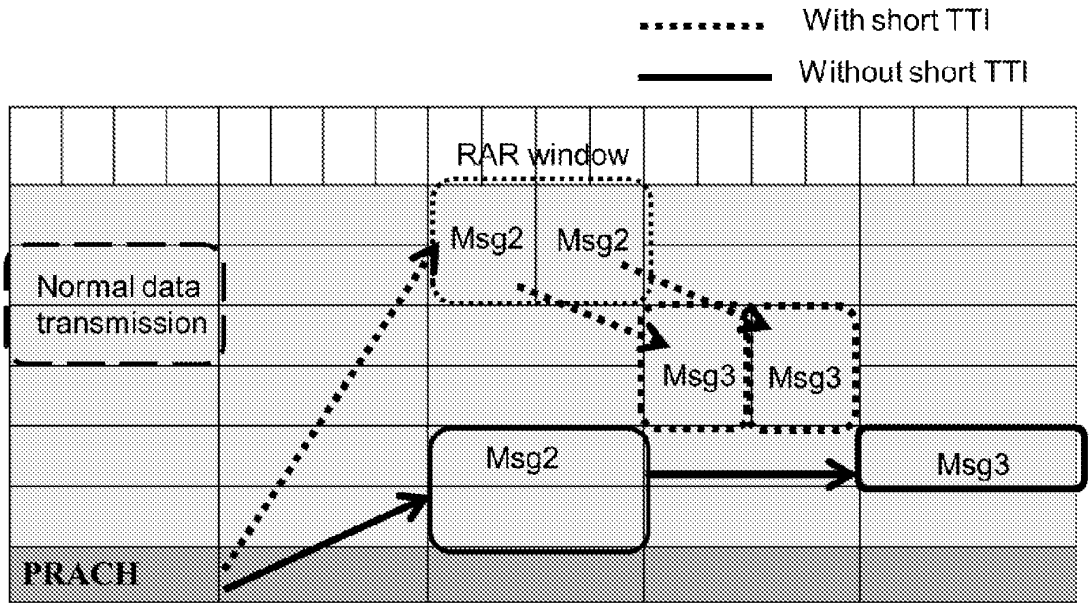

With short TTI
Without short TTI
RAR window
Msg2
Msg2
Normal data transmission
Msg3
Msg3
Msg2
Msg3
PRACH

FIG. 11

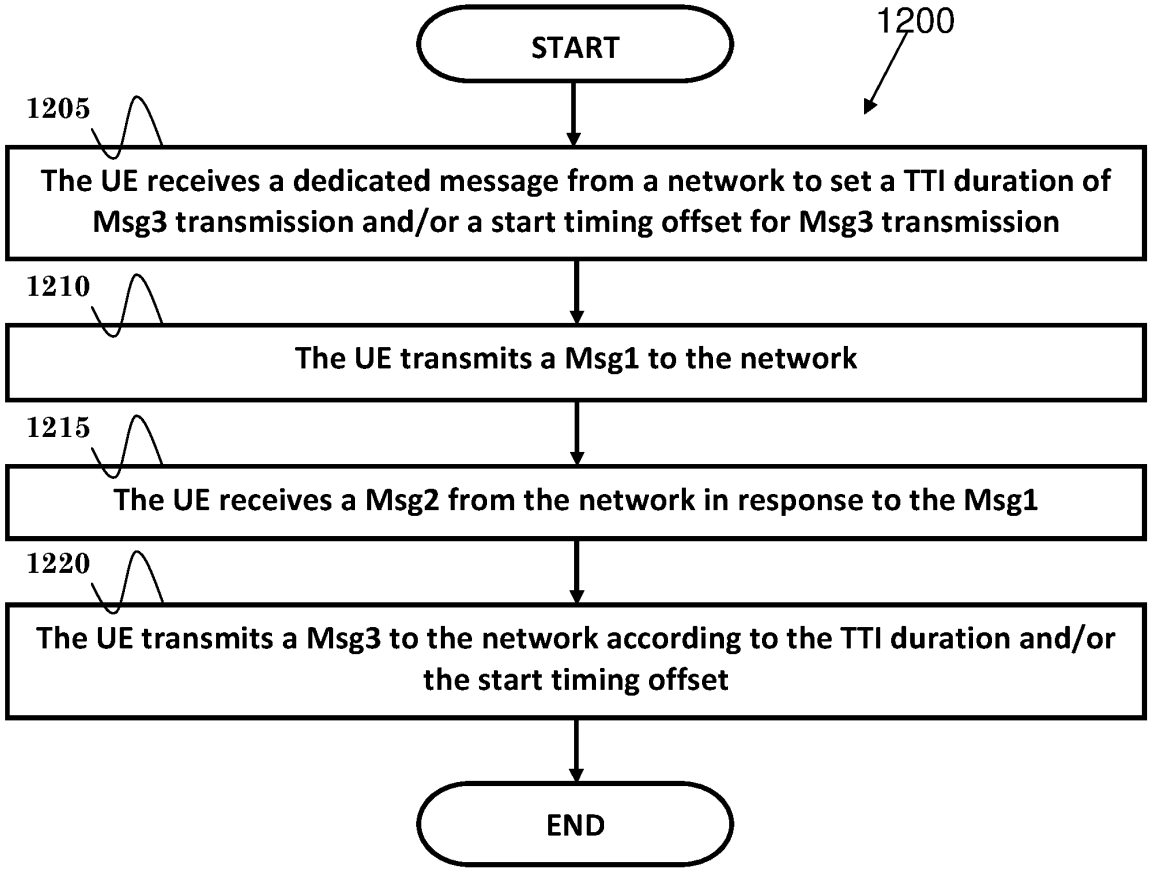

START
1200
1205
The UE receives a dedicated message from a network to set a TTI duration of Msg3 transmission and/or a start timing offset for Msg3 transmission
1210
The UE transmits a Msg1 to the network
1215
The UE receives a Msg2 from the network in response to the Msg1
1220
The UE transmits a Msg3 to the network according to the TTI duration and/or the start timing offset
END

FIG. 12

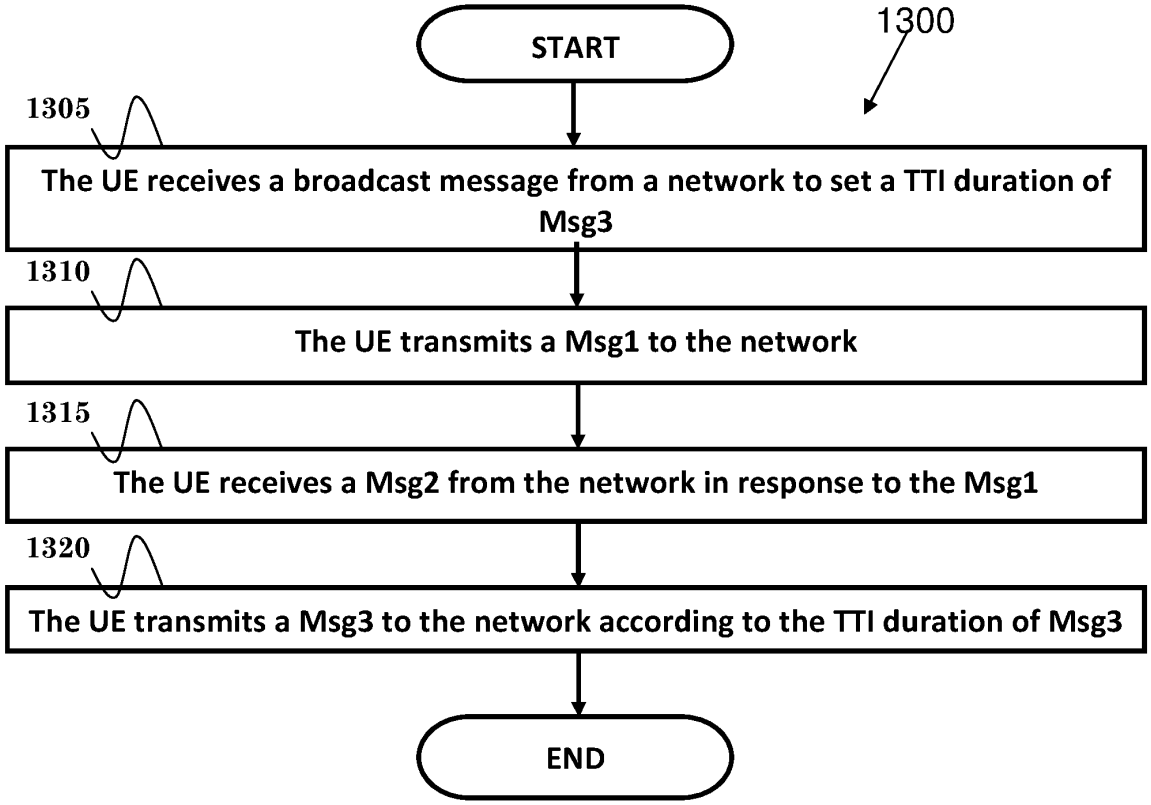

1300
START
1305
The UE receives a broadcast message from a network to set a TTI duration of Msg3
1310
The UE transmits a Msg1 to the network
1315
The UE receives a Msg2 from the network in response to the Msg1
1320
The UE transmits a Msg3 to the network according to the TTI duration of Msg3
END

FIG. 13

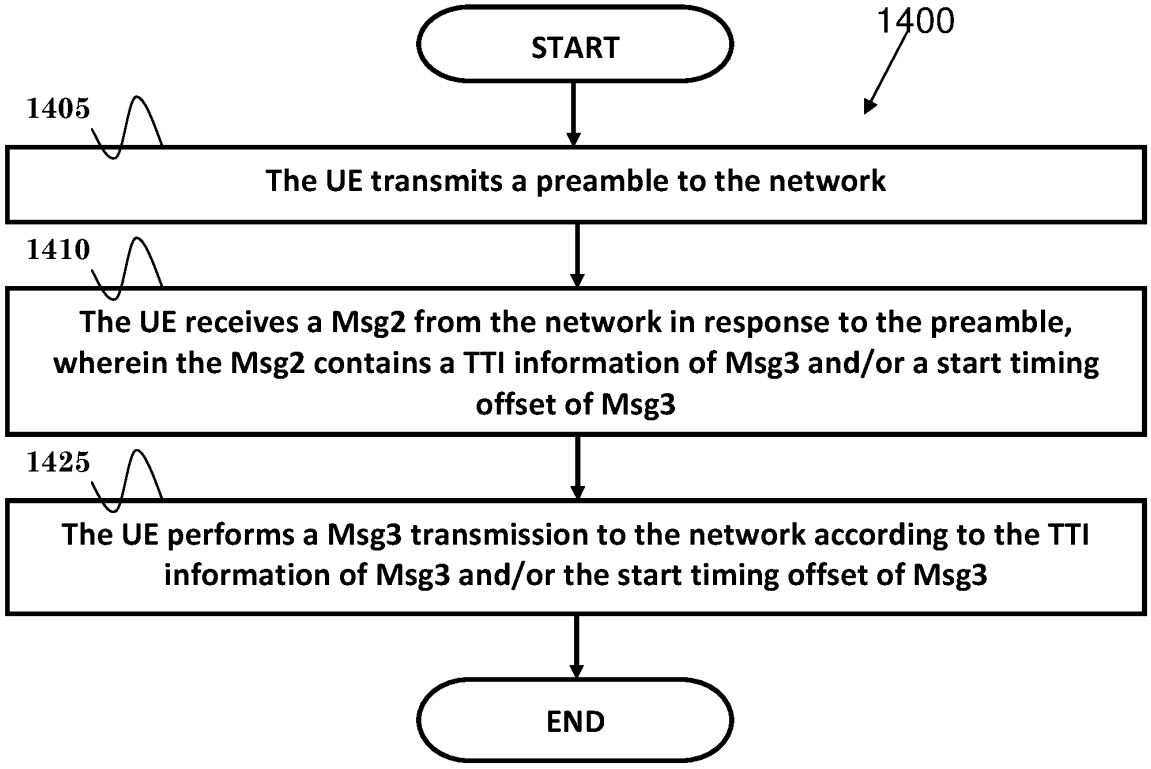

1400
START
1405
The UE transmits a preamble to the network
1410
The UE receives a Msg2 from the network in response to the preamble, wherein the Msg2 contains a TTI information of Msg3 and/or a start timing offset of Msg3
1425
The UE performs a Msg3 transmission to the network according to the TTI information of Msg3 and/or the start timing offset of Msg3
END

FIG. 14

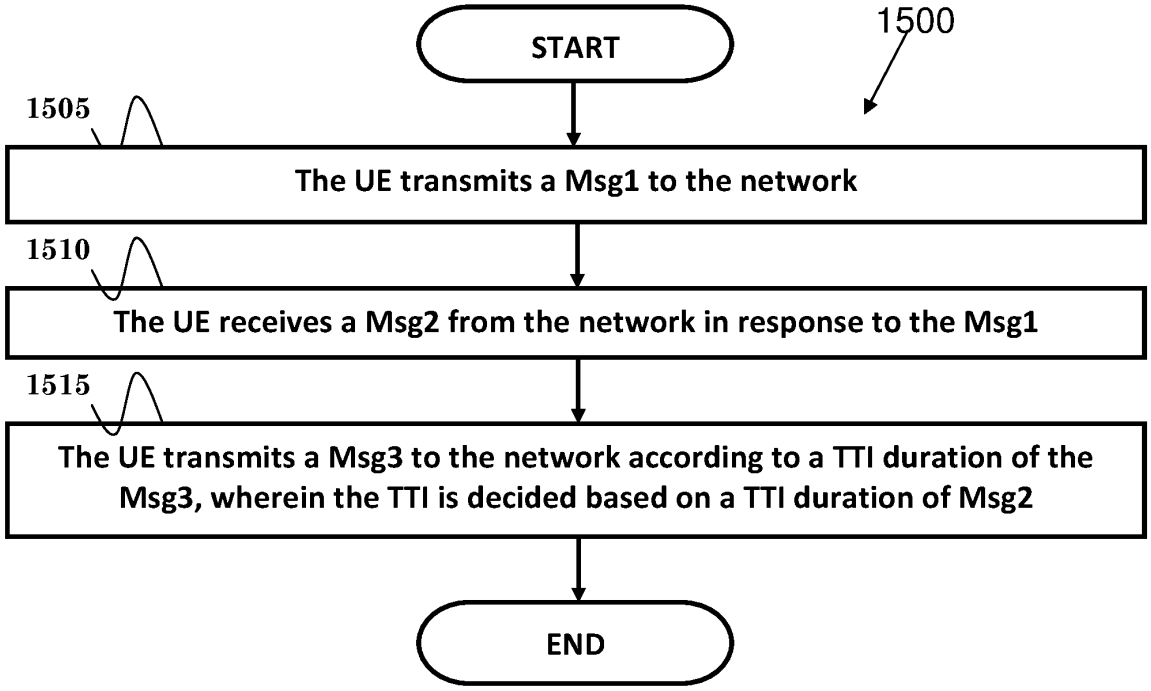

START
1500
1505
The UE transmits a Msg1 to the network
1510
The UE receives a Msg2 from the network in response to the Msg1
1515
The UE transmits a Msg3 to the network according to a TTI duration of the Msg3, wherein the TTI is decided based on a TTI duration of Msg2
END

FIG. 15

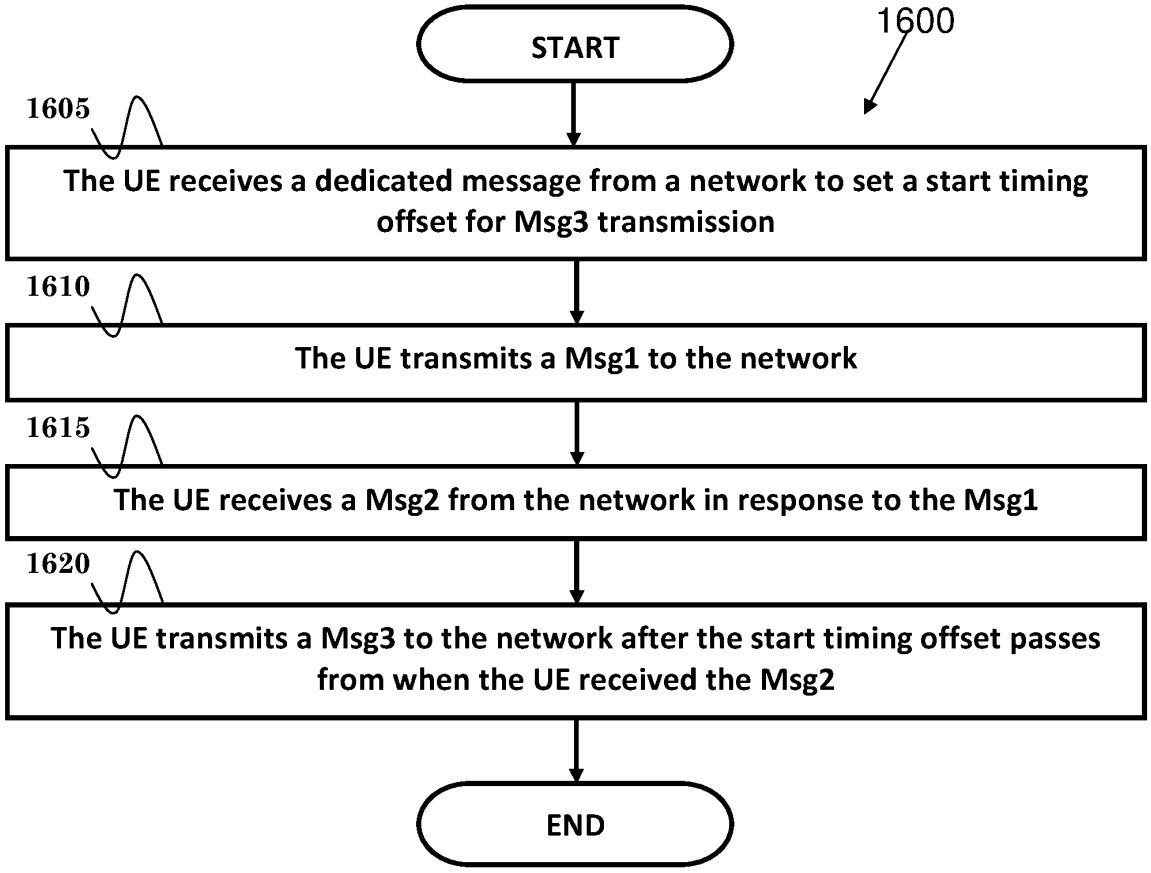

1600
START
1605
The UE receives a dedicated message from a network to set a start timing offset for Msg3 transmission
1610
The UE transmits a Msg1 to the network
1615
The UE receives a Msg2 from the network in response to the Msg1
1620
The UE transmits a Msg3 to the network after the start timing offset passes from when the UE received the Msg2
END

FIG. 16

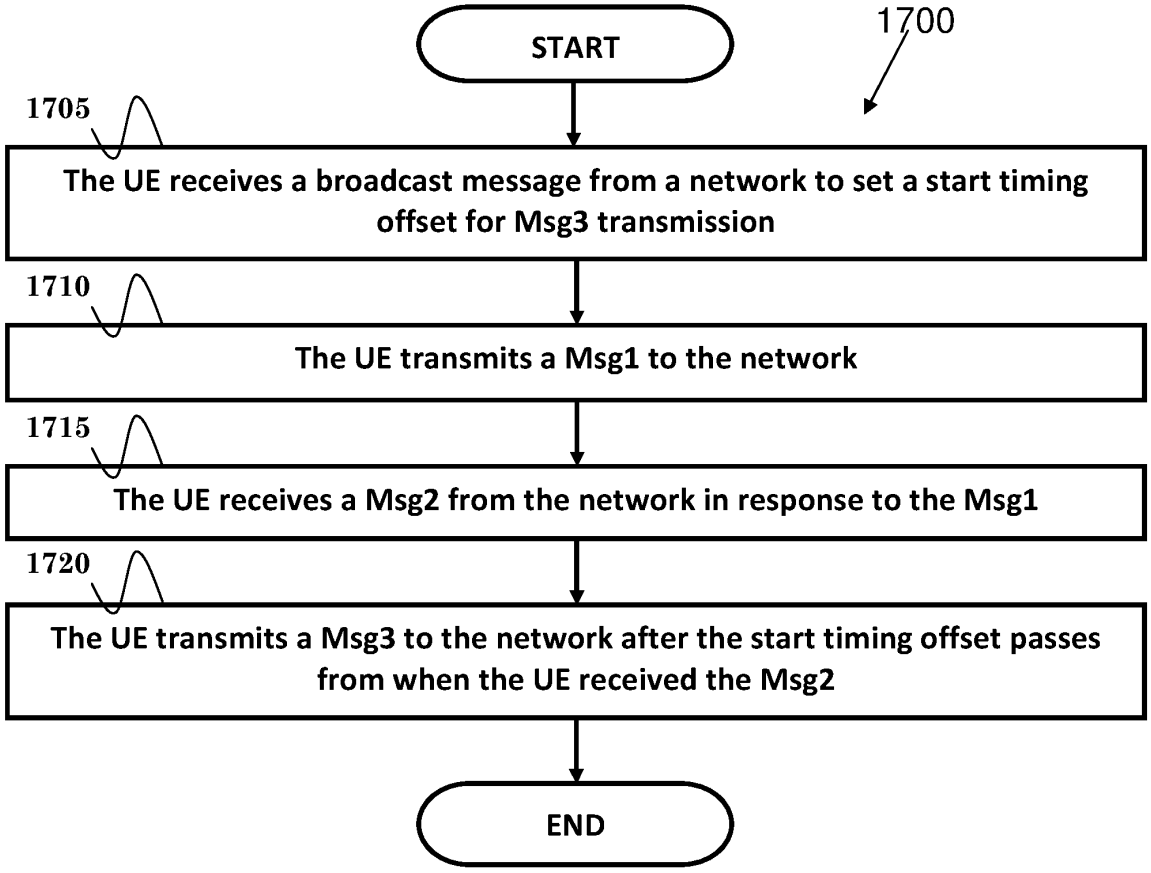

1700
START
1705
The UE receives a broadcast message from a network to set a start timing offset for Msg3 transmission
1710
The UE transmits a Msg1 to the network
1715
The UE receives a Msg2 from the network in response to the Msg1
1720
The UE transmits a Msg3 to the network after the start timing offset passes from when the UE received the Msg2
END

FIG. 17

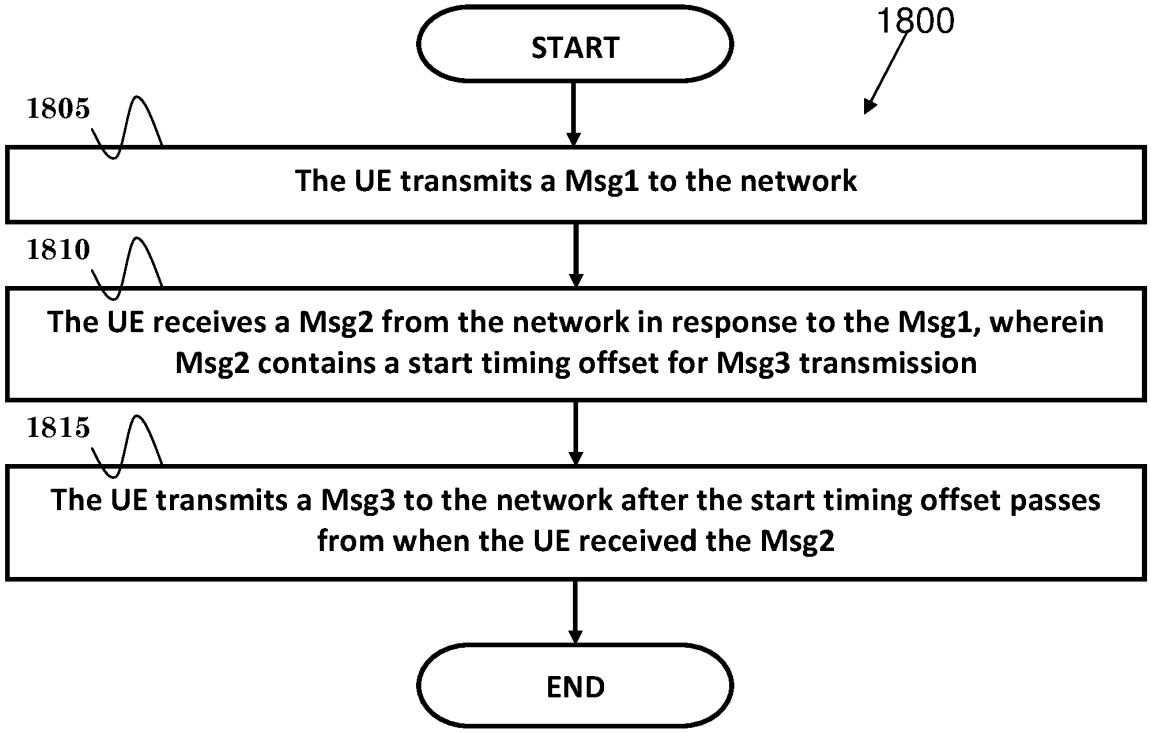

START
1800
1805
The UE transmits a Msg1 to the network
1810
The UE receives a Msg2 from the network in response to the Msg1, wherein Msg2 contains a start timing offset for Msg3 transmission
1815
The UE transmits a Msg3 to the network after the start timing offset passes from when the UE received the Msg2
END

FIG. 18

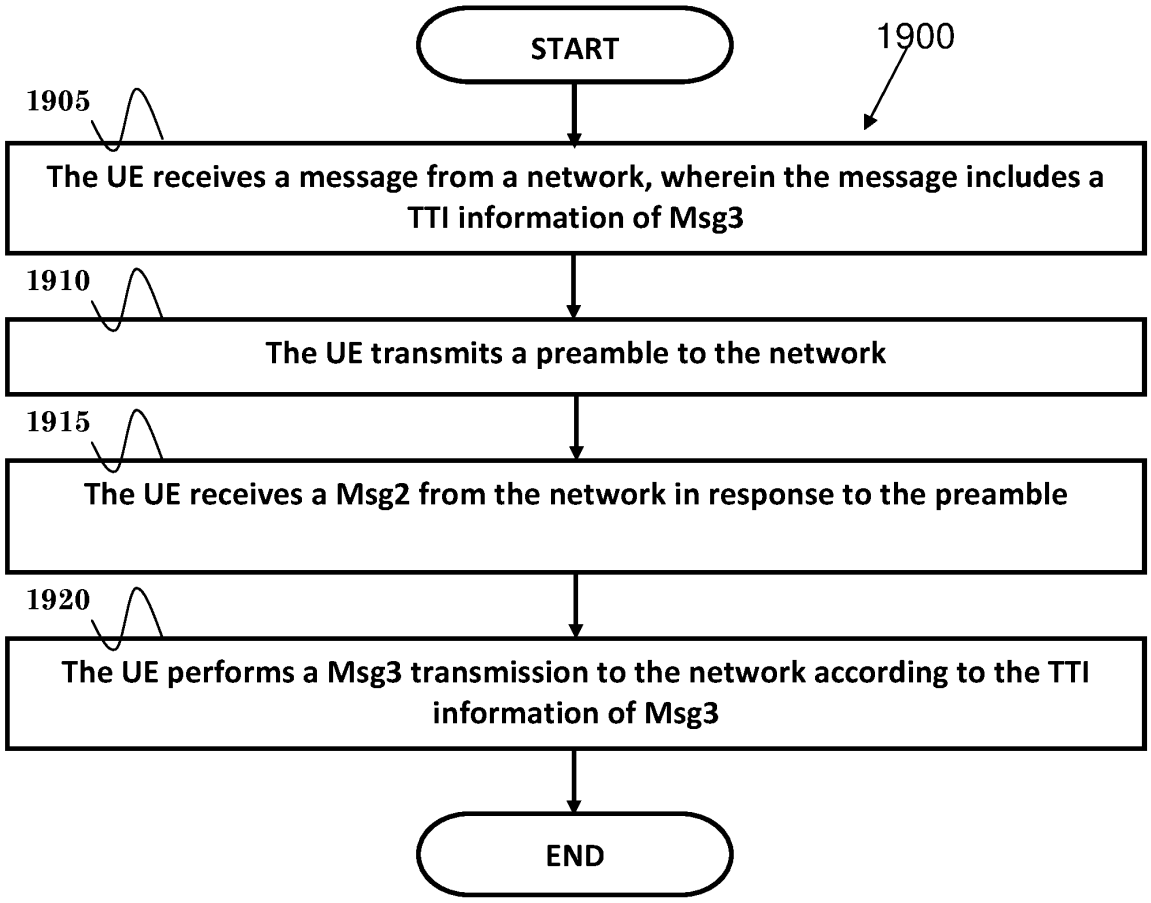

START
1900
1905
The UE receives a message from a network, wherein the message includes a TTI information of Msg3
1910
The UE transmits a preamble to the network
1915
The UE receives a Msg2 from the network in response to the preamble
1920
The UE performs a Msg3 transmission to the network according to the TTI information of Msg3
END

FIG. 19

ABSTRACT

A method and apparatus are disclosed, from the perspective of the UE, for performing random access procedure. In one embodiment, the method includes the UE receiving a message from a network. The message includes a TTI information of Msg3. In addition, the method includes the UE transmitting a preamble to the network. The method also includes the UE receiving a Msg2 from the network for responding the preamble. The method further includes the UE performing a Msg3 transmission to the network according to the TTI information of Msg3.

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Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

CLAIMS

1. A method of a UE (User Equipment) for performing random access procedure, comprising:

the UE transmits a preamble to a network;

the UE receives a Msg2 containing a TTI (Transmission Timer Interval) information of a Msg3 from the network in response to the preamble, wherein the TTI information of the Msg3 includes a TTI duration of the Msg3 and a start timing offset of the Msg3; and

the UE performs a Msg3 transmission to the network according to the TTI information of the Msg3.

2. The method of claim 1, further comprising:

the UE selects the TTI information of the Msg3 based on random access purpose, if there are multiple TTI information of the Msg3 in the Msg2.

3. The method of claim 1, further comprising:

the UE selects the TTI information of the Msg3 based on a PRACH (Physical Random Access Channel) resource set of the preamble transmission or a preamble set of the preamble transmission, if there are multiple TTI information of the Msg3 in the Msg2.

4. The method of claim 1, further comprising:

the UE selects the TTI information of the Msg3 based on highest priority of logical channel having data available for transmission, if there are multiple TTI information of the Msg3 in the Msg2.

5. The method of claim 1, wherein the TTI information of the Msg3 is included in a RAR (Random Access Response) for responding the preamble.

6. The method of claim 1, wherein the TTI information of the Msg3 is included in a common field for multiple RARs in the Msg2.

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Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

7. The method of claim 1, wherein the Msg2 is a random access response.

8. A User Equipment (UE), comprising:

a control circuit;

a processor installed in the control circuit; and

a memory installed in the control circuit and operatively coupled to the processor;

wherein the processor is configured to execute a program code stored in the memory to:

transmit a preamble to a network;

receive a Msg2 containing a TTI (Transmission Time Interval) information of a Msg3 from the network in response to the preamble, wherein the TTI information of the Msg3 includes a TTI duration of the Msg3 and a start timing offset of the Msg3; and

perform a Msg3 transmission to the network according to the TTI information of the Msg3.

9. The UE of claim 8, wherein the processor is further configured to execute the program code stored in the memory to:

select the TTI information of the Msg3 based on random access purpose, if there are multiple TTI information of the Msg3 in the Msg2.

10. The UE of claim 8, wherein the processor is further configured to execute the program code stored in the memory to:

select the TTI information of the Msg3 based on a PRACH (Physical Random Access Channel) resource set of the preamble or a preamble set of the preamble transmission, if there are multiple TTI information of the Msg3 in the Msg2.

11. The UE of claim 8, wherein the processor is further configured to execute the program code stored in the memory to:

select the TTI information of the Msg3 based on highest priority of logical channel having available data, if there are multiple TTI information of the Msg3 in the Msg2.

12. The UE of claim 8, wherein the TTI information of the Msg3 is included in a RAR (Random Access Response) for responding the preamble.

13. The UE of claim 8, wherein the TTI information of the Msg3 is included in a common field for multiple RARs in the Msg2.

14. The UE of claim 8, wherein the Msg2 is a random access response.

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METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a Divisional of U.S. Patent Application Serial No. 15/663,674, filed July 28, 2017, which claims the benefit of U.S. Provisional Patent Application Serial No. 62/367,875 filed on July 28, 2016, the entire disclosure of which are incorporated by reference.

FIELD

[0002] This disclosure generally relates to wireless communication networks, and more particularly, to a method and apparatus for improving Msg3 transmission of random access procedure in a wireless communication system.

BACKGROUND

[0003] With the rapid rise in demand for communication of large amounts of data to and from mobile communication devices, traditional mobile voice communication networks are evolving into networks that communicate with Internet Protocol (IP) data packets. Such IP data packet communication can provide users of mobile communication devices with voice over IP, multimedia, multicast and on-demand communication services.

[0004] An exemplary network structure is an Evolved Universal Terrestrial Radio Access Network (E-UTRAN). The E-UTRAN system can provide high data throughput in order to realize the above-noted voice over IP and multimedia services. A new radio technology for the next generation (e.g., 5G) is currently being discussed by the 3GPP standards organization. Accordingly, changes to the current body of 3GPP standard are currently being submitted and considered to evolve and finalize the 3GPP standard.

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SUMMARY

[0005] A method and apparatus are disclosed, from the perspective of the UE, for performing random access procedure. In one embodiment, the method includes the UE receiving a message from a network. The message includes a TTI (Transmission Time Interval) information of Msg3. In addition, the method includes the UE transmitting a preamble to the network. The method also includes the UE receiving a Msg2 from the network for responding the preamble. The method further includes the UE performing a Msg3 transmission to the network according to the TTI information of Msg3.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] FIG. 1 shows a diagram of a wireless communication system according to one exemplary embodiment.

[0007] FIG. 2 is a block diagram of a transmitter system (also known as access network) and a receiver system (also known as user equipment or UE) according to one exemplary embodiment.

[0008] FIG. 3 is a functional block diagram of a communication system according to one exemplary embodiment.

[0009] FIG. 4 is a functional block diagram of the program code of FIG. 3 according to one exemplary embodiment.

[0010] FIG. 5 is a reproduction of Figure 10.1.5.1-1 of 3GPP TS 36.300 v13.2.0.

[0011] FIG. 6 is a reproduction of Figure 10.1.5.2-1 of 3GPP TS 36.300 v13.2.0.

[0012] FIG. 7 is a diagram according to one exemplary embodiment.

[0013] FIG. 8 is a diagram according to one exemplary embodiment.

[0014] FIG. 9 is a diagram according to one exemplary embodiment.

[0015] FIG. 10 is a diagram according to one exemplary embodiment.

[0016] FIG. 11 is a diagram according to one exemplary embodiment.

[0017] FIG. 12 is a flow chart according to one exemplary embodiment.

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[0018] FIG. 13 is a flow chart according to one exemplary embodiment.

[0019] FIG. 14 is a flow chart according to one exemplary embodiment.

[0020] FIG. 15 is a flow chart according to one exemplary embodiment.

[0021] FIG. 16 is a flow chart according to one exemplary embodiment.

[0022] FIG. 17 is a flow chart according to one exemplary embodiment.

[0023] FIG. 18 is a flow chart according to one exemplary embodiment.

[0024] FIG. 19 is a flow chart according to one exemplary embodiment.

DETAILED DESCRIPTION

[0025] The exemplary wireless communication systems and devices described below employ a wireless communication system, supporting a broadcast service. Wireless communication systems are widely deployed to provide various types of communication such as voice, data, and so on. These systems may be based on code division multiple access (CDMA), time division multiple access (TDMA), orthogonal frequency division multiple access (OFDMA), 3GPP LTE (Long Term Evolution) wireless access, 3GPP LTE-A or LTE-Advanced (Long Term Evolution Advanced), 3GPP2 UMB (Ultra Mobile Broadband), WiMax, or some other modulation techniques.

[0026] In particular, the exemplary wireless communication systems devices described below may be designed to support one or more standards such as the standard offered by a consortium named "3rd Generation Partnership Project" referred to herein as 3GPP, including: TR 38.913 v0.3.0, "Study on Scenarios and Requirements for Next Generation Access Technologies"; TS 36.300 v13.2.0, "Overall Description; Stage 2"; TS 36.913, v13.0.0, "Requirements for further advancements for Evolved Universal Terrestrial Radio Access (E-UTRA)"; TS 36.331 v13.2.0, "Radio Resource Control (RRC); Protocol specification"; TS 36.321 v13.1.0, "Medium Access Control (MAC) protocol specification"; and R2-163445, "Scheduling Framework and Requirements", Nokia and Alcatel-Lucent Shanghai Bell. The standards and documents listed above are hereby expressly incorporated by reference in their entirety.

[0027] FIG. 1 shows a multiple access wireless communication system according to one embodiment of the invention. An access network 100 (AN) includes multiple antenna groups, one including 104 and 106, another including 108 and 110, and an additional including 112 and 114. In FIG. 1, only two antennas are shown for each antenna group, however, more or fewer antennas may be utilized for each antenna group. Access terminal 116 (AT) is in communication with antennas 112 and 114, where antennas 112 and 114 transmit information to access terminal 116 over forward link 120 and receive information from access terminal 116 over reverse link 118. Access terminal (AT) 122 is in communication with antennas 106 and 108, where antennas 106 and 108 transmit information to access terminal (AT) 122 over forward link 126 and receive information from access terminal (AT) 122 over reverse link 124. In a FDD system, communication links 118, 120, 124 and 126 may use different frequency for communication. For example, forward link 120 may use a different frequency then that used by reverse link 118.

[0028] Each group of antennas and/or the area in which they are designed to communicate is often referred to as a sector of the access network. In the embodiment, antenna groups each are designed to communicate to access terminals in a sector of the areas covered by access network 100.

[0029] In communication over forward links 120 and 126, the transmitting antennas of access network 100 may utilize beamforming in order to improve the signal-to-noise ratio of forward links for the different access terminals 116 and 122. Also, an access network using beamforming to transmit to access terminals scattered randomly through its coverage causes less interference to access terminals in neighboring cells than an access network transmitting through a single antenna to all its access terminals.

[0030] An access network (AN) may be a fixed station or base station used for communicating with the terminals and may also be referred to as an access point, a Node B, a base station, an enhanced base station, an evolved Node B (eNB), or some other terminology. An access terminal (AT) may also be called user equipment (UE), a wireless communication device, terminal, access terminal or some other terminology.

[0031] FIG. 2 is a simplified block diagram of an embodiment of a transmitter system 210 (also known as the access network) and a receiver system 250 (also known as access

terminal (AT) or user equipment (UE)) in a MIMO system 200. At the transmitter system 210, traffic data for a number of data streams is provided from a data source 212 to a transmit (TX) data processor 214.

[0032] In one embodiment, each data stream is transmitted over a respective transmit antenna. TX data processor 214 formats, codes, and interleaves the traffic data for each data stream based on a particular coding scheme selected for that data stream to provide coded data.

[0033] The coded data for each data stream may be multiplexed with pilot data using OFDM techniques. The pilot data is typically a known data pattern that is processed in a known manner and may be used at the receiver system to estimate the channel response. The multiplexed pilot and coded data for each data stream is then modulated (i.e., symbol mapped) based on a particular modulation scheme (e.g., BPSK, QPSK, M-PSK, or M-QAM) selected for that data stream to provide modulation symbols. The data rate, coding, and modulation for each data stream may be determined by instructions performed by processor 230.

[0034] The modulation symbols for all data streams are then provided to a TX MIMO processor 220, which may further process the modulation symbols (e.g., for OFDM). TX MIMO processor 220 then provides N_T modulation symbol streams to N_T transmitters (TMTR) 222a through 222t. In certain embodiments, TX MIMO processor 220 applies beamforming weights to the symbols of the data streams and to the antenna from which the symbol is being transmitted.

[0035] Each transmitter 222 receives and processes a respective symbol stream to provide one or more analog signals, and further conditions (e.g., amplifies, filters, and upconverts) the analog signals to provide a modulated signal suitable for transmission over the MIMO channel. N_T modulated signals from transmitters 222a through 222t are then transmitted from N_T antennas 224a through 224t, respectively.

[0036] At receiver system 250, the transmitted modulated signals are received by N_R antennas 252a through 252r and the received signal from each antenna 252 is provided to a respective receiver (RCVR) 254a through 254r. Each receiver 254 conditions (e.g., filters, amplifies, and downconverts) a respective received signal, digitizes the conditioned signal to

provide samples, and further processes the samples to provide a corresponding "received" symbol stream.

[0037] An RX data processor 260 then receives and processes the N_R received symbol streams from N_R receivers 254 based on a particular receiver processing technique to provide N_T "detected" symbol streams. The RX data processor 260 then demodulates, deinterleaves, and decodes each detected symbol stream to recover the traffic data for the data stream. The processing by RX data processor 260 is complementary to that performed by TX MIMO processor 220 and TX data processor 214 at transmitter system 210.

[0038] A processor 270 periodically determines which pre-coding matrix to use (discussed below). Processor 270 formulates a reverse link message comprising a matrix index portion and a rank value portion.

[0039] The reverse link message may comprise various types of information regarding the communication link and/or the received data stream. The reverse link message is then processed by a TX data processor 238, which also receives traffic data for a number of data streams from a data source 236, modulated by a modulator 280, conditioned by transmitters 254a through 254r, and transmitted back to transmitter system 210.

[0040] At transmitter system 210, the modulated signals from receiver system 250 are received by antennas 224, conditioned by receivers 222, demodulated by a demodulator 240, and processed by a RX data processor 242 to extract the reserve link message transmitted by the receiver system 250. Processor 230 then determines which pre-coding matrix to use for determining the beamforming weights then processes the extracted message.

[0041] Turning to FIG. 3, this figure shows an alternative simplified functional block diagram of a communication device according to one embodiment of the invention. As shown in FIG. 3, the communication device 300 in a wireless communication system can be utilized for realizing the UEs (or ATs) 116 and 122 in FIG. 1 or the base station (or AN) 100 in FIG. 1, and the wireless communications system is preferably the LTE system. The communication device 300 may include an input device 302, an output device 304, a control circuit 306, a central processing unit (CPU) 308, a memory 310, a program code 312, and a transceiver 314. The control circuit 306 executes the program code 312 in the memory 310 through the CPU 308,

thereby controlling an operation of the communications device 300. The communications device 300 can receive signals input by a user through the input device 302, such as a keyboard or keypad, and can output images and sounds through the output device 304, such as a monitor or speakers. The transceiver 314 is used to receive and transmit wireless signals, delivering received signals to the control circuit 306, and outputting signals generated by the control circuit 306 wirelessly. The communication device 300 in a wireless communication system can also be utilized for realizing the AN 100 in FIG. 1.

[0042] FIG. 4 is a simplified block diagram of the program code 312 shown in FIG. 3 in accordance with one embodiment of the invention. In this embodiment, the program code 312 includes an application layer 400, a Layer 3 portion 402, and a Layer 2 portion 404, and is coupled to a Layer 1 portion 406. The Layer 3 portion 402 generally performs radio resource control. The Layer 2 portion 404 generally performs link control. The Layer 1 portion 406 generally performs physical connections.

[0043] One of the general objectives of the present application is to study the frame structure used in New RAT (NR) for 5G, to accommodate various type of requirement (discussed in 3GPP TR 38.913) for time and frequency resource, e.g., from ultra-low latency (~0.5 ms) to expected longer TTI (Transmission Time Interval) for MTC (Machine Type Communication), from high peak rate for eMBB (enhanced Mobile Broadband) to very low data rate for MTC. An important focus is low latency aspect, while other aspect of mixing/adapting different TTIs can also be considered in the study. In addition to diverse services and requirements, forward compatibility is an important consideration in initial NR frame structure design as not all features of NR would be included in the beginning phase/release.

[0044] 3GPP TS 36.300 includes the following random access (RA) procedure related description:

10.1.5 Random Access Procedure

The random access procedure is characterized by:

- Common procedure for FDD and TDD;

- One procedure irrespective of cell size and the number of serving cells when CA is configured;

The random access procedure is performed for the following events related to the PCell:

- Initial access from RRC_IDLE;
- RRC Connection Re-establishment procedure;
- Handover;
- DL data arrival during RRC_CONNECTED requiring random access procedure:
  - E.g. when UL synchronisation status is "non-synchronised".
- UL data arrival during RRC_CONNECTED requiring random access procedure:
  - E.g. when UL synchronisation status is "non-synchronised" or there are no PUCCH resources for SR available.
- For positioning purpose during RRC_CONNECTED requiring random access procedure;
  - E.g. when timing advance is needed for UE positioning.

The random access procedure is also performed on a SCell to establish time alignment for the corresponding sTAG.

In DC, the random access procedure is also performed on at least PSCell upon SCG addition/modification, if instructed, or upon DL/UL data arrival during RRC_CONNECTED requiring random access procedure. The UE initiated random access procedure is performed only on PSCell for SCG.

Furthermore, the random access procedure takes two distinct forms:

- Contention based (applicable to first five events);
- Non-contention based (applicable to only handover, DL data arrival, positioning and obtaining timing advance alignment for a sTAG).

Normal DL/UL transmission can take place after the random access procedure.

An RN supports both contention-based and non-contention-based random access. When an RN performs the random access procedure, it suspends any current RN subframe configuration, meaning it temporarily disregards the RN subframe configuration. The RN subframe configuration is resumed at successful random access procedure completion.

10.1.5.1 Contention based random access procedure

The contention based random access procedure is outlined on Figure 10.1.5.1-1 below:

[Figure 10.1.5.1-1 of 3GPP TS 36.300 v13.2.0 is reproduced as FIG. 5]

The four steps of the contention based random access procedures are:

1) Random Access Preamble on RACH in uplink:
   - There are two possible groups defined and one is optional. If both groups are configured the size of message 3 and the pathloss are used to determine which group a preamble is selected from. The group to which a preamble belongs provides an indication of the size of the message 3 and the radio conditions at the UE. The preamble group information along with the necessary thresholds are broadcast on system information.
2) Random Access Response generated by MAC on DL-SCH:
   - Semi-synchronous (within a flexible window of which the size is one or more TTI) with message 1;
   - No HARQ;
   - Addressed to RA-RNTI on PDCCH;
   - Conveys at least RA-preamble identifier, Timing Alignment information for the pTAG, initial UL grant and assignment of Temporary C-RNTI (which may or may not be made permanent upon Contention Resolution);
   - Intended for a variable number of UEs in one DL-SCH message.
3) First scheduled UL transmission on UL-SCH:
   - Uses HARQ;
   - Size of the transport blocks depends on the UL grant conveyed in step 2.
   - For initial access:
     - Conveys the RRC Connection Request generated by the RRC layer and transmitted via CCCH;

- Conveys at least NAS UE identifier but no NAS message;
- RLC TM: no segmentation.

- For RRC Connection Re-establishment procedure:
  - Conveys the RRC Connection Re-establishment Request generated by the RRC layer and transmitted via CCCH;
  - RLC TM: no segmentation;
  - Does not contain any NAS message.
- After handover, in the target cell:
  - Conveys the ciphered and integrity protected RRC Handover Confirm generated by the RRC layer and transmitted via DCCH;
  - Conveys the C-RNTI of the UE (which was allocated via the Handover Command);
  - Includes an uplink Buffer Status Report when possible.
- For other events:
  - Conveys at least the C-RNTI of the UE.

4) Contention Resolution on DL:
   - Early contention resolution shall be used i.e. eNB does not wait for NAS reply before resolving contention;
   - Not synchronised with message 3;
   - HARQ is supported;
   - Addressed to:
     - The Temporary C-RNTI on PDCCH for initial access and after radio link failure;
     - The C-RNTI on PDCCH for UE in RRC_CONNECTED.
   - HARQ feedback is transmitted only by the UE which detects its own UE identity, as provided in message 3, echoed in the Contention Resolution message;
   - For initial access and RRC Connection Re-establishment procedure, no segmentation is used (RLC-TM).

The Temporary C-RNTI is promoted to C-RNTI for a UE which detects RA success and does not already have a C-RNTI; it is dropped by others. A UE which detects RA success and already has a C-RNTI, resumes using its C-RNTI.

When CA is configured, the first three steps of the contention based random access procedures occur on the PCell while contention resolution (step 4) can be cross-scheduled by the PCell.

When DC is configured, the first three steps of the contention based random access procedures occur on the PCell in MCG and PSCell in SCG. When CA is configured in SCG, the first three steps of the contention based random access procedures occur on the PSCell while contention resolution (step 4) can be cross-scheduled by the PSCell.

10.1.5.2 Non-contention based random access procedure

The non-contention based random access procedure is outlined on Figure 10.1.5.2-1 below:

[Figure 10.1.5.2-1 of 3GPP TS 36.300 v13.2.0 is reproduced as FIG. 6]

The three steps of the non-contention based random access procedures are:

0) Random Access Preamble assignment via dedicated signalling in DL:
   - eNB assigns to UE a non-contention Random Access Preamble (a Random Access Preamble not within the set sent in broadcast signalling).
   - Signalled via:
     - HO command generated by target eNB and sent via source eNB for handover;
     - PDCCH in case of DL data arrival or positioning;
     - PDCCH for initial UL time alignment for a sTAG.
1) Random Access Preamble on RACH in uplink:
   - UE transmits the assigned non-contention Random Access Preamble.
2) Random Access Response on DL-SCH:
   - Semi-synchronous (within a flexible window of which the size is two or more TTIs) with message 1;
   - No HARQ;

- Addressed to RA-RNTI on PDCCH;
- Conveys at least:
  - Timing Alignment information and initial UL grant for handover;
  - Timing Alignment information for DL data arrival;
  - RA-preamble identifier;
  - Intended for one or multiple UEs in one DL-SCH message.

When performing non-contention based random access on the PCell while CA is configured, the Random Access Preamble assignment via PDCCH of step 0, step 1 and 2 of the non-contention based random access procedure occur on the PCell. In order to establish timing advance for a sTAG, the eNB may initiate a non-contention based random access procedure with a PDCCH order (step 0) that is sent on a scheduling cell of activated SCell of the sTAG. Preamble transmission (step 1) is on the indicated SCell and Random Access Response (step 2) takes place on PCell.

When performing non-contention based random access on the PCell or PSCell while DC is configured, the Random Access Preamble assignment via PDCCH of step 0, step 1 and 2 of the non-contention based random access procedure occur on the corresponding cell. In order to establish timing advance for a sTAG, the eNB may initiate a non-contention based random access procedure with a PDCCH order (step 0) that is sent on a scheduling cell of activated SCell of the sTAG not including PSCell. Preamble transmission (step 1) is on the indicated SCell and Random Access Response (step 2) takes place on PCell for MCG and PSCell for SCG.

[0045] Details of each random access step and related control element are described in Sections 5.1, 5.4, 6, and 7 of 3GPP TS 36.321. Furthermore, some configurations for random access and obtaining procedure are discussed in 3GPP 36.331.

[0046] One NR requirement listed in 3GPP TR 38.913 lists the following NR requirement: "*Control plane latency refers to the time to move from a battery efficient state (e.g., IDLE) to start of continuous data transfer (e.g., ACTIVE). The target for control plane latency should be **10ms***." Regarding similar requirement in LTE, the control plane latency requirement is set to 50ms (as discussed in 3GPP TS 36.913). There is a huge gap between latency

requirement of LTE and latency requirement of NR. Therefore, it would be better to reduce possible transmission and processing latency as much as possible. As discussed below, the present application first focuses on random access latency.

[0047] In LTE, there are two kinds of random access procedure, contention and non-contention. The contention random access procedure consists of 4 steps, including: Msg1, Msg2, Msg3, and Msg4. FIG. 5 is an exemplary embodiment for the contention random access. The Msg1 and Msg3 are transmitted from a UE to a network. And the resource for performing Msg1 transmission and Msg3 transmission are contention resource. If the network can successfully receive a Msg3, the network could identify the UE based on contents in Msg3, and transmit a Msg4 to the UE for finishing the contention.

[0048] On the other hand, a dynamic TTI adjusting concept is discussed in 3GPP R2-163445, which proposes to set the TTI size per scheduling grant for optimizing TCP (Transmission Control Protocol) transmission case. In particular, short TTI can be used to accelerate TCP slow start process, and long TTI can be used in steady transmission rate state for reduce control signaling overhead.

[0049] Considering such dynamic TTI concept, the present application further discusses whether it can also be used to accelerate random access procedure and how to achieve dynamic TTI change in random access. The following discussion mainly focuses on the Msg3 transmission step in a random access procedure. In addition, the discussion below does not include UE's RF/Baseband capability differentiation (e.g., differentiation between normal cell phone in LTE and NB-IoT devices in LTE) case.

[0050] In LTE, there could be three different random access configurations in LTE system. The first configuration is generally for normal UEs with enough RF/Baseband capability to monitor whole system bandwidth (e.g., cell phones, high end MTC devices). The second configuration is generally for low-end MTC devices and normal UEs with enough RF/Baseband capability but worked in power limited condition. The third configuration is generally for NB-IoT (Narrow Band-Internet of Thing) UEs which pool RF/Baseband capability and can only perform transmission/reception on a narrow band (e.g., 1.4MHz). The last configuration is generally defined as a new RAT (Radio Access Technology). Normally, low-end MTC devices

will only worked on the second configuration, and NB-IoT devices will work only on the third configuration. For a normal UE with enough RF/Baseband capability, the UE will only change RA configuration when it enters the power limited state (e.g., cell edge or even far away).

[0051] If short TTI applies to Msg3 transmission, the average random access latency could be reduced due to early start to monitor Msg4. A possible case for such benefit is shown in FIG. 7. As shown in FIG. 7, although the processing delay is a fixed period, the UE could start to receive Msg4 earlier owing to early Msg3 transmission. Moreover, two possibilities for monitoring Msg4 are shown in FIG. 7. The UE may expect either TTI format if the TTI length information is not be carried in scheduling control signal. Otherwise, the UE may expect multiple possibilities of TTI length.

[0052] Another possible benefit may be improving resource efficiency. If the dynamic TTI concept is applied to Msg3, the network can more flexibly adjust resource allocation. In LTE, the TTI length for Msg3 is fixed. In the same modulation scheme condition, LTE system could only schedule radio resource in PRB level, while NR may be able to schedule in symbol level.

[0053] To achieve dynamic TTI concept, a UE needs to derive TTI information (e.g., TTI length, numerology) for transmitting Msg3 on air interface. In this aspect, possible candidates for the UE are proposed to obtain such information. One or multiple solutions can be applied in a NR system.

[0054] **Solution 1 – RAR (Random Access Response).** In LTE, Msg3 transmission is scheduled by UL grant field in RAR. A RAR is a response for a preamble transmitted at a Msg1 transmission opportunity from UE(s). The format of RAR in LTE is shown in FIG. 8.

[0055] The Msg3 transmission is scheduled according to UL (Uplink) grant field in the RAR. In this solution, additional TTI information is added into RAR for scheduling Msg3. In one embodiment, the new TTI information can be a new field in RAR or a new field in Msg2 for a specific preamble or added into UL grant field. A possible exemplary embodiment is shown in FIG. 9.

[0056] **Solution 2 – Common field in Msg2.** In Solution 2, the TTI information is also carried in Msg2 similar to Solution 1. The Msg2 may include multiple RARs. And sub-header of a RAR will indicate the RAR is for which preamble. However, since the TTI length has limited choices, there may be no need to repeatedly include the redundant information. Hence, it is proposed to use common field(s) in Msg2 to carry TTI information. A possible example is shown in FIG. 10. The TTI information 1 could be provided to preamble set 1 (e.g., rapid 0~20), and the TTI information 2 could be provided to preamble set 2 (e.g., rapid 21~40).

[0057] The TTI information carried in a common field will be applied to UEs performed different Msg1 transmission (e.g., different preamble). The different Msg1 transmissions are differentiable by receiving side in Code domain and/or Time domain and/or Frequency domain. Preferably, the common field(s) may be carried as control element. Alternatively, the common field(s) may be carried as part of MAC (sub-)header, as data (e.g., RRC configuration), or in control signal (e.g., PDCCH signal) for scheduling Msg2.

[0058] If multiple common fields are included in a Msg2, a UE could select one of them to apply to Msg3 transmission. In one embodiment, the UE could select common field based on its Msg1 transmission (e.g., preamble group set in RA configuration used by Msg1, PRACH resource set in RA configuration used by Msg1, Msg1 length or format, RA configuration used by Msg1, etc.). The UE could also select common field based on service types (e.g., URLLC, eMBB, delay sensitive, ...). For example, if the UE triggers RA for transmitting a specific service type data (e.g., URLLC service type), then the UE could select common field for the specific service type. Moreover, the UE may understand the data belonging to which service type based on a service type indication (similar to logical channel priority) in configuration of logical channel/RB having available data. The service type indication may be used in multiplexing procedure. For instance, the UE may not multiplex data with different service type indications into a TB for transmission. Alternatively, the UE may understand the data belonging to which service type based on header field of the data (e.g., RLC header field, PDCP field), or based on delivering user plane protocol type/category (e.g., category 1 maps to URLLC). As an example, if the UE triggers RA when the UE has registered/authorized for URLLC service type, the UE could select common field for URLLC service type. As another example, if higher layer (e.g., NAS layer, application layer, RRC layer) in a UE sends a service indication to lower

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layer(e.g., MAC, PHY) in the UE when the UE triggers and/or performs RA, the UE could select common field based on the service type indicated by the service indication.

[0059] In one embodiment, the UE selects common field based on random access purpose (e.g., request system information, paging, positioning, location update, control plane establishment, beam recovery, etc.). And the random access purpose may be indicated by higher layer (e.g. NAS, RRC, application layer) in the UE.

[0060] In one embodiment, the UE selects common field based on potential Msg3 size. For example, if the pending available data in a UE larger than a threshold when a UE is performing RA, the UE selects common field for potential message size larger than the threshold.

[0061] In one embodiment, the UE selects common field based on its DL measurement, based on connection establishment cause (e.g., emergency call, mo-data, mt-data, …), based on its current power ramping result (e.g., ramping over threshold times or threshold power, changing based on mapping table between ramping steps and TTI information), based on UE priority (e.g., access class, etc.) provided from network or UE subscription, or based on Msg3 contents (e.g., which type control element could be included, BSR reporting for which LCG or which RB/LC, data from which user plane protocol stock, data from which radio bearer, data from which logical channel, …). For example, if Msg3 could include data from a specific (set of) LC or RB (e.g. URLLC type RB, CCCH, …), the UE could select common field related to the LC or RB based on the UE's configuration(e.g., association between LC/RB and random access configuration, association between LC/RB and service configuration, association between LC/RB and transport channel configuration, etc). As another example, if Msg3 could include a special control element/special message, the UE could select common field related to the special control element/message. Preferably, the UE will select another common field if the Msg3 doesn't include the special control element and/or the special message (e.g., RRC message).

[0062] In one embodiment, the UE selects common field based on highest priority of radio bearers having available data. For example, the UE has available data belonging to radio bearer with priority 2 and priority 8 when the UE is performing RA. The UE could select common field based on whether priority 2 is over a threshold or not.

[0063] In one embodiment, the UE selects common field based on highest priority of logical channels having available data, or based on which user plane protocol stock (e.g., URLLC or eMBB type user plane protocol, protocol stock category/index 1 or 2, …) performing the random access.

[0064] **Solution 3 – Broadcast Information**. In Solution 3, a UE could derive TTI length for Msg3 transmission through a broadcast message (e.g., system information(s), MIB, etc.) from a network (e.g., gNB, base station, TRP, etc.). If multiple TTI information for Msg3 transmission are included in the broadcast message, a UE could select one of them to apply to Msg3 transmission.

[0065] In one embodiment, the UE selects TTI information in the broadcast message based on its Msg1 transmission (e.g., preamble group set in RA configuration used by Msg1, PRACH resource set in RA configuration used by Msg1, Msg1 length or format, RA configuration used by Msg1, etc.). For example, if the UE triggers RA for transmitting a specific service type data (e.g., URLLC service type), then the UE could select TTI information in the broadcast message for the specific service type. Moreover, the UE may understand the data belonging to which service type based on a service type indication (similar to logical channel priority) in configuration of logical channel/RB having available data.

[0066] The service type indication may be used in multiplexing procedure. For instance, the UE may not multiplex data with different service type indications into a TB for transmission. Alternatively, the UE may understand the data belonging to which service type based on header field of the data (e.g., RLC header field, PDCP field). The UE may also understand the data belonging to which service type based on delivering user plane protocol type/category (e.g., category 1 maps to URLLC). As another example, if the UE triggers RA when the UE has registered/authorized for URLLC service type, the UE could select TTI information in the broadcast message for URLLC service type. As a further example, if higher layer (e.g., NAS layer, application layer, RRC layer) in a UE sends a service indication to lower layer(e.g., MAC, PHY) in the UE when the UE triggers and/or performs RA, the UE could select TTI information in the broadcast message based on the service type indicated by the service indication.

[0067] In one embodiment, the UE selects TTI information in the broadcast message

based on random access purpose (e.g., request broadcast message, paging, positioning, location update, control plane establishment, beam recovery, etc.). And the random access purpose may be indicated by higher layer (e.g., NAS, RRC, application layer) in the UE.

[0068] In one embodiment, the UE selects TTI information in the broadcast message based on potential Msg3 size. For example, if the pending available data in the UE larger than a threshold when the UE is performing RA, the UE selects TTI information in the broadcast message for potential message size larger than the threshold.

[0069] In one embodiment, the UE selects TTI information in the broadcast message based on its DL measurement, based on connection establishment cause (e.g., emergency call, mo-data, mt-data, …), based on its current power ramping result (e.g., ramping over threshold times or threshold power, changing based on mapping table between ramping steps and TTI information), based on UE priority provided from network or UE subscription (e.g., access class, etc.), or based on Msg3 contents (e.g., which type control element could be included, BSR reporting for which LCG or which RB/LC, data from which user plane protocol stock, data from which radio bearer, data from which logical channel, …). For example, if Msg3 could include data from a specific or a set of LC or RB (e.g., URLLC type RB, CCCH, …), the UE could select TTI information in the broadcast message related to the LC or RB based on the UE's configuration. As another example, if Msg3 could include a special control element / special message, the UE could select TTI information in the broadcast message related to the special control element/message. Preferably, the UE will select another TTI information if the Msg3 doesn't include the special control element and/or the special message (e.g., RRC message).

[0070] In one embodiment, the UE selects TTI information in the broadcast message based on highest priority of radio bearers having available data. For example, the UE has available data belonging to radio bearer with priority 2 and priority 8 when the UE is performing RA. The UE could select TTI information in the broadcast message based on whether priority 2 is over a threshold or not.

[0071] In one embodiment, the UE selects TTI information in the broadcast message based on highest priority of logical channels having available data, or based on which user plane protocol stock (e.g., URLLC or eMBB type user plane protocol, protocol stock category/index 1

or 2, …) performing the random access.

[0072] **Solution 4 – Dedicated message.** In Solution 4, a UE could derive TTI length for Msg3 transmission through a dedicated message (e.g., RRC reconfiguration message, paging message, PDCCH for initiating RA, …) from a network. If multiple TTI information for Msg3 transmission are (implicitly or explicitly) included in the dedicated message, a UE could select one of them to apply to Msg3 transmission.

[0073] In one embodiment, the UE selects TTI information in dedicated message based on its Msg1 transmission (e.g., preamble group set in RA configuration used by Msg1, PRACH resource set in RA configuration used by Msg1, Msg1 length or format, RA configuration used by Msg1, etc.). For example, if the UE triggers RA for transmitting a specific service type data (e.g., URLLC service type), then the UE could select TTI information in dedicated message for the specific service type. Moreover, the UE may understand the data belonging to which service type based on a service type indication (similar to logical channel priority) in configuration of logical channel/RB having available data. The service type indication may be used in multiplexing procedure. For instance, the UE may not multiplex data with different service type indications into a TB for transmission. Alternatively, the UE may understand the data belonging to which service type based on header field of the data (e.g., RLC header field, PDCP field)), or based on delivering user plane protocol type/category (e.g., category 1 maps to URLLC).

[0074] As another example, if the UE triggers RA when the UE has registered/authorized for URLLC service type, the UE could select TTI information in the dedicated message for URLLC service type. As a further example, if higher layer (e.g., NAS layer, application layer, RRC layer) in the UE sends a service indication to lower layer(e.g., MAC, PHY) in the UE when the UE triggers and/or performs RA, the UE could select TTI information in the dedicated message based on the service type indicated by the service indication.

[0075] In one embodiment, the UE selects TTI information in the dedicated message based on random access purpose (e.g., request system information, paging, positioning, location update, control plane establishment, beam recovery, etc.). And the random access purpose may be indicated by higher layer (e.g., NAS, RRC, application layer) in the UE.

[0076] In one embodiment, the UE selects TTI information in the dedicated message based on potential Msg3 size. For example, if the pending available data in the UE larger than a threshold when the UE is performing RA, the UE selects TTI information in the dedicated message for potential message size larger than the threshold.

[0077] In one embodiment, the UE selects TTI information in the dedicated message based on its DL measurement, based on connection establishment cause (e.g., emergency call, mo-data, mt-data, …), based on its current power ramping result (e.g., ramping over threshold times or threshold power, changing based on mapping table between ramping steps and TTI information), based on UE priority provided from network or UE subscription (e.g., access class, etc.), or based on Msg3 contents (e.g., which type control element could be included, BSR reporting for which LCG or which RB/LC, data from which user plane protocol stock, data from which radio bearer, data from which logical channel, …). For example, if Msg3 could include data from a specific (set of) LC or RB (e.g. URLLC type RB, CCCH, …), the UE could select TTI information in dedicated message related to the LC or RB based on the UE's configuration. As another example, if Msg3 could include a special control element/special message, the UE could select TTI information in the dedicated message related to the special control element/message. Preferably, the UE will select another TTI information if the Msg3 doesn't include the special control element and/or the special message (e.g., RRC message).

[0078] In one embodiment, the UE selects TTI information in the dedicated message based on highest priority of radio bearers having available data. For example, the UE has available data belonging to radio bearer with priority 2 and priority 8 when the UE is performing RA. The UE could select TTI information in dedicated message based on whether priority 2 is over a threshold or not.

[0079] In one embodiment, the UE selects TTI information in the dedicated message based on highest priority of logical channels having available data, or based on which user plane protocol stock (e.g., URLLC or eMBB type user plane protocol, protocol stock category/index 1 or 2, …) performing the random access.

[0080] **Solution 5 – Implicitly derive from Msg2 Transmission.** In this solution, a UE could derive TTI length for Msg3 transmission based on implicit information of Msg2. In one

embodiment, a UE derives TTI length based on TTI length used by Msg2. The TTI duration of Msg3 transmission may be N times of TTI duration of Msg2. N value can be integer or decimal. The N value may be obtained by the UE based on one or multiple solutions mentioned above. For example, the UE may obtain the N value through the broadcast message from a network. And the UE could overwrite the N value provided in the broadcast message, if the UE receives another N value in a dedicated message.

[0081] In another embodiment, a UE derives TTI length based on frequency carrier used by Msg2. Each frequency carrier may have corresponding different TTI lengths. The corresponding TTI information may be predefined and/or provided through system information and/or dedicated RRC message.

[0082] *Msg3 start timing offset* - In LTE, there is a fixed gap period between Msg2 reception and Msg3 transmission. The fixed gap period is designed for covering UE's Msg2/3 processing time (e.g., decode, (de-)multiplexing transport block). However, in NR, some possible methods can bring benefits to reduce such fixed gap period. For example, if short TTI is applied to both Msg2/Msg3 transmissions as FIG. 11, the minimum of the fixed gap between Msg2 and Msg3 can be set to short TTI. Otherwise, the minimum gap could only be set to normal sub-frame length like without short TTI case.

[0083] There are also many other ways to reduce processing time (e.g., provision TB size). These methods will bring some benefits, as well as some limitations and/or complexity. As a conclusion, we think that it could be beneficial for network be capable to decide the length of gap period. For achieving the concept, a UE will need to know the gap information (or called Msg3 start timing offset) by information provided from network. The possible solutions are listed below.

[0084] **Solution 1 – RAR (Random Access Response).** In LTE, Msg3 transmission is scheduled by UL grant field in RAR. A RAR is a response for a preamble transmitted at a Msg1 transmission opportunity from UE(s). The format of RAR in LTE is shown in FIG. 8.

[0085] The Msg3 transmission is scheduled according to UL (Uplink) grant field in the RAR. In this solution, additional information is added into RAR for adjusting Msg3 start timing

offset. In one embodiment, the additional information can be a new field in RAR or a new field in Msg2 for a specific preamble or added into UL grant field.

[0086] **Solution 2 – Common field in Msg2.** In Solution 2, the Msg3 start timing offset is also carried in Msg2 similar to Solution 1. The Msg2 may include multiple RARs. And MAC sub-header of a RAR will indicate the RAR is for which preamble. However, since the TTI length has limited choices, there may be no need to repeatedly include the redundant information. Hence, it is proposed to use common field(s) in Msg2 to carry Msg3 start timing offset.

[0087] The Msg3 start timing offset carried in a common field will be applied to UEs performed different Msg1 transmission (e.g., different preamble). The different Msg1 transmissions are differentiable by receiving side in Code domain and/or Time domain and/or Frequency domain. Preferably, the common field(s) may be carried as control element. Alternatively, the common field(s) may be carried as part of MAC (sub-)header, as data (e.g., RRC configuration), or in control signal (e.g., PDCCH signal) for scheduling Msg2.

[0088] If multiple common fields are included in a Msg2, a UE could select one of them to apply to Msg3 transmission. In one embodiment, the UE could select common field based on its Msg1 transmission (e.g., preamble group set in RA configuration used by Msg1, PRACH resource set in RA configuration used by Msg1, Msg1 length or format, RA configuration used by Msg1, etc.). The UE could also select common field based on service types (e.g., URLLC, eMBB, delay sensitive, ...). For example, if the UE triggers RA for transmitting a specific service type data (e.g., URLLC service type), then the UE could select common field for the specific service type. Moreover, the UE may understand the data belonging to which service type based on a service type indication (similar to logical channel priority) in configuration of logical channel/RB having available data. The service type indication may be used in multiplexing procedure. For instance, the UE may not multiplex data with different service type indications into a TB for transmission.

[0089] Alternatively, the UE may understand the data belonging to which service type based on header field of the data (e.g., RLC header field, PDCP field), or based on delivering user plane protocol type/category (e.g., category 1 maps to URLLC). As an example, if the UE

triggers RA when the UE has registered/authorized for URLLC service type, the UE could select common field for URLLC service type. As another example, if higher layer (e.g., NAS layer, application layer, RRC layer) in a UE sends a service indication to lower layer(e.g., MAC, PHY) in the UE when the UE triggers and/or performs RA, the UE could select common field based on the service type indicated by the service indication.

[0090] In one embodiment, the UE selects common field based on random access purpose (e.g., request system information, paging, positioning, location update, control plane establishment, beam recovery, etc.). And the random access purpose may be indicated by higher layer (e.g., NAS, RRC, application layer) in the UE.

[0091] In one embodiment, the UE selects common field based on potential Msg3 size. For example, if the pending available data in a UE larger than a threshold when a UE is performing RA, the UE selects common field for potential message size larger than the threshold.

[0092] In one embodiment, the UE selects common field based on its DL measurement, based on connection establishment cause (e.g., emergency call, mo-data, mt-data, …), based on its current power ramping result (e.g., ramping over threshold times or threshold power, changing based on mapping table between ramping steps and Msg3 start timing offset), based on UE priority (e.g., access class, etc.) provided from network or UE subscription, or based on Msg3 contents (e.g., which type control element could be included, BSR reporting for which LCG or which RB/LC, data from which user plane protocol stock, data from which radio bearer, data from which logical channel, …). For example, if Msg3 could include data from a specific (set of) LC or RB (e.g. URLLC type RB, CCCH, …), the UE could select common field related to the LC or RB based on the UE's configuration (e.g., association between LC/RB and random access configuration, association between LC/RB and service configuration, association between LC/RB and transport channel configuration, etc.). As another example, if Msg3 could include a special control element / special message, the UE could select common field related to the special control element/message. Preferably, the UE will select another common field if the Msg3 doesn't include the special control element and/or the special message (e.g., RRC message).

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[0093] In one embodiment, the UE selects common field based on highest priority of radio bearers having available data. For example, the UE has available data belonging to radio bearer with priority 2 and priority 8 when the UE is performing RA. The UE could select common field based on whether priority 2 is over a threshold or not.

[0094] In one embodiment, the UE selects common field based on highest priority of logical channels having available data, or based on which user plane protocol stock (e.g., URLLC or eMBB type user plane protocol, protocol stock category/index 1 or 2, …) performing the random access.

[0095] **Solution 3 – Broadcast Information**. In Solution 3, a UE could derive Msg3 start timing offset for Msg3 transmission through a broadcast message (e.g., system information(s), MIB, etc.) from a network (e.g., gNB, base station, TRP, etc.). If multiple Msg3 start timing offsets for Msg3 transmission are included in the broadcast message, a UE could select one of them to apply to Msg3 transmission.

[0096] In one embodiment, the UE selects Msg3 start timing offsets in the broadcast message based on its Msg1 transmission (e.g., preamble group set in RA configuration used by Msg1, PRACH resource set in RA configuration used by Msg1, Msg1 length or format, RA configuration used by Msg1, etc.), or based on service types (e.g., URLLC, eMBB, delay sensitive, ...). For example, if the UE triggers RA for transmitting a specific service type data (e.g., URLLC service type), then the UE could select Msg3 start timing offset in the broadcast message for the specific service type. Moreover, the UE may understand the data belonging to which service type based on a service type indication (similar to logical channel priority) in configuration of logical channel/RB having available data.

[0097] The service type indication may be used in multiplexing procedure. For instance, the UE may not multiplex data with different service type indications into a TB for transmission. Alternatively, the UE may understand the data belonging to which service type based on header field of the data (e.g., RLC header field, PDCP field). The UE may also understand the data belonging to which service type based on delivering user plane protocol type/category (e.g., category 1 maps to URLLC). As another example, if the UE triggers RA when the UE has registered/authorized for URLLC service type, the UE could select Msg3 start timing offset in

the broadcast message for URLLC service type. As a further example, if higher layer (e.g., NAS layer, application layer, RRC layer) in a UE sends a service indication to lower layer(e.g., MAC, PHY) in the UE when the UE triggers and/or performs RA, the UE could select Msg3 start timing offset in the broadcast message based on the service type indicated by the service indication.

[0098] In one embodiment, the UE selects Msg3 start timing offset in the broadcast message based on random access purpose (e.g., request broadcast message, paging, positioning, location update, control plane establishment, beam recovery, etc.). And the random access purpose may be indicated by higher layer (e.g., NAS, RRC, application layer) in the UE.

[0099] In one embodiment, the UE selects Msg3 start timing offset in the broadcast message based on potential Msg3 size. For example, if the pending available data in the UE larger than a threshold when the UE is performing RA, the UE selects Msg3 start timing offset in the broadcast message for potential message size larger than the threshold.

[00100] In one embodiment, the UE selects Msg3 start timing offset in the broadcast message based on its DL measurement, based on connection establishment cause (e.g., emergency call, mo-data, mt-data, …), based on its current power ramping result (e.g., ramping over threshold times or threshold power, changing based on mapping table between ramping steps and Msg3 start timing offset), based on UE priority provided from network or UE subscription (e.g., access class, etc.), or based on Msg3 contents (e.g., which type control element could be included, BSR reporting for which LCG or which RB/LC, data from which user plane protocol stock, data from which radio bearer, data from which logical channel, …). For example, if Msg3 could include data from a specific or a set of LC or RB (e.g., URLLC type RB, CCCH, …), the UE could select Msg3 start timing offset in the broadcast message related to the LC or RB based on the UE's configuration. As another example, if Msg3 could include a special control element / special message, the UE could select Msg3 start timing offset in the broadcast message related to the special control element/message. Preferably, the UE will select another Msg3 start timing offset if the Msg3 doesn't include the special control element and/or the special message (e.g., RRC message).

[00101] In one embodiment, the UE selects Msg3 start timing offset in the broadcast

message based on highest priority of radio bearers having available data. For example, the UE has available data belonging to radio bearer with priority 2 and priority 8 when the UE is performing RA. The UE could select Msg3 start timing offset in the broadcast message based on whether priority 2 is over a threshold or not.

[00102] In one embodiment, the UE selects Msg3 start timing offset in the broadcast message based on highest priority of logical channels having available data, or based on which user plane protocol stock (e.g., URLLC or eMBB type user plane protocol, protocol stock category/index 1 or 2, …) performing the random access.

[00103] **Solution 4 – Dedicated message.** In Solution 4, a UE could derive Msg3 start timing offset for Msg3 transmission through a dedicated message (e.g., RRC reconfiguration message, paging message, PDCCH for initiating RA, …) from a network. If multiple Msg3 start timing offsets for Msg3 transmission are (implicitly or explicitly) included in the dedicated message, a UE could select one of them to apply to Msg3 transmission.

[00104] In one embodiment, the UE selects Msg3 start timing offset in dedicated message based on its Msg1 transmission (e.g., preamble group set in RA configuration used by Msg1, PRACH resource set in RA configuration used by Msg1, Msg1 length or format, RA configuration used by Msg1, etc), or based on service types (e.g., URLLC, eMBB, delay sensitive, ...). For example, if the UE triggers RA for transmitting a specific service type data (e.g., URLLC service type), then the UE could select Msg3 start timing offset in dedicated message for the specific service type. Moreover, the UE may understand the data belonging to which service type based on a service type indication (similar to logical channel priority) in configuration of logical channel/RB having available data. The service type indication may be used in multiplexing procedure. For instance, the UE may not multiplex data with different service type indications into a TB for transmission. Alternatively, the UE may understand the data belonging to which service type based on header field of the data (e.g., RLC header field, PDCP field)), or based on delivering user plane protocol type/category (e.g., category 1 maps to URLLC).

[00105] As another example, if the UE triggers RA when the UE has registered/authorized for URLLC service type, the UE could select Msg3 start timing offset in the dedicated message

for URLLC service type. As a further example, if higher layer (e.g., NAS layer, application layer, RRC layer) in the UE sends a service indication to lower layer (e.g., MAC, PHY) in the UE when the UE triggers and/or performs RA, the UE could select Msg3 start timing offset in the dedicated message based on the service type indicated by the service indication.

[00106] In one embodiment, the UE selects Msg3 start timing offset in the dedicated message based on random access purpose (e.g., request system information, paging, positioning, location update, control plane establishment, beam recovery, etc.). And the random access purpose may be indicated by higher layer (e.g., NAS, RRC, application layer) in the UE.

[00107] In one embodiment, the UE selects Msg3 start timing offset in the dedicated message based on potential Msg3 size. For example, if the pending available data in the UE larger than a threshold when the UE is performing RA, the UE selects Msg3 start timing offset in the dedicated message for potential message size larger than the threshold.

[00108] In one embodiment, the UE selects Msg3 start timing offset in the dedicated message based on its DL measurement, based on connection establishment cause (e.g., emergency call, mo-data, mt-data, …), based on its current power ramping result (e.g., ramping over threshold times or threshold power, changing based on mapping table between ramping steps and Msg3 start timing offset), based on UE priority provided from network or UE subscription (e.g., access class, etc), or based on Msg3 contents (e.g., which type control element could be included, BSR reporting for which LCG or which RB/LC, data from which user plane protocol stock, data from which radio bearer, data from which logical channel, …). For example, if Msg3 could include data from a specific (set of) LC or RB (e.g., URLLC type RB, CCCH, …), the UE could select Msg3 start timing offset in dedicated message related to the LC or RB based on the UE's configuration. As another example, if Msg3 could include a special control element / special message, the UE could select Msg3 start timing offset in the dedicated message related to the special control element/message. Preferably, the UE will select another Msg3 start timing offset if the Msg3 doesn't include the special control element and/or the special message (e.g., RRC message).

[00109] In one embodiment, the UE selects Msg3 start timing offset in the dedicated message based on highest priority of radio bearers having available data. For example, the UE

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has available data belonging to radio bearer with priority 2 and priority 8 when the UE is performing RA. The UE could select Msg3 start timing offset in dedicated message based on whether priority 2 is over a threshold or not.

[00110] In one embodiment, the UE selects Msg3 start timing offset in the dedicated message based on highest priority of logical channels having available data, or based on which user plane protocol stock (e.g., URLLC or eMBB type user plane protocol, protocol stock category/index 1 or 2, …) performing the random access.

[00111] **Solution 5 – Implicitly derive from Msg2 Transmission.** In this solution, a UE could derive Msg3 start timing offset for Msg3 transmission based on implicit information of Msg2. In one embodiment, a UE derives Msg3 start timing offset based on start timing offset used by Msg2. The Msg3 start timing offset of Msg3 transmission may be N times of start timing offset of Msg2. N value can be integer or decimal. The N value may be obtained by the UE based on one or multiple solutions mentioned above. For example, the UE may obtain the N value through the broadcast message from a network. And the UE could overwrite the N value provided in the broadcast message, if the UE receives another N value in a dedicated message.

[00112] In another embodiment, a UE derives Msg3 start timing offset based on frequency carrier used by Msg2. Each frequency carrier may have corresponding different Msg3 start timing offsets. The corresponding Msg3 start timing offset may be predefined and/or provided through system information and/or dedicated RRC message.

[00113] The Msg3 start timing offset can be derived through the solution 1 to 5 mentioned above or combination of those solutions, while Msg3 start timing offset and TTI information of Msg3 can apply the same or different solutions. The Msg3 start timing offset can be indicated in TTI duration, numerology, symbol, slot, microsecond, millisecond or N times of periodicity of periodic behavior. N can be an integer or a decimal number.

[00114] FIG. 12 is a flow chart 1200 according to one exemplary embodiment from the perspective of a UE. In step 1205, the UE receives a dedicated message from a network to set a TTI duration of Msg3 transmission and/or a start timing offset for Msg3 transmission. In step 1210, the UE transmits a Msg1 to the network. In step 1215, the UE receives a Msg2 from the

network in response to the Msg1. In step 1220, the UE transmits a Msg3 to the network according to the TTI duration and/or the start timing offset.

[00115] Referring back to FIGS. 3 and 4, in one exemplary embodiment of a UE, the device 300 includes a program code 312 stored in the memory 310. The CPU 308 could execute program code 312 to enable the UE (i) to receive a dedicated message from a network to set a TTI duration of Msg3 transmission and/or a start timing offset for Msg3 transmission, (ii) to transmit a Msg1 to the network, (iii) to receive a Msg2 from the network in response to the Msg1, and (iv) to transmit a Msg3 to the network according to the TTI duration and/or the start timing offset. Furthermore, the CPU 308 can execute the program code 312 to perform all of the above-described actions and steps or others described herein.

[00116] FIG. 13 is a flow chart 1300 according to one exemplary embodiment from the perspective of a UE. In step 1305, the UE receives a broadcast message from a network to set TTI duration of Msg3. In step 1310, the UE transmits a Msg1 to the network. In step 1315, the UE receives a Msg2 from the network in response to the Msg1. In step 1320, the UE transmits a Msg3 to the network according to the TTI duration of Msg3.

[00117] Referring back to FIGS. 3 and 4, in one exemplary embodiment of a UE, the device 300 includes a program code 312 stored in the memory 310. The CPU 308 could execute program code 312 to enable the UE (i) to receive a broadcast message from a network to set TTI duration of Msg3, (ii) to transmit a Msg1 to the network, (iii) to receive a Msg2 from the network in response to the Msg1, and (iv) to transmit a Msg3 to the network according to the TTI duration of Msg3. Furthermore, the CPU 308 can execute the program code 312 to perform all of the above-described actions and steps or others described herein.

[00118] FIG. 14 is a flow chart 1400 according to one exemplary embodiment from the perspective of a UE. In step 1405, the UE transmits a preamble to a network. In step 1410, the UE receives a Msg2 from the network in response to the Msg1, wherein the Msg2 contains a TTI information of Msg3 transmission and/or a start timing offset of Msg3 transmission. In one embodiment, the TTI information of Msg3 transmission is indicated in a common field for multiple RARs in the Msg2. In another embodiment, the TTI information of Msg3 is indicated in a RAR in response to the Msg1 transmission. In one embodiment, the start timing offset of

Msg3 is indicated in a common field for multiple RARs in the Msg2. In another embodiment, the start timing offset of Msg3 is indicated in a RAR in response to the Msg1 transmission. In step 1415, the UE transmits a Msg3 to the network according to the TTI information of Msg3 and/or the start timing offset of Msg3.

[00119] Referring back to FIGS. 3 and 4, in one exemplary embodiment of a UE, the device 300 includes a program code 312 stored in the memory 310. The CPU 308 could execute program code 312 to enable the UE (i) to transmit a preamble to a network, (ii) to receive a Msg2 from the network in response to the preamble, wherein the Msg2 contains a TTI duration of Msg3 transmission and/or a start timing offset of Msg3 transmission, and (iii) to perform a Msg3 transmission to the network according to the TTI information of Msg3 and/or the start timing offset of Msg3. Furthermore, the CPU 308 can execute the program code 312 to perform all of the above-described actions and steps or others described herein.

[00120] FIG. 15 is a flow chart 1500 according to one exemplary embodiment from the perspective of a UE. In step 1505, the UE transmits a Msg1 to a network. In step 1510, the UE receives a Msg2 from the network in response to the Msg1. In step 1515, the UE transmits a Msg3 to the network according to a TTI duration of the Msg3, wherein the TTI duration of the Msg3 is decided based on a TTI duration of Msg2.

[00121] Referring back to FIGS. 3 and 4, in one exemplary embodiment of a UE, the device 300 includes a program code 312 stored in the memory 310. The CPU 308 could execute program code 312 to enable the UE (i) to transmit a Msg1 to a network, (ii) to receive a Msg2 from the network in response to the Msg1, and (iii) to transmit a Msg3 to the network according to a TTI duration of the Msg3, wherein the TTI duration of the Msg3 is decided based on a TTI duration of Msg2. Furthermore, the CPU 308 can execute the program code 312 to perform all of the above-described actions and steps or others described herein.

[00122] FIG. 16 is a flow chart 1600 according to one exemplary embodiment from the perspective of a UE. In step 1605, the UE receives a dedicated message from a network to set a start timing offset for Msg3 transmission. In step 1610, the UE transmits a Msg1 to the network. In step 1615, the UE receives a Msg2 from the network in response to the Msg1. In step 1620,

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the UE transmits a Msg3 to the network after the start timing offset passes from when the UE received the Msg2.

[00123] Referring back to FIGS. 3 and 4, in one exemplary embodiment of a UE, the device 300 includes a program code 312 stored in the memory 310. The CPU 308 could execute program code 312 to enable the UE (i) to receive a dedicated message from a network to set a start timing offset for Msg3 transmission, (ii) to transmit a Msg1 to the network, (iii) to receive a Msg2 from the network in response to the Msg1, and (iv) to transmit a Msg3 to the network after the start timing offset passes from when the UE received the Msg2. Furthermore, the CPU 308 can execute the program code 312 to perform all of the above-described actions and steps or others described herein.

[00124] FIG. 17 is a flow chart 1700 according to one exemplary embodiment from the perspective of a UE. In step 1705, the UE receives a broadcast message from a network to set a start timing offset for Msg3 transmission. In step 1710, the UE transmits a Msg1 to the network. In step 1715, the UE receives a Msg2 from the network in response to the Msg1. In step 1720, the UE transmits a Msg3 to the network after the start timing offset passes from when the UE received the Msg2.

[00125] Referring back to FIGS. 3 and 4, in one exemplary embodiment of a UE, the device 300 includes a program code 312 stored in the memory 310. The CPU 308 could execute program code 312 to enable the UE (i) to receive a broadcast message from a network to set a start timing offset for Msg3 transmission, (ii) to transmit a Msg1 to the network, (iii) to receive a Msg2 from the network in response to the Msg1, and (iv) to transmit a Msg3 to the network after the start timing offset passes from when the UE received the Msg2. Furthermore, the CPU 308 can execute the program code 312 to perform all of the above-described actions and steps or others described herein.

[00126] FIG. 18 is a flow chart 1800 according to one exemplary embodiment from the perspective of a UE. In step 1805, the UE transmits a Msg1 to the network. In step 1810, the UE receives a Msg2 from the network in response to the Msg1, wherein the Msg2 contains a start timing offset for Msg3 transmission. In step 1815, the UE transmits a Msg3 to the network after the start timing offset passes from when the UE received the Msg2.

[00127] Referring back to FIGS. 3 and 4, in one exemplary embodiment of a UE, the device 300 includes a program code 312 stored in the memory 310. The CPU 308 could execute program code 312 to enable the UE (i) to transmit a Msg1 to the network, (iii) to receive a Msg2 from the network in response to the Msg1, (ii) to receive a Msg2 from the network in response to the Msg1, wherein the Msg2 contains a start timing offset for Msg3 transmission, and (iii) to transmit a Msg3 to the network after the start timing offset passes from when the UE received the Msg2. Furthermore, the CPU 308 can execute the program code 312 to perform all of the above-described actions and steps or others described herein.

[00128] FIG. 19 is a flow chart 1900 according to one exemplary embodiment from the perspective of a UE. In step 1905, the UE receives a message from a network, wherein the message includes a TTI information of Msg3. In step 1910, the UE transmits a preamble to a network. In step 1915, the UE receives a Msg2 from the network in response to the preamble. In one embodiment, the TTI information of Msg3 is indicated in a common field for multiple RARs in the Msg2. In another embodiment, the TTI information of Msg3 is indicated in a RAR in response to the Msg1 transmission. In step 1915, the UE performs a Msg3 transmission to the network according to the TTI information of Msg3.

[00129] Referring back to FIGS. 3 and 4, in one exemplary embodiment of a UE, the device 300 includes a program code 312 stored in the memory 310. The CPU 308 could execute program code 312 to enable the UE (i) to receive a message from a network, wherein the message includes a TTI information of Msg3, (ii) to transmit a preamble to a network, (ii) to receive a Msg2 from the network in response to the preamble, and (iii) to perform a Msg3 transmission to the network according to the TTI information of Msg3. Furthermore, the CPU 308 can execute the program code 312 to perform all of the above-described actions and steps or others described herein.

[00130] With respect to the embodiments illustrated in FIGS. 12 through 19 and discussed above, in one embodiment, the UE selects a TTI information of Msg3 if there are multiple TTI information of Msg3 in the dedicated message, the broadcast message, or the Msg2. Furthermore, the TTI information of Msg3 could be included in a RAR in response to Msg1 or in a common field for multiple RARs in a Msg2.

[00131] In one embodiment, the UE selects a TTI information of Msg3 if there are multiple start timing offsets for Msg3 transmission in the dedicated message, the broadcast message, or the Msg2. Furthermore, the start timing offset of Msg3 could be included in a RAR in response to Msg1 or in a common field for multiple RARs in a Msg2.

[00132] Various aspects of the disclosure have been described above. It should be apparent that the teachings herein may be embodied in a wide variety of forms and that any specific structure, function, or both being disclosed herein is merely representative. Based on the teachings herein one skilled in the art should appreciate that an aspect disclosed herein may be implemented independently of any other aspects and that two or more of these aspects may be combined in various ways. For example, an apparatus may be implemented or a method may be practiced using any number of the aspects set forth herein. In addition, such an apparatus may be implemented or such a method may be practiced using other structure, functionality, or structure and functionality in addition to or other than one or more of the aspects set forth herein. As an example of some of the above concepts, in some aspects concurrent channels may be established based on pulse repetition frequencies. In some aspects concurrent channels may be established based on pulse position or offsets. In some aspects concurrent channels may be established based on time hopping sequences. In some aspects concurrent channels may be established based on pulse repetition frequencies, pulse positions or offsets, and time hopping sequences.

[00133] Those of skill in the art would understand that information and signals may be represented using any of a variety of different technologies and techniques. For example, data, instructions, commands, information, signals, bits, symbols, and chips that may be referenced throughout the above description may be represented by voltages, currents, electromagnetic waves, magnetic fields or particles, optical fields or particles, or any combination thereof.

[00134] Those of skill would further appreciate that the various illustrative logical blocks, modules, processors, means, circuits, and algorithm steps described in connection with the aspects disclosed herein may be implemented as electronic hardware (e.g., a digital implementation, an analog implementation, or a combination of the two, which may be designed using source coding or some other technique), various forms of program or design code incorporating instructions (which may be referred to herein, for convenience, as "software" or a

"software module"), or combinations of both. To clearly illustrate this interchangeability of hardware and software, various illustrative components, blocks, modules, circuits, and steps have been described above generally in terms of their functionality. Whether such functionality is implemented as hardware or software depends upon the particular application and design constraints imposed on the overall system. Skilled artisans may implement the described functionality in varying ways for each particular application, but such implementation decisions should not be interpreted as causing a departure from the scope of the present disclosure.

[00135] In addition, the various illustrative logical blocks, modules, and circuits described in connection with the aspects disclosed herein may be implemented within or performed by an integrated circuit ("IC"), an access terminal, or an access point. The IC may comprise a general purpose processor, a digital signal processor (DSP), an application specific integrated circuit (ASIC), a field programmable gate array (FPGA) or other programmable logic device, discrete gate or transistor logic, discrete hardware components, electrical components, optical components, mechanical components, or any combination thereof designed to perform the functions described herein, and may execute codes or instructions that reside within the IC, outside of the IC, or both. A general purpose processor may be a microprocessor, but in the alternative, the processor may be any conventional processor, controller, microcontroller, or state machine. A processor may also be implemented as a combination of computing devices, e.g., a combination of a DSP and a microprocessor, a plurality of microprocessors, one or more microprocessors in conjunction with a DSP core, or any other such configuration.

[00136] It is understood that any specific order or hierarchy of steps in any disclosed process is an example of a sample approach. Based upon design preferences, it is understood that the specific order or hierarchy of steps in the processes may be rearranged while remaining within the scope of the present disclosure. The accompanying method claims present elements of the various steps in a sample order, and are not meant to be limited to the specific order or hierarchy presented.

[00137] The steps of a method or algorithm described in connection with the aspects disclosed herein may be embodied directly in hardware, in a software module executed by a processor, or in a combination of the two. A software module (e.g., including executable

instructions and related data) and other data may reside in a data memory such as RAM memory, flash memory, ROM memory, EPROM memory, EEPROM memory, registers, a hard disk, a removable disk, a CD-ROM, or any other form of computer-readable storage medium known in the art. A sample storage medium may be coupled to a machine such as, for example, a computer/processor (which may be referred to herein, for convenience, as a "processor") such the processor can read information (e.g., code) from and write information to the storage medium. A sample storage medium may be integral to the processor. The processor and the storage medium may reside in an ASIC. The ASIC may reside in user equipment. In the alternative, the processor and the storage medium may reside as discrete components in user equipment. Moreover, in some aspects any suitable computer-program product may comprise a computer-readable medium comprising codes relating to one or more of the aspects of the disclosure. In some aspects a computer program product may comprise packaging materials.

[00138] While the invention has been described in connection with various aspects, it could be understood that the invention is capable of further modifications. This application is intended to cover any variations, uses or adaptation of the invention following, in general, the principles of the invention, and including such departures from the present disclosure as come within the known and customary practice within the art to which the invention pertains.

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PTO/SB/17 (01-18)
Approved for use through 11/30/2020. OMB 0651-0032
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 displays a valid OMB control number

FEE TRANSMITTAL

Complete if known	
Application Number	Not Yet Assigned
Filing Date	August 1, 2018
First Named Inventor	Wei-Yu Chen
Examiner Name	Not Yet Assigned
Art Unit	Not Yet Assigned
Practitioner Docket No.	1426-136.301

☐ Applicant asserts small entity status. See 37 CFR 1.27.

☐ Applicant certifies micro entity status. See 37 CFR 1.29. Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

TOTAL AMOUNT OF PAYMENT ($) 1720

METHOD OF PAYMENT (check all that apply)

☐ Check ☒ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): _____

☐ Deposit Account Deposit Account Number: _____ Deposit Account Name: _____

For the above-identified deposit account, the Director is hereby authorized to (check all that apply):

☐ Charge fee(s) indicated below ☐ Charge fee(s) indicated below, **except for the filing fee**

☐ Charge any additional fee(s) or underpayment of fee(s) under 37 CFR 1.16 and 1.17 ☐ Credit any overpayment of fee(s)

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FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES (U = undiscounted fee; S = small entity fee; M = micro entity fee)

	FILING FEES			SEARCH FEES			EXAMINATION FEES			
Application Type	U ($)	S ($)	M ($)	U ($)	S ($)	M ($)	U ($)	S ($)	M ($)	Fees Paid ($)
Utility	300	150*	75	660	330	165	760	380	190	1720
Design	200	100	50	160	80	40	600	300	150	
Plant	200	100	50	420	210	105	620	310	155	
Reissue	300	150	75	660	330	165	2,200	1,100	550	
Provisional	280	140	70	0	0	0	0	0	0	

* The $150 small entity status filing fee for a utility application is further reduced to $75 for a small entity status applicant who files the application via EFS-Web.

2. EXCESS CLAIM FEES

Fee Description	Undiscounted Fee ($)	Small Entity Fee ($)	Micro Entity Fee ($)
Each claim over 20 (including Reissues)	100	50	25
Each independent claim over 3 (including Reissues)	460	230	115
Multiple dependent claims	820	410	205

Total Claims		Extra Claims	Fee ($)		Fee Paid ($)
14	-20 or HP =	_____ x	_____	=	_____

HP = highest number of total claims paid for, if greater than 20.

Indep. Claims		Extra Claims	Fee ($)		Fee Paid ($)
2	-3 or HP =	_____ x	_____	=	_____

HP = highest number of independent claims paid for, if greater than 3.

Multiple Dependent Claims	
Fee ($)	Fee Paid ($)
_____	_____

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is $400 ($200 for small entity) ($100 for micro entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof	Fee ($)	Fee Paid ($)
58 - 100 =	_____ / 50 =	_____ (round **up** to a whole number) x	_____ =	_____

4. OTHER FEE(S) Fees Paid ($)

Non-English specification, $130 fee (no small or micro entity discount) _____

Non-electronic filing fee under 37 CFR 1.16(t) for a utility application, $400 fee ($200 small or micro entity) _____

Other (e.g., late filing surcharge): _____ _____

SUBMITTED BY

Signature	/Sang N. Dang/	Registration No. (Attorney/Agent) 51,186	Telephone (714) 839-3800
Name (Print/Type)	Sang N. Dang		Date August 1, 2018

This collection of information is required by 37 CFR 1.136. 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, 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.

DocCode – SCORE

SCORE Placeholder Sheet for IFW Content

Application Number: 16052505 Document Date: 08/01/2018

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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 16/052,505

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	300
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	660
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	760
TOTAL CLAIMS (37 CFR 1.16(i))	14 minus 20 =	*			OR	x 100 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2 minus 3 =	*				x 460 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	1720

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)		RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
16/052,505	08/01/2018		1720	1426-136.301	14	2

CONFIRMATION NO. 1082

106622
Blue Capital Law Firm, P.C.
650 Town Center Drive, Suite 1530
Costa Mesa, CA 92626

FILING RECEIPT

OC000000102087487

Date Mailed: 09/06/2018

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Wei-Yu Chen, Taipei City, TAIWAN;
Li-Chih Tseng, Taipei City, TAIWAN;

Applicant(s)

ASUSTek Computer Inc., Taipei City, TAIWAN;

Power of Attorney: The patent practitioners associated with Customer Number 106622

Domestic Priority data as claimed by applicant

This application is a DIV of 15/663,674 07/28/2017
which claims benefit of 62/367,875 07/28/2016

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 09/05/2018

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The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/052,505**

Projected Publication Date: 12/13/2018

Non-Publication Request: No

Early Publication Request: No
Title

METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM

Preliminary Class

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

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Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

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IPR2024-01036

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/052,505	08/01/2018	Wei-Yu Chen	1426-136.301

CONFIRMATION NO. 1082

106622
Blue Capital Law Firm, P.C.
650 Town Center Drive, Suite 1530
Costa Mesa, CA 92626

PUBLICATION NOTICE

OC000000104471461

Title:METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM

Publication No.US-2018-0359785-A1
Publication Date:12/13/2018

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Public Records Division. The Public Records Division can be reached by telephone at (571) 272-3150 or (800) 972-6382, by facsimile at (571) 273-3250, by mail addressed to the United States Patent and Trademark Office, Public Records Division, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently https://portal.uspto.gov/pair/PublicPair. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/052,505	08/01/2018	Wei-Yu Chen	1426-136.301	1082

106622 7590 01/18/2019

Blue Capital Law Firm, P.C.
650 Town Center Drive, Suite 1530
Costa Mesa, CA 92626

EXAMINER	
FANG, PAKEE	

ART UNIT	PAPER NUMBER
2642	

NOTIFICATION DATE	DELIVERY MODE
01/18/2019	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):

docketing@bluecapitallaw.com

Office Action Summary	**Application No.** 16/052,505	**Applicant(s)** Chen et al.	
	Examiner PAKEE FANG	**Art Unit** 2642	**AIA Status** Yes

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

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 2 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
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Status

1)☑ Responsive to communication(s) filed on 08/01/2018.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☐ This action is non-final.

3)☐ 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.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-14 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☐ Claim(s) _____ is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☑ Claim(s) 1-14 are subject to restriction and/or election requirement

* If any claims have been determined allowable, 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.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ 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)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Claims 1-14 are directed to the following patentably distinct species:

1st Specie, Fig. 12;

2nd Specie Fig. 13;

3rd Specie Fig. 14;

4th Specie Fig. 15;

5th Specie Fig. 16;

6th Specie Fig. 17;

7th Specie Fig. 18;

8th Specie Fig. 19;

The species are independent or distinct because FIGS. 12-19 contains different methods which using different steps to perform different functions.

Applicant must determine which of the pending claim falls into which of the cited specie, and make an election of the cited specie along with affiliated pending claims in the response to this restriction.

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species, or a single grouping of patentably indistinct species, for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, there is no generic claim for the species restriction.

There is a search and/or examination burden for the patentably distinct species as set forth above because at least the following reason(s) apply: Each of the species is located in a different classification and/or sub-classification.

Applicant is advised that the reply to this requirement to be complete must include (i) an election of a species to be examined even though the requirement may be traversed (37 CFR 1.143) **and (ii) identification of the claims encompassing the elected species or grouping of patentably indistinct species**, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

The election may be made with or without traverse. To preserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically point out supposed errors in the election of species requirement, the election shall be treated as an election without traverse. Traversal must be presented at the time of election in order to be considered timely. Failure to timely traverse the requirement will result in the loss of right to petition under 37 CFR 1.144. If claims are added after the election, applicant must indicate which of these claims are readable on the elected species or grouping of patentably indistinct species.

Should applicant traverse on the ground that the species, or groupings of patentably indistinct species from which election is required, are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing them to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the species unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103 or pre-AIA 35 U.S.C. 103(a) of the other species. Furthermore, if the Applicant improperly selected unrelated claims for the elected species, further action maybe required that would result in an unintentional delay for prosecuting the current Application. **Please, also cancel all other unrelated claims** of the elected species.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which depend from or otherwise require all the limitations of an allowable generic claim as provided by 37 CFR 1.141.

Inquiries

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to PAKEE FANG whose telephone number is (571)270-3633. The Examiner can normally be reached on Mon-Fri 9AM - 5PM.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, PÉREZ-GUTIÉRREZ RAFAEL can be reached on 571-272-7915. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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.

/PAKEE FANG/
Primary Examiner, Art Unit 2642

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/052,505	Chen et al.
	Examiner	**Art Unit**
	PAKEE FANG	2642

✓	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	12/19/2018								
	1	÷								
	2	÷								
	3	÷								
	4	÷								
	5	÷								
	6	÷								
	7	÷								
	8	÷								
	9	÷								
	10	÷								
	11	÷								
	12	÷								
	13	÷								
	14	÷								

Samsung Exhibit 1002, Page 90 of 564
Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.	:	16/052,505
Confirmation No.	:	1082
Applicant	:	Wei-Yu Chen and Li-Chih Tseng
Filed	:	August 1, 2018
Title	:	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM
TC/A.U.	:	2642
Examiner	:	Pakee Fang
Docket No.	:	1426-136.301 (1050153-US-P2)
Customer No.	:	106622

RESPONSE TO RESTRICTION REQUIREMENT

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

Dear Sir:

In the Restriction Requirement of January 18, 2019, the Examiner has indicated that the species are independent or distinct because FIGS. 12-19 contain different methods which using different steps to perform different functions. *See* Office Action, Page 2. In particular, the Examiner has categorized the different species as follows:

1st Specie, Fig. 12;
2nd Specie Fig. 13;
3rd Specie Fig. 14;
4th Specie Fig. 15;
5th Specie Fig. 16;
6th Specie Fig. 17;
7th Specie Fig. 18;
8th Specie Fig. 19.

See Office Action, Page 2.

Samsung Exhibit 1002, Page 91 of 564
Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

Furthermore, the Examiner has required an election in the present application among the species that the Examiner has categorized.

As a preliminary matter, Applicants respectfully submit that claims 1-14 belong to *Specie 3* (shown in FIG. 14 and described in at least Paragraphs [00118] – [00119] of the present application). In particular, *Specie 3* is generally an embodiment where there is no further signal or message and where Msg2 contains a TTI duration of Msg3 transmission and/or a start timing offset for Msg3 transmission. Claims 1-7 are method claims, and claims 8-14 are parallel apparatus claims.

For the purpose of examination of the present application, Applicant elects claims 1-7 and 8-14 (which is *Specie 3*).

Should the Examiner find it necessary to speak with Applicant's attorney, he is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,
Sang N. Dang
BLUE CAPITAL LAW FIRM, P.C.

Dated: March 18, 2018

/Sang N. Dang/
Reg. No. 51,186
Tel.: (714) 839-3800

Samsung Exhibit 1002, Page 92 of 564
Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

Amendment Transmittal Letter

Docket Number
1426-136.301

Address To
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Title of Invention

METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM

First Named Inventor	Wei-Yu Chen
Application No.	16/052,505
Filing Date	August 1, 2018
Examiner	Pakee Fang
Art Unit	2642

Transmitted herewith is an amendment in the above-identified application.

The fee has been calculated and is transmitted as shown below.

☐ **Applicant claims Small Entity Status.** See 37 CFR 1.27.

Fee Calculation

Claims as Amended

For	#Filed	#Previously Paid For	#Extra	Rate	Fee
Total Claims	14	- 20 =		x =	
Total Indep. Claims	2	- 3 =		x =	
Multiple Dependent Claims (check if applicable) ☐					
				TOTAL	0

Method of Payment

☐ Deposit Account ☐ Credit Card ☐ Check ☐ Money Order ☐ Other: _____

Deposit Account Number

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

☐ Charge the fee(s) set forth above
☐ Charge any additional fee(s) or underpayments of fee(s) under 37 CFR 1.16 and 1.17
☐ Charge fee(s) indicated above, **except for the filing fee**
☐ Credit any overpayments

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on form PTO-2038.

Amount Grand Total 0

Samsung Exhibit 1002, Page 93 of 564
Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

Amendment Transmittal Letter

Docket Number
1426-136.301

Correspondence Address

Customer Number	106622		
-OR-			
Name			
Address			
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Country		Postal Code	
Phone Number			
E-mail Address			

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(Date of Mailing)

(Typed or Printed Name of Person Mailing Correspondence)

(Signature of Person Mailing Correspondence)

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(Date of Transmission) *(Name of Person Transmitting Correspondence)*

(Signature of Person Transmitting Correspondence)

Signature Instructions

Select the name of the person who will electronically sign the Amendment from the drop-down box below.

If a practitioner is not present in the drop-down list, you must close this form and select 'Add Practitioner...' in the Form Manager's Utility menu.

Verify that the signatory information is correct and press the 'eSign' button to electronically sign the submission. If you prefer to sign the form manually, simply do not click the 'eSign' button; just print and manually sign.

Signatory Drop-Down Box Sang N. Dang

Name	Sang N. Dang	Registration Number	51,186
Signatory Capacity	Attorney for Applicant(s)	E-mail Address	sdang@bluecapitallaw.com
eSign	/Sang N. Dang/	Date Signed	03/18/2019

Samsung Exhibit 1002, Page 94 of 564
Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

Electronic Acknowledgement Receipt

EFS ID:	35453030
Application Number:	16052505
International Application Number:	
Confirmation Number:	1082
Title of Invention:	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM
First Named Inventor/Applicant Name:	Wei-Yu Chen
Customer Number:	106622
Filer:	Sang N. Dang/Sandy Kim
Filer Authorized By:	Sang N. Dang
Attorney Docket Number:	1426-136.301
Receipt Date:	18-MAR-2019
Filing Date:	01-AUG-2018
Time Stamp:	15:18:10
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		1426-136-301--ResponsetoRRasFiled03182019.pdf	140455 df0b9c57debe07adad0196af9e19e546db19ba64	yes	5

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Miscellaneous Incoming Letter	5	5
	Response to Election / Restriction Filed	3	4
	Transmittal Letter	1	2
Warnings:			
Information:			
	Total Files Size (in bytes):	140455	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Wei-Yu Chen and Li-Chih Tseng	
Title:	METHOD AND APPARATUS FOR IMPROVING Msg3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM	
Serial No.:	16/052,505	Filed: August 1, 2018
Examiner:	Pakee Fang	Group Art Unit: 2642
Attorney Docket No.:	1426-136.301 (1050153-US-P2)	

CERTIFICATE OF EFS-WEB TRANSMISSION
UNDER 37 CFR § 1.8

I hereby certify that the enclosed 2 Page Amendment Transmittal Sheet; and 2 Page Response to Restriction Requirement are being transmitted to the United States Patent and Trademark Office via EFS-Web on March 18, 2019.

Date: March 18, 2019 /Sandy Kim/
Sandy Kim

Mailing Address:

BLUE CAPITAL LAW FIRM, P.C. (Customer No.: 106622)
650 Town Center Drive, Suite 1530
Costa Mesa, California 92626
Tel: 714-839-3800
Fax: 714-795-2995

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/052,505	08/01/2018	Wei-Yu Chen	1426-136.301	1082

106622 7590 03/25/2019

Blue Capital Law Firm, P.C.
650 Town Center Drive, Suite 1530
Costa Mesa, CA 92626

EXAMINER	
FANG, PAKEE	

ART UNIT	PAPER NUMBER
2642	

NOTIFICATION DATE	DELIVERY MODE
03/25/2019	ELECTRONIC

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Office Action Summary	**Application No.** 16/052,505	**Applicant(s)** Chen et al.	
	Examiner PAKEE FANG	**Art Unit** 2642	**AIA (FITF) Status** Yes

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Disposition of Claims*

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5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

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8) ☐ Claim(s) _____ is/are objected to.

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Application Papers

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Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ 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)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

1. **Claims 1-14 are presented for examination.**

Election/Restrictions

2. Applicant elected to prosecute claims **1-14** is acknowledged by the Primary Examiner.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102 of this title, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

4. **Claims 1-14 are** rejected under 35 U.S.C. 103 as being unpatentable over Mujtaba et al. (US Pub. 20160366705 A1) in view of Ai (US Pub. 20100177675 A1).

For claims 1 and 8, Mujtaba disclose (Figs. 1-7) a User Equipment (UE), comprising: a control circuit; a processor installed in the control circuit; and a memory installed in the control circuit and operatively coupled to the processor [0029, 0032, 0043, 0046-49]; wherein the processor is configured to execute a program code stored in the memory to:

transmit a preamble to a network (Step 502/602) [0060-61, 0070-73];

receive a Msg2 containing a TTI (Transmission Time Interval) information of a Msg3 from the network in response to the preamble (Step 504/604) [0062, 0074-79],

wherein the TTI information of the Msg3 includes a TTI duration of the Msg3 [0008, 0076, 0095] and a start timing offset of the Msg3; and

perform a Msg3 transmission to the network according to the TTI information of the Msg3 [0076, 0080, 0063-65].

But Mujtaba doesn't explicitly teach the TTI information includes a TTI duration and a start timing offset of a message.

However, Ai discloses wherein the TTI information of the Msg includes a TTI duration of the Msg and a start timing offset of the Msg [0067].

Since, all are analogous arts addressing data transmission in a message use in a mobile device; Therefore, it would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to combine the teachings of Mujtaba and Ai to enhance communication protocols in order to receive more resourceful information, thus, improving system efficiency.

Claim 1 differs from claim 8 only by the additional recitation of the following limitation which is also taught by Mujtaba as modified by Ai. Mujtaba, as modified by, Ai discloses a method of a UE (User Equipment) for performing random access procedure [0029, 0032, 0043, 0046-49]. All other identical limitations are rejected based on the same rationale as shown above.

For claims 2 and 9, Mujtaba, as modified by, Ai discloses the processor is further configured to execute the program code stored in the memory to: select the TTI information of the Msg3 based on random access purpose, if there are multiple TTI information of the Msg3 in the Msg2 [0076, 0080, 0062-65].

For claims 3 and 10, Mujtaba, as modified by, Ai discloses the processor is further configured to execute the program code stored in the memory to:

select the TTI information of the Msg3 based on a PRACH (Physical Random Access Channel) resource set of the preamble or a preamble set of the preamble transmission, if there are multiple TTI information of the Msg3 in the Msg2 [0062, 0074-79].

For claims 4 and 11, Mujtaba, as modified by, Ai discloses the processor is further configured to execute the program code stored in the memory to:

select the TTI information of the Msg3 based on highest priority of logical channel having available data, if there are multiple TTI information of the Msg3 in the Msg2 [0076, 0080, 0063-65].

For claims 5 and 12, Mujtaba, as modified by, Ai discloses the TTI information of the Msg3 is included in a RAR (Random Access Response) for responding the preamble [0062, 0074-79].

For claims 6 and 13, Mujtaba, as modified by, Ai discloses the TTI information of the Msg3 is included in a common field for multiple RARs in the Msg2 [0062, 0074-79].

For claims 7 and 14, Mujtaba, as modified by, Ai discloses the Msg2 is a random access response [0062, 0074-79].

Inquiries

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to PAKEE FANG whose telephone number is (571)270-3633. The

Examiner can normally be reached on Mon-Fri 9AM - 5PM. If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, PÉREZ-GUTIÉRREZ RAFAEL can be reached on 571-272-7915. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. 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.

/PAKEE FANG/
Primary Examiner, Art Unit 2642

Notice of References Cited	Application/Control No. 16/052,505	Applicant(s)/Patent Under Reexamination Chen et al.	
	Examiner PAKEE FANG	Art Unit 2642	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-20160366705-A1	12-2016	Mujtaba; Syed Aon	H04W72/0413	1/1
*	B	US-20100177675-A1	07-2010	Ai; Jianxun	H04L12/189	370/312
	C					
	D					
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

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.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/052,505	Chen et al.
	Examiner	Art Unit
	PAKEE FANG	2642

CPC - Searched*		
Symbol	Date	Examiner
H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607	03/20/2019	PF

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner
455	combined text	03/20/2019	PF

* 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
East, Google, Investor search	03/20/2019	PF

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

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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/052,505	Chen et al.
	Examiner	Art Unit
	PAKEE FANG	2642

✓	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	12/19/2018	03/20/2019							
	1	÷	✓							
	2	÷	✓							
	3	÷	✓							
	4	÷	✓							
	5	÷	✓							
	6	÷	✓							
	7	÷	✓							
	8	÷	✓							
	9	÷	✓							
	10	÷	✓							
	11	÷	✓							
	12	÷	✓							
	13	÷	✓							
	14	÷	✓							

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Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	2	"20180035470".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:17
S2	2	S1 and (frame msg$1)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:26
S3	82131	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:29
S4	5501	S3 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:33
S5	1227	S4 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:35
S6	78	S5 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:37
S7	66	@ay<"2017" and S6	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 17:41
S8	95587	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S9	6513	S8 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S10	1554	S9 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43

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S11	128	S10 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S12	82	@ay<"2017" and S11	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S13	3	S12 and Numerology	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S14	2	"20160366705".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:44
S15	0	S14 and Numerology	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:47
S16	7	S8 and Numerology with (message) same (preamble)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:01
S17	1	@ay<"2017" and S16	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:01
S18	3	"20180035470".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:15
S19	0	("455" "370").clas. and Numerology with (message) same (preamble)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:17
S20	7	Numerology with (message) same (preamble)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18
S21	1	@ay<"2017" and S20	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18
S22	0	("455" "370").clas. and Numerology with (message)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18

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S23	16	("455" "370").clas. and Numerology same (preamble)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18
S24	15	@ay<"2017" and S23	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18
S25	525	("455" "370").clas. and Numerology	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 17:59
S26	8	("20150099528" "20170280400")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/28 10:05
S27	5	("20150099528" "20170280400").pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/28 10:05
S28	98999	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S29	6750	S28 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S30	1631	S29 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S31	146	S30 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S32	86	@ay<"2017" and S31	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S33	98999	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S34	6750	S33 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01

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S35	1631	S34 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S36	146	S35 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S37	86	@ay<"2017" and S36	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S38	7	(US-20170339546-$ or US-20170019931-$ or US-20160366705-$ or US-20150365977-$ or US-20090316811-$ or US-20140334448-$ or US-20070268812-$).did.	US-PGPUB	OR	ON	2019/03/20 12:19
S39	2	S38 and (off$1set) with (tim$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:19
S40	2	"20160366705".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:20
S41	16	S37 and (off$1set) with (tim$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:25
S42	2	"20180359785".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:32
S43	333	("455" "370").clas. and (off$1set) with (tim$4) with ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:39
S44	333	@ay<"2017" and S43	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:40
S45	27	S44 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:40
S46	59	("455" "370").clas. and (off$1set) with (tim$4) with ((Transmission adj2 Time adj2 Interval) TTI) near3 (data information)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:50

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IPR2024-01036

S47	59	@ay< "2017" and S46	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:50
S48	5	("455" "370").clas. and (duration) same (off$1set) with (tim$4) with ((Transmission adj2 Time adj2 Interval) TTI) near3 (data information)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 13:40

3/ 20/ 2019 2:44:40 PM
C:\ Users\ pfang\ Documents\ EAST\ Workspaces\ 16052505.wsp

Samsung Exhibit 1002, Page 111 of 564
Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

Bibliographic Data

Application No: 16/052,505

Foreign Priority claimed: ○ Yes ◉ No

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

Verified and Acknowledged: /PAKEE FANG/ (Examiner's Signature) | (Initials)

Title: METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
08/01/2018	455	2642	1426-136.301
RULE			

APPLICANTS

ASUSTek Computer Inc., Taipei City, TAIWAN

INVENTORS

Wei-Yu Chen Taipei City, TAIWAN

Li-Chih Tseng Taipei City 112, OT, TAIWAN

CONTINUING DATA

This application is a DIV of 15663674 07/28/2017

15663674 has PRO of 62367875 07/28/2016

FOREIGN APPLICATIONS

IF REQUIRED, FOREIGN LICENSE GRANTED**

09/05/2018

STATE OR COUNTRY

TAIWAN

ADDRESS

Blue Capital Law Firm, P.C.
650 Town Center Drive, Suite 1530
Costa Mesa, CA 92626
UNITED STATES

FILING FEE RECEIVED

$1,720

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/052,505	Filing Date 08/01/2018	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $460 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	06/21/2019	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 14	Minus	** 20	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0		x $460 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/KIMBERLY N PANNELL/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. 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 12 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, 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

Appl. No.	:	16/052,505
Confirmation No.	:	1082
Applicant	:	Wei-Yu Chen and Li-Chih Tseng
Filed	:	August 1, 2018
Title	:	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM
TC/A.U.	:	2642
Examiner	:	Pakee Fang
Docket No.	:	1426-136.301 (1050153-US-P2)
Customer No.	:	106622

RESPONSE TO OFFICE ACTION

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

Dear Sir:

In response to the Office Action mailed on March 25, 2019, having a three-month period for responding to **June 25, 2019**, please consider the following amendments and remarks:

Claims begin on page 2.

Remarks begin on page 5.

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Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

IN THE CLAIMS:

1. (Original) A method of a UE (User Equipment) for performing random access procedure, comprising:

the UE transmits a preamble to a network;

the UE receives a Msg2 containing a TTI (Transmission Timer Interval) information of a Msg3 from the network in response to the preamble, wherein the TTI information of the Msg3 includes a TTI duration of the Msg3 and a start timing offset of the Msg3; and

the UE performs a Msg3 transmission to the network according to the TTI information of the Msg3.

2. (Original) The method of claim 1, further comprising:

the UE selects the TTI information of the Msg3 based on random access purpose, if there are multiple TTI information of the Msg3 in the Msg2.

3. (Original) The method of claim 1, further comprising:

the UE selects the TTI information of the Msg3 based on a PRACH (Physical Random Access Channel) resource set of the preamble transmission or a preamble set of the preamble transmission, if there are multiple TTI information of the Msg3 in the Msg2.

4. (Original) The method of claim 1, further comprising:

the UE selects the TTI information of the Msg3 based on highest priority of logical channel having data available for transmission, if there are multiple TTI information of the Msg3 in the Msg2.

5. (Original) The method of claim 1, wherein the TTI information of the Msg3 is included in a RAR (Random Access Response) for responding the preamble.

6. (Original) The method of claim 1, wherein the TTI information of the Msg3 is included in a common field for multiple RARs in the Msg2.

7. (Original) The method of claim 1, wherein the Msg2 is a random access response.

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8. (Original) A User Equipment (UE), comprising:

a control circuit;

a processor installed in the control circuit; and

a memory installed in the control circuit and operatively coupled to the processor;

wherein the processor is configured to execute a program code stored in the memory to:

transmit a preamble to a network;

receive a Msg2 containing a TTI (Transmission Time Interval) information of a Msg3 from the network in response to the preamble, wherein the TTI information of the Msg3 includes a TTI duration of the Msg3 and a start timing offset of the Msg3; and

perform a Msg3 transmission to the network according to the TTI information of the Msg3.

9. (Original) The UE of claim 8, wherein the processor is further configured to execute the program code stored in the memory to:

select the TTI information of the Msg3 based on random access purpose, if there are multiple TTI information of the Msg3 in the Msg2.

10. (Original) The UE of claim 8, wherein the processor is further configured to execute the program code stored in the memory to:

select the TTI information of the Msg3 based on a PRACH (Physical Random Access Channel) resource set of the preamble or a preamble set of the preamble transmission, if there are multiple TTI information of the Msg3 in the Msg2.

11. (Original) The UE of claim 8, wherein the processor is further configured to execute the program code stored in the memory to:

select the TTI information of the Msg3 based on highest priority of logical channel having available data, if there are multiple TTI information of the Msg3 in the Msg2.

12. (Original) The UE of claim 8, wherein the TTI information of the Msg3 is included in a RAR (Random Access Response) for responding the preamble.

13. (Original) The UE of claim 8, wherein the TTI information of the Msg3 is included in a common field for multiple RARs in the Msg2.

14. (Original) The UE of claim 8, wherein the Msg2 is a random access response.

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REMARKS

Claims 1-14 are pending in the application. In the Office Action, claims 1-14 stand rejected under 35 U.S.C. § 103 as being unpatentable over Mujtaba (U.S. Patent Publication No. 2016/0366705) in view of Ai (U.S. Patent Publication No. 2010/0177675). *See* Office Action, ¶ 4. Applicants respectfully traverse the rejection, and respectfully request reconsideration of the claims.

Claims 1 and 8 recite "receives [or receive] a Msg2 containing a TTI (Transmission Timer Interval) information of a Msg3 from the network in response to the preamble, wherein the TTI information of the Msg3 includes a TTI duration of the Msg3 and a start timing offset of the Msg3" and "the UE performs a Msg3 transmission to the network according to the TTI information of the Msg3." Applicants respectfully submit that the combination of Mujtaba and Ai fails to disclose the noted limitations.

The Office Action admits that "Mujtaba doesn't explicitly teach the TTI information includes a TTI duration and a start timing offset of a message." *See* Office Action, Page 3. Nevertheless, the Office Action cites to Paragraph [0067] of Ai in rejecting the claims. *See* Office Action, Page 3. Applicant respectfully disagrees.

Ai generally discloses a method for defining a continuous reception of a broadcast service (MBMS service). As disclosed in Ai, the BS repeatedly and continuously transmits same TB for a service in different TTIs; and the start offset is for receiving device to determine when to **start the reception**, rather for **reducing transmitting delay for transmission** as recited in the claims. Specifically, Ai discloses that a network determines a transmitting offset of its transmission and sends to a UE for UE determining reception timing. In contrast, as disclosed in the present application and recited in the claims, a network determines a transmitting offset of a UE's transmission and instructs UE to follow the transmitting offset to transmit.

In addition, Ai discloses a method is for a base station to broadcast contents of different MBMS services, while Mujtaba pertains to a random access procedure. Under the circumstances, there is no motivation for a person of ordinary skill in the art to combine a method for a base station to broad cast contents of different MBMS services disclosed in Ai with a random access procedure disclosed in Mujtaba.

For the reasons stated the above, Applicants respectfully submit that claims 1-25 are

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patentable over the combination of Mujtaba and Ai.

In view of the foregoing it is respectfully submitted that the pending claims are in condition for allowance. Reconsideration of the rejections is requested. Allowance of the claims is solicited.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made.

Respectfully submitted,
Sang N. Dang
BLUE CAPITAL LAW FIRM, P.C.

Dated: June 21, 2019

/Sang N. Dang/
Reg. No. 51,186
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Samsung Exhibit 1002, Page 119 of 564
Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Wei-Yu Chen and Li-Chih Tseng	
Title:	METHOD AND APPARATUS FOR IMPROVING Msg3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM	
Serial No.:	16/052,505	Filed: August 1, 2018
Examiner:	Pakee Fang	Group Art Unit: 2642
Attorney Docket No.:	1426-136.301 (1050153-US-P2)	

CERTIFICATE OF EFS-WEB TRANSMISSION
UNDER 37 CFR § 1.8

I hereby certify that the enclosed 2 Page Amendment Transmittal Sheet; and 6 Page Amendment are being transmitted to the United States Patent and Trademark Office via EFS-Web on June 21, 2019.

Date: June 21, 2019 /Sandy Kim/
Sandy Kim

Mailing Address:

BLUE CAPITAL LAW FIRM, P.C. (Customer No.: 106622)
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Fax: 714-795-2995

Electronic Acknowledgement Receipt

EFS ID:	36374823
Application Number:	16052505
International Application Number:	
Confirmation Number:	1082
Title of Invention:	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM
First Named Inventor/Applicant Name:	Wei-Yu Chen
Customer Number:	106622
Filer:	Sang N. Dang/Sandy Kim
Filer Authorized By:	Sang N. Dang
Attorney Docket Number:	1426-136.301
Receipt Date:	21-JUN-2019
Filing Date:	01-AUG-2018
Time Stamp:	14:45:22
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		1426-136-301--ROAof03252019asFiled06212019.pdf	140497 21757ea83d32a63496f9a93aba7837ea3d4ad1f9	yes	9

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Transmittal Letter	1	2
	Amendment/Req. Reconsideration-After Non-Final Reject	3	3
	Claims	4	6
	Applicant Arguments/Remarks Made in an Amendment	7	8
	Miscellaneous Incoming Letter	9	9
Warnings:			
Information:			
	Total Files Size (in bytes):	140497	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Amendment Transmittal Letter

Docket Number
1426-136.301

Address To
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Title of Invention

METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM

First Named Inventor	Wei-Yu Chen
Application No.	16/052,505
Filing Date	August 1, 2018
Examiner	Pakee Fang
Art Unit	2642

Transmitted herewith is an amendment in the above-identified application.

The fee has been calculated and is transmitted as shown below.

☐ **Applicant claims Small Entity Status.** See 37 CFR 1.27.

Fee Calculation

Claims as Amended

For	#Filed	#Previously Paid For	#Extra	Rate	Fee
Total Claims	14	- 20 =		x ☐ =	
Total Indep. Claims	2	- 3 =		x =	
Multiple Dependent Claims (check if applicable) ☐					
				TOTAL	0

Method of Payment

☐ Deposit Account ☐ Credit Card ☐ Check ☐ Money Order ☐ Other: _____

Deposit Account Number

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

☐ Charge the fee(s) set forth above
☐ Charge any additional fee(s) or underpayments of fee(s) under 37 CFR 1.16 and 1.17
☐ Charge fee(s) indicated above, **except for the filing fee**
☐ Credit any overpayments

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on form PTO-2038.

Amount Grand Total 0

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Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
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Amendment Transmittal Letter

Docket Number
1426-136.301

Correspondence Address

Customer Number	106622		
-OR-			
Name			
Address			
City		State	
Country		Postal Code	
Phone Number			
E-mail Address			

Certificate of Mailing by Express Mail

I hereby certify that this Amendment, accompanying documents, and fee (if appropriate) are being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450 on the date indicated below:

(Date of Mailing)

(Typed or Printed Name of Person Mailing Correspondence)

(Signature of Person Mailing Correspondence)

("Express Mail" Mailing Label Number)

Certificate of Mailing by First Class Mail

I hereby certify that this Amendment, accompanying documents, and fee (if appropriate) are being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450 on the date indicated below:

(Date of Mailing) *(Name of Person Mailing Correspondence)*

(Signature of Person Mailing Correspondence)

Certificate of Transmission

I hereby certify that this Amendment, accompanying documents, and fee (if appropriate) authorization are being facsimile transmitted to the United States Patent and Trademark Office on the date indicated below:

(Date of Transmission) *(Name of Person Transmitting Correspondence)*

(Signature of Person Transmitting Correspondence)

Signature Instructions

Select the name of the person who will electronically sign the Amendment from the drop-down box below.

If a practitioner is not present in the drop-down list, you must close this form and select 'Add Practitioner...' in the Form Manager's Utility menu.

Verify that the signatory information is correct and press the 'eSign' button to electronically sign the submission. If you prefer to sign the form manually, simply do not click the 'eSign' button; just print and manually sign.

Signatory Drop-Down Box Sang N. Dang

Name	Sang N. Dang			Registration Number	51,186
Signatory Capacity	Attorney for Applicant(s)		E-mail Address	sdang@bluecapitallaw.com	
eSign	/Sang N. Dang/			Date Signed	06-21-2019

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UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/052,505	08/01/2018	Wei-Yu Chen	1426-136.301	1082

106622 7590 07/31/2019

Blue Capital Law Firm, P.C.
650 Town Center Drive, Suite 1530
Costa Mesa, CA 92626

EXAMINER	
FANG, PAKEE	

ART UNIT	PAPER NUMBER
2642	

NOTIFICATION DATE	DELIVERY MODE
07/31/2019	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):

docketing@bluecapitallaw.com

Office Action Summary	**Application No.** 16/052,505	**Applicant(s)** Chen et al.	
	Examiner PAKEE FANG	**Art Unit** 2642	**AIA (FITF) Status** Yes

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

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 06/21/2019.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☑ This action is **FINAL.** 2b) ☐ This action is non-final.

3)☐ 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.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-14 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1-14 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, 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.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ 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)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The amendment filed on 06/21/2019 has been entered and considered by Examiner. Claims **1-14** are presented for examination. **This Action is made FINAL.**

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102 of this title, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

3. **Claims 1-14 are** rejected under 35 U.S.C. 103 as being unpatentable over Mujtaba et al. (US Pub. 20160366705 A1) in view of Ai (US Pub. 20100177675 A1).

For claims 1 and 8, Mujtaba disclose (Figs. 1-7) a User Equipment (UE), comprising: a control circuit; a processor installed in the control circuit; and a memory installed in the control circuit and operatively coupled to the processor [0029, 0032, 0043, 0046-49]; wherein the processor is configured to execute a program code stored in the memory to:

transmit a preamble to a network (Step 502/602) [0060-61, 0070-73];

receive a Msg2 containing a TTI (Transmission Time Interval) information of a Msg3 from the network in response to the preamble (Step 504/604) [0062, 0074-79],

wherein the TTI information of the Msg3 includes a TTI duration of the Msg3 [0008, 0076, 0095] and a start timing offset of the Msg3; and

perform a Msg3 transmission to the network according to the TTI information of the Msg3 [0076, 0080, 0063-65].

But Mujtaba doesn't explicitly teach the TTI information includes a TTI duration and a start timing offset of a message.

However, Ai discloses wherein the TTI information of the Msg includes a TTI duration of the Msg and a start timing offset of the Msg [0067].

Since, all are analogous arts addressing data transmission in a message use in a mobile device; Therefore, it would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to combine the teachings of Mujtaba and Ai to enhance communication protocols in order to receive more resourceful information, thus, improving system efficiency.

Claim 1 differs from claim 8 only by the additional recitation of the following limitation which is also taught by Mujtaba as modified by Ai. Mujtaba, as modified by, Ai discloses a method of a UE (User Equipment) for performing random access procedure [0029, 0032, 0043, 0046-49]. All other identical limitations are rejected based on the same rationale as shown above.

For claims 2 and 9, Mujtaba, as modified by, Ai discloses the processor is further configured to execute the program code stored in the memory to: select the TTI information of the Msg3 based on random access purpose, if there are multiple TTI information of the Msg3 in the Msg2 [0076, 0080, 0062-65].

For claims 3 and 10, Mujtaba, as modified by, Ai discloses the processor is further configured to execute the program code stored in the memory to:

select the TTI information of the Msg3 based on a PRACH (Physical Random Access Channel) resource set of the preamble or a preamble set of the preamble transmission, if there are multiple TTI information of the Msg3 in the Msg2 [0062, 0074-79].

For claims 4 and 11, Mujtaba, as modified by, Ai discloses the processor is further configured to execute the program code stored in the memory to:

select the TTI information of the Msg3 based on highest priority of logical channel having available data, if there are multiple TTI information of the Msg3 in the Msg2 [0076, 0080, 0063-65].

For claims 5 and 12, Mujtaba, as modified by, Ai discloses the TTI information of the Msg3 is included in a RAR (Random Access Response) for responding the preamble [0062, 0074-79].

For claims 6 and 13, Mujtaba, as modified by, Ai discloses the TTI information of the Msg3 is included in a common field for multiple RARs in the Msg2 [0062, 0074-79].

For claims 7 and 14, Mujtaba, as modified by, Ai discloses the Msg2 is a random access response [0062, 0074-79].

Response to Arguments

4. Applicant's arguments filed 06/21/2019 have been fully considered but they are not persuasive.

5. With regard to the references failing to teach every element recited in the independent claims; the Examiner respectfully disagrees with the arguments by the Applicant. Even though, the Examiner acknowledges Applicant's invention may possess some novel features, the claims are written too broad that can be read on the current cited prior art(s). Further actions must be taken to explicitly claim those novel features of the current application.

With regards to the argument for the limitation "*…receive a Msg2 containing a TTI information of a Msg3 from the network in response to the preamble …*", the Examiner asserts that the Examiner asserts that Mujtaba disclose on Fig. 5, message 504 (Msg 2) containing TTi information of a Msg 3 is received in response to the preamble message 502. "*… the base station may determine that the link budget constrained wireless device should implement transmission time i**nterval bundling (TTI-B) for the Msg3**. Such parameter(s)/characteristic(s) may be indicated to the link budget constrained wireless device by the base station as part of **the Msg2 transmitted** by the base station…*" [0076];

"*… The **second message** ("Msg2", also referred to as "random access response" or "RAR") may include **a timing advance (TA) parameter**, a temporary cell radio network temporary identifier (TC-RNTI), and an uplink grant for transmitting **a third message**.* " [0062].

With regards to the argument for the limitation "*…wherein the TTI information of the Msg3 includes a TTI duration of the Msg3 and a start timing offset of the Msg3…*", the Examiner asserts that Mujtaba disclose on Fig. 5 "*… the base station may determine that the link budget constrained wireless device should implement transmission time i**nterval bundling (TTI-B) for the Msg3**. Such parameter(s)/characteristic(s) may be indicated to the link budget constrained*

wireless device by the base station as part of ***the Msg2 transmitted*** *by the base station…*" [0076]; "*… The* ***second message*** *("Msg2", also referred to as "random access response" or "RAR") may include* ***a timing advance (TA) parameter****, a temporary cell radio network temporary identifier (TC-RNTI), and an uplink grant for transmitting* ***a third message****.*" [0062].

Ai compensates the teaching of Mujtaba by disclosing that a message can contain a starting timing offset. "*… a MBMS service occupies the channel resource continuously for a time length* ***starting from the TTI of TDM Offset*** *and with a duration of TTIs …*" [0067].

"*… TDM_ Offset is said* ***initial offset time****, i.e., information of the position of the resource occupied by said MBMS service in a repetition period…*" [0074].

With regards to the argument for the limitation "*…perform a Msg3 transmission to the network according to the TTI information of the Msg3…*", the Examiner asserts that Mujtaba disclose on Fig. 5 step 506. "*… transmit the third message to the base station 102. The third message ("Msg3",…*" [0063]; "*… the base station may determine that the link budget constrained wireless device should implement transmission time i****nterval bundling (TTI-B) for the Msg3****. Such parameter(s)/characteristic(s) may be indicated to the link budget constrained wireless device by the base station as part of* ***the Msg2 transmitted*** *by the base station…*" [0076].

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., ***reducing transmitting delay for transmission***) are not recited in the rejected claim(s). Although the

claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

ARGUMENT DOES NOT REPLACE EVIDENCE WHERE EVIDENCE IS NECESSARY

The arguments made by the counsel cannot take the place of evidence in the record. The Applicant representative's arguments for the obvious reason to combine the implicit and explicit teaching of the cited reference(s) failed to provide factual support to sustain the ground of arguments. The mere statement of disagreement of the prior art made by the Applicant's representative cannot be served as evidence for support. Please see the following case law for detail:

In re Schulze, 346 F.2d 600, 602, 145 USPQ 716, 718 (CCPA 1965); In re Geisler, 116 F.3d 1465,43 USPQ2d 1362 (Fed. Cir. 1997) ("An assertion of what seems to follow from common experience is just attorney argument and not the kind of **factual evidence that is required to rebut a prima facie case of obviousness**."). See MPEP § 716.01(c) for examples of **attorney statements which are not evidence** and which must be supported by an appropriate affidavit or declaration.

ARGUING AGAINST REFERENCES INDIVIDUALLY

One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. In re Keller, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); In re Merck and Co., Inc., 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

All limitations, elements, and arguments cited by the Applicant had indeed been disclosed by the reference prior art(s) or addressed by the Examiner. The concurrent Office Action furthermore elaborates the explicit and implicit teaching of the disclosed reference(s). Any rationale and citation applied in the previous Office Action not challenge by the Applicant will be treated as the Applicant's admittance in the subject matter.

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Inquiries

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to PAKEE FANG whose telephone number is (571)270-3633. The Examiner can normally be reached on Mon-Fri 9:00AM-5:00PM. If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, PÉREZ-GUTIÉRREZ RAFAEL can be reached on 571-272-7915. The fax phone number for the organization where

this application or proceeding is assigned is 571-273-8300. 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.

/PAKEE FANG/
Primary Examiner, Art Unit 2642

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/052,505	Chen et al.
	Examiner	**Art Unit**
	PAKEE FANG	2642

✓	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	12/19/2018	03/20/2019	07/25/2019						
	1	÷	✓	✓						
	2	÷	✓	✓						
	3	÷	✓	✓						
	4	÷	✓	✓						
	5	÷	✓	✓						
	6	÷	✓	✓						
	7	÷	✓	✓						
	8	÷	✓	✓						
	9	÷	✓	✓						
	10	÷	✓	✓						
	11	÷	✓	✓						
	12	÷	✓	✓						
	13	÷	✓	✓						
	14	÷	✓	✓						

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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/052,505	Chen et al.
	Examiner	Art Unit
	PAKEE FANG	2642

CPC - Searched*		
Symbol	Date	Examiner
H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607	03/20/2019	PF

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner
455	combined text	03/20/2019	PF

* 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
East, Google, Investor search	03/20/2019	PF
updated search	07/25/2019	PF

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

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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L2	2	"20160366705" and (tim$4 interval window)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 14:38
L3	2	"20160366705" and (tim$4 interval window TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 14:38
L5	1	"20100177675".pn. and (off$1set start$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 14:52
L6	2	"20160366705" and (Msg3 (third adj messag$4))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 14:55
L7	105281	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
L8	7343	L7 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
L9	1827	L8 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
L10	181	L9 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
L11	93	@ay<"2017" and L10	US-PGPUB; USPAT; USOCR;	OR	ON	2019/07/25 15:03

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			FPRS; EPO; JPO; DERWENT; IBM_TDB			
L12	59	("455" "370").clas. and (off$1set) with (tim$4) with ((Transmission adj2 Time adj2 Interval) TTI) near3 (data information)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
L13	59	@ay<"2017" and L12	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
S1	2	"20180035470".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:17
S2	2	S1 and (frame msg$1)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:26
S3	82131	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:29
S4	5501	S3 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:33
S5	1227	S4 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:35
S6	78	S5 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:37
S7	66	@ay<"2017" and S6	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 17:41
S8	95587	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006,	US-PGPUB; USPAT; USOCR;	OR	ON	2019/01/24 15:43

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		H04L1/1607).CPC.	FPRS; EPO; JPO; DERWENT; IBM_TDB			
S9	6513	S8 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S10	1554	S9 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S11	128	S10 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S12	82	@ay<"2017" and S11	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S13	3	S12 and Numerology	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S14	2	"20160366705".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:44
S15	0	S14 and Numerology	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:47
S16	7	S8 and Numerology with (message) same (preamble)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:01
S17	1	@ay<"2017" and S16	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:01
S18	3	"20180035470".pn.	US-PGPUB; USPAT; USOCR;	OR	ON	2019/01/24 16:15

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			FPRS; EPO; JPO; DERWENT; IBM_TDB			
S19	0	("455" "370").clas. and Numerology with (message) same (preamble)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:17
S20	7	Numerology with (message) same (preamble)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18
S21	1	@ay<"2017" and S20	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18
S22	0	("455" "370").clas. and Numerology with (message)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18
S23	16	("455" "370").clas. and Numerology same (preamble)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18
S24	15	@ay<"2017" and S23	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18
S25	525	("455" "370").clas. and Numerology	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 17:59
S26	8	("20150099528" "20170280400")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/28 10:05
S27	5	("20150099528" "20170280400").pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/28 10:05
S28	98999	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006,	US-PGPUB; USPAT; USOCR;	OR	ON	2019/03/20 12:01

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		H04L1/1607).CPC.	FPRS; EPO; JPO; DERWENT; IBM_TDB			
S29	6750	S28 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S30	1631	S29 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S31	146	S30 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S32	86	@ay<"2017" and S31	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S33	98999	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S34	6750	S33 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S35	1631	S34 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S36	146	S35 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S37	86	@ay<"2017" and S36	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S38	7	(US-20170339546-$ or US-20170019931-$ or US-	US-PGPUB	OR	ON	2019/03/20 12:19

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		20160366705-$ or US-20150365977-$ or US-20090316811-$ or US-20140334448-$ or US-20070268812-$).did.				
S39	2	S38 and (off$1set) with (tim$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:19
S40	2	"20160366705".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:20
S41	16	S37 and (off$1set) with (tim$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:25
S42	2	"20180359785".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:32
S43	333	("455" "370").clas. and (off$1set) with (tim$4) with ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:39
S44	333	@ay<"2017" and S43	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:40
S45	27	S44 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:40
S46	59	("455" "370").clas. and (off$1set) with (tim$4) with ((Transmission adj2 Time adj2 Interval) TTI) near3 (data information)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:50
S47	59	@ay<"2017" and S46	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:50
S48	5	("455" "370").clas. and (duration)	US-PGPUB;	OR	ON	2019/03/20

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		same (off$1set) with (tim$4) with ((Transmission adj2 Time adj2 Interval) TTI) near3 (data information)	USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			13:40

7/ 25/ 2019 3:05:16 PM
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PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/052,505	Filing Date 08/01/2018	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $460 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	10/25/2019	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 14	Minus	** 20	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0		x $460 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/ALLYSON PURNELL/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. 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 12 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, 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.

PTO/SB/30EFS (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	16/052,505	Filing Date	2018-08-01	Docket Number (if applicable)	1426-136.301	Art Unit	2642
First Named Inventor	Wei-Yu Chen			Examiner Name	Pakee Fang		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

- ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____
- ☐ Other _____

☒ Enclosed

- ☒ Amendment/Reply
- ☐ Information Disclosure Statement (IDS)
- ☐ Affidavit(s)/ Declaration(s)
- ☐ Other _____

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____
(Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

FEES

☐ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No _____

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

☐ Applicant Signature

PTO/SB/30EFS (02-18)
Approved for use through 11/30/2020. 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.

Signature of Registered U.S. Patent Practitioner			
Signature	/Sang N. Dang/	Date (YYYY-MM-DD)	2019-10-25
Name	Sang N. Dang	Registration Number	51186

This collection of information is required by 37 CFR 1.114. 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 12 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, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Amendment Transmittal Letter

Docket Number
1426-136.301

Address To
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Title of Invention

METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM

First Named Inventor	Wei-Yu Chen
Application No.	16/052,505
Filing Date	August 1, 2018
Examiner	Pakee Fang
Art Unit	2642

Transmitted herewith is an amendment in the above-identified application.

The fee has been calculated and is transmitted as shown below.

☐ **Applicant claims Small Entity Status.** See 37 CFR 1.27.

Fee Calculation

Claims as Amended

For	#Filed	#Previously Paid For	#Extra	Rate	Fee
Total Claims	14	- 20 =		x ☐ =	
Total Indep. Claims	2	- 3 =		x =	
Multiple Dependent Claims (check if applicable) ☐					
				TOTAL	0

Method of Payment

☐ Deposit Account ☐ Credit Card ☐ Check ☐ Money Order ☐ Other: _____

Deposit Account Number

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

☐ Charge the fee(s) set forth above
☐ Charge any additional fee(s) or underpayments of fee(s) under 37 CFR 1.16 and 1.17
☐ Charge fee(s) indicated above, **except for the filing fee**
☐ Credit any overpayments

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on form PTO-2038.

Amount Grand Total 0

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Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

Amendment Transmittal Letter

Docket Number
1426-136.301

Correspondence Address

Customer Number	106622		
-OR-			
Name			
Address			
City		State	
Country		Postal Code	
Phone Number			
E-mail Address			

Certificate of Mailing by Express Mail

I hereby certify that this Amendment, accompanying documents, and fee (if appropriate) are being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450 on the date indicated below:

(Date of Mailing)

(Typed or Printed Name of Person Mailing Correspondence)

(Signature of Person Mailing Correspondence)

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Certificate of Transmission

I hereby certify that this Amendment, accompanying documents, and fee (if appropriate) authorization are being facsimile transmitted to the United States Patent and Trademark Office on the date indicated below:

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Signature Instructions

Select the name of the person who will electronically sign the Amendment from the drop-down box below.

If a practitioner is not present in the drop-down list, you must close this form and select 'Add Practitioner...' in the Form Manager's Utility menu.

Verify that the signatory information is correct and press the 'eSign' button to electronically sign the submission. If you prefer to sign the form manually, simply do not click the 'eSign' button; just print and manually sign.

Signatory Drop-Down Box Sang N. Dang

Name	Sang N. Dang	Registration Number	51,186
Signatory Capacity	Attorney for Applicant(s)	E-mail Address	sdang@bluecapitallaw.com
eSign	/Sang N. Dang/	Date Signed	10/25/2019

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Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.	:	16/052,505
Confirmation No.	:	1082
Applicant	:	Wei-Yu Chen and Li-Chih Tseng
Filed	:	August 1, 2018
Title	:	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM
TC/A.U.	:	2642
Examiner	:	Pakee Fang
Docket No.	:	1426-136.301 (1050153-US-P2)
Customer No.	:	106622

RESPONSE TO FINAL OFFICE ACTION

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

Dear Sir:

In response to the final Office Action mailed on July 31, 2019, having a three-month period for responding to **October 31, 2019**, Applicants respectfully submit the following amendments and remarks along with a RCE.

Claims begin on page 2.

Remarks begin on page 5.

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Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
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IN THE CLAIMS:

1. (Currently Amended) A method of a UE (User Equipment) for performing random access procedure, comprising:

the UE transmits a preamble to a network;

the UE receives a Msg2 containing a TTI (Transmission Timer Interval) information of a Msg3 from the network in response to the preamble, wherein the TTI information of the Msg3 includes a TTI duration of the Msg3 and a start timing offset of the Msg3; and

the UE performs a single transport block (TB) of Msg3 transmission to the network according to the TTI information of the Msg3.

2. (Original) The method of claim 1, further comprising:

the UE selects the TTI information of the Msg3 based on random access purpose, if there are multiple TTI information of the Msg3 in the Msg2.

3. (Original) The method of claim 1, further comprising:

the UE selects the TTI information of the Msg3 based on a PRACH (Physical Random Access Channel) resource set of the preamble transmission or a preamble set of the preamble transmission, if there are multiple TTI information of the Msg3 in the Msg2.

4. (Original) The method of claim 1, further comprising:

the UE selects the TTI information of the Msg3 based on highest priority of logical channel having data available for transmission, if there are multiple TTI information of the Msg3 in the Msg2.

5. (Original) The method of claim 1, wherein the TTI information of the Msg3 is included in a RAR (Random Access Response) for responding the preamble.

6. (Original) The method of claim 1, wherein the TTI information of the Msg3 is included in a common field for multiple RARs in the Msg2.

7. (Original) The method of claim 1, wherein the Msg2 is a random access response.

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8. (Currently Amended) A User Equipment (UE), comprising:

a control circuit;

a processor installed in the control circuit; and

a memory installed in the control circuit and operatively coupled to the processor;

wherein the processor is configured to execute a program code stored in the memory to:

transmit a preamble to a network;

receive a Msg2 containing a TTI (Transmission Time Interval) information of a Msg3 from the network in response to the preamble, wherein the TTI information of the Msg3 includes a TTI duration of the Msg3 and a start timing offset of the Msg3; and

perform a single transport block (TB) of Msg3 transmission to the network according to the TTI information of the Msg3.

9. (Original) The UE of claim 8, wherein the processor is further configured to execute the program code stored in the memory to:

select the TTI information of the Msg3 based on random access purpose, if there are multiple TTI information of the Msg3 in the Msg2.

10. (Original) The UE of claim 8, wherein the processor is further configured to execute the program code stored in the memory to:

select the TTI information of the Msg3 based on a PRACH (Physical Random Access Channel) resource set of the preamble or a preamble set of the preamble transmission, if there are multiple TTI information of the Msg3 in the Msg2.

11. (Original) The UE of claim 8, wherein the processor is further configured to execute the program code stored in the memory to:

select the TTI information of the Msg3 based on highest priority of logical channel having available data, if there are multiple TTI information of the Msg3 in the Msg2.

12. (Original) The UE of claim 8, wherein the TTI information of the Msg3 is included in a RAR (Random Access Response) for responding the preamble.

13. (Original) The UE of claim 8, wherein the TTI information of the Msg3 is included in a common field for multiple RARs in the Msg2.

14. (Original) The UE of claim 8, wherein the Msg2 is a random access response.

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REMARKS

Claims 1-14 are pending in the application. In the Office Action, claims 1-14 stand rejected under 35 U.S.C. § 103 as being unpatentable over Mujtaba (U.S. Patent Publication No. 2016/0366705) in view of Ai (U.S. Patent Publication No. 2010/0177675). *See* Office Action, ¶ 3.

Claims 1 and 8 have been amended. The claim amendments are supported by at least Paragraphs [0051] and FIG. 7 of the present application. No new matter has been added. Applicants respectfully request reconsideration of the claims as amended.

Paragraph [0076] of Mujtaba teaches that the base station may determine that the link budget constrained wireless device should implement transmission time interval bundling (TTI-B) for the Msg3. Such parameter(s) or characteristic(s) may be indicated to the link budget constrained wireless device by the base station as part of the Msg2 transmitted by the base station. However, Paragraph [0062] of Mujtaba teaches that a random access response (RAR) includes a timing advance (TA) parameter, a temporary cell radio network temporary identifier (TC-RNTI), and an uplink grant. Mujtaba fails to teach that the UE receives a Msg2 containing a TTI (Transmission Timer Interval) information of a Msg3, and that the TTI information of the Msg3 includes a TTI duration of the Msg3 and a start timing offset of the Msg3.

Furthermore, TTI bundling (TTI-B) is a method to enable (or activate) the UE to send the same packet but with different error detection and correction bits in **4 consecutive TTIs (represents four TTI lengths)**. Under the circumstance, Mujtaba teaches away from the intention of reducing transmitting delay for Msg3 transmission as recited in the claims and described in the present application.

In addition, although Paragraph [0067] of Ai teaches that a message can contain a starting timing offset, the starting timing offset of Ai contained in MBSFN TDM Info List is related to multimedia broadcast multicast services (MBMS), which is irrelevant to the random access procedure (e.g., Msg2, Msg3). In contrast, as recited in claims 1 and 8, if a **single transport block (TB)** is used for Msg3 transmission, the average random access latency could be reduced due to early start to monitor Msg4.

For the reasons stated the above, Applicants respectfully submit that claims 1-14 are patentable over the combination of Mujtaba and Ai.

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In view of the foregoing it is respectfully submitted that the pending claims are in condition for allowance. Reconsideration of the rejections is requested. Allowance of the claims is solicited.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made.

Should the Examiner find it necessary to speak with Applicant's attorney, he is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

Sang N. Dang

BLUE CAPITAL LAW FIRM, P.C.

Dated: October 25, 2019

/Sang N. Dang/

Reg. No. 51,186

Tel.: (714) 839-3800

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Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Wei-Yu Chen and Li-Chih Tseng	
Title:	METHOD AND APPARATUS FOR IMPROVING Msg3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM	
Serial No.:	16/052,505	Filed: August 1, 2018
Examiner:	Pakee Fang	Group Art Unit: 2642
Attorney Docket No.:	1426-136.301 (1050153-US-P2)	

CERTIFICATE OF EFS-WEB TRANSMISSION
UNDER 37 CFR § 1.8

I hereby certify that the enclosed 2 Page Request for Continued Examination; 2 Page Amendment Transmittal Sheet; and 6 Page Amendment are being transmitted to the United States Patent and Trademark Office via EFS-Web on October 25, 2019.

Date: October 25, 2019 /Sandy Kim/
Sandy Kim

Mailing Address:

BLUE CAPITAL LAW FIRM, P.C. (Customer No.: 106622)
650 Town Center Drive, Suite 1530
Costa Mesa, California 92626
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Fax: 714-795-2995

Electronic Patent Application Fee Transmittal

Application Number:	16052505
Filing Date:	01-Aug-2018
Title of Invention:	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM
First Named Inventor/Applicant Name:	Wei-Yu Chen
Filer:	Sang N. Dang/Sandy Kim
Attorney Docket Number:	1426-136.301

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
RCE- 1ST REQUEST	1801	1	1300	1300
		Total in USD ($)		**1300**

Electronic Acknowledgement Receipt	
EFS ID:	37569319
Application Number:	16052505
International Application Number:	
Confirmation Number:	1082
Title of Invention:	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM
First Named Inventor/Applicant Name:	Wei-Yu Chen
Customer Number:	106622
Filer:	Sang N. Dang/Sandy Kim
Filer Authorized By:	Sang N. Dang
Attorney Docket Number:	1426-136.301
Receipt Date:	25-OCT-2019
Filing Date:	01-AUG-2018
Time Stamp:	22:00:59
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$1300
RAM confirmation Number	E20190OM01213872
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		1426-136-301--RFOAwRCEasFiled10252019v2.pdf	191063 4eb9b01a8a0eb7a979ff6d0b0e0026e105ea61d8	yes	11

Multipart Description/PDF files in .zip description

Document Description	Start	End
Request for Continued Examination (RCE)	1	2
Transmittal Letter	3	4
Amendment Submitted/Entered with Filing of CPA/RCE	5	5
Claims	6	8
Applicant Arguments/Remarks Made in an Amendment	9	10
Miscellaneous Incoming Letter	11	11

Warnings:

Information:

2	Fee Worksheet (SB06)	fee-info.pdf	30325 39b7fefd7b2aa62dc887dfdbd9de4a40b5beb260	no	2

Warnings:

Information:

Total Files Size (in bytes):	221388

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/052,505	08/01/2018	Wei-Yu Chen	1426-136.301	1082

106622 7590 01/13/2020

Blue Capital Law Firm, P.C.
650 Town Center Drive, Suite 1530
Costa Mesa, CA 92626

EXAMINER	
FANG, PAKEE	

ART UNIT	PAPER NUMBER
2642	

NOTIFICATION DATE	DELIVERY MODE
01/13/2020	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):

docketing@bluecapitallaw.com

Office Action Summary	**Application No.** 16/052,505	**Applicant(s)** Chen et al.	
	Examiner PAKEE FANG	**Art Unit** 2642	**AIA (FITF) Status** Yes

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

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 10/25/2019.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ 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.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-14 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1-14 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, 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.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ 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)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The amendment filed on 10/25/2019 has been entered and considered by Examiner. Claims **1-14** are presented for examination.

Continued Examination Under 37 CFR 1.114

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/25/2019 has been entered.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102 of this title, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

4. **Claims 1-14 are** rejected under 35 U.S.C. 103 as being unpatentable over Mujtaba et al. (US Pub. 20160366705 A1) in view of Ai (US Pub. 20100177675 A1) in further view of Lohr et al. (US Pub. 20120147830 A1).

For claims 1 and 8, Mujtaba disclose (Figs. 1-7) a User Equipment (UE), comprising: a control circuit; a processor installed in the control circuit; and a memory installed in the control circuit and operatively coupled to the processor [0029, 0032, 0043, 0046-49]; wherein the processor is configured to execute a program code stored in the memory to:

transmit a preamble to a network (Step 502/602) [0060-61, 0070-73];

receive a Msg2 containing a TTI (Transmission Time Interval) information of a Msg3 from the network in response to the preamble (Step 504/604) [0062, 0074-79],

wherein the TTI information of the Msg3 includes a TTI duration of the Msg3 [0008, 0076, 0095] and a start timing offset of the Msg3; and

perform Msg3 transmission to the network according to the TTI information of the Msg3 [0076, 0080, 0063-65].

But Mujtaba doesn't explicitly teach the TTI information includes a TTI duration and a start timing offset of a message.

However, Ai discloses wherein the TTI information of the Msg includes a TTI duration of the Msg and a start timing offset of the Msg [0067].

Since, all are analogous arts addressing data transmission in a message use in a mobile device; Therefore, it would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to combine the teachings of Mujtaba and Ai to enhance communication protocols in order to receive more resourceful information, thus, improving system efficiency.

But Mujtaba as modified by Ai and Lohr don't explicitly teach perform a single transport block (TB) of Msg3 transmission.

However, Lohr discloses (Figs. 7-15) perform a single transport block (TB) of Msg transmission to the network according to the TTI information of the Msg [0120, 0183, 0187].

Since, all are analogous arts addressing data transmission in a message use in a mobile device; Therefore, it would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to combine the teachings of Mujtaba, Ai,

and Lohr to allow different scheduling protocol to enhance data communication, thus, improving data rate.

Claim 1 differs from claim 8 only by the additional recitation of the following limitation which is also taught by Mujtaba as modified by Ai and Lohr. Mujtaba, as modified by Ai and Lohr, discloses a method of a UE (User Equipment) for performing random access procedure [0029, 0032, 0043, 0046-49]. All other identical limitations are rejected based on the same rationale as shown above.

For claims 2 and 9, Mujtaba, as modified by Ai and Lohr, discloses the processor is further configured to execute the program code stored in the memory to: select the TTI information of the Msg3 based on random access purpose, if there are multiple TTI information of the Msg3 in the Msg2 [0076, 0080, 0062-65].

For claims 3 and 10, Mujtaba, as modified by Ai and Lohr, discloses the processor is further configured to execute the program code stored in the memory to:

select the TTI information of the Msg3 based on a PRACH (Physical Random Access Channel) resource set of the preamble or a preamble set of the preamble transmission, if there are multiple TTI information of the Msg3 in the Msg2 [0062, 0074-79].

For claims 4 and 11, Mujtaba, as modified by Ai and Lohr, discloses the processor is further configured to execute the program code stored in the memory to:

select the TTI information of the Msg3 based on highest priority of logical channel having available data, if there are multiple TTI information of the Msg3 in the Msg2 [0076, 0080, 0063-65].

For claims 5 and 12, Mujtaba, as modified by Ai and Lohr, discloses the TTI information of the Msg3 is included in a RAR (Random Access Response) for responding the preamble [0062, 0074-79].

For claims 6 and 13, Mujtaba, as modified by Ai and Lohr, discloses the TTI information of the Msg3 is included in a common field for multiple RARs in the Msg2 [0062, 0074-79].

For claims 7 and 14, Mujtaba, as modified by Ai and Lohr, discloses the Msg2 is a random access response [0062, 0074-79].

Response to Arguments

Applicant's arguments with respect to claims 1 – 14 have been considered but are moot in view of the new ground(s) of rejection.

In view of amendment, the reference Lohr has been used for new ground of rejections.

Inquiries

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to PAKEE FANG whose telephone number is (571)270-3633. The Examiner can normally be reached on Mon-Fri 9:00AM-5:00PM. If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, PÉREZ-GUTIÉRREZ RAFAEL can be reached on 571-272-7915. The fax phone number for the organization where

this application or proceeding is assigned is 571-273-8300. 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.

/PAKEE FANG/
Primary Examiner, Art Unit 2642

Notice of References Cited	Application/Control No. 16/052,505	Applicant(s)/Patent Under Reexamination Chen et al.	
	Examiner PAKEE FANG	Art Unit 2642	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-20120147830-A1	06-2012	Lohr; Joachim	H04L1/1854	370/329
	B					
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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.

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/052,505	Chen et al.
	Examiner	**Art Unit**
	PAKEE FANG	2642

✓	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	12/19/2018	03/20/2019	07/25/2019	12/19/2019					
	1	÷	✓	✓	✓					
	2	÷	✓	✓	✓					
	3	÷	✓	✓	✓					
	4	÷	✓	✓	✓					
	5	÷	✓	✓	✓					
	6	÷	✓	✓	✓					
	7	÷	✓	✓	✓					
	8	÷	✓	✓	✓					
	9	÷	✓	✓	✓					
	10	÷	✓	✓	✓					
	11	÷	✓	✓	✓					
	12	÷	✓	✓	✓					
	13	÷	✓	✓	✓					
	14	÷	✓	✓	✓					

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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/052,505	Chen et al.
	Examiner	Art Unit
	PAKEE FANG	2642

CPC - Searched*		
Symbol	Date	Examiner
H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607	03/20/2019	PF

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner
455	combined text	03/20/2019	PF

* 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
East, Google, Investor search	03/20/2019	PF
updated search	07/25/2019	PF
updated search	12/19/2019	PF

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

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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L2	112688	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:36
L3	8130	L2 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:36
L4	2058	L3 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:36
L5	214	L4 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:36
L6	100	@ay<"2017" and L5	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:36
L7	112688	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:37
L8	8130	L7 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:37
L9	2058	L8 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:37
L10	214	L9 and ((Transmission adj2 Time adj2 Interval) TTI) with (first	US-PGPUB; USPAT; USOCR;	OR	ON	2019/12/19 11:37

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		second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	FPRS; EPO; JPO; DERWENT; IBM_TDB			
L11	100	@ay<"2017" and L10	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:37
L12	42	11 and (transport$4 adj2 block)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:38
L13	3	11 and (transport$4 adj2 block) with (msg message)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:39
S1	2	"20180035470".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:17
S2	2	S1 and (frame msg$1)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:26
S3	82131	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:29
S4	5501	S3 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:33
S5	1227	S4 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:35
S6	78	S5 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:37
S7	66	@ay<"2017" and S6	US-PGPUB; USPAT; USOCR;	OR	ON	2018/05/21 17:41

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			FPRS; EPO; JPO; DERWENT; IBM_TDB			
S8	95587	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S9	6513	S8 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S10	1554	S9 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S11	128	S10 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S12	82	@ay<"2017" and S11	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S13	3	S12 and Numerology	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S14	2	"20160366705".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:44
S15	0	S14 and Numerology	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:47
S16	7	S8 and Numerology with (message) same (preamble)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:01
S17	1	@ay<"2017" and S16	US-PGPUB; USPAT; USOCR;	OR	ON	2019/01/24 16:01

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			FPRS; EPO; JPO; DERWENT; IBM_TDB			
S18	3	"20180035470".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:15
S19	0	("455" "370").clas. and Numerology with (message) same (preamble)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:17
S20	7	Numerology with (message) same (preamble)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18
S21	1	@ay<"2017" and S20	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18
S22	0	("455" "370").clas. and Numerology with (message)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18
S23	16	("455" "370").clas. and Numerology same (preamble)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18
S24	15	@ay<"2017" and S23	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18
S25	525	("455" "370").clas. and Numerology	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 17:59
S26	8	("20150099528" "20170280400")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/28 10:05
S27	5	("20150099528" "20170280400").pn.	US-PGPUB; USPAT; USOCR;	OR	ON	2019/01/28 10:05

			FPRS; EPO; JPO; DERWENT; IBM_TDB			
S28	98999	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S29	6750	S28 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S30	1631	S29 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S31	146	S30 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S32	86	@ay<"2017" and S31	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S33	98999	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S34	6750	S33 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S35	1631	S34 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S36	146	S35 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S37	86	@ay<"2017" and S36	US-PGPUB; USPAT; USOCR;	OR	ON	2019/03/20 12:01

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			FPRS; EPO; JPO; DERWENT; IBM_TDB			
S38	7	(US-20170339546-$ or US-20170019931-$ or US-20160366705-$ or US-20150365977-$ or US-20090316811-$ or US-20140334448-$ or US-20070268812-$).did.	US-PGPUB	OR	ON	2019/03/20 12:19
S39	2	S38 and (off$1set) with (tim$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:19
S40	2	"20160366705".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:20
S41	16	S37 and (off$1set) with (tim$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:25
S42	2	"20180359785".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:32
S43	333	("455" "370").clas. and (off$1set) with (tim$4) with ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:39
S44	333	@ay<"2017" and S43	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:40
S45	27	S44 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:40
S46	59	("455" "370").clas. and (off$1set) with (tim$4) with ((Transmission adj2 Time adj2 Interval) TTI) near3 (data information)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:50
S47	59	@ay<"2017" and S46	US-PGPUB;	OR	ON	2019/03/20

			USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			12:50
S48	5	("455" "370").clas. and (duration) same (off$1set) with (tim$4) with ((Transmission adj2 Time adj2 Interval) TTI) near3 (data information)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 13:40
S49	2	"20160366705" and (tim$4 interval window)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 14:38
S50	2	"20160366705" and (tim$4 interval window TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 14:38
S51	1	"20100177675".pn. and (off$1set start$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 14:52
S52	2	"20160366705" and (Msg3 (third adj messag$4))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 14:55
S53	105281	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
S54	7343	S53 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
S55	1827	S54 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
S56	181	S55 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
S57	93	@ay<"2017" and S56	US-PGPUB;	OR	ON	2019/07/25

			USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			15:03
S58	59	("455" "370").clas. and (off$1set) with (tim$4) with ((Transmission adj2 Time adj2 Interval) TTI) near3 (data information)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
S59	59	@ay<"2017" and S58	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03

12/19/2019 11:53:22 AM
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PTO/SB/08a (03-15)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	16052505
	Filing Date	2018-08-01
	First Named Inventor	Chen, Wei-Yu
	Art Unit	2642
	Examiner Name	Pakee Fang
	Attorney Docket Number	1426-136.301

U.S.PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					
If you wish to add additional U.S. Patent citation information please click the Add button.						

U.S.PATENT APPLICATION PUBLICATIONS						
Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					
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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							☐
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NON-PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16052505
	Filing Date	2018-08-01
	First Named Inventor	Chen, Wei-Yu
	Art Unit	2642
	Examiner Name	Pakee Fang
	Attorney Docket Number	1426-136.301

	1	NOKIA NETWORKS: "Basic system design for UL NB-IoT", 3GPP DRAFT; R1-160041, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE, vol. RAN WG1,no. Budapest, HU; 20160118-20160120 17 January 2016 (2016-01 -17), XP051053364.	☐
	2	QUALCOMM EUROPE: "RACH procedure", 3GPP DRAFT; R2-070212, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE, vol. RAN WG2, no. Sorrento, Italy; 20070112, 12 January 2007 (2007-01 -12), XP050133313, [retrieved on 2007-01-12]	☐
	3	Communication pursuant to Article 94(3) from European Patent Office in corresponding EP Application No. 17183827.9, dated January 7, 2020.	☐

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

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*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 Transmittal

Docket Number
1426-136.301

Address To
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

In Re Application Of:

Wei-Yu Chen

Application No.	16/052,505
Filing Date	August 1, 2018
Examiner	Pakee Fang
Art Unit	2642

Title of Invention

METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM

BASIS FOR FILING (Select 1, 2 or 3 below.)

37 CFR 1.97(b)

1) ☐ The Information Disclosure Statement submitted herewith is being filed within three months of the filing of a national application other than a continued prosecution application under 37 CFR 1.53 (d); within three months of the date of entry of the national stage as set forth in 37 CFR 1.491 in an international application; before the mailing of a first Office Action on the merits, or before the mailing of a first Office Action after the filing of a request for continued examination under 37 CFR 1.114.

37 CFR 1.97(c)

2) ☒ The Information Disclosure Statement submitted herewith is being filed after the period specified in 37 CFR 1.97(b), but before the mailing date of a Final Action under 37 CFR 1.113, a Notice of Allowance under 37 CFR 1.311, or an Action that otherwise closes prosecution in the application, and is accompanied by one of:

a) ☒ the statement specified in 37 CFR 1.97(e);

OR

b) ☐ the fee set forth in 37 CFR 1.17(p).

37 CFR 1.97(d)

3) ☐ The Information Disclosure Statement submitted herewith is being filed after the period specified in 37 CFR 1.97(c), and on or before payment of the issue fee, and is accompanied by the Statement as specified in 37 CFR 1.97(e) and the fee set forth in 37 CFR 1.17(p).

Samsung Exhibit 1002, Page 181 of 564
Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

Information Disclosure Statement Transmittal

Docket Number
1426-136.301

STATEMENT UNDER 37 CFR 1.97(e) ACCOMPANYING INFORMATION DISCLOSURE STATEMENT

The Information Disclosure Statement submitted herewith is submitted under one of the following conditions, which satisfies the requirement under 37 CFR 1.97(e). (Select 4 or 5 below if applicable.)

4) [X] 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

5) [ ] 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.

Remarks (Enter Remarks Below or Attach Document Containing Remarks)

Fee set forth in 37 CFR 1.17(p):

[X] No additional fee is required.

[ ] A check in the amount of _____ is attached.

[ ] The Director is hereby authorized to charge and credit Deposit Account No. _____ as described below.

- [ ] Charge the amount of _____
- [ ] Credit any overpayment.
- [ ] Charge any additional fee required.

[ ] Payment by credit card. Form PTO-2038 is attached.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

Samsung Exhibit 1002, Page 182 of 564
Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

Information Disclosure Statement Transmittal

Docket Number
1426-136.301

Correspondence Address

Customer Number	106622		
-OR-			
Name			
Address			
City		State	
Country		Postal Code	
Phone Number			
E-mail Address			

Certificate of Mailing by Express Mail

I hereby certify that this Transmittal Letter, accompanying documents and fee (if appropriate) are being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450 on the date indicated below:

(Date of Mailing)

(Typed or Printed Name of Person Mailing Correspondence)

(Signature of Person Mailing Correspondence)

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(Date of Mailing) *(Name of Person Mailing Correspondence)*

(Signature of Person Mailing Correspondence)

Certificate of Transmission

I hereby certify that this Transmittal Letter, accompanying documents and fee authorization (if appropriate) is being facsimile transmitted to the United States Patent and Trademark Office on the date indicated below:

(Date of Transmission) *(Name of Person Transmitting Correspondence)*

(Signature of Person Transmitting Correspondence)

Signature Instructions

Select the name of the person who will electronically sign the Trasmittal Letter from the drop-down box below.

If a practitioner is not present in the drop-down list, you must close this form and select 'Add Practitioner...' in the Form Manager's Utility menu.

Verify that the signatory information is correct and press the 'eSign' button to electronically sign the submission. If you prefer to sign the form manually, simply do not click the 'eSign' button; just print and manually sign.

Signatory Drop-Down Box Sang N. Dang

Name	Sang N. Dang	Registration Number	51,186
Signatory Capacity	Attorney for Applicant(s)	E-mail Address	sdang@bluecapitallaw.com
eSign	/Sang N. Dang/	Date Signed	01-13-2020

Samsung Exhibit 1002, Page 183 of 564
Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

Electronic Acknowledgement Receipt

EFS ID:	38279499
Application Number:	16052505
International Application Number:	
Confirmation Number:	1082
Title of Invention:	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM
First Named Inventor/Applicant Name:	Wei-Yu Chen
Customer Number:	106622
Filer:	Sang N. Dang/Sandy Kim
Filer Authorized By:	Sang N. Dang
Attorney Docket Number:	1426-136.301
Receipt Date:	13-JAN-2020
Filing Date:	01-AUG-2018
Time Stamp:	15:35:50
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		1426-136-301--IDSasFiled01132020.pdf	155222 d6b51be6618e02c2f28ec30865dc092a4dfdd58d	yes	6

	Multipart Description/PDF files in .zip description			
	Document Description	**Start**	**End**	
	Miscellaneous Incoming Letter	6	6	
	Information Disclosure Statement (IDS) Form (SB08)	4	5	
	Transmittal Letter	1	3	
Warnings:				
Information:				
2	Non Patent Literature	R1-160041.pdf	404611 7e6138f7b75ff838cc8e609c023a88b6a447f37b	no	2
Warnings:				
Information:				
3	Non Patent Literature	R2-070212.pdf	452790 8ba57f05ab2e34b2d163b72c1362ed57f0538993	no	4
Warnings:				
Information:				
4	Non Patent Literature	NPL--EPComm.pdf	2117317 a903e7d0d97ef3a6aac380cdf0966cf32265de2c	no	9
Warnings:				
Information:				
		Total Files Size (in bytes):	3129940	

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Wei-Yu Chen and Li-Chih Tseng	
Title:	METHOD AND APPARATUS FOR IMPROVING Msg3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM	
Serial No.:	16/052,505	Filed: August 1, 2018
Examiner:	Pakee Fang	Group Art Unit: 2642
Attorney Docket No.:	1426-136.301 (1050153-US-P2)	

CERTIFICATE OF EFS-WEB TRANSMISSION
UNDER 37 CFR § 1.8

I hereby certify that the enclosed 3 Page Information Disclosure Statement Transmittal; 2 Page Information Disclosure Statement by Applicant with 3 references are being transmitted to the United States Patent and Trademark Office via EFS-Web on January 13, 2020.

Date: January 13, 2020 /Sandy Kim/
Sandy Kim

Mailing Address:

BLUE CAPITAL LAW FIRM, P.C. (Customer No.: 106622)
650 Town Center Drive, Suite 1530
Costa Mesa, California 92626
Tel: 714-839-3800
Fax: 714-795-2995

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82A (07-13)
Approved for use through 11/30/2014. OMB 0651-0051
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TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	16/052,505
Filing Date	August 1, 2018
First Named Inventor	Wei-Yu Chen
Title	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM
Art Unit	2642
Examiner Name	Pakee Fang
Attorney Docket Number	ASUP152US

SIGNATURE of Applicant or Patent Practitioner

Signature	/Ali Assar/	Date (Optional)	February 25, 2020
Name	Ali Assar	Registration Number	65848
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ *Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. 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 3 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, 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.**

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Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82B (07-13)
Approved for use through 11/30/2014. OMB 0651-0051
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

☑ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 92096

OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

☑ The address associated with the above-mentioned Customer Number

OR

☐ The address associated with Customer Number:

OR

Firm or Individual Name	Cooper Legal Group, LLC				
Address	6505 Rockside Road, Suite 330				
City	Independence	State	Ohio	Zip	44131
Country	US				
Telephone	216-654-0090	Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

ASUSTek Computer Inc.

☐ Inventor or Joint Inventor (title not required below)

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☑ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature	MING-HSIU HSU	Date (Optional)	
Name	MING-HSIU HSU		
Title	Director of ASUSTek Computer Inc.		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ Total of forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. 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 3 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, 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.**

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Electronic Acknowledgement Receipt

EFS ID:	38684270
Application Number:	16052505
International Application Number:	
Confirmation Number:	1082
Title of Invention:	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM
First Named Inventor/Applicant Name:	Wei-Yu Chen
Customer Number:	106622
Filer:	William Joseph Cooper/Amy Ansbro
Filer Authorized By:	William Joseph Cooper
Attorney Docket Number:	1426-136.301
Receipt Date:	25-FEB-2020
Filing Date:	01-AUG-2018
Time Stamp:	14:19:27
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	POA.pdf	487515 f25967f4f0f58001263e5c8652571ab28dfc8feb	no	2
Warnings:					

Information:	
Total Files Size (in bytes):	487515

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/052,505	08/01/2018	Wei-Yu Chen	1426-136.301

CONFIRMATION NO. 1082

92096
Cooper Legal Group LLC
6505 Rockside Road
Suite 330
Independence, OH 44131

POA ACCEPTANCE LETTER

OC000000115060219

Date Mailed: 03/02/2020

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 02/25/2020.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/sleutchit/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/052,505	08/01/2018	Wei-Yu Chen	1426-136.301

CONFIRMATION NO. 1082

106622
Blue Capital Law Firm, P.C.
650 Town Center Drive, Suite 1530
Costa Mesa, CA 92626

POWER OF ATTORNEY NOTICE

OC000000115060213

Date Mailed: 03/02/2020

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 02/25/2020.

- The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/sleutchit/

Docket No. **1050153-US-P2** **ASUP152US**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re **PATENT** application of:

Applicant: WEI-YU CHEN

Serial No.: 16/052,505

For: METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM

Filing Date: August 1, 2018

Examiner: PAKEE FANG

Art Unit: 2642

REPLY TO THE NON-FINAL OFFICE ACTION DATED JANUARY 13, 2020

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

Dear Commissioner:

Favorable reconsideration of the above-identified application is respectfully requested in view of the following amendments and remarks.

AMENDMENTS

IN THE CLAIMS:

Please amend claims 1 and 8 as follows:

1. (Currently Amended) A method of a UE (User Equipment) for performing random access procedure, comprising:

the UE transmits a preamble to a network;

the UE receives a Msg2 containing a TTI (Transmission Timer Interval) information of a Msg3 from the network in response to the preamble, wherein the TTI information of the Msg3 includes a TTI duration of the Msg3 and a start timing offset of the Msg3; and

the UE performs a single (TB) transport block ~~(TB)~~ of Msg3 transmission to the network according to the TTI information of the Msg3.

2. (Original) The method of claim 1, further comprising:

the UE selects the TTI information of the Msg3 based on random access purpose, if there are multiple TTI information of the Msg3 in the Msg2.

3. (Original) The method of claim 1, further comprising:

the UE selects the TTI information of the Msg3 based on a PRACH (Physical Random Access Channel) resource set of the preamble transmission or a preamble set of the preamble transmission, if there are multiple TTI information of the Msg3 in the Msg2.

4. (Original) The method of claim 1, further comprising:

the UE selects the TTI information of the Msg3 based on highest priority of logical channel having data available for transmission, if there are multiple TTI

information of the Msg3 in the Msg2.

5. (Original) The method of claim 1, wherein the TTI information of the Msg3 is included in a RAR (Random Access Response) for responding the preamble.

6. (Original) The method of claim 1, wherein the TTI information of the Msg3 is included in a common field for multiple RARs in the Msg2.

7. (Original) The method of claim 1, wherein the Msg2 is a random access response.

8. (Currently Amended) A User Equipment (UE), comprising:

a control circuit;

a processor installed in the control circuit; and

a memory installed in the control circuit and operatively coupled to the processor;

wherein the processor is configured to execute a program code stored in the memory to:

transmit a preamble to a network;

receive a Msg2 containing a TTI (Transmission Time Interval) information of a Msg3 from the network in response to the preamble, wherein the TTI information of the Msg3 includes a TTI duration of the Msg3 and a start timing offset of the Msg3; and

perform a single (TB) transport block ~~(TB)~~ of Msg3 transmission to the network according to the TTI information of the Msg3.

9. (Original) The UE of claim 8, wherein the processor is further configured to execute the program code stored in the memory to:

select the TTI information of the Msg3 based on random access purpose, if there are multiple TTI information of the Msg3 in the Msg2.

10. (Original) The UE of claim 8, wherein the processor is further configured to execute the program code stored in the memory to:

select the TTI information of the Msg3 based on a PRACH (Physical Random Access Channel) resource set of the preamble or a preamble set of the preamble transmission, if there are multiple TTI information of the Msg3 in the Msg2.

11. (Original) The UE of claim 8, wherein the processor is further configured to execute the program code stored in the memory to:

select the TTI information of the Msg3 based on highest priority of logical channel having available data, if there are multiple TTI information of the Msg3 in the Msg2.

12. (Original) The UE of claim 8, wherein the TTI information of the Msg3 is included in a RAR (Random Access Response) for responding the preamble.

13. (Original) The UE of claim 8, wherein the TTI information of the Msg3 is included in a common field for multiple RARs in the Msg2.

14. (Original) The UE of claim 8, wherein the Msg2 is a random access response.

REMARKS

Claims 1-14 are pending in the application, and are all rejected. Claims 1 and 8 are amended herein. Reconsideration of the application in light of the following remarks is respectfully requested.

I. REJECTION OF CLAIMS 1-14 UNDER 35 U.S.C. § 103(a)

Claims 1-14 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Mujtaba, U.S. Publication No. 2016/0366705 (*hereinafter* "Mujtaba") in view of Ai, U.S. Publication No. 2010/0177675 (*hereinafter* "Ai") in further view of Lohr, U.S. Patent No. 2012/0147830 (*hereinafter* "Lohr"). Withdrawal of this rejection is respectfully requested for at least the following reasons.

Independent claim 1 provides for, among other things, **the UE transmits a preamble to a network; the UE receives a Msg2 containing a TTI (Transmission Timer Interval) information of a Msg3 from the network in response to the preamble, wherein the TTI information of the Msg3 includes a TTI duration of the Msg3 and a start timing offset of the Msg3; and the UE performs a single (TB) transport block of Msg3 transmission to the network according to the TTI information of the Msg3**, and **independent claim 8** is believed to provide for at least some similar features.

It is respectfully submitted that the references cited fail to teach and/or suggest at least these features.

The Office Action acknowledges that Mujtaba is silent as to at least some of these features (e.g., page 3 of the Office Action).

Ai and/or Lohr are believed to fail to make up for the deficiencies of Mujtaba.

For example, Ai seems to provide that:

> [0009] TDM Rep, this parameter is defined as a repetition period and is represented by the number of TTIs in the repetition period. Different services are configured with different repetition period lengths, and the

parameter is configured in a relatively fixed way, that is, it is configured through the TDM Req parameter of each service. Each service occupies the resource for a certain time length in a repetition period. The resource allocation situation is consistent in different repetition periods. (Emphasis added)

[0057] If two services with different service rates share the same channel resource by time division multiplexing, obviously the service with higher rate needs to occupy more channel resource, while the service with lower rate only needs to occupy less channel resource. However, with the above mode adopted, if the two services are configured with identical repetition periods of time division multiplexing, they have to occupy the same amount of channel resource; therefore, the resource allocated to the service with higher rate may not be enough, while for the service with lower rate, a waste is caused. But if the two services are configured with different time division multiplexing periods, for example, for service one, the TDM Rep is configured as 2, and TDM Offset is configured as 0, while for service two, the TDM Rep is configured as 4, and TDM Offset is configured as 1, then service one occupies a half of the channel resource, while service two occupies a quarter of the channel resource, and there is another quarter of channel resource being idle and not occupied, and due to the limitation in the current TDM allocation mechanism and method, the idle resource cannot be allocated to service one or service two to use, thus the channel resource is greatly wasted. With regard to this, the present invention proposes an improvement of the current TDM mechanism to improve the efficiency and effectiveness of time division multiplexing of resource. (Emphasis added)

[0067] It can be seen that said TDM Rep Length cell comprises information of the repetition length of continuous channel resource occupation by a MBMS service in a TDM Rep. Said repetition length information is the number of TTIs of continuous channel resource occupation by a MBMS service, that is, in a TDM Rep, a MBMS service occupies the channel resource continuously for a time length starting from the TTI of TDM Offset and with a duration of TTIs of which the number is equal to the repetition length defined by the TDM Rep Length cell. (Emphasis added)

[0069] The TDM Rep Length cell is an optional item, and by default, in a TDM Rep, the time of channel resource occupation by a MBMS service is one TTI. (Emphasis added)

[0075] TDM_Length is information of the number of transmission time

> intervals continuously occupied by said MBMS service in a repetition period, i.e., information of the amount of channel resource occupied by said MBMS service. (Emphasis added)

Notably, Ai seems to be silent as to a UE receiving **a Msg2 (e.g., associated with downlink) containing a TTI information of a Msg3 (e.g., associated with uplink)** from a network in response to the preamble, wherein the TTI information of the Msg3 includes **a TTI duration of the Msg3** and a start timing offset of the Msg3.

Rather, Ai seems to provide for **a one-direction MBMS broadcast service (e.g., associated merely with downlink)**, repetition length information being a number of TTIs, and/or a TDM rep parameter being represented by **a number of TTIs (e.g., 2 TTIs, 4 TTIs, etc.)**.

Lohr seems to provide for:

> [0120] In this exemplary embodiment, the transmission mode may be for example a TTI bundling mode. The mobile terminal is therefore transmitting different redundancy versions of the same transport block within a number of consecutive transmission time intervals on the resources granted in the random access response message. (Emphasis added)
>
> [0183] It should be further noted that in the examples discussed with respect to FIG. 10 and FIG. 11 above, the allocated resources for the mobile terminal according to the grant comprised in the random access response message yield a transport block size for the first scheduled transmission sufficient in size to transmit a RRC connection setup request and a NAS service request simultaneously. As explained above, in case of using TTI bundling, the base station's scheduler can for example use a more aggressive modulation and coding scheme (i.e. a higher order modulation scheme and/or higher code rate) due to the soft-combining gain obtained by TTI bundling in comparison to a non-bundling transmission that is allocated the same number of resource elements on the physical channel. (Emphasis added)

Notably, Lohr seems to be silent as to a UE performing **a single (TB) transport block** of Msg3 transmission to a network according to TTI information of a Msg3.

Rather, Lohr seems to provide for a TTI **bundling** mode via which **multiple redundant versions of a transport block** are transmitted.

It is respectfully submitted that **a one-direction MBMS broadcast service (e.g., associated merely with downlink), repetition length information being a number of TTIs, and/or a TDM rep parameter being represented by a number of TTIs**, as provided for by Ai, and/or **a TTI bundling mode via which multiple redundant versions of a transport block are transmitted**, as provided for by Lohr, do not teach **the UE transmits a preamble to a network; the UE receives a Msg2 containing a TTI (Transmission Timer Interval) information of a Msg3 from the network in response to the preamble, wherein the TTI information of the Msg3 includes a TTI duration of the Msg3 and a start timing offset of the Msg3; and the UE performs a single (TB) transport block of Msg3 transmission to the network according to the TTI information of the Msg3** as provided for by independent claim 1, and as similarly provided for by independent claim 8, at least in part. It is thus respectfully submitted that independent claims 1 and 8 and the remaining claims that depend therefrom are not taught by the suggested combination, and allowance of the same is therefore respectfully requested.

Therefore, withdrawal of the rejection and allowance of the pending claims is respectfully requested.

II. CONCLUSION

For at least the above reasons, the claims currently under consideration are believed to be in condition for allowance. It is to be appreciated that while reference may be made back to certain parts of the application in this Reply (e.g., page numbers, line numbers, Figs., etc.), that such referencing is not to be interpreted in a limiting manner (e.g., to limit the scope of the claims and/or features therein to the particular portion(s) referenced), but is instead merely done for purposes of explanation, illustration and/or ease of understanding, for example. Additionally, at least one of A and B and/or the like generally comprises A or B and/or both A and B. Also, first, second, third, etc. are generally merely used as names, designators, etc. and are not necessarily meant to imply an ordering, temporal relation, etc. Although the present communication may include alterations to the application or claims, or characterizations of claim scope or referenced art, the Applicant is not conceding that previously pending claims are not patentable over the cited references. Rather, any alterations or characterizations are being made to facilitate expeditious prosecution of this application. 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 Applicants have made any disclaimers or disavowals of any subject matter supported by the present application.

Should the Examiner feel that a telephone interview would be helpful to facilitate favorable prosecution of the above-identified application, the Examiner is invited to contact the undersigned at the telephone number provided below.

Should any fees be due as a result of the filing of this response, the Commissioner is hereby authorized to charge the Deposit Account Number 50-5088, **ASUP152US**.

Respectfully submitted,
COOPER LEGAL GROUP, LLC

By: /Ali Assar/

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PTO/SB/08a (03-15)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16052505
	Filing Date	2018-08-01
	First Named Inventor	Wei-Yu Chen
	Art Unit	2642
	Examiner Name	Pakee Fang
	Attorney Docket Number	ASUP152US

U.S.PATENTS

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					

If you wish to add additional U.S. Patent citation information please click the Add button.

U.S.PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20090252125	A1	2009-10-08	Dragan Vujcic	Paragraphs [0034], [0035-0037], [0043-0048], [0049], [0052]; Claims 1-21
	2	20160183243	A1	2016-06-23	Minyoung Park	Paragraphs [0030-0036], [0068], [0087-0098]

If you wish to add additional U.S. Published Application citation information please click the Add button.

FOREIGN PATENT DOCUMENTS

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							☐

If you wish to add additional Foreign Patent Document citation information please click the Add button

NON-PATENT LITERATURE DOCUMENTS

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16052505
	Filing Date	2018-08-01
	First Named Inventor	Wei-Yu Chen
	Art Unit	2642
	Examiner Name	Pakee Fang
	Attorney Docket Number	ASUP152US

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	Indian Office Action from corresponding IN Application No. 201744026864 dated March 9, 2020, 7 pgs.	☐

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

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*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	16052505
	Filing Date	2018-08-01
	First Named Inventor	Wei-Yu Chen
	Art Unit	2642
	Examiner Name	Pakee Fang
	Attorney Docket Number	ASUP152US

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	/Ali Assar/	Date (YYYY-MM-DD)	2020-04-13
Name/Print	Ali Assar	Registration Number	65848

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.**

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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 record s.

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.

Electronic Acknowledgement Receipt

EFS ID:	39135292
Application Number:	16052505
International Application Number:	
Confirmation Number:	1082
Title of Invention:	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM
First Named Inventor/Applicant Name:	Wei-Yu Chen
Customer Number:	92096
Filer:	William Joseph Cooper/Amy Ansbro
Filer Authorized By:	William Joseph Cooper
Attorney Docket Number:	1426-136.301
Receipt Date:	13-APR-2020
Filing Date:	01-AUG-2018
Time Stamp:	10:50:53
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		ASUP152_R01.pdf	49949 7592835a1b8341977194d522dc9f19e912089af7	yes	10

	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Amendment/Req. Reconsideration-After Non-Final Reject		1	1	
	Claims		2	4	
	Applicant Arguments/Remarks Made in an Amendment		5	10	
Warnings:					
Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	IDS.pdf	64255 ffd4d0567437ae960bc512daa32dfa14f53ae44f	no	4
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Other Reference-Patent/App/Search documents	IN_OA.pdf	217395 7dc189c76c0a2eafbbf4c709942d2570f1223e33	no	7
Warnings:					
Information:					
		Total Files Size (in bytes):	331599		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/052,505	Filing Date 08/01/2018	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $460 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	04/13/2020	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 14	Minus	** 20	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0		x $460 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/NICOLE L NICHOLSON/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. 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 12 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, 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.**

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/052,505	08/01/2018	Wei-Yu Chen	1426-136.301	1082

92096 7590 05/01/2020

Cooper Legal Group LLC
6505 Rockside Road
Suite 330
Independence, OH 44131

EXAMINER	
FANG, PAKEE	

ART UNIT	PAPER NUMBER
2642	

NOTIFICATION DATE	DELIVERY MODE
05/01/2020	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):

docketing@cooperlegalgroup.com

Office Action Summary	**Application No.** 16/052,505	**Applicant(s)** Chen et al.	
	Examiner PAKEE FANG	**Art Unit** 2642	**AIA (FITF) Status** Yes

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

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 04/13/2020.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☑ This action is **FINAL.** 2b) ☐ This action is non-final.

3)☐ 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.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-14 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1-14 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, 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.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ 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)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The amendment filed on 04/13/2020 has been entered and considered by Examiner. Claims **1-14** are presented for examination. **This Action is made FINAL.**

Information Disclosure Statement

2. The information disclosure statements (IDS) submitted are in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the Examiner.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102 of this title, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

4. **Claims 1-14 are** rejected under 35 U.S.C. 103 as being unpatentable over Mujtaba et al. (US Pub. 20160366705 A1) in view of Ai (US Pub. 20100177675 A1) in further view of Lohr et al. (US Pub. 20120147830 A1).

For claims 1 and 8, Mujtaba disclose (Figs. 1-7) a User Equipment (UE), comprising: a control circuit; a processor installed in the control circuit; and a memory installed in the control circuit and operatively coupled to the processor [0029, 0032, 0043, 0046-49]; wherein the processor is configured to execute a program code stored in the memory to:

transmit a preamble to a network (Step 502/602) [0060-61, 0070-73];

receive a Msg2 containing a TTI (Transmission Time Interval) information of a Msg3 from the network in response to the preamble (Step 504/604) [0062, 0074-79],

wherein the TTI information of the Msg3 includes a TTI duration of the Msg3 [0008, 0076, 0095] and a start timing offset of the Msg3; and

perform Msg3 transmission to the network according to the TTI information of the Msg3 [0076, 0080, 0063-65].

But Mujtaba doesn't explicitly teach the TTI information includes a TTI duration and a start timing offset of a message.

However, Ai discloses wherein the TTI information of the Msg includes a TTI duration of the Msg and a start timing offset of the Msg [0067].

Since, all are analogous arts addressing data transmission in a message use in a mobile device; Therefore, it would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to combine the teachings of Mujtaba and Ai to enhance communication protocols in order to receive more resourceful information, thus, improving system efficiency.

But Mujtaba as modified by Ai and Lohr don't explicitly teach perform a single (TB) transport blockof Msg3 transmission.

However, Lohr discloses (Figs. 7-15) perform a single (TB) transport block of Msg transmission to the network according to the TTI information of the Msg [0164, 0120, 0183, 0187].

Since, all are analogous arts addressing data transmission in a message use in a mobile device; Therefore, it would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to combine the teachings of Mujtaba, Ai,

and Lohr to allow different scheduling protocol to enhance data communication, thus, improving data rate.

Claim 1 differs from claim 8 only by the additional recitation of the following limitation which is also taught by Mujtaba as modified by Ai and Lohr. Mujtaba, as modified by Ai and Lohr, discloses a method of a UE (User Equipment) for performing random access procedure [0029, 0032, 0043, 0046-49]. All other identical limitations are rejected based on the same rationale as shown above.

For claims 2 and 9, Mujtaba, as modified by Ai and Lohr, discloses the processor is further configured to execute the program code stored in the memory to: select the TTI information of the Msg3 based on random access purpose, if there are multiple TTI information of the Msg3 in the Msg2 [0076, 0080, 0062-65].

For claims 3 and 10, Mujtaba, as modified by Ai and Lohr, discloses the processor is further configured to execute the program code stored in the memory to:

select the TTI information of the Msg3 based on a PRACH (Physical Random Access Channel) resource set of the preamble or a preamble set of the preamble transmission, if there are multiple TTI information of the Msg3 in the Msg2 [0062, 0074-79].

For claims 4 and 11, Mujtaba, as modified by Ai and Lohr, discloses the processor is further configured to execute the program code stored in the memory to:

select the TTI information of the Msg3 based on highest priority of logical channel having available data, if there are multiple TTI information of the Msg3 in the Msg2 [0076, 0080, 0063-65].

For claims 5 and 12, Mujtaba, as modified by Ai and Lohr, discloses the TTI information of the Msg3 is included in a RAR (Random Access Response) for responding the preamble [0062, 0074-79].

For claims 6 and 13, Mujtaba, as modified by Ai and Lohr, discloses the TTI information of the Msg3 is included in a common field for multiple RARs in the Msg2 [0062, 0074-79].

For claims 7 and 14, Mujtaba, as modified by Ai and Lohr, discloses the Msg2 is a random access response [0062, 0074-79].

Response to Arguments

1. Applicant's arguments filed 04/13/2020 have been fully considered but they are not persuasive.

2. With regard to the references failing to teach every element recited in the independent claims; the Examiner respectfully disagrees with the arguments by the Applicant. Even though, the Examiner acknowledges Applicant's invention may possess some novel features, the claims are written too broad that can be read on the current cited prior art(s). Further actions must be taken to explicitly claim those novel features of the current application.

With regards to the argument for the limitation "*…receive a Msg2 containing a TTI information of a Msg3 from the network in response to the preamble …*", the Examiner asserts that the Examiner asserts that Mujtaba disclose on Fig. 5, message 504 (Msg 2) containing TTi information of a Msg 3 is received in response to the preamble message 502. "*… the base station may determine that the link budget constrained wireless device should implement transmission time i**nterval bundling (TTI-B) for the Msg3**. Such parameter(s)/characteristic(s) may be indicated to the link budget constrained wireless device by the base station as part of **the Msg2 transmitted** by the base station…*" [0076];

"*… The **second message** ("Msg2", also referred to as "random access response" or "RAR") may include **a timing advance (TA) parameter**, a temporary cell radio network temporary identifier (TC-RNTI), and an uplink grant for transmitting **a third message**.* " [0062].

With regards to the argument for the limitation "*…wherein the TTI information of the Msg3 includes a TTI duration of the Msg3 and a start timing offset of the Msg3…*", the Examiner asserts that Mujtaba disclose on Fig. 5 "*… the base station may determine that the link budget constrained wireless device should implement transmission time i**nterval bundling (TTI-B) for the Msg3**. Such parameter(s)/characteristic(s) may be indicated to the link budget constrained wireless device by the base station as part of **the Msg2 transmitted** by the base station…*" [0076]; "*… The **second message** ("Msg2", also referred to as "random access response" or "RAR") may include **a timing advance (TA) parameter**, a temporary cell radio network temporary identifier (TC-RNTI), and an uplink grant for transmitting **a third message**.* " [0062].

Ai compensates the teaching of Mujtaba by disclosing that a message can contain a starting timing offset. "… *a MBMS service occupies the channel resource continuously for a time length* ***starting from the TTI of TDM Offset*** *and with a duration of TTIs …*" [0067].

"… *TDM_ Offset is said* ***initial offset time****, i.e., information of the position of the resource occupied by said MBMS service in a repetition period…*" [0074].

With regards to the argument for the limitation "…*perform a single (TB) transport block of a Msg3 transmission to the network according to the TTI information of the Msg3…*", the Examiner asserts that Mujtaba disclose on Fig. 5 step 506. "… *transmit the third message to the base station 102. The third message ("Msg3",…*" [0063]; "… *the base station may determine that the link budget constrained wireless device should implement transmission time i****nterval bundling (TTI-B) for the Msg3****. Such parameter(s)/characteristic(s) may be indicated to the link budget constrained wireless device by the base station as part of* ***the Msg2 transmitted*** *by the base station…*" [0076].

Lohr, compensates the teaching of Mujtaba, by disclosing on Figs. 7-15, "… *It is assumed for exemplary purposes that 4 consecutive subframes, respectively TTIs are bundled.* ***A single transport block*** *from MAC layer for the first scheduled transmission of the random access procedure is coded and is transmitted repeatedly in four consecutive subframes, i.e. also referred to as TTI bundle…*" [0164].

ARGUMENT DOES NOT REPLACE EVIDENCE WHERE EVIDENCE IS NECESSARY

The arguments made by the counsel cannot take the place of evidence in the record. The Applicant representative's arguments for the obvious reason to combine the implicit and explicit teaching of the cited reference(s) failed to provide factual support to sustain the ground of arguments. The mere statement of disagreement of the prior art made by the Applicant's representative cannot be served as evidence for support. Please see the following case law for detail:

In re Schulze, 346 F.2d 600, 602, 145 USPQ 716, 718 (CCPA 1965); In re Geisler, 116 F.3d 1465,43 USPQ2d 1362 (Fed. Cir. 1997) ("An assertion of what seems to follow from common experience is just attorney argument and not the kind of **factual evidence that is required to rebut a prima facie case of obviousness**."). See MPEP § 716.01(c) for examples of **attorney statements which are not evidence** and which must be supported by an appropriate affidavit or declaration.

ARGUING AGAINST REFERENCES INDIVIDUALLY

One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. In re Keller, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); In re Merck and Co., Inc., 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

All limitations, elements, and arguments cited by the Applicant had indeed been disclosed by the reference prior art(s) or addressed by the Examiner. The concurrent Office Action furthermore elaborates the explicit and implicit teaching of the disclosed reference(s). Any rationale and citation applied in the previous Office Action not challenge by the Applicant will be treated as the Applicant's admittance in the subject matter.

Conclusion

3. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Inquiries

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to PAKEE FANG whose telephone number is (571)270-3633. The Examiner can normally be reached on Mon-Fri 9:00AM-5:00PM. If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, PÉREZ-GUTIÉRREZ RAFAEL can be reached on 571-272-7915. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. 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

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/PAKEE FANG/
Primary Examiner, Art Unit 2642

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/052,505	Chen et al.
	Examiner	Art Unit
	PAKEE FANG	2642

CPC - Searched*		
Symbol	Date	Examiner
H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607	03/20/2019	PF

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner
455	combined text	03/20/2019	PF

* 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
East, Google, Investor search	03/20/2019	PF
updated search	07/25/2019	PF
updated search	12/19/2019	PF
updated search	04/21/2020	PF

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

Samsung Exhibit 1002, Page 222 of 564
Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/052,505	Chen et al.
	Examiner	**Art Unit**
	PAKEE FANG	2642

✓	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	12/19/2018	03/20/2019	07/25/2019	12/19/2019	04/21/2020				
	1	÷	✓	✓	✓	✓				
	2	÷	✓	✓	✓	✓				
	3	÷	✓	✓	✓	✓				
	4	÷	✓	✓	✓	✓				
	5	÷	✓	✓	✓	✓				
	6	÷	✓	✓	✓	✓				
	7	÷	✓	✓	✓	✓				
	8	÷	✓	✓	✓	✓				
	9	÷	✓	✓	✓	✓				
	10	÷	✓	✓	✓	✓				
	11	÷	✓	✓	✓	✓				
	12	÷	✓	✓	✓	✓				
	13	÷	✓	✓	✓	✓				
	14	÷	✓	✓	✓	✓				

Samsung Exhibit 1002, Page 223 of 564
Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (03-15)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16052505
Filing Date	2018-08-01
First Named Inventor	Wei-Yu Chen
Art Unit	2642
Examiner Name	Pakee Fang
Attorney Docket Number	ASUP152US

U.S.PATENTS

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					

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U.S.PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20090252125	A1	2009-10-08	Dragan Vujcic	Paragraphs [0034], [0035-0037], [0043-0048], [0049], [0052]; Claims 1-21
	2	20160183243	A1	2016-06-23	Minyoung Park	Paragraphs [0030-0036], [0068], [0087-0098]

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FOREIGN PATENT DOCUMENTS

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							☐

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16052505
	Filing Date	2018-08-01
	First Named Inventor	Wei-Yu Chen
	Art Unit	2642
	Examiner Name	Pakee Fang
	Attorney Docket Number	ASUP152US

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	Indian Office Action from corresponding IN Application No. 201744026864 dated March 9, 2020, 7 pgs.	☐

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EXAMINER SIGNATURE

Examiner Signature	/PAKEE FANG/	Date Considered	04/21/2020

*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.

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	Application Number	16052505
	Filing Date	2018-08-01
	First Named Inventor	Wei-Yu Chen
	Art Unit	2642
	Examiner Name	Pakee Fang
	Attorney Docket Number	ASUP152US

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	/Ali Assar/	Date (YYYY-MM-DD)	2020-04-13
Name/Print	Ali Assar	Registration Number	65848

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.**

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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.

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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.

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Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (03-15)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99**)		
	Application Number	16052505
	Filing Date	2018-08-01
	First Named Inventor	Chen, Wei-Yu
	Art Unit	2642
	Examiner Name	Pakee Fang
	Attorney Docket Number	1426-136.301

U.S.PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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FOREIGN PATENT DOCUMENTS								
Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							☐
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	Filing Date	2018-08-01
	First Named Inventor	Chen, Wei-Yu
	Art Unit	2642
	Examiner Name	Pakee Fang
	Attorney Docket Number	1426-136.301

	1	NOKIA NETWORKS: "Basic system design for UL NB-IoT", 3GPP DRAFT; R1-160041, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE, vol. RAN WG1,no. Budapest, HU; 20160118-20160120 17 January 2016 (2016-01 -17), XP051053364.	☐
	2	QUALCOMM EUROPE: "RACH procedure", 3GPP DRAFT; R2-070212, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE, vol. RAN WG2, no. Sorrento, Italy; 20070112, 12 January 2007 (2007-01 -12), XP050133313, [retrieved on 2007-01-12]	☐
	3	Communication pursuant to Article 94(3) from European Patent Office in corresponding EP Application No. 17183827.9, dated January 7, 2020.	☐

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EXAMINER SIGNATURE

Examiner Signature	/PAKEE FANG/	Date Considered	04/21/2020

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[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.

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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	2	"20120147830".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:19
L2	120052	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
L3	8779	L2 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
L4	2276	L3 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
L5	250	L4 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
L6	104	@ay<"2017" and L5	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
L7	120052	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33

L8	8779	L7 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
L9	2276	L8 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
L10	250	L9 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
L11	104	@ay<"2017" and L10	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
L12	43	L11 and (transport$4 adj2 block)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
L13	120052	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:34
L14	8779	L13 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:34
L15	2276	L14 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:34

L16	250	L15 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:34
L17	104	@ay<"2017" and L16	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:34
S1	2	"20180035470".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:17
S2	2	S1 and (frame msg$1)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:26
S3	82131	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:29
S4	5501	S3 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:33
S5	1227	S4 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:35
S6	78	S5 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:37

S7	66	@ay<"2017" and S6	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 17:41
S8	95587	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S9	6513	S8 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S10	1554	S9 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S11	128	S10 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S12	82	@ay<"2017" and S11	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S13	3	S12 and Numerology	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S14	2	"20160366705".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:44

S15	0	S14 and Numerology	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:47
S16	7	S8 and Numerology with (message) same (preamble)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:01
S17	1	@ay<"2017" and S16	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:01
S18	3	"20180035470".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:15
S19	0	("455" "370").clas. and Numerology with (message) same (preamble)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:17
S20	7	Numerology with (message) same (preamble)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18
S21	1	@ay<"2017" and S20	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18
S22	0	("455" "370").clas. and Numerology with (message)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18

S23	16	("455" "370").clas. and Numerology same (preamble)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18
S24	15	@ay<"2017" and S23	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18
S25	525	("455" "370").clas. and Numerology	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 17:59
S26	8	("20150099528" "20170280400")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/28 10:05
S27	5	("20150099528" "20170280400").pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/28 10:05
S28	98999	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S29	6750	S28 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S30	1631	S29 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01

S31	146	S30 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S32	86	@ay<"2017" and S31	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S33	98999	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S34	6750	S33 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S35	1631	S34 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S36	146	S35 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S37	86	@ay<"2017" and S36	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S38	7	(US-20170339546-$ or US-20170019931-$ or US-20160366705-$ or US-20150365977-$ or US-20090316811-$ or US-20140334448-$ or US-20070268812-$).did.	US-PGPUB	OR	ON	2019/03/20 12:19

S39	2	S38 and (off$1set) with (tim$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:19
S40	2	"20160366705".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:20
S41	16	S37 and (off$1set) with (tim$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:25
S42	2	"20180359785".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:32
S43	333	("455" "370").clas. and (off$1set) with (tim$4) with ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:39
S44	333	@ay<"2017" and S43	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:40
S45	27	S44 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:40
S46	59	("455" "370").clas. and (off$1set) with (tim$4) with ((Transmission adj2 Time adj2 Interval) TTI) near3 (data information)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:50

S47	59	@ay<"2017" and S46	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:50
S48	5	("455" "370").clas. and (duration) same (off$1set) with (tim$4) with ((Transmission adj2 Time adj2 Interval) TTI) near3 (data information)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 13:40
S49	2	"20160366705" and (tim$4 interval window)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 14:38
S50	2	"20160366705" and (tim$4 interval window TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 14:38
S51	1	"20100177675".pn. and (off$1set start$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 14:52
S52	2	"20160366705" and (Msg3 (third adj messag$4))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 14:55
S53	105281	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
S54	7343	S53 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03

S55	1827	S54 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
S56	181	S55 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
S57	93	@ay<"2017" and S56	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
S58	59	("455" "370").clas. and (off$1set) with (tim$4) with ((Transmission adj2 Time adj2 Interval) TTI) near3 (data information)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
S59	59	@ay<"2017" and S58	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
S60	112688	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:36
S61	8130	S60 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:36
S62	2058	S61 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:36

S63	214	S62 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:36
S64	100	@ay<"2017" and S63	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:36
S65	112688	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:37
S66	8130	S65 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:37
S67	2058	S66 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:37
S68	214	S67 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:37
S69	100	@ay<"2017" and S68	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:37
S70	42	S69 and (transport$4 adj2 block)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:38

S71	3	S69 and (transport$4 adj2 block) with (msg message)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:39
S72	4	("20090252125" "20160183243").pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 11:08

4/21/2020 12:36:29 PM
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/052,505	08/01/2018	Wei-Yu Chen	1426-136.301	1082

92096 7590 07/14/2020

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Independence, OH 44131

EXAMINER	
FANG, PAKEE	

ART UNIT	PAPER NUMBER
2642	

NOTIFICATION DATE	DELIVERY MODE
07/14/2020	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):

docketing@cooperlegalgroup.com

Applicant-Initiated Interview Summary	**Application No.** 16/052,505	**Applicant(s)** Chen et al.	
	Examiner PAKEE FANG	**Art Unit** 2642	**AIA (FITF) Status** Yes

All participants (applicant, applicants representative, PTO personnel):

(1) PAKEE FANG. (3) _____.

(2) Ali Assar. (4) _____.

Date of Interview: 09 July 2020.

Type: ☑ Telephonic ☐ Video Conference
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☑ No.
If Yes, brief description: _____.

Issues Discussed ☐101 ☐112 ☐102 ☑103 ☐Others
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: 1.

Identification of prior art discussed: Mujtaba in view of Ai in further view of Lohr.

Substance of Interview
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

Applicant persuasively discussed the background of the invention and the perceived novelty of the current claimed invention. Applicant furthermore descriptively explained how the current claimed invention differs from the cited prior art(s). Applicant proposed to clarified the structure elements of the uplink and downlink messages, and amend the claims to show the functional language of the said element. Upon receiving an official response, an updated search and/or consideration must be required.

Applicant recordation instructions: The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☐ Attachment

/PAKEE FANG/ Primary Examiner, Art Unit 2642	

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record
A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) 1.133 Interviews
Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.
All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiners responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicants correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:
- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:
1) A brief description of the nature of any exhibit shown or any demonstration conducted,-
2) an identification of the claims discussed,
3) an identification of the specific prior art discussed,
4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
5) a brief identification of the general thrust of the principal arguments presented to the examiner,
(The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
6) a general indication of any other pertinent matters discussed, and
7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicants record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiners version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, Interview Record OK on the paper recording the substance of the interview along with the date and the examiners initials.

PTO/SB/30EFS (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	16052505	Filing Date	2018-08-01	Docket Number (if applicable)	1426-136.301	Art Unit	2642
First Named Inventor	Wei-Yu Chen			Examiner Name	Pakee FANG		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

- ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____
- ☐ Other _____

☒ Enclosed

- ☒ Amendment/Reply
- ☐ Information Disclosure Statement (IDS)
- ☐ Affidavit(s)/ Declaration(s)
- ☐ Other _____

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____
(Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

FEES

☒ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 505088

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

☐ Applicant Signature

PTO/SB/30EFS (02-18)
Approved for use through 11/30/2020. 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.

Signature of Registered U.S. Patent Practitioner			
Signature	/Ali Assar/	Date (YYYY-MM-DD)	2020-08-04
Name	Ali Assar	Registration Number	65848

This collection of information is required by 37 CFR 1.114. 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 12 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, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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.

Electronic Patent Application Fee Transmittal

Application Number:	16052505
Filing Date:	01-Aug-2018
Title of Invention:	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM
First Named Inventor/Applicant Name:	Wei-Yu Chen
Filer:	William Joseph Cooper/Jennifer Meinyk
Attorney Docket Number:	1426-136.301

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 1 month with $0 paid	1251	1	200	200
Miscellaneous:				
RCE- 2ND AND SUBSEQUENT REQUEST	1820	1	1900	1900
		Total in USD ($)		**2100**

Electronic Acknowledgement Receipt	
EFS ID:	40189739
Application Number:	16052505
International Application Number:	
Confirmation Number:	1082
Title of Invention:	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM
First Named Inventor/Applicant Name:	Wei-Yu Chen
Customer Number:	92096
Filer:	William Joseph Cooper/Jennifer Meinyk
Filer Authorized By:	William Joseph Cooper
Attorney Docket Number:	1426-136.301
Receipt Date:	04-AUG-2020
Filing Date:	01-AUG-2018
Time Stamp:	14:40:26
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$2100
RAM confirmation Number	E202084E41051789
Deposit Account	505088
Authorized User	Jennifer Meinyk
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.21 (Miscellaneous fees and charges)	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		ASUP152_R02.pdf	35456 2971dd5c27504acdaa0d351410e8e9881e65d821	yes	7
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Amendment Submitted/Entered with Filing of CPA/RCE		1	1	
	Claims		2	4	
	Applicant Arguments/Remarks Made in an Amendment		5	7	
Warnings:					
Information:					
2	Request for Continued Examination (RCE)	ASUP152_R02_RCE.pdf	74039 d4746b4cef4abed15d9d69371dbb461cf4fa8415	no	3
Warnings:					
This is not a USPTO supplied RCE SB30 form.					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	32895 8322ecd51575bf6fdb2e2d8f09250b8a3ef3a46e	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	142390		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Docket No. **1050153-US-P2** **ASUP152US**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re **PATENT** application of:

Applicant: WEI-YU CHEN

Serial No.: 16/052,505

For: METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM

Filing Date: August 1, 2018

Examiner: PAKEE FANG

Art Unit: 2642

RCE SUBMISSION/REPLY TO THE FINAL OFFICE ACTION DATED MAY 1, 2020

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

Dear Commissioner:

Favorable reconsideration of the above-identified application is respectfully requested in view of the following amendments and remarks.

AMENDMENTS

IN THE CLAIMS:

Please amend claims 1 and 8 as follows:

1. (Currently Amended) A method of a UE (User Equipment) for performing random access procedure, comprising:

the UE transmits a preamble to a network;

the UE receives a Msg2, associated with downlink, containing a TTI (Transmission Timer Interval) information of a Msg3, associated with uplink, from the network in response to the preamble, wherein the TTI information, contained in the Msg2 associated with downlink, of the Msg3, associated with uplink, includes a TTI duration of the Msg3, associated with uplink, and a start timing offset of the Msg3, associated with uplink; and

the UE performs a single (TB) transport block of Msg3 transmission to the network according to the TTI information of the Msg3.

2. (Original) The method of claim 1, further comprising:

the UE selects the TTI information of the Msg3 based on random access purpose, if there are multiple TTI information of the Msg3 in the Msg2.

3. (Original) The method of claim 1, further comprising:

the UE selects the TTI information of the Msg3 based on a PRACH (Physical Random Access Channel) resource set of the preamble transmission or a preamble set of the preamble transmission, if there are multiple TTI information of the Msg3 in the Msg2.

4. (Original) The method of claim 1, further comprising:

the UE selects the TTI information of the Msg3 based on highest priority of logical channel having data available for transmission, if there are multiple TTI information of the Msg3 in the Msg2.

5. (Original) The method of claim 1, wherein the TTI information of the Msg3 is included in a RAR (Random Access Response) for responding the preamble.

6. (Original) The method of claim 1, wherein the TTI information of the Msg3 is included in a common field for multiple RARs in the Msg2.

7. (Original) The method of claim 1, wherein the Msg2 is a random access response.

8. (Currently Amended) A User Equipment (UE), comprising:

a control circuit;

a processor installed in the control circuit; and

a memory installed in the control circuit and operatively coupled to the processor;

wherein the processor is configured to execute a program code stored in the memory to:

transmit a preamble to a network;

receive a Msg2, associated with downlink, containing a TTI (Transmission Time Interval) information of a Msg3, associated with uplink, from the network in response to the preamble, wherein the TTI information, contained in the Msg2 associated with downlink, of the Msg3, associated with uplink, includes a TTI duration of the Msg3, associated with uplink, and a start timing offset of the Msg3, associated with uplink; and

perform a single (TB) transport block of Msg3 transmission to the network according to the TTI information of the Msg3.

9. (Original) The UE of claim 8, wherein the processor is further configured to execute the program code stored in the memory to:

select the TTI information of the Msg3 based on random access purpose, if there are multiple TTI information of the Msg3 in the Msg2.

10. (Original) The UE of claim 8, wherein the processor is further configured to execute the program code stored in the memory to:

select the TTI information of the Msg3 based on a PRACH (Physical Random Access Channel) resource set of the preamble or a preamble set of the preamble transmission, if there are multiple TTI information of the Msg3 in the Msg2.

11. (Original) The UE of claim 8, wherein the processor is further configured to execute the program code stored in the memory to:

select the TTI information of the Msg3 based on highest priority of logical channel having available data, if there are multiple TTI information of the Msg3 in the Msg2.

12. (Original) The UE of claim 8, wherein the TTI information of the Msg3 is included in a RAR (Random Access Response) for responding the preamble.

13. (Original) The UE of claim 8, wherein the TTI information of the Msg3 is included in a common field for multiple RARs in the Msg2.

14. (Original) The UE of claim 8, wherein the Msg2 is a random access response.

REMARKS

Initially, the undersigned would like to thank the Examiner for his time in discussing this matter in an interview on 7/9/2020. Proposed claim amendments were discussed during the interview. The Examiner indicated that amending claims based upon the proposed claim amendments would advance prosecution and require further search and consideration. At least some of the claims have been amended based upon the proposed claim amendments. Accordingly, allowance of the pending claims is respectfully requested. An invitation to contact the undersigned is hereby extended should the same be thought to advance prosecution.

Claims 1-14 are pending in the application, and are all rejected. Claims 1 and 8 are amended herein by way of RCE. Reconsideration of the application in light of the following remarks is respectfully requested.

I. REJECTION OF CLAIMS 1-14 UNDER 35 U.S.C. § 103(a)

Claims 1-14 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Mujtaba, U.S. Publication No. 2016/0366705 (*hereinafter* "Mujtaba") in view of Ai, U.S. Publication No. 2010/0177675 (*hereinafter* "Ai") in further view of Lohr, U.S. Patent No. 2012/0147830 (*hereinafter* "Lohr"). Withdrawal of this rejection is respectfully requested for at least the following reasons.

In the interview on 7/9/2020, proposed claim amendments were discussed and the Examiner indicated that amending claims based upon the proposed claim amendments would advance prosecution and require further search and consideration. Claims 1 and/or 8 are amended based upon the proposed claim amendments and are therefore believed to overcome the rejection.

Therefore, withdrawal of the rejection and allowance of the pending claims is respectfully requested.

II. CONCLUSION

For at least the above reasons, the claims currently under consideration are believed to be in condition for allowance. It is to be appreciated that while reference may be made back to certain parts of the application in this Reply (e.g., page numbers, line numbers, Figs., etc.), that such referencing is not to be interpreted in a limiting manner (e.g., to limit the scope of the claims and/or features therein to the particular portion(s) referenced), but is instead merely done for purposes of explanation, illustration and/or ease of understanding, for example. Additionally, at least one of A and B and/or the like generally comprises A or B and/or both A and B. Also, first, second, third, etc. are generally merely used as names, designators, etc. and are not necessarily meant to imply an ordering, temporal relation, etc. Although the present communication may include alterations to the application or claims, or characterizations of claim scope or referenced art, the Applicant is not conceding that previously pending claims are not patentable over the cited references. Rather, any alterations or characterizations are being made to facilitate expeditious prosecution of this application. 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 Applicants have made any disclaimers or disavowals of any subject matter supported by the present application.

Should the Examiner feel that a telephone interview would be helpful to facilitate favorable prosecution of the above-identified application, the Examiner is invited to contact the undersigned at the telephone number provided below.

Should any fees be due as a result of the filing of this response, the Commissioner is hereby authorized to charge the Deposit Account Number 50-5088, **ASUP152US**.

Respectfully submitted,

COOPER LEGAL GROUP, LLC

By: /Ali Assar/

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Reg. No. 65,848

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PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
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 displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/052,505	Filing Date 08/01/2018	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $460 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	08/04/2020	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 14	Minus	** 20	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0		x $460 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/TERRANCE R LAWRENCE/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. 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 12 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, 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.

PTO/SB/08a (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
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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	16052505
	Filing Date	2018-08-01
	First Named Inventor	Wei-Yu CHEN
	Art Unit	2642
	Examiner Name	Pakee FANG
	Attorney Docket Number	ASUP152US

U.S.PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					
If you wish to add additional U.S. Patent citation information please click the Add button.						

U.S.PATENT APPLICATION PUBLICATIONS						
Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					
If you wish to add additional U.S. Published Application citation information please click the Add button.						

FOREIGN PATENT DOCUMENTS								
Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] ¡	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							☐
If you wish to add additional Foreign Patent Document citation information please click the Add button								

NON-PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	16052505
	Filing Date	2018-08-01
	First Named Inventor	Wei-Yu CHEN
	Art Unit	2642
	Examiner Name	Pakee FANG
	Attorney Docket Number	ASUP152US

	1	Corresponding European Patent Application No. 17183827.9, Office Action dated September 25, 2020.	☐
	2	"3 Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Layer Procedures (Release 13)", 3GPP STANDARD; 3GPP TS 36.213, 3RD GENERATION PARTNERSHIP PROJECT (3GPP) MOBILE COMPETENCE CENTRE; 650, ROUTE DES LUCIOLES; F-06921 SOPHIA-ANTIPOLIS CEDED; FRANCE vol. RAN WG1, no. V13.2.0, 30 June 2016, pgs 45-254.	☐

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

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*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	16052505
	Filing Date	2018-08-01
	First Named Inventor	Wei-Yu CHEN
	Art Unit	2642
	Examiner Name	Pakee FANG
	Attorney Docket Number	ASUP152US

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	/Ali Assar/	Date (YYYY-MM-DD)	2020-10-09
Name/Print	Ali Assar	Registration Number	65,848

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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.

Electronic Acknowledgement Receipt

EFS ID:	40800652
Application Number:	16052505
International Application Number:	
Confirmation Number:	1082
Title of Invention:	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM
First Named Inventor/Applicant Name:	Wei-Yu Chen
Customer Number:	92096
Filer:	William Joseph Cooper/Jennifer Meinyk
Filer Authorized By:	William Joseph Cooper
Attorney Docket Number:	1426-136.301
Receipt Date:	09-OCT-2020
Filing Date:	01-AUG-2018
Time Stamp:	07:58:12
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	IDS.pdf	63766 dff59933516e4d3acd114773b075cabdce14fabc	no	4
Warnings:					

Information:					
This is not an USPTO supplied IDS fillable form					
2	Other Reference-Patent/App/Search documents	IDS_NPL1_EPOA_9_25_2020.pdf	1918721 facd86df3f1b2f6e7ad8d1efeebfb0b986a84ae7	no	22
Warnings:					
Information:					
3	Non Patent Literature	IDS_NPL2.pdf	15755933 ed55fa1462310b1048fa6c45f1c7e58c71dfbb75	no	210
Warnings:					
Information:					
		Total Files Size (in bytes):	17738420		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

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National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

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PTO/SB/08a (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	16052505
	Filing Date	2018-08-01
	First Named Inventor	Wei-Yu CHEN
	Art Unit	2642
	Examiner Name	Pakee FANG
	Attorney Docket Number	ASUP152US

U.S.PATENTS

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					

If you wish to add additional U.S. Patent citation information please click the Add button.

U.S.PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20070268812	A1	2007-11-22	YOON et al.	
	2	20100278064	A1	2010-11-04	JEONG	

If you wish to add additional U.S. Published Application citation information please click the Add button.

FOREIGN PATENT DOCUMENTS

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	102422568	CN	A	2012-04-18	SAMSUNG ELECTRONICS CO LTD.	Entire Document with English Abstract	☒
	2	105052065	CN	A	2015-11-11	QUALCOMM INC	Entire Document with English Abstract	☒

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16052505
	Filing Date	2018-08-01
	First Named Inventor	Wei-Yu CHEN
	Art Unit	2642
	Examiner Name	Pakee FANG
	Attorney Docket Number	ASUP152US

	3	105122710	CN	A	2015-12-02	QUALCOMM INC	Entire Document with English Abstract	☒
	4	102740407	CN	A	2012-10-17	ZTE CORP	Entire Document with English Abstract	☒
If you wish to add additional Foreign Patent Document citation information please click the Add button								
NON-PATENT LITERATURE DOCUMENTS								
Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.						T[5]
	1							☐
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EXAMINER SIGNATURE			
Examiner Signature		Date Considered	

*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	16052505
	Filing Date	2018-08-01
	First Named Inventor	Wei-Yu CHEN
	Art Unit	2642
	Examiner Name	Pakee FANG
	Attorney Docket Number	ASUP152US

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Signature	/Ali Assar/	Date (YYYY-MM-DD)	2021-02-11
Name/Print	Ali Assar	Registration Number	65,848

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Espacenet

Bibliographic data: CN102422568 (A) — 2012-04-18

Rach-specific informaiton transmission methods and apparatuses for wireless communication system

Inventor(s): IN JEONG KYEONG ± (JEONG KYEONG IN)

Applicant(s): SAMSUNG ELECTRONICS CO LTD ± (SAMSUNG ELECTRONICS CO., LTD)

Classification: **- international:** ***H04B7/26***
- cooperative: **H04L1/18 (KR)**; **H04L43/0829 (EP, KR, US)**; **H04L43/50 (KR)**; **H04L5/14 (KR)**; **H04L69/18 (KR)**; **H04W36/18 (KR)**; **H04W72/04 (KR)**; **H04W74/008 (EP, KR, US)**; **H04W74/0833 (KR)**; **H04W80/04 (KR)**; **H04W88/08 (KR)**; H04L29/06163 (US); H04L43/50 (US); H04L5/14 (US); H04L69/18 (EP); H04W36/18 (US); H04W72/04 (US); H04W74/0833 (EP, US); H04W80/04 (US); H04W88/08 (US)

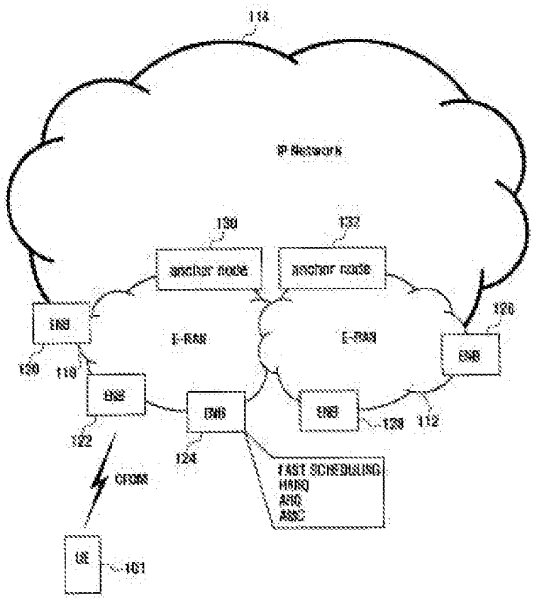
Application number: CN20108019079 20100416 Global Dossier

Priority number(s): WO2010KR02386 20100416 ; KR20090038569 20090430

Also published as: CN102422568 (B) EP2425549 (A2) EP2425549 (A4) EP2425549 (B1) KR101618172 (B1) more

Abstract of CN102422568 (A)

An RACH information transmission method and apparatus is provided for a wireless communication system. A preamble selected from a specific preamble group is transmitted. A random access response message having a Transmission Time Interval (TTI) bundling indicator is awaited in response to the preamble. A combined message generated by applying a TTI bundling based on the TTI bundling indicator with a number of TTIs is transmitted, when the random access response message is received.


IP Network
anchor node
anchor node
E-RAN
E-RAN
FAST SCHEDULING
UE

(19)中华人民共和国国家知识产权局

(12)发明专利申请

(10)申请公布号 CN 102422568 A
(43)申请公布日 2012.04.18

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2011.10.31

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PCT/KR2010/002386 2010.04.16

(87)PCT申请的公布数据
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代理人 刘虹

(51)Int.Cl.
H04B 7/26(2006.01)

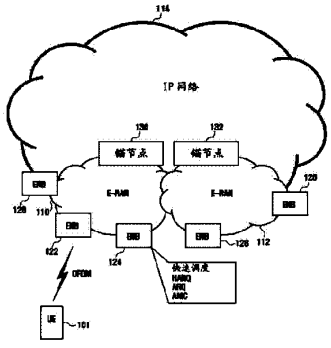
权利要求书 3 页 说明书 7 页 附图 4 页

(54)发明名称

用于无线通信系统的特定随机接入信道信息传送方法和装置

(57)摘要

提供用于无线通信系统的RACH信息传送方法和装置。传送从特定前导码组中选择的前导码。响应于前导码,等待具有传送时间间隔(TTI)的随机接入响应消息。当收到随机接入响应消息时,传送通过基于TTI绑定指示符与TTI数量应用TTI绑定而生成的组合的消息。



CN 102422568 A

1. 一种用于在无线通信系统中优化用户设备的随机接入程序的方法，该方法包括步骤：

传送从特定前导码组中选择的前导码；

响应于所述前导码，等待具有传送时间间隔 (TTI) 绑定指示符的随机接入响应消息；以及

当收到所述随机接入响应消息时，传送通过基于 TTI 绑定指示符与 TTI 数量应用 TTI 绑定而生成的组合的消息。

2. 如权利要求 1 所述的方法，还包括：

接收系统信息，该系统信息包括特定前导码组的前导码身份范围和信道偏移；

比较当前测量的路径损失与配置值；

当基于比较结果确定信道条件较差、当用户设备是先进长期演进 (LTE-A) 终端、以及当用户设备处于空闲模式时，从所述特定前导码组中选择前导码。

3. 如权利要求 2 所述的方法，其中，所述当前测量的路径损失按照以下等式与所述配置值进行比较：

路径损失 > PCMAX-preambleInitialReceivedTargetPower-deltaPreambleMsg3- 信道偏移

其中，PCMAX 是小区中最大用户设备传送功率和最大可用传送功率中的最小值，preambleInitialReceivedTargetPower 是开环功率控制补偿值，而 deltaPreambleMsg3 是要使用的前导码格式的补偿值，并且 PCMAX、preambleInitialReceivedTargetPower、以及 deltaPreambleMsg3 在系统信息中广播。

4. 如权利要求 2 所述的方法，其中，所述组合的消息包括无线资源控制连接请求 (RRC 连接 REQ) 消息和非接入层服务请求 (NAS 服务 REQ) 消息。

5. 如权利要求 4 所述的方法，其中，所述 TTI 数量由所述系统信息携带。

6. 如权利要求 4 所述的方法，其中，所述 TTI 数量由所述随机接入响应消息携带。

7. 一种用于在无线通信系统中处理随机接入信道 (RACH) 信息的方法，该方法包括步骤：

从演进节点 B(ENB) 广播系统信息，该系统信息包括特定前导码组的前导码身份 (ID) 范围和信道偏移；

在用户设备 (UE) 比较当前测量的路径损失与配置值；

当基于比较结果确定信道条件较差、当 UE 是先进长期演进 (LTE-A) 终端、以及当 UE 处于空闲模式时，将从特定前导码组中选择的前导码从 UE 传送到 ENB；

当 ENB 接收到前导码时，将具有传送时间间隔 (TTI) 绑定指示符的 RACH 响应消息从 ENB 传送到 UE；

当 UE 接收到 RACH 响应消息时，将通过基于 TTI 绑定指示符与 TTI 数量应用 TTI 绑定而生成的组合的消息从 UE 传送到 ENB；以及

在 ENB 处理组合的消息。

8. 如权利要求 7 所述的方法，其中，所述当前测量的路径损失按照以下等式与所述配置值进行比较：

路径损失 > PCMAX-preambleInitialReceivedTargetPower-deltaPreambleMsg3- 信

Samsung Exhibit 1002, Page 274 of 564
Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

道偏移

其中，PCMAX 是小区中最大用户设备传送功率和最大可用传送功率中的最小值，preambleInitialReceivedTargetPower 是开环功率控制补偿值，而 deltaPreambleMsg3 是要使用的前导码格式的补偿值，并且 PCMAX、preambleInitialReceivedTargetPower、以及 deltaPreambleMsg3 在系统信息中广播。

9. 如权利要求 8 所述的方法，其中，所述组合的消息包括无线资源控制连接请求 (RRC 连接 REQ) 消息和非接入层服务请求 (NAS 服务 REQ) 消息。

10. 如权利要求 9 所述的方法，其中，处理组合的消息包括：

从所述组合的消息中分离出所述 RRC 连接 REQ 消息和所述 NAS 服务 REQ 消息；以及

将所述 NAS 服务 REQ 消息转移到移动性管理实体 (MME)。

11. 如权利要求 9 所述的方法，其中，所述 TTI 数量由所述系统信息携带。

12. 如权利要求 9 所述的方法，其中，所述 TTI 数量由所述 RACH 响应消息携带。

13. 一种用于在无线通信系统中用户设备与演进节点 B(ENB) 进行通信的随机接入信道 (RACH) 信息处理装置，包括：

类型确定器，其确定所述用户设备是否是先进长期演进 (LTE-A) 终端；

模式检测器，其检测所述用户设备是否处于空闲模式；

测量单元，其测量路径损失、比较所测量的路径损失与配置值、并且基于比较结果分析信道条件；

前导码选择器，其接收所述类型确定器、模式检测器、以及测量单元的输出，当路径损失大于配置值、当用户设备是 LTE-A 终端、以及当用户设备处于空闲模式时，从特定前导码组中选择前导码，并且传送所选择的前导码；

消息分析器，其分析响应于前导码接收到的 RACH 响应消息，以确定 RACH 响应消息是否包括传送时间间隔 (TTI) 绑定指示符；

消息生成器，当所述 RACH 响应包括 TTI 绑定指示符时，其通过应用 TTI 绑定生成组合的消息；以及

收发机，其接收由 ENB 传送的系统信息和 RACH 响应消息，并且其利用 TTI 绑定将从特定前导码组中选择的前导码和组合的消息传送到 ENB。

14. 如权利要求 13 所述的 RACH 信息处理装置，其中，所述 ENB 包括：

前导码组分析器，其分析从用户设备接收到的前导码，以确定所述前导码是否属于所述特定前导码组；

调度器 / 资源分配器，当所述前导码属于所述特定前导码组时，其分配用于 TTI 绑定的资源；

消息生成器 / 分析器，其处理组合的消息；以及

收发机，其将系统信息和包含资源分配信息的 RACH 响应消息传送到用户设备，并且其接收由用户设备传送的前导码和组合的消息。

15. 如权利要求 14 所述的 RACH 信息处理装置，其中，所述测量单元确定下列等式：

路径损失 > PCMAX-preambleInitialReceivedTargetPower-deltaPreambleMsg3- 信道偏移

其中，PCMAX 是小区中最大用户设备传送功率和最大可用传送功率中的最小值，prea

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mbleInitialReceivedTargetPower 是开环功率控制补偿值，而 deltaPreambleMsg3 是要使用的前导码格式的补偿值，并且 PCMAX、preambleInitialReceivedTargetPower、以及 deltaPreambleMsg3 在系统信息中广播。

16. 如权利要求 15 所述的 RACH 信息处理装置，其中，所述组合的消息包括无线资源控制连接请求 (RRC 连接 REQ) 消息和非接入层服务请求 (NAS 服务 REQ) 消息。

17. 如权利要求 16 所述的 RACH 信息处理装置，其中，所述消息生成器 / 分析器从组合的消息中分离所述 RRC 连接 REQ 消息和所述 NAS 服务 REQ 消息，并将所述 NAS 服务 REQ 消息转移到可动性管理实体 (MME)。

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用于无线通信系统的特定随机接入信道信息传送方法和装置

技术领域

[0001] 本发明一般涉及无线通信，并且具体来讲，涉及在无线通信系统中随机接入信道(Random Access CHannel，RACH)信息传送方法和装置。

背景技术

[0002] 长期演进(Long Term Evolution，LTE)是对于全球移动通信服务(UMTS)的第三代(3G)网络技术的承继者，并且支持基于正交频分复用(OFDM)的高速分组服务。

[0003] 开始参考图1，附图示出了LTE系统体系结构(architecture)。

[0004] LTE移动通信的特征在于具有仅仅两种类型的基础结构(infrastructure)节点的演进的无线接入网络(E-RANs)110和112：演进的节点B(ENB)120、122、124、126和128，以及锚节点130和132。用户设备(UE)101经由E-RAN 110和112接入网际协议(IP)网络114。ENB 120、122、124、126和128负责用于UE 101的无线信道建立，以及小区(cells)和无线资源的管理。例如，ENB 120、122、124、126和128广播系统信息，分配用于数据传送的无线资源和对于UE 101的控制信息，并且基于从当前小区及其相邻小区收集的信道管理信息确定UE 101的切换。ENB 120、122、124、126和128被提供以控制协议，诸如关于无线资源管理的无线资源控制(Radio Resource Control，RRC)。

[0005] 图2是示出在传统LTE系统中在UE和ENB之间的RACH信令通信(signaling)。

[0006] 在图2中，UE 201尝试对ENB 203的随机接入。在步骤211，ENB 203广播包括关于随机接入所特定的参数的信息的系统信息。系统信息包括关于随机接入前导码组(Random Access Preamble group)A和随机接入前导码组B的ID的范围的信息，UE 201的传送消息大小阈值(THRES)，以及信道条件偏移(OFFSET)。这些参数规定在3GPP标准TS36.331v850中。关于随机接入前导码组中前导码的ID范围的信息通过sizeOFRA-PreamblesGroupA来通知。关于随机接入前导码组B中前导码的ID范围的信息通过numberOFPreambles(用于基于竞争的(contention-based)随机接入的前导码的总数)-sizeOFRA-PreamblesGroupA来获得。MessageSizeGroupA是指示信道条件的偏移。当路径损失(pathloss)小于PCMAX-preambleInitialReceivedTargetPower-deltaPreambleMsg3-messagePowerOffsetGroupB(即，信道条件良好)并且传送大小大于MessageSizeGroupA时，UE选择前导码组A中的前导码。在其它情况下，UE 选择前导码组B中的前导码。参数PCMAX、preambleInitialReceivedTargetPower、以及deltaPreambleMsg3被规定在3GPP标准TS36.331v850中。

[0007] 一旦前导码组和前导码被选择，在步骤221，UE 201在RACH上将选择的随机接入前导码发送到ENB 203。如果随机接入前导码被成功接收，则在步骤231，ENB 203发送随机接入响应消息，其包含关于前导码ID和用于调整上行链路定时的定时超前(Timing Advance，TA)的信息。当接收到随机接入响应消息时，在步骤241，UE将调度的传送消息发送到ENB 203，该调度的传送消息包含关于用于消息传送的上行链路资源分配的信息以及临时无线网络临时标识符(Temporary-Radio Network Temporary Identifier，T-RNTI)的

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信息。

[0008] 如果在步骤 221 有多于一个的 UE 同时使用同一个随机接入前导码，则它们可能互相冲突。为了弄清楚哪个 UE 成功传送了前导码，在步骤 251，ENB203 向 UE 发送竞争解决消息，该竞争解决消息包含在步骤 241 接收的关于服务临时移动订户身份 (Serving-Temporary Mobile Subscriber Identity,S-TMSI) 或者随机数的信息。使用同一个前导码的每个 UE 接收竞争解决消息，并且检查 S-TMSI 或随机数是否与在步骤 241 所传送的 S-TMSI 或随机数相匹配。如果 ID 信息匹配，则 UE 继续随机接入程序，否则就重新启动 (reinitiate) 随机接入程序。

[0009] 在 LTE 系统中，在图 2 的步骤 241，由 UE 201 传送的消息的大小是受限的。因此，从空闲模式转换到连接模式的 UE 只能在步骤 241 传送 RRC 连接 REQ 消息，并且在步骤 251 之后传送非接入层 (Non Access Stratum，NAS) 服务请求 (REQ) 消息。由于 RRC 连接 REQ 消息和 NAS 服务 REQ 消息以逐步方式传送，这导致程序上的延迟。RRC 连接 REQ 消息和 NAS 服务请求消息被分别定义在 3GPP 标准 TS36.331v850 和 TS24.301v810 中。

发明内容

[0010] 技术问题

[0011] 在 LTE 系统中，在图 2 的步骤 241 由 UE 201 传送的消息的大小是受限的。因此，从空闲模式转换到连接模式的 UE 只能在步骤 241 传送 RRC 连接 REQ 消息，并且在步骤 251 之后传送非接入层 (NAS) 服务请求 (REQ) 消息。由于 RRC 连接 REQ 消息和 NAS 服务 REQ 消息以逐步方式传送，这导致程序上的延迟。

[0012] 解决方案

[0013] 本发明已经被用以解决至少以上问题和 / 或缺点，并且提供至少下述优点。因此，本发明的一个方面提供一种特定 RACH 信息传送方法和装置，其能够通过同时地而不是以逐步方式传送 RRC 连接 REQ 消息和 NAS 服务 REQ 消息来减少程序上的延迟。

[0014] 根据本发明的一个方面，提供一种用于在无线通信系统中优化用户设备的随机接入程序的方法。传送从特定前导码组中选择的前导码。响应于前导码，等待具有传送时间间隔 (Transmission Time Interval,TTI) 绑定指示符 (bundling indicator) 的随机接入响应消息。当收到随机接入响应消息时，传送通过基于 TTI 绑定指示符与 TTI 数量应用 TTI 绑定 (TTI bundling) 而生成的组合的消息。

[0015] 根据本发明的另一个方面，提供一种用于在无线通信系统中处理 RACH 信息的方法。从 ENB 广播包括特定前导码组的前导码身份 (preamble identity，ID) 范围和信道偏移的系统信息。在 UE 将当前测量的路径损失与配置值进行比较。当基于比较结果确定信道条件较差、当 UE 是先进长期演进 (Long Term Evolution-Advanced,LTE-A) 终端、以及当 UE 处于空闲模式时，从特定前导码组中选择的前导码被从 UE 传送到 ENB。当 ENB 接收到前导码时，具有 TTI 绑定指示符的 RACH 响应消息被从 ENB 传送到 UE。当 UE 接收到 RACH 响应消息时，通过基于 TTI 绑定指示符与 TTI 数量应用 TTI 绑定而生成的组合的消息被从 UE 传送到 ENB。在 ENB 处理组合的消息。

[0016] 根据本发明的一个另外的方面，提供一种在无线通信系统中用户设备与 ENB 进行通信的 RACH 信息处理装置。该装置包括类型确定器，其确定用户设备是否是 LTE-A 终端。

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该装置还包括模式检测器，其检测用户设备是否处于空闲模式。该装置另外包括测量单元，其测量路径损失、比较所测量的路径损失与配置值、并且基于比较结果分析信道条件。该装置还包括前导码选择器，其接收类型确定器、模式检测器、以及测量单元的输出，当路径损失大于配置值、当用户设备是 LTE-A 终端、以及当用户设备处于空闲模式时，从特定前导码组中选择前导码，并且传送所选择的前导码。该装置还包括消息分析器，其分析响应于前导码收到的 RACH 响应消息，以确定 RACH 响应是否包括 TTI 绑定指示符。该装置还包括消息生成器，当 RACH 响应包括 TTI 绑定指示符时，其通过应用 TTI 绑定生成组合的消息。另外，该装置包括收发机，其接收由 ENB 传送的系统信息和 RACH 响应，并且利用 TTI 绑定将从特定前导码组中选择的前导码和组合的消息传送到 ENB。

[0017] 发明的有益效果

[0018] 如上所述，本发明的特定 RACH 信息传送方法和装置允许 UE 响应于随机接入响应消息与 RACH 信息同步地传送 RRC 连接 REQ 和 NAS 服务 REQ 消息。这使得由 RRC 连接 REQ 和 NAS 服务 REQ 消息的逐步传送引起的程序上的延迟的减少。

附图说明

[0019] 当结合附图时，从以下详细描述中，本发明的以上以及其它方面、特征和优点将更加清楚，其中：

[0020] 图 1 是示出 LTE 系统体系结构的示图；

[0021] 图 2 是示出在传统 LTE 系统中在 UE 和 ENB 之间的 RACH 信令通信的信令通信图；

[0022] 图 3 是示出根据本发明实施例的支持无线通信系统中 RACH 程序的 UE 和 ENB 的操作的顺序图；

[0023] 图 4 是示出根据本发明实施例的在图 3 的 UE 中执行的 RACH 程序的步骤的流程图；

[0024] 图 5 是示出根据本发明实施例的执行图 4 的 RACH 程序的 UE 的配置的框图；

[0025] 图 6 是示出根据本发明实施例的在图 3 的 ENB 中执行的 RACH 程序的步骤的流程图；以及

[0026] 图 7 是示出根据本发明实施例的执行图 6 的 RACH 程序的 ENB 的配置的框图。

具体实施方式

[0027] 参考附图详细描述了本发明的实施例。相同或相似的参考标号在附图中始终用来指代相同或相似的组件。本领域已知结构或过程的详细描述可以被省略，以避免模糊本发明的主题。

[0028] 在本发明的实施例的无线通信系统中，当传送 RACH 信息时，UE 将 RRC 连接 REQ 消息和 NAS 服务 REQ 消息同时发送到网络，从而减少了模式转换延迟。

[0029] 为是实现这个目的，UE 使用 TTI 绑定技术来传送 RACH 消息。为达此目的，定义新的前导码组 C，并且在系统信息中广播关于前导码组 C 的前导码 ID 范围的信息和用于选择前导码组 C 的信道偏移值。TTI 绑定是使用时域中的连续资源传送相同传输块 (transport block) 的技术。新引入的前导码组 C 是这样的前导码组：其能被 UE 用来使用 TTI 绑定在 RACH 消息中同时传送 RRC 连接 REQ 消息和 NAS 服务 REQ 消息。在以下描述中，术语“前导

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码组 C”与术语“特定前导码组”可交换地使用。

[0030] 利用当前在规范中定义的前导码组 A 和前导码组 B，当路径损失小于阈值并且传送数据大于阈值时（路径损失 < 阈值并且传送数据 > 阈值），UE 发送在前导码组 B 中选择的前导码。否则，UE 发送在前导码组 A 中选择的前导码。在本发明的实施例中，前导码组 C 被定义为 UE 用来请求 ENB 使用 TTI 绑定传送数据的前导码组。

[0031] 在本发明的实施例中，UE 支持具有前导码组 C 的 TTI 绑定（例如，LTE-A UE），并且假设当信道条件较差（即，路径损失大于具有信道偏移的配置值集）且 UE 处于空闲模式时使用 TTI 绑定。路径损失可以大于 PCMAX-preambleInitialReceivedTargetPower-deltaPreambleMsgS- 信道偏移价值。这里，PCMAX 可以被选为小区内的最大 UE 传送功率和最大可用传送功率中的最小值 (least value)。preambleInitialReceivedTargetPower 可以是开环功率控制补偿值。deltaPreambleMsg3 可以是要使用的前导码格式的补偿值。PCMAX、preambleInitialReceivedTargetPower、以及 deltaPreambleMsg3 可以在系统信息中广播。

[0032] 如上所述，如果 UE 是 LTE-A UE，如果当前信道条件较差，以及如果 UE 处于空闲模式，则 UE 可以使用该前导码组 C。空闲模式的定义遵循在 3GPP 标准 TS36.331v850 中规定的 RRC_IDLE 状态。满足这三个条件的 UE 选择前导码组 C 中的前导码。接收前导码组 C 中的前导码的 ENB 分配用于以 TTI 绑定进行 RACH 消息传输的无线资源。

[0033] 如果应用 TTI 绑定，则 ENB 向 UE 发送 RACH 消息，该 RACH 消息包含通知 TTI 绑定的应用的指示符和用于 TTI 绑定的 TTI 数量。关于用于 TTI 绑定的连续 TTI 的数量的信息可以作为系统信息传送。如果 UE 发送前导码组 C 的前导码，则 ENB 可以发送只具有 TTI 绑定指示符的消息。如果接收到 RACH 响应消息，则 UE 使用在时域中连续分配的资源传送组合的 RACH 消息（这里，组合的消息包括 RRC 连接 REQ 消息和 NAS 服务 REQ 消息）。UE 组合 RRC 连接 REQ 消息和 NAS 服务 REQ 消息，并作为单一消息同时传送该 RRC 连接 REQ 消息和 NAS 服务 REQ 消息。如果接收到组合的 RACH 消息（即，RRC 连接 REQ 和 NAS 服务 REQ），则 ENB 从组合的 RACH 消息中分离 RRC 连接 REQ 和 NAS 服务 REQ 消息，并且将分离的消息转移到上层核心节点 (upper core node)，或可动性管理实体 (MME)。MME 的定义遵循 3GPP 标准 TS23.401。

[0034] 虽然如上所述，关于是否应用 TTI 绑定以及连续 TTI 的数量的信息是使用 RACH 响应消息来进行信令通信的 (signaled)，但是当 UE 发送在前导码组 C 中选择的前导码时，TTI 绑定以及预订数量的连续 TTI 的使用可以被 UE 用户以非明确方式得知 (implicitly acknowledged)。

[0035] 图 3 是示出根据本发明实施例的支持无线通信系统中 RACH 程序的 UE 和 ENB 的操作的顺序图。

[0036] 在步骤 311，ENB 303 定义前导码组 C 并广播系统信息，该系统信息包含关于前导码组 C 中前导码的 ID 范围的信息和用于选择前导码组 C 的信道偏移值。该系统信息包括前导码组 C 的前导码 ID 范围以及包含测量 UE 路径损失所需的 PCMAX、preambleInitialReceivedTargetPower、deltaPreambleMsg3、以及信道偏移的信息。该系统信息可以包括用于 TTI 绑定的连续 TTI 的数量。

[0037] 在步骤 321，UE 301 在接收到系统信息时检查信道条件和操作模式，并且确定是否使用前导码组 C 的前导码。如果 UE 301 是 LTE-AUE，如果路径损失大于通过如等式 (1)

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右边的项的公式获得的值（即，信道状态较差），以及如果 UE 301 处于空闲模式，则从前导码组 C 中选择前导码。如果满足这三个条件 (UE = LTE-A UE，路径损失 > PCMAX-preambleInitialReceivedTargetPower-deltaPreambleMsgS- 信道偏移，以及 UE 操作模式 = 空闲模式），则 UE 从新引入的前导码组 C 中选择前导码。

[0038] 路径损失 > PCMAX-preambleInitialReceivedTargetPower-deltaPreambleMsg3- 信道偏移 (1)

[0039] 在步骤 331，如果满足这三个条件，UE 301 使用由 ENB 303 信令通信的物理随机接入 (Physical Random Access，PRACH) 资源将从前导码组 C 中选择的前导码发送到 ENB 303。在步骤 341，如果接收到从前导码组 C 中选择的前导码，则 ENB 303 应用用于传送 RACH 消息 (RACH MSG3) 的 TTI 绑定，并分配用于 RACH MSG3 的无线资源。一旦已经确定用于 RACH MSG3 的 TTI 绑定，则在步骤 351，ENB 303 向 UE 301 发送随机接入响应消息，该随机接入响应消息包含 TTI 绑定配置指示符和用于 TTI 绑定的连续 TTI 的数量。用于 TTI 绑定的 TTI 数量可以在系统信息中携带 (carried)。在步骤 351，可以传送没有关于 TTI 数量的信息的随机接入响应消息。

[0040] 如果接收到随机接入响应消息，则在步骤 361，UIE 301 考虑到 TTI 数量生成组合的 RACH 消息，并使用分配用于 RACH 消息 (RACH MSG3) 的资源将组合的 RACH 消息发送到 ENB 303。组合的 RACH 消息可以是根据 TTI 绑定配置而组合的多个 RACH 消息。所述组合的 RACH 消息可以是 RRC 连接 REQ 消息和 NAS 服务 REQ 消息。因此，RRC 连接 REQ 消息和 NAS 服务 REQ 消息以组合的 RACH MSG3 的形式被同时传送。

[0041] 如果接收到组合的 RACH MSG3，则在步骤 371，ENB 303 将组合的 RACH MSG3 分解为 RRC 连接 REQ 消息和 NAS 服务 REQ 消息，并将 NAS 服务 REQ 消息转移到核心网络节点，即，MME。

[0042] 当关于是否使用 TTI 绑定的决定以及用于 TTI 绑定的连续 TTI 的数量被明确 (explicitly) 信令通信给 UE 时，UE 可以在已经传送从前导码组 C 中选择的前导码时，以预订数量的连续 TTI 自主地 (autonomously) 配置 TTI 绑定。

[0043] 图 4 是示出根据本发明实施例的在图 3 的 UE 中执行的 RACH 程序的步骤的流程图。

[0044] 一旦在步骤 401 开始 RACH 程序，则在步骤 411，UE 301 确定是否使用来自前导码组 C 的前导码。在步骤 411，UE 301 确定 UE 301 是否是 LTE-A 终端，所测量的路径损失是否大于信道偏移被应用的特定值，以及 UE 是否处于空闲模式。如果满足这三个条件 (UE = LTE-A UE，路径损失 > PCMAX-preambleInitialReceivedTargetPower-deltaPreambleMsgS- 信道偏移，以及 UE 操作模式 = 空闲模式），则在步骤 421，UE 301 从新引入的前导码组 C 中选择前导码。一旦从前导码组 C 中选择前导码，则在步骤 431，UE 将所选择的前导码传送到 ENB 303。如果在步骤 411 三个条件中的至少一个没有满足，则 UE 301 根据传统前导码选择规则，通过从前导码组 A 和前导码组 B 中选择一个前导码组并从所选择的前导码组中选择前导码，来继续 RACH 程序，如在 3GPP 标准 TS36.321v850 中规定的。

[0045] 在步骤 431 传送前导码之后，UE 301 等待接收随机接入响应消息。随机接入响应消息可以包括 TTI 绑定配置指示符和 TTI 数量。一旦接收到随机接入响应消息，则在步骤 411，UE 301 确定随机接入响应消息是否包含 TTI 绑定配置指示符和 TTI 数量。如果随机接入响应消息包含 TTI 绑定配置指示符和 TTI 数量，则在步骤 451，UE 301 根据 TTI 数量使

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用在时域中连续的资源生成并传送组合的 RACH 消息到 ENB 303。组合的 RACH 消息可以包括 RRC 连接 REQ 消息和 NAS 服务 REQ 消息，并被称为组合的 RACH MSG3。

[0046] 如果在步骤 441 已经确定随机接入响应消息没有包括 TTI 绑定配置指示符和 TTI 数量，则在步骤 471，UE 301 根据在 3GPP 标准 TS36.321v850 中规定的传统前导码选择规则来执行 RACH 程序。

[0047] 现在参考图 5，其框图示出了根据本发明实施例的用于执行图 4 的 RACH 程序的 UE 301 的配置。

[0048] 如图 5 中所示，UE 301 包括收发机 501、前导码选择器 511、类型确定器 521、模式检测器 531、测量单元 541、消息分析器 551、以及消息生成器 561。

[0049] 收发机 501 负责建立与 ENB 的通信链接。收发机 501 可以包括射频 (RF) 单元和调制解调器。收发机 501 接收由 ENB 303 传送的系统信息和随机接入响应消息，该系统信息包括前导码 ID 范围和信道偏移，该随机接入响应消息包括 TTI 绑定配置指示符和 TTI 数量。收发机 501 将前导码和 RACH MSG3 传送到 ENB 303。

[0050] 类型确定器 521 确定 UE 301 的类型（例如，LTE-A）。模式检测器 531 检测 UE 301 的当前操作模式。UE 301 可以以空闲模式或忙碌模式进行操作。测量单元 541 测量由收发机 501 收到的信号的路径损失，并基于测量结果确定当前信道条件。具体来讲，测量单元 541 测量路径损失并确定所测量的路径损失是否大于通过应用信道偏移值配置的值，如以上等式 (1) 中所示。等式 (1) 中的参数 (PCMAX、preambleInitialReceivedTargetPower、deltaPreambleMsg3、以及信道偏移）可以在由 ENB 303 传送的系统信息中携带。

[0051] 前导码选择器 511 可以包括或生成前导码组 A、B、和 C。前导码选择器 511 接收类型确定器 521、模式检测器 531、以及管理单元 541 的输出，基于 UE 301 的条件选择前导码组之一，并从所选择的前导码组中选择前导码。在本发明的实施例中，如果 UE 301 是 LTE-A 终端，如果 UE 301 以空闲模式进行操作，以及如果所测量的路径损失大于通过应用信道偏移获得的配置值（即，如果等式 (1) 成立），则前导码选择器 511 从前导码组 C 中选择前导码。由前导码选择器 511 选择的前导码利用收发机 501 被送到 ENB 303。

[0052] 消息分析器 551 分析通过收发机 501 接收的消息。所接收的消息可以是由 ENB 303 传送的随机接入响应消息，包含 TTI 绑定配置指示符和 TTI 数量。关于 TTI 数量的信息可以在由 ENB 303 传送的系统信息中携带。消息生成器 561 可以根据关于 TTI 绑定配置信息和 TTI 数量的信息生成初始上行链路 L2/L3 消息，并根据 TTI 绑定以组合的消息的形式传送上行链路 L2/L3 消息。初始上行链路 L2/L3 消息可以包括 RRC 连接 REQ 消息和 NAS 服务 REQ 消息。根据 TTI 绑定组合的消息可以利用收发机 501 传送到 ENB 303。

[0053] 收发机 501 建立与 ENB 303 的无线链接，并接收由 ENB 303 传送的关于新引入的前导码组 C 的前导码 ID 范围和信道偏移的信息。测量单元 541 测量应用了信道偏移的路径损失 / 信道条件，模式检测器 531 确定 UE 301 是否以空闲模式进行操作，类型确定器 521 确定 UE 301 的类型，而前导码选择器 511 基于所述测量和确定结果选择前导码之一组并从所选择的前导码组中选择前导码。如果响应于前导码接收到的随机接入响应消息包括 TTI 绑定配置指示符，则消息分析器 551/ 消息生成器 561 生成包含 RRC 连接 REQ 消息和 NAS 服务 REQ 消息的初始上行链路 L2/L3 消息，并使用 TTI 绑定传送该初始上行链路 L2/L3 消息。

[0054] 图 6 是示出根据本发明实施例的在图 3 的 ENB 中执行的 RACH 程序的步骤的流程

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图。

[0055] 参考图 6，在步骤 601，ENB 303 首先接收由 UE 301 传送的前导码。一旦接收到前导码，则在步骤 611，ENB 303 确定前导码是否属于前导码组 C。如果前导码属于前导码组 C，则在步骤 621，ENB 303 应用 TTI 绑定来传送上行链路 L2/L3 消息，分配用于上行链路 L2/L3 消息的无线资源，并利用 TTI 绑定配置指示符和 TTI 数量生成随机接入响应消息。在步骤 631，ENB 303 将随机接入响应消息传送到 UE 301。

[0056] 在传送随机接入响应消息之后，ENB 303 等待接收由 UE 301 根据 TTI 绑定传送的上行链路 L2/L3 消息（组合了 RRC 连接 REQ 和 NAS 服务 REQ 消息的 RACH MSG3）。如果在步骤 651 接收到基于 TTI 绑定的上行链路 L2/L3 消息，则在步骤 651，ENB 303 从上行链路 L2/L3 消息中分解 RRC 连接 REQ 消息和 NAS 服务 REQ 消息，并将 NAS 服务 REQ 消息转移到 MME。

[0057] 如果在步骤 611 确定前导码不属于前导码组 C，则在步骤 661，ENB 303 分配用于上行链路 L2/L3 消息的资源而不应用 TTI 绑定，并生成随机接入响应消息。随机接入响应消息可以包括设置为“FALSE”的 TTI 绑定配置指示符和设置为“1”的 TTI 数量。ENB 303 在步骤 663 将随机接入响应消息传送到 UE 301，并在步骤 665 接收由 UE 301 传送的没有应用 TTI 绑定的上行链路 L2/L3 消息。

[0058] 图 7 是示出根据本发明实施例的执行图 6 的 RACH 程序的 ENB 的配置的框图。

[0059] 如图 7 所示，ENB 包括收发机 701、前导码组分析器 711、消息生成器 / 分析器 721、以及调度器 / 资源分配器 731。

[0060] 收发机 701 负责建立与 UE 301 的无线链接。收发机 701 传送系统信息和具有资源分配信息的随机接入响应消息，并接收由 UE 301 传送的前导码和 TTI 绑定的上行链路 L2/L3 消息。前导码组分析器 711 分析由收发机 701 接收到的前导码，以确定前导码是否属于前导码组 C。在图 7 的实施例中，假定所接收到的前导码属于前导码组 C。调度器 / 资源分配器 731 根据所接收到的前导码所属于的前导码组来分配资源。该资源可以是 TTI 绑定资源或非 TTI 绑定资源。如果所接收到的前导码属于前导码组 C，则调度器 / 资源分配器 731 将 TTI 绑定资源分配给 UE。当应用了 TTI 绑定时，消息生成器 / 分析器 721 将由 UE 301 传送的上行链路 L2/L3 消息分解为 RRC 连接 REQ 消息和 NAS 服务 REQ 消息，并将 NAS 服务 REQ 消息转移到 MME。

[0061] 如上所述，本发明的 RACH 特定的信息传送方法和装置允许 UE 响应于随机接入响应消息与 RACH 信息同步地传送 RRC 连接 REQ 和 NAS 服务 REQ 消息。这使得由 RRC 连接 REQ 和 NAS 服务 REQ 消息的逐步传送引起的程序上的延迟的减少。

[0062] 虽然已经参考本发明的一定实施例示出和描述了本发明，本领域技术人员将理解，可以在此做出形式和细节上的各种改变，而不脱离由所附权利要求定义的本发明的精神和范围。

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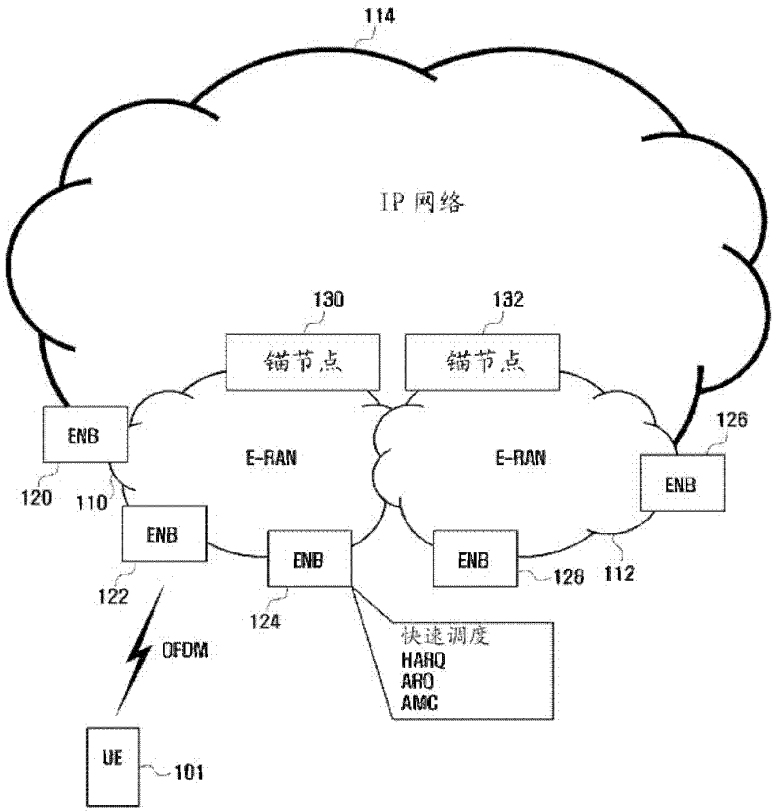


图 1

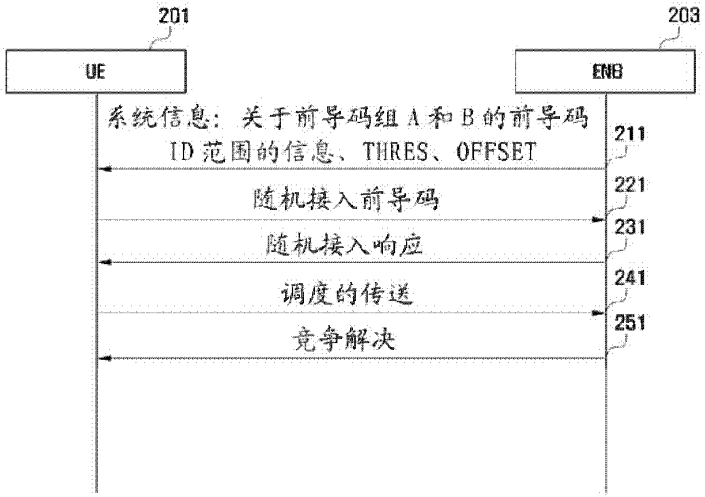


图 2

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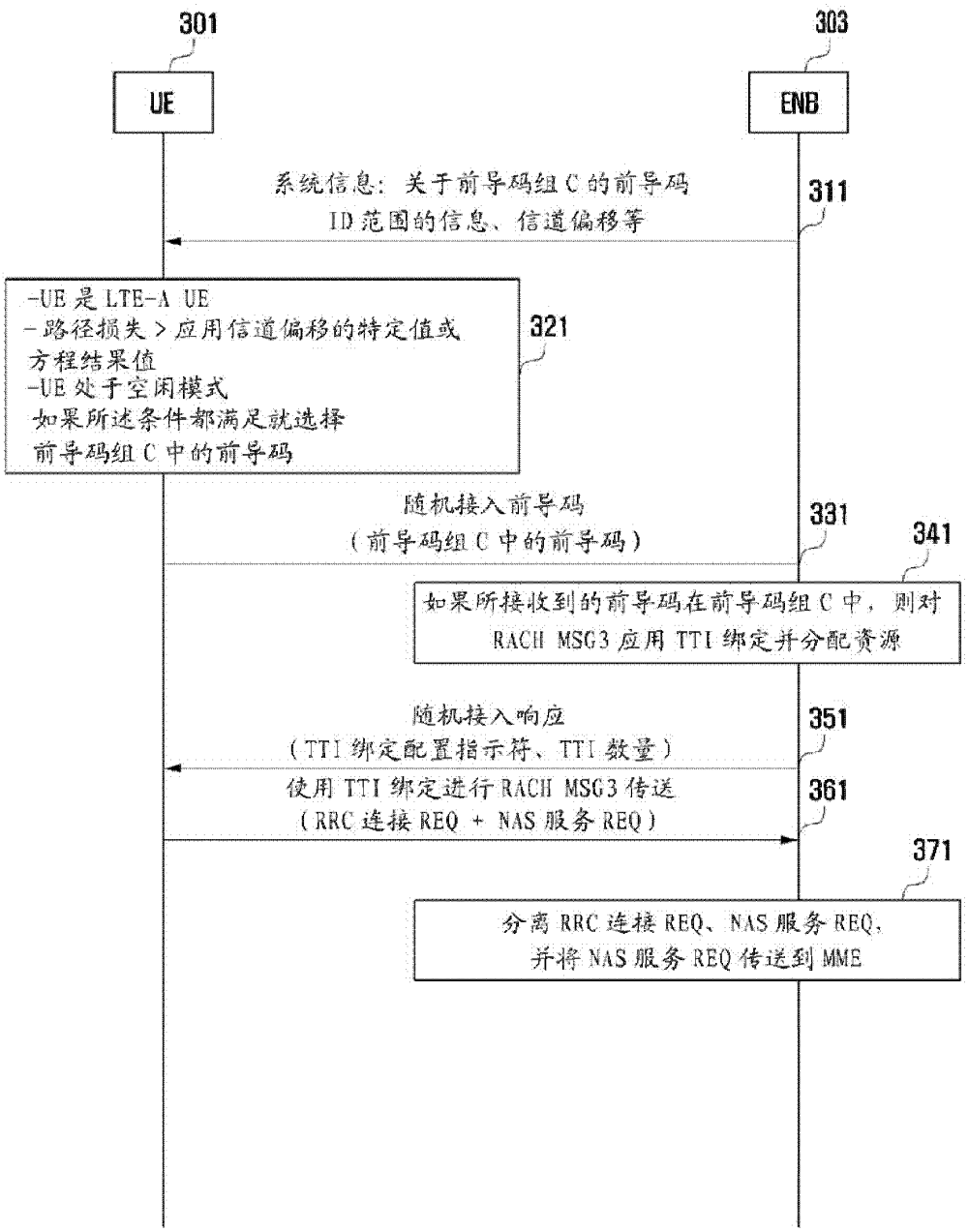


图 3

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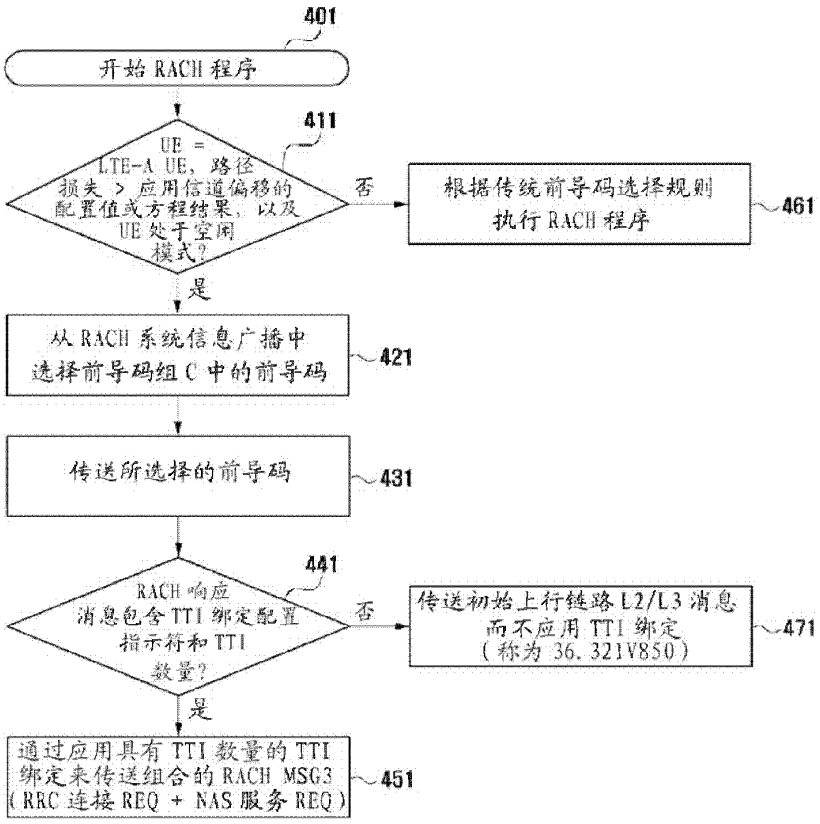


图 4

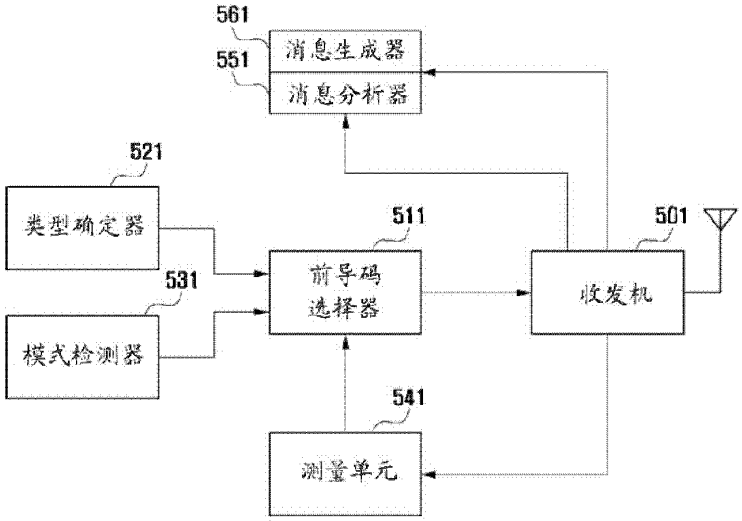


图 5

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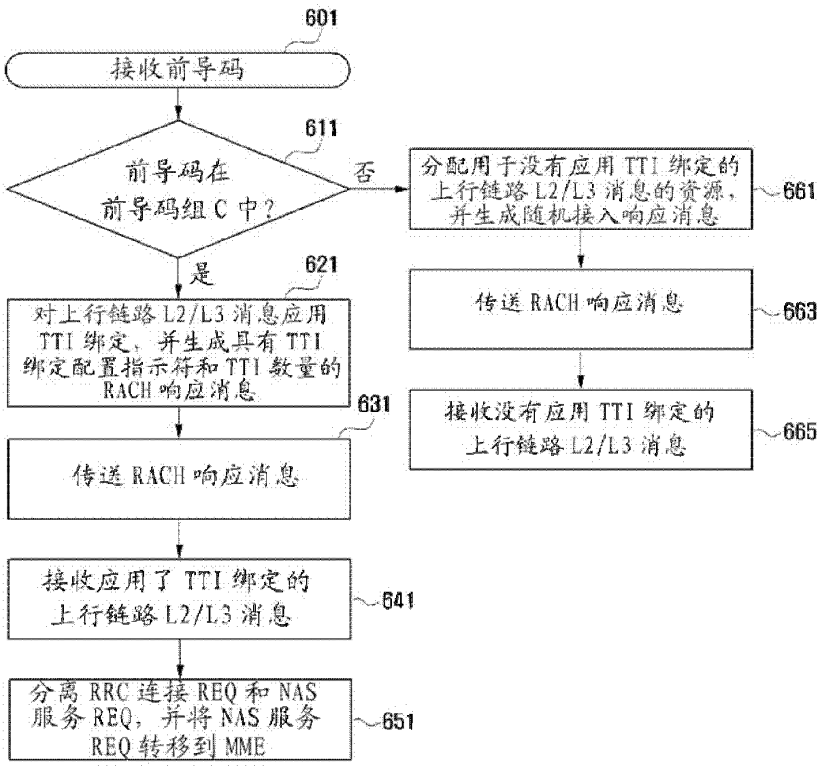


图 6

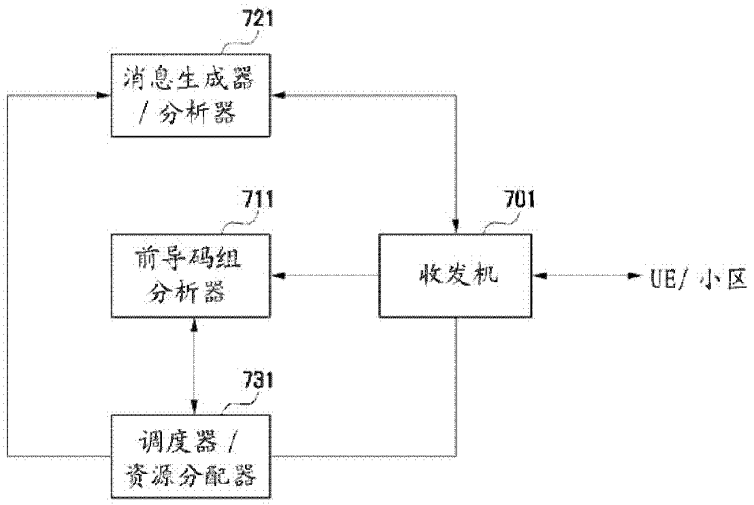


图 7

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Channel state information and adaptive modulation and coding design for long-term evolution machine type communications

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Applicant(s): QUALCOMM INC ± (QUALCOMM, INCORPORATED, ; 高通股份有限公司)

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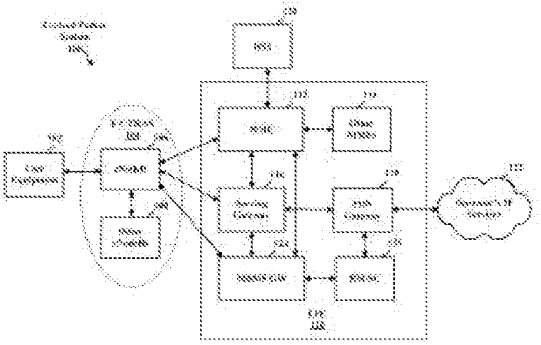
Application number: CN20148014785 20140107 Global Dossier

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Abstract of CN105052065 (A)

A method, an apparatus, and a computer program product for wireless communication are provided. The apparatus may be a UE. The UE determines CSI. The UE determines whether to send the CSI based on at least one of a timer or a threshold. The UE sends the CSI upon determining to send the CSI. The UE may send the CSI in a MAC header upon determining to send the CSI. When the UE determines whether to send the CSI based on the threshold, the UE may determine whether to



send the CSI based on a difference between the CSI and reference CSI. The UE may determine the reference CSI based on at least one of previously reported CSI, fixed CSI, or an MCS of a received data transmission from a base station. The UE may send CSI to the base station in an initial connection setup with the base station.

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代理人 张扬 王英
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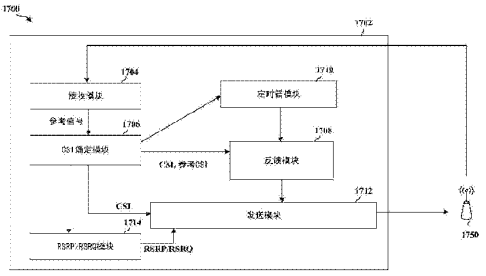
权利要求书3页 说明书25页 附图18页

(54)发明名称

用于长期演进机器类型通信的信道状态信息以及自适应调制和编码设计

(57)摘要

提供了用于无线通信的方法、装置和计算机程序产品。该装置可以是UE。UE确定CSI。UE基于定时器或门限中的至少一个，来确定是否要发送该CSI。在确定要发送CSI时，UE发送该CSI。在确定要发送该CSI时，UE可以在MAC报头中发送该CSI。当UE基于门限来确定是否要发送CSI时，UE可以基于CSI和参考CSI之间的差值来确定是否要发送该CSI。UE可以基于先前报告的CSI、固定的CSI或者从基站接收的数据传输的MCS中的至少一个，来确定该参考CSI。UE可以在与基站的初始连接建立期间，向基站发送CST。



CN 105052065 A

1.一种用户设备(UE)的无线通信的方法,包括:

确定信道状态信息(CSI);

基于定时器或者门限中的至少一个,来确定是否要发送所述CSI;以及

在确定要发送所述CSI时,发送所述CSI。

2.根据权利要求1所述的方法,其中,在确定要发送所述CSI时,所述UE在介质访问控制(MAC)报头中发送所述CSI。

3.根据权利要求1所述的方法,其中,所述CSI包括以下各项中的至少一项:信道质量指示(CQI)、秩指示(RI)、预编码矩阵索引(PMI)、调制和编码方案(MCS)或路径损耗。

4.根据权利要求1所述的方法,其中,所述确定是否要发送所述CSI是基于所述门限的,并取决于所述CSI和参考CSI之间的差值。

5.根据权利要求4所述的方法,其中,所述参考CSI是基于以下各项中的至少一项来确定的:先前报告的CSI、固定的CSI、路径损耗或者从基站接收的数据传输的MCS。

6.根据权利要求1所述的方法,还包括:

在与基站的初始连接建立期间,向所述基站发送CSI。

7.根据权利要求1所述的方法,还包括:

向基站发送用于发送所述CSI的请求;以及

从所述基站接收基于所述请求的响应,

其中,所述CSI是基于所接收到的响应而向所述基站发送的。

8.根据权利要求7所述的方法,其中,所述请求是调度请求或者随机接入信道(RACH)消息,并且所述响应是上行链路准许,其中,所述UE在所述上行链路准许的、调度的物理上行链路共享信道(PUSCH)中发送所述CSI。

9.根据权利要求7所述的方法,其中,所述UE在RACH过程的消息3或消息5中发送所述CSI。

10.根据权利要求1所述的方法,还包括:

从基站接收上行链路准许,当在大于第二门限的时间段内没有发送CSI时,接收到所述上行链路准许,其中,所述CSI是基于所接收到的上行链路准许来发送的。

11.根据权利要求1所述的方法,其中,所述CSI是通过多个子帧来确定的。

12.根据权利要求1所述的方法,还包括:

在多个子帧中的每一个子帧中,估计所述CSI;以及

基于所述多个子帧上的最低CSI,或者基于所述多个子帧上的所估计的CSI的平均值,来确定所述CSI。

13.根据权利要求1所述的方法,还包括:

对指示如何确定所述CSI的配置进行接收;以及

基于所接收到的配置来确定所述CSI。

14.根据权利要求1所述的方法,还包括:

对指示多播广播单频网(MBSFN)子帧的信息进行接收;以及

基于所接收到的信息来确定所述CSI。

15.根据权利要求1所述的方法,还包括:

基于所述CSI来选择用于随机接入信道(RACH)过程的RACH格式,其中,所述CSI是通

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过所述 RACH 过程来发送的，并通过所选择的 RACH 格式来指示。

16. 根据权利要求 1 所述的方法，还包括：

从基站接收定期监管消息；以及

基于所接收到的定期监管消息，向所述基站发送响应，其中，所述 CSI 是与所述响应一起发送的。

17. 根据权利要求 1 所述的方法，还包括：

确定参考信号接收质量 (RSRQ) 或者参考信号接收功率 (RSRP) 中的至少一个；以及

向基站发送所述 RSRP 或者所述 RSRQ 中的所述至少一个，

其中，所述 CSI 是与所述 RSRP 或者所述 RSRQ 中的所述至少一个一起发送的。

18. 根据权利要求 1 所述的方法，其中，在所述定时器到期时，发送所述 CSI。

19. 一种用于无线通信的装置，所述装置是用户设备 (UE)，所述装置包括：

存储器；以及

至少一个处理器，其耦合到所述存储器并且被配置为：

确定信道状态信息 (CSI)；

基于定时器或者门限中的至少一个，来确定是否要发送所述 CSI；

以及

在确定要发送所述 CSI 时，发送所述 CSI。

20. 根据权利要求 19 所述的装置，其中，在确定要发送所述 CSI 时，所述装置在介质访问控制 (MAC) 报头中发送所述 CSI。

21. 根据权利要求 19 所述的装置，其中，所述至少一个处理器还被配置为：

向基站发送用于发送所述 CSI 的请求；以及

从所述基站接收基于所述请求的响应，

其中，所述 CSI 是基于所接收到的响应而向所述基站发送的。

22. 根据权利要求 19 所述的装置，其中，所述至少一个处理器还被配置为：从基站接收上行链路准许，当在大于第二门限的时间段内没有发送 CSI 时，接收到所述上行链路准许，其中所述 CSI 是基于所接收到的上行链路准许来发送的。

23. 根据权利要求 19 所述的装置，其中，所述至少一个处理器还被配置为：

在多个子帧中的每一个子帧中，估计所述 CSI；以及

基于所述多个子帧上的最低 CSI，或者基于所述多个子帧上的所估计的 CSI 的平均值，来确定所述 CSI。

24. 根据权利要求 19 所述的装置，其中，所述至少一个处理器还被配置为：

对指示如何确定所述 CSI 的配置进行接收；以及

基于所接收到的配置来确定所述 CSI。

25. 根据权利要求 19 所述的装置，其中，所述至少一个处理器还被配置为：

对指示多播广播单频网 (MBSFN) 子帧的信息进行接收；以及

基于所接收到的信息来确定所述 CSI。

26. 根据权利要求 19 所述的装置，其中，所述至少一个处理器还被配置为：基于所述 CSI 来选择用于随机接入信道 (RACH) 过程的 RACH 格式，其中，所述 CSI 是通过所述 RACH 过程来发送的，并通过所选择的 RACH 格式来指示。

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27. 根据权利要求 19 所述的装置，其中，所述至少一个处理器还被配置为：

从基站接收定期监管消息；以及

基于所接收到的定期监管消息，向所述基站发送响应，其中，所述 CSI 是与所述响应一起发送的。

28. 根据权利要求 19 所述的装置，其中，所述至少一个处理器还被配置为：

确定参考信号接收质量 (RSRQ) 或者参考信号接收功率 (RSRP) 中的至少一个；以及

向基站发送所述 RSRP 或者所述 RSRQ 中的所述至少一个，

其中，所述 CSI 是与所述 RSRP 或者所述 RSRQ 中的所述至少一个一起发送的。

29. 一种用于无线通信的装置，所述装置是用户设备 (UE)，所述装置包括：

用于确定信道状态信息 (CSI) 的单元；

用于基于定时器或者门限中的至少一个，来确定是否要发送所述 CSI 的单元；以及

用于在确定要发送所述 CSI 时，发送所述 CSI 的单元。

30. 一种用户设备 (UE) 中的计算机程序产品，包括：

计算机可读介质，其包括用于执行以下各项操作的代码：

确定信道状态信息 (CSI)；

基于定时器或者门限中的至少一个，来确定是否要发送所述 CSI；

以及

在确定要发送所述 CSI 时，发送所述 CSI。

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用于长期演进机器类型通信的信道状态信息以及自适应调制和编码设计

[0001] 相关申请的交叉引用

[0002] 本申请要求享受以下申请的优先权：

[0003] 2013 年 1 月 16 日提交的、标题为“CHANNEL STATE INFORMATION AND ADAPTIVE MODULATION AND CODING DESIGN FOR LONG-TERM EVOLUTION MACHINE TYPE COMMUNICATIONS”的美国临时申请序列号 No.61/753,395；

[0004] 2013 年 12 月 18 日提交的、标题为“CHANNEL STATE INFORMATION AND ADAPTIVE MODULATION AND CODING DESIGN FOR LONG-TERM EVOLUTION MACHINE TYPE COMMUNICATIONS”的美国非临时申请序列号 No.14/133,062，

[0005] 故以引用方式将这些申请的全部内容明确地并入本文。

技术领域

[0006] 概括地说，本公开内容涉及通信系统，更具体地说，涉及用于长期演进 (LTE) 机器类型通信 (MTC) 的信道状态信息 (CSI) 以及自适应调制和编码 (AMC) 设计方案。

背景技术

[0007] 无线通信系统被广泛地部署以便提供诸如电话、视频、数据、消息传送和广播之类的各种电信服务。典型的无线通信系统可以使用能通过共享可用的系统资源 (例如，带宽、发射功率)，来支持与多个用户进行通信的多址技术。这类多址技术的例子包括码分多址 (CDMA) 系统、时分多址 (TDMA) 系统、频分多址 (FDMA) 系统、正交频分多址 (OFDMA) 系统、单载波频分多址 (SC-FDMA) 系统和时分同步码分多址 (TD-SCDMA) 系统。

[0008] 在多种电信标准中已采纳这些多址技术，以提供使不同无线设备能在城市级别、国家级别、地域级别、甚至全球级别上进行通信的公用协议。一种新兴的电信标准的例子是远程 LTE。LTE 是对第三代合作伙伴计划 (3GPP) 发布的通用移动通信系统 (UMTS) 移动标准的增强集合。设计 LTE 以便通过提高谱效率、降低费用、提高服务、充分利用新频谱来更好地支持移动宽带互联网接入，并与在下行链路 (DL) 上使用 OFDMA、在上行链路 (UL) 上使用 SC-FDMA 以及使用多输入多输出 (MIMO) 天线技术的其它开放标准进行更好地集成。但是，随着移动宽带接入需求的持续增加，存在着进一步提高 LTE 技术的需求。优选的是，这些提高应当可适用于其它多址技术和使用这些技术的通信标准。

发明内容

[0009] 在本公开内容的一个方面，提供了一种方法、计算机程序产品和装置。该装置是 MTC UE。UE 确定与在基站和该 UE 之间的所估计的信道相对应的第一调制和编码方案 (MCS)。UE 从基站接收利用第二 MCS 进行调制和编码的数据。UE 确定第二 MCS 与第一 MCS 相差是否超过某个门限。在确定第二 MCS 与第一 MCS 相差超过该门限时，UE 发送 CSI。

[0010] 在本公开内容的另一个方面，提供了一种方法、计算机程序产品和装置。该装置是

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MTC UE。UE 从基站接收传输时间间隔 (TTI) 绑定传输。UE 对该 TTI 绑定传输的子集进行解码。在对该 TTI 绑定传输的该子集进行解码之后，UE 向基站发送确认以早期地终止该 TTI 绑定传输。通过 UE 所接收的 TTI 绑定传输的百分比，向基站指示 CSI。

[0011] 在本公开内容的另一个方面，提供了一种方法、计算机程序产品和装置。该装置向基站发送上行链路传输。该装置从基站接收数据传输，其中该数据传输具有以下各项中的至少一项：基于上行链路传输而确定的 MCS 或者基于上行链路传输而确定的 TTI 绑定大小。

[0012] 在本公开内容的另一个方面，提供了一种方法、计算机程序产品和装置。该装置是 MTC UE。UE 确定 CSI。UE 基于定时器或者门限中的至少一个，来确定是否要发送该 CSI。在确定要发送 CSI 时，UE 发送该 CSI。

附图说明

[0013] 图 1 是示出一种网络架构的例子的图。

[0014] 图 2 是示出一种接入网络的例子的图。

[0015] 图 3 是示出 LTE 中的 DL 帧结构的例子的图。

[0016] 图 4 是示出 LTE 中的 UL 帧结构的例子的图。

[0017] 图 5 是示出用于用户平面和控制平面的无线协议架构的例子的图。

[0018] 图 6 是示出接入网络中的演进型节点 B 和用户设备的例子的图。

[0019] 图 7A 是示出多播广播单频网中的演进型多媒体广播多播服务信道配置的例子的图。

[0020] 图 7B 是示出多播信道调度信息介质访问控制控制元素的格式的图。

[0021] 图 8A 是用于示出第一示例性方法的图。

[0022] 图 8B 是用于示出第二示例性方法的图。

[0023] 图 8C 是用于示出第三示例性方法的图。

[0024] 图 8D 是用于示出第四示例性方法的图。

[0025] 图 9 是无线通信的第一方法的流程图。

[0026] 图 10 是无线通信的第二方法的流程图。

[0027] 图 11 是无线通信的第三方法的流程图。

[0028] 图 12 是示出示例性装置中的不同模块 / 单元 / 组件之间的数据流的概念性数据流图。

[0029] 图 13 是示出用于使用处理系统的装置的硬件实现的例子的图。

[0030] 图 14 是示出示例性装置中的不同模块 / 单元 / 组件之间的数据流的概念性数据流图。

[0031] 图 15 是示出用于使用处理系统的装置的硬件实现的例子的图。

[0032] 图 16 是无线通信的第四方法的流程图。

[0033] 图 17 是示出示例性装置中的不同模块 / 单元 / 组件之间的数据流的概念性数据流图。

[0034] 图 18 是示出用于使用处理系统的装置的硬件实现的例子的图。

具体实施方式

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[0035] 下面结合附图所阐述的具体实施方式，仅仅旨在对各种配置进行描述，而不是旨在表示仅在这些配置中才可以实现本文所描述的概念。为了提供对各种概念的透彻理解，具体实施方式包括特定的细节。但是，对于本领域技术人员来说将显而易见的是，可以在不使用这些特定细节的情况下实现这些概念。在一些实例中，为了避免对这些概念造成模糊，以框图形式示出公知的结构和组件。

[0036] 现在将参照各种装置和方法来呈现电信系统的一些方面。这些装置和方法将在下面的具体实施方式中进行描述，并在附图中通过各种框、模块、组件、电路、步骤、过程、算法等等（其统称为“元素”）来进行描绘。可以使用电子硬件、计算机软件或者其任意组合来实现这些元素。至于这些元素是实现成硬件还是实现成软件，取决于特定的应用和施加在整个系统上的设计约束。

[0037] 举例而言，元素或者元素的任何部分或者元素的任意组合，可以用包括一个或多个处理器的“处理系统”来实现。处理器的例子包括微处理器、微控制器、数字信号处理器(DSP)、现场可编程门阵列 (FPGA)、可编程逻辑器件 (PLD)、状态机、门控逻辑、分立硬件电路和被配置为执行贯穿本公开内容所描述的各种功能的其它适当硬件。处理系统中的一个或多个处理器可以执行软件。软件应当被广泛地解释为意味着指令、指令集、代码、代码段、程序代码、程序、子程序、软件模块、应用、软件应用、软件包、例程、子例程、对象、可执行文件、执行的线程、过程、函数等等，无论其被称为软件、固件、中间件、微代码、硬件描述语言还是其它术语。

[0038] 因此，在一个或多个示例性实施例中，所描述的功能可以用硬件、软件、固件或者其任意组合来实现。当使用软件实现时，这些功能可以作为一个或多个指令或代码存储或编码在计算机可读介质上。计算机可读介质包括计算机存储介质。存储介质可以是计算机能够存取的任何可用介质。通过举例而非限制性的方式，这种计算机可读介质可以包括RAM、ROM、EEPROM、CD-ROM或其它光盘存储、磁盘存储或其它磁存储设备、或者能够用于携带或存储具有指令或数据结构形式的期望的程序代码并能够由计算机存取的任何其它介质。如本文所使用的，磁盘(disk)和光盘(disc)包括压缩盘(CD)、激光光盘、光盘、数字多功能光盘(DVD)和软盘，其中磁盘通常磁性地复制数据，而光盘则用激光来光学地复制数据。上面的组合也应当包括在计算机可读介质的保护范围之内。

[0039] 图1是示出LTE网络架构的图。该LTE网络架构可以称为演进分组系统(EPS)100。EPS 100可以包括一个或多个用户设备(UE)102、演进型UMTS陆地无线接入网络(E-UTRAN)104、演进分组核心(EPC)110、归属用户服务器(HSS)120和运营商的互联网协议(IP)服务122。EPS可以与其它接入网络互连，但为简单起见，没有示出这些实体/接口。如图所示，EPS提供分组交换服务，但是，如本领域技术人员将容易意识到的，贯穿本公开内容给出的各种概念可以扩展到提供电路交换服务的网络。

[0040] E-UTRAN包括演进型节点B(eNB)106和其它eNB 108。eNB 106提供针对于UE 102的用户平面和控制平面协议终止。eNB 106可以经由回程（例如，X2接口）连接到其它eNB 108。eNB 106还可以称为基站、节点B、接入点、基站收发机、无线基站、无线收发机、收发机功能单元、基本服务集(BSS)、扩展服务集(ESS)或者某种其它适当术语。eNB 106为UE 102提供至EPC 110的接入点。UE 102的例子包括蜂窝电话、智能电话、会话发起协议(SIP)电话、膝上型计算机、个人数字助理(PDA)、卫星无线电装置、全球定位系统、多媒体设备、视频

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设备、数字音频播放器（例如，MP3 播放器）、照相机、游戏控制台、平板计算机或者任何其它类似功能设备。本领域技术人员还可以将 UE 102 称为移动站、用户站、移动单元、用户单元、无线单元、远程单元、移动设备、无线设备、无线通信设备、远程设备、移动用户站、接入终端、移动终端、无线终端、远程终端、手持装置、用户代理、移动客户端、客户端或者某种其它适当术语。

[0041] eNB 106 连接到 EPC 110。EPC 110 包括移动性管理实体 (MME)112、其它 MME 114、服务网关 116、多媒体广播多播服务 (MBMS) 网关 124、广播多播服务中心 (BM-SC)126 和分组数据网络 (PDN) 网关 118。MME112 是处理 UE 102 和 EPC 110 之间的信令的控制节点。通常，MME 112 提供承载和连接管理。所有用户 IP 分组通过服务网关 116 来传送，其中服务网关 116 自己连接到 PDN 网关 118。PDN 网关 118 提供 UE IP 地址分配以及其它功能。PDN 网关 118 连接到运营商的 IP 服务 122。运营商的 IP 服务 122 可以包括互联网、内联网、IP 多媒体子系统 (IMS) 和 PS 流服务 (PSS)。BM-SC 126 可以提供用于 MBMS 用户服务供应和传送的功能。BM-SC 126 可以服务成用于内容提供商 MBMS 传输的进入点，可以用于授权和发起 PLMN 中的 MBMS 承载服务，并可以用于调度和传送 MBMS 传输。MBMS 网关 124 可以用于向属于多播广播单频网 (MBSFN) 区域（其正在广播特定的服务）的 eNB（例如，eNB 106、108）分发 MBMS 业务，并可以负责会话管理（开始 / 停止）和收集与 eMBMS 有关的计费信息。

[0042] 图 2 是示出 LTE 网络架构中的接入网络 200 的例子的图。在该例子中，将接入网络 200 划分成多个蜂窝区域（小区）202。一个或多个较低功率等级 eNB 208 可以具有与小区 202 中的一个或多个小区相重叠的蜂窝区域 210。较低功率等级 eNB 208 可以是毫微微小区（例如，家庭 eNB(HeNB)）、微微小区、微小区或者远程无线电头端 (RRH)。宏 eNB 204 分配给各小区 202，并被配置为向小区 202 中的所有 UE 206 提供至 EPC 110 的接入点。在接入网络 200 的该例子中，不存在集中式控制器，但在替代的配置中可以使用集中式控制器。eNB 204 负责所有与无线相关的功能，其包括无线承载控制、准入控制、移动性控制、调度、安全和连接到服务网关 116。

[0043] 接入网络 200 所使用的调制和多址方案可以根据所部署的具体电信标准来变化。在 LTE 应用中，在 DL 上使用 OFDM，在 UL 上使用 SC-FDMA，以便支持频分双工 (FDD) 和时分双工 (TDD)。如本领域技术人员通过下面的详细描述将容易意识到的，本文给出的各种概念非常适合用于 LTE 应用。但是，这些概念可以容易地扩展到使用其它调制和多址技术的其它电信标准。举例而言，这些概念可以扩展到演进数据优化 (EV-DO) 或超移动宽带 (UMB)。EV-DO 和 UMB 是第三代合作伙伴计划 2(2GPP2) 作为 CDMA2000 标准系列的一部分发布的空中接口标准，EV-DO 和 UMB 使用 CDMA 来为移动站提供宽带互联网接入。这些概念还可以扩展到：使用宽带 CDMA(W-CDMA) 和 CDMA 的其它变型（例如，TD-SCDMA）的通用陆地无线接入 (UTRA)；使用 TDMA 的全球移动通信系统 (GSM)；使用 OFDMA 的演进型 UTRA(E-UTRA)、IEEE 802.11(Wi-Fi)、IEEE 802.16(WiMAX)、IEEE 802.20 和闪速 OFDM。在来自 3GPP 组织的文档中描述了 UTRA、E-UTRA、UMTS、LTE 和 GSM。在来自 3GPP2 组织的文档中描述了 CDMA2000 和 UMB。所使用的实际无线通信标准和多址技术，取决于特定的应用和施加在系统上的整体设计约束。

[0044] eNB 204 可以具有支持 MIMO 技术的多个天线。MIMO 技术的使用使 eNB 204 能够使用空间域来支持空间复用、波束成形和发射分集。空间复用可以用于在相同频率上同时

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发送不同的数据流。可以将数据流发送给单一UE 206以增加数据速率，或者发送给多个UE 206以增加整体系统容量。这是通过对每一个数据流进行空间预编码（即，应用幅度和相位的缩放），并随后通过多个发射天线在DL上发送每一个经空间预编码的流来实现。到达UE 206的经空间预编码的数据流具有不同的空间特征，这使得每一个UE 206都能恢复出以该UE 206为目的地的一个或多个数据流。在UL上，每一个UE 206发送经空间预编码的数据流，其中经空间预编码的数据流使eNB 204能识别每一个经空间预编码的数据流的源。

[0045] 当信道状况良好时，通常使用空间复用。当信道状况不太有利时，可以使用波束成形来将传输能量聚焦在一个或多个方向中。这可以通过对经由多个天线发送的数据进行空间预编码来实现。为了在小区边缘处实现良好的覆盖，可以结合发射分集来使用单流波束成形传输。

[0046] 在下面的详细描述中，将参照在DL上支持OFDM的MIMO系统来描述接入网络的各个方面。OFDM是一种扩频技术，该技术将数据调制在OFDM符号中的多个子载波上。这些子载波以精确的频率间隔开。这种间隔提供了“正交性”，该“正交性”使接收机能够从这些子载波中恢复数据。在时域，可以向每一个OFDM符号添加保护间隔（例如，循环前缀），以克服OFDM符号间干扰。UL可以使用具有DFT扩展OFDM信号形式的SC-FDMA，以便补偿较高的峰均功率比(PARR)。

[0047] 图3是示出LTE中的DL帧结构的例子的图300。可以将一个帧(10ms)划分成10个均匀大小的子帧。每一个子帧可以包括两个连续的时隙。可以使用一个资源格来表示两个时隙，每一个时隙包括一个资源块。将资源格划分成多个资源单元。在LTE中，一个资源块在频域上包含12个连续的子载波，并且对于每一个OFDM符号中的常规循环前缀来说，在时域上包括7个连续的OFDM符号，或者说84个资源单元。对于扩展循环前缀，一个资源块在时域中包括6个连续的OFDM符号，其具有72个资源单元。这些资源单元中的一些（其指示成R 302、304）包括DL参考信号(DL-RS)。DL-RS包括特定于小区的RS(CRS)（其有时还称为公共RS)302和特定于UE的RS(UE-RS)304。仅在将相应的物理DL共享信道(PDSCH)所映射到的资源块上发送UE-RS 304。每一个资源单元所携带的比特数量取决于调制方案。因此，UE接收的资源块越多，调制方案阶数越高，则针对该UE的数据速率越高。

[0048] 图4是示出LTE中的UL帧结构的例子的图400。可以将用于UL的可用资源块划分成数据段和控制段。可以在系统带宽的两个边缘处形成控制段，控制段可以具有可配置的大小。可以将控制段中的资源块分配给UE，以传输控制信息。数据段可以包括不包含在控制段中的所有资源块。该UL帧结构产生了包括连续子载波的数据段，其可以允许向单个UE分配数据段中的所有连续子载波。

[0049] 可以向UE分配控制段中的资源块410a、410b，以向eNB发送控制信息。还可以向UE分配数据段中的资源块420a、420b，以向eNB发送数据。UE可以在控制段中的分配的资源块上，在物理UL控制信道(PUCCH)中发送控制信息。UE可以在数据段中的分配的资源块上，在物理UL共享信道(PUSCH)中只发送数据或者发送数据和控制信息二者。UL传输可以持续子帧的两个时隙，并且可以在频率之间进行跳变。

[0050] 可以使用一组资源块来执行初始的系统接入，并在物理随机接入信道(RACH)(PRACH)430中实现UL同步。PRACH 430携带随机序列，并且不能携带任何UL数据/信令。每一个随机接入前导码占据与六个连续资源块相对应的带宽。起始频率由网络进行指定。

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也就是说，将随机接入前导码的传输限制于某些时间和频率资源。对于 PRACH 来说，不存在频率跳变。PRACH 尝试在单个子帧（1ms）中或者在几个连续子帧的序列中进行携带，UE 可以在每一帧（10ms）只进行单次 PRACH 尝试。

[0051] 图 5 是示出用于 LTE 中的用户平面和控制平面的无线协议架构的例子的图 500。用于 UE 和 eNB 的无线协议架构示出为具有三个层：层 1、层 2 和层 3。层 1（L1 层）是最低层，其实现各种物理层信号处理功能。本文将 L1 层称为物理层 506。层 2（L2 层）508 高于物理层 506，其负责物理层 506 之上的 UE 和 eNB 之间的链路。

[0052] 在用户平面中，L2 层 508 包括 MAC 子层 510、无线链路控制（RLC）子层 512 和分组数据会聚协议（PDCP）514 子层，其中这些子层在网络一侧的 eNB 处终止。虽然没有示出，但 UE 可以具有高于 L2 层 508 的一些上层，其包括网络层（例如，IP 层）和应用层，其中网络层在网络一侧的 PDN 网关 118 处终止，应用层在连接的另一端（例如，远端 UE、服务器等等）处终止。

[0053] PDCP 子层 514 提供不同的无线承载和逻辑信道之间的复用。PDCP 子层 514 还提供用于上层数据分组的报头压缩以减少无线传输开销，通过对数据分组进行加密来实现安全，以及为 UE 提供 eNB 之间的切换支持。RLC 子层 512 提供上层数据分组的分段和重组、丢失数据分组的重传以及数据分组的重新排序，以便补偿由于混合自动重传请求（HARQ）而造成的乱序接收。MAC 子层 510 提供逻辑信道和传输信道之间的复用。MAC 子层 510 还负责在 UE 之间分配一个小区中的各种无线资源（例如，资源块）。MAC 子层 510 还负责 HARQ 操作。

[0054] 在控制平面中，对于物理层 506 和 L2 层 508 来说，除不存在用于控制平面的报头压缩功能之外，用于 UE 和 eNB 的无线协议架构基本相同。控制平面还包括层 3（L3 层）中的无线资源控制（RRC）子层 516。RRC 子层 516 负责获得无线资源（例如，无线承载），并负责在 eNB 和 UE 之间使用 RRC 信令来配置较低层。

[0055] 图 6 是接入网络中，eNB 610 与 UE 650 相通信的框图。在 DL 中，将来自核心网的上层分组提供给控制器 / 处理器 675。控制器 / 处理器 675 实现 L2 层的功能。在 DL 中，控制器 / 处理器 675 提供报头压缩、加密、分组分段和重新排序、逻辑信道和传输信道之间的复用以及基于各种优先级度量来向 UE 650 提供无线资源分配。控制器 / 处理器 675 还负责 HARQ 操作、丢失分组的重传以及向 UE 650 发送信令。

[0056] 发射（TX）处理器 616 实现 L1 层（即，物理层）的各种信号处理功能。这些信号处理功能包括为有助于在 UE 650 处实现前向纠错（FEC）而进行的编码和交织，以及基于各种调制方案（例如，二进制移相键控（BPSK）、正交移相键控（QPSK）、M 相移相键控（M-PSK）、M 阶正交幅度调制（M-QAM））来映射到信号星座。随后，将编码和调制的符号分割成并行的流。随后，将每一个流映射到 OFDM 子载波，在时域和 / 或频域中将其与参考信号（例如，导频）进行复用，并随后使用快速傅里叶逆变换（IFFT）将各个流组合在一起以便生成携带时域 OFDM 符号流的物理信道。对该 OFDM 流进行空间预编码，以生成多个空间流。来自信道估计器 674 的信道估计可以用于确定编码和调制方案以及用于实现空间处理。可以从 UE 650 发送的参考信号和 / 或信道状况反馈中推导出信道估计。随后，经由单独的发射机 618TX，将各空间流提供给不同的天线 620。每一个发射机 618TX 使用各空间流对 RF 载波进行调制，以便进行传输。

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[0057] 在 UE 650 处，每一个接收机 654RX 通过其相应的天线 652 接收信号。每一个接收机 654RX 恢复调制到 RF 载波上的信息，并将该信息提供给接收 (RX) 处理器 656。RX 处理器 656 实现 L1 层的各种信号处理功能。RX 处理器 656 可以对所述信息执行空间处理，以恢复以 UE 650 为目的地的任何空间流。如果多个空间流以 UE 650 为目的地，则 RX 处理器 656 将它们组合成单个 OFDM 符号流。随后，RX 处理器 656 使用快速傅里叶变换 (FFT)，将 OFDM 符号流从时域变换到频域。频域信号包括用于 OFDM 信号的每一个子载波的单独 OFDM 符号流。通过确定 eNB 610 发送的最可能的信号星座点，来恢复和解调每一个子载波上的符号以及参考信号。这些软判决可以是基于信道估计器 658 所计算得到的信道估计。随后，对这些软判决进行解码和解交织，以恢复 eNB 610 最初在物理信道上发送的数据和控制信号。随后，将这些数据和控制信号提供给控制器 / 处理器 659。

[0058] 控制器 / 处理器 659 实现 L2 层。该控制器 / 处理器可以与存储程序代码和数据的存储器 660 进行关联。存储器 660 可以称为计算机可读介质。在 UL 中，控制器 / 处理器 659 提供传输信道和逻辑信道之间的解复用、分组重组、解密、报头解压缩、控制信号处理，以恢复来自核心网的上层分组。随后，将上层分组提供给数据宿 662，其中数据宿 662 表示高于 L2 层的所有协议层。还可以向数据宿 662 提供各种控制信号以进行 L3 处理。控制器 / 处理器 659 还负责使用确认 (ACK) 和 / 或否定确认 (NACK) 协议进行错误检测，以支持 HARQ 操作。

[0059] 在 UL 中，数据源 667 用于向控制器 / 处理器 659 提供上层分组。数据源 667 表示高于 L2 层的所有协议层。类似于结合 eNB 610 进行 DL 传输所描述的功能，控制器 / 处理器 659 通过提供报头压缩、加密、分组分段和重新排序，以及基于由 eNB 610 进行的无线资源分配在逻辑信道和传输信道之间进行复用，来实现用户平面和控制平面的 L2 层。控制器 / 处理器 659 还负责 HARQ 操作、丢失分组的重传和向 eNB 610 发送信令。

[0060] 信道估计器 658 从 eNB 610 发送的参考信号或反馈中推导出的信道估计，可以由 TX 处理器 668 使用，以便选择适当的编码和调制方案和有助于实现空间处理。可以经由单独的发射机 654TX，将 TX 处理器 668 生成的空间流提供给不同的天线 652。每一个发射机 654TX 使用相应的空间流来对 RF 载波进行调制，以便进行传输。

[0061] 以类似于结合 UE 650 处的接收机功能所描述的方式，在 eNB 610 处对 UL 传输进行处理。每一个接收机 618RX 通过其相应的天线 620 来接收信号。每一个接收机 618RX 恢复调制到 RF 载波上的信息，并将该信息提供给 RX 处理器 670。RX 处理器 670 可以实现 L1 层。

[0062] 控制器 / 处理器 675 实现 L2 层。控制器 / 处理器 675 可以与存储程序代码和数据的存储器 676 进行关联。存储器 676 可以称为计算机可读介质。在 UL 中，控制器 / 处理器 675 提供传输信道和逻辑信道之间的解复用、分组重组、解密、报头解压缩、控制信号处理，以恢复来自 UE 650 的上层分组。可以将来自控制器 / 处理器 675 的上层分组提供给核心网。控制器 / 处理器 675 还负责使用 ACK 和 / 或 NACK 协议进行错误检测，以支持 HARQ 操作。

[0063] 图 7A 是示出 MBSFN 中的演进型 MBMS(eMBMS) 信道配置的例子的图 750。小区 752' 中的 eNB 752 可以形成第一 MBSFN 区域，小区 754' 中的 eNB 754 可以形成第二 MBSFN 区域。eNB 752、754 中的每一个可以与其它 MBSFN 区域（例如，多达总共八个 MBSFN 区域）相关

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联。可以将 MBSFN 区域中的小区指定成保留小区。保留小区不提供多播 / 广播内容，但与小区 752'、754' 是时间同步的，并在 MBSFN 资源上具有受限的功率，以便限制对于该 MBSFN 区域的干扰。MBSFN 区域中的每一个 eNB 同步地发送相同的 eMBMS 控制信息和数据。每一个区域可以支持广播、多播和单播服务。单播服务是旨在针对于特定用户的服务（例如，语音呼叫）。多播服务是可以由一组用户接收的服务（例如，订阅视频服务）。广播服务是可以被所有用户接收的服务（例如，新闻广播）。参见图 7A，第一 MBSFN 区域可以支持第一 eMBMS 广播服务（例如，通过向 UE 770 提供特定的新闻广播）。第二 MBSFN 区域可以支持第二 eMBMS 广播服务（例如，通过向 UE 760 提供不同的新闻广播）。每一个 MBSFN 区域支持多个物理多播信道 (PMCH)（例如，15 个 PMCH）。每一个 PMCH 对应于一个多播信道 (MCH)。每一个 MCH 可以复用多个（例如，29 个）多播逻辑信道。每一个 MBSFN 区域可以具有一个多播控制信道 (MCCH)。因此，一个 MCH 可以复用一个 MCCH 和多个多播业务信道 (MTCH)，剩余的 MCH 可以复用多个 MTCH。

[0064] UE 可以驻留在 LTE 小区上，以发现 eMBMS 服务接入的可用性和相应的接入层配置。在第一步骤中，UE 捕获系统信息块 (SIB)13(SIB13)。在第二步骤中，基于该 SIB13，UE 在 MCCH 上捕获 MBSFN 区域配置消息。在第三步骤中，基于该 MBSFN 区域配置消息，UE 捕获 MCH 调度信息 (MSI)MAC 控制元素。SIB13 指示：(1) 该小区所支持的每一个 MBSFN 区域的 MBSFN 区域标识符；(2) 用于捕获 MCCH 的信息，例如，MCCH 重复周期（如，32、64、……、256 个帧）、MCCH 偏移（例如，0、1、……、10 个帧）、MCCH 修改周期（例如，512、1024 个帧）、信号传送调制和编码方案 (MCS)、子帧分配信息（其指示如通过重复周期和偏移所指示的该无线帧中的哪些子帧可以发送 MCCH）；以及 (3)MCCH 改变通知配置。每一个 MBSFN 区域对应一个 MBSFN 区域配置消息。MBSFN 区域配置消息指示：(1) 临时移动组标识 (TMGI) 以及通过 PMCH 中的逻辑信道标识符所标识的每一个 MTCH 的可选的会话标识符；(2) 所分配的用于发送该 MBSFN 区域的每一个 PMCH 的资源（即，无线帧和子帧），以及针对该区域中的所有 PMCH 的所分配资源的分配周期（例如，4、8、……、256 个帧）；以及 (3) 在其上发送 MSI MAC 控制元素的 MCH 调度周期 (MSP)（例如，8、16、32、……、或 1024 个无线帧）。

[0065] 图 7B 是示出 MSI MAC 控制元素的格式的图 790。可以每一个 MSP，发送一次 MSI MAC 控制元素。可以在 PMCH 的每一个调度周期的第一子帧中发送 MSI MAC 控制元素。MSI MAC 控制元素可以指示 PMCH 中的每一个 MTCH 的停止帧和子帧。在每一个 MBSFN 区域，每一个 PMCH 存在一个 MSI。

[0066] 在 LTE 中，特别是在诸如智能电话、平板设备等等之类的高端设备中，对于提高频谱效率、提供无处不在的覆盖、支持增强的服务质量 (QoS) 等等具有兴趣。还对于基于 LTE 的低成本 MTC UE 也具有兴趣，同时考虑诸如减小最大带宽、单一接收 RF 链、减少峰值速率、减少发射功率、以及半双工操作之类的因素。在 LTE 中，eNB 基于接收到的 CSI 反馈来执行 AMC。CSI 反馈包括信道质量指示 (CQI)、秩指示 (RI) 和 / 或预编码矩阵索引 (PMI)。CSI 反馈为 eNB 的调度器提供准确的信息，以便用于 AMC 目的。期望具有 CSI 反馈，这是由于如果不存在 CSI 反馈的话，可能导致吞吐量和功耗的低效性。例如，在低 SNR 不具有 CSI 反馈的情况下，使用高 MCS 将导致较高的残余块差错率 (BLER)（即使在较长的 TTI 绑定之后）。较高的残余 BLER 可能触发较高层的重传。另一方面，在高 SNR 不具有 CSI 反馈的情况下，使用低 MCS 将导致更长的传输。但是，传统的 CSI 反馈特征通常涉及频繁的 CSI 反馈，这会

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消耗大量的功率和 UL 资源。此外，CSI 反馈计算涉及大量的计算，其会增加 MTC UE 的计算代价。因此，需要一种用于提供 CSI 反馈的高效方法。下文参照图 8A、图 8B、图 8C 和图 8D 来提供用于高效地提供 CSI 反馈的方法。参照图 8A、图 8B、图 8C 和图 8D 所提供的每一种方法可以单独地执行，也可以与其它方法中的一种或多种方法一起进行执行。

[0067] 图 8A 是用于示出第一示例性方法的图 810。在初始连接建立期间（例如，在 RACH 过程中），MTC UE 803A 可以向 eNB 805A 传送 CS1。MTC UE803A 从 eNB 805A 接收参考（导频）信号 811。基于参考信号，MTC UE 803A 对 eNB 805A 和 MTC UE 803A 之间的信道进行估计。随后，MTC UE 803A 确定 (813) 与在 eNB 805A 和 MTC UE 803A 之间的所估计的信道相对应的第一（预期的）MCS。MTC UE 803A 可以在多个子帧中的每一个子帧中，对该信道进行估计。MTC UE 803A 可以对多个子帧上的信道估计进行平均。在确定第一 MCS 之后，MTC UE 803A 从 eNB 805A 接收利用第二（当前）MCS 调制和编码的数据 815，并确定 (817) 第二 MCS 与第一 MCS 相差是否超过某个门限。如果第二（当前）MCS 与第一（预期的）MCS 相差超过门限 T，则第二 MCS 明显偏离了真实的信道统计值。如果 MTC UE 803A 确定第二 MCS 明显地偏离了真实的信道统计值，则 MTC UE 803A 向 eNB805A 发送 CSI 819。根据第一示例性方法，仅仅当需要 CSI 反馈时，MTC UE803A 才提供 CSI 反馈（例如，在第二 MCS 与第一 MCS 相差超过该门限之后）。仅仅当需要时才提供 CSI 反馈，节省了功率和 UL 资源。

[0068] 门限 T 可以是大于或等于零的整数，其对应于该 MCS 提供的每一符号的比特数量。例如，假定当前 MCS 是 16-QAM，预期的 MCS 是 QPSK。16-QAM 提供 4 比特 / 符号，而 QPSK 提供 2 比特 / 符号。16-QAM 和 QPSK 之间的差值等于 2。如果门限 T 被设置为 0 或 1，则 MTC UE 803A 将确定当前 MCS 明显地偏离了所预期的 MCS。但是，如果将门限 T 设置为 2，则由于 16-QAM 和 QPSK 之间的差值不大于 T，因此 MTC UE 803A 确定当前 MCS 没有明显地偏离所预期的 MCS。如果将门限 T 设置为 2，并且预期的 MCS 是 QPSK，则仅仅在当前 MCS 是 64-QAM 或者更高（其对应于 5 比特 / 符号或者更多）时，MTC UE 803A 才将确定当前 MCS 明显地偏离真实的信道统计值。可以以其它方式来确定门限 T，例如，其对应于 MCS 索引。例如，假定当前 MCS 是 MCS 4(MCS 索引是 4)，所预期的 MCS 是 MCS 2(MCS 索引是 2)。MCS 2 和 MCS 4 之间的差值等于 2。如果门限 T 被设置为 0 或 1，则 MTC UE 803A 将确定当前 MCS 明显地偏离了所预期的 MCS。但是，如果将门限 T 设置为 2，则由于 MCS 2 和 MCS 4 之间的差值不大于 T，因此 MTC UE 803A 将确定当前 MCS 没有明显地偏离所预期的 MCS。如果将门限 T 设置为 2，并且预期的 MCS 是 MCS 2，则仅仅在当前 MCS 是 MCS 5 或者更高时，MTC UE 803A 才将确定当前 MCS 明显地偏离真实的信道统计值。

[0069] eNB 805A 可以基于最低的 MCS（如，BPSK）或者基于来自 MTC UE803A 的 CSI 反馈（例如，在初始连接建立期间（例如，在 RACH 过程期间）所提供的 CSI 反馈），来确定初始的 AMC。eNB 805A 可以继续使用相同的 MCS 来进行 DL 传输，除非 MTC UE 803A 提供经更新的 CSI 反馈。如果 MTC UE 803A 提供经更新的 CSI 反馈，则 eNB 805A 可以基于所接收的 CSI 反馈来确定 AMC，并继续使用所确定的 AMC，直到接收到另外的 CSI 反馈为止。

[0070] 如上所述，MTC UE 803A 可以执行信道的长期平均，但仅仅在当前 MCS 明显地偏离（更佳或者更差）了其真实的信道统计值，才向 eNB 805A 发送 CSI。因此，MTC UE 803A 可以对多个子帧上 eNB 805A 和 MTC UE803A 之间的该信道进行平均，仅仅当与所估计的信道相对应的所预期 MCS 和当前 MCS 相差某个门限时，才发送 CSI 反馈。因此，这种 CSI 反馈是

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事件驱动型的。例如，如果 MTC UE 803A 确定预期的 MCS 是 QPSK，但接收到具有 64-QAM 的数据传输（其明显地比 QPSK 更好），则 MTC UE 803A 可以确定要向 eNB 805A 发送经更新的 CSI 反馈。举另一个例子，如果 MTC UE 803A 确定预期的 MCS 是 64-QAM，但接收到具有 QPSK 的数据传输（其明显地比 64-QAM 更差），则 MTC UE 803A 可以确定要向 eNB 805A 发送经更新的 CSI 反馈。

[0071] 一旦 MTC UE 803A 确定要向 eNB 805A 发送 CSI 反馈，MTC UE 803A 就可以存储该 CSI 反馈，直到下一个 UL 传输为止。在第一配置中，MTC UE803A 可以在发送给 eNB 805A 的调度的 UL 数据 (PUSCH) 传输中的 MAC 报头中包含该 CSI。在第二配置中，如果没有调度的 PUSCH 传输，但 MTC UE 803A 具有用于向 eNB 805A 发送的缓冲区状态报告 (BSR)（即，MTC UE 803A 有数据要发送），则 MTC UE 803A 可以利用包括该 BSR 的 UL PUSCH 传输，在 MAC 报头中发送 CSI。BSR 向 eNB 805A 指示该 MTC UE803A 的缓冲区中的数据的量。如果 MTC UE 803A 有 BSR 要发送给 eNB805A，则 MTC UE 803A 将向 eNB 805A 发送调度请求 (SR)，其中该 SR 请求用于发送 BSR 的 UL 资源。在第二配置中，MTC UE 803A 在被分配用于 BSR 的资源中发送 CSI 和 BSR。

[0072] 在第三配置中，如果 MTC UE 803A 不具有调度的 UL 传输（例如，PUSCH 传输），并且没有 BSR 要发送给 eNB 805A，则 MTC UE 803A 可以发送 SR 或者执行随机接入信道 (RACH) 过程，以便向 eNB 805A 发送经更新的 CSI。在第三配置中，在确定第二 MCS 与第一 MCS 相差超过所述门限时，MTC UE 803A 可以向 eNB 805A 发送用于发送 CSI 的请求。MTC UE 803A 可以从 eNB 805A 接收基于该请求的响应，并基于所接收的响应来发送 CSI。在一种配置中，该请求可以是 SR，所接收的响应可以是 UL 准许。因此，例如，在当前 MCS 与预期的 MCS 相差超过所述门限，并且 MTC UE 803A 不具有调度的 PUSCH 传输，而且 MTC UE 803A 没有 BSR 要发送给 eNB 805A 时，可以触发 SR 以请求 eNB 805A 提供用于发送 CSI 的 UL 资源。在另一种配置中，该请求和响应可以与 RACH 过程相关联。因此，该请求可以是随机接入前导码，并且该响应可以是随机接入响应。因此，例如，在当前 MCS 与预期的 MCS 相差超过所述门限，MTC UE 803A 不具有调度的 PUSCH 传输，并且 MTC UE 803A 没有 BSR 要发送给 eNB 805A 时，MTC UE 803A 可以执行 RACH 过程，向 eNB 805A 发送随机接入前导码。随后，MTC UE 803A 可以从 eNB 805A 接收随机接入响应。基于所接收的随机接入响应，MTC UE 803A 可以向 eNB 805A 发送 CSI。在另一种配置中，MTC UE 803A 可以基于 CSI 来选择用于 RACH 过程的 RACH 格式，并在 RACH 过程中，通过所选择的 RACH 格式向 eNB 805A 指示该 CSI。MTC UE 803A 可以在随机接入前导码中，通过所选择的 RACH 格式来指示该 CSI，和 / 或在针对随机接入响应的响应中，通过所选择的 RACH 格式来指示该 CSI。

[0073] 在第四配置中，MTC UE 803A 可以通过非定期的 CQI 传输，向 eNB805A 发送 CSI。在第四配置中，MTC UE 803A 从 eNB 805A 接收 UL 准许，该 UL 准许专门指示将在所分配的 UL 资源中发送 CSI。MTC UE 803A 在所分配的 UL 资源中发送该 CSI 反馈。

[0074] 在第五配置中，如果没有 UL 传输，则 eNB 805A 可以偶尔地向 MTC UE803A 发送 UL 准许以便其发送 CSI 反馈。因此，当 MTC UE 803A 在大于门限时间段的一个时间段内没有发送 CSI 时，eNB 805A 可以发送 UL 准许。MTC UE 803A 可以从 eNB 805A 接收该 UL 准许，并基于从 eNB 805A 所接收到的 UL 准许，向 eNB 805A 发送 CSI。该过程可以与监管过程联系在一起。

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[0075] 如上所述，CSI 报告可以是基于 MCS 差值大于某个门限。此外，可以实现替代的方法，以比较当前测量的路径损耗与上一次报告的路径损耗。如果当前测量的路径损耗和上一次报告的路径损耗之间的差值明显地很大时（例如，大于某个门限），则 UE 可以发送 CSI。

[0076] 存在用于报告 CSI 反馈的几种方法。在第一方法中，MTC UE 803A 可以基于多个子帧上的最低质量信道估计来确定 CSI，并报告与最差的 MCS 相对应的 CSI（用于功率优化）。在第二方法中，MTC UE 803A 可以基于所估计的信道在多个帧上的平均值来确定 CSI，并报告该平均 CSI（用于频谱效率优化）。在第三方法中，MTC UE 803A 可以确定最差情形和平均 CSI，并报告该最差情形和平均 CSI（用于 eNB 调度灵活性）。在第四方法中，MTC UE 803A 可以基于多个子帧的所估计信道之中的该信道的一个估计来确定 CSI。在第五方法中，MTC UE 803A 可以对指示如何确定 CSI 的配置进行接收，随后基于所接收的配置来确定 CSI。该配置可以指示 MTC UE803A 使用第一方法到第四方法中的一种，或者指示 MTC UE 803A 使用不同的方法来报告 CSI 反馈。

[0077] 如果 MBSFN 广播用于数据传输，则 MTC UE 803A 可以对指示 MBSFN 子帧的信息进行接收，并基于所接收的信息来确定 CSI。因此，可以向 MTC UE 803A 通知使用多播 / 广播进行发送的子帧，MTC UE 803A 可以针对这些子帧来差别化处理 CSI 反馈。例如，如果 MTC UE 803A 接收到多播 / 广播数据，则与基于所接收的单播数据而确定的 CSI 反馈相比，基于所接收的多播 / 广播数据而确定的 CSI 反馈可能更佳。因此，MTC UE 803A 可以调整或者忽略基于多播 / 广播数据的信道估计。

[0078] 如果将解耦合的 DL 和 UL 操作用于 MTC UE 803A，则 eNB 805A 中的一个小区可以专用于 DL，而 eNB 805A 中的另一个小区可以专用于 UL。在该情况下，MTC UE 803A 可以从 eNB 805A 的第一小区接收数据，并且向 eNB 805A 的第二小区发送 CSI，其中第二小区与第一小区不同。eNB805A 的第一小区可以是 DL 服务小区，而 eNB 805A 的第二小区可以是 UL 服务小区。

[0079] 如上所述，MTC UE 803A 可以基于 CSI 来选择用于 RACH 过程的 RACH 格式。MTC UE 803A 通过 RACH 过程来发送 CSI，并通过所选择的 RACH 格式来指示 CSI。换言之，MTC UE 803A 可以选择 RACH 格式（例如，RACH 绑定的不同长度）来向 eNB 805A 指示其无线状况，使得 RACH 的格式向 eNB 805A 指示 CSI。例如，如果该信道处于差的状况，则 MTC UE803A 可以选择具有较长传输时间的 RACH。这种较长传输时间的 RACH 格式向 eNB 805A 指示该信道处于差的状况。另一方面，例如，如果该信道处于良好状况，则 MTC UE 803A 可以选择紧凑 RACH 信道，该 RACH 格式向 eNB 805A 指示该信道处于良好状况。根据 RACH 格式，eNB 805A 可以为后续的 DL 传输选择适当的 MCS 和绑定大小（例如，具有绑定的 msg2）。类似地，还可以在 RACH 和 RRC 连接建立过程期间，在 msg3 或 msg5 中发送 CSI 信息。

[0080] 对于初始 RACH 过程而言，MTC UE 803A 测量 DL 路径损耗，并根据该路径损耗，选择多个 RACH 序列 / 签名中的一个（其还称为格式）。如果 MTC UE 803A 选择普通 RACH 传输，则由 MTC UE 803A 进行的后续传输 (msg3 和 msg5) 和由 eNB 805A 进行的后续传输 (msg2 和 msg4) 不使用 TTI 绑定。如果 MTC UE 803A 选择具有长 TTI 的绑定的 RACH 传输，则由 MTC UE 803A 进行的后续传输 (msg3 和 msg5) 和由 eNB 805A 进行的后续传输 (msg2 和 msg4) 使用具有 TTI 绑定的最低 MCS（例如，BPSK）。

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[0081] 可以对 CSI 反馈与其它报告进行组合。在一种方法中，MTC UE 803A 可以从 eNB 805A 接收定期监管消息，并基于所接收的定期监管消息向 eNB805A 发送响应，其中在该情况下，将 CSI 与该响应一起发送。可能需要定期监管以确定 MTC UE 803A 是否是可访问的，或者确定 MTC UE 803A 是否离开了覆盖范围或者退出了服务（例如，由于电池故障）。因此，通过向 MTC UE 803A 发送定期监管消息，并从 MTC UE 803A 接收响应，eNB 805A 可以确定 MTC UE 803A 是否存活。例如，eNB 805A 可以发送定期监管消息，如果 MTC UE 803A 响应于该请求而反向发送了确认，则 eNB 805A 可以确定该 MTC UE 803A 是可访问的。MTC UE 803A 也可以将 CSI 反馈与针对该监管请求的确认一起发送。

[0082] 在用于对 CSI 与其它报告进行组合的另一种方法中，MTC UE 803A 可以确定参考信号接收质量 (RSRQ) 和 / 或参考信号接收功率 (RSRP)，并向 eNB 805A 发送该 RSRP 和 / 或 RSRQ，其中在该情况下，CSI 是与 RSRP 或者 RSRQ 中的至少一个一起发送的。因此，根据该方法，MTC UE 803A 可以测量 RSRP 和 / 或 RSRQ，随后当 MTC UE 803A 向 eNB 805A 报告所测量的 RSRP/RSRQ 时，MTC UE 803A 可以对 CSI 报告与 RSRP/RSRQ 报告进行组合，并向 eNB 805A 发送组合后的报告。RSRP/RSRQ 报告可以是事件驱动型的。此外，可以对长期 CSI 报告与 RSRP/RSRQ 报告进行组合。

[0083] 在一种配置中，MTC UE 803A 确定与在 eNB 805A 和该 MTC UE 803A 之间的所估计的信道相对应的第一绑定大小，从 eNB 805A 接收具有第二绑定大小的数据，并确定第二绑定大小是否与第一绑定大小相差超过某个门限。转而，在确定第二绑定大小是否与第一绑定大小相差超过该门限之后，MTC UE 803A 发送 CSI。该门限 T 可以对应于绑定大小差值。因此，当第一绑定大小和第二绑定大小之间的差值大于门限 T 时，MTC UE 803A 可以确定要向 eNB 805A 发送 CSI。

[0084] 在一种配置中，eNB 805A 调度 MTC UE 803A 以特定的 MCS 进行上行链路传输。eNB 805A 确定 MTC UE 803A 和 eNB 805A 之间的 UL 信道。该 UL 信道可以是基于从 MTC UE 803A 接收的参考信号和 / 或该 eNB 是否可以对绑定的 TTI 传输进行早期地解码。eNB 805A 可以基于所确定的上行链路信道，确定预期的 MCS 和 / 或 TTI 绑定大小。如果从 MTC UE 803A 接收的当前 MCS 和 / 或 TTI 绑定大小明显地与所预期的值不同（例如，基于门限 T，其中该门限 T 可以取决于调制阶数（如，QPSK）、MCS 或 TTI 绑定大小中的至少一个），则 eNB 805A 可以在 DL 传输分组的 MAC 报头中，向 MTC UE 803A 发送信息，该信息请求该 MTC UE 803A 调整用于后续传输的 UL 传输 MCS 和 / 或 TTI 绑定大小。

[0085] 图 8B 是用于示出第二示例性方法的图 830。在第二示例性方法中，eNB805B 发送长 TTI 绑定，当 MTC UE 804 可以对该 TTI 绑定的子集进行解码时，MTC UE 803B 发送确认以进行早期地终止。eNB 805B 基于这种早期终止统计学（例如，MTC UE 803B 接收到的该 TTI 绑定传输的百分比）来适应于信道状况。因此，在第二示例性方法中，MTC UE 803B 不需要确定或者发送 CSI。如图 8B 中所示，MTC UE 803B 从 eNB 805B 接收 TTI 绑定传输 831，对该 TTI 绑定传输的子集进行解码 (833)。当 MTC UE 803B 对该 TTI 绑定传输的该子集进行了解码时，MTC UE 803B 向 eNB 805B 发送确认 835，以便早期地终止该 TTI 绑定传输。通过 MTC UE 803B 所接收的 TTI 绑定传输的百分比，来向 eNB 805B 指示 CSI。因此，eNB 805B 可以基于该 UE 所接收的 TTI 绑定传输的百分比来确定 CSI，并通过选择适合于所确定的 CSI 的 MCS，来适应 (837) 该 CSI 的信道状况。例如，如果 MTC UE803B 所接收的 TTI 绑定传输的百

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分比是低的，则这向 eNB 805B 指示 MTC UE 803B 能够对该 TTI 绑定传输的该子集进行早期地解码，因此信道状况良好。eNB 805B 还可以向 MTC UE 803B 发送利用某种 MCS 调制和编码的数据 839，其中该 MCS 是基于 MTC UE 803B 所接收的 TTI 绑定传输的百分比。数据 839 的 TTI 绑定大小也可以是基于 MTC UE 803B 所接收的 TTI 绑定传输的百分比。

[0086] 在缺省行为中，eNB 805B 可以使用缺省的绑定大小和 MCS 来进行 DL 传输，并监测来自 MTC UE 803B 的针对可能的早期终止的确认。例如，eNB805B 可以初始地使用 100 个子帧的缺省绑定大小 (100 个 TTI)。如果 MTC UE 803B 在 10 个子帧之后进行早期地终止，并向 eNB 805B 通知该早期终止，则 eNB 805B 可以确定该 MTC UE 803B 在仅仅接收了传输的 10％之后就对该传输进行了解码。随后，eNB 805B 可以增加用于后续 TTI 绑定的数据传输的 MCS，并在 10 个 TTI 上发送该 TTI 绑定的数据传输。

[0087] 此外，对于半双工操作或者 TDD 来说，绑定操作可以改写 (overwrite)DL 和 UL 方向改变。例如，如果存在具有 10 毫秒 TTI 绑定的 DL，则可以在不将方向改变到 UL 的情况下，完成所有 10 毫秒的 DL 传输。

[0088] 在一种配置中，eNB 805B 向 MTC UE 803B 发送第一 TTI 绑定传输。eNB 805B 从该 UE 接收该 TTI 绑定传输被早期终止的确认，并且基于 MTC UE 803B 所接收的第一 TTI 绑定传输的百分比来确定 MCS。eNB 805B 向 MTC UE 803B 发送利用基于第一 TTI 绑定传输的百分比而确定的 MCS 进行调制和编码的第二 TTI 绑定传输。

[0089] 图 8C 是用于示出第三示例性方法的图 850。在第三示例性方法中，MTC UE 803C 经由 UL 信道向 eNB 805C 发送单触发 (one-shot) 信号 (例如，单触发探测参考信号 (SRS))，eNB 805C 根据 UL 路径损耗来调整 MCS/ 绑定大小。因此，在该实施例中，MTC UE 803C 不需要计算 CSI 和向 eNB805C 提供 CSI。如图 8C 中所示，MTC UE 803C 向 eNB 805C 发送 UL 传输。基于该 UL 传输，eNB 805C 确定 (853)MCS 和 / 或 TTI 绑定大小。随后，eNB 805C 向 MTC UE 803C 发送数据 855。MTC UE 803C 所接收的该数据传输具有基于 UL 传输而确定的 MCS 和 / 或 TTI 绑定大小。由于 eNB 805C 是基于 UL 信道估计而不是基于 DL 信道估计来确定 MCS，因此第三示例性方法只可以用于 TDD(这时，UL 信道估计与 DL 信道估计是基于相同的子载波)。

[0090] 在一种配置中，eNB 805C 从 MTC UE 803C 接收上行链路传输，基于所接收的上行链路传输来确定 MCS 和 / 或基于所接收的上行链路传输来确定 TTI 绑定大小。eNB 805C 向 MTC UE 803C 发送具有所确定的 MCS 和 / 或所确定的 TTI 绑定大小的数据传输。

[0091] 图 8D 是用于示出第四示例性方法的图 870。在初始连接建立期间 (例如，在 RACH 过程中)，MTC UE 803D 可以向 eNB 805D 传送 CSI。MTC UE803D 从 eNB 805D 接收参考信号 871。基于该参考信号 871，MTC UE 803D 对 eNB 805D 和 MTC UE 803D 之间的信道进行估计。随后，MTC UE 803D 确定 (873) 与在 eNB 805D 和 MTC UE 803D 之间的所估计的信道相对应的 CSI。MTC UE 803D 可以在多个子帧中的每一个子帧中，对该信道进行估计。MTC UE 803D 可以对多个子帧上的信道估计进行平均。在确定 CSI 之后，MTC UE 803D 基于门限 T2 和 / 或定时器来确定是否要向 eNB 805D 发送该 CSI。例如，如果该 CSI 与参考 CSI 相差超过门限 T2($D_{CSI} \geq T2$，其中是参考 CSI 和该 CSI 之间的差值)，则 MTC UE 803D 可以向 eNB 805D 发送该 CSI。换言之，如果该 CSI 和参考 CSI 之间的差值大于门限 T2，则 MTC UE 803D 可以确定要向 eNB 805D 发送该 CSI。举另一个例子，在发送 CSI 时，MTC UE 803D 可以设置

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定时器。当该定时器到期时，MTC UE803D 可以确定要向 eNB 805D 发送 CSI。MTC UE 803D 可以对门限 T2 和定时器二者均使用。在这种配置中，当 CSI 和参考 CSI 之间的差值大于门限 T2 时，以及在定时器到期时（即使 CSI 和参考 CSI 之间的差值不大于门限 T2 时），MTC UE 803D 确定要发送该 CSI。如果 MTC UE 803D 确定要发送，则 MTC UE 803 向 eNB 805D 发送该 CSI 877。MTC UE 803D 可以在 MAC 报头中发送该 CSI 877。根据第四示例性方法，仅仅当需要 CSI 反馈时和 / 或定时器到期时（例如，当该 CSI 与参考 CSI 相差超过门限 T2 和 / 或定时器到期时），MTC UE 803D 才提供 CSI 反馈。仅仅当需要时才提供 CSI 反馈，或者基于定时器来不频繁地提供 CSI 反馈，节省了功率和 UL 资源。

[0092] MTC UE 803D 基于门限 T2 而进行的是否向 eNB 805D 发送 CSI 的判定，可以取决于 CSI 和参考 CSI 之间的差值。该 CSI 可以包括 CQI、RI、PMI、MCS 和 / 或路径损耗。因此，该 CSI 可以对应于 CQI 索引。例如，假定 CSI 对应于值为 4 的 CQI 索引，参考 CSI 对应于值为 8 的 CQI 索引。那么，具有 CQI 索引为 4 的该 CSI 与具有 CQI 索引为 8 的参考 CSI 之间的差值是 4。在第一场景中，如果门限 T2 小于或等于 3，则该门限 T2 小于具有 CQI 索引为 4 的 CSI 和具有 CQI 索引为 8 的参考 CSI 之间的差值。因此，MTC UE 803D 确定该 CSI 和参考 CSI 之间的差值大于门限 T2，因此该 CSI 明显地偏离了参考 CSI。结果，在第一场景中，MTC UE 803D 确定要向 eNB805D 发送该 CSI。另一方面，在第二场景中，如果门限 T2 大于或等于 5，则 MTC UE 803D 确定该 CSI 没有明显地偏离参考 CSI，这是由于具有 CQI 索引为 4 的 CSI 和具有 CQI 索引为 8 的参考 CSI 之间的差值不大于该门限 T2。因此，在第二场景中，MTC UE 803D 确定不向 eNB 805D 发送该 CSI。

[0093] 举一个例子，参考 CSI 可以是在 873 处确定 CSI 之前，该 UE 803D 先前向 eNB 805D 报告的 CSI。例如，在 873 处确定 CSI 之前，MTC UE 803D 可以基于先前从 eNB 805D 接收的参考信号来确定 CSI，并向 eNB 805D 报告该参考 CSI。因此，当将先前报告的 CSI 使用成参考 CSI 时，该参考 CSI 根据从 eNB 805D 接收的参考信号而发生变化。在另一个例子中，参考 CSI 可以是固定的 CSI，其将某个固定的值包括成该参考 CSI。在另一个例子中，参考 CSI 可以是基于路径损耗（例如，DL 路径损耗）。在一个方面，可以在 CSI 中，将当前路径损耗和参考路径损耗（例如，参考 CSI 中包括的路径损耗）之间的差值包括成路径损耗信息。

[0094] 在另一个例子中，MTC UE 803D 可以基于从 eNB 805D 接收的数据传输的 MCS 来确定参考 CSI。参考 CSI 可以是基于 MCS 和 CSI 之间的映射来确定的。例如，具有 CQI 索引为 4 的参考 CSI 可以对应于编码速率为 0.03 的 QPSK，而具有 CQI 索引为 8 的参考 CSI 可以对应于编码速率为 0.48 的 16QAM。因此，如果从 eNB 805D 接收的数据传输的 MCS 是具有编码速率近似为 0.48 的 16QAM，则 MTC UE 803D 确定参考 CSI 对应于值为 8 的 CQI 索引。

[0095] 如上所述，MTC UE 803D 可以执行信道的长期平均，但仅仅在 CSI 明显地偏离了参考 CSI 时，才向 eNB 805D 发送该 CSI。因此，MTC UE 803D 可以在多个子帧上对 eNB 805D 和 MTC UE 803D 之间的该信道进行平均，仅仅当参考 CSI 和该 CSI 相差门限 T2 时，才发送 CSI 反馈。因此，这种 CSI 反馈是事件驱动型的。在将门限 T2 设置为 4，并且参考 CSI 对应于值为 8 的 CQI 索引的例子中，如果 MTC UE 803D 确定 CSI 具有值为 15 的 CQI 索引，则 MTC UE 803D 可以确定要向 eNB 805D 发送 CSI 反馈，这是由于该 CSI 的 CQI 索引明显地比参考 CSI 的值为 8 的 CQI 索引更佳（即，CQI 索引 15 - CQI 索引 8 ≥ 4）。举另一个例子，如果 MTC UE 803D 确定 CSI 具有值为 3 的 CQI 索引，则 MTC UE 803D 可以确定要向 eNB 805D 发

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送 CSI 反馈，这是由于该 CSI 的 CQI 索引明显地比参考 CSI 的值为 8 的 CQI 索引更差（即，CQI 索引 8 - CQI 索引 3 ≥ 4）。

[0096] 一旦 MTC UE 803D 确定要向 eNB 805D 发送 CSI 反馈，MTC UE 803D 就可以存储该 CSI 反馈，直到下一个 UL 传输为止。在第一配置中，MTC UE803D 可以在发送给 eNB 805D 的调度的 UL 数据 (PUSCH) 传输中的 MAC 报头中包含该 CSI。在第二配置中，如果没有调度的 PUSCH 传输，但 MTC UE 803D 具有用于向 eNB 805D 发送的 BSR（即，MTC UE 803D 有数据要发送），则 MTC UE 803D 可以利用包括该 BSR 的 UL PUSCH 传输，在 MAC 报头中发送该 CSI。BSR 向 eNB 805D 指示该 MTC UE 803D 的缓冲区中的数据的量。如果 MTC UE 803D 有 BSR 要发送给 eNB 805D，则 MTC UE 803D 将向 eNB 805D 发送 SR，其中该 SR 请求用于发送 BSR 的 UL 资源。在第二配置中，MTC UE 803D 在被分配用于 BSR 的资源中发送 CSI 和 BSR。

[0097] 在第三配置中，如果 MTC UE 803D 不具有调度的 UL 传输（例如，PUSCH 传输），并且没有 BSR 要发送给 eNB 805D，则 MTC UE 803D 可以发送 SR 或者执行 RACH 过程，以便向 eNB 805D 发送经更新的 CSI。在第三配置中，在基于定时器和 / 或门限 T2 而确定要发送该 CSI 时，MTC UE803D 可以向 eNB 805D 发送用于发送该 CSI 的请求。MTC UE 803D 可以从 eNB 805D 接收基于该请求的响应，并基于所接收的响应来发送该 CSI。该响应可以是 UL 准许。随后，MTC UE 803D 可以在该 UL 准许的、调度的 PUSCH 中发送该 CSI。MTC UE 803D 可以在该 UL 准许的、调度的 PUSCH 的 MAC 报头中发送该 CSI，或者可以在该 UL 准许的、调度的 PUSCH 的有效载荷部分中发送该 CSI。在一个方面，MTC UE 803D 可以在 RACH 过程的消息 3(msg3) 或消息 5(msg5) 中发送该 CSI。在一种配置中，该请求可以是 SR，并且所接收的响应可以是 UL 准许。因此，例如，当该 CSI 与参考 CSI 相差超过门限 T2 和 / 或定时器到期时，MTC UE 803D 不具有调度的 PUSCH 传输并且 MTC UE 803D 没有 BSR 要发送给 eNB 805D 时，可以触发 SR 以请求 eNB 805D 提供用于发送 CSI 的 UL 资源。在另一种配置中，该请求和响应可以与 RACH 过程相关联。在 MTC UE 803D 处所接收的响应可以是 UL 准许。因此，该请求可以是随机接入前导码，该响应可以是随机接入响应。因此，例如，当该 CSI 与参考 CSI 相差超过门限 T2 和 / 或定时器到期时，MTC UE 803D 不具有调度的 PUSCH 传输并且 MTC UE803D 还没有 BSR 要发送给 eNB 805D 时，MTC UE 803D 可以执行 RACH 过程，并且向 eNB 805D 发送随机接入前导码。随后，MTC UE 803D 可以从 eNB 805D 接收随机接入响应。基于所接收的随机接入响应，MTC UE803D 可以向 eNB 805D 发送 CSI。在另一种配置中，MTC UE 803D 可以基于 CSI 来选择用于 RACH 过程的 RACH 格式，并在 RACH 过程中，通过所选择的 RACH 格式向 eNB 805D 指示该 CSI。MTC UE 803D 可以在随机接入前导码中，通过所选择的 RACH 格式来指示该 CSI，和 / 或在针对随机接入响应的响应中，通过所选择的 RACH 格式来指示该 CSI。

[0098] 在第四配置中，MTC UE 803D 可以通过非定期的 CQI 传输，向 eNB805D 发送 CSI。在第四配置中，MTC UE 803D 从 eNB 805D 接收 UL 准许，该 UL 准许专门指示将在所分配的 UL 资源中发送 CSI。MTC UE 803D 在所分配的 UL 资源中发送该 CSI 反馈。

[0099] 在第五配置中，如果没有 UL 传输，则 eNB 805D 可以偶尔地向 MTC UE803D 发送 UL 准许以便其发送 CSI 反馈。因此，当 MTC UE 803D 在大于门限时间段的一个时间段内没有发送 CSI 时，eNB 805D 可以发送 UL 准许。MTC UE 803D 可以从 eNB 805D 接收该 UL 准许，并基于从 eNB 805D 所接收到的 UL 准许，向 eNB 805D 发送 CSI。该过程可以与监管过程联系在一起。

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[0100] 存在用于报告 CSI 反馈的几种方法。在第一方法中，MTC UE 803D 可以基于多个子帧上的最低质量信道估计来确定 CSI，并报告最差的 CSI（用于功率优化）。在第二方法中，MTC UE 803D 可以基于所估计信道在多个子帧上的平均值来确定 CSI，并报告该平均 CSI（用于频谱效率优化）。在第三方法中，MTC UE 803D 可以确定最差情形和平均 CSI，并报告该最差情形和平均 CSI（用于 eNB 调度灵活性）。在第四方法中，MTC UE 803D 可以基于多个子帧的估计信道之中的该信道的一个估计来确定 CSI。在第五方法中，MTC UE 803D 可以对指示如何确定 CSI 的配置进行接收，随后基于所接收的配置来确定 CSI。该配置可以指示 MTC UE 803D 使用第一方法到第四方法中的一种，或者指示 MTC UE 803D 使用不同的方法来报告 CSI 反馈。

[0101] 如果 MBSFN 广播用于数据传输，则 MTC UE 803D 可以对指示 MBSFN 子帧的信息进行接收，并基于所接收的信息来确定 CSI。因此，可以向 MTC UE 803D 通知使用多播 / 广播进行发送的子帧，MTC UE 803D 可以针对这些子帧来差别化处理 CSI 反馈。例如，如果 MTC UE 803D 接收到多播 / 广播数据，则与基于所接收的单播数据而确定的 CSI 反馈相比，基于所接收的多播 / 广播数据而确定的 CSI 反馈可能更佳。因此，MTC UE 803D 可以调整或者忽略基于多播 / 广播数据的信道估计。

[0102] 如果将解耦合的 DL 和 UL 操作用于 MTC UE 803D，则 eNB 805D 中的一个小区可以专用于 DL，而 eNB 805D 中的另一个小区可以专用于 UL。在该情况下，MTC UE 803D 可以从 eNB 805D 的第一小区接收数据，并且向 eNB 805D 的第二小区发送 CSI，其中第二小区与第一小区不同。eNB805D 的第一小区可以是 DL 服务小区，而 eNB 805D 的第二小区可以是 UL 服务小区。

[0103] 如上所述，MTC UE 803D 可以基于 CSI 来选择用于 RACH 过程的 RACH 格式。MTC UE 803D 通过 RACH 过程来发送 CSI，并通过所选择的 RACH 格式来指示 CSI。换言之，MTC UE 803D 可以选择 RACH 格式（例如，RACH 绑定的不同长度）来向 eNB 805D 指示其无线状况，使得 RACH 的格式向 eNB 805D 指示 CSI。例如，如果该信道处于差的状况，则 MTC UE803D 可以选择具有较长传输时间的 RACH。这种较长传输时间的 RACH 格式向 eNB 805D 指示该信道处于差的状况。另一方面，例如，如果该信道处于良好状况，则 MTC UE 803D 可以选择紧凑 RACH 信道，该 RACH 格式向 eNB 805D 指示该信道处于良好状况。根据 RACH 格式，eNB 805D 可以为后续的 DL 传输选择适当的 MCS 和绑定大小（例如，具有绑定的 msg2）。

[0104] 对于初始 RACH 过程而言，MTC UE 803D 测量 DL 路径损耗，并根据该路径损耗，选择多个 RACH 序列 / 签名中的一个（其还称为格式）。如果 MTC UE 803D 选择普通 RACH 传输，则由 MTC UE 803D 进行的后续传输（msg3 和 msg5）和由 eNB 805D 进行的后续传输（msg2 和 msg4）不使用 TTI 绑定。如果 MTC UE 803D 选择具有长 TTI 的绑定的 RACH 传输，则由 MTC UE 803D 进行的后续传输（msg3 和 msg5）和由 eNB 805D 进行的后续传输（msg2 和 msg4）使用具有 TTI 绑定的最低 MCS（例如，BPSK）。

[0105] 可以对 CSI 反馈与其它报告进行组合。在一种方法中，MTC UE 803D 可以从 eNB 805D 接收定期监管消息，并基于所接收的定期监管消息向 eNB805D 发送响应，其中在该情况下，将 CSI 与该响应一起发送。可能需要定期监管以确定 MTC UE 803D 是否是可访问的，或者确定 MTC UE 803D 是否离开了覆盖范围或者退出了服务（例如，由于电池故障）。因此，通过向 MTC UE 803D 发送定期监管消息，并从 MTC UE 803D 接收响应，eNB 805D 可以确

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定 MTC UE 803D 是否存活。例如，eNB 805D 可以发送定期监管消息，如果 MTC UE 803D 响应于该请求而反向发送了确认，则 eNB 805D 可以确定该 MTC UE 803D 是可访问的。MTC UE 803D 也可以将 CSI 反馈与针对该监管请求的确认一起发送。

[0106] 在用于对 CSI 与其它报告进行组合的另一种方法中，MTC UE 803D 可以确定 RSRQ 和 / 或 RSRP，并向 eNB 805D 发送该 RSRP 和 / 或 RSRQ，其中在该情况下，将 CSI 与 RSRP 和 / 或 RSRQ 一起发送。因此，根据该方法，MTC UE 803D 可以测量 RSRP 和 / 或 RSRQ，随后当 MTC UE 803D 向 eNB805D 报告所测量的 RSRP/RSRQ 时，MTC UE 803D 可以对该 CSI 报告与 RSRP/RSRQ 报告进行组合，并向 eNB 805D 发送组合后的报告。RSRP/RSRQ 报告可以是事件驱动型的。此外，还可以对长期 CSI 报告与 RSRP/RSRQ 报告进行组合。

[0107] 图 9 是无线通信的第一方法的流程图 900。该方法可以由 UE 来执行。在步骤 902 处，UE 在多个子帧中的每一个子帧中对基站和 UE 之间的信道进行估计。该信道可以在多个子帧上进行平均化。在步骤 904 处，UE 确定与在基站和该 UE 之间的所估计的信道相对应的第一 MCS。在步骤 906 处，UE 从基站接收利用第二 MCS 进行调制和编码的数据。在步骤 908 处，UE 确定第二 MCS 和第一 MCS 是否相差超过某个门限。如果 UE 确定第二 MCS 和第一 MCS 没有相差超过门限，则 UE 返回到步骤 902。如果 UE 确定第二 MCS 和第一 MCS 相差超过了门限，则在步骤 912 处，UE 可以确定 CSI。UE 可以基于在步骤 910 中接收的配置，来在步骤 912 中确定 CSI。在步骤 914 处，在确定第二 MCS 和第一 MCS 相差超过了门限之后，UE 发送该 CSI。在步骤 914 处，可以在调度的 UL 数据传输中的 MAC 报头中发送该 CSI。在步骤 914 处，可以在 UL 传输中的 MAC 报头中，将该 CSI 与缓冲区状态报告一起发送。

[0108] 例如，参见图 8A，MTC UE 803A 在多个子帧中的每一个子帧中，对 eNB 805A 和 MTC UE 803A 之间的信道进行估计。该信道可以在多个子帧上进行平均化。MTC UE 803A 确定与在 eNB 805A 和该 MTC UE 803A 之间的所估计的信道相对应的第一 MCS。MTC UE 803A 从 eNB 805A 接收利用第二 MCS 进行调制和编码的数据。MTC UE 803A 确定第二 MCS 和第一 MCS 是否相差超过某个门限。如果 MTC UE 803A 确定第二 MCS 和第一 MCS 没有相差超过门限，则 MTC UE 803A 返回到在多个子帧中的每一个子帧中，对 eNB 805A 和 MTC UE 803A 之间的信道进行估计。如果 MTC UE803A 确定第二 MCS 和第一 MCS 相差超过了门限，则 MTC UE 803A 确定 CSI，随后根据 CSI 反馈方法，在下一个可用的机会发送该 CSI。

[0109] 在一种配置中，在确定第二 MCS 和第一 MCS 相差超过了门限时，UE 向基站发送用于发送该 CSI 的请求，并从基站接收基于该请求的响应。UE 可以基于所接收的响应，向基站发送 CSI。该请求可以是调度请求，并且该响应可以是 UL 准许。该调度请求可以请求用于发送 CSI 的 UL 资源。UE 可以在所请求的 UL 资源中发送该 CSI。该请求可以是随机接入前导码，并且该响应可以是随机接入响应。

[0110] 在一种配置中，UE 从基站接收 UL 准许。该 UL 准许请求 CSI。UE 基于所接收到的 UL 准许来发送 CSI。在一种配置中，UE 从基站接收 UL 准许。当在大于门限的一个时间段内没有发送 CSI 时，接收到该 UL 准许。UE 可以基于所接收到的 UL 准许来发送 CSI。在一种配置中，所估计的信道在多个子帧上进行平均化。在一种配置中，UE 在多个子帧中的每一个子帧中，对该信道进行估计，并基于所述多个子帧上的最低质量信道估计来确定 CSI。在一种配置中，UE 在多个子帧中的每一个子帧中，对该信道进行估计，并基于所述多个子帧上的所估计的信道的平均值来确定 CSI。在一种配置中，该 CSI 包括与最低质量信道估计相对应的

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第一 CSI 和与平均信道估计相对应的第二 CSI。在一种配置中，UE 在多个子帧中的每一个子帧中，对该信道进行估计，并基于该信道的一个估计来确定 CSI。在一种配置中，UE 对指示如何确定 CSI 的配置进行接收，并基于所接收的配置来确定 CSI。在一种配置中，UE 对指示 MBSFN 子帧的信息进行接收，并基于所接收的信息来确定 CSI。在一种配置中，从基站的第一小区接收数据，而将 CSI 发送给第二小区，其中第二小区与该基站的第一小区不相同。在一种配置中，UE 基于 CSI 来选择用于 RACH 过程的 RACH 格式。UE 通过 RACH 过程来发送 CSI，并通过所选择的 RACH 格式来指示 CSI。在一种配置中，UE 从基站接收定期监管消息，并基于所接收的定期监管消息向基站发送响应。UE 可以将 CSI 与该响应一起发送。在一种配置中，UE 确定 RSRQ 或 RSRP 中的至少一个，并向基站发送 RSRQ 或 RSRP 中的所述至少一个。UE 可以将 RSRQ 或 RSRP 中的所述至少一个与 CSI 一起发送。

[0111] 图 10 是无线通信的第二方法的流程图 1000。该方法可以由 UE 来执行。在步骤 1002 处，UE 从基站接收 TTI 绑定传输。在步骤 1004 处，UE 对该 TTI 绑定传输的子集进行解码。在步骤 1006 处，在对该 TTI 绑定传输的该子集进行解码之后，UE 向基站发送确认以早期地终止该 TTI 绑定传输。通过 UE 所接收的 TTI 绑定传输的百分比，向基站指示 CSI。在步骤 1008 处，UE 从基站接收利用某种 MCS 进行调制和编码的（TTI 绑定的）数据，其中该 MCS 是基于该 UE 所接收的 TTI 绑定传输的百分比。UE 返回到步骤 1004，以便对在步骤 1008 处接收的 TTI 绑定传输的子集进行解码。

[0112] 例如，参见图 8B，MTC UE 803B 从 eNB 805B 接收 TTI 绑定传输。MTC UE 803B 对该 TTI 绑定传输的子集进行解码。在对该 TTI 绑定传输的该子集进行解码之后，MTC UE 803B 向 eNB 805B 发送确认以早期地终止该 TTI 绑定传输。通过 MTC UE 803B 所接收的 TTI 绑定传输的百分比，向 eNB 805B 指示 CSI。MTC UE 803B 从 eNB 805B 接收利用某种 MCS 进行调制和编码的（TTI 绑定的）数据，其中该 MCS 是基于该 MTC UE 803B 所接收的 TTI 绑定传输的百分比。

[0113] 图 11 是无线通信的第三方法的流程图 1100。该方法可以由 UE 来执行。在步骤 1102 处，UE 向基站发送 UL 传输。在步骤 1104 处，UE 从基站接收数据传输。该数据传输具有以下各项中的至少一项：基于 UL 传输而确定的 MCS 或者基于 UL 传输而确定的 TTI 绑定大小。

[0114] 例如，参见图 8C，MTC UE 803C 向 eNB 805C 发送 UL 传输。MTC UE803C 从 eNB 805C 接收数据传输，其中该数据传输具有以下各项中的至少一项：基于 UL 传输而确定的 MCS 或者基于 UL 传输而确定的 TTI 绑定大小。

[0115] 图 12 是示出示例性装置 1202 中的不同模块 / 单元 / 组件之间的数据流的概念性数据流图 1200。该装置可以是 UE。该装置包括接收模块 1204，接收模块 1204 被配置为从基站接收数据。该装置还包括信道估计模块 1206，信道估计模块 1206 被配置为：在多个子帧中的每一个子帧中，对基站和该 UE 之间的信道进行估计。所估计的信道可以在多个子帧上进行平均化。该装置还包括 MCS 确定和比较模块 1208，MCS 确定和比较模块 1208 被配置为确定与在基站和该 UE 之间的所估计的信道相对应的第一 MCS。MCS 确定和比较模块 1208 被配置为：确定第二 MCS，以及确定第二 MCS 是否与第一 MCS 相差超过某个门限。该装置还包括 CSI 确定模块 1210，CSI 确定模块 1210 被配置为确定 CSI。CSI 确定模块 1210 可以对指示如何确定 CSI 的配置进行接收，并基于所接收的配置来确定 CSI。具体而言，CSI 确定

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模块 1210 可以被配置为：基于在所述多个子帧上的最低质量信道估计来确定 CSI。CSI 确定模块 1210 还可以被配置为：基于所述多个子帧上的所估计信道的平均值来确定 CSI。CSI 确定模块 1210 还可以被配置为：确定包括与最低质量信道估计相对应的第一 CSI 和与平均信道估计相对应的第二 CSI 的 CSI。CSI 确定模块 1210 还可以被配置为基于信道的一个估计来确定 CSI。CSI 确定模块 1210 还可以被配置为对指示 MBSFN 子帧的信息进行接收，并基于所接收的信息来确定 CSI。此外，数据可以是从基站的第一小区接收的，并且可以将 CSI 发送给与基站的第一小区不相同的第二小区。

[0116] 该装置还包括发送模块 1212，发送模块 1212 被配置为：在确定第二 MCS 与第一 MCS 相差超过所述门限之后，发送 CSI。发送模块 1212 还可以被配置为：在调度的 UL 数据传输中的 MAC 报头中发送 CSI，和 / 或利用 UL 传输与缓冲区状态报告一起在 MAC 报头中发送 CSI。发送模块 1212 还可以被配置为：在确定第二 MCS 与第一 MCS 相差超过所述门限时，向基站发送用于发送 CSI 的请求，并且接收模块 1204 还可以被配置为从基站接收基于该请求的响应，其中该 CSI 是基于所接收的响应而发送给基站的。该请求可以是调度请求，并且该响应可以是 UL 准许。该调度请求可以请求用于发送 CSI 的 UL 资源，其中该 CSI 是经由发送模块 1212 在所请求的 UL 资源中发送的。该请求还可以是随机接入前导码，并且该响应可以是随机接入响应。接收模块 1204 还可以被配置为从基站接收 UL 准许，该 UL 准许请求 CSI，其中该 CSI 是基于所接收到的 UL 准许来发送的。接收模块 1204 还可以被配置为从基站接收 UL 准许，当在大于门限的一个时间段内没有发送 CSI 时，接收到该 UL 准许，其中该 CSI 是基于所接收到的 UL 准许来发送的。

[0117] 发送模块 1212 还可以被配置为基于 CSI 来选择用于 RACH 过程的 RACH 格式，其中 CSI 通过 RACH 过程来发送，并通过所选择的 RACH 格式来指示。接收模块 1204 还可以被配置为从基站接收定期监管消息，并且发送模块 1212 可以被配置为基于所接收的定期监管消息向基站发送响应。在一个方面，可以将 CSI 与该响应一起发送。该装置还包括 RSRP/RSRQ 模块 1214，RSRP/RSRQ 模块 1214 被配置为确定 RSRQ 或 RSRP 中的至少一个，并且发送模块 1212 可以被配置为向基站发送 RSRQ 或 RSRP 中的所述至少一个。在该方面，CSI 可以是与 RSRQ 或 RSRP 中的所述至少一个一起发送的。

[0118] 该装置可以包括用于执行图 8A 和图 9 中的前述流程图中的算法中的每一个步骤的另外模块。因此，图 8A 和图 9 中的前述流程图中的每一个步骤可以由一个模块来执行，并且该装置可以包括这些模块中的一个或多个。这些模块可以是专门被配置为执行所陈述的过程 / 算法的一个或多个硬件组件、由配置为执行所陈述的过程 / 算法的处理器来实现、存储在计算机可读介质之中以便由处理器实现、或者是其某种组合。

[0119] 图 13 是示出用于使用处理系统 1314 的装置 1202' 的硬件实现的例子的图 1300。处理系统 1314 可以使用通常用总线 1324 表示的总线架构来实现。根据处理系统 1314 的具体应用和整体设计约束，总线 1324 可以包括任意数量的互连总线和桥接。总线 1324 将包括一个或多个处理器和 / 或硬件模块（其用处理器 1304、模块 1204、1206、1208、1210、1212 和 1214 表示）、以及计算机可读介质 1306 的各种电路连接在一起。总线 1324 还可以连接诸如时钟源、外围设备、电压调节器和电源管理电路等等之类的各种其它电路，其中这些电路是本领域所公知的，因此将不做任何进一步的描述。

[0120] 处理系统 1314 可以耦合到收发机 1310。收发机 1310 耦合到一个或多个天线

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1320。收发机 1310 提供通过传输介质与各种其它装置进行通信的单元。收发机 1310 从所述一个或多个天线 1320 接收信号，从所接收的信号中提取信息，将提取的信息提供给处理系统 1314（具体而言，接收模块 1204）。此外，收发机 1310 还从处理系统 1314 接收信息（具体而言，发送模块 1212），并基于所接收的信息，生成要应用于所述一个或多个天线 1320 的信号。处理系统 1314 包括处理器 1304，处理器 1304 耦合到计算机可读介质 1306。处理器 1304 负责通用处理，其包括执行计算机可读介质 1306 上存储的软件。当该软件由处理器 1304 执行时，使得处理系统 1314 执行上文针对任何特定装置所描述的各种功能。计算机可读介质 1306 还可以用于存储当处理器 1304 执行软件时所操作的数据。该处理系统还包括模块 1204、1206、1208、1210、1212 和 1214 中的至少一个。这些模块可以是在处理器 1304 中运行、驻留 / 存储在计算机可读介质 1306 中的软件模块、耦合到处理器 1304 的一个或多个硬件模块、或者其某种组合。处理系统 1314 可以是 UE 650 的组件，其可以包括存储器 660 和 / 或 TX 处理器 668、RX 处理器 656 和控制器 / 处理器 659 中的至少一个。

[0121] 在一种配置中，用于无线通信的装置 1202/1202' 包括：用于确定与在基站和 UE 之间的所估计的信道相对应的第一 MCS 的单元；用于从基站接收利用第二 MCS 进行调制和编码的数据的单元；用于确定第二 MCS 是否与第一 MCS 相差超过某个门限的单元；用于在确定第二 MCS 与第一 MCS 相差超过该门限之后，发送 CSI 的单元。该装置还可以包括：用于在确定第二 MCS 与第一 MCS 相差超过门限时，向基站发送用于发送 CSI 的请求的单元；以及用于从基站接收基于该请求的响应的单元。该 CSI 是基于所接收的响应而发送给基站的。该装置还可以包括：用于在多个子帧中的每一个子帧中，对信道进行估计的单元；以及用于基于所述多个子帧上的最低质量信道估计来确定 CSI 的单元。该装置还可以包括：用于在多个子帧中的每一个子帧中，对信道进行估计的单元；以及用于基于所述多个子帧上的所估计的信道的平均值来确定 CSI 的单元。该装置还可以包括：用于在多个子帧中的每一个子帧中，对信道进行估计的单元；以及用于基于该信道的一个估计来确定 CSI 的单元。该装置还可以包括：用于对指示如何确定 CSI 的配置进行接收的单元；以及用于基于所接收的配置来确定 CSI 的单元。该装置还可以包括：用于对指示 MBSFN 子帧的信息进行接收的单元；以及用于基于所接收的信息来确定 CSI 的单元。该装置还可以包括：用于从基站接收定期监管消息的单元；以及用于基于所接收的定期监管消息来向基站发送响应的单元。该装置还可以包括：用于确定 RSRQ 或 RSRP 中的至少一个的单元；以及用于向基站发送 RSRQ 或 RSRP 中的所述至少一个的单元。CSI 可以是与 RSRQ 或 RSRP 中的所述至少一个一起发送的。前述的单元可以是装置 1202 中的前述模块中的一个或多个，和 / 或配置为执行这些前述单元所列举的功能的装置 1202' 的处理系统 1314。如上所述，处理系统 1314 可以包括 TX 处理器 668、RX 处理器 656 和控制器 / 处理器 659。因此，在一种配置中，前述的单元可以是配置为执行这些前述单元所列举的功能的 TX 处理器 668、RX 处理器 656 和控制器 / 处理器 659。

[0122] 图 14 是示出示例性装置 1402 中的不同模块 / 单元 / 组件之间的数据流的概念性数据流图 1400。该装置可以是 UE。该装置包括接收模块 1404，接收模块 1404 被配置为从基站接收 TTI 绑定传输。该装置还包括解码模块 1406，解码模块 1406 被配置为对 TTI 绑定传输的子集进行解码。该装置还包括发送模块 1408，发送模块 1408 被配置为：在对 TTI 绑定传输的该子集进行解码之后，向基站发送确认以早期地终止该 TTI 绑定传输。通过 UE 所

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接收的 TTI 绑定传输的百分比，向基站指示 CSI。接收模块 1404 可以被配置为从基站接收利用某种 MCS 进行调制和编码的数据，其中该 MCS 是基于该 UE 所接收的 TTI 绑定传输的百分比。

[0123] 替代地，发送模块 1408 可以被配置为向基站发送 UL 传输，并且接收模块 1404 可以被配置为从基站接收数据传输，该数据传输具有以下各项中的至少一项：基于 UL 传输而确定的 MCS 或者基于 UL 传输而确定的 TTI 绑定大小。

[0124] 该装置可以包括用于执行图 8B、图 8C、图 10 和图 11 中的前述流程图中的算法中的每一个步骤的另外模块。因此，图 8B、图 8C、图 10 和图 11 中的前述流程图中的每一个步骤可以由一个模块来执行，并且该装置可以包括这些模块中的一个或多个。这些模块可以是专门被配置为执行所陈述的过程 / 算法的一个或多个硬件组件、由配置为执行所陈述的过程 / 算法的处理器来实现、存储在计算机可读介质之中以便由处理器实现、或者是其某种组合。

[0125] 图 15 是示出用于使用处理系统 1514 的装置 1402' 的硬件实现的例子的图 1300。处理系统 1514 可以使用通常用总线 1524 表示的总线架构来实现。根据处理系统 1514 的具体应用和整体设计约束，总线 1524 可以包括任意数量的互连总线和桥接。总线 1524 将包括一个或多个处理器和 / 或硬件模块（其用处理器 1504、模块 1404、1406 和 1408 表示）、以及计算机可读介质 1506 的各种电路连接在一起。总线 1524 还可以连接诸如时钟源、外围设备、电压调节器和电源管理电路等等之类的各种其它电路，其中这些电路是本领域所公知的，因此将不做任何进一步的描述。

[0126] 处理系统 1514 可以耦合到收发机 1510。收发机 1510 耦合到一个或多个天线 1520。收发机 1510 提供通过传输介质与各种其它装置进行通信的单元。收发机 1510 从所述一个或多个天线 1520 接收信号，从所接收的信号中提取信息，将提取的信息提供给处理系统 1514（具体而言，接收模块 1404）。此外，收发机 1510 还从处理系统 1514 接收信息（具体而言，发送模块 1408），并基于所接收的信息，生成要应用于所述一个或多个天线 1520 的信号。处理系统 1514 包括处理器 1504，处理器 1504 耦合到计算机可读介质 1506。处理器 1504 负责通用处理，其包括执行计算机可读介质 1506 上存储的软件。当该软件由处理器 1504 执行时，使得处理系统 1514 执行上文针对任何特定装置所描述的各种功能。计算机可读介质 1506 还可以用于存储当处理器 1504 执行软件时所操作的数据。该处理系统还包括模块 1404、1406 和 1408 中的至少一个。这些模块可以是在处理器 1504 中运行、驻留 / 存储在计算机可读介质 1506 中的软件模块、耦合到处理器 1504 的一个或多个硬件模块、或者其某种组合。处理系统 1514 可以是 UE 650 的组件，其可以包括存储器 660 和 / 或 TX 处理器 668、RX 处理器 656 和控制器 / 处理器 659 中的至少一个。

[0127] 在一种配置中，用于无线通信的装置 1402/1402' 包括：用于从基站接收 TTI 绑定传输的单元；用于对 TTI 绑定传输的子集进行解码的单元；以及用于在对 TTI 绑定传输的该子集进行解码之后，向基站发送确认以早期地终止该 TTI 绑定传输的单元，其中通过 UE 所接收的 TTI 绑定传输的百分比，向基站指示 CSI。该装置还可以包括：用于从基站接收利用某种 MCS 进行调制和编码的数据的单元。该 MCS 是基于该 UE 所接收的 TTI 绑定传输的百分比。

[0128] 在另一种配置中，用于无线通信的装置 1402/1402' 包括：用于向基站发送 UL 传输

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的单元；以及用于从基站接收数据传输的单元，其中该数据具有以下各项中的至少一项：基于 UL 传输而确定的 MCS 或者基于 UL 传输而确定的 TTI 绑定大小。前述的单元可以是装置 1402 中的前述模块中的一个或多个，和 / 或配置为执行这些前述单元所列举的功能的装置 1402' 的处理系统 1514。如上所述，处理系统 1514 可以包括 TX 处理器 668、RX 处理器 656 和控制器 / 处理器 659。因此，在一种配置中，前述的单元可以是配置为执行这些前述单元所列举的功能的 TX 处理器 668、RX 处理器 656 和控制器 / 处理器 659。

[0129] 图 16 是无线通信的第四方法的流程图 1600。该方法可以由 UE 来执行。在步骤 1602 处，UE 确定 CSI。该 CSI 可以是通过多个子帧来确定的。在步骤 1604 处，UE 基于定时器和 / 或门限来确定是否要发送该 CSI。如果 UE 确定不发送该 CSI，则 UE 返回到步骤 1602。如果 UE 确定要发送该 CSI，则在步骤 1606 处，UE 发送该 CSI。在确定要发送该 CSI 时，UE 可以在 MAC 报头中发送该 CSI。在一个方面，CSI 可以包括 CQI、RI、PMI、MCS 或路径损耗中的至少一个。UE 在步骤 1604 中基于门限而进行的是否发送该 CSI 的判定，可以取决于该 CSI 和参考 CSI 之间的差值。参考 CSI 可以是基于以下各项中的至少一项来确定的：先前报告的 CSI、固定的 CSI、路径损耗或者从基站接收的数据传输的 MCS。UE 可以在与基站的初始连接建立期间，向该基站发送 CSI。

[0130] 例如，参见图 8D，MTC UE 803D 对 eNB 805D 和该 MTC UE 803D 之间的信道进行估计。随后，MTC UE 803D 确定 (873) 与在 eNB 805D 和该 MTC UE 803D 之间的所估计的信道相对应的 CSI。MTC UE 803D 基于门限 T2 和 / 或定时器来确定是否要发送该 CSI。例如，如果该 CSI 和参考 CSI 之间的差值大于门限 T2 和 / 或定时器到期，则 MTC UE 803D 可以确定要向 eNB 805D 发送该 CSI。参考 CSI 可以是在确定该 CSI 之前，该 UE 803D 先前已向 eNB 805D 报告的 CSI。参考 CSI 可以是固定的 CSI，其将某个固定的值包括成该参考 CSI。参考 CSI 可以是基于从 eNB 805D 接收的数据传输的 MCS 来确定的。如果 MTC UE 803D 确定要向 eNB 805D 发送该 CSI，则 MTC UE 803 在 MAC 报头中向 eNB 805D 发送该 CSI。

[0131] 在一种配置中，UE 向基站发送用于发送该 CSI 的请求，并从基站接收基于该请求的响应。在一个方面，UE 可以基于所接收的响应，向基站发送该 CSI。该请求可以是调度请求或者 RACH 消息，并且该响应是 UL 准许。在一个方面，UE 在该 UL 准许的、调度的 PUSCH 中发送该 CSI。UE 可以在 RACH 过程的消息 3 或消息 5 中发送该 CSI。

[0132] 在一种配置中，当在大于门限的一个时间段内没有发送 CSI 时，UE 从基站接收到 UL 准许。在一个方面，UE 可以基于所接收到的 UL 准许来发送 CSI。在一种配置中，所估计的信道在多个子帧上进行平均化。在一种配置中，UE 在多个子帧中的每一个子帧中对该信道进行估计，并基于所述多个子帧上的最低 CSI 来确定 CSI。在一种配置中，UE 在多个子帧中的每一个子帧中对该信道进行估计，并基于所述多个子帧上的所估计的信道的平均值来确定 CSI。在一种配置中，UE 对指示如何确定 CSI 的配置进行接收，并基于所接收的配置来确定 CSI。在一种配置中，UE 对指示 MBSFN 子帧的信息进行接收，并基于所接收的信息来确定 CSI。在一种配置中，UE 基于 CSI 来选择用于 RACH 过程的 RACH 格式。在一个方面，UE 可以通过 RACH 过程来发送 CSI，并通过所选择的 RACH 格式来指示 CSI。在一种配置中，UE 从基站接收定期监管消息，并基于所接收的定期监管消息向基站发送响应。在一个方面，UE 可以将 CSI 与该响应一起发送。在一种配置中，UE 确定 RSRQ 或 RSRP 中的至少一个，并向基站发送 RSRQ 或者 RSRP 中的所述至少一个。在一个方面，UE 可以将 RSRP 或者 RSRQ 中的

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所述至少一个与 CSI 一起发送。在一种配置中，在定时器到期时，UE 可以发送该 CSI。

[0133] 图 17 是示出示例性装置 1702 中的不同模块 / 单元 / 组件之间的数据流的概念性数据流图 1700。该装置可以是 UE。该装置包括接收模块 1704，接收模块 1704 被配置为从基站 1750 接收参考信号。该装置还包括 CSI 确定模块 1706，CSI 确定模块 1706 被配置为确定 CSI。CSI 确定模块 1706 可以通过多个子帧来确定 CSI。CSI 确定模块 1706 可以被配置为：在多个子帧中的每一个子帧中，对 CSI 进行估计，并基于所述多个子帧上的最低 CSI 或者所述多个子帧上的所估计 CSI 的平均值来确定 CSI。CSI 确定模块 1706 可以对指示如何确定 CSI 的配置进行接收，并基于所接收的配置来确定 CSI。CSI 确定模块 1706 还可以被配置为：对指示 MBSFN 子帧的信息进行接收，并基于所接收的信息来确定 CSI。

[0134] 该装置还包括反馈模块 1708，反馈模块 1708 被配置为基于定时器或者门限来确定是否要发送该 CSI。该装置还包括定时器模块 1710 以管理定时器。反馈模块 1708 可以根据该 CSI 和参考 CSI 之间的差值，基于所述门限来确定要发送该 CSI。CSI 确定模块 1706 可以基于以下各项中的至少一项来确定参考 CSI：先前报告的 CSI、固定的 CSI、路径损耗或者从基站 1750 接收的数据传输的 MCS。在定时器模块 1710 所指示的定时器到期时，反馈模块 1708 可以确定要发送该 CSI。

[0135] 该装置还包括发送模块 1712，发送模块 1712 被配置为在确定要发送该 CSI 时，发送该 CSI。在确定要发送该 CSI 时，发送模块 1712 可以在 MAC 报头中发送该 CSI。在一个方面，该 CSI 可以包括 CQI、RI、PMI、MCS 或路径损耗中的至少一个。发送模块 1712 可以被配置为：在与基站 1750 的初始连接建立期间，向基站 1750 发送 CSI。发送模块 1712 还可以被配置为向基站 1750 发送用于发送该 CSI 的请求，并且接收模块 1704 还可以被配置为从基站 1750 接收基于该请求的响应，其中该 CSI 是基于所接收的响应而发送给基站 1750 的。该请求可以是调度请求或者 RACH 消息，并且该响应可以是 UL 准许，其中该装置在该 UL 准许的、调度的 PUSCH 中发送该 CSI。在一个方面，发送模块 1712 可以在 RACH 过程的消息 3 或消息 5 中发送该 CSI。发送模块 1712 还可以被配置为基于 CSI 来选择用于 RACH 过程的 RACH 格式，其中该 CSI 通过 RACH 过程来发送，并通过所选择的 RACH 格式来指示。接收模块 1704 还可以被配置为从基站 1750 接收定期监管消息，并且发送模块 1750 可以被配置为基于所接收的定期监管消息来向基站 1750 发送响应，其中将 CSI 与该响应一起发送。该装置还包括 RSRP/RSRQ 模块 1714，RSRP/RSRQ 模块 1714 被配置为确定 RSRQ 或者 RSRP 中的至少一个，并且发送模块 1712 可以被配置为向基站 1750 发送 RSRP 或者 RSRQ 中的所述至少一个，其中 CSI 是与 RSRP 或者 RSRQ 中的所述至少一个一起发送的。接收模块 1704 还可以被配置为从基站 1750 接收 UL 准许，当在大于第二门限的一个时间段内没有发送 CSI 时，接收到该 UL 准许，其中该 CSI 是基于所接收到的 UL 准许来发送的。

[0136] 该装置可以包括用于执行图 8D 和图 16 中的前述流程图中的算法中的每一个步骤的另外模块。因此，图 8D 和图 16 中的前述流程图中的每一个步骤可以由一个模块来执行，并且该装置可以包括这些模块中的一个或多个。这些模块可以是专门被配置为执行所陈述的过程 / 算法的一个或多个硬件组件、由配置为执行所陈述的过程 / 算法的处理器来实现、存储在计算机可读介质之中以便由处理器实现、或者是其某种组合。

[0137] 图 18 是示出用于使用处理系统 1814 的装置 1702' 的硬件实现的例子的图 1800。处理系统 1814 可以使用通常用总线 1824 表示的总线架构来实现。根据处理系统 1814 的

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具体应用和整体设计约束，总线1824可以包括任意数量的互连总线和桥接。总线1824将包括一个或多个处理器和/或硬件模块（其用处理器1804、模块1704、1706、1708、1710、1712和1714表示）、以及计算机可读介质/存储器1806的各种电路连接在一起。总线1824还可以连接诸如时钟源、外围设备、电压调节器和电源管理电路等等之类的各种其它电路，其中这些电路是本领域所公知的，因此将不做任何进一步的描述。

[0138] 处理系统1814可以耦合到收发机1810。收发机1810耦合到一个或多个天线1820。收发机1810提供通过传输介质与各种其它装置进行通信的单元。收发机1810从所述一个或多个天线1820接收信号，从所接收的信号中提取信息，将提取的信息提供给处理系统1814（具体而言，接收模块1704）。此外，收发机1810还从处理系统1814接收信息（具体而言，发送模块1712），并基于所接收的信息，生成要应用于所述一个或多个天线1820的信号。处理系统1814包括处理器1804，处理器1804耦合到计算机可读介质/存储器1806。处理器1804负责通用处理，其包括执行计算机可读介质/存储器1806上存储的软件。当该软件由处理器1804执行时，使得处理系统1814执行上文针对任何特定装置所描述的各种功能。计算机可读介质/存储器1806还可以用于存储当处理器1804执行软件时所操作的数据。该处理系统还包括模块1704、1706、1708、1710、1712和1714中的至少一个。这些模块可以是在处理器1804中运行、驻留/存储在计算机可读介质/存储器1806中的软件模块、耦合到处理器1804的一个或多个硬件模块、或者其某种组合。处理系统1814可以是UE 650的组件，其可以包括存储器660和/或TX处理器668、RX处理器656和控制器/处理器659中的至少一个。

[0139] 在一种配置中，用于无线通信的装置1702/1702'包括：用于确定CSI的单元；用于基于定时器或者门限中的至少一个来确定是否要发送该CSI的单元；用于在确定要发送该CSI时，发送该CSI的单元。该装置还可以包括：用于向基站发送用于发送该CSI的请求，并从基站接收基于该请求的响应的单元。在一个方面，该CSI是基于所接收的响应而发送给基站的。该装置还可以包括：用于从基站接收上行链路准许的单元，当在大于第二门限的一个时间段内没有发送CSI时，接收到该上行链路准许。在一个方面，该CSI是基于所接收到的UL准许来发送的。该装置还可以包括：用于在多个子帧中的每一个子帧中，对CSI进行估计的单元；以及用于基于所述多个子帧上的最低CSI或者基于所述多个子帧上的所估计CSI的平均值来确定CSI的单元。该装置还可以包括：用于对指示如何确定CSI的配置进行接收的单元；以及用于基于所接收的配置来确定CSI的单元。该装置还可以包括：用于对指示MBSFN子帧的信息进行接收的单元；以及用于基于所接收的信息来确定CSI的单元。

[0140] 该装置还可以包括：用于基于CSI来选择用于RACH过程的RACH格式的单元。在一个方面，CSI通过RACH过程来发送，并通过所选择的RACH格式来指示。该装置还可以包括：用于从基站接收定期监管消息的单元；以及用于基于所接收的定期监管消息来向基站发送响应的单元。在一个方面，将CSI与该响应一起发送。该装置还可以包括：用于确定RSRQ或者RSRP中的至少一个的单元；以及用于向基站发送RSRP或者RSRQ中的所述至少一个的单元。在一个方面，CSI是与RSRP或者RSRQ中的所述至少一个一起发送的。前述的单元可以是装置1702中的前述模块中的一个或多个，和/或配置为执行这些前述单元所列举的功能的装置1702'的处理系统1814。如上所述，处理系统1814可以包括TX处理器

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668、RX 处理器 656 和控制器 / 处理器 659。因此，在一种配置中，前述的单元可以是配置为执行这些前述单元所列举的功能的 TX 处理器 668、RX 处理器 656 和控制器 / 处理器 659。

[0141] 应当理解的是，所公开的过程中步骤的特定顺序或层次只是对示例性方法的说明。应当理解的是，基于设计偏好，可以重新排列这些过程中步骤的特定顺序或层次。此外，可以对一些步骤进行组合或省略。所附的方法权利要求以示例顺序给出各种步骤元素，但并不意味着其受限于给出的特定顺序或层次。

[0142] 提供以上的描述以使得任何本领域技术人员能够实现本文所描述的各个方面。对于本领域技术人员来说，对这些方面的各种修改将是显而易见的，并且本文所定义的总体原理也可以适用于其它方面。因此，权利要求并不旨在限于本文示出的方面，而是要与权利要求字面语言的全部范围相一致，其中，以单数形式引用元素并不旨在表示“一个且仅有一个”（除非特别地如此声明），而是表示“一个或更多”。除非另外特别地声明，否则术语“一些”是指一个或更多。贯穿本公开内容所描述的各个方面的要素的所有结构性和功能性等效项对于本领域普通技术人员来说是公知的或即将成为公知的，其通过引用被明确地并入本文中并且旨在被包含在权利要求中。此外，本文中没有任何公开内容旨在捐献给公众，不管这样的公开内容是否明确记载在权利要求书中。任何权利要求要素不应被解释为单元 + 功能，除非该要素明确采用了“用于……的单元”的措辞进行记载。

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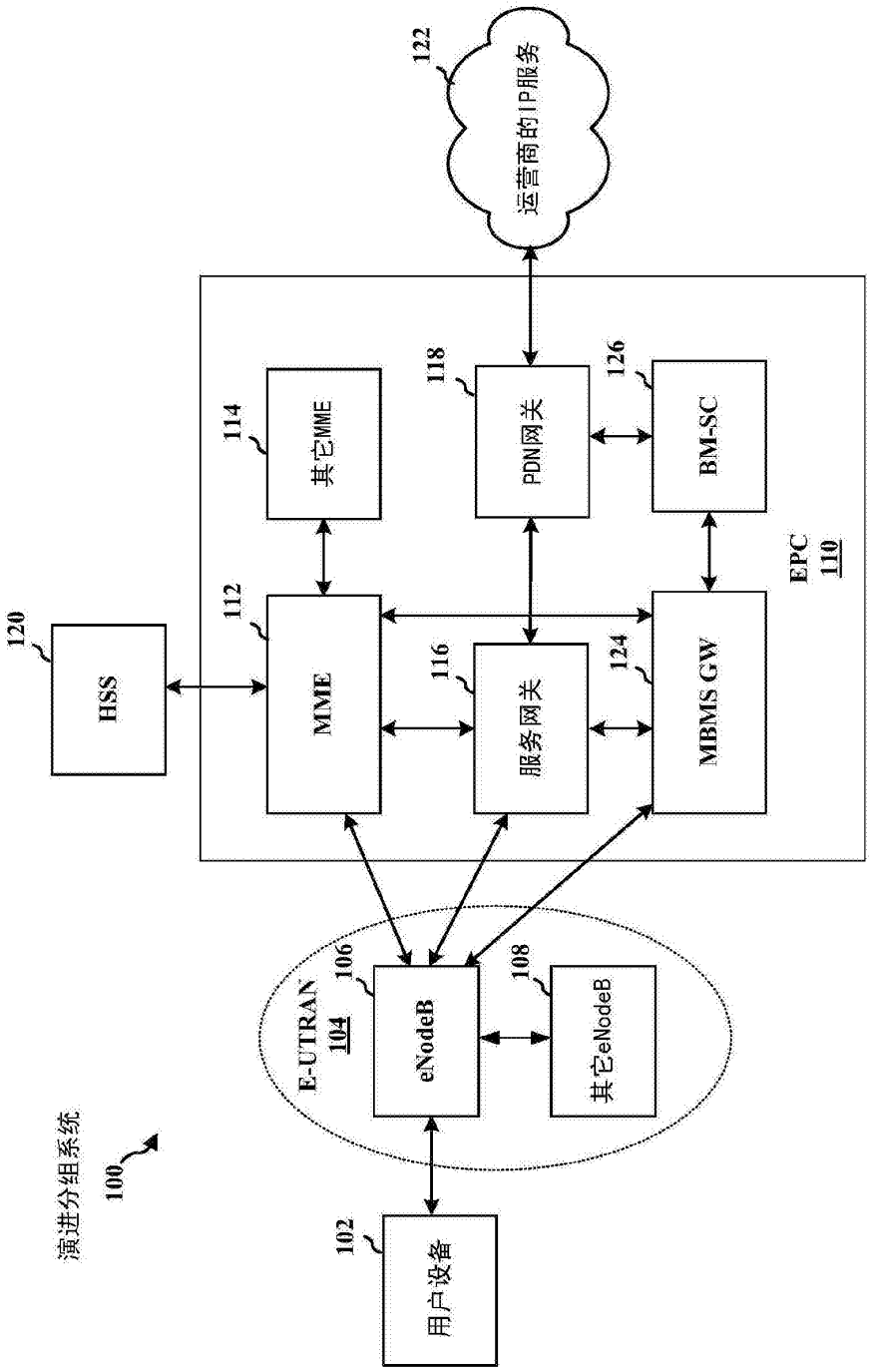


图 1

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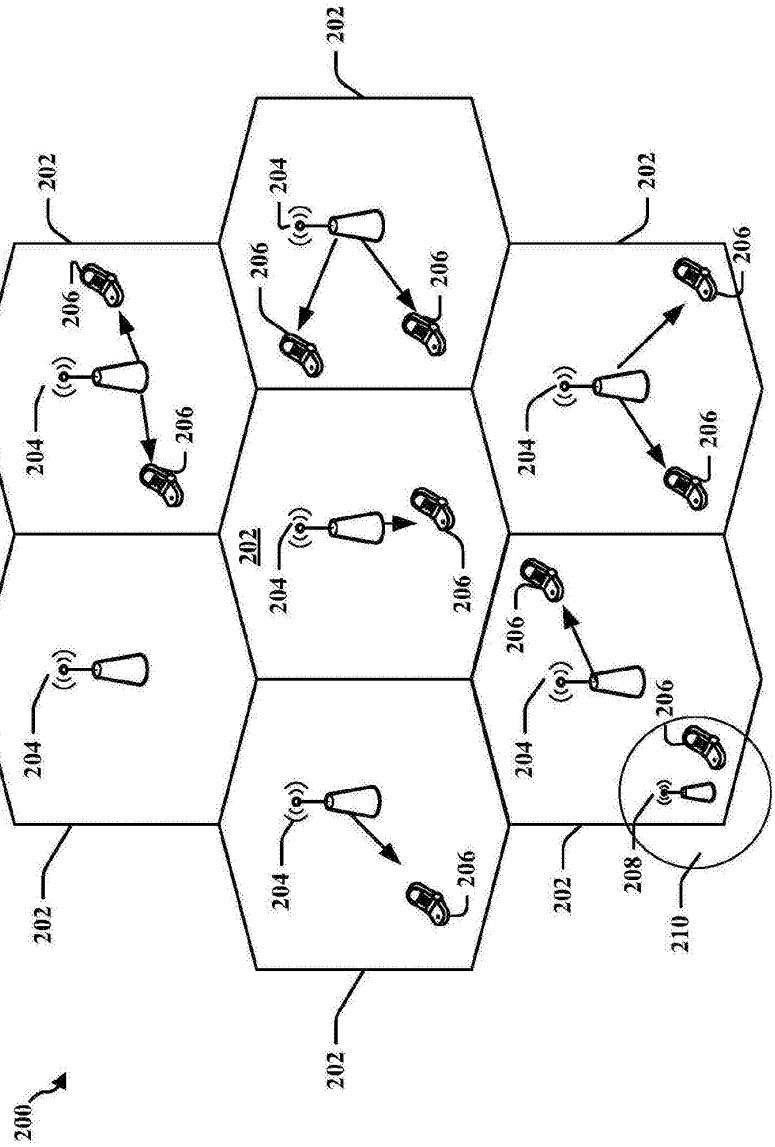


图 2

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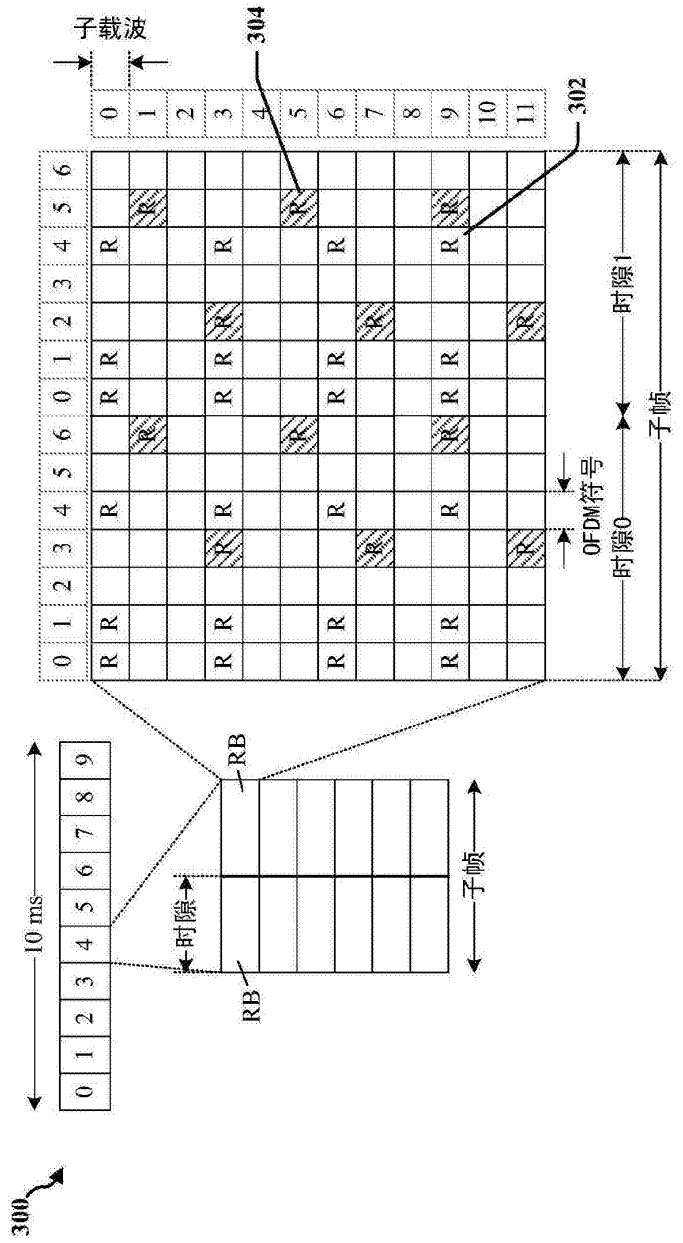


图 3

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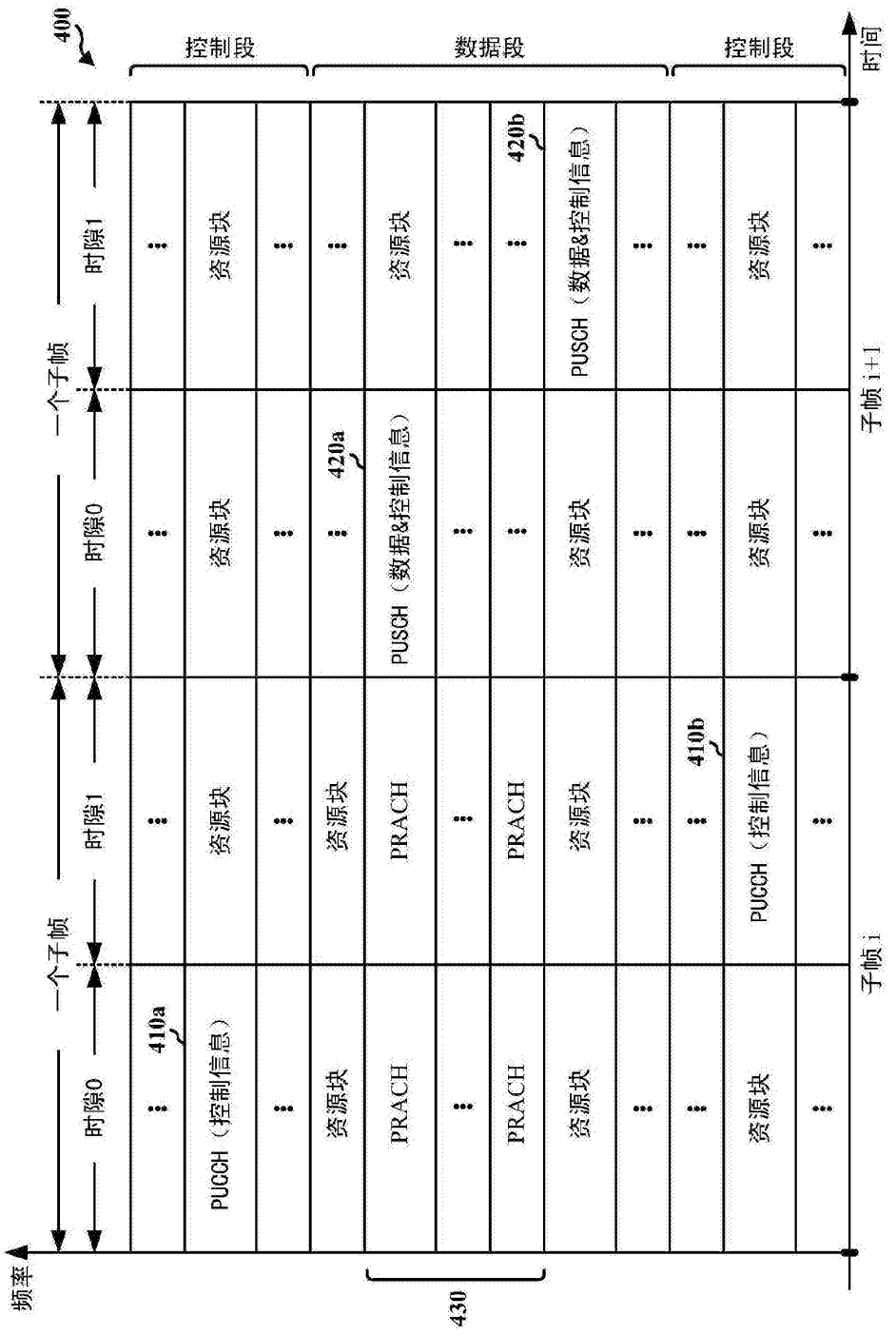


图 4

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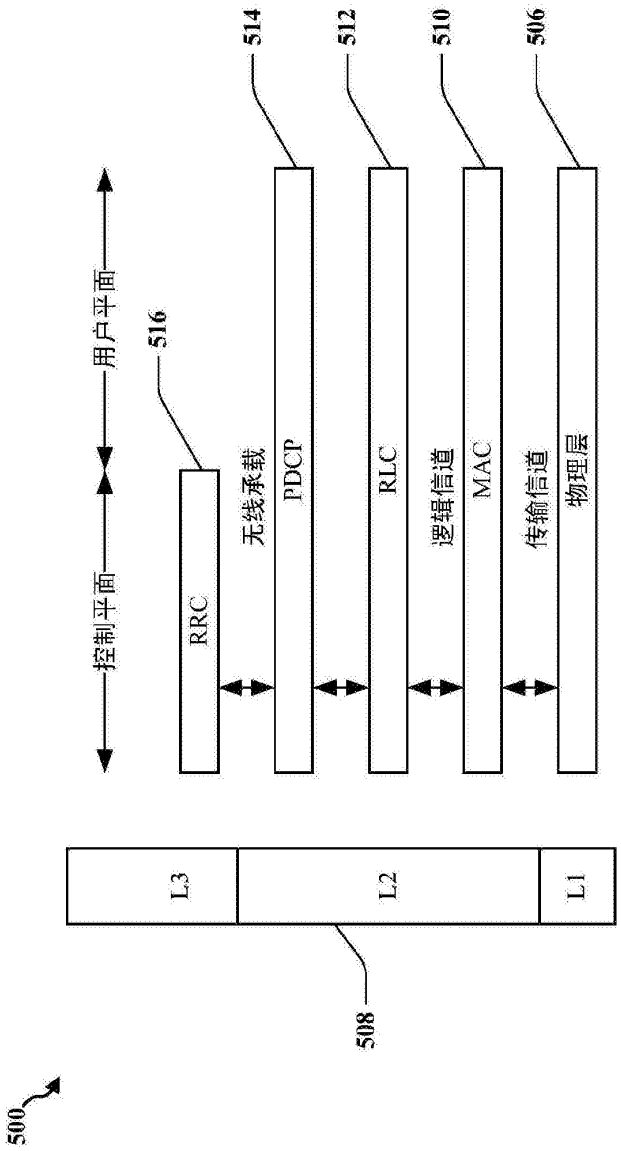


图 5

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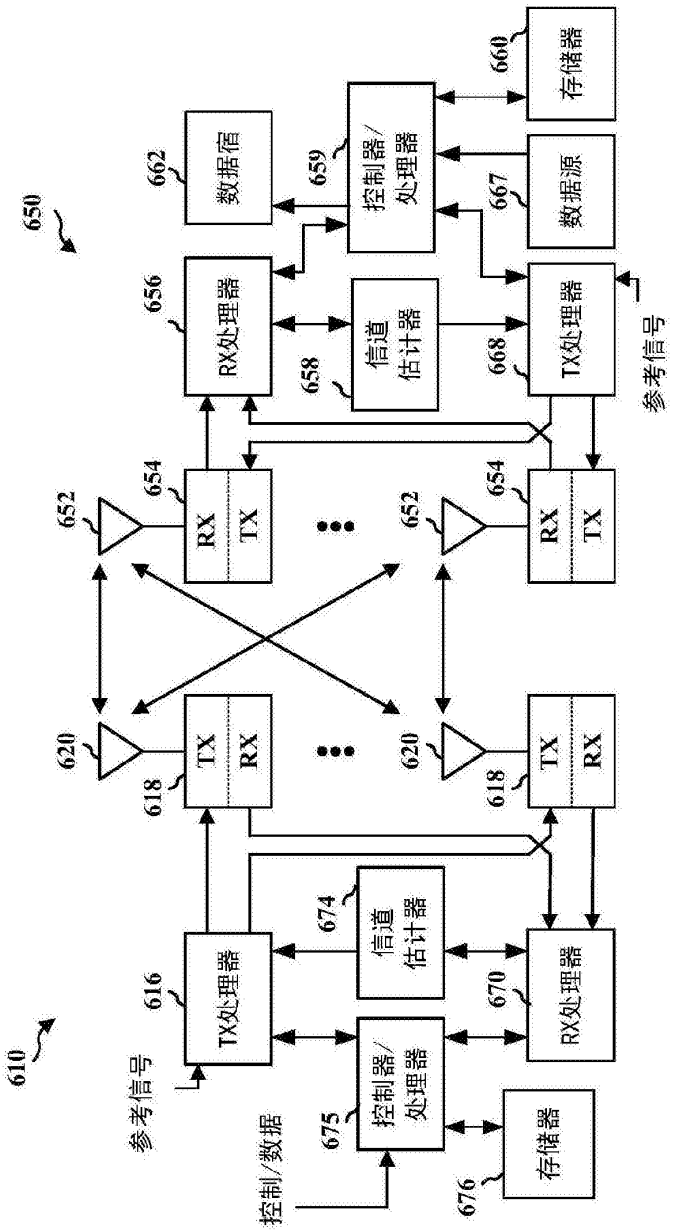


图 6

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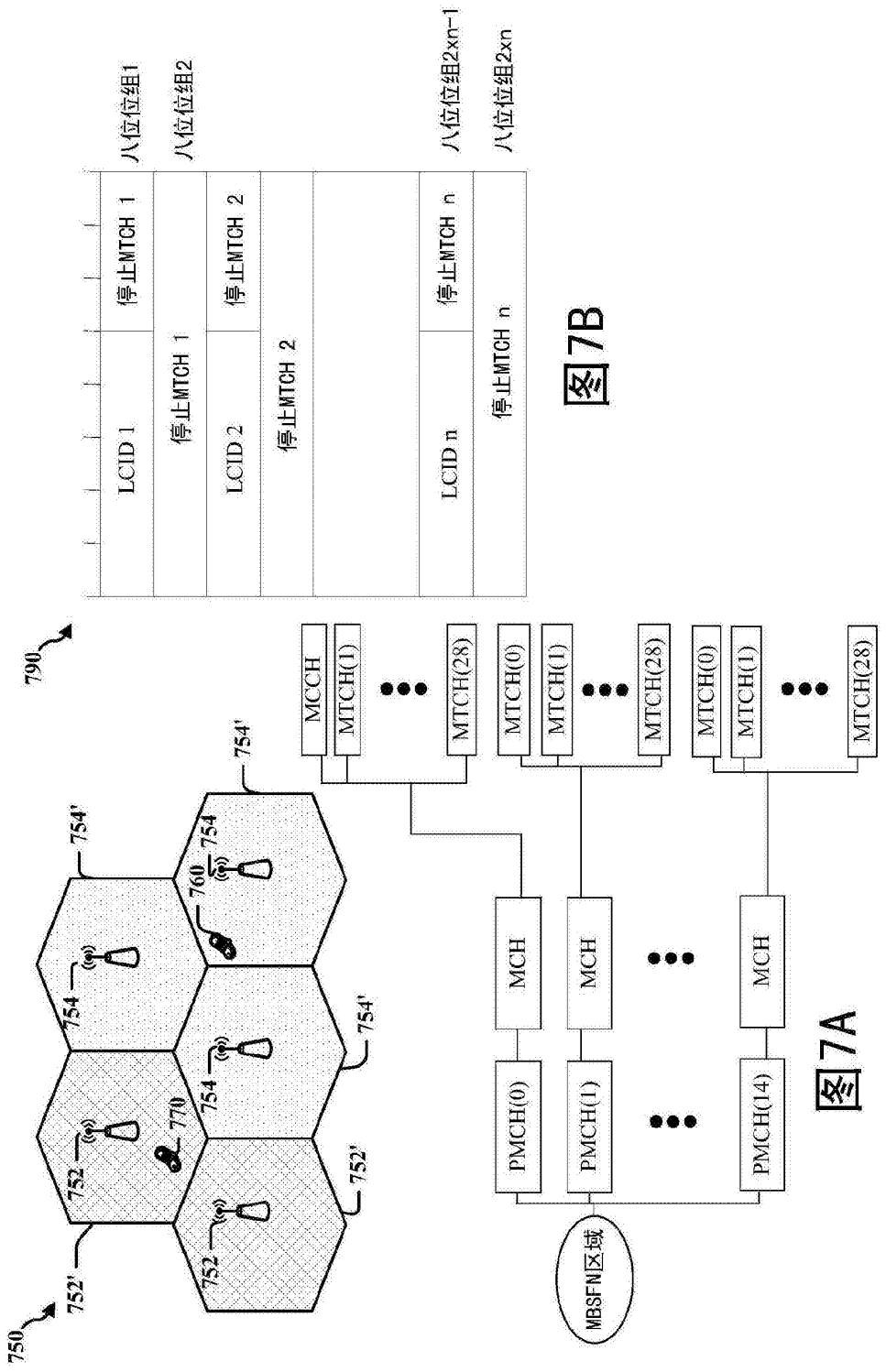


图7A

LCID 1	停止MTCH 1	八位位组1
停止MTCH 1		八位位组2
LCID 2	停止MTCH 2	
停止MTCH 2		
LCID n	停止MTCH n	八位位组2xn-1
停止MTCH n		八位位组2xn

图7B

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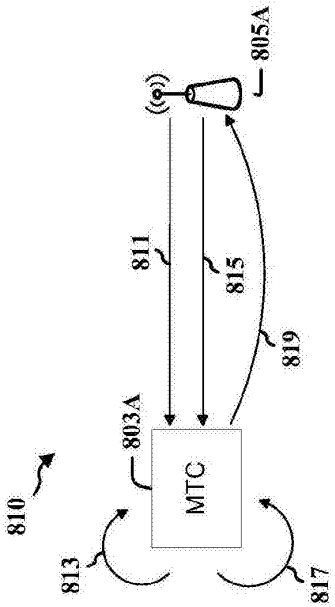


图 8A

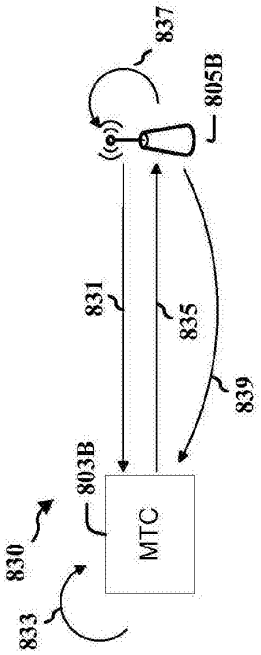


图 8B

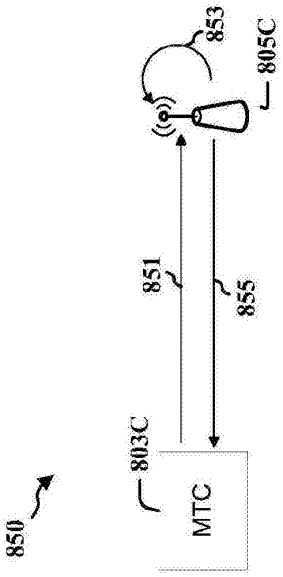


图 8C

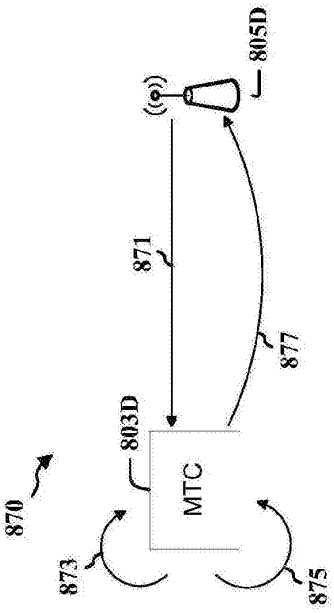


图 8D

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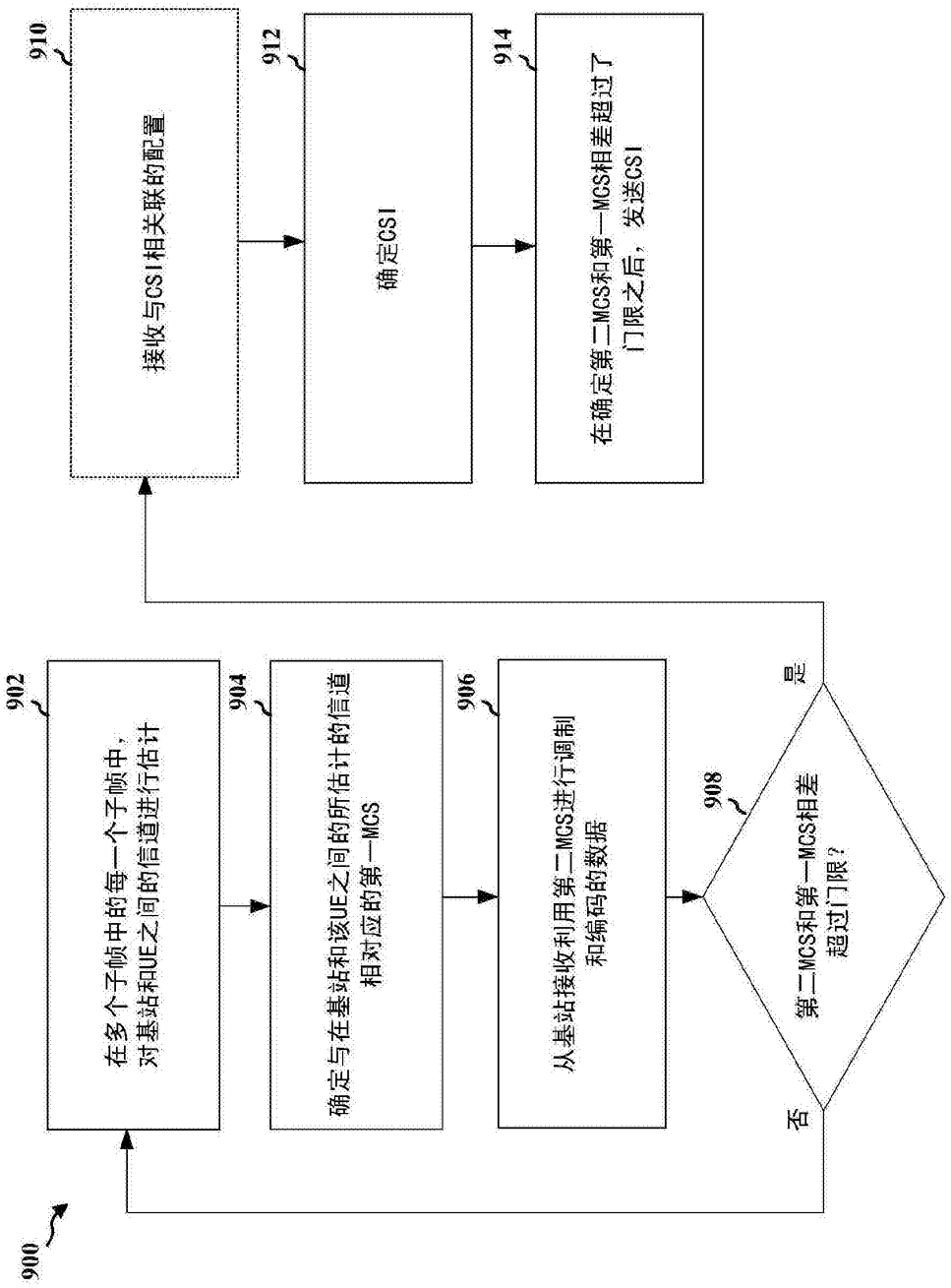


图 9

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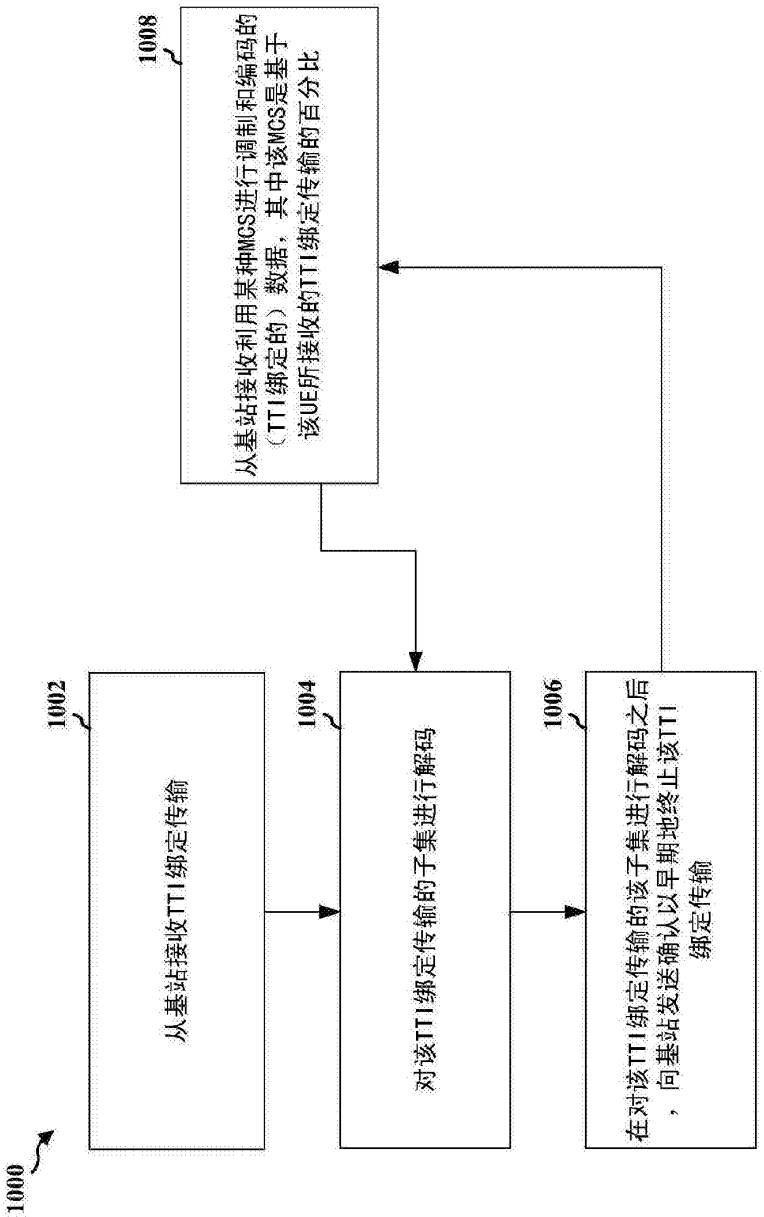


图 10

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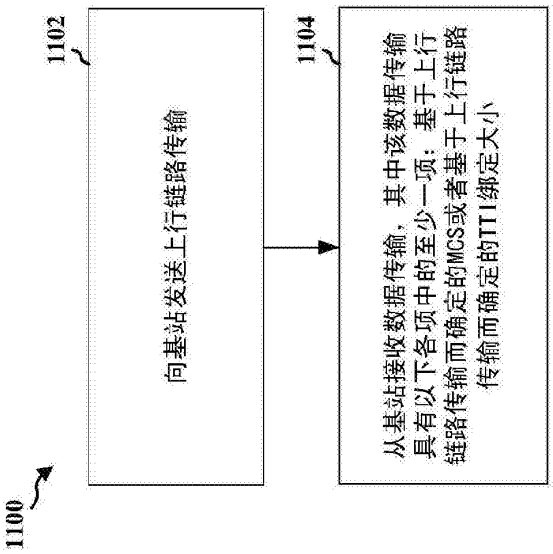


图 11

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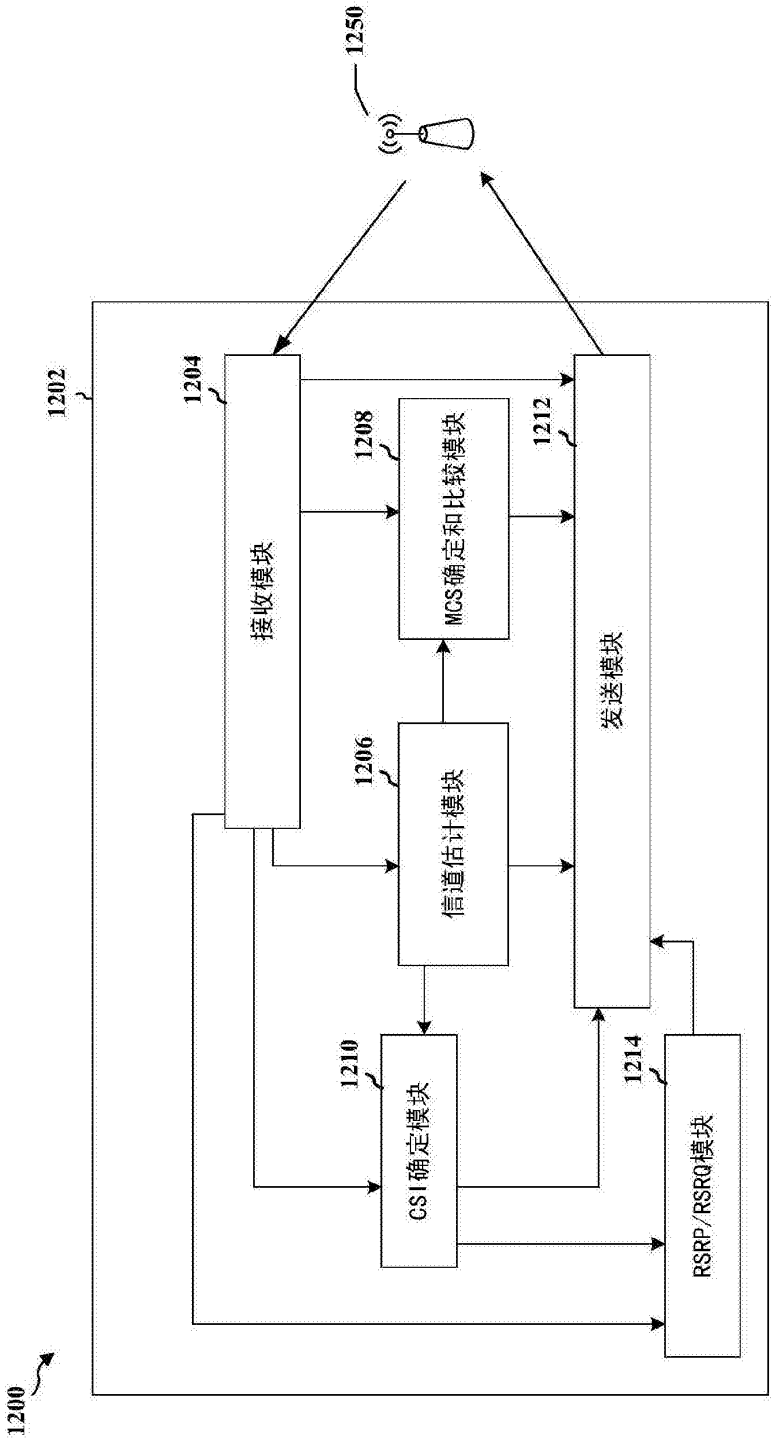


图 12

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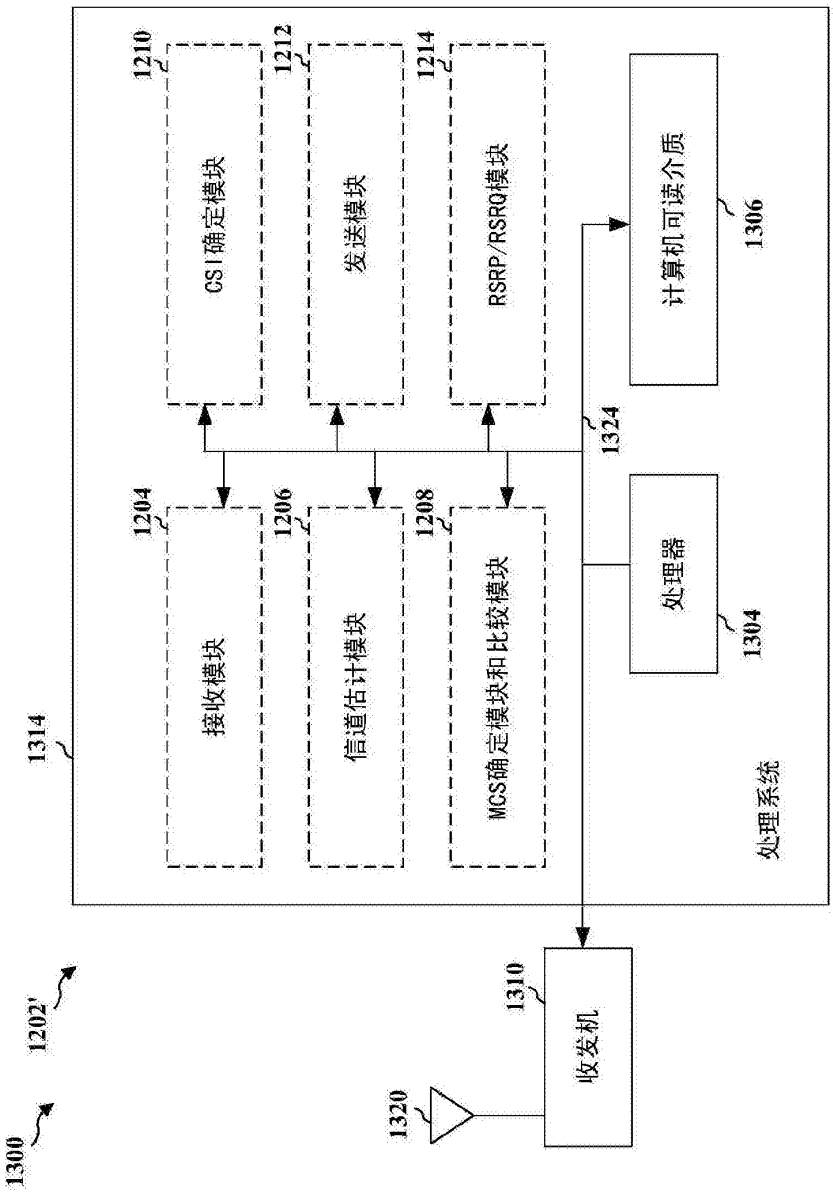


图 13

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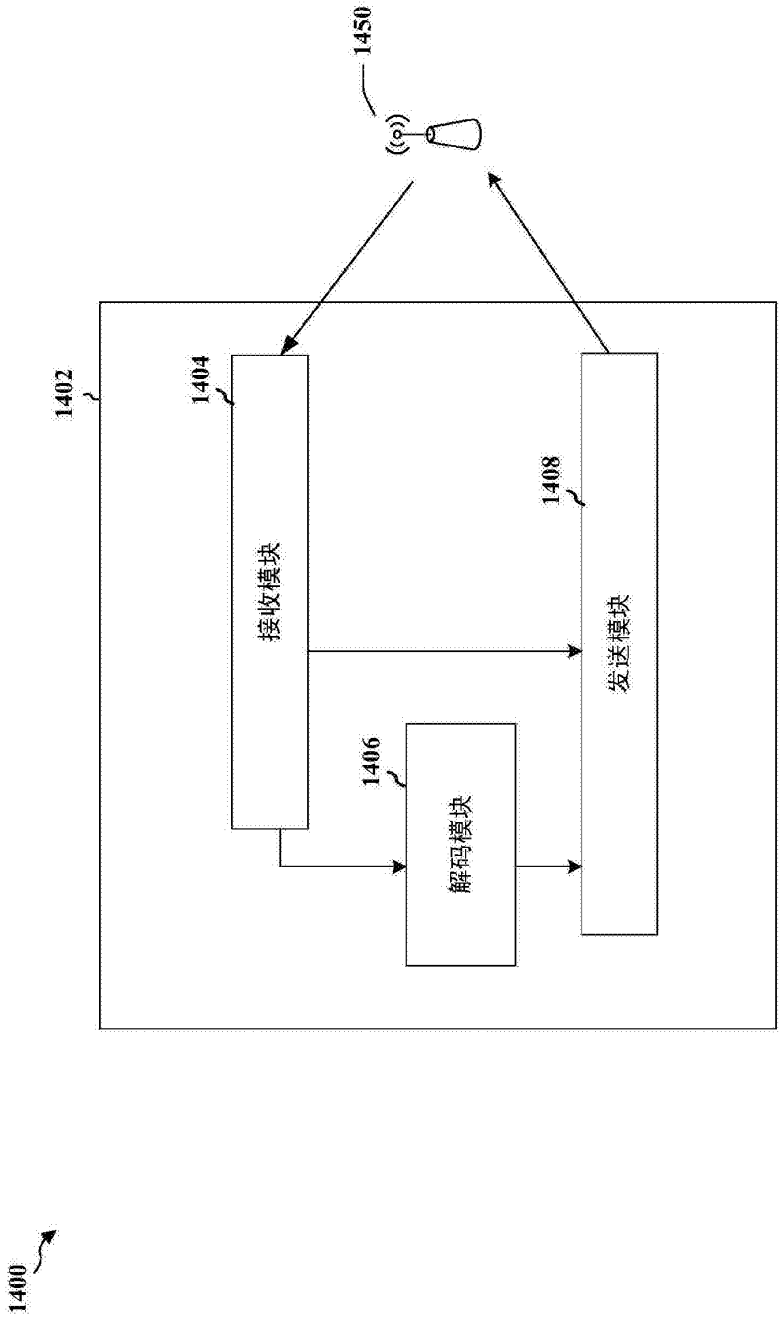


图 14

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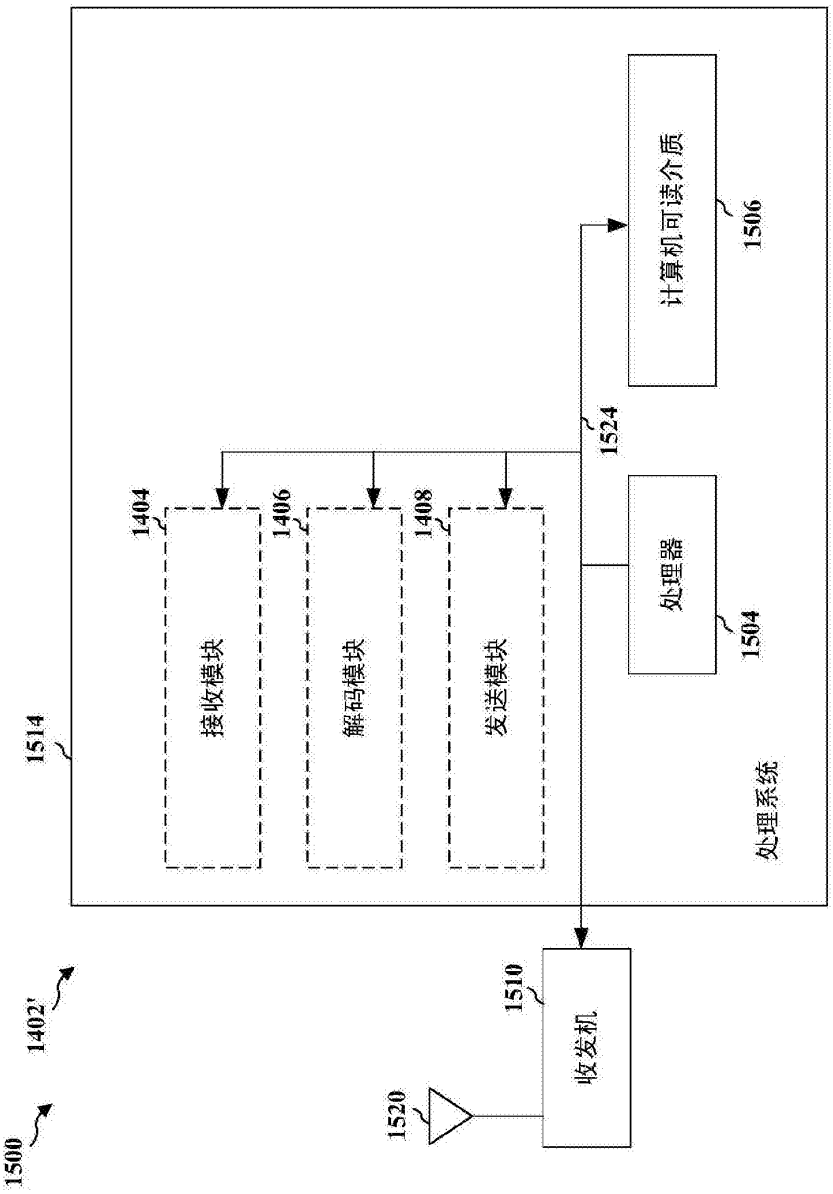


图 15

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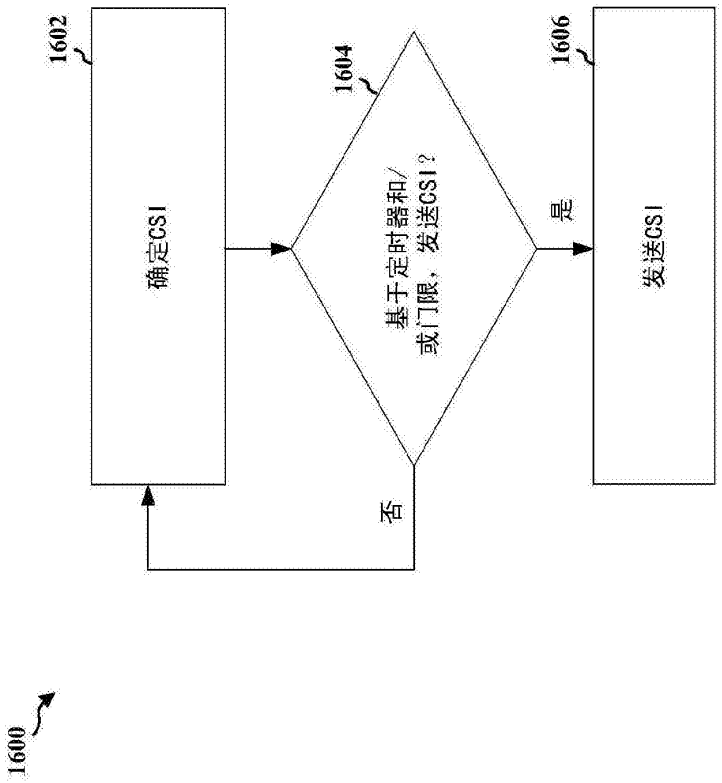


图 16

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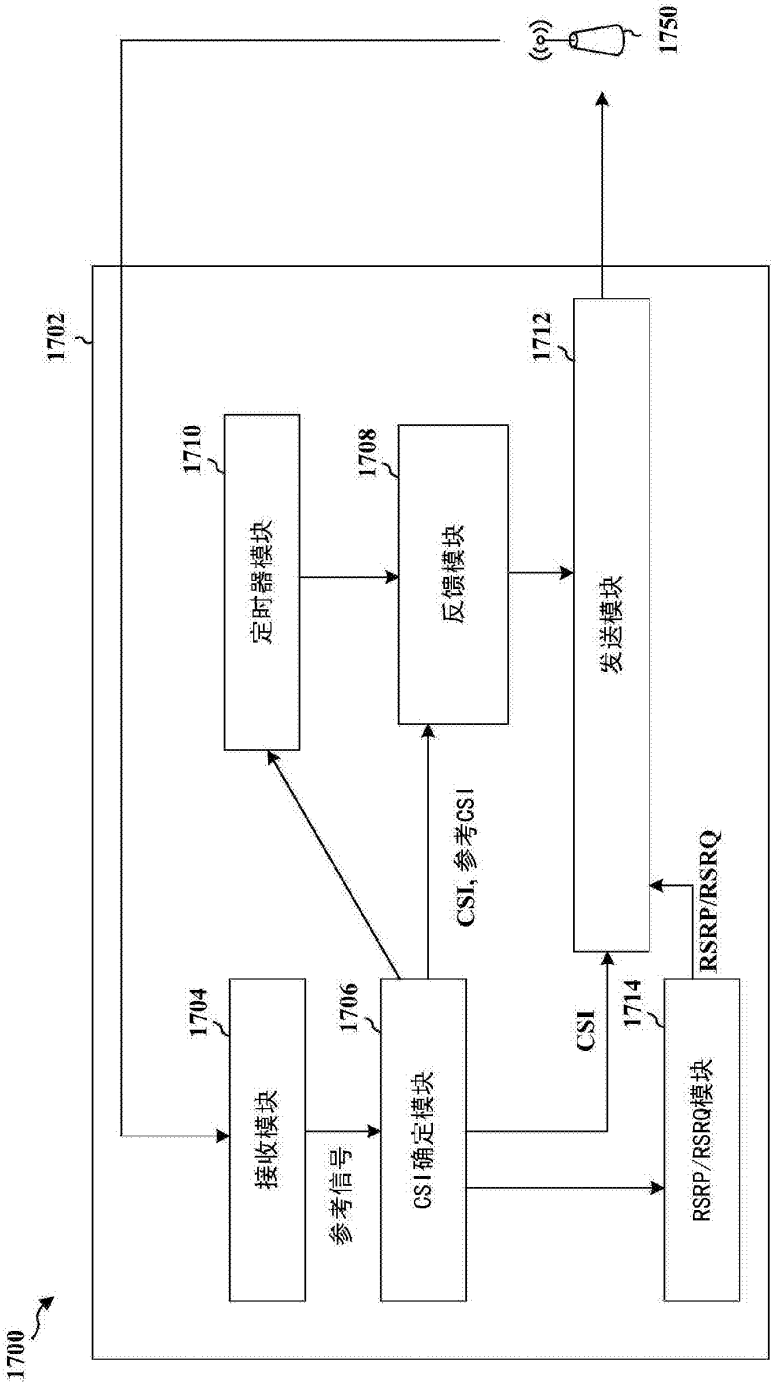


图 17

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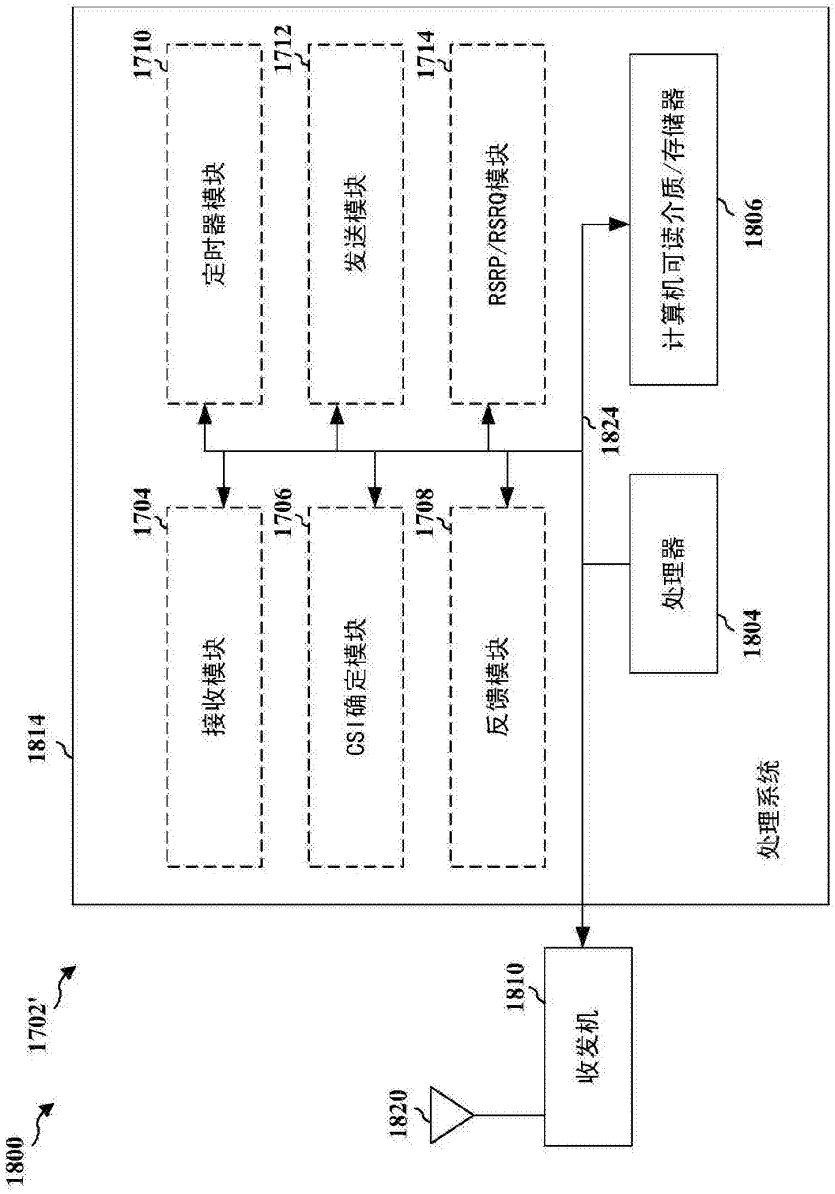


图 18

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Espacenet

Bibliographic data: CN105122710 (A) — 2015-12-02

Enhanced transmission time interval bundling design for machine type communications

Inventor(s): H XU; W CHEN; T JI; GAAL PETER ± (H XU, ; W CHEN, ; T JI, ; GAAL PETER, ; H·徐, ; W·陈, ; T·姬, ; P·盖尔)

Applicant(s): QUALCOMM INC ± (QUALCOMM, INCORPORATED, ; 高通股份有限公司)

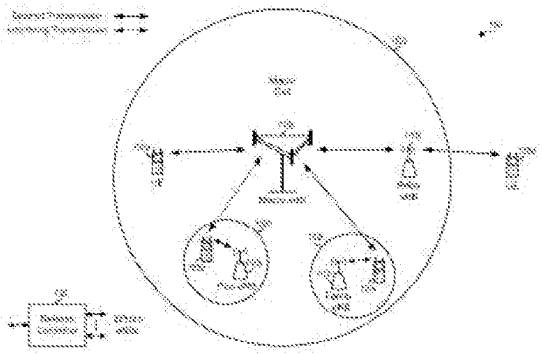
Classification: **- international:*H04L1/18; H04L5/00; H04W72/04***
- cooperative: **H04L1/0007 (EP, US); H04L1/1854 (EP, US);** H04L1/0003 (EP, US); H04L1/0009 (EP, US); H04L2001/125 (EP, US); H04L5/0007 (EP, US); H04L5/0092 (EP, US)

Application number: CN20148019273 20140404 Global Dossier

Priority number(s): WO2014US32974 20140404 ; US201361809184P 20130405 ; US201414244752 20140403

Also published as: CN105122710 (B) CN109951258 (A) EP2982070 (A2) EP2982070 (B1) ES2637408 (T3) more

Abstract of CN105122710 (A)



Aspects of the present disclosure provide techniques for enhanced transmission time interval, TTI, bundling design for machine type communications, MTC. A method includes determining a mapping of one or more uplink or downlink channels to one or more fixed bundling sizes, wherein each of the one or more fixed bundling sizes indicates a number of transmission time intervals, TTIs, over which a channel should be transmitted (502) and processing transmission of the one or more uplink or downlink channels based on the mapping (504).

(19)中华人民共和国国家知识产权局

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(21)申请号 201480019273.9

(22)申请日 2014.04.04

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14/244,752 2014.04.03 US

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代理人 亓云

(51)Int.Cl.
H04L 1/18(2006.01)
H04W 72/04(2006.01)
H04L 5/00(2006.01)

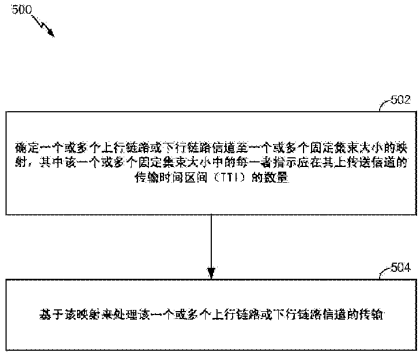
权利要求书3页 说明书12页 附图9页

(54)发明名称

针对机器类型通信的增强型传输时间区间集束设计

(57)摘要

本公开的诸方面提供了用于针对机器类型通信MTC的增强型传输时间区间TTI集束设计的技术。一种方法包括：确定一个或多个上行链路或下行链路信道至一个或多个固定集束大小的映射，其中该一个或多个固定集束大小中的每一者指示应在其上传送一信道的传输时间区间TTI的数量(502)，以及基于该映射来处理该一个或多个上行链路或下行链路信道的传输(504)。



CN 105122710 A

1.一种用于由无线设备进行无线通信的方法,包括:

确定一个或多个上行链路或下行链路信道至一个或多个固定集束大小的映射,其中所述一个或多个固定集束大小中的每一者指示应在其上传送信道的传输时间区间(TTI)的数量;以及

基于所述映射来处理所述一个或多个上行链路或下行链路信道的传输。

2.如权利要求1所述的方法,其特征在于,用于一信道的集束大小规定用于一个或多个其他信道的集束大小。

3.如权利要求2所述的方法,其特征在于,用于上行链路信道的集束大小规定用于一个或多个下行链路信道的集束大小。

4.如权利要求2所述的方法,其特征在于,用于下行链路信道的集束大小规定用于一个或多个上行链路信道的集束大小。

5.如权利要求3所述的方法,其特征在于,用于物理广播信道(PBCH)的集束大小规定用于系统信息块(SIB)和增强型物理下行链路控制信道(PDCCH)的集束大小。

6.如权利要求1所述的方法,其特征在于,用于随机接入信道(RACH)的集束大小是在物理广播信道(PBCH)或系统信息块(SIB)的至少一者中发信令通知的。

7.如权利要求1所述的方法,其特征在于,用于随机接入信道(RACH)的集束大小被映射至物理广播信道(PBCH)或系统信息块(SIB)中的至少一者的集束大小。

8.如权利要求1所述的方法,其特征在于,所述映射包括消息1(随机接入信道(RACH))、消息2(RACH响应)、消息3、或消息4中的至少一者的集束大小至主同步信号(PSS)、副同步信号(SSS)、物理广播信道(PBCH)、或系统信息块(SIB)中的至少一者的集束大小的映射。

9.如权利要求8所述的方法,其特征在于,进一步包括第一RACH消息的集束大小基于一不同的RACH消息的集束大小。

10.如权利要求1所述的方法,其特征在于,所述一个或多个上行链路或下行链路信道包括:

物理上行链路共享信道(PUSCH)、随机接入信道(RACH)消息1、或RACH消息3中的至少一者。

11.如权利要求1所述的方法,其特征在于,所述一个或多个上行链路或下行链路信号包括物理下行链路控制信道(PDCCH)、物理广播信道(PBCH)、物理HARQ指示符信道(PHICH)或系统信息块(SIB)中的至少一者。

12.如权利要求1所述的方法,其特征在于,所述处理包括基于所指派的用于上行链路信道的集束大小来标识用于下行链路信道的集束大小。

13.如权利要求12所述的方法,其特征在于,所述处理包括基于所指派的用于物理上行链路共享信道(PUSCH)的集束大小来标识用于物理下行链路控制信道(PDCCH)或物理HARQ指示符信道(PHICH)中的至少一者的集束大小。

14.如权利要求1所述的方法,其特征在于,所述处理包括基于用于下行链路信道的集束大小来标识用于上行链路信道的集束大小。

15.如权利要求14所述的方法,其特征在于,所述处理包括基于用于增强型物理下行链路控制信道(PDCCH)或PDCCH的集束大小来标识用于物理上行链路控制信道(PUCCH)确

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收(ACK)的集束大小。

16.如权利要求1所述的方法,其特征在于,所述处理包括根据所述映射来传送所述一个或多个上行链路或下行链路信道。

17.如权利要求1所述的方法,其特征在于,所述处理包括接收根据所述映射来传送的所述一个或多个上行链路或下行链路信道。

18.如权利要求1所述的方法,其特征在于,所述映射包括针对至少一个信道的该信道至单个固定集束大小的一对一映射。

19.如权利要求1所述的方法,其特征在于,所述映射包括针对至少一个信道的该信道至潜在可能集束大小集的一对多映射。

20.如权利要求19所述的方法,其特征在于,进一步包括经由盲检测确定来自所述潜在可能集束大小集的所使用的实际集束大小。

21.如权利要求20所述的方法,其特征在于,进一步包括接收指示来自所述潜在可能集束大小集的一个或多个集束大小的信令。

22.一种用于由无线设备进行无线通信的设备,包括:

用于确定一个或多个上行链路或下行链路信道至一个或多个固定集束大小的映射的装置,其中所述一个或多个固定集束大小中的每一者指示应在其上传送信道的传输时间区间(TTI)的数量;以及

用于基于所述映射来处理所述一个或多个上行链路或下行链路信道的传输的装置。

23.如权利要求22所述的设备,其特征在于,用于一信道的集束大小规定用于一个或多个其他信道的集束大小。

24.如权利要求22所述的设备,其特征在于,用于随机接入信道(RACH)的集束大小在物理广播信道(PBCH)或系统信息块(SIB)的至少一者中发信令通知。

25.如权利要求22所述的设备,其特征在于,用于随机接入信道(RACH)的集束大小被映射至用于物理广播信道(PBCH)或系统信息块(SIB)中的至少一者的集束大小。

26.如权利要求22所述的设备,其特征在于,所述处理包括基于所指派的用于上行链路信道的集束大小来标识用于下行链路信道的集束大小。

27.如权利要求22所述的设备,其特征在于,所述映射包括针对至少一个信道的该信道至单个固定集束大小的一对一映射。

28.如权利要求22所述的设备,其特征在于,所述映射包括针对至少一个信道的该信道至潜在可能集束大小集的一对多映射。

29.一种用于由无线设备进行无线通信的装置,包括:

至少一个处理器,其被配置成:

确定一个或多个上行链路或下行链路信道至一个或多个固定集束大小的映射,其中所述一个或多个固定集束大小中的每一者指示应在其上传送信道的传输时间区间(TTI)的数量;以及

基于所述映射来处理所述一个或多个上行链路或下行链路信道的传输;以及

与所述至少一个处理器耦合的存储器。

30.一种用于无线通信的计算机程序产品,包括其上存储有指令的计算机可读介质,所述指令能由一个或多个处理器执行以:

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确定一个或多个上行链路或下行链路信道至一个或多个固定集束大小的映射，其中所述一个或多个固定集束大小中的每一者指示应在其上传送信道的传输时间区间（TTI）的数量；以及

基于所述映射来处理所述一个或多个上行链路或下行链路信道的传输。

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针对机器类型通信的增强型传输时间区间集束设计

[0001] 根据 35U.S.C. §119 的优先权要求

[0002] 本申请要求于 2013 年 4 月 5 日提交的美国临时专利申请序列号 61/809,184 的权益，其通过引用整体纳入于此。

[0003] 背景

[0004] 领域

[0005] 本公开的某些方面一般涉及无线通信，更具体地涉及用于针对机器类型通信 (MTC) 的增强型传输时间区间 (TTI) 集束设计的技术。

背景技术

[0006] 无线通信系统被广泛部署以提供诸如语音、数据等等各种类型的通信内容。这些系统可以是能够通过共享可用系统资源（例如，带宽和发射功率）来支持与多个用户的通信的多址系统。此类多址系统的示例包括码分多址 (CDMA) 系统、时分多址 (TDMA) 系统、频分多址 (FDMA) 系统、第三代伙伴项目 (3GPP) 长期演进 (LTE)/ 高级 LTE 系统、以及正交频分多址 (OFDMA) 系统。

[0007] 一般而言，无线多址通信系统能同时支持多个无线终端的通信。每个终端经由前向和反向链路上的传输与一个或多个基站通信。前向链路（或即下行链路）是指从基站至终端的通信链路，而反向链路（或即上行链路）是指从终端至基站的通信链路。这种通信链路可经由单输入单输出、多输入单输出或多输入多输出 (MIMO) 系统来建立。

[0008] 无线通信网络可包括能支持数个无线设备通信的数个基站。无线设备包括用户装备 (UE) 和远程设备。UE 可以是在人类的直接控制下操作的设备。UE 的一些示例包括蜂窝电话、智能电话、个人数字助理 (PDA)、无线调制解调器、手持式设备、膝上型计算机、平板设备、上网本、智能本、超级本等。远程设备可以是在没有人类的直接控制下操作的设备。远程设备的一些示例包括传感器、计量仪、监视器、位置标签等。远程设备可以与基站、另一远程设备、或其他某个实体通信。机器类型通信 (MTC) 指代在该通信的至少一端上涉及至少一个远程设备的通信。

[0009] 概述

[0010] 本公开的某些方面一般涉及无线通信，更具体地涉及用于针对机器类型通信 (MTC) 的增强型传输时间区间 (TTI) 集束设计的技术。

[0011] 本公开的某些方面提供了一种用于由无线设备进行无线通信的方法、相应的装置和程序产品。该方法一般包括：确定一个或多个上行链路或下行链路信道至一个或多个固定集束大小的映射，其中该一个或多个固定集束大小中的每一者指示应在其上传送信道的传输时间区间 (TTI) 的数量，以及基于该映射来处理该一个或多个上行链路或下行链路信道的传输。

[0012] 在各方面，相应的设备一般包括：用于确定一个或多个上行链路或下行链路信道至一个或多个固定集束大小的映射的装置，其中该一个或多个固定集束大小中的每一者指示应在其上传送信道的传输时间区间 (TTI) 的数量，以及用于基于该映射来处理该一个或

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多个上行链路或下行链路信道的传输的装置。

[0013] 在各方面，相应的装置一般包括：至少一个处理器，其被配置成确定一个或多个上行链路或下行链路信道至一个或多个固定集束大小的映射，其中该一个或多个固定集束大小中的每一者指示应在其上传送信道的传输时间区间（TTI）的数量；以及基于该映射来处理该一个或多个上行链路或下行链路信道的传输。该装置一般还包括与该至少一个处理器耦合的存储器。

[0014] 在各方面，相应的计算机程序一般包括其上存储有指令的计算机可读介质，这些指令可由一个或多个处理器执行以用于：确定一个或多个上行链路或下行链路信道至一个或多个固定集束大小的映射，其中该一个或多个固定集束大小中的每一者指示应在其上传送信道的传输时间区间（TTI）的数量；以及基于该映射来处理该一个或多个上行链路或下行链路信道的传输。

[0015] 本公开的某些方面提供了一种用于由无线设备进行无线通信的方法、相应的装置和程序产品。该方法一般包括：确定对规定要被用于至少一个信道的传输的传输时间区间（TTI）的数量的集束大小的持久调度（PS）指派，在一个或多个TTI中传送该至少一个信道，以及响应于接收到接收方设备成功接收到该至少一个信道的指示而在达到由该集束大小规定的TTI数量之前终止该至少一个信道的传输。

[0016] 本公开的某些方面提供了一种用于由无线设备进行无线通信的方法、相应的装置和程序产品。该方法一般包括：接收对规定要被用于至少一个信道的传输的传输时间区间（TTI）的数量的集束大小的持久调度（PS）指派的指示，在一个或多个TTI中接收该至少一个信道，以及如果成功接收到该至少一个信道，则传送在达到由该集束大小规定的TTI数量之前终止该至少一个信道的传输的指示。

[0017] 本公开的某些方面提供了一种用于由无线设备进行无线通信的方法、相应的装置和程序产品。该方法一般包括确定对用于传送至少一个信道的固定数量的资源块（RB）的持久调度（PS）指派，以及在传送该至少一个信道时调整调制和编码方案（MCS）、速率、或发射功率中的至少一者。

[0018] 本公开的某些方面提供了一种用于由无线设备进行无线通信的方法、相应的装置和程序产品。该方法一般包括：确定对用于传送至少一个信道的固定数量的资源块（RB）的持久调度（PS）指派，以及处理该至少一个信道的传输，其中在传送该至少一个信道时可以调整调制和编码方案（MCS）、速率、或发射功率中的至少一者。

[0019] 提供了包括方法、装置、系统、计算机程序产品、以及处理系统的众多其他方面。

[0020] 附图简述

[0021] 为了能详细理解本公开的以上陈述的特征所用的方式，可参照各方面来对以上简要概述的内容进行更具体的描述，其中一些方面在附图中解说。然而应该注意，附图仅解说了本公开的某些典型方面，故不应被认为限定其范围，因为本描述可允许有其他等同有效的方面。

[0022] 图1是概念地解说了根据本公开的某些方面的无线通信网络的示例的框图。

[0023] 图2示出了概念地解说根据本公开的某些方面的无线通信网络中基站与用户装备（UE）处于通信中的示例的框图。

[0024] 图3是概念地解说根据本公开的某些方面的无线通信网络中的帧结构的示例的

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框图。

[0025] 图 4 是概念性地解说具有正常循环前缀的两个示例性子帧格式的框图。

[0026] 图 5 解说了根据本公开的某些方面的可由无线设备执行的用于增强型上行链路覆盖的示例操作。

[0027] 图 6 解说了根据本公开的某些方面的可由无线设备执行的用于增强型上行链路覆盖的示例操作。

[0028] 图 7 解说了根据本公开的某些方面的可由无线设备执行的用于增强型上行链路覆盖的示例操作。

[0029] 图 8 解说了根据本公开的某些方面的可由无线设备执行的用于增强型上行链路覆盖的示例操作。

[0030] 图 9 解说了根据本公开的某些方面的可由无线设备执行的用于增强型上行链路覆盖的示例操作。

[0031] 详细描述

[0032] 本公开的某些方面提供了用于针对机器类型通信 (MTC) 的增强型传输时间区间 (TTI) 集束设计的技术。TTI 集束大小可由一对一或一对多映射来固定。针对信道的集束大小可基于用于由另一信道发信令通知的集束大小来确定。持久调度也可被用于传送信道，其中调制和编码方案 (MCS)、速率、或发射功率可针对该信道的传输来被调整。

[0033] 本文描述的技术可用于各种无线通信网络，诸如 CDMA、TDMA、FDMA、OFDMA、SC-FDMA 及其他网络。术语“网络”和“系统”常可互换地使用。CDMA 网络可以实现诸如通用地面无线电接入 (UTRA)、cdma2000 等无线电技术。UTRA 包括宽带 CDMA(WCDMA)、时分同步 CDMA(TD-SCDMA) 和 CDMA 的其他变体。cdma2000 涵盖 IS-2000、IS-95 和 IS-856 标准。TDMA 网络可实现诸如全球移动通信系统 (GSM) 之类的无线电技术。OFDMA 网络可实现诸如演进 UTRA(E-UTRA)、超移动宽带 (UMB)、IEEE 802.11(Wi-Fi)、IEEE 802.16(WiMAX)、IEEE 802.20、Flash-OFDM® 等的无线电技术。UTRA 和 E-UTRA 是通用移动电信系统 (UMTS) 的部分。频分双工 (FDD) 和时分双工 (TDD) 两种形式的 3GPP 长期演进 (LTE) 及高级 LTE(LTE-A) 是 UMTS 的使用 E-UTRA 的新版本，其在下行链路上采用 OFDMA 而在上行链路上采用 SC-FDMA。UTRA、E-UTRA、UMTS、LTE、LTE-A 和 GSM 在来自名为“第 3 代伙伴项目”(3GPP) 的组织的文献中描述。cdma2000 和 UMB 在来自名为“第 3 代伙伴项目 2”(3GPP2) 的组织的文献中描述。本文描述的技术可被用于以上所提及的无线网络和无线电技术以及其他无线网络和无线电技术。为了清楚起见，以下针对 LTE/ 高级 LTE 来描述这些技术的某些方面，并且在以下大部分描述中使用 LTE/ 高级 LTE 术语。

[0034] 示例无线通信系统

[0035] 图 1 示出了无线通信网络 100，其可以是 LTE 网络或者其他某个无线网络。无线网络 100 可包括数个演进 B 节点 (eNB)110 和其他网络实体。eNB 是与用户装备 (UE) 通信的实体并且也可被称为基站、B 节点、接入点等。每个 eNB 可为特定地理区域提供通信覆盖。在 3GPP 中，术语“蜂窝小区”取决于使用该术语的上下文可指 eNB 的覆盖区域和 / 或服务该覆盖区域的 eNB 子系统。

[0036] eNB 可提供对宏蜂窝小区、微微蜂窝小区、毫微微蜂窝小区、和 / 或其他类型的蜂窝小区的通信覆盖。宏蜂窝小区可覆盖相对较大的地理区域 (例如，半径为数千米)，并且

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可允许不受限地由具有服务订阅的UE接入。微微蜂窝小区可覆盖相对较小的地理区域并且可允许无约束地由具有服务订阅的UE接入。毫微微蜂窝小区可覆盖相对较小的地理区域（例如，住宅）并且可允许有约束地由与该毫微微蜂窝小区有关联的UE（例如，封闭订户群(CSG)中的UE）接入。用于宏蜂窝小区的eNB可被称为宏eNB。用于微微蜂窝小区的eNB可被称为微微eNB。用于毫微微蜂窝小区的eNB可被称为毫微微eNB或家用eNB(HeNB)。在图1中所示的示例中，eNB 110a可以是用于宏蜂窝小区102a的宏eNB，eNB 110b可以是用于微微蜂窝小区102b的微微eNB，并且eNB 110c可以是用于毫微微蜂窝小区102c的毫微微eNB。一eNB可支持一个或多个（例如，三个）蜂窝小区。术语“eNB”、“基站”和“蜂窝小区”可在本文中可互换地使用。

[0037] 无线网络100还可包括中继站。中继站是能接收来自上游站（例如，eNB或UE）的数据的传输并向下游站（例如，UE或eNB）发送该数据的传输的实体。中继站也可以是能为其他UE中继传输的UE。在图1中所示的示例中，中继站110d可与宏eNB 110a和UE 120d通信以促成eNB 110a与UE 120d之间的通信。中继站也可被称为中继eNB、中继基站、中继等。

[0038] 无线网络100可以是包括不同类型的eNB（例如，宏eNB、微微eNB、毫微微eNB、中继eNB等）的异构网络。这些不同类型的eNB可具有不同发射功率电平、不同覆盖区域，并对无线网络100中的干扰产生不同影响。例如，宏eNB可具有高发射功率电平（例如，5到40瓦），而微微eNB、毫微微eNB和中继eNB可具有较低发射功率电平（例如，0.1到2瓦）。

[0039] 网络控制器130可耦合至一组eNB并可提供对这些eNB的协调和控制。网络控制器130可以经由回程与各eNB通信。这些eNB还可以彼此例如经由无线或有线回程直接或间接地通信。

[0040] UE 120（例如，120a、120b、120c等）可分散遍及无线网络100，并且每个UE可以是驻定或移动的。UE还可以指接入终端、终端、移动站、订户单元、站等。UE可以是蜂窝电话、个人数字助理(PDA)、无线调制解调器、无线通信设备、手持式设备、膝上型计算机、无绳电话、无线本地环路(WLL)站、平板、智能电话、上网本、智能本、超级本等等。

[0041] 图2示出了可以是图1中的各基站/eNB之一和各UE之一的基站/eNB 110和UE 120的设计的框图。基站110可装备有T个天线234a到234t，并且UE 120可装备有R个天线252a到252r，其中一般而言，$T \geq 1$并且$R \geq 1$。

[0042] 在基站110处，发射处理器220可从数据源212接收给一个或多个UE的数据，基于从每个UE接收的CQI来选择针对该UE的一种或多种调制及编码方案(MCS)，基于为每个UE选择的（诸）MCS来处理（例如，编码和调制）给该UE的数据，并提供给所有UE的数据码元。发射处理器220还可以处理系统信息（例如，针对SRPI等）和控制数据/信息（例如，CQI请求、准予、上层信令等），并提供开销码元和控制码元。处理器220还可以生成参考信号（例如，CRS）和同步信号（例如，PSS和SSS）的参考码元。发射(TX)多输入多输出(MIMO)处理器230可在适用的情况下对数据码元、控制码元、开销码元、和/或参考码元执行空间处理（例如，预编码），并且可将T个输出码元流提供给T个调制器(MOD)232a到232t。每个调制器232可处理各自的输出码元流（例如，针对OFDM等）以获得输出采样流。每个调制器232可进一步处理（例如，转换至模拟、放大、滤波、及上变频）该输出采样流以获得下行链路信号。来自调制器232a至232t的T个下行链路信号可分别经由T个天

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线 234a 至 234t 被传送。

[0043] 在 UE 120 处，天线 252a 到 252r 可接收来自基站 110 和 / 或其他基站的下行链路信号并且可分别向解调器 (DEMOD)254a 到 254r 提供收到信号。每个解调器 254 可调理 (例如，滤波、放大、下变频、及数字化) 其收到信号以获得输入采样。每个解调器 254 可进一步处理输入采样 (例如，针对 OFDM 等) 以获得收到码元。MIMO 检测器 256 可获得来自所有 R 个解调器 254a 到 254r 的收到码元，在适用的情况下对这些收到码元执行 MIMO 检测，并且提供检出码元。接收处理器 258 可以处理 (例如，解调和解码) 这些检出码元，将 UE 120 的经解码数据提供给数据阱 260，并且将经解码的控制信息和系统信息提供给控制器 / 处理器 280。信道处理器可以确定 RSRP、RSSI、RSRQ、CQI 等。

[0044] 在上行链路上，在 UE 120 处，发射处理器 264 可接收并处理来自数据源 262 的数据和来自控制器 / 处理器 280 的控制信息 (例如，针对包括 RSRP、RSSI、RSRQ、CQI 等的报告)。处理器 264 还可生成一个或多个参考信号的参考码元。来自发射处理器 264 的码元可在适用的场合由 TX MIMO 处理器 266 预编码，进一步由调制器 254a 到 254r 处理 (例如，用于 SC-FDM、OFDM 等)，并且向基站 110 发射。在基站 110 处，来自 UE 120 以及其他 UE 的上行链路信号可由天线 234 接收，由解调器 232 处理，在适用的情况下由 MIMO 检测器 236 检测，并由接收处理器 238 进一步处理以获得经解码的由 UE 120 发送的数据和控制信息。处理器 238 可将经解码数据提供给数据阱 239 并将经解码控制信息提供给控制器 / 处理器 240。基站 110 可包括通信单元 244 并且经由通信单元 244 与网络控制器 130 通信。网络控制器 130 可包括通信单元 294、控制器 / 处理器 290、以及存储器 292。

[0045] 控制器 / 处理器 240 和 280 可以分别指导基站 110 和 UE 120 处的操作。处理器 240 和 / 或基站 110 处的其他处理器和模块、和 / 或处理器 280 和 / 或 UE 120 处的其他处理器和模块可以执行或指导本文描述的技术的各过程。存储器 242 和 282 可分别存储供基站 110 和 UE 120 用的数据和程序代码。调度器 246 可调度 UE 以进行下行链路和 / 或上行链路上的数据传输。

[0046] 当向 UE 120 传送数据时，基站 110 可被配置成至少部分地基于数据分配大小来确定集束大小，并预编码所确定集束大小的经集束毗连资源块中的数据，其中每个集束中的诸资源块是以共用预编码矩阵来进行预编码的。也就是说，资源块中的参考信号 (诸如，UE-RS) 和 / 或数据可以是使用相同预编码器来预编码的。用于这些经集束 RB 的每个 RB 中的 UE-RS 的功率电平也可以是相同的。

[0047] UE 120 可被配置成执行互补的处理以解码从基站 110 传送的数据。例如，UE 120 可被配置成基于从基站以毗连资源块 (RB) 的集束形式传送而来的收到数据的数据分配大小来确定集束大小，其中每个集束中的诸资源块中的至少一个参考信号是以共用预编码矩阵来预编码的；基于所确定的集束大小和从基站传送的一个或多个参考信号 (RS) 来估计至少一个经预编码信道，并使用所估计的经预编码信道来解码收到集束。

[0048] 图 3 示出了 LTE 中用于 FDD 的示例性帧结构 300。用于下行链路和上行链路中每一者的传输时间线可被划分成以无线电帧为单位。每个无线电帧可具有预定历时 (例如 10 毫秒 (ms))，并且可被划分成具有索引 0 至 9 的 10 个子帧。每个子帧可包括两个时隙。每个无线电帧可因此包括具有索引 0 至 19 的 20 个时隙。每个时隙可包括 L 个码元周期，例如，对于正常循环前缀 (如图 2 中所示) 为 7 个码元周期，或者对于扩展循环前缀为 6 个码

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元周期。每个子帧中的这 2L 个码元周期可被指派索引 0 至 2L-1。

[0049] 在 LTE 中，eNB 可在下行链路上在用于该 eNB 所支持的每个蜂窝小区的系统带宽的中心 1.08MHz 中传送主同步信号 (PSS) 和副同步信号 (SSS)。PSS 和 SSS 可以在具有正常循环前缀的每个无线电帧的子帧 0 和 5 中分别在码元周期 6 和 5 中传送，如图 3 中所示。PSS 和 SSS 可被 UE 用于蜂窝小区搜索和捕获。eNB 可跨用于该 eNB 所支持的每个蜂窝小区的系统带宽来传送因蜂窝小区而异的参考信号 (CRS)。CRS 可在每个子帧的某些码元周期中传送，并且可被 UE 用于执行信道估计、信道质量测量、和 / 或其他功能。eNB 还可在某些无线电帧的时隙 1 中的码元周期 0 到 3 中传送物理广播信道 (PBCH)。PBCH 可携带一些系统信息。eNB 可在某些子帧中传送其他系统信息，诸如物理下行链路共享信道 (PDSCH) 上的系统信息块 (SIB)。eNB 可在子帧的头 B 个码元周期中在物理下行链路控制信道 (PDCCH) 上传送控制信息 / 数据，其中 B 可以是可针对每个子帧配置的。eNB 可在每个子帧的其余码元周期中在 PDSCH 上传送话务数据和 / 或其他数据。

[0050] 图 4 示出了具有正常循环前缀的两个示例性子帧格式 410 和 420。可用时频资源可被划分成资源块。每个资源块可覆盖一个时隙中的 12 个副载波并且可包括数个资源元素。每个资源元素可覆盖一个码元周期中的一个副载波，并且可被用于发送一个调制码元，该调制码元可以是实数值或复数值。

[0051] 子帧格式 410 可对两个天线使用。CRS 可在码元周期 0、4、7 和 11 中从天线 0 和 1 发射。参考信号是发射机和接收机先验已知的信号，并且也可被称为导频。CRS 是因蜂窝小区而异的参考信号，例如是基于蜂窝小区身份 (ID) 生成的。在图 4 中，对于具有标记 R_a 的给定资源元素，可在该资源元素上从天线 a 发射调制码元，并且可以在该资源元素上不从其他天线发射任何调制码元。子帧格式 420 可与四个天线联用。CRS 可在码元周期 0、4、7 和 11 中从天线 0 和 1 发射以及在码元周期 1 和 8 中从天线 2 和 3 发射。对于子帧格式 410 和 420 两者，CRS 可在均匀间隔的副载波上传送，这些副载波可以基于蜂窝小区 ID 来确定。CRS 可取决于其蜂窝小区 ID 在相同或不同的副载波上传送。对于子帧格式 410 和 420 两者，未被用于 CRS 的资源元素可被用于传送数据 (例如，话务数据、控制数据、和 / 或其他数据)。

[0052] LTE 中的 PSS、SSS、CRS 和 PBCH 在公众可获取的题为“Evolved Universal Terrestrial Radio Access(E-UTRA);Physical Channels and Modulation(演进型通用地面无线电接入 (E-UTRA);物理信道和调制)”的 3GPP TS 36.211 中作了描述。

[0053] 为在 LTE 中实现 FDD，可将交织结构用于下行链路和上行链路中的每一者。例如，可定义具有索引 0 到的 Q 股交织，其中 Q 可等于 4、6、8、10 或其他某个值。每股交织可包括间隔开 Q 个帧的子帧。具体而言，交织 q 可包括子帧 q、q+Q、q+2Q 等，其中 $q \in \{0,\ldots,Q-1\}$。

[0054] 无线网络可支持用于下行链路和上行链路上的数据传输的混合自动重传请求 (HARQ)。对于 HARQ，发射机 (例如，eNB) 可发送分组的一个或多个传输直至该分组被接收机 (例如，UE) 正确解码或是遭遇到其他某个终止条件。对于同步 HARQ，该分组的所有传输可在单股交织的各子帧中发送。对于异步 HARQ，该分组的每个传输可在任何子帧中发送。

[0055] UE 可能位于多个 eNB 的覆盖范围内。可选择这些 eNB 之一来服务该 UE。服务 eNB 可基于各种准则 (诸如，收到信号强度、收到信号质量、路径损耗等) 来选择。收到信号质量可由信噪干扰比 (SINR)、或参考信号收到质量 (RSRQ) 或其他某个度量来量化。UE 可能

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在强势干扰情景中工作，在此类干扰情景中UE可能会观察到来自一个或多个干扰eNB的严重干扰。

[0056] 针对MTC的示例增强型TTI集束设计

[0057] 传统LTE设计的焦点在于改进频谱效率、无所不在的覆盖、以及增强的服务质量(QoS)支持等。目前的LTE系统DL和上行链路UL链路预算是针对高端设备(诸如最先进的智能电话和平板)的覆盖来设计的。然而，同样需要支持低成本低速率设备。例如，对于MTC，可以减小最大带宽，可以使用单个接收射频(RF)链，可以降低峰值速率，可以减小发射功率，以及可以执行半双工操作。

[0058] 除了低成本以外，可能增加链路预算要求，例如，20dB覆盖增强以覆盖地下室中的设备。为了满足这一覆盖增加，已经提出了大的TTI集束以达成20dB链路预算增益。例如，可以使用具有大的集束大小的针对下行链路(例如，物理广播信道(PBCH)、物理下行链路控制信道(PDCCH)和增强型PDCCH、物理混合自动重复请求(HARQ)指示符信道(PHICH)、和物理下行链路共享信道(PDSCH))和上行链路(例如，随机接入信道(RACH)、物理上行链路控制信道(PUCCH)、和物理上行链路共享信道(PUSCH))信道两者传输时间区间(TTI)集束。

[0059] 然而，有了大的TTI集束大小，功耗和系统效率是考虑因素，特别是对于针对DL和UL两者均支持大集束的UE而言。例如，UE可能需要支持64个的集束以获得PDCCH准予，随后用128个的PUSCH集束来传送，随后用16个的集束来接收DL ACK等。

[0060] 在某些系统中(例如，长期演进(LTE)第8发行版)、TTI(例如，子帧)集束可在每用户装备(UE)基础上配置。子帧集束操作由较高层所提供的ttiBundling参数来配置。通常，TTI集束是通过在上行链路共享信道中在多个TTI上从UE向基站发送数据来执行的——集束不应用于其他上行链路信号/话务(例如，上行链路控制信息)。

[0061] 集束大小被固定在4个TTI(子帧)，即，PUSCH在四个连贯子帧中传送并且相同的HARQ过程号在这些经集束子帧中的每一个子帧中被使用。资源分配大小被约束成不超过3个资源块(RB)。调制阶数被设置成2(正交相移键控(QPSK))。每个集束被当做单个资源，例如，单个准予和单个HARQ确收(ACK)被用于每个集束。

[0062] TTI集束通常被用于低速话务。例如，如果网际协议上语音(VoIP)分组由于低上行链路链路预算而不能在单个TTI中被传送，则可以应用层2(L2)分段。例如，VoIP分组可被分段为在四个连贯TTI中传送的四个无线电链路控制(RLC)协议数据单元(PDU)。2-3个HARQ重传可被作为目标以达成充分覆盖。

[0063] 然而，常规办法可能是低效的。每个附加分段引入了一个字节的RLC、一个字节的媒体接入控制(MAC)、以及3个字节的L1循环冗余校验(CRC)开销。假定33个字节RLC服务数据单元(SDU)大小，这可折合例如15％的开销。在4个分段的情形，存在45％的附加L1/L2开销。

[0064] 常规办法的另一缺点是每个分段的HARQ传输/重传可能要求PDCCH上的准予，从而消耗了显著的PDCCH资源。另外，每个HARQ传输或重传之后跟随有PHICH上的HARQ反馈。假定NACK/ACK差错率为10^{-3}，则大量HARQ反馈信号导致高分组丢失概率。例如，如果发送了12个HARQ反馈信号，则HARQ反馈差错率可能是在$1.2*10^{-2}$数量级。10^{-2}以上的分组丢失率对于VoIP话务而言是不可接受的。

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[0065] 每 TTI 集束只使用单个上行链路准予和单个 PHICH 信号将是有利的。L1 和 L2 开销可被最小化，因为不要求 L2 分段。对于中数据速率 PUSCH 和 UL VoIP 的覆盖改善也是期望的，其对中数据速率 PUSCH 和 UL VoIP 两者具有 1dB 的最小增益。

[0066] 要解决的一个问题是如何提高大集束 20dB 覆盖的效率（例如，对于插入到插座中的设备）。一个问题是如何针对其中要求不同集束大小的不同用户条件来适配于信道状况，而非始终使用最差情形。要解决的另一问题是要使用什么 PHICH 集束大小，例如，如果 UE 使用具有集束大小 128 的 PUSCH 则要使用什么 PHICH 集束大小。

[0067] 本文提供了为部署在难以达到的位置（诸如地下室）中的设备以大集束和低功率来增强 MTC 操作的各种办法。本文提供了用于使用集束大小映射、固定集束大小、和集束大小的信令通知来确定集束大小的具有大集束大小的增强型 TTI 集束的技术和装置。本文还提供了用于具有大集束大小的持久调度和提前终止的技术。

[0068] 本公开的某些方面提供了用于针对机器类型通信 (MTC) 的增强型传输时间区间 (TTI) 集束设计的技术。TTI 集束大小可由一对一或一对多映射来固定。针对信道的集束大小可基于用于由另一信道发信令通知的集束大小来确定（或规定）。持久调度也可被用于传送信道，其中调制和编码方案 (MCS)、速率、或发射功率可针对信道传输来调整。

[0069] 对于严重覆盖受限的 UE 而言，所有 DL 信道的链路预算增强可能是期望的。根据某些方面，集束大小的固定集可被应用于所有信道。在各方面，可以有一对一映射而没有任何盲解码或附加信令。替换地，可能有具有有限的一组可能性的一对多映射，其由盲检测或信令来进一步缩选。

[0070] 根据某些方面，可在规范中定义用于 DL 和 UL 信道的集束大小的组合。替换地，可在一对一或一对多映射中信令通知用于 DL 和 UL 信道的集束大小。例如，PBCH 可以具有为 64 的固定集束大小，系统信息块 (SIB) 可以具有为 128 的固定集束大小，RACH 可以具有为 16 的固定集束大小，而消息 3 可以具有为 64 的固定集束大小。另外，PUSCH 可以具有为 128 的固定集束大小，PHICH 可以具有为 32 的固定集束大小，而 PDCCH 可以具有为 32 的固定集束大小。替换地，PUSCH 可以具有为 16 的固定集束大小，PHICH 可以具有为 4 的固定集束大小，而 PDCCH 可以具有为 4 的固定集束大小。在另一替换方案中，PUSCH 可以具有为 64 的固定集束大小，PHICH 可以具有为 4 或 8 的固定集束大小，而 PDCCH 可以具有为 2 或 4 的固定集束大小。

[0071] 根据某些方面，一旦 UE 从（诸）第一信道捕获了系统，则该 UE 可以知道其他信道的其余参数或有限参数集。例如，PBCH/SIB/ePDCCH 可以具有固定的集束大小映射。在这一情形中，UE 可以发现 PBCH 具有为 8 的集束大小，由此该 UE 可以知道 SIB 具有为 16 的集束大小，而 ePDCCH 具有聚集等级 8 和集束大小 8。在另一情形中，UE 可以发现 PBCH 具有为 16 的集束大小，由此该 UE 可以知道 SIB 具有为 32 的集束大小，而 ePDCCH 具有聚集等级 8 和集束大小 16。

[0072] 在各方面，对于 RACH 而言，RACH 的集束大小可在 PBCH/SIB 中被信令通知，或被直接映射至 PBCH/SIB 的 TTI 集束大小。例如，基于主同步信号 (PSS)/副同步信号 (SSS)/PBCH/SIB 的集束大小，可以确定 RACH 消息 1、3、5 的集束大小。

[0073] 根据某些方面，一个信道的集束大小可基于不同信道的集束大小来确定。在各方面，UE 可基于 UL 信道的所指派集束大小来确定 DL 信道的集束大小。例如，基于 PUSCH 传

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输的所指派集束大小，UE 可以确定动态 PDCCH 或 PHICH 的集束大小。在各方面，UE 可基于 DL 信道的所指派集束大小来确定 UL 信道的集束大小。例如，基于 ePDCCH/PDCCH 的所指派集束大小，UE 可以确定 PUCCH ACK 的集束大小。

[0074] 可以使用持久指派以减少因经集束 PDCCH/ePDCCH 指派所导致的开销。然而，持久调度的一个缺陷是它不能适配于信道变动和有效载荷大小改变。根据某些方面，大的集束大小可经由持久调度来指派并且可以允许分组的提前终止。在 UL 上，可向 UE 发信令通知以用 N 的 TTI 集束大小来传送，但为该 UE 提供多个 PHICH 资源以在其完成整个 TTI 集束之前进行监视。这可以避免动态准予改变并且 PHICH 可以具有少得多的开销并且更容易进行功率推升。替换地，可以指令 UE 来监视动态 PDCCH 准予以指示提前终止和新传输两者。在各方面，该指令可在规范中或经由信令来指示。

[0075] 作为示例，PUSCH 传输可针对为 128 的 TTI 集束大小来被持久调度，但是允许 UE 在为 64 或 96 的 TTI 处提前终止。因此，如果 eNB 提前解码，则其能发信令通知 UE 停止在其余 TTI 上传送。PHICH 可仍旧映射至物理资源块 (PRB)。另外，PHICH 可被集束或功率推升以实现链路预算改进。

[0076] 根据某些方面，PS 可具有固定 RB 大小。调制和编码方案 (MCS) / 速率可基于 UL 有效载荷大小在有限集内被适配，或者可被链接至功率控制和提前终止。这可以提供 PDCCH/ePDCCH 开销和功率节省。在 UL 上，这可以是全速率 / 半速率的 UE 速率选择或 eNB 盲解码等。

[0077] 根据某些方面，如果支持提前终止，则 UE 可以用最大功率来发射并且依赖于提前终止来适配于信道和干扰状况。如果不支持提前终止，则 UE 可以根据所选取的传输块 (TB) 大小来自动调整发射功率，并保持相同的经集束 TTI 传输。根据某些方面，在 DL 上，eNB 可以在持久指派 (UE 可以盲解码) 内提供多个速率并允许该 UE 传送 PHICH 以实现提前终止。

[0078] 图 5 解说了根据本公开的某些方面的用于无线通信的示例操作 500。操作 500 例如可由无线设备来执行。操作 500 可在 502 处通过确定一个或多个上行链路 (例如，PUSCH、RACH 消息 1、RACH 消息 3) 或下行链路 (例如，PDCCH、PBCH、PHICH、SIB) 信道至一个或多个固定集束大小的映射来开始，其中每个集束大小指示信道应该在其上被传送的传输时间区间 (TTI) 的数目。在各方面，该映射可以是信道至单个固定集束大小的一对一映射或者信道至潜在可能集束大小集合的一对多映射。

[0079] 在 504，无线设备基于该映射来处理该一个或多个上行链路或下行链路信道的传输。例如，该设备可以根据该映射来传送和 / 或接收该一个或多个上行链路或下行链路信道。根据某些方面，无线设备可以经由盲检测确定来自该集合的所使用的实际集束大小。在各方面，无线设备可以接收指示来自该集合的一个或多个集束大小的信令。

[0080] 在各方面，用于一个信道的集束大小可以规定用于一个或多个其他信道的集束大小。例如，用于该一个或多个其他信道中的每个其他信道的集束大小可与这一个信道的集束大小数成比例。替换地，用于上行链路信道的集束大小可以规定用于一个或多个下行链路信道的集束大小，或者用于该下行链路信道的集束大小可以规定用于该一个或多个上行链路信道的集束大小。

[0081] 在各方面，用于 RACH 的集束大小可在 PBCH 或 SIB 中来发信令通知。替换地，用于 RACH 的集束大小可被映射至 PBCH 或 SIB 的集束大小。在各方面，消息 1(RACH)、消息 2(RACH

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响应）、消息3、或消息4的集束大小可被映射至PSS、SSS、PBCH或SIB中的至少一者的集束大小。在各方面，一RACH消息的集束大小是基于一不同的RACH消息的集束大小来确定的。例如，RACH消息2的集束大小是基于RACH消息1或RACH消息3的集束大小来确定的。

[0082] 图6解说了根据本公开的某些方面的用于无线通信的示例操作600。操作600例如可由无线设备来执行。操作600可在602处通过确定对规定要被用于至少一个信道的传输的传输时间区间（TTI）的数量的集束大小的持久调度（PS）指派开始。

[0083] 在604，无线设备在一个或多个TTI中传送该至少一个信道。

[0084] 在606，无线设备响应于接收到接收方设备成功接收到该至少一个信道的指示（例如，经由PDCCH准予或PHICH）而在达到由集束大小规定的TTI数量之前终止该至少一个信道的传输。

[0085] 图7解说了根据本公开的某些方面的用于无线通信的示例操作700。操作700例如可由无线设备来执行。操作700可在702处通过接收对规定要被用于至少一个信道的传输的传输时间区间（TTI）的数量的集束大小的持久调度（PS）指派的指示来开始。

[0086] 在704，无线设备在一个或多个TTI中接收该至少一个信道。

[0087] 在706，如果成功接收到该至少一个信道，则无线设备传送在达到由集束大小规定的TTI数量之前终止该至少一个信道的传输的指示（例如，经由PDCCH准予、ePDCCH、PHICH、或PDCCH、ePDCCH或PHICH的经集束版本）。

[0088] 图8解说了根据本公开的某些方面的用于无线通信的示例操作800。操作800例如可由无线设备来执行。操作800可在802处通过确定对用于传送至少一个信道的固定数量的资源块（RB）的持久调度（PS）指派（例如，指示TTI的集束大小）来开始。

[0089] 在804，无线设备在传送该至少一个信道时调整调制和编码方案（MCS）、速率、或发射功率中的至少一者。例如，无线设备可以基于该信道的有效载荷大小来调整MCS、速率或发射功率。在各方面，无线设备可以在MCS或速率的有限集之间进行调整。根据某些方面，无线设备可以响应于接收到接收方设备成功接收到该至少一个信道的指示而在达到由集束大小规定的TTI数量之前终止该至少一个信道的传输。在各方面，该至少一个信道是上行链路信道并且该调整包括以UE所选的速率来传送该上行链路信道。

[0090] 图9解说了根据本公开的某些方面的用于无线通信的示例操作900。操作900例如可由无线设备来执行。操作900可在902处通过确定对要传送至少一个信道的固定数量的资源块（RB）的持久调度（PS）指派（例如，指示TTI的集束大小）来开始。

[0091] 在904，无线设备处理（例如，盲检测以确定经调整速率）该至少一个信道的传输，其中调制和编码方案（MCS）、速率、或发射功率中的至少一者可在传送该至少一个信道时来调整。例如，无线设备可以基于该信道的有效载荷大小来调整MCS、速率或发射功率。在各方面，无线设备可以在MCS或速率的有限集之间进行调整。在各方面，无线设备可以接收指示PS指派内可用的速率集的信令。

[0092] 根据某些方面，无线设备可以响应于接收到接收方设备成功接收到该至少一个信道的指示而在达到由集束大小规定的TTI数量之前终止该至少一个信道的传输。在各方面，该至少一个信道是上行链路信道并且该调整包括以UE所选的速率来传送该上行链路信道。

[0093] 术语“或”旨在表示包含性“或”而非排他性“或”。即，除非另外指明或从上下文

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能清楚地看出，否则短语例如“X 采用 A 或 B”旨在表示任何自然的可兼排列。即，例如短语“X 采用 A 或 B”得到以下任何实例的满足：X 采用 A；X 采用 B；或 X 采用 A 和 B 两者。另外，本申请和所附权利要求书中所使用的冠词“一”和“某”一般应当被解释成表示“一个或多个”，除非另外声明或者可从上下文中清楚看出是指单数形式。如本文中所使用的，引述一列项目中的“至少一个”的短语是指这些项目的任何组合，包括单个成员。作为示例，“a、b 或 c 中的至少一个”旨在涵盖：a、b、c、a-b、a-c、b-c 和 a-b-c。

[0094] 以上所描述的方法的各种操作可由能够执行相应功能的任何合适的装置来执行。这些装置可包括各种硬件和 / 或软件 / 固件组件和 / 或模块，包括但不限于电路、专用集成电路 (ASIC)、或处理器。一般而言，在附图中解说操作的场合，那些操作可由任何合适的相应配对装置加功能组件来执行。

[0095] 本领域技术人员应理解，信息和信号可使用各种不同技术和技艺中的任何一种来表示。例如，贯穿上面说明始终可能被述及的数据、指令、命令、信息、信号、比特（位）、码元、和码片可由电压、电流、电磁波、磁场或磁粒子、光场或光粒子、或其组合来表示。

[0096] 本领域技术人员将进一步领会，结合本文的公开所描述的各种解说性逻辑框、模块、电路、和算法步骤可被实现为电子硬件、软件 / 固件、或者其组合。为清楚地解说硬件与软件 / 固件的这一可互换性，各种解说性组件、框、模块、电路、和步骤在上面是以其功能性的形式作一般化描述的。这样的功能性是实现成硬件 / 固件还是软件取决于具体应用和加诸整体系统上的设计约束。技术人员可针对每种特定应用以不同方式来实现所描述的功能性，但此类实现决策不应被解读为致使脱离本发明的范围。

[0097] 结合本文的公开所描述的各种解说性逻辑框、模块、以及电路可用设计成执行本文中描述的功能的通用处理器、数字信号处理器 (DSP)、专用集成电路 (ASIC)、现场可编程门阵列 (FPGA) 或其他可编程逻辑器件、分立的门或晶体管逻辑、分立的硬件组件、或其任何组合来实现或执行。通用处理器可以是微处理器，但在替换方案中，处理器可以是任何常规的处理器、控制器、微控制器、或状态机。处理器还可以被实现为计算设备的组合，例如 DSP 与微处理器的组合、多个微处理器、与 DSP 核心协同的一个或多个微处理器、或任何其他此类配置。

[0098] 结合本文公开描述的方法或算法的步骤可直接在硬件中、在由处理器执行的软件 / 固件模块中、或在其组合中实施。软件 / 固件模块可驻留在 RAM 存储器、闪存、ROM 存储器、EPROM 存储器、EEPROM 存储器、PCM（相变存储器）、寄存器、硬盘、可移动盘、CD-ROM、或本领域中所知的任何其他形式的存储介质中。示例性存储介质耦合到处理器以使得该处理器能从 / 向该存储介质读写信息。替换性地，存储介质可以被整合到处理器。处理器和存储介质可驻留在 ASIC 中。ASIC 可驻留在用户终端中。在替换方案中，处理器和存储介质可作为分立组件驻留在用户终端中。

[0099] 在一个或多个示例性设计中，所描述的功能可以在硬件、软件 / 固件、或其组合中实现。如果在软件 / 固件中实现，则各功能可以作为一条或多条指令或代码存储在计算机可读介质上或藉其进行传送。计算机可读介质包括计算机存储介质和通信介质两者，包括促成计算机程序从一地向另一地转移的任何介质。存储介质可以是可被通用或专用计算机访问的任何可用介质。作为示例而非限定，这样的计算机可读介质可以包括 RAM、ROM、EEPROM、CD-ROM 或其他光盘存储、磁盘存储或其他磁存储设备、或能被用来携带或存储指令

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或数据结构形式的期望程序代码手段且能被通用或专用计算机、或者通用或专用处理器访问的任何其他介质。任何连接也被正当地称为计算机可读介质。例如，如果软件 / 固件是使用同轴电缆、光纤电缆、双绞线、数字订户线 (DSL)、或诸如红外、无线电、以及微波之类的无线技术从 web 网站、服务器、或其它远程源传送而来，则该同轴电缆、光纤电缆、双绞线、DSL、或诸如红外、无线电、以及微波之类的无线技术就被包括在介质的定义之中。如本文中所使用的盘 (disk) 和碟 (disc) 包括压缩碟 (CD)、激光碟、光碟、数字多用碟 (DVD)、软盘和蓝光碟，其中盘 (disk) 往往以磁的方式再现数据而碟 (disc) 用激光以光学方式再现数据。上述的组合应当也被包括在计算机可读介质的范围内。

[0100] 提供对本公开的先前描述是为使得本领域任何技术人员皆能够制作或使用本公开。对本公开的各种修改对本领域技术人员来说都将是显而易见的，且本文中所定义的普适原理可被应用到其他变型而不会脱离本公开的精神或范围。由此，本公开并非旨在被限定于本文中所描述的示例和设计，而是应被授予与本文中所公开的原理和新颖特征一致的最广义的范围。

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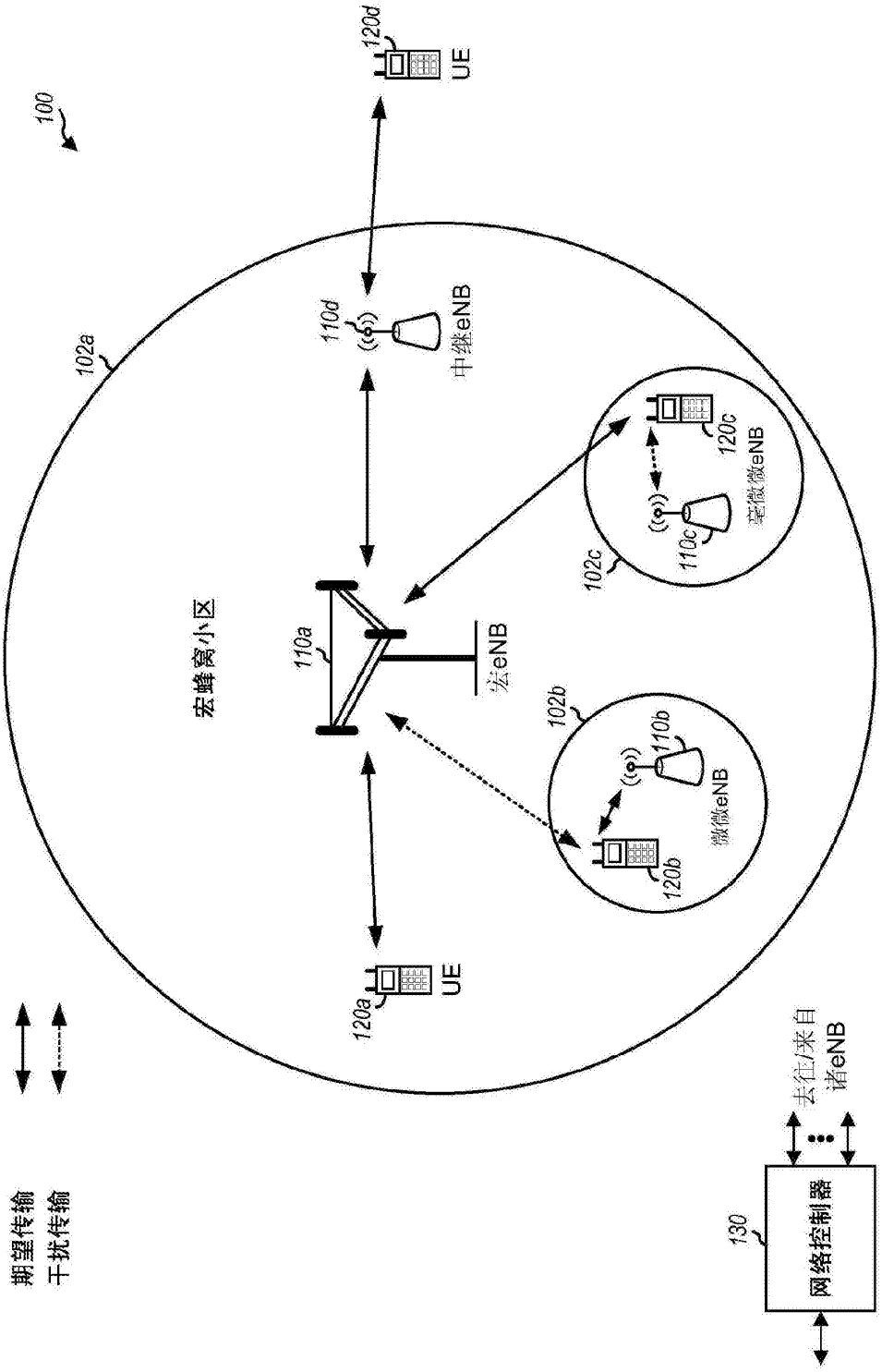


图 1

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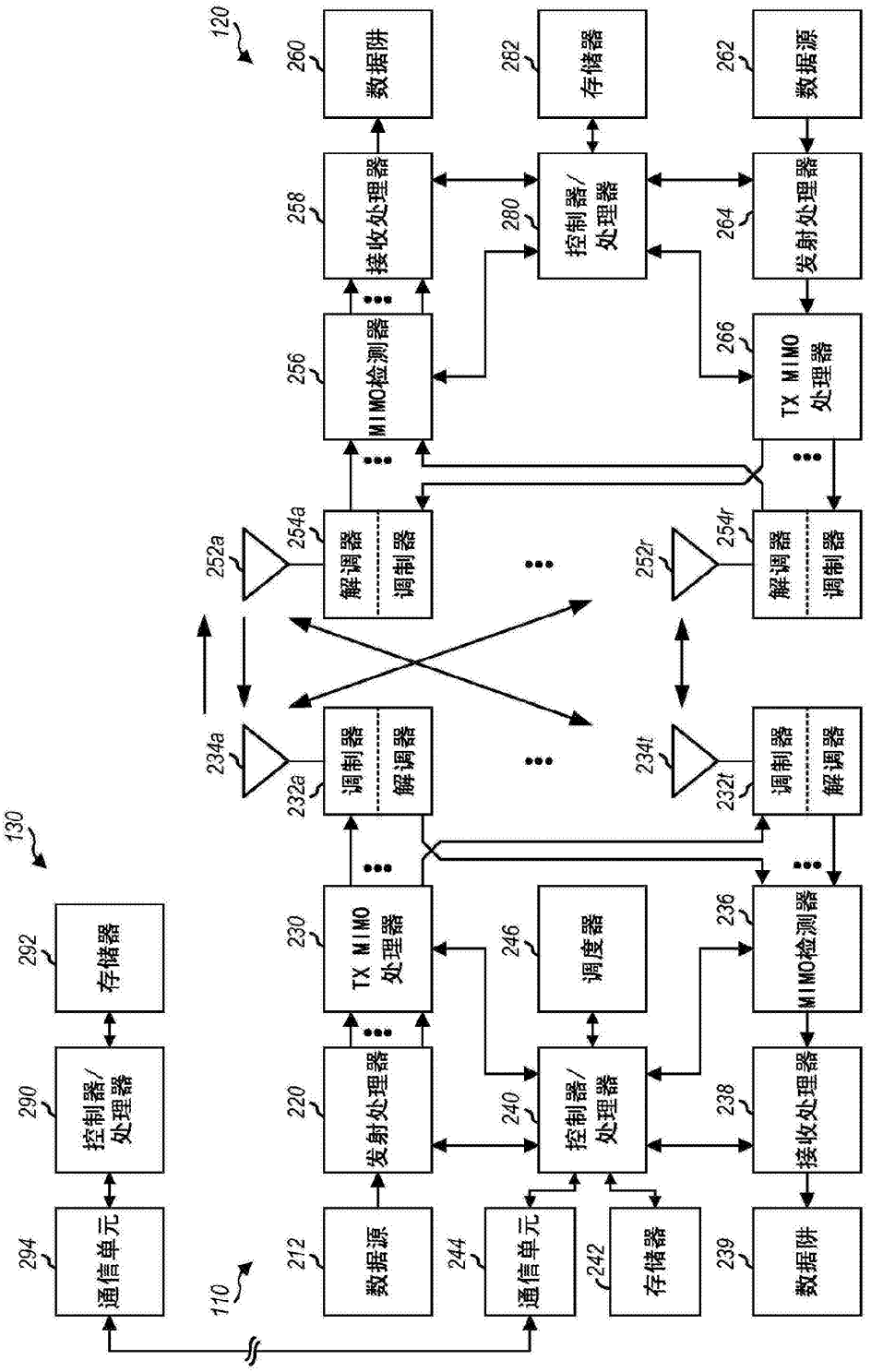


图 2

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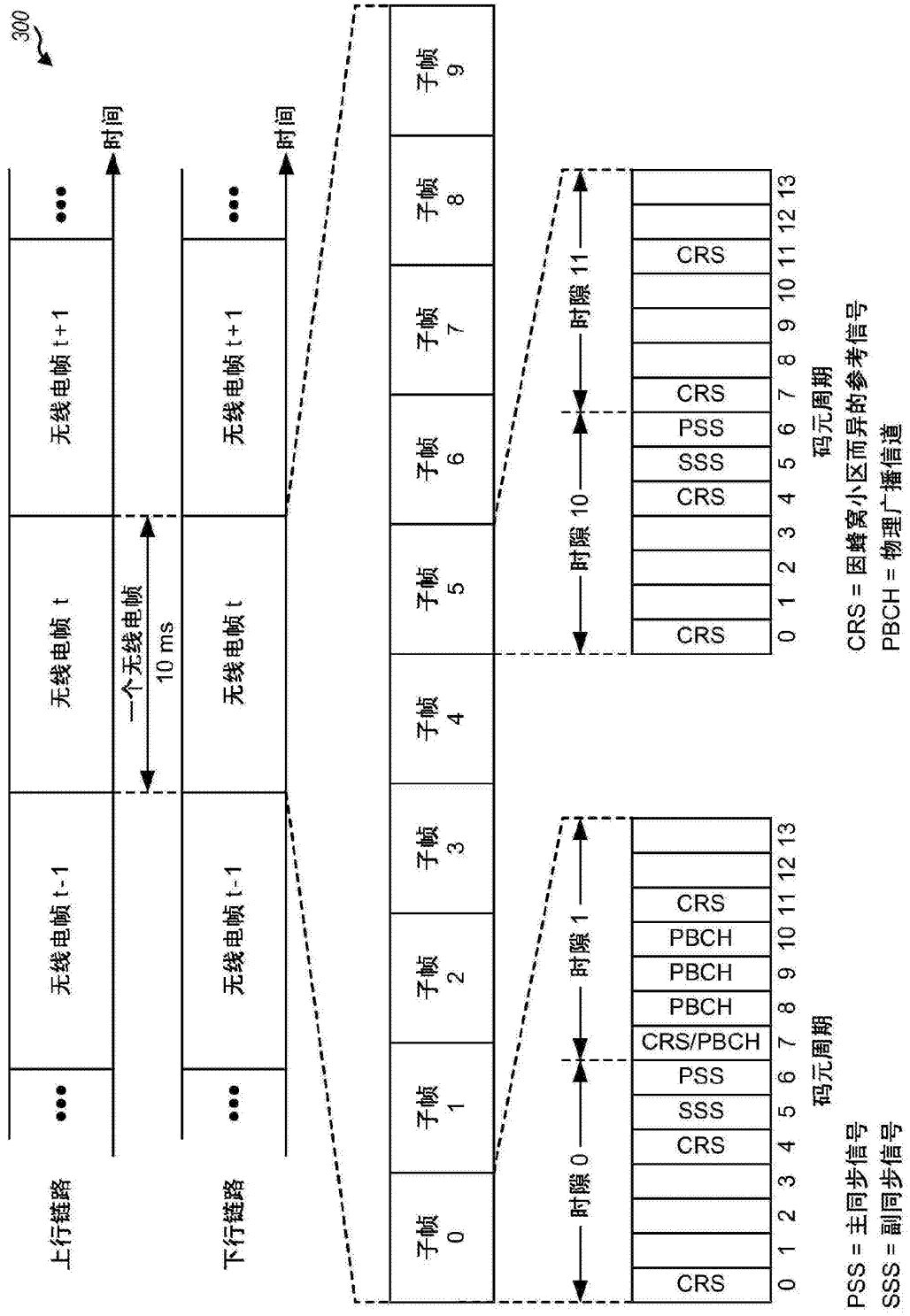


图 3

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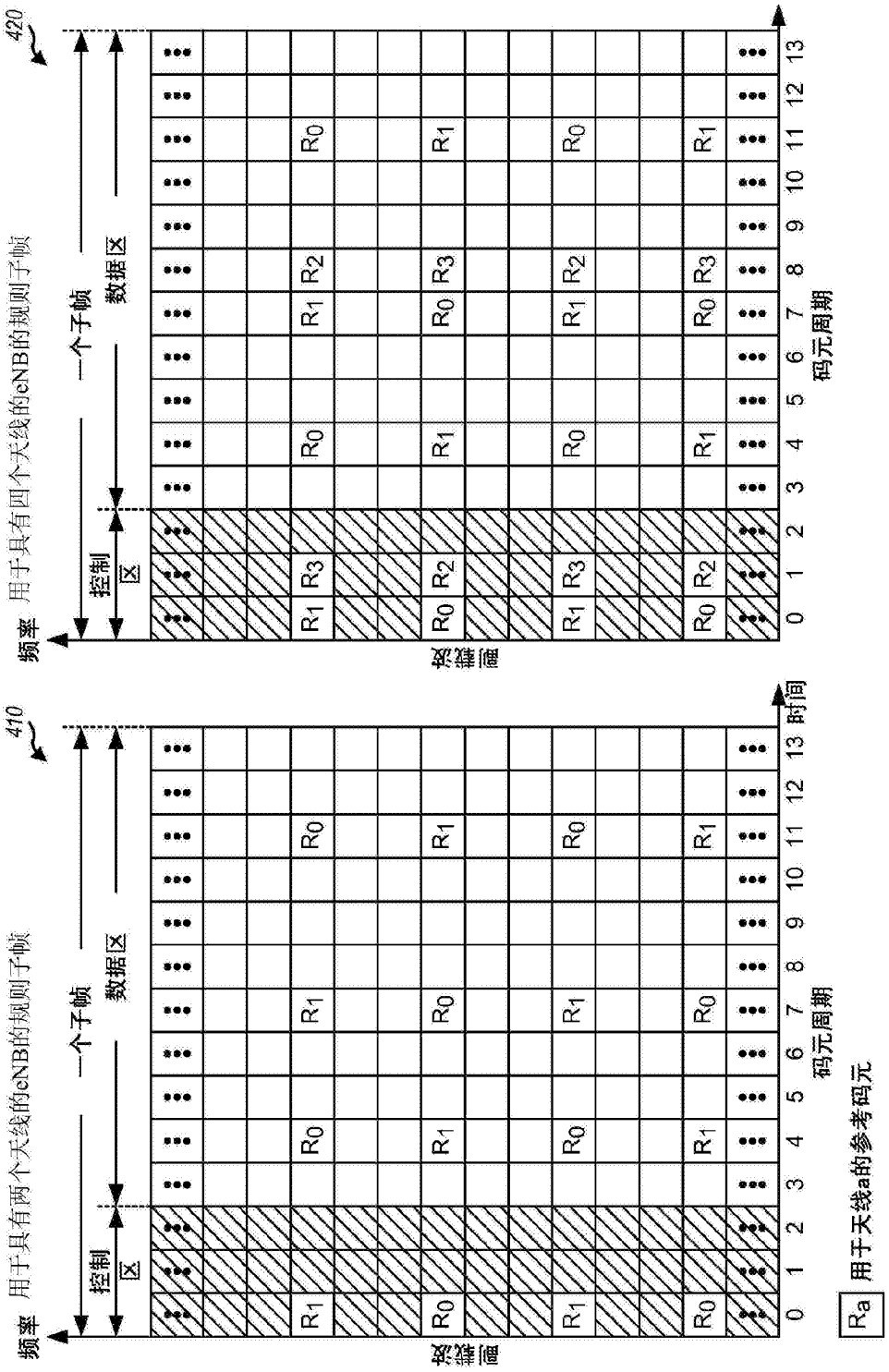


图 4

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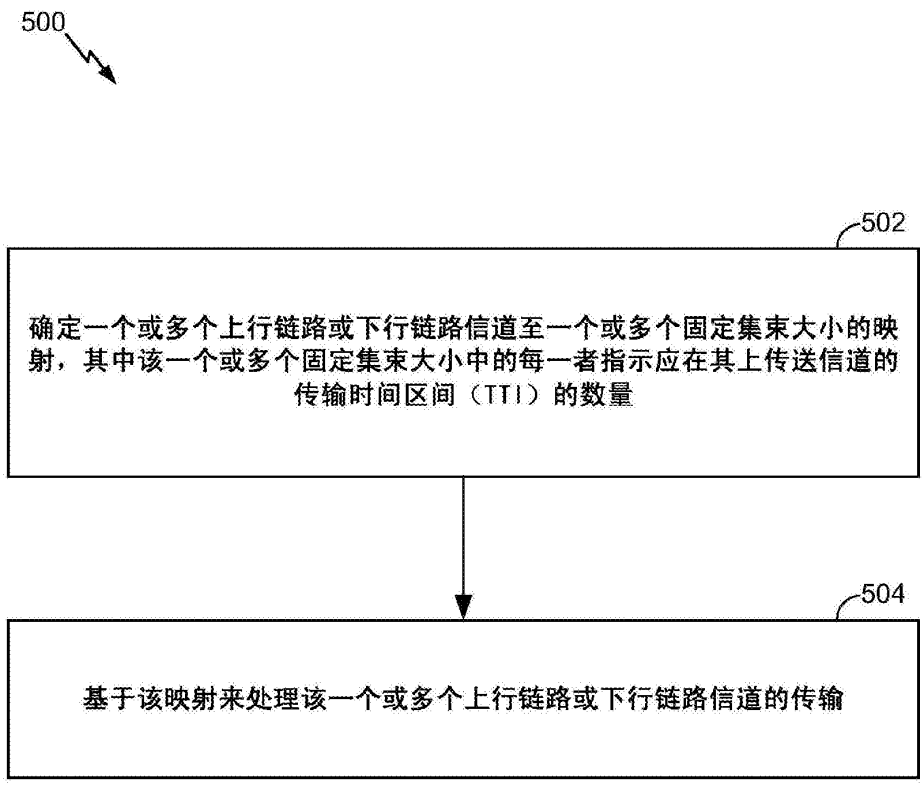


图 5

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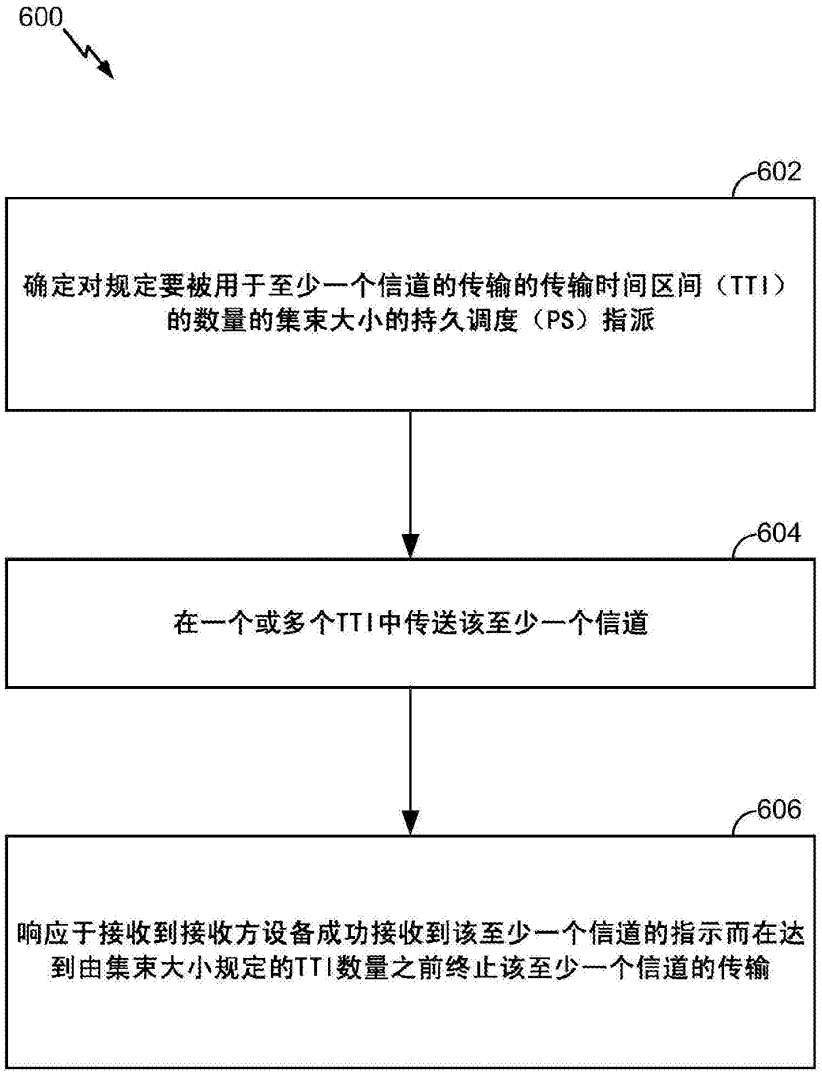


图 6

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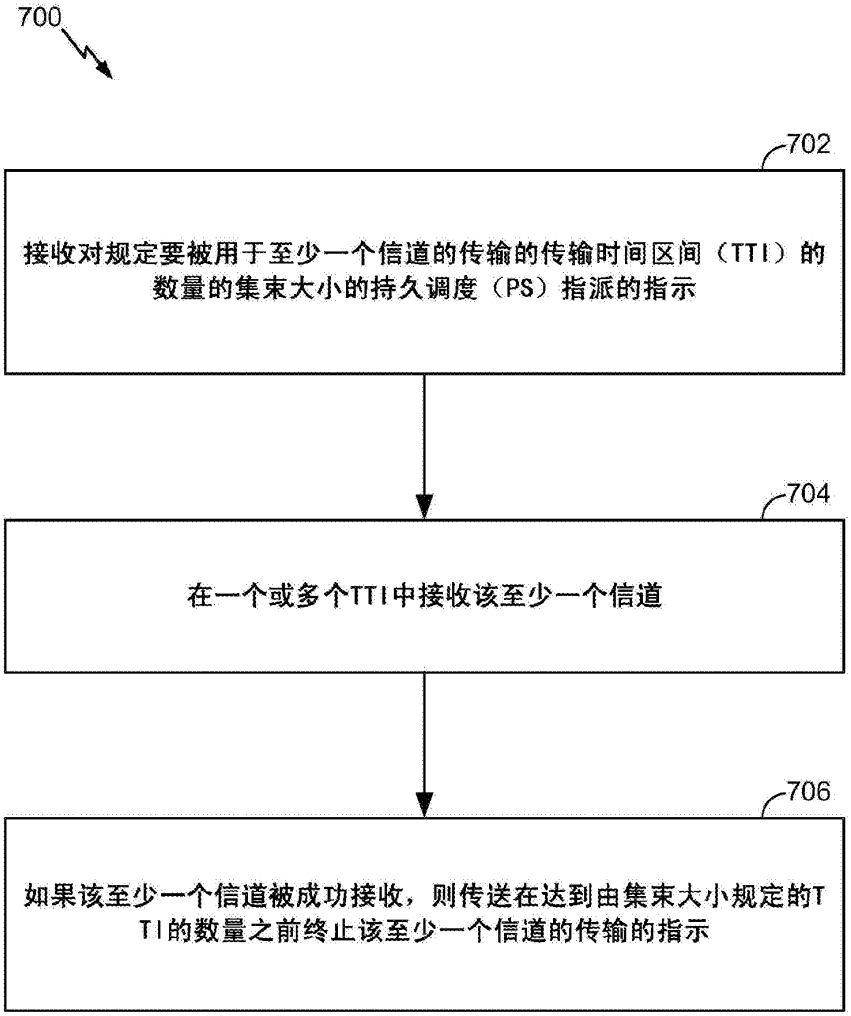


图 7

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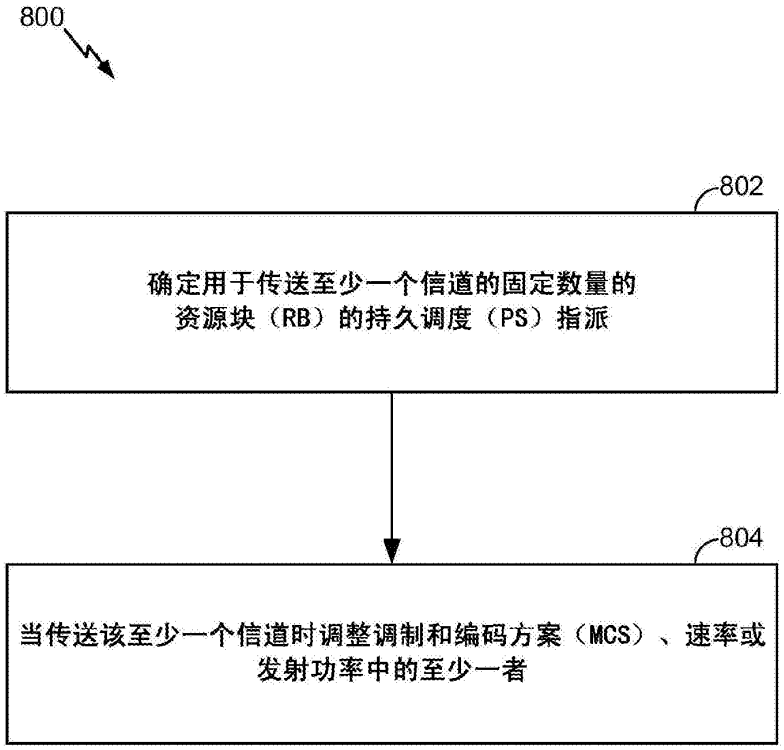


图 8

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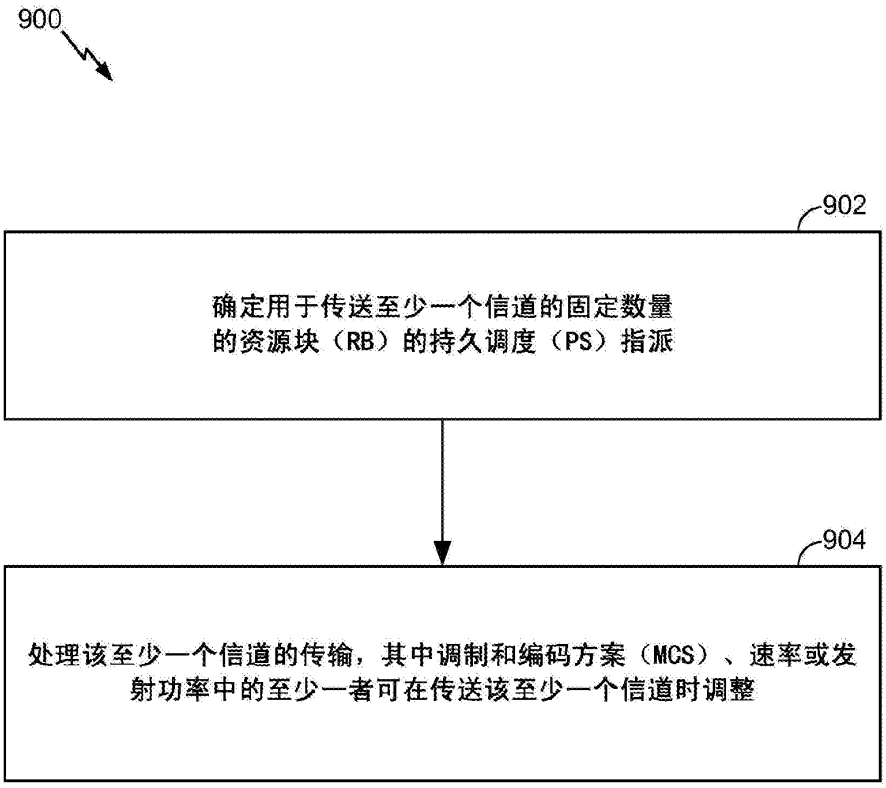


图 9

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Espacenet

Bibliographic data: CN102740407 (A) — 2012-10-17

Method and system for uplink scheduling, terminal and base station

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Classification: **- international:** ***H04W48/16; H04W72/04; H04W74/08***
- cooperative: **H04W74/0833 (EP)**

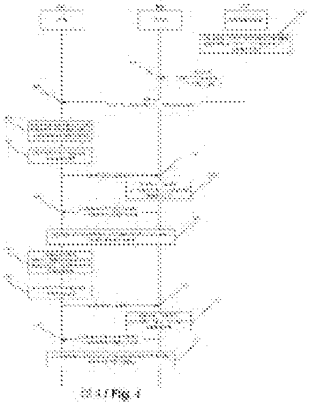
Application number: CN20111089850 20110411 Global Dossier

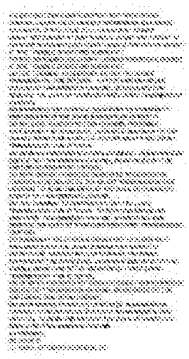
Priority number(s): CN20111089850 20110411

Also published as: CN102740407 (B) WO2012139377 (A1)

Abstract of CN102740407 (A)

The invention discloses a method for uplink scheduling. Preamble signatures of the PRACH are divided into at least two types which are respectively used for indicating scheduling in a short transmission time interval mode and indicating scheduling in a long transmission time interval mode. The method further comprises the steps that: the short transmission time interval mode or the long transmission time interval mode used when uplink random access is carried out is determined by a terminal; a corresponding preamble signature of the determined scheduling mode is selected to establish a preamble of the PRACH; and the uplink random access is carried out. The invention further discloses an uplink scheduling system, a terminal and a base station. According to network coverage situations and terminal characteristics in the invention, the short transmission time interval scheduling mode or the long transmission time interval scheduling mode is dynamically selected by the terminal to use reinforced special-purpose transmission channel resources, and thereby a network coverage





scope is not only ensured, but also uplink high-speed transmission needs can be satisfied.

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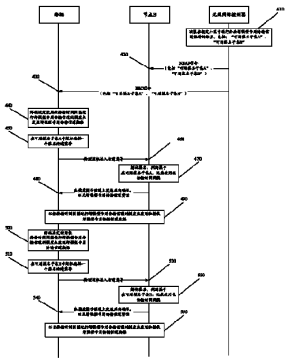
权利要求书 2 页 说明书 9 页 附图 4 页

(54)发明名称

上行调度方法及系统、终端及基站

(57)摘要

本发明公开了一种上行调度方法，将PRACH的前导签名至少分为用于指示短传输时间间隔方式调度和长传输时间间隔方式调度的两种类型；所述方法还包括：终端确定上行随机接入时所使用的短传输时间间隔方式或长传输时间间隔调度方式，并选用与所确定的调度方式对应的前导签名构建PRACH的前导，进行上行随机接入。本发明同时公开了一种上行调度系统，终端以及基站。本发明针对网络覆盖情况以及终端特性，由终端动态选择短传输时间间隔调度方式或长传输时间间隔调度方式来使用增强型专用传输信道资源，从而既确保了网络覆盖范围，又能够满足上行高速率传输需求。



CN 102740407 A

1. 一种上行调度方法，其特征在于，将物理随机接入信道 PRACH 的前导签名至少分为用于指示短传输时间间隔方式调度和长传输时间间隔方式调度的两种类型；所述方法还包括：

终端确定上行随机接入时所使用的短传输时间间隔方式或长传输时间间隔调度方式，并选用与所确定的调度方式对应的前导签名构建 PRACH 的前导，进行上行随机接入。

2. 根据权利要求 1 所述的方法，其特征在于，所述方法还包括：

网络侧将 PRACH 的可用前导签名分为用于指示短传输时间间隔方式调度和长传输时间间隔方式调度的两种类型，并通知所述终端及所述终端所在小区所属的基站。

3. 根据权利要求 2 所述的方法，其特征在于，所述网络侧为无线网络控制器；

所述通知所述终端及所述终端所在小区所属的基站，为：

所述无线网络控制器分别通知所述终端及所述终端所在小区所属的基站，或者，所述无线网络控制器通过所述终端所在小区所属的基站通知所述终端。

4. 根据权利要求 2 所述的方法，其特征在于，所述方法还包括：

所述终端接收到所述终端所在小区所属的基站发送的正向确认后，使用所确定的调度方式调度承载待发送上行数据的资源，进行上行数据发送。

5. 根据权利要求 4 所述的方法，其特征在于，所述方法还包括：

所述终端所在小区所属的基站侦听所述 PRACH，根据所述 PRACH 中的前导签名确定当前的调度方式，向所述终端发送正向确认；随后利用所确定的调度方式接收上行数据。

6. 根据权利要求 5 所述的方法，其特征在于，所述利用所确定的调度方式接收上行数据，为：

所述基站使用短传输时间间隔的间隔周期进行增强型专用传输信道 E-DCH 资源的调度来接收增强型专用传输信道数据；

或者，所述基站使用长传输时间间隔的间隔周期进行 E-DCH 资源的调度来接收增强型专用传输信道数据。

7. 根据权利要求 1 至 5 任一项所述的方法，其特征在于，所述短传输时间间隔调度方式为，所述终端使用短传输时间间隔的间隔周期进行 E-DCH 资源的调度来发送增强型专用传输信道数据；

所述长传输时间间隔调度方式为，所述终端使用长传输时间间隔的间隔周期进行 E-DCH 资源的调度来发送增强型专用传输信道数据。

8. 一种终端，其特征在于，包括接收单元、确定单元和随机接入单元，其中，

接收单元，用于接收网络侧发送的将 PRACH 的前导签名至少分为用于指示短传输时间间隔方式调度和长传输时间间隔方式调度的两种类型的通知；

确定单元，用于确定上行随机接入时所使用的短传输时间间隔方式或长传输时间间隔调度方式；

随机接入单元，用于选用与所确定的调度方式对应的前导签名构建 PRACH 的前导，进行上行随机接入。

9. 根据权利要求 8 所述的终端，其特征在于，所述终端还包括：

发送单元，用于在所述接收单元接收到所述终端所在小区所属的基站发送的正向确认后，使用所确定的调度方式进行 E-DCH 资源的调度来发送增强型专用传输信道数据。

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10. 一种基站，其特征在于，包括接收单元、侦听单元和发送单元，其中，

接收单元，用于接收网络侧发送的将 PRACH 的前导签名至少分为用于指示短传输时间间隔方式调度和长传输时间间隔方式调度的两种类型的通知；

侦听单元，用于侦听终端的 PRACH，根据所述 PRACH 中的前导签名确定当前的调度方式；

发送单元，用于向终端发送正向确认；

所述接收单元进一步利用所确定的调度方式进行 E-DCH 资源的调度来接收增强型专用传输信道数据。

11. 一种上行调度系统，包括网络侧、终端和所述终端所在小区所属的基站；其特征在于，

网络侧，用于将 PRACH 的前导签名至少分为用于指示短传输时间间隔方式调度和长传输时间间隔方式调度的两种类型，并通知所述终端及所述终端所在小区所属的基站；

终端，用于确定上行随机接入时所使用的短传输时间间隔方式或长传输时间间隔调度方式，并选用与所确定的调度方式对应的前导签名构建 PRACH 的前导，进行上行随机接入。

12. 根据权利要求 10 所述的系统，其特征在于，所述网络侧为无线网络控制器；

所述无线网络控制器进一步用于，分别通知所述终端及所述终端所在小区所属的基站，或者，通过所述终端所在小区所属的基站通知所述终端。

13. 根据权利要求 10 所述的系统，其特征在于，所述终端进一步用于，在接收到所述终端所在小区所属的基站发送的正向确认后，使用所确定的调度方式进行 E-DCH 资源的调度来发送增强型专用传输信道数据。

14. 根据权利要求 13 所述的系统，其特征在于，所述终端所在小区所属的基站进一步用于，侦听所述终端的 PRACH，根据所述 PRACH 中的前导签名确定当前的调度方式，向所述终端发送正向确认；随后利用所确定的调度方式进行 E-DCH 资源的调度来接收增强型专用传输信道数据。

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上行调度方法及系统、终端及基站

技术领域

[0001] 本发明涉及一种上行随机接入技术，尤其涉及一种高速上行链路分组接入系统中的上行调度方法及系统、终端及基站。

背景技术

[0002] 高速上行链路分组接入技术通过快速调度以及物理层快速重传合并等手段来改善上行链路分组数据的性能。为此，高速上行链路分组接入技术引入了一种新的传输信道－增强型专用传输信道（E-DCH，Enhanced Dedicated Transport Channel）用于承载用户数据，E-DCH 为专门用于承载上行数据的上行信道。另外，承载增强型专用传输信道的物理信道是物理随机接入信道（PRACH，Physical Random Access Channel）。

[0003] 终端有两个基本操作模式，分别是空闲模式和连接模式。连接模式可以进一步分为以下不同的状态：通用移动通讯系统无线接入网注册区域寻呼信道（URA_PCH，Universal mobile telecommunication system Radio access network Register area Paging Channel）状态、小区寻呼信道（CELL_PCH，CELL Paging Channel）状态、小区前向接入信道（CELL_FACH，CELL Forward Access Channel）状态以及小区专用信道（CELL_DCH，CELL Dedicated Channel）状态等，这些状态定义了终端可以使用的物理信道及传输信道的种类。

[0004] 在 CELL_FACH 状态下，终端在发送上行数据时可使用高速上行链路分组接入技术，通过增强型专用传输信道来发送上行用户数据。增强型专用传输信道的传输时间间隔有两种，一种是 2 毫秒的传输时间间隔，也就是以 2 毫秒的间隔周期进行增强型专用传输信道的调度来发送增强型专用传输信道数据，这种 2 毫秒的传输时间间隔称为短传输时间间隔；另外一种是 10 毫秒的传输时间间隔，也就是以 10 毫秒的间隔周期进行增强型专用传输信道的调度来发送增强型专用传输信道数据，这种 10 毫秒的传输时间间隔称为长传输时间间隔。

[0005] 终端开展如电子邮件的推送（PUSH Email）、虚拟连接等业务时，需要与服务器之间频繁地发送／接收小包数据。针对于此，终端可以采用常驻 CELL_FACH 状态来实现上述业务，以避免频繁地到 CELL_DCH 的状态迁移。此外，智能手机终端在通用移动通信系统（UMTS，Universal Mobile Telecommunications System）中得到了大规模使用，需要针对现网现况来着力提升上行链路的使用效率，特别是需要提升增强型专用传输信道的使用效率。

[0006] 现有技术中，所有的公共增强型专用传输信道资源只能够配置为短传输时间间隔，或者只能够配置为长传输时间间隔。考虑到需要确保较大的随机接入信道覆盖范围的这个主要约束，网络通常趋向性地选择配置为长传输时间间隔的调度周期。这样，就使得那些具备较大功率余量的终端被迫使用较低速率来传输数据，使得短传输时间间隔的快速调度所带来的增益不可用。同时，那些具备较小功率余量的终端，也无法从长传输时间间隔的调度周期带来的更大小区边缘覆盖范围中受益。

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[0007] 考虑到上述限制，期望进行如下改进，小区中的公共的增强型专用传输信道资源既可以用于短传输时间间隔的调度，也可以用于长传输时间间隔的调度。针对网络覆盖情况以及终端特性，由终端动态选择短传输时间间隔或长传输时间间隔来使用增强型专用传输信道资源，以既确保覆盖范围又能够满足用户高速率传输需求。

发明内容

[0008] 有鉴于此，本发明的主要目的在于提供一种上行调度方法及系统、终端及基站，能根据网络接入状况选用适当的上行调度方式，实现了上行传输的高速率及确保了较大的覆盖范围。

[0009] 为达到上述目的，本发明的技术方案是这样实现的：

[0010] 一种上行调度方法，将 PRACH 的前导签名至少分为用于指示短传输时间间隔方式调度和长传输时间间隔方式调度的两种类型；所述方法还包括：

[0011] 终端确定上行随机接入时所使用的短传输时间间隔方式或长传输时间间隔调度方式，并选用与所确定的调度方式对应的前导签名构建 PRACH 的前导，进行上行随机接入。

[0012] 优选地，所述方法还包括：

[0013] 网络侧将 PRACH 的可用前导签名分为用于指示短传输时间间隔方式调度和长传输时间间隔方式调度的两种类型，并通知所述终端及所述终端所在小区所属的基站。

[0014] 优选地，所述网络侧为无线网络控制器；

[0015] 所述通知所述终端及所述终端所在小区所属的基站，为：

[0016] 所述无线网络控制器分别通知所述终端及所述终端所在小区所属的基站，或者，所述无线网络控制器通过所述终端所在小区所属的基站通知所述终端。

[0017] 优选地，所述方法还包括：

[0018] 所述终端接收到所述终端所在小区所属的基站发送的正向确认后，使用所确定的调度方式调度承载待发送上行数据的资源，进行上行数据发送。

[0019] 优选地，所述方法还包括：

[0020] 所述终端所在小区所属的基站侦听所述 PRACH，根据所述 PRACH 中的前导签名确定当前的调度方式，向所述终端发送正向确认；随后利用所确定的调度方式接收上行数据。

[0021] 优选地，所述利用所确定的调度方式接收上行数据，为：

[0022] 所述基站使用短传输时间间隔的间隔周期进行 E-DCH 资源的调度来接收增强型专用传输信道数据；

[0023] 或者，所述基站使用长传输时间间隔的间隔周期进行 E-DCH 资源的调度来接收增强型专用传输信道数据。

[0024] 优选地，所述短传输时间间隔调度方式为，所述终端使用短传输时间间隔的间隔周期进行 E-DCH 资源的调度来发送增强型专用传输信道数据；

[0025] 所述长传输时间间隔调度方式为，所述终端使用长传输时间间隔的间隔周期进行 E-DCH 资源的调度来发送增强型专用传输信道数据。

[0026] 一种终端，包括接收单元、确定单元和随机接入单元，其中，

[0027] 接收单元，用于接收网络侧发送的将 PRACH 的前导签名至少分为用于指示短传输时间间隔方式调度和长传输时间间隔方式调度的两种类型的通知；

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[0028] 确定单元，用于确定上行随机接入时所使用的短传输时间间隔方式或长传输时间间隔调度方式；

[0029] 随机接入单元，用于选用与所确定的调度方式对应的前导签名构建 PRACH 的前导，进行上行随机接入。

[0030] 优选地，所述终端还包括：

[0031] 发送单元，用于在所述接收单元接收到所述终端所在小区所属的基站发送的正向确认后，使用所确定的调度方式进行 E-DCH 资源的调度来发送增强型专用传输信道数据。

[0032] 一种基站，包括接收单元、侦听单元和发送单元，其中，

[0033] 接收单元，用于接收网络侧发送的将 PRACH 的前导签名至少分为用于指示短传输时间间隔方式调度和长传输时间间隔方式调度的两种类型的通知；

[0034] 侦听单元，用于侦听终端的 PRACH，根据所述 PRACH 中的前导签名确定当前的调度方式；

[0035] 发送单元，用于向终端发送正向确认；

[0036] 所述接收单元进一步利用所确定的调度方式进行 E-DCH 资源的调度来接收增强型专用传输信道数据。

[0037] 一种上行调度系统，包括网络侧、终端和所述终端所在小区所属的基站；其中，

[0038] 网络侧，用于将 PRACH 的前导签名至少分为用于指示短传输时间间隔方式调度和长传输时间间隔方式调度的两种类型，并通知所述终端及所述终端所在小区所属的基站；

[0039] 终端，用于确定上行随机接入时所使用的短传输时间间隔方式或长传输时间间隔调度方式，并选用与所确定的调度方式对应的前导签名构建 PRACH 的前导，进行上行随机接入。

[0040] 优选地，所述网络侧为无线网络控制器；

[0041] 所述无线网络控制器进一步用于，分别通知所述终端及所述终端所在小区所属的基站，或者，通过所述终端所在小区所属的基站通知所述终端。

[0042] 优选地，所述终端进一步用于，在接收到所述终端所在小区所属的基站发送的正向确认后，使用所确定的调度方式进行 E-DCH 资源的调度来发送增强型专用传输信道数据。

[0043] 优选地，所述终端所在小区所属的基站进一步用于，侦听所述终端的 PRACH，根据所述 PRACH 中的前导签名确定当前的调度方式，向所述终端发送正向确认；随后利用所确定的调度方式进行 E-DCH 资源的调度来接收增强型专用传输信道数据。

[0044] 本发明中，通过将 PRACH 的前导签名至少分为用于指示短传输时间间隔方式调度和长传输时间间隔方式调度的两种类型，实现了终端在进行上行数据调度时，既可以使用短传输时间间隔方式的调度，也可以用于长传输时间间隔方式的调度。本发明针对网络覆盖情况以及终端特性，由终端动态选择短传输时间间隔调度方式或长传输时间间隔调度方式来使用增强型专用传输信道资源，从而既确保了网络覆盖范围，又能够满足上行高速率传输需求。

附图说明

[0045] 图 1 为本发明上行调度方法实施例一的流程图；

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[0046] 图 2 为本发明上行调度方法实施例二的流程图；

[0047] 图 3 为本发明上行调度方法实施例三的流程图；

[0048] 图 4 为本发明上行调度方法实施例四的流程图；

[0049] 图 5 为本发明终端的组成结构示意图；

[0050] 图 6 为本发明基站的组成结构示意图。

具体实施方式

[0051] 本发明的基本思想为：通过将 PRACH 的前导签名至少分为用于指示短传输时间间隔方式调度和长传输时间间隔方式调度的两种类型，实现了终端在进行上行数据调度时，既可以使用短传输时间间隔方式的调度，也可以用于长传输时间间隔方式的调度。

[0052] 为使本发明的目的、技术方案和优点更加清楚明白，以下举实施例并参照附图，对本发明进一步详细说明。

[0053] 本发明中，网络侧（无线网络控制器等）将承载增强型专用传输信道的物理随机接入信道的前导部分的可用前导签名分为可用前导签名子集 A 和可用前导签名子集 B。其中，使用可用前导签名子集 A 指示采用短传输时间间隔的间隔周期进行增强型专用传输信道的调度，来发送或者接收增强型专用传输信道数据。使用可用前导签名子集 B 指示采用长传输时间间隔的间隔周期进行增强型专用传输信道的调度，来发送或者接收增强型专用传输信道数据。由终端决策上行所使用的传输时间间隔（即确定上行数据的调度方式），通过使用可用前导签名子集 A 或可用前导签名子集 B 来通知基站（节点 B）所选用的上行数据的调度方式（使用长时间间隔方式调度上行数据或使用短时间间隔方式调度上行数据）。终端和节点 B 以一致的传输时间间隔来进行增强型专用传输信道数据的发送和接收。

[0054] 本发明中基站主要是指节点 B(Node B)，当然，针对多应用的通信系统，也可能是普通基站或演进基站等。

[0055] 以下通过具体的示例，进一步阐明本发明技术方案的实质。

[0056] 实施例一

[0057] 本示例侧重描述了终端侧的上行随机接入及上行数据发送过程，终端驻留在某个小区，并处于小区前向接入信道状态。图 1 为本发明上行调度方法实施例一的流程图，如图 1 所示，本示例上行调度方法具体包括以下步骤：

[0058] 步骤 110，终端接收到驻留小区中由无线网络控制器发送的无线资源控制 (RRC, Radio Resource Control) 信令，从中获得如下信息：承载增强型专用传输信道的物理随机接入信道的前导部分的可用前导签名的可用前导签名子集 A 和可用前导签名子集 B。使用可用前导签名子集 A 则指示采用短传输时间间隔的间隔周期进行增强型专用传输信道的调度来发送（终端侧）或者接收（基站侧）增强型专用传输信道数据。使用可用前导签名子集 B 则指示采用长传输时间间隔的间隔周期进行增强型专用传输信道的调度来发送或者接收增强型专用传输信道数据。

[0059] 终端保存从无线网络控制器获得的可用前导签名子集 A 和可用前导签名子集 B 的信息。

[0060] 步骤 120，假设终端依据某种策略，决定使用短传输时间间隔进行增强型专用传输信道的调度来发送增强型专用传输信道数据。这里，选用短传输时间间隔方式调度或选用

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长传输时间间隔方式调度上行数据的策略事先配置于终端中。例如，需要保证网络覆盖范围时，选用长时间间隔方式调度上行数据，而需要提升数据传输速率时使用短时间间隔方式调度上行数据。上述策略的配置是容易实现的，由于不是实现本发明技术方案的难点，也非重点，这里不再赘述策略的确定方式。

[0061] 步骤 130，终端发起上行随机接入。终端在可用前导签名子集 A 中随机选择一个前导签名构建 PRACH 的前导，进行上行随机接入。

[0062] 步骤 140，终端下行接收到来自节点 B 的捕获指示信道的正向确认，以及由节点 B 分配的给该终端使用的增强型专用传输信道资源。

[0063] 步骤 150，终端以短传输时间间隔进行增强型专用传输信道的调度来发送增强型专用传输信道数据。数据发送结束后，增强型专用传输信道资源被释放。

[0064] 步骤 160，假设终端依据某种策略，终端决定使用长传输时间间隔进行增强型专用传输信道的调度来发送增强型专用传输信道数据。

[0065] 步骤 170，终端试图发起上行随机接入。终端在可用前导签名子集 B 中随机选择一个前导签名构建 PRACH 前导，进行上行随机接入。

[0066] 步骤 180，终端下行接收到来自捕获指示信道的正向确认，以及由节点 B 分配的给该终端使用的增强型专用传输信道资源。

[0067] 步骤 190，终端以长传输时间间隔进行增强型专用传输信道的调度来发送增强型专用传输信道数据。数据发送结束后，增强型专用传输信道资源被释放。

[0068] 需要说明的是，本发明中，无线网络控制器仅是网络侧的一种代表，在其他通信网络中，也可以是移动性管理实体 (MME，Mobile Management Entity) 等，当然，也可以是其他的网元。

[0069] 实施例二

[0070] 本示例侧重描述了基站侧的处理过程。图 2 为本发明上行调度方法实施例二的流程图，如图 2 所示，本示例上行调度方法具体包括以下步骤：

[0071] 步骤 210，节点 B 接收由无线网络控制器发送的节点 B 应用部分协议 (NBAP，NodeB Application Part) 信令，在指定小区中进行公共增强型专用传输信道操作的配置。NBAP 信令包括如下信息：承载增强型专用传输信道的物理随机接入信道的前导部分的可用前导签名的可用前导签名子集 A 和可用前导签名子集 B。其中，使用可用前导签名子集 A 指示采用短传输时间间隔的间隔周期进行增强型专用传输信道的调度来发送或者接收增强型专用传输信道数据。使用可用前导签名子集 B 指示采用长传输时间间隔的间隔周期进行增强型专用传输信道的调度来发送或者接收增强型专用传输信道数据。节点 B 保存这些信息。

[0072] 步骤 220，节点 B 在此指定小区中侦听终端发起的物理随机接入信道。

[0073] 步骤 230，节点 B 解析 PRACH 的前导中的前导签名，判断该前导签名属于可用前导签名子集 A，节点 B 记录此终端使用短传输时间间隔。

[0074] 步骤 240，节点 B 通过捕获指示信道发送正向确认，以及由节点 B 分配的给该终端使用的增强型专用传输信道资源。

[0075] 步骤 250，节点 B 以短传输时间间隔进行增强型专用传输信道的调度来接收增强型专用传输信道数据。数据接收结束后，增强型专用传输信道资源被释放。

[0076] 步骤 260，节点 B 在该指定小区中侦听到终端发起的物理随机接入信道。

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[0077] 步骤 270，节点 B 解析 PRACH 的前导中的前导签名，判断该前导签名属于可用前导签名子集 B，节点 B 记录该终端使用长传输时间间隔。

[0078] 步骤 280，节点 B 通过捕获指示信道发送正向确认，以及由节点 B 分配的给该终端使用的增强型专用传输信道资源。

[0079] 步骤 290，节点 B 以长传输时间间隔进行增强型专用传输信道的调度来接收增强型专用传输信道数据。数据接收结束后，增强型专用传输信道资源被释放。

[0080] 实施例三

[0081] 本示例侧重描述了网络侧（无线网络控制器等网元）的处理过程。图 3 为本发明上行调度方法实施例二的流程图，如图 3 所示，本示例上行调度方法具体包括以下步骤：

[0082] 步骤 310，无线网络控制器决定在指定小区中进行公共增强型专用传输信道操作的配置。具体配置包括：承载增强型专用传输信道的物理随机接入信道的前导部分的可用前导签名的可用前导签名子集 A 和可用前导签名子集 B。其中，使用可用前导签名子集 A 指示采用短传输时间间隔的间隔周期进行增强型专用传输信道的调度来发送或者接收增强型专用传输信道数据。使用可用前导签名子集 B 指示采用长传输时间间隔的间隔周期进行增强型专用传输信道的调度来发送或者接收增强型专用传输信道数据。

[0083] 步骤 320，无线网络控制器发送 NBAP 信令给节点 B，通知节点 B 在指定小区中进行公共增强型专用传输信道操作的配置。NBAP 信令包括如下信息：承载增强型专用传输信道的物理随机接入信道的前导部分的可用前导签名的可用前导签名子集 A 和可用前导签名子集 B。使用可用前导签名子集 A 则指示采用短传输时间间隔的间隔周期进行增强型专用传输信道的调度来发送或者接收增强型专用传输信道数据。使用可用前导签名子集 B 则指示采用长传输时间间隔的间隔周期进行增强型专用传输信道的调度来发送或者接收增强型专用传输信道数据。

[0084] 步骤 330，无线网络控制器在指定小区中发送 RRC 信令给终端，RRC 信令中包含如下信息：承载增强型专用传输信道的物理随机接入信道的前导部分的可用前导签名的可用前导签名子集 A 和可用前导签名子集 B。其中，使用可用前导签名子集 A 指示采用短传输时间间隔的间隔周期进行增强型专用传输信道的调度来发送或者接收增强型专用传输信道数据。使用可用前导签名子集 B 指示采用长传输时间间隔的间隔周期进行增强型专用传输信道的调度来发送或者接收增强型专用传输信道数据。

[0085] 本发明中，无线网络控制器可以分别向基站和终端发送 NBAP 信令及 RRC 信令来通知 PRACH 前导签名的划分方式，也可以首先通过 NBAP 信令通知基站，再由基站通知给终端。由于实现上述通知是容易实现的，本发明不再赘述其具体实现方式。

[0086] 实施例四

[0087] 图 4 为本发明上行调度方法实施例二的流程图，如图 4 所示，本示例上行调度方法具体包括以下步骤：

[0088] 步骤 410，无线网络控制器决策在指定小区中进行公共增强型专用传输信道操作的配置。具体配置包括：承载增强型专用传输信道的物理随机接入信道的前导部分的可用前导签名的可用前导签名子集 A 和可用前导签名子集 B。其中，使用可用前导签名子集 A 指示采用短传输时间间隔的间隔周期进行增强型专用传输信道的调度来发送或者接收增强型专用传输信道数据。使用可用前导签名子集 B 指示采用长传输时间间隔的间隔周期进行

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增强型专用传输信道的调度来发送或者接收增强型专用传输信道数据。

[0089] 步骤 420，无线网络控制器发送 NBAP 信令给节点 B，通知节点 B 在指定小区中进行公共增强型专用传输信道操作的配置。NBAP 信令包括如下信息：承载增强型专用传输信道的物理随机接入信道的前导部分的可用前导签名的可用前导签名子集 A 和可用前导签名子集 B。

[0090] 节点 B 保存上述信息。

[0091] 步骤 430，终端驻留在此指定小区中，且处于小区前向接入信道状态。终端接收此指定小区中由无线网络控制器发送的 RRC 信令，从中获得如下信息：承载增强型专用传输信道的物理随机接入信道的前导部分的可用前导签名的可用前导签名子集 A 和可用前导签名子集 B。

[0092] 终端保存上述信息。

[0093] 步骤 440，终端决定使用短传输时间间隔进行增强型专用传输信道的调度来发送增强型专用传输信道数据。

[0094] 步骤 450，终端试图在此指定小区中发起上行随机接入。终端在可用前导签名子集 A 中随机选择一个前导签名构建 PRACH 前导，进行上行随机接入。

[0095] 步骤 460，节点 B 在此指定小区中接收到终端发起的物理随机接入信道前导。

[0096] 步骤 470，节点 B 解析 PRACH 前导中的前导签名，判断该前导签名属于可用前导签名子集 A，节点 B 记录此终端使用短传输时间间隔。

[0097] 步骤 480，节点 B 通过捕获指示信道发送正向确认，以及由节点 B 分配的给该终端使用的增强型专用传输信道资源。终端下行接收到来自捕获指示信道的正向确认，以及由节点 B 分配的给该终端使用的增强型专用传输信道资源。

[0098] 步骤 490，终端以短传输时间间隔进行增强型专用传输信道的调度来发送增强型专用传输信道数据。节点 B 以短传输时间间隔进行增强型专用传输信道的调度来接收增强型专用传输信道数据。数据接收结束后，增强型专用传输信道资源被释放。

[0099] 步骤 500，终端决定使用长传输时间间隔进行增强型专用传输信道的调度来发送增强型专用传输信道数据。

[0100] 步骤 510，终端在此指定小区中发起上行随机接入。终端在可用前导签名子集 B 中随机选择一个前导签名构建 PRACH 前导，进行上行随机接入。

[0101] 步骤 520，节点 B 在此指定小区中接收到终端发起的物理随机接入信道前导。

[0102] 步骤 530，节点 B 解析 PRACH 前导中的前导签名，判断该前导签名属于可用前导签名子集 B，节点 B 记录此终端使用长传输时间间隔。

[0103] 步骤 540，节点 B 通过捕获指示信道发送正向确认，以及由节点 B 分配的给该终端使用的增强型专用传输信道资源。终端下行接收到来自捕获指示信道的正向确认，以及由节点 B 分配的给该终端使用的增强型专用传输信道资源。

[0104] 步骤 550，终端以长传输时间间隔进行增强型专用传输信道的调度来发送增强型专用传输信道数据。节点 B 以长传输时间间隔进行增强型专用传输信道的调度来接收增强型专用传输信道数据。数据接收结束后，增强型专用传输信道资源被释放。

[0105] 图 5 为本发明终端的组成结构示意图，如图 5 所示，本发明终端包括接收单元 50、确定单元 51 和随机接入单元 52，其中，

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[0106] 接收单元 50，用于接收网络侧发送的将 PRACH 的前导签名至少分为用于指示短传输时间间隔方式调度和长传输时间间隔方式调度的两种类型的通知；

[0107] 确定单元 51，用于确定上行随机接入时所使用的短传输时间间隔方式或长传输时间间隔调度方式；

[0108] 随机接入单元 52，用于选用与所确定的调度方式对应的前导签名构建 PRACH 的前导，进行上行随机接入。

[0109] 在图 5 所示的结构的基础上，本发明的终端还包括：

[0110] 发送单元（未图示），用于在所述接收单元接收到所述终端所在小区所属的基站发送的正向确认后，使用所确定的调度方式进行 E-DCH 资源的调度来发送增强型专用传输信道数据。

[0111] 本领域技术人员应当理解，图 5 所示的终端主要是用于前述实施例一至实施例四中，图 5 所示的终端中各处理单元的功能可参照前述实施例一至实施例四的相关描述而理解，各处理单元的功能可通过运行于处理器上的程序而实现，也可通过具体的逻辑电路而实现。

[0112] 图 6 为本发明基站的组成结构示意图，如图 6 所示，本发明的基站包括接收单元 60、侦听单元 61 和发送单元 62，其中，

[0113] 接收单元 60，用于接收网络侧发送的将 PRACH 的前导签名至少分为用于指示短传输时间间隔方式调度和长传输时间间隔方式调度的两种类型的通知；

[0114] 侦听单元 61，用于侦听终端的 PRACH，根据所述 PRACH 中的前导签名确定当前的调度方式；

[0115] 发送单元 62，用于向终端发送正向确认；

[0116] 上述接收单元 60 进一步利用所确定的调度方式进行 E-DCH 资源的调度来接收增强型专用传输信道数据。

[0117] 本领域技术人员应当理解，图 6 所示的基站主要是用于前述实施例一至实施例四中，图 6 所示的基站中各处理单元的功能可参照前述实施例一至实施例四的相关描述而理解，各处理单元的功能可通过运行于处理器上的程序而实现，也可通过具体的逻辑电路而实现。

[0118] 本发明还记载了一种上行调度系统，包括网络侧、终端和所述终端所在小区所属的基站；其中，

[0119] 网络侧，用于将 PRACH 的前导签名至少分为用于指示短传输时间间隔方式调度和长传输时间间隔方式调度的两种类型，并通知所述终端及所述终端所在小区所属的基站；

[0120] 终端，用于确定上行随机接入时所使用的短传输时间间隔方式或长传输时间间隔调度方式，并选用与所确定的调度方式对应的前导签名构建 PRACH 的前导，进行上行随机接入。

[0121] 上述网络侧为无线网络控制器；

[0122] 上述无线网络控制器进一步用于，分别通知所述终端及所述终端所在小区所属的基站，或者，通过所述终端所在小区所属的基站通知所述终端。

[0123] 上述终端进一步用于，在接收到所述终端所在小区所属的基站发送的正向确认后，使用所确定的调度方式进行 E-DCH 资源的调度而发送增强型专用传输信道数据。

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[0124] 上述终端所在小区所属的基站进一步用于，侦听所述终端的 PRACH，根据所述 PRACH 中的前导签名确定当前的调度方式，向所述终端发送正向确认；随后利用所确定的调度方式进行 E-DCH 资源的调度而接收增强型专用传输信道数据。

[0125] 本领域技术人员应当理解，本发明的上行调度系统是为实现前述上行调度方法而实现的，在网络结构上，本发明并无改动，仅是上述的各网元所实现的功能与现有网络中的相关网元所实现的功能有所不同而已。具体的，可参照上述实施例一至实施例四的相关描述理解本发明的上行调度系统。

[0126] 以上所述，仅为本发明的较佳实施例而已，并非用于限定本发明的保护范围。

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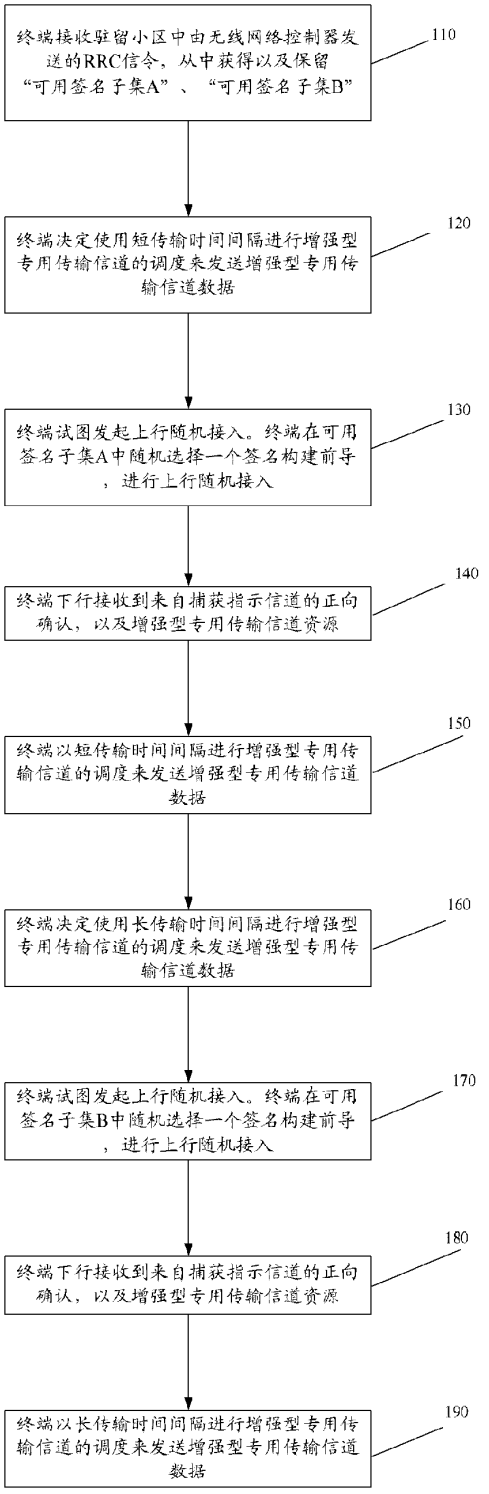


图 1

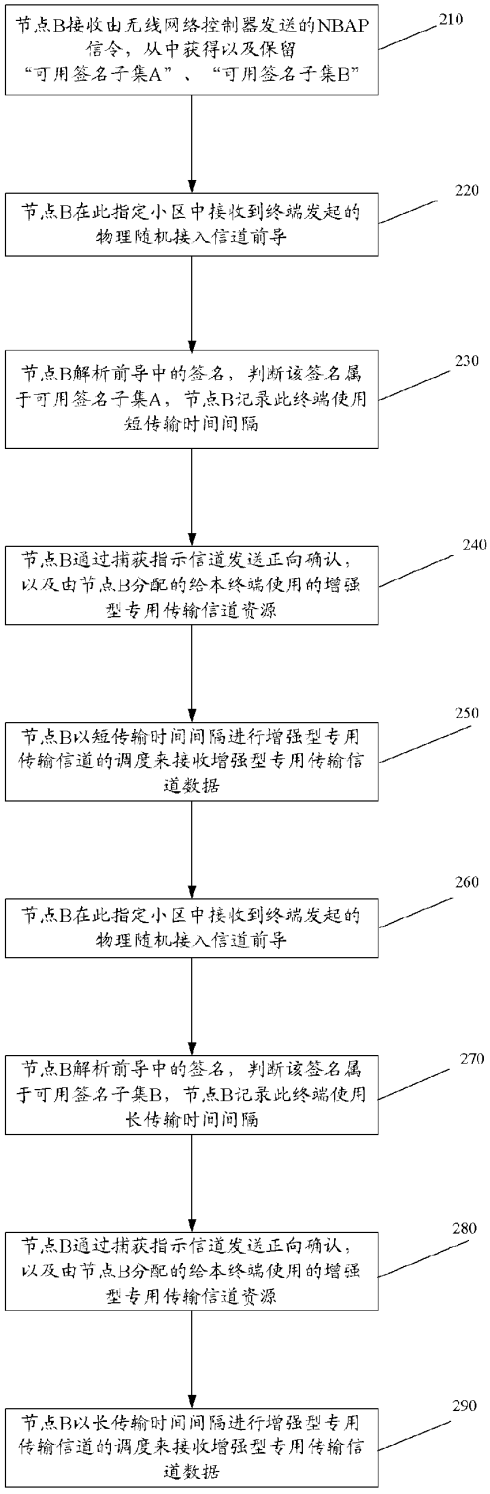


图 2

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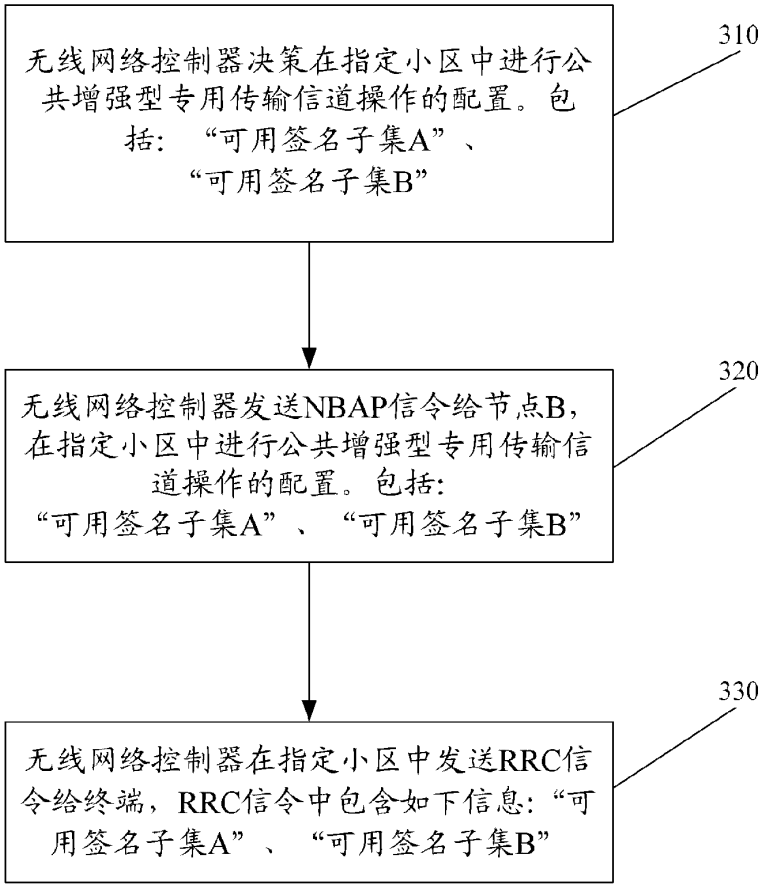


图 3

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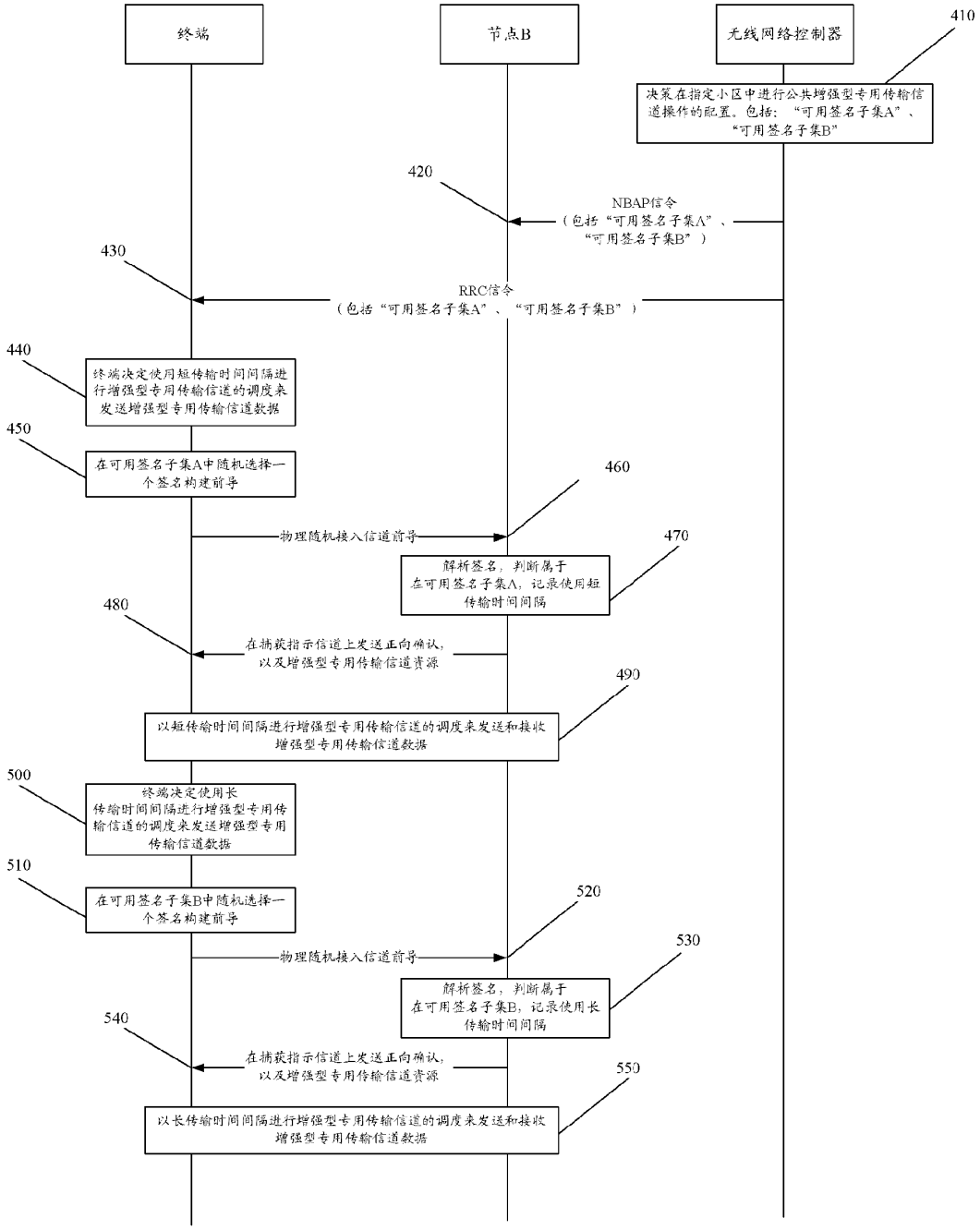


图 4

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Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
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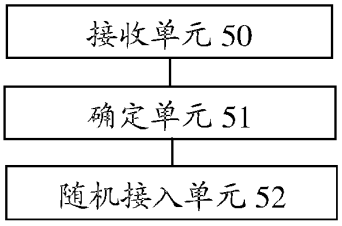


图 5

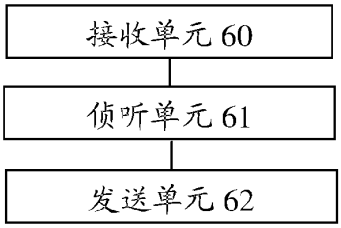


图 6

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Electronic Acknowledgement Receipt

EFS ID:	41899874
Application Number:	16052505
International Application Number:	
Confirmation Number:	1082
Title of Invention:	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM
First Named Inventor/Applicant Name:	Wei-Yu Chen
Customer Number:	92096
Filer:	William Joseph Cooper/Jennifer Meinyk
Filer Authorized By:	William Joseph Cooper
Attorney Docket Number:	1426-136.301
Receipt Date:	11-FEB-2021
Filing Date:	01-AUG-2018
Time Stamp:	12:41:26
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	IDS.pdf	65605 70ab1cbe9e16781d65af9da190930a769aa5403c	no	4
Warnings:					

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2	Foreign Reference	IDS_FOR1_CN102422568A.pdf	2417104 c879507064753dbfed5721262d53e181125 8411a	no	17
Warnings:					
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3	Foreign Reference	IDS_FOR2_CN105052065A.pdf	6109373 572579d06dc2efb769f21f68b95cf5e697b9 7650	no	49
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National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

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PTO/SB/08a (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	16052505
	Filing Date	2018-08-01
	First Named Inventor	Wei-Yu CHEN
	Art Unit	2642
	Examiner Name	Pakee FANG
	Attorney Docket Number	ASUP152US

U.S.PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	2016072843	JP	A	2016-05-09	KDDI CORP	Entire Document with English Abstract	☒
	2	2014511080	JP	A	2014-05-01	HUAWEI TECHNOLOGIES CO., LTD	Entire Document with English Abstract	☒
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NON-PATENT LITERATURE DOCUMENTS

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	16052505
	Filing Date	2018-08-01
	First Named Inventor	Wei-Yu CHEN
	Art Unit	2642
	Examiner Name	Pakee FANG
	Attorney Docket Number	ASUP152US

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	Corresponding Japanese patent application no. 2019-201501, Office Action mailed February 2, 2021. English Translation.	☒

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Examiner Signature		Date Considered	

*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	16052505
	Filing Date	2018-08-01
	First Named Inventor	Wei-Yu CHEN
	Art Unit	2642
	Examiner Name	Pakee FANG
	Attorney Docket Number	ASUP152US

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	/Ali Assar/	Date (YYYY-MM-DD)	2021-03-05
Name/Print	Ali Assar	Registration Number	65,848

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.**

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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.

Espacenet

Bibliographic data: JP2016072843 (A) — 2016-05-09

BASE STATION DEVICE, COMMUNICATION METHOD, AND COMMUNICATION SYSTEM

Inventor(s): OZEKI TAKEO; YAMAMOTO TOSHIAKI; SUEGARA YASUHIRO ± (大関 武雄, ; 山本 俊明, ; 末柄 恭宏)

Applicant(s): KDDI CORP ± (ＫＤＤＩ株式会社)

Classification: **- international:** ***H04W28/06; H04W72/04; H04W92/10***
- cooperative: **G02B27/0012 (EP, US); G02B27/48 (EP, US); G02B3/0043 (EP, US); G02B5/0221 (EP, US); G02B5/0278 (EP, US); G02B5/0284 (US); G03B21/602 (EP, US); G03B21/625 (US)**

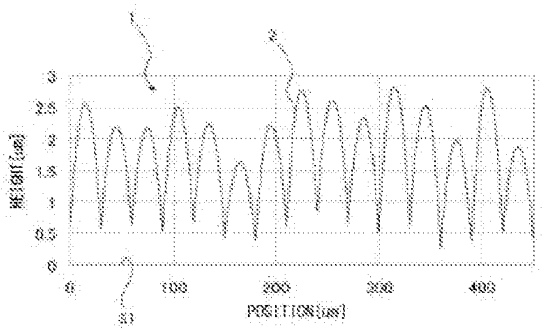
Application number: JP20140201306 20140930 Global Dossier

Priority number(s): JP20140201306 20140930

Also published as: US10551633 (B2) US2017235154 (A1)

Abstract of JP2016072843 (A)

PROBLEM TO BE SOLVED: To enable the shortening of a TTI.SOLUTION: A base station device 30 is able to perform radio communication with a terminal device 10 using a sub-frame including one or more OFDM symbols. The base station device allocates the terminal device 10 TTI time length to be used and offset information indicating the start position of the TTI in the sub-frame, and notifies the terminal device 10 of the allocated TTI time length and offset information by at least one of upper layer signaling and physical layer signaling.SELECTED DRAWING: Figure 1



(19)日本国特許庁(JP)　(12)公開特許公報(A)　(11)特許出願公開番号
特開2016-72843
(P2016-72843A)
(43)公開日　平成28年5月9日(2016.5.9)

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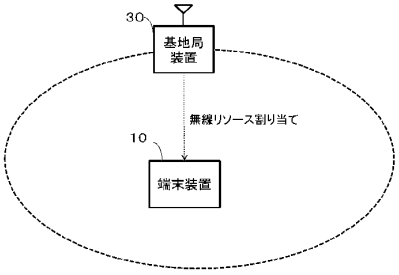
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(54)【発明の名称】基地局装置、通信方法、および通信システム

(57)【要約】
【課題】ＴＴＩの短縮化を可能にすること。
【解決手段】基地局装置３０は、１以上のＯＦＤＭシンボルを含むサブフレームを用いて、端末装置１０との間で無線通信可能な基地局装置であって、端末装置１０に使用させるべきＴＴＩの時間長と、当該ＴＴＩのサブフレームにおける開始位置を示すオフセット情報とを割り当てて、上位層シグナリングと物理層シグナリングのうちの少なくとも一方で、割り当てたＴＴＩの時間長とオフセット情報とを端末装置１０に通知する。
【選択図】図１



【特許請求の範囲】
【請求項１】
１以上のＯＦＤＭシンボルを含むサブフレームを用いて、端末装置との間で無線通信可能な基地局装置であって、
前記端末装置に使用させるべきＴＴＩの時間長と、当該ＴＴＩのサブフレームにおける開始位置を示すオフセット情報とを割り当てる割当制御部と、
前記割当制御部で割り当てたＴＴＩの時間長とオフセット情報とを前記端末装置に通知する通知制御部と、
を備える基地局装置。
【請求項２】
前記割当制御部は、割り当てる時間長および／またはオフセット情報を、シンボル数を単位として決定する
ことを特徴とする請求項１に記載の基地局装置。
【請求項３】
前記通知制御部は、上位層シグナリングと物理層シグナリングのうちの少なくとも一方で、前記端末装置へ通知する
ことを特徴とする請求項１または２に記載の基地局装置。
【請求項４】
前記通知制御部は、先ず、前記上位層シグナリングにて、前記端末装置に通知する
ことを特徴とする請求項３に記載の基地局装置。
【請求項５】
前記通知制御部は、前記上位層シグナリングがされた後に、必要に応じて、前記物理層シグナリングとして、前記端末装置に通知する
ことを特徴とする請求項４に記載の基地局装置。
【請求項６】
前記通知制御部は、前記上位層シグナリングにて過去に通知した時間長とオフセット情報のうちの少なくとも一方を変更する場合に、前記物理層シグナリングにて、変更にかかる情報を通知する
ことを特徴とする請求項５に記載の基地局装置。
【請求項７】
前記通知制御部は、当該端末装置が過去の割当情報に従うべきことを黙示的に示すために、前記上位層シグナリングと前記物理層シグナリングの少なくとも一方で、変更しない旨が示された情報を通知する、
ことを特徴とする請求項５に記載の基地局装置。
【請求項８】
前記通知制御部は、前記上位層シグナリング、前記物理層シグナリングのいずれかにおいて過去に通知した時間長とオフセット情報を変更しない場合に、他方のシグナリングにて、変更しない旨が示された情報を通知する
ことを特徴とする請求項７に記載の基地局装置。
【請求項９】
前記通知制御部は、当該端末装置が過去の割当情報に従うべきことを黙示的に示すために、前記上位層シグナリングと前記物理層シグナリングの双方で、変更しない旨が示された情報を通知する、
ことを特徴とする請求項７に記載の基地局装置。
【請求項１０】
前記通知制御部は、当該端末装置が過去の割当情報に従うべきことを黙示的に示すために、物理層シグナリングを前記端末装置へ通知しない、
ことを特徴とする請求項５のいずれかに記載の基地局装置。
【請求項１１】
前記通知制御部は、当該端末装置が過去の物理層シグナリングにて通知された割当情報

に従うべきことを黙示的に示すために、前記上位層シグナリングで割当情報を通知した後に、前記物理層シグナリングにて通知しない、
ことを特徴とする請求項１０に記載の基地局装置。
【請求項１２】
前記通知制御部において通知先となるべき端末装置への送信データに用いる符号化情報を１以上決定する符号化情報決定部、
をさらに備え、
前記割当制御部は、前記端末装置に使用させるべきＴＴＩの時間長とオフセット情報とが含まれた１組の割当情報を１以上決定し、
前記通知制御部は、前記割当制御部において決定された１組以上の割当情報と前記符号化情報決定部において決定された１以上の符号化情報と、をそれぞれ対応付けて通知することを特徴とする請求項１に記載の基地局装置。
【請求項１３】
前記符号化情報決定部において決定された１以上の符号化情報のうちのいずれかを用いて、当該端末装置に対する送信データを符号化する
ことを特徴とする請求項１２に記載の基地局装置。
【請求項１４】
１以上のＯＦＤＭシンボルを含むサブフレームを用いて、端末装置との間で無線通信可能な基地局装置に用いられる通信方法であって、
前記端末装置に使用させるべきＴＴＩの時間長と、当該ＴＴＩのサブフレームにおける開始位置を示すオフセット情報とを割り当てる割当制御ステップと、
前記割当制御ステップで割り当てたＴＴＩの時間長とオフセット情報とを前記端末装置に通知する通知制御ステップとを含み、
前記通知制御ステップにおいて、先ず、前記上位層シグナリングにて、前記端末装置に通知し、必要に応じて、前記物理層シグナリングとして前記端末装置へ通知する
ことを特徴とする通信方法。
【請求項１５】
端末装置と、１以上のＯＦＤＭシンボルを含むサブフレームを用いて、前記端末装置との間で無線通信可能な基地局装置と、を備える通信システムであって、
前記基地局装置は、
前記端末装置に使用させるべきＴＴＩの時間長と、当該ＴＴＩのサブフレームにおける開始位置を示すオフセット情報とを割り当てる割当制御部と、
前記割当制御部で割り当てたＴＴＩの時間長とオフセット情報とを前記端末装置に通知する通知制御部と
を備え、
前記端末装置は、
前記基地局装置から通知される、前記ＴＴＩの時間長と前記オフセット情報とに基づいて前記基地局装置との間の無線通信を制御する制御部
を備える通信システム。

【発明の詳細な説明】
【技術分野】
【０００１】
本発明は、無線通信システムの制御技術に関する。
【背景技術】
【０００２】
ＬＴＥ（Ｌｏｎｇ　Ｔｅｒｍ　Ｅｖｏｌｕｔｉｏｎ）などの無線通信システムにおいては、基地局装置が端末装置ごとに共有データチャネル上の無線リソースを動的に割り当ててスケジューリングを行っている。ＬＴＥのスケジューリングの最小時間単位であるＴＴ

Ｉ（Ｔｒａｎｓｍｉｓｓｉｏｎ Ｔｉｍｅ Ｉｎｔｅｒｖａｌ）は、１サブフレーム長であり、１ミリ秒（ｍｓ）で固定されている。他方、Ｗ－ＣＤＭＡにおけるスケジューリングの最小時間単位は、１スロット長であり、０．６７ｍｓと一意に固定されている。また、ＷｉＭＡＸは５ｍｓ毎にスケジューリングを行い、毎回端末装置ごとの送信時間長および周波数幅を通知している。

【０００３】

機械の制御やドライビングサポートなど、ミッションクリティカルなシチュエーションが要求される分野に無線通信を適用する場合では、低遅延な無線通信環境が望ましい。今後、ＬＴＥの無線区間においても、特にショートパケットの送受信時の遅延に顕著に影響を与える、無線区間のラウンドトリップタイム（Ｒｏｕｎｄ ｔｒｉｐ ｔｉｍｅ）の短縮化が必要であり、そのためにＴＴＩの更なる短縮化が期待されている。

【先行技術文献】

【非特許文献】

【０００４】

【非特許文献１】３ＧＰＰ ＴＳ３６．２１１ Ｖｅｒ．８．６．０ “Ｅｖｏｌｖｅｄ Ｕｎｉｖｅｒｓａｌ Ｔｅｒｒｅｓｔｒｉａｌ Ｒａｄｉｏ Ａｃｃｅｓｓ（Ｅ－ＵＴＲＡ）；Ｐｈｙｓｉｃａｌ Ｃｈａｎｎｅｌｓ ａｎｄ Ｍｏｄｕｌａｔｉｏｎ” ２００９年３月”

【発明の概要】

【発明が解決しようとする課題】

【０００５】

上述したように、ＬＴＥの無線区間のラウンドトリップタイムを更に短縮化するために、１ｍｓのサブフレーム長で固定されているＴＴＩを短縮することが期待される。一方で、既存の端末との互換性の維持も必要であり、同一システム帯域幅内に、異なるＴＴＩの物理層（ＰＤＳＣＨ／ＰＵＳＣＨ）を共存させることが求められる。しかしながら、その場合、現在のＬＴＥでは、受信側は、送信側がどのようなＴＴＩで送信を行ったのかが分からないという問題が発生する。

【０００６】

そこで、例えば、ＷｉＭＡＸのように、物理パケットのスケジューリング間隔毎に、毎回、ＵＥ毎の送信時間長（及び周波数幅）を通知するという解決手段が考えられる。しかしながら、ＷｉＭＡＸはスケジューリング周期が５ｍｓであるのに対し、ＬＴＥはスケジューリング周期が１ｍｓであるから、ＷｉＭＡＸの手法をそのまま適用すると、物理層のシグナリングのためのオーバーヘッド量が増大するという問題が発生する。

【０００７】

本発明はかかる課題に鑑みてなされたものであり、その目的は、ＴＴＩの短縮化を可能にする基地局装置、通信方法、および通信システムを提供することにある。

【課題を解決するための手段】

【０００８】

本発明のある態様は、基地局装置に関する。この基地局装置は、１以上のＯＦＤＭシンボルを含むサブフレームを用いて、端末装置との間で無線通信可能な基地局装置であって、前記端末装置に使用させるべきＴＴＩの時間長と、当該ＴＴＩのサブフレームにおける開始位置を示すオフセット情報とを割り当てる割当制御部と、前記割当制御部で割り当てたＴＴＩの時間長とオフセット情報とを前記端末装置に通知する通知制御部とを備える。

【０００９】

このような態様によると、１ｍｓのサブフレーム長で固定されているＴＴＩを短縮することができるため、ラウンドトリップタイムの更なる短縮化が実現できる。また、端末装置ごとにＴＴＩの動的制御が可能となり、異なるＴＴＩの物理層を共存させることが可能になる。

【００１０】

本発明の別の態様は、通信システムに関する。この通信システムは、端末装置と、１以

上のＯＦＤＭシンボルを含むサブフレームを用いて、前記端末装置との間で無線通信可能な基地局装置と、を備える通信システムであって、前記基地局装置は、前記端末装置に使用させるべきＴＴＩの時間長と、当該ＴＴＩのサブフレームにおける開始位置を示すオフセット情報とを割り当てる割当制御部と、前記割当制御部で割り当てたＴＴＩの時間長とオフセット情報とを前記端末装置に通知する通知制御部とを備え、前記端末装置は、前記基地局装置から通知される、前記ＴＴＩの時間長と前記オフセット情報とに基づいて前記基地局装置との間の無線通信を制御する制御部を備える。

【００１１】

このような態様によると、基地局装置は端末装置ごとに使用させるべきＴＴＩの時間長と、当該ＴＴＩのサブフレームにおける開始位置を示すオフセット情報とを割り当て、端末装置に通知し、端末装置は基地局装置から通知される、ＴＴＩの時間長とオフセット情報とに基づいてサブフレームを復調する。これにより、１ｍｓのサブフレーム長で固定されているＴＴＩを短縮して、低遅延な無線通信が実現できる。

【００１２】

なお、以上の構成要素の任意の組み合わせ、本発明の表現を方法、装置、システム、コンピュータプログラムなどの間で変換したものもまた、本発明の態様として有効である。

【発明の効果】

【００１３】

本発明によれば、ＴＴＩの短縮化を可能にする基地局装置、通信方法、および通信システムを提供できる。

【図面の簡単な説明】

【００１４】

【図１】本発明の一実施形態にかかる無線通信システムの構成例を示す図である。
【図２】図１の基地局装置の構成例を示す図である。
【図３】物理シグナリングに割当情報を含める例を示す図である。
【図４】図１の端末装置の構成例を示す図である。
【図５】端末装置が利用する選択ルールの例を示す図である。
【図６】実施例１にかかる無線通信システムの動作例を示すシーケンス図である。
【図７】実施例２において端末装置が利用する選択ルールの例を示す図である。
【図８】実施例３にかかる基地局装置の構成例を示す図である。
【図９】実施例３にかかる無線通信システムの動作例を示すシーケンス図である。

【発明を実施するための形態】

【００１５】

（本発明の概要）

本発明の実施例を説明する前に、まず、本発明の概要を述べる。本発明は、基地局装置が端末装置ごとの無線リソースを割り当てるスケジューリング技術に関する。

【００１６】

ＬＴＥの物理層は、時間、周波数を多重化して利用する方式であり、時間方向は１０ｍｓ周期の無線フレームという単位があり、この無線フレームを１０分割した１ｍｓのサブフレームという単位がある。サブフレームは０．５ｍｓの２つのスロットを有し、１スロットは６または７個のシンボルを含む。既存のＬＴＥシステムにおいては、スケジューリングの最小時間単位であるＴＴＩ（Ｔｒａｎｓｍｉｓｓｉｏｎ Ｔｉｍｅ Ｉｎｔｅｒｖａｌ）は、１サブフレーム長であり、１ｍｓで固定されている。このＴＴＩ単位で、ＦＥＣ（Ｆｏｒｗａｒｄ Ｅｒｒｏｒ Ｃｏｒｒｅｃｔｉｏｎ）による誤り訂正やハイブリッド自動再送要求（ＨＡＲＱ；Ｈｙｂｒｉｄ Ａｕｔｏｍａｔｉｃ Ｒｅｐｅａｔ Ｒｅｑｕｅｓｔ）などが行われている。

【００１７】

ＬＴＥの物理層では、下りリンクの送信開始から、上りリンクのＨＡＲＱ－ＡＣＫの送信開始までの時間は最短で４ｍｓである。このうち、下りリンクの１ＴＴＩの送信時間は１ｍｓであり、またハードウェアの変復調の処理時間を最大限短くしても０ｍｓにするこ

とは出来ないため、送信時間と変復調の処理時間で最低限２ｍｓの時間が必要である。即ち、下りリンクの送信開始から、上りリンクのＨＡＲＱ－ＡＣＫの送信開始までの時間は２ｍｓの短縮が限界である。ここで、仮に、１ｍｓのＴＴＩの短縮化（ＴＴＩ　ｓｈｏｒｔｅｎｉｎｇ）が下りリンクに適用できれば、合計３ｍｓの短縮が可能となる。同様に、上りリンクにもＴＴＩ　ｓｈｏｒｔｅｎｉｎｇを適用すれば、更なる時間短縮が可能になる。

【００１８】

そこで、本発明にかかるスケジューリングでは、従来サブフレーム長である１ｍｓに固定されていたＴＴＩを短縮可能にするために、基地局装置が、端末装置に使用させるべきＴＴＩの時間長と、当該ＴＴＩのサブフレームにおける開始位置を示すオフセット情報とを割り当て、割り当てたＴＴＩの時間長とオフセット情報とを端末装置に通知する。

【００１９】

このようにすることで、受信側は、送信側がどのようなＴＴＩで送信を行ったのかが把握でき、異なるＴＴＩの物理層を共存させることが可能になる。また、従来固定値であった１ｍｓのＴＴＩを短縮することで、ＬＴＥの無線区間のラウンドトリップタイムを更に短縮化することが可能になる。

【００２０】

（無線通信システムの構成例）

図１は、本発明の一実施形態にかかる無線通信システムの構成例を示す図である。無線通信システム１００は、端末装置１０と、基地局装置３０とを含む。基地局装置３０は、端末装置１０に対して物理層における共有データチャネル上の無線リソースを割り当てるスケジューリングを行っている。

【００２１】

上りリンク（端末装置１０から基地局装置３０へ向かう通信経路）においては、基地局装置３０は、下りリンクの制御チャネル（ＰＤＣＣＨ；Ｐｈｙｓｉｃａｌ　ｄｏｗｎｌｉｎｋ　ｃｏｎｔｒｏｌ　ｃｈａｎｎｅｌ）などを用いて、上りリンク共有データチャネル（ＰＵＳＣＨ；Ｐｈｙｓｉｃａｌ　ｕｐｌｉｎｋ　ｓｈａｒｅｄ　ｃｈａｎｎｅｌ）のための無線リソースの割り当て情報を端末装置１０に通知する。

【００２２】

下りリンク（基地局装置３０から端末装置１０へ向かう通信経路）においては、基地局装置３０は、下りリンクの制御チャネル（ＰＤＣＣＨ；Ｐｈｙｓｉｃａｌ　ｄｏｗｎｌｉｎｋ　ｃｏｎｔｒｏｌ　ｃｈａｎｎｅｌ）などを用いて、下りリンク共有データチャネル（ＰＤＳＣＨ；Ｐｈｙｓｉｃａｌ　ｄｏｗｎｌｉｎｋ　ｓｈａｒｅｄ　ｃｈａｎｎｅｌ）を構成する無線リソースの割り当て情報を端末装置１０に通知する。

【００２３】

本実施形態においては、デフォルト値１ｍｓとして設定されているＴＴＩの長さを短縮するために、基地局装置３０は、端末装置１０に使用させるべきＴＴＩの時間長と、当該ＴＴＩのサブフレームにおける開始位置を示すオフセット情報とを割り当て、割り当てたＴＴＩの時間長とオフセット情報とを端末装置１０に通知する。ここで、サブフレームの長さは固定であり、境界も不変であるとする。例えば、割り当てる時間長および／またはオフセット情報は、シンボル数を単位として決定し、これにより、サブフレームの先頭からいくつめのシンボルが、当該ＴＴＩの先頭になるかが決定されることとなる。下りリンクの場合は、割り当てる時間長として、ＰＤＳＣＨのサブフレーム内のＯＦＤＭシンボル数、オフセット情報として、ＰＤＳＣＨのサブフレーム内のスタートＯＦＤＭシンボル番号とすることができる。

【００２４】

また、基地局装置３０は、割り当てたＴＴＩの時間長とオフセット情報とを上位層シグナリングと物理層シグナリングのうちの少なくとも一方で、端末装置１０に通知することができる。例えば、先ず、上位層シグナリングにて、端末装置１０に通知し、上位層シグナリングがされた後に、必要に応じて、物理層シグナリングとして、端末装置１０に通知

してもよい。また、上位層シグナリングにて過去に通知した時間長とオフセット情報のうちの少なくとも一方を変更する場合に、物理層シグナリングにて、変更にかかる情報を通知してもよい。

【００２５】

（基地局装置３０の構成例）

図２は、図１の基地局装置３０の構成例を示す図である。基地局装置３０は、通信部３２と、制御部３４と、記憶部３６とを含む。

【００２６】

通信部３２は、記憶部３６に記憶された情報を制御部３４が使用しながら、自局の通信エリアに属する端末装置１０と、所定のアクセス方式を用いて無線通信を実行する。

【００２７】

制御部３４は、割当制御部３４２と、通知制御部３４４とを含む。割当制御部３４２は、端末装置１０に使用させるべきＴＴＩの時間長と、当該ＴＴＩのサブフレームにおける開始位置を示すオフセット情報とを割り当てる。割当制御部３４２は、割り当てる時間長および／またはオフセット情報を、シンボル数を単位として決定する。割当制御部３４２により割り当てられたＴＴＩの時間長とオフセット情報は、記憶部３６に記憶される。以下、割当制御部３４２が割り当てた、ＴＴＩの時間長とオフセット情報とを割当情報と呼ぶ。

【００２８】

通知制御部３４４は、割当制御部３４２で割り当てたＴＴＩの時間長とオフセット情報とを端末装置１０に通知する。ここで、通知制御部３４４は、上位層シグナリングと物理層シグナリングのうちの少なくとも一方で、端末装置１０へ通知するように制御する。例えば、通知制御部３４４は、先ず、上位層シグナリングにて、端末装置１０に通知し、上位層シグナリングがされた後に、必要に応じて、前記物理層シグナリングとして、端末装置１０に通知するようにしてもよい。

【００２９】

さらに、基地局装置３０は、当該端末装置が過去の割当情報に従うべきことを黙示的に示すために、上位層シグナリングと物理層シグナリングの少なくとも一方で、変更しない旨が示された情報を通知するようにしてもよい。また、上位層シグナリング、物理層シグナリングのいずれかにおいて過去に通知した時間長とオフセット情報を変更しない場合に、他方のシグナリングにて、変更しない旨が示された情報を通知してもよい。当該端末装置が過去の割当情報に従うべきことを黙示的に示すために、上位層シグナリングと物理層シグナリングの双方で、変更しない旨が示された情報を通知してもよい。当該端末装置が過去の割当情報に従うべきことを黙示的に示すために、物理層シグナリングを端末装置へ通知しないようにしてもよい。当該端末装置が過去の物理層シグナリングにて通知された割当情報に従うべきことを黙示的に示すために、上位層シグナリングで割当情報を通知した後に、物理層シグナリングにて通知しないようにすることもできる。

【００３０】

図３に、物理層シグナリングで割当情報を通知する際に用いられるフォーマットの一例を示す。図３には、ＰＤＣＣＨメッセージのＤＣＩフォーマット１に、割当情報を含める例を示す。ＰＤＣＣＨでは、割当てリソースの位置（Ｒｅｓｏｕｒｃｅ ｂｌｏｃｋ ａｓｓｉｇｎｍｅｎｔ）、変調方式（Ｍｏｄｕｌａｔｉｏｎ ａｎｄ ｃｏｄｉｎｇ ｓｃｈｅｍｅ）、送信電力用のコマンド（ＴＰＣ ｃｏｍｍａｎｄ ｆｏｒ ＰＵＣＣＨ）などを含むスケジューリング情報が通知される。本実施形態では、図３中の３００に示す“Ｓｔａｒｔ ＯＦＤＭ ｓｙｍｂｏｌ ｎｕｍｂｅｒ”および“Ｎｕｍｂｅｒ ｏｆ ＯＦＤＭ ｓｙｍｂｏｌ”を新たに追加する。“Ｎｕｍｂｅｒ ｏｆ ＯＦＤＭ ｓｙｍｂｏｌ”が端末装置に使用させるべきＴＴＩの時間長に対応し、“Ｓｔａｒｔ ＯＦＤＭ ｓｙｍｂｏｌ ｎｕｍｂｅｒ”が当該ＴＴＩのサブフレームにおける開始位置を示すオフセット情報に対応する。このように、物理層シグナリングに、ＯＦＤＭシンボルを単位として決定した割当情報を追加することができる。なお、“Ｓｔａｒｔ ＯＦＤＭ ｓｙｍｂ

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ｏｌ ｎｕｍｂｅｒ”および“Ｎｕｍｂｅｒ ｏｆ ＯＦＤＭ ｓｙｍｂｏｌ”は、ＰＤＣＣＨメッセージのＤＣＩフォーマット１以外の制御シグナリングのＩＥ（Ｉｎｆｏｒｍａｔｉｏｎ Ｅｌｅｍｅｎｔ）として含めてもよい。

【００３１】

（端末装置の構成例）

図４は、図１の第１端末装置１０として用いられる端末装置の構成例を示す図である。端末装置は、通信部１２と、制御部１４と、記憶部１６と、ユーザインタフェース（ユーザＩＦ）１８とを備える。

【００３２】

通信部１２は、記憶部１６に記憶された情報を制御部１４が使用しながら、所定のアクセス方式を用いて基地局装置３０との間で無線により通信を行う。これらの通信処理は、公知の変復調技術、アンテナ技術が用いられてもよい。

【００３３】

記憶部１６は、基地局装置３０から送信されたデータを記憶し、また、基地局装置３０に対して送信すべき、ユーザＩＦ１８を通じて得たデータを記憶してもよい。ユーザＩＦ１８は、画面インタフェースと、操作ボタンやタッチパネルなどのユーザからの入力を受け付ける入力インタフェースと、カメラなどの画像撮像手段を含んでもよい。

【００３４】

制御部１４は、例えば、ＣＰＵにより構成され、通信部１２から受信された情報、または記憶部１６に記憶された情報を用いて、各部を統括的に制御する。

【００３５】

制御部１４は、基地局装置３０から通知される、ＴＴＩの時間長とオフセット情報とを、通信部１２により受信し、記憶部１６へ記憶させる。制御部１４は、記憶部１６に記憶したＴＴＩの時間長とオフセット情報とに基づいて、基地局装置３０との間の無線通信を制御する。例えば、下りリンクのデータを受信した場合は、ＴＴＩの時間長とオフセット情報とで指示されるサブフレーム内の無線リソースを復調する。上りリンクのデータを送信する場合は、ＴＴＩの時間長とオフセット情報とで指示されるサブフレーム内の無線リソースに送信すべきデータを格納して変調する。

【００３６】

また、ＴＴＩの時間長とオフセット情報とは、基地局装置３０からの上位層シグナリングと物理層シグナリングのうちの少なくとも一方で、端末装置１０へ通知される。制御部１４は、所定の選択ルールに従って、ＴＴＩの時間長とオフセット情報とを選択し、選択したＴＴＩの時間長とオフセット情報とで指定されるサブフレーム内の無線リソースを用いることができる。選択ルールは、予め決められ、記憶部１６に記憶されていてもよいし、上位層シグナリングまたは物理層シグナリングで動的に変更されるものであってもよい。

【００３７】

図５に、選択ルールの一例を示す。図５の選択ルールによれば、端末装置１０の制御部１４は、以下のように割当情報を選択する。

（１）割当情報が上位層シグナリングと物理層シグナリングの双方に有る場合は、物理層シグナリングで通知された割当情報に従う。

（２）割当情報が上位層シグナリングに有り、物理層シグナリングに無い場合は、上位層シグナリングで通知された割当情報に従う。

（３）割当情報が上位層シグナリングに無く、物理層シグナリングに有る場合は、物理層シグナリングで通知された割当情報に従う。

（４）割当情報が上位層シグナリングと物理層シグナリングの双方に無い場合は、ＬＴＥシステムの既存のスペック（ＴＴＩの時間長＝１ｍｓ、オフセット情報＝０）に従う。

ここで、割当情報が有るとは、ＴＴＩの時間長および／またはオフセット情報として値がセットされていることを示し、割当情報が無いとは、ＴＴＩの時間長およびオフセット情報として、例えばｎｕｌｌあるいは０ｘｆｆｆｆなどのデフォルト値がセットされてい

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ることを示す。

【００３８】

次に、このように構成された無線通信システムの動作について、各実施例に従って説明する。なお、各実施例において、既出の構成、動作については、同じ符号を用いることによってその説明を簡略化する。以下、本明細書において同様である。

【００３９】

（実施例１）

本発明の実施例１について、図６を用いて説明する。図６は、実施例１の無線通信システムの動作例を示すシーケンス図である。なお、図６において、端末装置１０をｕ番目のユーザが用いる端末装置（ＵＥ）とし、ＵＥ　ｕと表すものとする。また、実施例１においては、端末装置１０は、図５に示した選択ルールを用いることとする。

【００４０】

先ず、基地局装置３０は、上位層シグナリング（例えば、ＲＲＣ　ｒｅｃｏｎｆｉｇｕｒａｔｉｏｎメッセージ）によって、以下のように、割当情報を通知する（Ｓ１０）。

・ＵＥ　ｕ宛ＰＤＳＣＨのＳｕｂｆｒａｍｅ内スタートＯＦＤＭシンボル番号：ｉ（ｕ）

・ＵＥ　ｕ宛ＰＤＳＣＨのＳｕｂｆｒａｍｅ内ＯＦＤＭシンボル数：ｎ（ｕ）

端末装置１０は、基地局装置３０から通知された割当情報を記憶部１６に記憶する。

【００４１】

Ｓ１０で通知された上位層シグナリング（例えば、ＲＲＣ　ｒｅｃｏｎｆｉｇｕｒａｔｉｏｎメッセージ）に応じてＲＲＣが再構成された後、基地局装置３０は、物理層シグナリング（ＰＤＣＣＨ）および物理層データ送信（ＰＤＳＣＨ）によって、以下のように、割当情報を含む情報などを端末装置１０に通知する（Ｓ１２）。

・ＰＤＳＣＨのＳｕｂｆｒａｍｅ内スタートＯＦＤＭシンボル番号：ｎｕｌｌ

・ＰＤＳＣＨのＳｕｂｆｒａｍｅ内ＯＦＤＭシンボル数：ｎｕｌｌ

・ＰＤＳＣＨ周波数ポジション情報：ｒ（ｕ，ｔ）

・ＰＤＳＣＨデータ

ＰＤＳＣＨ周波数ポジション情報において、ｕはユーザが用いる端末装置を指し、ｔはサブフレームを指す。ＰＤＣＣＨメッセージは、例えば、上記図３に示すようなフォーマットを用いることができる。

【００４２】

端末装置１０は、Ｓ１２のＰＤＣＣＨおよびＰＤＳＣＨを受信すると、ｉ（ｕ），ｎ（ｕ），ｒ（ｕ，ｔ）を用いてＰＤＳＣＨデータを復調する（Ｓ１４）。端末装置１０は、Ｓ１２のＰＤＣＣＨのＰＤＳＣＨのＳｕｂｆｒａｍｅ内スタートＯＦＤＭシンボル番号およびＰＤＳＣＨのＳｕｂｆｒａｍｅ内ＯＦＤＭシンボル数が共にｎｕｌｌであることから、図５に示した選択ルール（２）にしたがって、Ｓ１０の上位層シグナリングで通知されたｉ（ｕ），ｎ（ｕ）を選択してＰＳＤＳＣＨデータを復調する。

【００４３】

さらに、基地局装置３０は、物理層シグナリング（ＰＤＣＣＨ）および物理層データ送信（ＰＤＳＣＨ）によって、以下のように、割当情報を含む情報などを通知する（Ｓ１６）。

・ＰＤＳＣＨのＳｕｂｆｒａｍｅ内スタートＯＦＤＭシンボル番号：ｉ´（ｕ）

・ＰＤＳＣＨのＳｕｂｆｒａｍｅ内ＯＦＤＭシンボル数：ｎ´（ｕ）

・ＰＤＳＣＨ周波数ポジション情報：ｒ（ｕ，ｔ）

・ＰＤＳＣＨデータ

【００４４】

端末装置１０は、Ｓ１６のＰＤＣＣＨおよびＰＤＳＣＨを受信すると、ｉ´（ｕ），ｎ´（ｕ），ｒ（ｕ，ｔ）を用いてＰＤＳＣＨデータを復調する（Ｓ１８）。端末装置１０は、Ｓ１６のＰＤＣＣＨのＰＤＳＣＨのＳｕｂｆｒａｍｅ内スタートＯＦＤＭシンボル番号およびＰＤＳＣＨのＳｕｂｆｒａｍｅ内ＯＦＤＭシンボル数に値がセットされていることから、図５に示した選択ルール（１）にしたがって、Ｓ１６の物理層シグナリングで通

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知されたｉ´（ｕ），ｎ´（ｕ）を選択してＰＳＤＳＣＨデータを復調する。

【００４５】

以上述べたように、実施例１によれば、１ｍｓのサブフレーム長で固定されているＴＴＩを短縮することができるため、ラウンドトリップタイムの更なる短縮化が実現できる。また、端末装置ごとにＴＴＩの動的制御が可能となり、異なるＴＴＩの物理層を共存させることが可能になる。

【００４６】

（実施例２）

本発明の実施例２について、図７を用いて説明する。本発明の実施例２は、実施例１の変形例である。実施例１と異なる部分は、基地局装置３０の通知制御部３４４の動作と、端末装置１０の制御部１４で用いる選択ルールにある。基地局装置３０の通知制御部３４４は、端末装置１０が過去の割当情報に従うべきことを黙示的に示すために、物理層シグナリングを端末装置１０へ通知しないようにする。このようにすることで、実施例１よりも、物理層シグナリングのオーバーヘッドを削減することが可能になる。

【００４７】

図７は、実施例２において端末装置１０が利用する選択ルールの例を示す図である。図７では、図５に示した選択ルールに、さらに以下の（５）、（６）のケースを追加する。（５）割当情報が上位層シグナリングに有り、物理層シグナリング自体が無い場合は、最終受信の物理層シグナリングで通知された割当情報に従う。最終受信の物理層シグナリングに割当情報が含まれていない場合は上位層シグナリングで通知された割当情報に従う。（６）割当情報が上位層シグナリングに無く、過去に受信した物理層シグナリングのいずれにも無い状態で、物理層シグナリング自体が無い場合は、ＬＴＥシステムの既存のスペック（ＴＴＩの時間長＝１ｍｓ、オフセット情報＝０）に従う。

【００４８】

例えば、ＷｉＭＡＸでは、物理パケットのスケジューリング間隔毎に、毎回、ＵＥ毎の送信時間長（及び周波数幅）を通知している。ＷｉＭＡＸはスケジューリング周期が５ｍｓであるのに対し、ＬＴＥはスケジューリング周期が１ｍｓであるから、ＷｉＭＡＸの手法をそのまま適用すると、物理層のオーバーヘッドが増大するという問題が発生する。実施例２によれば、実施例１に比べ、物理層シグナリングを削減できるため、この問題による影響を低減することが可能になる。

【００４９】

（実施例３）

本発明の実施例３について、図８および図９を用いて説明する。実施例３は、端末装置に使用させるべきＴＴＩの時間長とオフセット情報とを、端末を識別可能な制御情報、たとえば無線ネットワーク一時識別子（ＲＮＴＩ；Ｒａｄｉｏ　Ｎｅｔｗｏｒｋ　Ｔｅｍｐｏｒａｒｙ　ＩＤ）などに対応付けておき、基地局装置はＰＤＳＣＨデータに用いるＴＴＩの時間長とオフセット情報とに対応するＲＮＴＩでＰＤＣＣＨを符号化し、端末装置はＰＤＣＣＨの復調に成功したＲＮＴＩによってＴＴＩの時間長とオフセット情報を把握する手法である。図８は、実施例３にかかる基地局装置３０１の構成例を示す図である。図９は、実施例３にかかる無線通信システムの動作例を示すシーケンス図である。

【００５０】

図８に示す基地局装置３０１は、図２の基地局装置３０の構成に、符号化情報決定部３４６を加えたものである。符号化情報決定部３４６は、通知制御部３４４において通知先となるべき端末装置への送信データに用いる符号化情報を１以上決定する。符号化情報として、例えばＲＮＴＩを用いることができる。割当制御部３４２は、端末装置に使用させるべきＴＴＩの時間長とオフセット情報とが含まれた１組の割当情報を１以上決定する。通知制御部３４４は、割当制御部３４２において決定された１組以上の割当情報と符号化情報決定部３４６において決定された１以上の符号化情報と、をそれぞれ対応付けて上位層シグナリングで通知する。そして、下りリンクのデータの送信の際に、基地局装置３０１は、端末装置１０１に使用させるべきＴＴＩの時間長とオフセット情報に対応する符号

化情報で物理シグナリングをスクランブルして送信する。なお、ＲＮＴＩを用いたスクランブルについては、既存の技術が用いられてもよい。

【００５１】

実施例３の端末装置１０１は、図４の端末装置１０と構成は同じであるが、制御部１４の動作が異なる。制御部１４は、基地局装置３０１から通知される、各符号化情報に対応付けられた１以上の割当情報を、通信部１２により受信し、記憶部１６へ記憶させる。制御部１４は、下りリンクのデータを受信した場合は、各符号化情報で物理シグナリングのデスクランブルを行うブラインドデコーディングを行い、デスクランブルが成功した符号化情報に対応する割当情報に含まれるＴＴＩの時間長とオフセット情報とで指示されるサブフレーム内の無線リソースを復調する。ブラインドデコーディングは、たとえば、デコーディング結果のＣＲＣ判定によりエラーなしと判定されるまで、通知されたすべてのＲＮＴＩを順に用いてデコーディングを行うことなどを指す。

【００５２】

以下、図９のシーケンスを用いて、実施例３にかかる無線通信システムの具体的な動作を説明する。

先ず、基地局装置３０１は、上位層シグナリング（例えば、ＲＲＣ　ｒｅｃｏｎｆｉｇｕｒａｔｉｏｎメッセージ）によって、以下のように、各ＲＮＴＩに対応付けて複数の割当情報を通知する（Ｓ２０）。

＜ＲＮＴＩ　Ａ＞

ＵＥ　ｕ宛ＰＤＳＣＨのＳｕｂｆｒａｍｅ内スタートＯＦＤＭシンボル番号：ｉ（ｕ）

ＵＥ　ｕ宛ＰＤＳＣＨのＳｕｂｆｒａｍｅ内ＯＦＤＭシンボル数：ｎ（ｕ）

＜ＲＮＴＩ　Ｂ＞

ＵＥ　ｕ宛ＰＤＳＣＨのＳｕｂｆｒａｍｅ内スタートＯＦＤＭシンボル番号：ｉ´(u)

ＵＥ　ｕ宛ＰＤＳＣＨのＳｕｂｆｒａｍｅ内ＯＦＤＭシンボル数：ｎ´（ｕ）

端末装置１０１は、基地局装置３０１から通知された割当情報を各ＲＮＴＩに対応付けて記憶部１６に記憶する。

【００５３】

Ｓ２０で通知された上位層シグナリング（例えば、ＲＲＣ　ｒｅｃｏｎｆｉｇｕｒａｔｉｏｎメッセージ）に応じてＲＲＣが再構成された後、基地局装置３０１は、以下に示すように、物理層シグナリング（ＰＤＣＣＨ）および物理層データ送信（ＰＤＳＣＨ）を、端末装置１０１に通知する（Ｓ２２）。

ＰＤＳＣＨ周波数ポジション情報：ｒ（ｕ，ｔ）（ＲＮＴＩ　Ａでｓｃｒａｍｂｌｉｎｇ）

ＰＤＳＣＨデータ

Ｓ２２では、ＰＤＣＣＨはＲＮＴＩ　Ａでスクランブリングされていることから、ＰＤＳＣＨには、ＲＮＴＩ　Ａに対応する割当情報ｉ（ｕ），ｎ（ｕ）が用いられている。

【００５４】

端末装置１０１は、Ｓ２２のＰＤＣＣＨおよびＰＤＳＣＨを受信すると、ＰＤＣＣＨをＲＮＴＩ　ＡとＲＮＴＩ　Ｂとのそれぞれでデスクランブリングする。そして、ＲＮＴＩ　ＡでＰＤＣＣＨのデスクランブリングが成功した場合、ＲＮＴＩ　Ａに対応付けられたｉ（ｕ），ｎ（ｕ），ｒ（ｕ，ｔ）を用いてＰＳＤＳＣＨデータを復調する（Ｓ２４）。

【００５５】

さらに、基地局装置３０１は、以下に示すように、物理層シグナリング（ＰＤＣＣＨ）および物理層データ送信（ＰＤＳＣＨ）を、端末装置１０１に通知する（Ｓ２６）。

ＰＤＳＣＨ周波数ポジション情報：ｒ（ｕ，ｔ）（ＲＮＴＩ　Ｂでｓｃｒａｍｂｌｉｎｇ）

ＰＤＳＣＨデータ

Ｓ２６では、ＰＤＣＣＨはＲＮＴＩ　Ｂでスクランブリングされていることから、ＰＤＳＣＨには、ＲＮＴＩ　Ｂに対応する割当情報ｉ´（ｕ），ｎ´（ｕ）が用いられている。

【００５６】
端末装置１０１は、Ｓ２６のＰＤＣＣＨおよびＰＤＳＣＨを受信すると、ＰＤＣＣＨをＲＮＴＩ Ａとｒｎｔｉ Ｂとのそれぞれでデスクランブリングする。そして、ｒｎｔｉ ＢでＰＤＣＣＨのデスクランブリングが成功した場合、ｒｎｔｉ Ｂに対応付けられたｉ´（ｕ），ｎ´（ｕ），ｒ（ｕ，ｔ）を用いてＰＳＤＳＣＨデータを復調する（Ｓ２８）。

【００５７】
以上述べたように、実施例３では、端末装置１０１に使用させるべきＴＴＩの時間長とオフセット情報とをＲＮＴＩに対応付けておき、基地局装置３０１はＰＤＳＣＨデータに用いるＴＴＩの時間長とオフセット情報とに対応するＲＮＴＩでＰＤＣＣＨを符号化する。端末装置１０１はＰＤＣＣＨの復調に成功したＲＮＴＩによってＴＴＩの時間長とオフセット情報を把握することができる。

【００５８】
したがって、実施例３のようにしても、１ｍｓのサブフレーム長で固定されているＴＴＩを短縮することができるため、ラウンドトリップタイムの更なる短縮化が実現できる。また、端末装置ごとにＴＴＩの動的制御が可能となり、異なるＴＴＩの物理層を共存させることが可能になる。また、実施例３では、物理層シグナリング（ＰＤＣＣＨ）は、図３のようにパラメータを追加する必要が無く、既存のフォーマットが利用できるという利点がある。

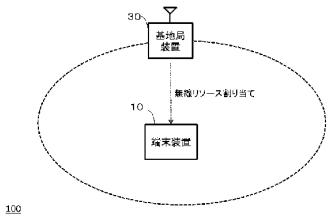
【００５９】
以上、本発明を実施例をもとに説明した。本発明は上述した実施例並びに各実施例の内容に限定されるものではなく、本発明の要旨の範囲内において種々に変形して実施をすることが可能である。上記実施例は例示であり、各実施例を組み合わせるなどして、それらの各構成要素や各処理プロセスの組み合わせにいろいろな変形例が可能なこと、またそうした変形例も本発明の範囲にあることは当業者に理解されるところである。

【符号の説明】

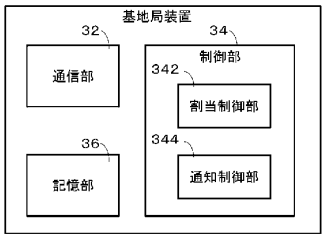
【００６０】
１００…無線通信システム、１０…端末装置、３０…基地局装置、１２…通信部、１４…制御部、１６…記憶部、１８…ユーザＩＦ、３２…通信部、３４…制御部、３４２…割当制御部、３４４…通知制御部、３４６…符号化情報決定部、３６…記憶部。

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IPR2024-01036

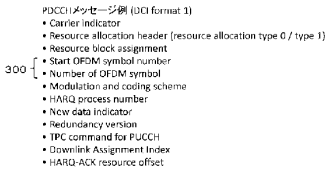
【図１】



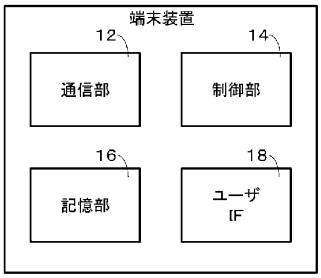
【図２】



【図３】



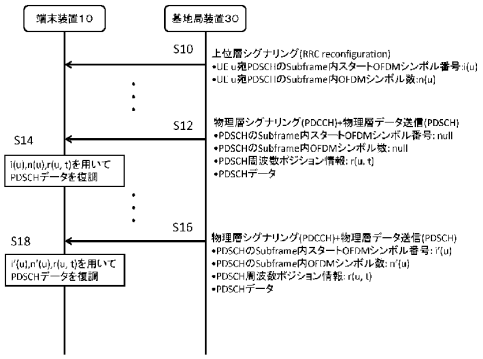
【図４】



【図５】

		上位層シグナリング	
		割当情報あり	割当情報なし
物理層シグナリング	割当情報あり	(1)物理層シグナリングに従う	(3)物理層シグナリングに従う
	割当情報なし	(2)上位層シグナリングに従う	(4)既存スペックに従う

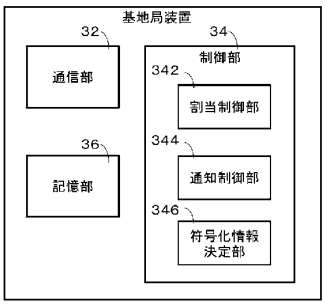
【図６】



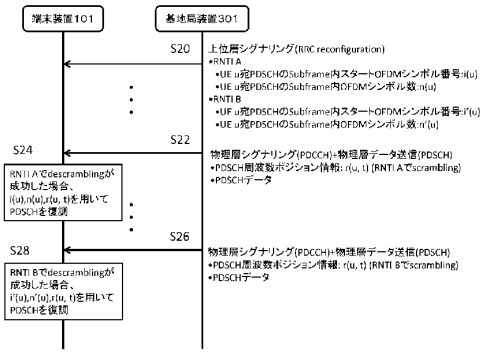
【図７】

		上位層シグナリング	
		割当情報あり	割当情報なし
物理層シグナリング	割当情報あり	(1)物理層シグナリングに従う	(3)物理層シグナリングに従う
	割当情報なし	(2)上位層シグナリングに従う	(4)既存スペックに従う
	シグナリングなし	(5)最終受信物理層シグナリングに従う（最終受信物理層シグナリングに割当情報が含まれていない場合は上位層シグナリングに従う）	(6)既存スペックに従う

【図８】



【図９】



Espacenet

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METHOD, BASE STATION DEVICE, TERMINAL DEVICE, AND COMMUNICATION SYSTEM FOR CHANNEL RESOURCE ALLOCATION

Inventor(s):

Applicant(s):

Classification: **- international:** ***H04W72/04; H04W74/08***
- cooperative: **H04W72/0406 (EP);** H04W28/18 (EP)

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Abstract not available for JP2014511080 (A)
Abstract of corresponding document: EP2680651 (A1)

Embodiments of the present invention provide a method for allocating channel resource, a base station device, a terminal device, and a communication system. The method includes: sending a cell broadcast message to a terminal device, where the cell broadcast message includes description information of a first parameter configuration and description information of a second parameter configuration that correspond to common enhanced dedicated channel resources, where the first parameter configuration is specific to a first transmission time interval (TTI) and the second parameter configuration is specific to a second TTI which is different from the first TTI; receiving indication information sent from the terminal device, where the indication information indicates that the terminal device selects the first TTI or the second TTI as a TTI for use; and allocating a common enhanced dedicated channel resource to the terminal device according to the indication information. In the embodiments of the present invention, multiple TTIs are configured for a cell and the parameter configuration information of the multiple TTIs is broadcast to the terminal device, so that the terminal device can select a proper TTI from the multiple TTIs and a network side can allocate a channel resource according to the selected TTI, thereby increasing the efficiency in allocating and utilizing system resources.

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H04W 74/08	(2009.01)	H04W 74/08		

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最終頁に続く

(54)【発明の名称】チャネルリソース割振りのための方法、基地局デバイス、端末デバイス、および通信システム

(57)【要約】
本発明はチャネルリソース割振り方法、基地局デバイス、端末デバイス及び通信システムを提供する。セルブロードキャストメッセージを端末デバイスに送信する段階であって、セルブロードキャストメッセージがコモンエンハンスト専用チャネルリソースに対応する、第1パラメータ構成の記述情報および第2パラメータ構成の記述情報を含み、第1パラメータ構成が第1送信時間間隔TTIを対象とし、第2パラメータ構成が第1TTIとは異なる第2TTIを対象とする段階と、端末デバイスによって送信された指示情報を受信する段階であって、指示情報が端末デバイスが選択TTIとして第1TTIまたは第2TTIの選択を示す段階と、指示情報に従ってコモンエンハンスト専用チャネルリソースを端末デバイスに割り振る段階とを含む。本発明ではセル中で複数のTTIが構成され、複数のTTIのパラメータ構成情報が端末デバイスにブロードキャストされる。

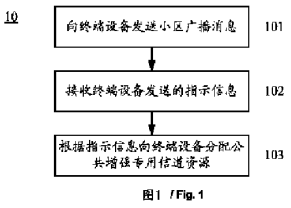


图1 / Fig. 1

101 SENDING OF A CELL BROADCAST MESSAGE TO A TERMINAL DEVICE
102 RECEPTION OF INDICATION INFORMATION SENT BY THE TERMINAL DEVICE
103 ALLOCATION OF A COMMON ENHANCED-DEDICATED CHANNEL RESOURCE TO THE TERMINAL DEVICE ACCORDING TO THE INDICATION INFORMATION

【特許請求の範囲】
【請求項１】
チャネルリソースを割り振る方法であって、
セルブロードキャストメッセージを端末デバイスに送信する段階であって、前記セルブロードキャストメッセージが、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、前記第1のパラメータ構成が第1の送信時間間隔(TTI)に特有であり、前記第2のパラメータ構成が、前記第1のTTIとは異なる第2の送信時間間隔(TTI)に特有である段階と、
前記端末デバイスから送信された指示情報を受信する段階であって、前記指示情報が、前記端末デバイスが使用TTIとして前記第1のTTIまたは前記第2のTTIを選択することを示すものである段階と、
前記指示情報に従ってコモンエンハンスト専用チャネルリソースを前記端末デバイスに割り振る段階とを含むことを特徴とする方法。
【請求項２】
前記セルブロードキャストメッセージを前記端末デバイスに送信する前記段階が、
前記セルブロードキャストメッセージを前記端末デバイスに送信する段階であって、前記セルブロードキャストメッセージ中で、前記コモンエンハンスト専用チャネルリソースが、前記第1のTTIに特有の第1のリソースサブセットと前記第2のTTIに特有の第2のリソースサブセットとにグループ化された段階を含むことを特徴とする、請求項1に記載の方法。
【請求項３】
前記指示情報に従って前記コモンエンハンスト専用チャネルリソースを前記端末デバイスに割り振る前記段階が、
前記選択されたTTIが前記第1のTTIであることを前記指示情報が示すときに、前記第1のリソースサブセット中のコモンエンハンスト専用チャネルリソースを前記端末デバイスに割り振り、前記選択されたTTIが前記第2のTTIであることを前記指示情報が示すときに、前記第2のリソースサブセット中のコモンエンハンスト専用チャネルリソースを前記端末デバイスに割り振る段階を含むことを特徴とする、請求項2に記載の方法。
【請求項４】
前記端末デバイスに対する拒否回数を記録する段階と、
前記記録された回数を無線ネットワークコントローラに送信する段階とをさらに含み、それにより前記無線ネットワークコントローラが前記回数に従って前記第1のリソースサブセットおよび前記第2のリソースサブセット中のコモンエンハンスト専用チャネルリソースを調整することを特徴とする、請求項2に記載の方法。
【請求項５】
チャネルリソースを割り振る方法であって、
セルブロードキャストメッセージをネットワーク側から受信する段階であって、前記セルブロードキャストメッセージが、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、前記第1のパラメータ構成が第1の送信時間間隔(TTI)に特有であり、第2のパラメータ構成が、前記第1のTTIとは異なる第2のTTIに特有である段階と、
使用TTIとして前記第1のTTIまたは前記第2のTTIを選択し、前記選択したTTIの指示情報を生成する段階と、
前記ネットワーク側が前記指示情報に従ってコモンエンハンスト専用チャネルリソースを割り振るよう、前記指示情報を前記ネットワーク側に送信する段階とを含むことを特徴とする方法。
【請求項６】
前記セルブロードキャストメッセージを前記ネットワーク側から受信する前記段階が、
前記セルブロードキャストメッセージを受信する段階であって、前記セルブロードキャストメッセージ中で、前記コモンエンハンスト専用チャネルリソースが、前記第1のTTIに

特有の第1のリソースサブセットと前記第2のTTIに特有の第2のリソースサブセットとにグループ化された段階を含むことを特徴とする、請求項5に記載の方法。

【請求項７】

チャネルリソースを割り振る方法であって、

セルブロードキャストメッセージを端末デバイスに送信する段階であって、前記セルブロードキャストメッセージが、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、前記第1のパラメータ構成が第1の送信時間間隔(TTI)に特有であり、前記第2のパラメータ構成が、前記第1のTTIとは異なる第2のTTIに特有である段階と、

使用TTIとして前記第1のTTIまたは前記第2のTTIを選択する段階と、

前記選択されたTTIを前記端末デバイスに通知する段階と、

前記選択されたTTIに従ってコモンエンハンスト専用チャネルリソースを前記端末デバイスに割り振る段階とを含むことを特徴とする方法。

【請求項８】

チャネルリソースを割り振る方法であって、

セルブロードキャストメッセージをネットワーク側から受信する段階であって、前記セルブロードキャストメッセージが、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、前記第1のパラメータ構成が第1の送信時間間隔(TTI)に特有であり、前記第2のパラメータ構成が、前記第1のTTIとは異なる第2のTTIに特有である段階と、

指示情報を前記ネットワーク側から受信する段階であって、前記指示情報が、前記ネットワーク側デバイスが使用TTIとして前記第1のTTIまたは前記第2のTTIを選択することを示すものである段階と、

前記選択されたTTIに従って前記ネットワーク側によって割り振られたコモンエンハンスト専用チャネルリソースを受信する段階とを含むことを特徴とする方法。

【請求項９】

セルブロードキャストメッセージを端末デバイスに送信するように構成されたブロードキャスティングユニットであって、前記セルブロードキャストメッセージが、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、前記第1のパラメータ構成が第1の送信時間間隔(TTI)に特有であり、前記第2のパラメータ構成が、前記第1のTTIとは異なる第2のTTIに特有であるブロードキャスティングユニットと、

前記端末デバイスから送信された指示情報を受信するように構成された受信ユニットであって、前記指示情報が、前記端末デバイスが使用TTIとして前記第1のTTIまたは前記第2のTTIを選択することを示すものである受信ユニットと、

前記指示情報に従ってコモンエンハンスト専用チャネルリソースを前記端末デバイスに割り振るように構成された割振りユニットとを備えることを特徴とする基地局デバイス。

【請求項１０】

前記ブロードキャスティングユニットが前記セルブロードキャストメッセージを前記端末デバイスに送信し、前記セルブロードキャストメッセージ中で、前記コモンエンハンスト専用チャネルリソースが、前記第1のTTIに特有の第1のリソースサブセットと前記第2のTTIに特有の第2のリソースサブセットとにグループ化されたことを特徴とする、請求項9に記載の基地局デバイス。

【請求項１１】

前記割振りユニットが、前記選択されたTTIが前記第1のTTIであることを前記指示情報が示すときに、前記第1のリソースサブセット中のコモンエンハンスト専用チャネルリソースを前記端末デバイスに割り振り、前記選択されたTTIが前記第2のTTIであることを前記指示情報が示すときに、前記第2のリソースサブセット中のコモンエンハンスト専用チャネルリソースを前記端末デバイスに割り振ることを特徴とする、請求項10に記載の基地局デバイス。

【請求項１２】
前記端末デバイスに対する拒否回数を記録して、前記記録された回数を無線ネットワークコントローラに送信するように構成された記録ユニットをさらに備え、それにより前記無線ネットワークコントローラが前記回数に従って前記第1のリソースサブセットおよび前記第2のリソースサブセット中の前記コモンエンハンスト専用チャネルリソースを調整することを特徴とする、請求項10に記載の基地局デバイス。
【請求項１３】
セルブロードキャストメッセージを端末デバイスに送信するように構成されたブロードキャスティングユニットであって、前記セルブロードキャストメッセージが、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、前記第1のパラメータ構成が第1の送信時間間隔(TTI)に特有であり、前記第2のパラメータ構成が、前記第1のTTIとは異なる第2のTTIに特有であるブロードキャスティングユニットと、
使用TTIとして前記第1のTTIまたは前記第2のTTIを選択するように構成された選択ユニットと、
前記選択されたTTIを前記端末デバイスに通知するように構成された通知ユニットと、
前記選択されたTTIに従ってコモンエンハンスト専用チャネルリソースを前記端末デバイスに割り振るように構成された割振りユニットとを備えることを特徴とする基地局デバイス。
【請求項１４】
セルブロードキャストメッセージをネットワーク側から受信するように構成された受信ユニットであって、前記セルブロードキャストメッセージが、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、前記第1のパラメータ構成が第1の送信時間間隔(TTI)に特有であり、前記第2のパラメータ構成が、前記第1のTTIとは異なる第2のTTIに特有である受信ユニットと、
使用TTIとして前記第1のTTIまたは前記第2のTTIを選択し、前記選択したTTIの指示情報を生成するように構成された選択ユニットと、
前記ネットワーク側が前記指示情報に従ってコモンエンハンスト専用チャネルリソースを割り振るよう、前記指示情報を前記ネットワーク側に送信するように構成された送信ユニットとを備えることを特徴とする端末デバイス。
【請求項１５】
前記受信ユニットがさらに、前記割り振られたコモンエンハンスト専用チャネルリソースの通知を受信するように構成され、
前記選択ユニットがさらに、前記選択したTTIに従って前記第1のパラメータ構成または前記第2のパラメータ構成を選択するように構成されたことを特徴とする、請求項14に記載の端末デバイス。
【請求項１６】
前記受信ユニットが前記セルブロードキャストメッセージを受信し、前記セルブロードキャストメッセージ中で、前記コモンエンハンスト専用チャネルリソースが、前記第1のTTIに特有の第1のリソースサブセットと前記第2のTTIに特有の第2のリソースサブセットとにグループ化されたことを特徴とする、請求項14に記載の端末デバイス。
【請求項１７】
端末デバイスであって、
セルブロードキャストメッセージをネットワーク側から受信するように構成された受信ユニットを備え、前記セルブロードキャストメッセージが、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、前記第1のパラメータ構成が第1の送信時間間隔(TTI)に特有であり、前記第2のパラメータ構成が、前記第1のTTIとは異なる第2のTTIに特有であり、
前記受信ユニットがさらに、指示情報を前記ネットワーク側から受信するように構成さ

れ、前記指示情報が、前記ネットワーク側デバイスが使用TTIとして前記第1のTTIまたは前記第2のTTIを選択することを示し、

前記受信ユニットがさらに、前記選択されたTTIに従って前記ネットワーク側によって割り振られたコモンエンハンスト専用チャネルリソースを受信するように構成されたことを特徴とする端末デバイス。

【請求項１８】

請求項9から13のいずれか一項に記載の基地局デバイスと、

請求項14から17のいずれか一項に記載の端末デバイスとを備えることを特徴とする通信システム。

【請求項１９】

前記基地局デバイスによって記録された、前記端末デバイスに対する拒否回数を受信し、前記回数に従って前記第1のリソースサブセットおよび前記第2のリソースサブセット中の前記コモンエンハンスト専用チャネルリソースを調整するように構成された無線ネットワークコントローラをさらに備えることを特徴とする、請求項18に記載の通信システム。

【発明の詳細な説明】

【技術分野】

【０００１】

本出願は、参照によりその全体が本明細書に組み込まれる、2011年4月2日に中国特許庁に出願された「METHOD FOR ALLOCATING CHANNEL RESOURCE, BASE STATION DEVICE, TERMINAL DEVICE, AND COMMUNICATION SYSTEM」という名称の中国特許出願第201110083708.4号に対する優先権を主張するものである。

【０００２】

本発明の実施形態は、ワイヤレス通信の分野に関し、特に、チャネルリソースを割り振る方法、基地局デバイス、端末デバイス、および通信システムに関する。

【背景技術】

【０００３】

3GPP(The 3rd Generation Partnership Project、第3世代パートナーシッププロジェクト)UMTS(Universal Mobile Telecommunications System、ユニバーサルモバイルテレコミュニケーションズシステム)R8バージョンでは、遊休(idle)モードまたはCELL_FACH(CELL Forward Access Channel、セルフォワードアクセスチャネル)状態のUE(User Equipment、ユーザ機器)に関して、アップリンク送信遅延を低減しアップリンク送信レートを上げるために、エンハンストRACH(Random Access Channel、ランダムアクセスチャネル)と呼ばれる新しい機能が採用される。エンハンストRACHは、R99バージョンにおけるランダムアクセスを向上させる。エンハンストランダムアクセスは、RACHの代わりとするためのE-DCH(Enhanced Dedicated Channel、エンハンスト専用チャネル)を採用して、アップリンク送信を実施する。エンハンストCELL_FACHプロシージャは、概して、プリアンブルアクセスおよびリソース割振り段階と、衝突解決段階と、E-DCHデータ送信段階と、リソース解放段階とを含む。

【０００４】

リソース割振り段階で割り振られるリソースは、Common-EDCH(Common Enhanced-Dedicated Channel、コモンエンハンスト専用チャネル)リソースを指し、これは、セルのシステム情報中でブロードキャストされる。UEは、セルによってブロードキャストされたシステム情報を読むことによって、Common-EDCHリソース情報を得ることができる。既存のプロトコルによれば、全部で32セットのCommon-EDCHリソースがあり、これらには、F-DPCH(Fractional Dedicated Physical Channel、フラクショナル専用物理チャネル)、E-RGCH(E-DCH absolute grant channel、E-DCH絶対グラントチャネル)、E-HICH(E-DCH HARQ Acknowledgement Indicator Channel、E-DCHハイブリッド自動反復要求肯定応答インジケータチャネル)、およびアップリンクDPCH(Dedicated Physical Channel、専用物理チャネル)などの、符号情報が含まれる。Node Bは、リソース割振り段階で、AICH(Acquisition Indicator Channel、アクイジションインジケータチャネル)を介して、リソースインデックス

の使用をUEに通知する。UEは、リソースインデックスを受信した後、対応するリソースセットを使用してアップリンクデータを送信する。

【０００５】

エンハンストRACH機能については、アップリンクTTI(Transmission Time Interval、送信時間間隔)長さを各セルにつき1つだけ構成することができ、UEは、1つのTTI長さだけを使用する。このTTI長さは、アップリンクデータ送信では、2ミリ秒のTTIまたは10ミリ秒のTTIであることがある。したがって、前述の32セットのリソースは全て、UEが1つのTTI長さを使用する場合に向けて特に構成される。

【０００６】

しかし、この構成は十分にフレキシブルではない。セルのTTIが、UEによって必要とされるTTIと合致しない場合は、システムリソースの利用効率が低下することになる。

【発明の概要】

【発明が解決しようとする課題】

【０００７】

本発明の実施形態は、システムリソースの利用効率を高めることのできる、チャネルリソースを割り振る方法、基地局デバイス、端末デバイス、および通信システムを提供する。

【課題を解決するための手段】

【０００８】

一態様では、チャネルリソースを割り振る方法が提供される。この方法は、セルブロードキャストメッセージを端末デバイスに送信する段階であって、セルブロードキャストメッセージが、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、第1のパラメータ構成が第1の送信時間間隔(TTI)に特有であり、第2のパラメータ構成が、第1のTTIとは異なる第2のTTIに特有である段階と、端末デバイスから送信された指示情報を受信する段階であって、指示情報が、端末デバイスが使用TTIとして第1のTTIまたは第2のTTIを選択することを示すものである段階と、指示情報に従ってコモンエンハンスト専用チャネルリソースを端末デバイスに割り振る段階とを含む。

【０００９】

別の態様では、チャネルリソースを割り振る方法が提供される。この方法は、セルブロードキャストメッセージをネットワーク側から受信する段階であって、セルブロードキャストメッセージが、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、第1のパラメータ構成が第1の送信時間間隔(TTI)に特有であり、第2のパラメータ構成が、第1のTTIとは異なる第2のTTIに特有である段階と、使用TTIとして第1のTTIまたは第2のTTIを選択し、選択したTTIの指示情報を生成する段階と、ネットワーク側が指示情報に従ってコモンエンハンスト専用チャネルリソースを割り振るよう、指示情報をネットワーク側に送信する段階とを含む。

【００１０】

別の態様では、基地局デバイスが提供される。この基地局デバイスは、セルブロードキャストメッセージを端末デバイスに送信するように構成されたブロードキャスティングユニットであって、セルブロードキャストメッセージが、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、第1のパラメータ構成が第1の送信時間間隔(TTI)に特有であり、第2のパラメータ構成が、第1のTTIとは異なる第2のTTIに特有であるブロードキャスティングユニットと、端末デバイスから送信された指示情報を受信するように構成された受信ユニットであって、指示情報が、端末デバイスが使用TTIとして第1のTTIまたは第2のTTIを選択することを示すものである受信ユニットと、指示情報に従ってコモンエンハンスト専用チャネルリソースを端末デバイスに割り振るように構成された割振りユニットとを備える。

【００１１】

別の態様では、端末デバイスが提供される。この端末デバイスは、セルブロードキャストメッセージをネットワーク側から受信するように構成された受信ユニットであって、セルブロードキャストメッセージが、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、第1のパラメータ構成が第1の送信時間間隔(TTI)に特有であり、第2のパラメータ構成が、第1のTTIとは異なる第2のTTIに特有である受信ユニットと、使用TTIとして第1のTTIまたは第2のTTIを選択し、選択したTTIの指示情報を生成するように構成された選択ユニットと、ネットワーク側が指示情報に従ってコモンエンハンスト専用チャネルリソースを割り振るよう、指示情報をネットワーク側に送信するように構成された送信ユニットとを備える。

【００１２】

別の態様では、チャネルリソースを割り振る方法が提供される。この方法は、セルブロードキャストメッセージを端末デバイスに送信する段階であって、セルブロードキャストメッセージが、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、第1のパラメータ構成が第1の送信時間間隔(TTI)に特有であり、第2のパラメータ構成が、第1のTTIとは異なる第2のTTIに特有である段階と、使用TTIとして第1のTTIまたは第2のTTIを選択する段階と、選択されたTTIを端末デバイスに通知する段階と、選択されたTTIに従ってコモンエンハンスト専用チャネルリソースを端末デバイスに割り振る段階とを含む。

【００１３】

別の態様では、チャネルリソースを割り振る方法が提供される。この方法は、セルブロードキャストメッセージをネットワーク側から受信する段階であって、セルブロードキャストメッセージが、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、第1のパラメータ構成が第1の送信時間間隔(TTI)に特有であり、第2のパラメータ構成が、第1のTTIとは異なる第2のTTIに特有である段階と、指示情報をネットワーク側から受信する段階であって、指示情報が、ネットワーク側デバイスが使用TTIとして第1のTTIまたは第2のTTIを選択することを示すものである段階と、選択されたTTIに従ってネットワーク側によって割り振られたコモンエンハンスト専用チャネルリソースを受信する段階とを含む。

【００１４】

別の態様では、基地局デバイスが提供される。この基地局デバイスは、セルブロードキャストメッセージを端末デバイスに送信するように構成されたブロードキャスティングユニットであって、セルブロードキャストメッセージが、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、第1のパラメータ構成が第1の送信時間間隔(TTI)に特有であり、第2のパラメータ構成が、第1のTTIとは異なる第2のTTIに特有であるブロードキャスティングユニットと、使用TTIとして第1のTTIまたは第2のTTIを選択するように構成された選択ユニットと、選択されたTTIを端末デバイスに通知するように構成された通知ユニットと、選択されたTTIに従ってコモンエンハンスト専用チャネルリソースを端末デバイスに割り振るように構成された割振りユニットとを備える。

【００１５】

別の態様では、端末デバイスが提供される。この端末デバイスは、セルブロードキャストメッセージをネットワーク側から受信するように構成された受信ユニットを備え、セルブロードキャストメッセージは、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、第1のパラメータ構成は第1の送信時間間隔(TTI)に特有であり、第2のパラメータ構成は、第1のTTIとは異なる第2のTTIに特有であり、受信ユニットはさらに、指示情報をネットワーク側から受信するように構成され、指示情報は、ネットワーク側デバイスが使用TTIとして第1のTTIまたは第2のTTIを選択することを示し、受信ユニットはさらに、選択されたTTIに従ってネットワーク側によって割り振られたコモンエンハンスト専用チャネルリソースを受信するように構成される。

【００１６】
別の態様では、通信システムが提供される。この通信システムは、上記の基地局デバイスまたは上記の端末デバイスを備える。
【発明の効果】
【００１７】
本発明の実施形態では、セルに対して複数のTTIが構成され、複数のTTIのパラメータ構成情報が端末デバイスにブロードキャストされる。したがって、端末デバイスは、複数のTTIから適切なTTIを選択することができ、ネットワーク側は、選択されたTTIに従ってチャネルリソースを割り振ることができ、それにより、システムリソースの割振りおよび利用の効率を高める。
【００１８】
本発明の実施形態における技術的解決法をより明確に例示するために、実施形態または従来技術を記述するのに必要とされる添付図面を以下に簡単に紹介する。明らかに、以下の記述における添付図面は本発明のいくつかの実施形態のみを示し、当業者なら、これらの添付図面から創意工夫なしに他の図面を導出することもなお可能である。
【図面の簡単な説明】
【００１９】
【図１】本発明の一実施形態による、チャネルリソースを割り振る方法の概略フローチャートである。
【図２】本発明の一実施形態による、チャネルリソースを割り振る方法の概略フローチャートである。
【図３Ａ】本発明の一実施形態による、チャネルリソース割振りのプロセスの概略フローチャートである。
【図３Ｂ】本発明の一実施形態による、チャネルリソース割振りのプロセスの概略フローチャートである。
【図４】本発明の一実施形態による、チャネルリソース割振りのプロセスの概略フローチャートである。
【図５】本発明の一実施形態による基地局デバイスの概略ブロック図である。
【図６】本発明の一実施形態による基地局デバイスの概略ブロック図である。
【図７】本発明の一実施形態による端末デバイスの概略ブロック図である。
【図８】本発明の一実施形態による、チャネルリソースを割り振る方法の概略フローチャートである。
【図９】本発明の一実施形態による、チャネルリソースを割り振る方法を示す図である。
【図１０】本発明の一実施形態による基地局デバイスの概略ブロック図である。
【図１１】本発明の一実施形態による端末デバイスの概略ブロック図である。
【図１２】本発明の一実施形態による通信システムの概略ブロック図である。
【図１３】本発明の別の実施形態による通信システムの概略ブロック図である。
【発明を実施するための形態】
【００２０】
以下、本発明の実施形態における添付図面を参照しながら、本発明の実施形態における技術的解決法について明確かつ完全に述べる。明らかに、述べる実施形態は、本発明の実施形態の全部ではなく一部でしかない。本発明の実施形態に基づいて当業者によって創意工夫なしに得られる他の全ての実施形態も、本発明の保護範囲に入るものとする。
【００２１】
本発明の技術的解決法は、GSM、符号分割多元接続(CDMA、Code Division Multiple Access)、広帯域符号分割多元接続(WCDMA（登録商標）、Wideband Code Division Multiple Access Wireless)、汎用パケット無線サービス(GPRS、General Packet Radio Service)、ロングタームエボリューション(LTE、Long Term Evolution)など、様々な通信システムに適用することができる。
【００２２】

モバイル端末(Mobile Terminal)は、モバイルユーザ(UE、User Equipment)またはモバイルユーザ機器などとも呼ばれるが、無線アクセスネットワーク(RAN、Radio Access Network)を介して1つまたは複数のコアネットワークと通信することができる。モバイル端末は、携帯電話機(あるいはセルラー電話機とも呼ばれる)などのモバイル端末とすることができ、または、ポータブル、ポケットサイズ、ハンドヘルド、コンピュータ組込み型、もしくは車載型のモバイル装置など、モバイル端末搭載コンピュータとすることができる。モバイル端末は、音声および/またはデータを無線アクセスネットワークと交換する。

【００２３】

基地局は、GSM（登録商標）もしくはCDMA中の基地局(BTS、Base Transceiver Station)、またはWCDMA中の基地局(NodeB)、またはLTE中の進化型基地局(eNBもしくはe-NodeB、evolutional Node B)とすることができ、本発明によって限定されない。記述を容易にするために、以下の実施形態では、Node Bを記述のための例にとる。

【００２４】

UEまたはネットワーク側は、UEの要件に従って動的にTTIの長さを調整することはできない。UEは、ネットワーク側によって構成されたTTIのみを使用することができる。例えば、セルが2ミリ秒のTTI長さのみをサポートするが、UEはセルのエッジに位置する。この場合、10ミリ秒のTTI長さに切り替えれば、よりよいカバレッジおよび伝送信頼性を達成することができる。あるいは、セルが10ミリ秒のTTI長さのみをサポートするが、UEはセルの中心に位置する。この場合、より多くの電力が利用可能であり、2ミリ秒のTTI長さに切り替えれば、アップリンク送信レートが効果的に上がることになる。このケースでは、セルのTTIが、UEによって必要とされるTTIと合致せず、これによりシステムリソースの利用効率が低下する。

【００２５】

本発明の実施形態は、各セル中で2つのTTI長さを構成できることを考慮に入れる。すなわち、1つのセル中で、エンハンストRACHをサポートするUEは、2つのTTI長さのうちの一方を動的に選択して、アップリンクデータを送信することができる。

【００２６】

以下では、端末デバイスを表すのにUEを使用し、基地局デバイスを表すのにNode Bを使用するが、本発明の実施形態は、これらの用語によって表される特定のシステムに限定されない。本発明の実施形態は、1つのセル中で複数のTTI長さを使用できる任意のシステムに適用可能である。

【００２７】

図1は、本発明の一実施形態による、チャネルリソースを割り振る方法の概略フローチャートである。図1に示す方法10は、主にネットワーク側で、例えば基地局(Node Bなど)によって実行される。

【００２８】

方法10のステップ101で、セルブロードキャストメッセージが端末デバイス(UEなど)に送信される。セルブロードキャストメッセージは、コモンエンハンスト専用チャネルCommon-EDCHリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、第1のパラメータ構成は、第1の送信時間間隔(TTI)に特有であり、第2のパラメータ構成は、第1のTTIとは異なる第2のTTIに特有である。

【００２９】

102.端末デバイスから送信された指示情報を受信する。指示情報は、端末デバイスが使用TTIとして第1のTTIまたは第2のTTIを選択することを示す。

【００３０】

103.指示情報に従って、コモンエンハンスト専用チャネルリソースを端末デバイスに割り振る。

【００３１】

本発明の実施形態では、セルに対して複数のTTIが構成され、複数のTTIのパラメータ構成情報が端末デバイスにブロードキャストされる。したがって、端末デバイスは、複数の

TTIから適切なTTIを選択することができ、ネットワーク側は、選択されたTTIに従ってチャネルリソースを割り振ることができ、それにより、システムリソースの割振りおよび利用の効率を高める。

【００３２】

対応する動作が端末側で実行される。図2は、本発明の一実施形態による、チャネルリソースを割り振る方法の概略フローチャートである。図2に示す方法20は、端末デバイス(UEなど)によって実行され、以下を含む。

【００３３】

201.セルブロードキャストメッセージをネットワーク側から受信する。セルブロードキャストメッセージは、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、第1のパラメータ構成は、第1の送信時間間隔(TTI)に特有であり、第2のパラメータ構成は、第1のTTIとは異なる第2のTTIに特有である。

【００３４】

202.使用TTIとして第1のTTIまたは第2のTTIを選択し、選択したTTIの指示情報を生成する。

【００３５】

203.ネットワーク側が指示情報に従ってコモンエンハンスト専用チャネルリソースを割り振るよう、指示情報をネットワーク側に送信する。

【００３６】

本発明の実施形態では、セルに対して複数のTTIが構成され、複数のTTIのパラメータ構成情報が端末デバイスにブロードキャストされる。したがって、端末デバイスは、複数のTTIから適切なTTIを選択することができ、ネットワーク側は、選択されたTTIに従ってチャネルリソースを割り振ることができ、それにより、システムリソースの割振りおよび利用の効率を高める。

【００３７】

本発明の一実施形態における、通信システム中でのチャネルリソース割振りのプロセスについて、以下に詳細に述べる。図3Aは、本発明の一実施形態による、チャネルリソース割振りのプロセスの概略フローチャートである。

【００３８】

図3Aに示すステップS301で、Node Bがセルブロードキャストメッセージを UEに送信する。セルブロードキャストメッセージは、Common-EDCHリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、第1のパラメータ構成は、第1のTTI(2ミリ秒または10ミリ秒など)に特有であり、第2のパラメータ構成は、第1のTTIとは異なる第2のTTI(10ミリ秒または2ミリ秒など)に特有である。言い換えれば、本発明の実施形態におけるブロードキャストメッセージは、既存のTTIに加えて、別のTTI長さに特有の追加パラメータ構成も含むことができる。

【００３９】

ステップ302で、UEは、ブロードキャストメッセージを受信した後、セルによってサポートされ得る2つのTTIの情報を得る。したがって、UEは、それ自体の要件に従って、使用TTIとして第1のTTIまたは第2のTTIを選択する。

【００４０】

ステップ303で、UEは、選択したTTIの指示情報を生成し、ステップ304で、指示情報をNode Bに送信する。指示情報は、専用の指示メッセージを介して送信されるか、または他のメッセージによって搬送されてよい。例えば、UEは、ランダムアクセス段階で、異なるシグネチャ(signature)を選択することによって、選択したTTI長さをNode Bに通知するか、または、UEは、ランダムアクセス段階で、異なるプリアンブルスクランブル符号(preamble scramble code)を選択することによって、選択したTTI長さをNode Bに通知する。

【００４１】

ステップ305で、Node Bは、UEによって選択されたTTIの指示情報を受信した後、Common

-EDCHリソースを割り振るようトリガされる。2ミリ秒のTTIおよび10ミリ秒のTTIが32セットのcommon E-DCHリソースを共有するシナリオでは、Node Bは、既存のプロトコル中で定義されるのと同様のリソース割振り方式に従って、common E-DCHリソースを割り振ることができる。

【００４２】

ステップ306で、Node Bは、割り振ったCommon-EDCHリソースをUEに通知する。

【００４３】

ステップ307で、UEは、Node Bの通知を受信した後、選択したTTIに従って、対応するパラメータ構成(第1のパラメータ構成または第2のパラメータ構成)を選択する。

【００４４】

ステップ308で、UEは、選択したパラメータ構成を使用してアップリンクデータを送信する。

【００４５】

本発明の実施形態では、セルに対して複数のTTIが構成され、複数のTTIのパラメータ構成情報が端末デバイスにブロードキャストされる。したがって、端末デバイスは、複数のTTIから適切なTTIを選択することができ、ネットワーク側は、選択されたTTIに従ってチャネルリソースを割り振ることができ、それにより、システムリソースの割振りおよび利用の効率を高める。

【００４６】

図3Aに示す例では、2ミリ秒のTTIおよび10ミリ秒のTTIが32セットのcommon E-DCHリソースを共有するシナリオで、Node Bは、common E-DCHリソースを割り振るとき、UEによって選択されたTTI長さを考慮しないものとすることができる。本発明の一実施形態では、common E-DCHリソースを割り振るとき、UEによって選択されたTTIを考慮することができる。

【００４７】

図3Bは、本発明によるチャネルリソース割振りのプロセスの概略フローチャートである。図3Bでは、図3Aのプロセスと同じかまたは同様のプロセスは、同じかまたは同様のマークで識別し、それらの詳細は適宜省略する。

【００４８】

ステップ301'は、図3Aのステップ301と同様であり、Node Bがセルブロードキャストメッセージを UEに送信する。違いは、ステップ301'で送信されるセルブロードキャストメッセージは、2つのTTI(2ミリ秒のTTI長さおよび10ミリ秒のTTI長さなど)のパラメータ構成の記述情報だけでなく、2ミリ秒のTTIおよび10ミリ秒のTTIによってそれぞれ使用されるcommon E-DCHリソースのインデックスも含むことである。すなわち、既存の32セットのcommon E-DCHリソースが、2ミリ秒のTTIおよび10ミリ秒のTTIの2つのリスト(リソースサブセット)にグループ化される。

【００４９】

ステップ302～304は、図3Aのステップ302～304と同じである。ステップ302で、UEは、ブロードキャストメッセージを受信した後、セルによってサポートされ得る2つのTTIの情報を得る。UEは、それ自体の必要性に従って、使用TTIとして第1のTTIまたは第2のTTIを選択する。

【００５０】

ステップ303で、UEは、選択したTTIの指示情報を生成し、ステップ304で、指示情報をNode Bに送信する。指示情報は、専用の指示メッセージを介して送信されるか、または他のメッセージによって搬送されてよい。例えば、UEは、ランダムアクセス段階で、異なるシグネチャ(signature)を選択することによって、選択したTTI長さをNode Bに通知するか、または、UEは、ランダムアクセス段階で、異なるプリアンブルスクランブル符号(preamble scramble code)を選択することによって、選択したTTI長さをNode Bに通知する。

【００５１】

ステップ305'で、Node Bは、UEによって選択されたTTIの指示情報を受信した後、Commo

n-EDCHリソースを割り振るようトリガされる。このケースでは、Node Bは、リソースを割り振るとき、UEによって選択されたTTIを考慮する。

【００５２】

例えば、32セットのcommon E-DCHリソースのインデックスが0～31であり、ブロードキャストメッセージ中では、0～15が2ミリ秒のTTIに割り振られ、16～31が10ミリ秒のTTIに割り振られる。この場合、2ミリ秒のTTI長さが選択されることをUEの指示メッセージが示すならば、Node Bは、0～15のインデックスを有するリソースサブセットから、UEに割り振られることになるcommon E-DCHリソースを選択する。10ミリ秒のTTI長さが選択されることをUEの指示メッセージが示すならば、Node Bは、16～31のインデックスを有するリソースサブセットから、UEに割り振られることになるcommon E-DCHリソースを選択する。

【００５３】

ステップ306～308は、図3Aのステップ306～308と同じである。ステップ306で、Node Bは、割り振ったCommon-EDCHリソースをUEに通知する。

【００５４】

ステップ307で、UEは、Node Bの通知を受信した後、選択したTTIに従って、対応するパラメータ構成(第1のパラメータ構成または第2のパラメータ構成)を選択する。

【００５５】

ステップ308で、UEは、選択したパラメータ構成を使用してアップリンクデータを送信する。

【００５６】

本発明の実施形態では、セルに対して複数のTTIが構成され、複数のTTIのパラメータ構成情報が端末デバイスにブロードキャストされる。したがって、端末デバイスは、複数のTTIから適切なTTIを選択することができ、ネットワーク側は、選択されたTTIに従ってチャネルリソースを割り振ることができ、それにより、システムリソースの割振りおよび利用の効率を高める。

【００５７】

選択したTTIをUEがNode Bに通知したとき、選択は拒否される場合がある(ステップ305または305')。例えば、割振りに利用可能なリソースの数(対応するリソースサブセットのサイズ)は2つのTTI長さについて同じであることがあるが、2ミリ秒のTTI長さを使用するUEの数が、10ミリ秒のTTI長さを使用するUEの数よりも多いので、2ミリ秒のTTI長さに対応するリソースサブセット中のリソースが全て占有されていることがあり、その結果、2ミリ秒のTTIを選択するUEが拒否される。この場合、本発明の実施形態では、UEに対する拒否の回数を記録することができ、リソースサブセットのサイズを動的に調整することができる。

【００５８】

図4は、本発明の一実施形態による、リソースサブセットの動的調整のプロセスの概略フローチャートである。

【００５９】

図4に示すように、ステップ401で、Node Bは、UEに対する拒否の回数を記録する。例えば、Node Bは、2ミリ秒のTTIを選択したUEに対する拒否の回数と、10ミリ秒のTTIを選択したUEに対する拒否の回数とを記録する。

【００６０】

ステップ402で、Node Bは、記録した回数をRNC(無線ネットワークコントローラ、Radio Network Controller)に報告する。例えば、Node Bは、Iubインタフェースを介して回数をRNCに報告する。本発明の一実施形態によれば、Node Bは、E-DCH RACH Reportの下で、Denied E-DCH RACH Resourcesメッセージを介して、回数をRNCに報告することができる。

【００６１】

ステップ403で、RNCは、Node Bによって報告された拒否回数に従って、2ミリ秒のTTIと10ミリ秒のTTIのリソースサブセット(リスト)中のリソースの数を調整する。例えば、以前は、0～15が2ミリ秒のTTIに割り振られ、16～31が10ミリ秒のTTIに割り振られているも

のとする。Node Bが2ミリ秒のTTIと10ミリ秒のTTIのDenied E-DCH RACH Resourcesの数を報告した後、2ミリ秒のTTIの拒否回数の方が多い場合は、RNCは、2ミリ秒のTTIに対応するcommon E-DCHリソースを増加させることができる。例えば、0～20のインデックスの付いたリソースを2ミリ秒のTTIに割り振り、21～31のインデックスの付いたリソースを10ミリ秒のTTIに割り振ることができる。これにより、リソースサブセット中のcommon E-DCHリソースが動的に調整される。

【００６２】

ステップ404で、RNCは、調整結果をNode Bに通知する。RNCは、専用メッセージまたは他の適切なメッセージを介して、調整結果をNode Bに通知することができる。

【００６３】

ステップ405で、Node Bは、ブロードキャストメッセージを介して、新しいリソースサブセット(リスト)情報をUEに通知する。これにより、UEは、ブロードキャストメッセージを読むことによって、調整済みリソースサブセット情報を得る。

【００６４】

よって、本発明の実施形態では、2つのTTI長さに対応するリソースの割振り方式を、ネットワークの稼働ステータスに従って動的に調整することができる。これによりリソースの利用効率がさらに高まる。

【００６５】

図5は、本発明の一実施形態による基地局デバイスの概略ブロック図である。図5に示すように、本発明の実施形態による基地局デバイス50は、ブロードキャスティングユニット51、受信ユニット52、および割振りユニット53を備える。

【００６６】

ブロードキャスティングユニット51は、セルブロードキャストメッセージを端末デバイスに送信するように構成され、セルブロードキャストメッセージは、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、第1のパラメータ構成は、第1の送信時間間隔(TTI)に特有であり、第2のパラメータ構成は、第1のTTIとは異なる第2のTTIに特有である。

【００６７】

受信ユニット52は、端末デバイスから送信された指示情報を受信するように構成され、指示情報は、端末デバイスが使用TTIとして第1のTTIまたは第2のTTIを選択することを示す。

【００６８】

割振りユニット53は、指示情報に従ってコモンエンハンスト専用チャネルリソースを端末デバイスに割り振るように構成される。

【００６９】

本発明の実施形態では、セルに対して複数のTTIが構成され、複数のTTIのパラメータ構成情報が端末デバイスにブロードキャストされる。したがって、端末デバイスは、複数のTTIから適切なTTIを選択することができ、ネットワーク側は、選択されたTTIに従ってチャネルリソースを割り振ることができ、それにより、システムリソースの割振りおよび利用の効率を高める。

【００７０】

図6は、本発明の一実施形態による基地局デバイスの概略ブロック図である。図6では、図5の部分と同じかまたは同様の部分は、同じかまたは同様のマークで識別し、それらの詳細は適宜省略する。

【００７１】

図6の基地局デバイス60は、ブロードキャスティングユニット51'、受信ユニット52、および割振りユニット53'を備える。ブロードキャスティングユニット51'から送信されるセルブロードキャストメッセージは、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、コモンエンハンスト専用チャネルリソースは、第1のTTIに特有の第1のリソースサブセットと、

第2のTTIに特有の第2のリソースサブセットとにグループ化される。

【００７２】

加えて、割振りユニット53'は、受信ユニット52によって受信された指示情報が、選択されたTTIが第1のTTIであることを示すときには、第1のリソースサブセット中のコモンエンハンスト専用チャネルリソースを端末デバイスに割り振り、受信ユニット52によって受信された指示情報が、選択されたTTIが第2のTTIであることを示すときには、第2のリソースサブセット中のコモンエンハンスト専用チャネルリソースを端末デバイスに割り振る。

【００７３】

図6に示すように、基地局デバイス60はさらに、通知ユニット61、および/または記録ユニット62を備える。

【００７４】

通知ユニット61は、割り振られたコモンエンハンスト専用チャネルリソースを端末デバイスに通知し、それにより端末デバイスは、選択したTTIに従って第1のパラメータ構成または第2のパラメータ構成を選択する。

【００７５】

記録ユニット62は、端末デバイスに対する拒否回数を記録して、記録した回数を無線ネットワークコントローラに送信するように構成され、それにより無線ネットワークコントローラは、回数に従って、第1のリソースサブセットおよび第2のリソースサブセット中のコモンエンハンスト専用チャネルリソースを調整する。

【００７６】

図5および図6の基地局デバイスは、コモンエンハンスト専用チャネルリソースを割り振るための前述の方法におけるNode Bに関係する全てのステップを実行することができ、ここでは、繰返しを避けるため、詳細を再度述べることはしない。

【００７７】

図7は、本発明の一実施形態による端末デバイスの概略ブロック図である。図7の端末デバイス70は、受信ユニット71、選択ユニット72、および送信ユニット73を備える。

【００７８】

受信ユニット71は、セルブロードキャストメッセージをネットワーク側から受信するように構成され、セルブロードキャストメッセージは、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、第1のパラメータ構成は、第1の送信時間間隔(TTI)に特有であり、第2のパラメータ構成は、第1のTTIとは異なる第2のTTIに特有である。

【００７９】

選択ユニット72は、使用TTIとして第1のTTIまたは第2のTTIを選択し、選択したTTIの指示情報を生成するように構成される。

【００８０】

送信ユニット73は、ネットワーク側が指示情報に従ってコモンエンハンスト専用チャネルリソースを割り振るよう、指示情報をネットワーク側に送信するように構成される。

【００８１】

本発明の実施形態では、セルに対して複数のTTIが構成され、複数のTTIのパラメータ構成情報が端末デバイスにブロードキャストされる。したがって、端末デバイスは、複数のTTIから適切なTTIを選択することができ、ネットワーク側は、選択されたTTIに従ってチャネルリソースを割り振ることができ、それにより、システムリソースの割振りおよび利用の効率を高める。

【００８２】

図7の端末デバイス70は、コモンエンハンスト専用チャネルリソースを割り振るための前述の方法におけるUEに関係する全てのステップを実行することができ、ここでは、繰返しを避けるため、詳細を再度述べることはしない。

【００８３】

例えば、受信ユニット71はさらに、割り振られたコモンエンハンスト専用チャネルリソ

ースの通知を受信するように構成される。選択ユニット72はさらに、選択したTTIに従って第1のパラメータ構成または第2のパラメータ構成を選択するように構成される。

【００８４】

本発明の別の実施形態によれば、受信ユニット71はセルブロードキャストメッセージを受信するが、セルブロードキャストメッセージ中では、コモンエンハンスト専用チャネルリソースが、第1のTTIに特有の第1のリソースサブセットと、第2のTTIに特有の第2のリソースサブセットとにグループ化される。

【００８５】

以上では、UEがTTIを選択する実施形態について述べているが、本発明はこれに限定されない。TTIの選択は、ネットワーク側によって決定されてもよい。

【００８６】

図8は、本発明の一実施形態による、チャネルリソースを割り振る方法の概略フローチャートである。図8に示す方法80は、主にネットワーク側で、例えば基地局(Node Bなど)によって実行される。

【００８７】

図8に示すように、方法80のステップ801は、方法10のステップ101と同様である。セルブロードキャストメッセージが、端末デバイスに送信される。セルブロードキャストメッセージは、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、第1のパラメータ構成は、第1の送信時間間隔(TTI)に特有であり、第2のパラメータ構成は、第1のTTIとは異なる第2のTTIに特有である。

【００８８】

ステップ802で、Node Bは、使用TTIとして第1のTTIまたは第2のTTIを選択する。セル中の情報に従って、Node Bは、UEによって使用されることになるTTIを選択することができる。例えば、Node Bは、UEのアップリンクアクセスのプリアンブル(preamble)電力に従って、選択するTTI長さを決定することができる。

【００８９】

ステップ803で、Node Bは、選択したTTIを端末デバイスに通知し、ステップ804で、Node Bは、選択したTTIに従ってコモンエンハンスト専用チャネルリソースを端末に割り振る。

【００９０】

本発明の実施形態では、セルに対して複数のTTIが構成され、ネットワーク側は、複数のTTIのパラメータ構成情報を端末デバイスにブロードキャストし、次いで、複数のTTIから適切なTTIを選択して、選択したTTIに従ってチャネルリソースを割り振り、それにより、システムリソースの割振りおよび利用の効率を高める。

【００９１】

対応する動作が端末側で実行される。図9は、本発明の一実施形態による、チャネルリソースを割り振る方法を示す。図9に示す方法90は、端末デバイス(UEなど)によって実行される。

【００９２】

901.セルブロードキャストメッセージをネットワーク側から受信する。セルブロードキャストメッセージは、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、第1のパラメータ構成は、第1の送信時間間隔(TTI)に特有であり、第2のパラメータ構成は、第1のTTIとは異なる第2のTTIに特有である。

【００９３】

902.指示情報をネットワーク側から受信する。指示情報は、ネットワーク側デバイスが使用TTIとして第1のTTIまたは第2のTTIを選択することを示す。

【００９４】

903.選択されたTTIに従ってネットワーク側によって割り振られたコモンエンハンスト

専用チャネルリソースを受信する。

【００９５】

よって、本発明の実施形態では、セルに対して複数のTTIが構成され、ネットワーク側は、複数のTTIのパラメータ構成情報を端末デバイスにブロードキャストし、次いで、複数のTTIから適切なTTIを選択して、選択したTTIに従ってチャネルリソースを割り振り、それにより、システムリソースの割振りおよび利用の効率を高める。

【００９６】

図10は、本発明の一実施形態による基地局デバイスの概略ブロック図である。図10に示す基地局デバイス100は、

セルブロードキャストメッセージを端末デバイスに送信するように構成されたブロードキャスティングユニット1010であって、セルブロードキャストメッセージが、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、第1のパラメータ構成が第1の送信時間間隔(TTI)に特有であり、第2のパラメータ構成が、第1のTTIとは異なる第2のTTIに特有であるブロードキャスティングユニット1010と、

使用TTIとして第1のTTIまたは第2のTTIを選択するように構成された選択ユニット1020と、

選択されたTTIを端末デバイスに通知するように構成された通知ユニット1030と、

選択されたTTIに従ってコモンエンハンスト専用チャネルリソースを端末デバイスに割り振るように構成された割振りユニット1040とを備える。

【００９７】

よって、本発明の実施形態では、セルに対して複数のTTIが構成され、ネットワーク側は、複数のTTIのパラメータ構成情報を端末デバイスにブロードキャストし、次いで、複数のTTIから適切なTTIを選択して、選択したTTIに従ってチャネルリソースを割り振り、それにより、システムリソースの割振りおよび利用の効率を高める。

【００９８】

図11は、本発明の一実施形態による端末デバイスの概略ブロック図である。図11に示す端末デバイス110は、受信ユニット115を備える。受信ユニット115は、セルブロードキャストメッセージをネットワーク側から受信するように構成され、セルブロードキャストメッセージは、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、第1のパラメータ構成は、第1の送信時間間隔(TTI)に特有であり、第2のパラメータ構成は、第1のTTIとは異なる第2のTTIに特有である。

【００９９】

受信ユニット115はさらに、指示情報をネットワーク側から受信するように構成され、指示情報は、ネットワーク側デバイスが使用TTIとして第1のTTIまたは第2のTTIを選択することを示す。

【０１００】

受信ユニット115はさらに、選択されたTTIに従ってネットワーク側によって割り振られたコモンエンハンスト専用チャネルリソースを受信するように構成される。

【０１０１】

よって、本発明の実施形態では、セルに対して複数のTTIが構成され、ネットワーク側は、複数のTTIのパラメータ構成情報を端末デバイスにブロードキャストし、次いで、複数のTTIから適切なTTIを選択して、選択したTTIに従ってチャネルリソースを割り振り、それにより、システムリソースの割振りおよび利用の効率を高める。

【０１０２】

図12は、本発明の一実施形態による通信システムの概略ブロック図である。図12に示す通信システム120は、基地局デバイス121および端末デバイス122を備える。

【０１０３】

基地局デバイス121は、前述の基地局デバイス50、60、または100とすることができる。

端末デバイス122は、前述の端末デバイス70または110とすることができる。したがって、これらについての詳細な記述は省略する。

【０１０４】

図13は、本発明の別の実施形態による通信システムの概略ブロック図である。図13に示す通信システム130中では、図12中の部分と同じかまたは同様の部分は、同じかまたは同様のマークで識別する。

【０１０５】

図13に示すように、基地局デバイス121および端末デバイス122に加えて、通信システム130はさらに、無線ネットワークコントローラ(RNC)131も備える。異なるTTIに対して異なるリソースサブセット(第1のリソースサブセットおよび第2のリソースサブセットなど)が採用されるシナリオでは、無線ネットワークコントローラ131は、基地局デバイス121によって記録された、端末デバイス122に対する拒否回数を受信し、この回数に従って、第1のリソースサブセットおよび第2のリソースサブセット中のコモンエンハンスト専用チャネルリソースを調整するように構成される。

【０１０６】

本明細書に開示する実施形態で述べた例と組み合わせて、ユニットおよびアルゴリズムステップを、電子ハードウェア、コンピュータソフトウェア、またはこれらの組合せによって実現できることを、当業者なら認識するであろう。ハードウェアとソフトウェアとの間の交換可能性を明確に記述するために、上記では、各実施形態の構成およびステップを、機能に従って一般に述べた。機能がハードウェアによって実施されるかソフトウェアによって実施されるかは、技術的解決法の特定の適用例および設計制約条件に依存する。当業者なら、特定の適用例ごとに異なる方法を使用して、述べた機能を実施することができるが、こうした実施が本発明の範囲を超えると考えるべきではない。

【０１０７】

簡便な記述のために、前述のシステム、装置、およびユニットの詳細な動作プロセスについては、前述の方法実施形態における対応するプロセスを参照することができ、ここでは詳細を再度述べないことは、当業者には明確に理解されるであろう。

【０１０８】

本出願において提供されるいくつかの実施形態では、開示するシステム、装置、および方法を他の方式で実現してもよいことを理解されたい。例えば、述べた装置実施形態は例に過ぎない。例えば、ユニット分割は単に論理的な機能分割であり、実際の実装形態では他の分割であってもよい。例えば、複数のユニットもしくはコンポーネントを別のシステムに結合もしくは統合してもよく、または、いくつかの特徴を省略するかもしくは実行しなくてもよい。加えて、表示または考察した、相互結合、または直接的な結合もしくは通信接続は、いくつかのインタフェースを介して実現されてもよい。装置またはユニット間の間接的な結合または通信接続は、電気的、機械的、または他の形で実現されてよい。

【０１０９】

別々の部分として述べたユニットは、物理的に分離していてもそうでなくてもよく、ユニットとして表示した部分は、物理的なユニットであってもそうでなくてもよい。すなわち、これらのユニットは、1か所に位置してもよく、または複数のネットワーク要素上に分散してもよい。一部または全部のユニットを実際の必要性に従って選択して、実施形態の解決法の目的を達成することができる。

【０１１０】

加えて、本発明の実施形態における機能ユニットは、1つの処理ユニットに統合されてもよく、または各ユニットが物理的に単独で存在してもよく、または2つ以上のユニットが1つのユニットに統合されてもよい。統合されたユニットは、ハードウェアの形で実現されてもよく、またはソフトウェア機能ユニットの形で実現されてもよい。

【０１１１】

統合されたユニットがソフトウェア機能ユニットの形で実現されて、独立した製品として販売または使用されるとき、統合されたユニットはコンピュータ可読記憶媒体に記憶さ

れてよい。このような理解に基づき、本発明の技術的解決法は本質的に、または従来技術に寄与する部分は、または技術的解決法の全部もしくは一部は、ソフトウェア製品の形で実現することができる。コンピュータソフトウェア製品は記憶媒体に記憶され、コンピュータソフトウェア製品はまた、本発明の実施形態で述べた方法のステップの全部または一部を実施するようコンピュータデバイス(パーソナルコンピュータ、サーバ、またはネットワークデバイスなどとすることができる)に命令するためのいくつかの命令を含む。前述の記憶媒体は、USBフラッシュディスク、取外し可能ハードディスク、読取専用メモリ(ROM、Read-Only Memory)、ランダムアクセスメモリ(RAM、Random Access Memory)、磁気ディスク、または光ディスクなど、プログラムコードを記憶できる任意の媒体を含む。

【０１１２】

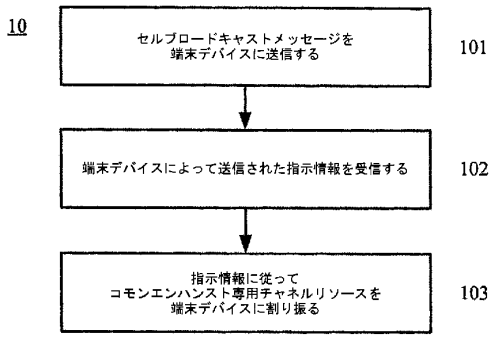
以上の記述は、本発明の特定の実施形態に過ぎず、本発明の保護範囲を限定するものとはしない。本発明において開示される技術範囲内で当業者によってすぐに見出されるどんな変形または置換も、本発明の保護範囲内に入るものとする。したがって、本発明の保護範囲は、特許請求の範囲の保護範囲に従うものとする。

【符号の説明】

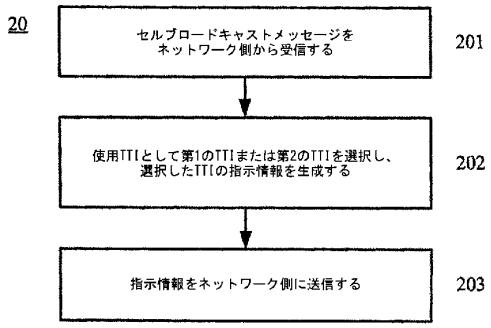
【０１１３】

50 基地局デバイス
51 ブロードキャスティングユニット
52 受信ユニット
53 割振りユニット
60 基地局デバイス
51' ブロードキャスティングユニット
53' 割振りユニット
61 通知ユニット
62 記録ユニット
70 端末デバイス
71 受信ユニット
72 選択ユニット
73 送信ユニット
100 基地局デバイス
1010 ブロードキャスティングユニット
1020 選択ユニット
1030 通知ユニット
1040 割振りユニット
110 端末デバイス
115 受信ユニット
120 通信システム
121 基地局デバイス
122 端末デバイス
130 通信システム
131 無線ネットワークコントローラ

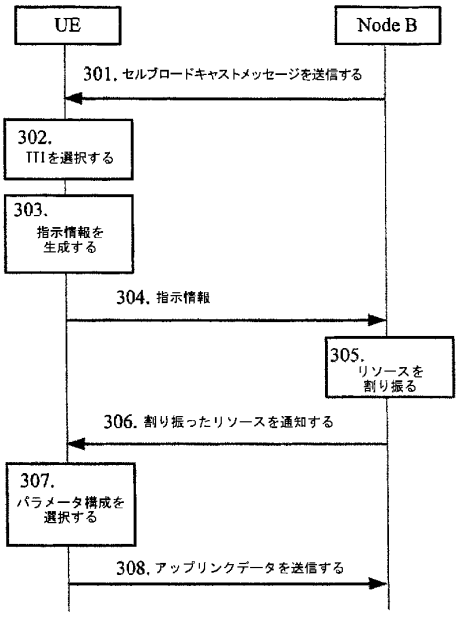
【図１】


10
セルブロードキャストメッセージを
端末デバイスに送信する
101
端末デバイスによって送信された指示情報を受信する
102
指示情報に従って
コモンエンハンスト専用チャネルリソースを
端末デバイスに割り振る
103

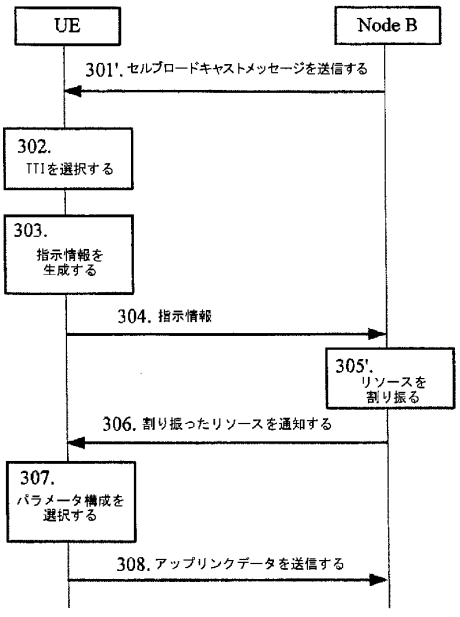
【図２】


20
セルブロードキャストメッセージを
ネットワーク側から受信する
201
使用TTIとして第1のTTIまたは第2のTTIを選択し、
選択したTTIの指示情報を生成する
202
指示情報をネットワーク側に送信する
203

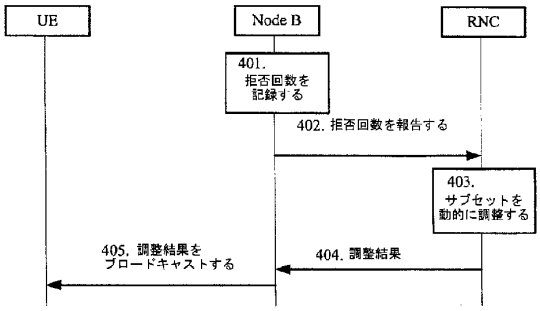
【図３Ａ】


UE
Node B
301. セルブロードキャストメッセージを送信する
302.
TTIを選択する
303.
指示情報を
生成する
304. 指示情報
305.
リソースを
割り振る
306. 割り振ったリソースを通知する
307.
パラメータ構成を
選択する
308. アップリンクデータを送信する

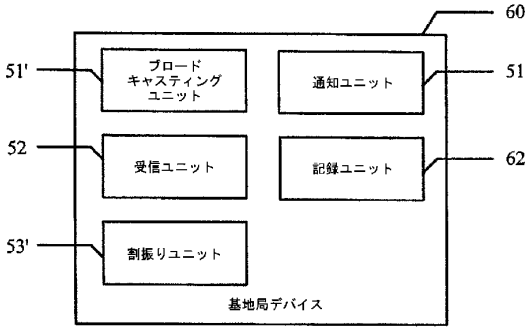
【図３Ｂ】


UE
Node B
301'. セルブロードキャストメッセージを送信する
302.
TTIを選択する
303.
指示情報を
生成する
304. 指示情報
305'.
リソースを
割り振る
306. 割り振ったリソースを通知する
307.
パラメータ構成を
選択する
308. アップリンクデータを送信する

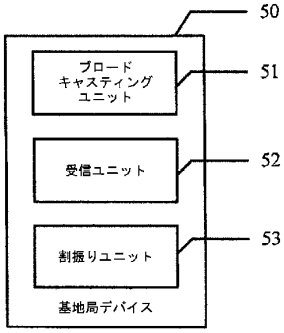
【図４】


UE
Node B
RNC
401.
拒否回数を
記録する
402. 拒否回数を報告する
403.
サブセットを
動的に調整する
405. 調整結果を
ブロードキャストする
404. 調整結果

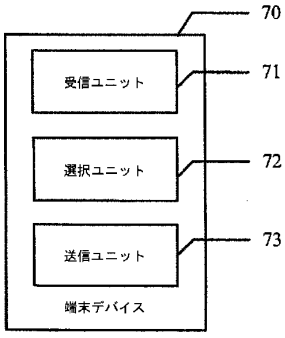
【図６】


60
51'
ブロード
キャスティング
ユニット
通知ユニット
51
52
受信ユニット
記録ユニット
62
53'
割振りユニット
基地局デバイス

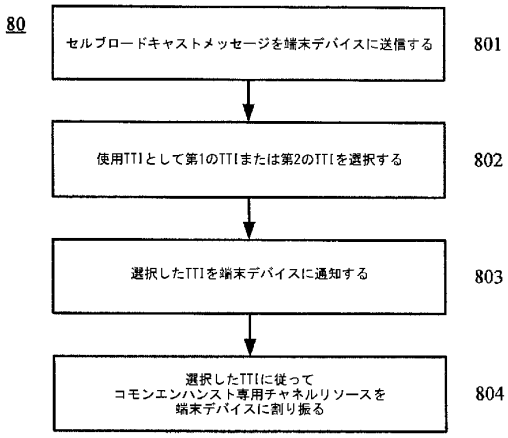
【図５】


50
ブロード
キャスティング
ユニット
51
受信ユニット
52
割振りユニット
53
基地局デバイス

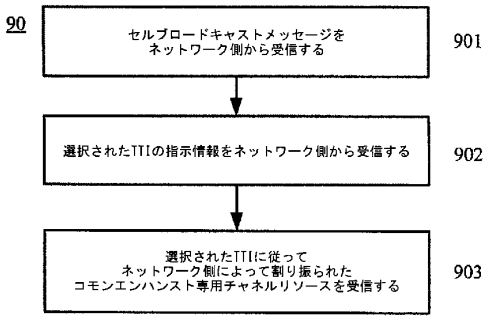
【図７】


70
受信ユニット
71
選択ユニット
72
送信ユニット
73
端末デバイス

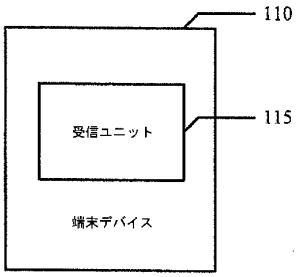
【図８】


80
セルブロードキャストメッセージを端末デバイスに送信する
801
使用TTIとして第1のTTIまたは第2のTTIを選択する
802
選択したTTIを端末デバイスに通知する
803
選択したTTIに従って
コモンエンハンスト専用チャネルリソースを
端末デバイスに割り振る
804

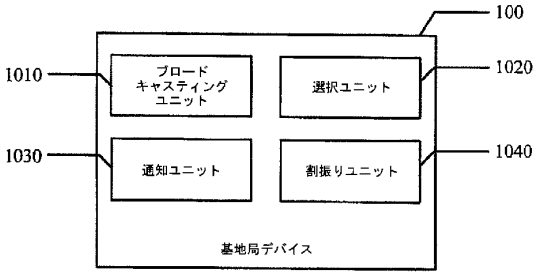
【図９】



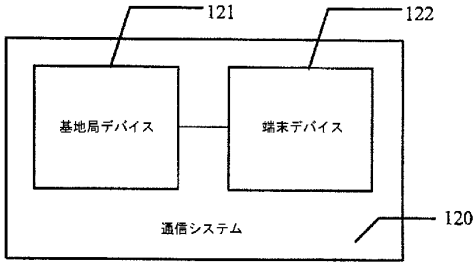
【図１１】



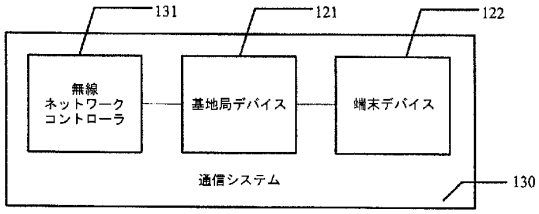
【図１０】



【図１２】



【図１３】



【手続補正書】
【提出日】平成25年11月8日(2013.11.8)
【手続補正１】
【補正対象書類名】明細書
【補正対象項目名】全文
【補正方法】変更
【補正の内容】
【発明の詳細な説明】
【技術分野】
【０００１】
本出願は、参照によりその全体が本明細書に組み込まれる、2011年4月2日に中国特許庁に出願された「METHOD FOR ALLOCATING CHANNEL RESOURCE, BASE STATION DEVICE, TERMINAL DEVICE, AND COMMUNICATION SYSTEM」という名称の中国特許出願第201110083708.4号に対する優先権を主張するものである。
【０００２】
本発明の実施形態は、ワイヤレス通信の分野に関し、特に、チャネルリソースを割り振る方法、基地局デバイス、端末デバイス、および通信システムに関する。
【背景技術】
【０００３】
3GPP(The 3rd Generation Partnership Project、第3世代パートナーシッププロジェクト)UMTS(Universal Mobile Telecommunications System、ユニバーサルモバイルテレコミュニケーションズシステム)R8バージョンでは、遊休(idle)モードまたはCELL_FACH(CELL Forward Access Channel、セルフォワードアクセスチャネル)状態のUE(User Equipment、ユーザ機器)に関して、アップリンク送信遅延を低減しアップリンク送信レートを上げるために、エンハンストRACH(Random Access Channel、ランダムアクセスチャネル)と呼ばれる新しい機能が採用される。エンハンストRACHは、R99バージョンにおけるランダムアクセスを向上させる。エンハンストランダムアクセスは、RACHの代わりとするためのE-DCH(Enhanced Dedicated Channel、エンハンスト専用チャネル)を採用して、アップリンク送信を実施する。エンハンストCELL_FACHプロシージャは、概して、プリアンブルアクセスおよびリソース割振り段階と、衝突解決段階と、E-DCHデータ送信段階と、リソース解放段階とを含む。
【０００４】
リソース割振り段階で割り振られるリソースは、Common E-DCH(Common Enhanced Dedicated Channel、コモンエンハンスト専用チャネル)リソースを指し、これは、セルのシステム情報中でブロードキャストされる。UEは、セルによってブロードキャストされたシステム情報を読むことによって、Common-EDCHリソース情報を得ることができる。既存のプロトコルによれば、全部で32セットのCommon-EDCHリソースがあり、これらには、F-DPCH(Fractional Dedicated Physical Channel、フラクショナル専用物理チャネル)、E-RGCH(E-DCH relative grant channel、E-DCH相対グラントチャネル)、E-HICH(E-DCH HARQ Acknowledgement Indicator Channel、E-DCHハイブリッド自動反復要求肯定応答インジケータチャネル)、およびアップリンクDPCH(Dedicated Physical Channel、専用物理チャネル)などの、符号情報が含まれる。NodeBは、リソース割振り段階で、AICH(Acquisition Indicator Channel、アクイジションインジケータチャネル)を介して、リソースインデックスの使用をUEに通知する。UEは、リソースインデックスを受信した後、対応するリソースセットを使用してアップリンクデータを送信する。
【０００５】
エンハンストRACH機能については、アップリンクTTI(Transmission Time Interval、送信時間間隔)を各セルにつき1つだけ構成することができ、UEは、1つのTTI長さだけを使用する。このTTI長さは、アップリンクデータ送信では、2ミリ秒または10ミリ秒であることがある。したがって、前述の32セットのリソースは全て、UEが1つのTTI長さを使用する場

合に向けて特に構成される。

【０００６】

しかし、この構成は十分にフレキシブルではない。セルのTTIが、UEによって必要とされるTTIと合致しない場合は、システムリソースの利用効率が低下することになる。

【発明の概要】

【発明が解決しようとする課題】

【０００７】

本発明の実施形態は、システムリソースの利用効率を高めることのできる、チャネルリソースを割り振る方法、基地局デバイス、端末デバイス、および通信システムを提供する。

【課題を解決するための手段】

【０００８】

一態様では、チャネルリソースを割り振る方法が提供される。この方法は、セルブロードキャストメッセージを端末デバイスに送信する段階であって、セルブロードキャストメッセージが、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、第1のパラメータ構成が第1の送信時間間隔(TTI)に特有であり、第2のパラメータ構成が、第1のTTIとは異なる第2のTTIに特有である段階と、端末デバイスから送信された指示情報を受信する段階であって、指示情報が、端末デバイスが使用TTIとして第1のTTIまたは第2のTTIを選択することを示すものである段階と、指示情報に従ってコモンエンハンスト専用チャネルリソースを端末デバイスに割り振る段階とを含む。

【０００９】

別の態様では、チャネルリソースを割り振る方法が提供される。この方法は、セルブロードキャストメッセージをネットワークから受信する段階であって、セルブロードキャストメッセージが、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、第1のパラメータ構成が第1の送信時間間隔(TTI)に特有であり、第2のパラメータ構成が、第1のTTIとは異なる第2のTTIに特有である段階と、使用TTIとして第1のTTIまたは第2のTTIを選択し、選択したTTIの指示情報を生成する段階と、ネットワークが指示情報に従ってコモンエンハンスト専用チャネルリソースを割り振るよう、指示情報をネットワークに送信する段階とを含む。

【００１０】

別の態様では、基地局デバイスが提供される。この基地局デバイスは、セルブロードキャストメッセージを端末デバイスに送信するように構成されたブロードキャスティングユニットであって、セルブロードキャストメッセージが、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、第1のパラメータ構成が第1の送信時間間隔(TTI)に特有であり、第2のパラメータ構成が、第1のTTIとは異なる第2のTTIに特有であるブロードキャスティングユニットと、端末デバイスから送信された指示情報を受信するように構成された受信ユニットであって、指示情報が、端末デバイスが使用TTIとして第1のTTIまたは第2のTTIを選択することを示すものである受信ユニットと、指示情報に従ってコモンエンハンスト専用チャネルリソースを端末デバイスに割り振るように構成された割振りユニットとを備える。

【００１１】

別の態様では、端末デバイスが提供される。この端末デバイスは、セルブロードキャストメッセージをネットワークから受信するように構成された受信ユニットであって、セルブロードキャストメッセージが、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、第1のパラメータ構成が第1の送信時間間隔(TTI)に特有であり、第2のパラメータ構成が、第1のTTIとは異なる第2のTTIに特有である受信ユニットと、使用TTIとして第1のTTIまたは第2のTTIを選択し、選択したTTIの指示情報を生成するように構成された選択ユニットと、ネットワークが指示情報に従ってコモンエンハンスト専用チャネルリソースを割り振るよう、

指示情報をネットワークに送信するように構成された送信ユニットとを備える。

【００１２】

別の態様では、チャネルリソースを割り振る方法が提供される。この方法は、セルブロードキャストメッセージを端末デバイスに送信する段階であって、セルブロードキャストメッセージが、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、第1のパラメータ構成が第1の送信時間間隔(TTI)に特有であり、第2のパラメータ構成が、第1のTTIとは異なる第2のTTIに特有である段階と、使用TTIとして第1のTTIまたは第2のTTIを選択する段階と、選択されたTTIを端末デバイスに通知する段階と、選択されたTTIに従ってコモンエンハンスト専用チャネルリソースを端末デバイスに割り振る段階とを含む。

【００１３】

別の態様では、チャネルリソースを割り振る方法が提供される。この方法は、セルブロードキャストメッセージをネットワークから受信する段階であって、セルブロードキャストメッセージが、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、第1のパラメータ構成が第1の送信時間間隔(TTI)に特有であり、第2のパラメータ構成が、第1のTTIとは異なる第2のTTIに特有である段階と、指示情報をネットワークから受信する段階であって、指示情報が、ネットワークが使用TTIとして第1のTTIまたは第2のTTIを選択することを示すものである段階と、選択されたTTIに従ってネットワークによって割り振られたコモンエンハンスト専用チャネルリソースを受信する段階とを含む。

【００１４】

別の態様では、基地局デバイスが提供される。この基地局デバイスは、セルブロードキャストメッセージを端末デバイスに送信するように構成されたブロードキャスティングユニットであって、セルブロードキャストメッセージが、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、第1のパラメータ構成が第1の送信時間間隔(TTI)に特有であり、第2のパラメータ構成が、第1のTTIとは異なる第2のTTIに特有であるブロードキャスティングユニットと、使用TTIとして第1のTTIまたは第2のTTIを選択するように構成された選択ユニットと、選択されたTTIを端末デバイスに通知するように構成された通知ユニットと、選択されたTTIに従ってコモンエンハンスト専用チャネルリソースを端末デバイスに割り振るように構成された割振りユニットとを備える。

【００１５】

別の態様では、端末デバイスが提供される。この端末デバイスは、セルブロードキャストメッセージをネットワークから受信するように構成された受信ユニットを備え、セルブロードキャストメッセージは、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、第1のパラメータ構成は第1の送信時間間隔(TTI)に特有であり、第2のパラメータ構成は、第1のTTIとは異なる第2のTTIに特有であり、受信ユニットはさらに、指示情報をネットワークから受信するように構成され、指示情報は、ネットワークが使用TTIとして第1のTTIまたは第2のTTIを選択することを示し、受信ユニットはさらに、選択されたTTIに従ってネットワークによって割り振られたコモンエンハンスト専用チャネルリソースを受信するように構成される。

【００１６】

別の態様では、通信システムが提供される。この通信システムは、上記の基地局デバイスおよび上記の端末デバイスを備える。

【発明の効果】

【００１７】

本発明の実施形態では、セルに対して複数のTTIが構成され、複数のTTIのパラメータ構成情報が端末デバイスにブロードキャストされる。したがって、端末デバイスは、複数のTTIから適切なTTIを選択することができ、ネットワークは、選択されたTTIに従ってチャ

ネルリソースを割り振ることができ、それにより、システムリソースの割振りおよび利用の効率を高める。

【００１８】

本発明の実施形態における技術的解決法をより明確に例示するために、実施形態を記述するのに必要とされる添付図面を以下に簡単に紹介する。明らかに、以下の記述における添付図面は本発明のいくつかの実施形態のみを示し、当業者なら、これらの添付図面から創意工夫なしに他の図面を導出することもなお可能である。

【図面の簡単な説明】

【００１９】

【図１】本発明の一実施形態による、チャネルリソースを割り振る方法の概略フローチャートである。

【図２】本発明の一実施形態による、チャネルリソースを割り振る方法の概略フローチャートである。

【図３Ａ】本発明の一実施形態による、チャネルリソース割振りのプロセスの概略フローチャートである。

【図３Ｂ】本発明の一実施形態による、チャネルリソース割振りのプロセスの概略フローチャートである。

【図４】本発明の一実施形態による、リソースサブセットの動的調整のプロセスの概略フローチャートである。

【図５】本発明の一実施形態による基地局デバイスの概略ブロック図である。

【図６】本発明の一実施形態による基地局デバイスの概略ブロック図である。

【図７】本発明の一実施形態による端末デバイスの概略ブロック図である。

【図８】本発明の一実施形態による、チャネルリソースを割り振る方法の概略フローチャートである。

【図９】本発明の一実施形態による、チャネルリソースを割り振る方法を示す図である。

【図１０】本発明の一実施形態による基地局デバイスの概略ブロック図である。

【図１１】本発明の一実施形態による端末デバイスの概略ブロック図である。

【図１２】本発明の一実施形態による通信システムの概略ブロック図である。

【図１３】本発明の別の実施形態による通信システムの概略ブロック図である。

【発明を実施するための形態】

【００２０】

以下、本発明の実施形態における添付図面を参照しながら、本発明の実施形態における技術的解決法について明確に述べる。明らかに、述べる実施形態は、本発明の実施形態の全部ではなく一部でしかない。本発明の実施形態に基づいて当業者によって創意工夫なしに得られる他の全ての実施形態も、本発明の保護範囲に入るものとする。

【００２１】

本発明の技術的解決法は、GSM(Global System for Mobile Communications)、符号分割多元接続(CDMA、Code Division Multiple Access)、広帯域符号分割多元接続(WCDMA、Wideband Code Division Multiple Access)、汎用パケット無線サービス(GPRS、General Packet Radio Service)、ロングタームエボリューション(LTE、Long Term Evolution)など、様々な通信システムに適用することができる。

【００２２】

モバイル端末(Mobile Terminal)は、ユーザ機器(UE、User Equipment)またはモバイルユーザ機器などとも呼ばれるが、無線アクセスネットワーク(RAN、Radio Access Network)を介して1つまたは複数のコアネットワークと通信することができる。モバイル端末は、携帯電話機(あるいはセルラー電話機とも呼ばれる)とすることができ、または、ポータブル、ポケットサイズ、ハンドヘルド、コンピュータ組込み型、もしくは車載型のモバイル装置など、モバイル端末搭載コンピュータとすることができる。モバイル端末は、音声および/またはデータを無線アクセスネットワークと交換する。

【００２３】

基地局は、GSMもしくはCDMA中のトランシーバ基地局(BTS、Base Transceiver Station)、またはWCDMA中の基地局(NodeB)、またはLTE中の進化型NodeB(eNBもしくはe-NodeB、evolved NodeB)とすることができ、本発明によって限定されない。記述を容易にするために、以下の実施形態では、NodeBを記述のための例にとる。

【００２４】

UEまたはネットワークは、UEの要件に従って動的にTTIの長さを調整することはできない。UEは、ネットワークによって構成されたTTIのみを使用することができる。例えば、セルが2ミリ秒のTTIのみをサポートするが、UEはセルのエッジに位置する。この場合、10ミリ秒のTTI長さに切り替えれば、よりよいカバレッジおよび伝送信頼性を達成することができる。あるいは、セルが10ミリ秒のTTI長さのみをサポートするが、UEはセルの中心に位置する。この場合、より多くの電力が利用可能であり、2ミリ秒のTTIに切り替えれば、アップリンク送信レートが効果的に上がることになる。このケースでは、セルのTTIが、UEによって必要とされるTTIと合致せず、これによりシステムリソースの利用効率が低下する。

【００２５】

本発明の実施形態は、各セル中で2つのTTI長さを構成できることを考慮に入れる。すなわち、1つのセル中で、エンハンストRACHをサポートするUEは、2つのTTI長さのうちの一方を動的に選択して、アップリンクデータを送信することができる。

【００２６】

以下では、端末デバイスを表すのにUEを使用し、基地局デバイスを表すのにNodeBを使用するが、本発明の実施形態は、これらの用語によって表される特定のシステムに限定されない。本発明の実施形態は、1つのセル中で複数のTTI長さを使用できる任意のシステムに適用可能である。

【００２７】

図1は、本発明の一実施形態による、チャネルリソースを割り振る方法の概略フローチャートである。図1に示す方法10は、主にネットワーク側で、例えば基地局(NodeBなど)によって実行される。

【００２８】

方法10は以下を含む。101.セルブロードキャストメッセージを端末デバイス(UEなど)に送信する。セルブロードキャストメッセージは、コモンエンハンスト専用チャネルCommon-EDCHリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、第1のパラメータ構成は、第1の送信時間間隔(TTI)に特有であり、第2のパラメータ構成は、第1のTTIとは異なる第2のTTIに特有である。

【００２９】

102.端末デバイスから送信された指示情報を受信する。指示情報は、端末デバイスが使用TTIとして第1のTTIまたは第2のTTIを選択することを示す。

【００３０】

103.指示情報に従って、コモンエンハンスト専用チャネルリソースを端末デバイスに割り振る。

【００３１】

本発明の実施形態では、セルに対して複数のTTIが構成され、複数のTTIのパラメータ構成情報が端末デバイスにブロードキャストされる。したがって、端末デバイスは、複数のTTIから適切なTTIを選択することができ、ネットワークは、選択されたTTIに従ってチャネルリソースを割り振ることができ、それにより、システムリソースの割振りおよび利用の効率を高める。

【００３２】

対応する動作が端末で実行される。図2は、本発明の一実施形態による、チャネルリソースを割り振る方法の概略フローチャートである。図2に示す方法20は、端末デバイス(UEなど)によって実行され、以下を含む。

【００３３】

201.セルブロードキャストメッセージをネットワークから受信する。セルブロードキャストメッセージは、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、第1のパラメータ構成は、第1の送信時間間隔(TTI)に特有であり、第2のパラメータ構成は、第1のTTIとは異なる第2のTTIに特有である。

【００３４】

202.使用TTIとして第1のTTIまたは第2のTTIを選択し、選択したTTIの指示情報を生成する。

【００３５】

203.ネットワークが指示情報に従ってコモンエンハンスト専用チャネルリソースを割り振るよう、指示情報をネットワークに送信する。

【００３６】

本発明の実施形態では、セルに対して複数のTTIが構成され、複数のTTIのパラメータ構成情報が端末デバイスにブロードキャストされる。したがって、端末デバイスは、複数のTTIから適切なTTIを選択することができ、ネットワークは、選択されたTTIに従ってチャネルリソースを割り振ることができ、それにより、システムリソースの割振りおよび利用の効率を高める。

【００３７】

本発明の一実施形態における、通信システム中でのチャネルリソース割振りのプロセスについて、以下に詳細に述べる。図3Aは、本発明の一実施形態による、チャネルリソース割振りのプロセスの概略フローチャートである。

【００３８】

図3Aに示すステップS301で、NodeBがセルブロードキャストメッセージをUEに送信する。セルブロードキャストメッセージは、Common-EDCHリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、第1のパラメータ構成は、第1のTTI(2ミリ秒または10ミリ秒など)に特有であり、第2のパラメータ構成は、第1のTTIとは異なる第2のTTI(10ミリ秒または2ミリ秒など)に特有である。言い換えれば、本発明の実施形態におけるブロードキャストメッセージは、既存のTTIに加えて、別のTTI長さに特有の追加パラメータ構成も含むことができる。

【００３９】

ステップ302で、UEは、ブロードキャストメッセージを受信した後、セルによってサポートされ得る2つのTTIの情報を得る。したがって、UEは、それ自体の要件に従って、使用TTIとして第1のTTIまたは第2のTTIを選択する。

【００４０】

ステップ303で、UEは、選択したTTIの指示情報を生成し、ステップ304で、指示情報をNodeBに送信する。指示情報は、専用の指示メッセージを介して送信されるか、または他のメッセージによって搬送されてよい。例えば、UEは、ランダムアクセス段階で、異なるシグネチャ(signature)を選択することによって、選択したTTI長さをNodeBに通知するか、または、UEは、ランダムアクセス段階で、異なるプリアンブルスクランブリング符号(preamble scrambling code)を選択することによって、選択したTTI長さをNodeBに通知する。

【００４１】

ステップ305で、NodeBは、UEによって選択されたTTIの指示情報を受信した後、Common-EDCHリソースを割り振るようトリガされる。2ミリ秒のTTIおよび10ミリ秒のTTIが32セットのcommon E-DCHリソースを共有するシナリオでは、NodeBは、既存のプロトコル中で定義されるのと同様のリソース割振り方式に従って、common E-DCHリソースを割り振ることができる。

【００４２】

ステップ306で、NodeBは、割り振ったCommon-EDCHリソースをUEに通知する。

【００４３】

ステップ307で、UEは、NodeBの通知を受信した後、選択したTTIに従って、対応するパ

ラメータ構成(第1のパラメータ構成または第2のパラメータ構成)を選択する。

【００４４】

ステップ308で、UEは、選択したパラメータ構成を使用してアップリンクデータを送信する。

【００４５】

本発明の実施形態では、セルに対して複数のTTIが構成され、複数のTTIのパラメータ構成情報が端末デバイスにブロードキャストされる。したがって、端末デバイスは、複数のTTIから適切なTTIを選択することができ、ネットワークは、選択されたTTIに従ってチャネルリソースを割り振ることができ、それにより、システムリソースの割振りおよび利用の効率を高める。

【００４６】

図3Aに示す例では、2ミリ秒のTTIおよび10ミリ秒のTTIが32セットのcommon E-DCHリソースを共有するシナリオで、NodeBは、common E-DCHリソースを割り振るとき、UEによって選択されたTTI長さを考慮しないものとすることができる。本発明の一実施形態では、common E-DCHリソースを割り振るとき、UEによって選択されたTTIを考慮することができる。

【００４７】

図3Bは、本発明によるチャネルリソース割振りのプロセスの概略フローチャートである。図3Bでは、図3Aのプロセスと同じかまたは同様のプロセスは、同じかまたは同様のマークで識別し、それらの詳細は適宜省略する。

【００４８】

ステップ301'は、図3Aのステップ301と同様であり、NodeBがセルブロードキャストメッセージをUEに送信する。違いは、ステップ301'で送信されるセルブロードキャストメッセージは、2つのTTI(2ミリ秒のTTIおよび10ミリ秒のTTI長さなど)のパラメータ構成の記述情報だけでなく、2ミリ秒のTTIおよび10ミリ秒のTTIによってそれぞれ使用されるcommon E-DCHリソースのインデックスも含むことである。すなわち、既存の32セットのcommon E-DCHリソースが、2ミリ秒のTTIおよび10ミリ秒のTTIの2つのリスト(リソースサブセット)にグループ化される。

【００４９】

ステップ302～304は、図3Aのステップ302～304と同じである。ステップ302で、UEは、ブロードキャストメッセージを受信した後、セルによってサポートされ得る2つのTTIの情報を得る。UEは、それ自体の必要性に従って、使用TTIとして第1のTTIまたは第2のTTIを選択する。

【００５０】

ステップ303で、UEは、選択したTTIの指示情報を生成し、ステップ304で、指示情報をNodeBに送信する。指示情報は、専用の指示メッセージを介して送信されるか、または他のメッセージによって搬送されてよい。例えば、UEは、ランダムアクセス段階で、異なるシグネチャ(signature)を選択することによって、選択したTTI長さをNodeBに通知するか、または、UEは、ランダムアクセス段階で、異なるプリアンブルスクランブリング符号(preamble scramble code)を選択することによって、選択したTTI長さをNodeBに通知する。

【００５１】

ステップ305'で、NodeBは、UEによって選択されたTTIの指示情報を受信した後、Common-EDCHリソースを割り振るようトリガされる。このケースでは、NodeBは、リソースを割り振るとき、UEによって選択されたTTIを考慮する。

【００５２】

例えば、32セットのcommon E-DCHリソースのインデックスが0～31であり、ブロードキャストメッセージ中では、0～15が2ミリ秒のTTIに割り振られ、16～31が10ミリ秒のTTIに割り振られる。この場合、2ミリ秒のTTIが選択されることをUEの指示メッセージが示すならば、NodeBは、0～15のインデックスを有するリソースサブセットから、UEに割り振られることになるcommon E-DCHリソースを選択する。10ミリ秒のTTI長さが選択されることをU

Eの指示メッセージが示すならば、NodeBは、16～31のインデックスを有するリソースサブセットから、UEに割り振られることになるcommon E-DCHリソースを選択する。

【００５３】

ステップ306～308は、図3Aのステップ306～308と同じである。ステップ306で、NodeBは、割り振ったCommon-EDCHリソースをUEに通知する。

【００５４】

ステップ307で、UEは、NodeBの通知を受信した後、選択したTTIに従って、対応するパラメータ構成(第1のパラメータ構成または第2のパラメータ構成)を選択する。

【００５５】

ステップ308で、UEは、選択したパラメータ構成を使用してアップリンクデータを送信する。

【００５６】

本発明の実施形態では、セルに対して複数のTTIが構成され、複数のTTIのパラメータ構成情報が端末デバイスにブロードキャストされる。したがって、端末デバイスは、複数のTTIから適切なTTIを選択することができ、ネットワークは、選択されたTTIに従ってチャネルリソースを割り振ることができ、それにより、システムリソースの割振りおよび利用の効率を高める。

【００５７】

選択したTTIをUEがNodeBに通知したとき、選択は拒否される場合がある(ステップ305または305')。例えば、割振りに利用可能なリソースの数(対応するリソースサブセットのサイズ)は2つのTTI長さについて同じであることがあるが、2ミリ秒のTTIを使用するUEの数が、10ミリ秒のTTI長さを使用するUEの数よりも多いので、2ミリ秒のTTIに対応するリソースサブセット中のリソースが全て占有されていることがあり、その結果、2ミリ秒のTTIを選択するUEが拒否される。この場合、本発明の実施形態では、UEに対する拒否の回数を記録することができ、リソースサブセットのサイズを動的に調整することができる。

【００５８】

図4は、本発明の一実施形態による、リソースサブセットの動的調整のプロセスの概略フローチャートである。

【００５９】

図4に示すように、ステップ401で、NodeBは、UEに対する拒否の回数を記録する。例えば、NodeBは、2ミリ秒のTTIを選択したUEに対する拒否の回数と、10ミリ秒のTTIを選択したUEに対する拒否の回数とを記録する。

【００６０】

ステップ402で、NodeBは、記録した回数をRNC(無線ネットワークコントローラ、Radio Network Controller)に報告する。例えば、NodeBは、Iubインタフェースを介して回数をRNCに報告する。本発明の一実施形態によれば、NodeBは、E-DCH RACH Reportの下で、Denied E-DCH RACH Resourcesメッセージを介して、回数をRNCに報告することができる。

【００６１】

ステップ403で、RNCは、NodeBによって報告された拒否回数に従って、2ミリ秒のTTIと10ミリ秒のTTIのリソースサブセット(リスト)中のリソースの数を調整する。例えば、以前は、0～15が2ミリ秒のTTIに割り振られ、16～31が10ミリ秒のTTIに割り振られているものとする。NodeBが2ミリ秒のTTIと10ミリ秒のTTIのDenied E-DCH RACH Resourcesの数を報告した後、2ミリ秒のTTIの拒否回数の方が多い場合は、RNCは、2ミリ秒のTTIに対応するcommon E-DCHリソースを増加させることができる。例えば、0～20のインデックスの付いたリソースを2ミリ秒のTTIに割り振り、21～31のインデックスの付いたリソースを10ミリ秒のTTIに割り振ることができる。これにより、リソースサブセット中のcommon E-DCHリソースが動的に調整される。

【００６２】

ステップ404で、RNCは、調整結果をNodeBに通知する。RNCは、専用メッセージまたは他の適切なメッセージを介して、調整結果をNodeBに通知することができる。

【００６３】
ステップ405で、NodeBは、ブロードキャストメッセージを介して、新しいリソースサブセット(リスト)情報をUEに通知する。これにより、UEは、ブロードキャストメッセージを読むことによって、調整済みリソースサブセット情報を得る。
【００６４】
よって、本発明の実施形態では、2つのTTI長さに対応するリソースの割振り方式を、ネットワークの稼働ステータスに従って動的に調整することができる。これによりリソースの利用効率がさらに高まる。
【００６５】
図5は、本発明の一実施形態による基地局デバイスの概略ブロック図である。図5に示すように、本発明の実施形態による基地局デバイス50は、ブロードキャスティングユニット51、受信ユニット52、および割振りユニット53を備える。
【００６６】
ブロードキャスティングユニット51は、セルブロードキャストメッセージを端末デバイスに送信するように構成され、セルブロードキャストメッセージは、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、第1のパラメータ構成は、第1の送信時間間隔(TTI)に特有であり、第2のパラメータ構成は、第1のTTIとは異なる第2のTTIに特有である。
【００６７】
受信ユニット52は、端末デバイスから送信された指示情報を受信するように構成され、指示情報は、端末デバイスが使用TTIとして第1のTTIまたは第2のTTIを選択することを示す。
【００６８】
割振りユニット53は、指示情報に従ってコモンエンハンスト専用チャネルリソースを端末デバイスに割り振るように構成される。
【００６９】
本発明の実施形態では、セルに対して複数のTTIが構成され、複数のTTIのパラメータ構成情報が端末デバイスにブロードキャストされる。したがって、端末デバイスは、複数のTTIから適切なTTIを選択することができ、ネットワークは、選択されたTTIに従ってチャネルリソースを割り振ることができ、それにより、システムリソースの割振りおよび利用の効率を高める。
【００７０】
図6は、本発明の一実施形態による基地局デバイスの概略ブロック図である。図6では、図5の部分と同じかまたは同様の部分は、同じかまたは同様のマークで識別し、それらの詳細は適宜省略する。
【００７１】
図6の基地局デバイス60は、ブロードキャスティングユニット51'、受信ユニット52、および割振りユニット53'を備える。ブロードキャスティングユニット51'から送信されるセルブロードキャストメッセージは、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、コモンエンハンスト専用チャネルリソースは、第1のTTIに特有の第1のリソースサブセットと、第2のTTIに特有の第2のリソースサブセットとにグループ化される。
【００７２】
加えて、割振りユニット53'は、受信ユニット52によって受信された指示情報が、選択されたTTIが第1のTTIであることを示すときには、第1のリソースサブセット中のコモンエンハンスト専用チャネルリソースを端末デバイスに割り振り、受信ユニット52によって受信された指示情報が、選択されたTTIが第2のTTIであることを示すときには、第2のリソースサブセット中のコモンエンハンスト専用チャネルリソースを端末デバイスに割り振る。
【００７３】
図6に示すように、基地局デバイス60はさらに、通知ユニット61、および/または記録ユ

ニット62を備える。

【００７４】

通知ユニット61は、割り振られたコモンエンハンスト専用チャネルリソースを端末デバイスに通知し、それにより端末デバイスは、選択したTTIに従って第1のパラメータ構成または第2のパラメータ構成を選択する。

【００７５】

記録ユニット62は、端末デバイスに対する拒否回数を記録して、記録した回数を無線ネットワークコントローラに送信するように構成され、それにより無線ネットワークコントローラは、回数に従って、第1のリソースサブセットおよび第2のリソースサブセット中のコモンエンハンスト専用チャネルリソースを調整する。

【００７６】

図5および図6の基地局デバイスは、コモンエンハンスト専用チャネルリソースを割り振るための前述の方法におけるNodeBに関係する全てのステップを実行することができ、ここでは、繰返しを避けるため、詳細を再度述べることはしない。

【００７７】

図7は、本発明の一実施形態による端末デバイスの概略ブロック図である。図7の端末デバイス70は、受信ユニット71、選択ユニット72、および送信ユニット73を備える。

【００７８】

受信ユニット71は、セルブロードキャストメッセージをネットワークから受信するように構成され、セルブロードキャストメッセージは、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、第1のパラメータ構成は、第1の送信時間間隔(TTI)に特有であり、第2のパラメータ構成は、第1のTTIとは異なる第2のTTIに特有である。

【００７９】

選択ユニット72は、使用TTIとして第1のTTIまたは第2のTTIを選択し、選択したTTIの指示情報を生成するように構成される。

【００８０】

送信ユニット73は、ネットワークが指示情報に従ってコモンエンハンスト専用チャネルリソースを割り振るよう、指示情報をネットワークに送信するように構成される。

【００８１】

本発明の実施形態では、セルに対して複数のTTIが構成され、複数のTTIのパラメータ構成情報が端末デバイスにブロードキャストされる。したがって、端末デバイスは、複数のTTIから適切なTTIを選択することができ、ネットワークは、選択されたTTIに従ってチャネルリソースを割り振ることができ、それにより、システムリソースの割振りおよび利用の効率を高める。

【００８２】

図7の端末デバイス70は、コモンエンハンスト専用チャネルリソースを割り振るための前述の方法におけるUEに関係する全てのステップを実行することができ、ここでは、繰返しを避けるため、詳細を再度述べることはしない。

【００８３】

例えば、受信ユニット71はさらに、割り振られたコモンエンハンスト専用チャネルリソースの通知を受信するように構成される。選択ユニット72はさらに、選択したTTIに従って第1のパラメータ構成または第2のパラメータ構成を選択するように構成される。

【００８４】

本発明の別の実施形態によれば、受信ユニット71はセルブロードキャストメッセージを受信するが、セルブロードキャストメッセージ中では、コモンエンハンスト専用チャネルリソースが、第1のTTIに特有の第1のリソースサブセットと、第2のTTIに特有の第2のリソースサブセットとにグループ化される。

【００８５】

以上では、UEがTTIを選択する実施形態について述べているが、本発明はこれに限定さ

れない。TTIの選択は、ネットワークによって決定されてもよい。

【００８６】

図8は、本発明の一実施形態による、チャネルリソースを割り振る方法の概略フローチャートである。図8に示す方法80は、主にネットワークで、例えば基地局(NodeBなど)によって実行される。

【００８７】

図8に示すように、方法80のステップ801は、方法10のステップ101と同様である。セルブロードキャストメッセージが、端末デバイスに送信される。セルブロードキャストメッセージは、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、第1のパラメータ構成は、第1の送信時間間隔(TTI)に特有であり、第2のパラメータ構成は、第1のTTIとは異なる第2のTTIに特有である。

【００８８】

ステップ802で、NodeBは、使用TTIとして第1のTTIまたは第2のTTIを選択する。セル中の情報に従って、NodeBは、UEによって使用されることになるTTIを選択することができる。例えば、NodeBは、UEのアップリンクアクセスのプリアンブル(preamble)電力に従って、選択するTTI長さを決定することができる。

【００８９】

ステップ803で、NodeBは、選択したTTIを端末デバイスに通知し、ステップ804で、NodeBは、選択したTTIに従ってコモンエンハンスト専用チャネルリソースを端末に割り振る。

【００９０】

本発明の実施形態では、セルに対して複数のTTIが構成され、ネットワークは、複数のTTIのパラメータ構成情報を端末デバイスにブロードキャストし、次いで、複数のTTIから適切なTTIを選択して、選択したTTIに従ってチャネルリソースを割り振り、それにより、システムリソースの割振りおよび利用の効率を高める。

【００９１】

対応する動作が端末で実行される。図9は、本発明の一実施形態による、チャネルリソースを割り振る方法を示す。図9に示す方法90は、端末デバイス(UEなど)によって実行される。

【００９２】

901.セルブロードキャストメッセージをネットワークから受信する。セルブロードキャストメッセージは、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、第1のパラメータ構成は、第1の送信時間間隔(TTI)に特有であり、第2のパラメータ構成は、第1のTTIとは異なる第2のTTIに特有である。

【００９３】

902.指示情報をネットワークから受信する。指示情報は、ネットワークが使用TTIとして第1のTTIまたは第2のTTIを選択することを示す。

【００９４】

903.選択されたTTIに従ってネットワークによって割り振られたコモンエンハンスト専用チャネルリソースを受信する。

【００９５】

よって、本発明の実施形態では、セルに対して複数のTTIが構成され、ネットワークは、複数のTTIのパラメータ構成情報を端末デバイスにブロードキャストし、次いで、複数のTTIから適切なTTIを選択して、選択したTTIに従ってチャネルリソースを割り振り、それにより、システムリソースの割振りおよび利用の効率を高める。

【００９６】

図10は、本発明の一実施形態による基地局デバイスの概略ブロック図である。図10に示す基地局デバイス100は、

セルブロードキャストメッセージを端末デバイスに送信するように構成されたブロード

キャスティングユニット1010であって、セルブロードキャストメッセージが、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、第1のパラメータ構成が第1の送信時間間隔(TTI)に特有であり、第2のパラメータ構成が、第1のTTIとは異なる第2のTTIに特有であるブロードキャスティングユニット1010と、

使用TTIとして第1のTTIまたは第2のTTIを選択するように構成された選択ユニット1020と、

選択されたTTIを端末デバイスに通知するように構成された通知ユニット1030と、

選択されたTTIに従ってコモンエンハンスト専用チャネルリソースを端末デバイスに割り振るように構成された割振りユニット1040とを備える。

【００９７】

よって、本発明の実施形態では、セルに対して複数のTTIが構成され、ネットワークは、複数のTTIのパラメータ構成情報を端末デバイスにブロードキャストし、次いで、複数のTTIから適切なTTIを選択して、選択したTTIに従ってチャネルリソースを割り振り、それにより、システムリソースの割振りおよび利用の効率を高める。

【００９８】

図11は、本発明の一実施形態による端末デバイスの概略ブロック図である。図11に示す端末デバイス110は、受信ユニット115を備える。受信ユニット115は、セルブロードキャストメッセージをネットワークから受信するように構成され、セルブロードキャストメッセージは、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、第1のパラメータ構成は、第1の送信時間間隔(TTI)に特有であり、第2のパラメータ構成は、第1のTTIとは異なる第2のTTIに特有である。

【００９９】

受信ユニット115はさらに、指示情報をネットワークから受信するように構成され、指示情報は、ネットワークが使用TTIとして第1のTTIまたは第2のTTIを選択することを示す。

【０１００】

受信ユニット115はさらに、選択されたTTIに従ってネットワークによって割り振られたコモンエンハンスト専用チャネルリソースを受信するように構成される。

【０１０１】

よって、本発明の実施形態では、セルに対して複数のTTIが構成され、ネットワークは、複数のTTIのパラメータ構成情報を端末デバイスにブロードキャストし、次いで、複数のTTIから適切なTTIを選択して、選択したTTIに従ってチャネルリソースを割り振り、それにより、システムリソースの割振りおよび利用の効率を高める。

【０１０２】

図12は、本発明の一実施形態による通信システムの概略ブロック図である。図12に示す通信システム120は、基地局デバイス121および端末デバイス122を備える。

【０１０３】

基地局デバイス121は、前述の基地局デバイス50、60、または100とすることができる。端末デバイス122は、前述の端末デバイス70または110とすることができる。したがって、これらについての詳細な記述は省略する。

【０１０４】

図13は、本発明の別の実施形態による通信システムの概略ブロック図である。図13に示す通信システム130中では、図12中の部分と同じかまたは同様の部分は、同じかまたは同様のマークで識別する。

【０１０５】

図13に示すように、基地局デバイス121および端末デバイス122に加えて、通信システム130はさらに、無線ネットワークコントローラ(RNC)131も備える。異なるTTIに対して異なるリソースサブセット(第1のリソースサブセットおよび第2のリソースサブセットなど)が

採用されるシナリオでは、無線ネットワークコントローラ131は、基地局デバイス121によって記録された、端末デバイス122に対する拒否回数を受信し、この回数に従って、第1のリソースサブセットおよび第2のリソースサブセット中のコモンエンハンスト専用チャネルリソースを調整するように構成される。

【０１０６】

本明細書に開示する実施形態で述べた例と組み合わせて、ユニットおよびアルゴリズムステップを、電子ハードウェア、コンピュータソフトウェア、またはこれらの組合せによって実現できることを、当業者なら認識するであろう。ハードウェアとソフトウェアとの間の交換可能性を明確に記述するために、上記では、各実施形態の構成およびステップを、機能に従って一般に述べた。機能がハードウェアによって実施されるかソフトウェアによって実施されるかは、技術的解決法の特定の適用例および設計制約条件に依存する。当業者なら、特定の適用例ごとに異なる方法を使用して、述べた機能を実施することができるが、こうした実施が本発明の範囲を超えると考えるべきではない。

【０１０７】

簡便な記述のために、前述のシステム、装置、およびユニットの詳細な動作プロセスについては、前述の方法実施形態における対応するプロセスを参照することができ、ここでは詳細を再度述べないことは、当業者には明確に理解されるであろう。

【０１０８】

本出願において提供されるいくつかの実施形態では、開示するシステム、装置、および方法を他の方式で実現してもよいことを理解されたい。例えば、述べた装置実施形態は例に過ぎない。例えば、ユニット分割は単に論理的な機能分割であり、実際の実装形態では他の分割であってもよい。例えば、複数のユニットもしくはコンポーネントを別のシステムに結合もしくは統合してもよく、または、いくつかの特徴を省略するかもしくは実行しなくてもよい。加えて、表示または考察した、相互結合、または直接的な結合もしくは通信接続は、いくつかのインタフェースを介して実現されてもよい。装置またはユニット間の間接的な結合または通信接続は、電気的、機械的、または他の形で実現されてよい。

【０１０９】

別々の部分として述べたユニットは、物理的に分離していてもそうでなくてもよく、ユニットとして表示した部分は、物理的なユニットであってもそうでなくてもよい。すなわち、これらのユニットは、1か所に位置してもよく、または複数のネットワーク要素上に分散してもよい。一部または全部のユニットを実際の必要性に従って選択して、実施形態の解決法の目的を達成することができる。

【０１１０】

加えて、本発明の実施形態における機能ユニットは、1つの処理ユニットに統合されてもよく、または各ユニットが物理的に単独で存在してもよく、または2つ以上のユニットが1つのユニットに統合されてもよい。統合されたユニットは、ハードウェアの形で実現されてもよく、またはソフトウェア機能ユニットの形で実現されてもよい。

【０１１１】

統合されたユニットがソフトウェア機能ユニットの形で実現されて、独立した製品として販売または使用されるとき、統合されたユニットはコンピュータ可読記憶媒体に記憶されてよい。このような理解に基づき、本発明の技術的解決法は本質的に、または従来技術に寄与する部分は、または技術的解決法の全部もしくは一部は、ソフトウェア製品の形で実現することができる。コンピュータソフトウェア製品は記憶媒体に記憶され、コンピュータソフトウェア製品はまた、本発明の実施形態で述べた方法のステップの全部または一部を実施するようコンピュータデバイス(パーソナルコンピュータ、サーバ、またはネットワークデバイスなどとすることができる)に命令するためのいくつかの命令を含む。前述の記憶媒体は、USBフラッシュディスク、取外し可能ハードディスク、読取専用メモリ(ROM、Read-Only Memory)、ランダムアクセスメモリ(RAM、Random Access Memory)、磁気ディスク、または光ディスクなど、プログラムコードを記憶できる任意の媒体を含む。

【０１１２】

以上の記述は、本発明の特定の実施形態に過ぎず、本発明の保護範囲を限定するものとはしない。本発明において開示される技術範囲内で当業者によってすぐに見出されるどんな変形または置換も、本発明の保護範囲内に入るものとする。したがって、本発明の保護範囲は、特許請求の範囲の保護範囲に従うものとする。

【符号の説明】

【０１１３】

50 基地局デバイス
51 ブロードキャスティングユニット
52 受信ユニット
53 割振りユニット
60 基地局デバイス
51’ ブロードキャスティングユニット
53’ 割振りユニット
61 通知ユニット
62 記録ユニット
70 端末デバイス
71 受信ユニット
72 選択ユニット
73 送信ユニット
100 基地局デバイス
1010 ブロードキャスティングユニット
1020 選択ユニット
1030 通知ユニット
1040 割振りユニット
110 端末デバイス
115 受信ユニット
120 通信システム
121 基地局デバイス
122 端末デバイス
130 通信システム
131 無線ネットワークコントローラ

【手続補正２】

【補正対象書類名】特許請求の範囲

【補正対象項目名】全文

【補正方法】変更

【補正の内容】

【特許請求の範囲】

【請求項１】

チャネルリソースを割り振る方法であって、

セルブロードキャストメッセージを端末デバイスに送信する段階であって、前記セルブロードキャストメッセージが、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、前記第1のパラメータ構成が第1の送信時間間隔(TTI)に特有であり、前記第2のパラメータ構成が、前記第1のTTIとは異なる第2の送信時間間隔(TTI)に特有である段階と、

前記端末デバイスから送信された指示情報を受信する段階であって、前記指示情報が、前記端末デバイスが使用TTIとして前記第1のTTIまたは前記第2のTTIを選択することを示すものである段階と、

前記指示情報に従ってコモンエンハンスト専用チャネルリソースを前記端末デバイスに割り振る段階とを含むことを特徴とする方法。

【請求項２】

前記セルブロードキャストメッセージを前記端末デバイスに送信する前記段階が、
前記セルブロードキャストメッセージを前記端末デバイスに送信する段階であって、前記セルブロードキャストメッセージ中で、前記コモンエンハンスト専用チャネルリソースが、前記第1のTTIに特有の第1のリソースサブセットと前記第2のTTIに特有の第2のリソースサブセットとにグループ化された段階を含む、請求項1に記載の方法。
【請求項３】
前記指示情報に従って前記コモンエンハンスト専用チャネルリソースを前記端末デバイスに割り振る前記段階が、
前記選択されたTTIが前記第1のTTIであることを前記指示情報が示すときに、前記第1のリソースサブセット中のコモンエンハンスト専用チャネルリソースを前記端末デバイスに割り振り、前記選択されたTTIが前記第2のTTIであることを前記指示情報が示すときに、前記第2のリソースサブセット中のコモンエンハンスト専用チャネルリソースを前記端末デバイスに割り振る段階を含む、請求項2に記載の方法。
【請求項４】
前記端末デバイスに対する拒否回数を記録する段階と、
前記記録された回数を無線ネットワークコントローラに送信する段階とをさらに含み、それにより前記無線ネットワークコントローラが前記回数に従って前記第1のリソースサブセットおよび前記第2のリソースサブセット中のコモンエンハンスト専用チャネルリソースを調整する、請求項2に記載の方法。
【請求項５】
チャネルリソースを割り振る方法であって、
セルブロードキャストメッセージをネットワークから受信する段階であって、前記セルブロードキャストメッセージが、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、前記第1のパラメータ構成が第1の送信時間間隔(TTI)に特有であり、第2のパラメータ構成が、前記第1のTTIとは異なる第2のTTIに特有である段階と、
使用TTIとして前記第1のTTIまたは前記第2のTTIを選択し、前記選択したTTIの指示情報を生成する段階と、
前記ネットワークが前記指示情報に従ってコモンエンハンスト専用チャネルリソースを割り振るよう、前記指示情報を前記ネットワークに送信する段階とを含むことを特徴とする方法。
【請求項６】
前記セルブロードキャストメッセージを前記ネットワークから受信する前記段階が、
前記セルブロードキャストメッセージを受信する段階であって、前記セルブロードキャストメッセージ中で、前記コモンエンハンスト専用チャネルリソースが、前記第1のTTIに特有の第1のリソースサブセットと前記第2のTTIに特有の第2のリソースサブセットとにグループ化された段階を含む、請求項5に記載の方法。
【請求項７】
前記割り振られたコモンエンハンスト専用チャネルリソースの通知を受信する段階と、
前記選択されたTTIに従って前記第1のパラメータ構成または前記第2のパラメータ構成を選択する段階とをさらに含む、請求項5に記載の方法。
【請求項８】
セルブロードキャストメッセージを端末デバイスに送信するように構成されたブロードキャスティングユニットであって、前記セルブロードキャストメッセージが、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、前記第1のパラメータ構成が第1の送信時間間隔(TTI)に特有であり、前記第2のパラメータ構成が、前記第1のTTIとは異なる第2のTTIに特有であるブロードキャスティングユニットと、
前記端末デバイスから送信された指示情報を受信するように構成された受信ユニットであって、前記指示情報が、前記端末デバイスが使用TTIとして前記第1のTTIまたは前記第2

のTTIを選択することを示すものである受信ユニットと、
前記指示情報に従ってコモンエンハンスト専用チャネルリソースを前記端末デバイスに割り振るように構成された割振りユニットとを備えることを特徴とする基地局デバイス。
【請求項９】
前記ブロードキャスティングユニットが前記セルブロードキャストメッセージを前記端末デバイスに送信し、前記セルブロードキャストメッセージ中で、前記コモンエンハンスト専用チャネルリソースが、前記第1のTTIに特有の第1のリソースサブセットと前記第2のTTIに特有の第2のリソースサブセットとにグループ化される、請求項8に記載の基地局デバイス。
【請求項１０】
前記割振りユニットが、前記選択されたTTIが前記第1のTTIであることを前記指示情報が示すときに、前記第1のリソースサブセット中のコモンエンハンスト専用チャネルリソースを前記端末デバイスに割り振り、前記選択されたTTIが前記第2のTTIであることを前記指示情報が示すときに、前記第2のリソースサブセット中のコモンエンハンスト専用チャネルリソースを前記端末デバイスに割り振る、請求項9に記載の基地局デバイス。
【請求項１１】
前記端末デバイスに対する拒否回数を記録して、前記記録された回数を無線ネットワークコントローラに送信するように構成された記録ユニットをさらに備え、それにより前記無線ネットワークコントローラが前記回数に従って前記第1のリソースサブセットおよび前記第2のリソースサブセット中の前記コモンエンハンスト専用チャネルリソースを調整する、請求項9に記載の基地局デバイス。
【請求項１２】
セルブロードキャストメッセージをネットワークから受信するように構成された受信ユニットであって、前記セルブロードキャストメッセージが、コモンエンハンスト専用チャネルリソースに対応する、第1のパラメータ構成の記述情報および第2のパラメータ構成の記述情報を含み、前記第1のパラメータ構成が第1の送信時間間隔(TTI)に特有であり、前記第2のパラメータ構成が、前記第1のTTIとは異なる第2のTTIに特有である受信ユニットと、
使用TTIとして前記第1のTTIまたは前記第2のTTIを選択し、前記選択したTTIの指示情報を生成するように構成された選択ユニットと、
前記ネットワークが前記指示情報に従ってコモンエンハンスト専用チャネルリソースを割り振るよう、前記指示情報を前記ネットワークに送信するように構成された送信ユニットとを備えることを特徴とする端末デバイス。
【請求項１３】
前記受信ユニットがさらに、前記割り振られたコモンエンハンスト専用チャネルリソースの通知を受信するように構成され、
前記選択ユニットがさらに、前記選択したTTIに従って前記第1のパラメータ構成または前記第2のパラメータ構成を選択するように構成される、請求項12に記載の端末デバイス。
【請求項１４】
前記受信ユニットが前記セルブロードキャストメッセージを受信し、前記セルブロードキャストメッセージ中で、前記コモンエンハンスト専用チャネルリソースが、前記第1のTTIに特有の第1のリソースサブセットと前記第2のTTIに特有の第2のリソースサブセットとにグループ化される、請求項12に記載の端末デバイス。
【請求項１５】
請求項8から11のいずれか一項に記載の基地局デバイスと、
請求項12から14のいずれか一項に記載の端末デバイスとを備えることを特徴とする通信システム。
【請求項１６】
前記基地局デバイスによって記録された、前記端末デバイスに対する拒否回数を受信し

、前記回数に従って前記第1のリソースサブセットおよび前記第2のリソースサブセット中の前記コモンエンハンスト専用チャネルリソースを調整するように構成された無線ネットワークコントローラをさらに備える、請求項15に記載の通信システム。

【国際調査報告】

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2012/073476

A. CLASSIFICATION OF SUBJECT MATTER

H04W 72/04(2009.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: H04W; H04L; H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CPRSABS, CNTXT, CNKI, VEN: broadcast, first, second, different, transmission time interval, TTI, select, indicate, enhanced dedicated channel, EDCH

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN101400072A (DA TANG MOBILE COMMUNICATION APPARATUS) 01 Apr. 2009 (01.04.2009), the description page 4 line 12- page 6 line 22, claims 1, 8-11	7-8, 13, 17-19
Y	CN1852605A (HUAWEI TECHNOLOGIES CO., LTD.), 25 Oct. 2006 (25.10.2006) claims 1, 9	7-8, 13, 17-19
A	CN101902779A(HUAWEI TECHNOLOGIES CO., LTD.), 01 Dec. 2010 (01.12.2010) the whole document	1-19

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
15 Jun. 2012(15.06.2012)	12 Jul. 2012(12.07.2012)

Name and mailing address of the ISA/CN	Authorized officer
State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No. (86-10)62019451	LI, Qian Telephone No. (86-10) 62411283

Form PCT/ISA /210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2012/073476

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN101400072A	01.04.2009	NONE	
CN1852605A	25.10.2006	CN100421528C	24.09.2008
CN101902779A	01.12.2010	WO2010135985A1	02.12.2010

Form PCT/ISA /210 (patent family annex) (July 2009)

国际检索报告	国际申请号 PCT/CN2012/073476

A. 主题的分类

H04W 72/04(2009.01) i

按照国际专利分类(IPC)或者同时按照国家分类和 IPC 两种分类

B. 检索领域

检索的最低限度文献(标明分类系统和分类号)

IPC: H04W; H04L; H04Q

包含在检索领域中的除最低限度文献以外的检索文献

在国际检索时查阅的电子数据库(数据库的名称，和使用的检索词（如使用））

CPRSABS, CNTXT, CNKI:广播，第一，第二，不同，传输时间间隔，TTI，选择，指示，增强专用信道，EDCH; VEN: broadcast, first, second, different, transmission time interval, TTI, select, indicate, enhanced dedicated channel, EDCH

C. 相关文件

类 型*	引用文件，必要时，指明相关段落	相关的权利要求
Y	CN101400072A (大唐移动通信设备有限公司), 01.4 月 2009 (01.04.2009) 说明书第 4 页第 12 行-第 6 页第 22 行、权利要求 1、8-11	7-8、13、17-19
Y	CN1852605A (华为技术有限公司), 25.10 月 2006 (25.10.2006) 权利要求 1、9	7-8、13、17-19
A	CN101902779A(华为技术有限公司), 01.12 月 2010 (01.12.2010) 全文	1-19

☐ 其余文件在 C 栏的续页中列出。　　☒ 见同族专利附件。

* 引用文件的具体类型：

"A" 认为不特别相关的表示了现有技术一般状态的文件

"E" 在国际申请日的当天或之后公布的在先申请或专利

"L" 可能对优先权要求构成怀疑的文件，或为确定另一篇引用文件的公布日而引用的或者因其他特殊理由而引用的文件（如具体说明的）

"O" 涉及口头公开、使用、展览或其他方式公开的文件

"P" 公布日先于国际申请日但迟于所要求的优先权日的文件

"T" 在申请日或优先权日之后公布，与申请不相抵触，但为了理解发明之理论或原理的在后文件

"X" 特别相关的文件，单独考虑该文件，认定要求保护的发明不是新颖的或不具有创造性

"Y" 特别相关的文件，当该文件与另一篇或者多篇该类文件结合并且这种结合对于本领域技术人员为显而易见时，要求保护的发明不具有创造性

"&" 同族专利的文件

国际检索实际完成的日期	国际检索报告邮寄日期
15.6 月 2012(15.06.2012)	**12.7 月 2012 (12.07.2012)**
ISA/CN 的名称和邮寄地址： 中华人民共和国国家知识产权局 中国北京市海淀区蓟门桥西土城路 6 号 100088 传真号： (86-10)62019451	受权官员 李倩 电话号码：(86-10) **62411283**

PCT/ISA/210 表(第 2 页) (2009 年 7 月)

国际检索报告
关于同族专利的信息

国际申请号
PCT/CN2012/073476

检索报告中引用的专利文件	公布日期	同族专利	公布日期
CN101400072A	01.04.2009	无	
CN1852605A	25.10.2006	CN100421528C	24.09.2008
CN101902779A	01.12.2010	WO2010135985A1	02.12.2010

PCT/ISA/210 表(同族专利附件) (2009 年 7 月)

フロントページの続き

(81)指定国 AP(BW,GH,GM,KE,LR,LS,MW,MZ,NA,RW,SD,SL,SZ,TZ,UG,ZM,ZW),EA(AM,AZ,BY,KG,KZ,MD,RU,TJ,TM),EP(AL,AT,BE,BG,CH,CY,CZ,DE,DK,EE,ES,FI,FR,GB,GR,HR,HU,IE,IS,IT,LT,LU,LV,MC,MK,MT,NL,NO,PL,PT,RO,RS,SE,SI,SK,SM,TR),OA(BF,BJ,CF,CG,CI,CM,GA,GN,GQ,GW,ML,MR,NE,SN,TD,TG),AE,AG,AL,AM,AO,AT,AU,AZ,BA,BB,BG,BH,BR,BW,BY,BZ,CA,CH,CL,CN,CO,CR,CU,CZ,DE,DK,DM,DO,DZ,EC,EE,EG,ES,FI,GB,GD,GE,GH,GM,GT,HN,HR,HU,ID,IL,IN,IS,JP,KE,KG,KM,KN,KP,KR,KZ,LA,LC,LK,LR,LS,LT,LU,LY,MA,MD,ME,MG,MK,MN,MW,MX,MY,MZ,NA,NG,NI,NO,NZ,OM,PE,PG,PH,PL,PT,QA,RO,RS,RU,RW,SC,SD,SE,SG,SK,SL,SM,ST,SV,SY,TH,TJ,TM,TN,TR,TT,TZ,UA,UG,US,UZ,VC,VN

Ｆターム(参考) 5K067 AA11 CC14 DD57 EE02 EE10 EE16 EE22 EE71 HH23

Electronic Acknowledgement Receipt

EFS ID:	42101637
Application Number:	16052505
International Application Number:	
Confirmation Number:	1082
Title of Invention:	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM
First Named Inventor/Applicant Name:	Wei-Yu Chen
Customer Number:	92096
Filer:	William Joseph Cooper/Jennifer Meinyk
Filer Authorized By:	William Joseph Cooper
Attorney Docket Number:	1426-136.301
Receipt Date:	05-MAR-2021
Filing Date:	01-AUG-2018
Time Stamp:	14:01:01
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	IDS.pdf	63918 5a8b30bc3abee64a2bd80da74a9ead80ed145e07	no	4

Warnings:

Information:					
This is not an USPTO supplied IDS fillable form					
2	Foreign Reference	IDS_FOR1_JP2016072843.pdf	358964 1baf9a709bdf32d4cf7e7f3593dd26b5a06416ff	no	14
Warnings:					
Information:					
3	Foreign Reference	IDS_FOR2_JP2014511080.pdf	653033 ed3678edb09115e0524b8f9afb9e894273238fd37	no	44
Warnings:					
Information:					
4	Non Patent Literature	IDS_NPL1_1050153-JP-P2-1OA.pdf	106579 25e0c409512636607fe11791112e712a05cc3dfa	no	6
Warnings:					
Information:					
		Total Files Size (in bytes):	1182494		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/052,505	08/01/2018	Wei-Yu Chen	1426-136.301	1082

92096 7590 04/30/2021

Cooper Legal Group LLC
6505 Rockside Road
Suite 330
Independence, OH 44131

EXAMINER	
FANG, PAKEE	

ART UNIT	PAPER NUMBER
2642	

NOTIFICATION DATE	DELIVERY MODE
04/30/2021	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):

docketing@cooperlegalgroup.com

Office Action Summary	**Application No.** 16/052,505	**Applicant(s)** Chen et al.	
	Examiner PAKEE FANG	**Art Unit** 2642	**AIA (FITF) Status** Yes

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

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 08/04/2020.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ 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.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-14 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1-14 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, 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.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ 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)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The amendment filed on 08/04/2020 has been entered and considered by Examiner. Claims 1 - 14 are presented for examination.

Continued Examination Under 37 CFR 1.114

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 08/04/2020 has been entered.

Information Disclosure Statement

3. The information disclosure statements (IDS) submitted are in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the Examiner.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 1-14 are rejected under 35 U.S.C. 112(a) or 35 U.S.C. 112 (pre-AIA), first paragraph, as failing to comply with the written description requirement. The claim(s) contains NEW subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Under close examination for claims 1 and 8, the Applicant's original filed specification and/or drawings fail to address the newly added limitations e.g., "*the UE receives a Msg2, **associated with downlink**, containing a TTI (Transmission Timer Interval) information of a Msg3, **associated with uplink**, from the network in response to the preamble, wherein the TTI information, contained in the Msg2 **associated with downlink**, of the Msg3, **associated with uplink**, includes a TTI duration of the Msg3, **associated with uplink**, and a start timing offset of the Msg3, **associated with uplink***;" or the like. Furthermore, Applicant fails to distinctly point out on the Remark & Argument Section where the amended limitations can be found. The Examiner respectfully request the Applicant to withdraw all the new matter added to the current examination.

Applicant is welcome to point out where in the specification and/or drawings the Examiner can find support for the newly-added limitations if Applicant believes otherwise.

All dependent claims base on the rejected base claim is also rejected.

Inquiries

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to PAKEE FANG whose telephone number is (571)270-3633. The Examiner can normally be reached on Mon-Fri 9:00AM-5:00PM.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, Applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, PÉREZ-GUTIÉRREZ RAFAEL can be reached on 571-272-7915. The fax phone

number for the organization where this application or proceeding is assigned is 571-273-8300. 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.

/PAKEE FANG/
Primary Examiner, Art Unit 2642

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/052,505	Chen et al.
	Examiner	Art Unit
	PAKEE FANG	2642

CPC - Searched*		
Symbol	Date	Examiner
H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607	03/20/2019	PF

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner
455	combined text	03/20/2019	PF

* 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
East, Google, Investor search	03/20/2019	PF
updated search	07/25/2019	PF
updated search	12/19/2019	PF
updated search	04/21/2020	PF
updated search	03/08/2021	PF

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

Samsung Exhibit 1002, Page 452 of 564
Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/052,505	Chen et al.
	Examiner	Art Unit
	PAKEE FANG	2642

Samsung Exhibit 1002, Page 453 of 564
Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/052,505	Chen et al.
	Examiner	**Art Unit**
	PAKEE FANG	2642

✓	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	12/19/2018	03/20/2019	07/25/2019	12/19/2019	04/21/2020	03/08/2021			
	1	÷	✓	✓	✓	✓	✓			
	2	÷	✓	✓	✓	✓	✓			
	3	÷	✓	✓	✓	✓	✓			
	4	÷	✓	✓	✓	✓	✓			
	5	÷	✓	✓	✓	✓	✓			
	6	÷	✓	✓	✓	✓	✓			
	7	÷	✓	✓	✓	✓	✓			
	8	÷	✓	✓	✓	✓	✓			
	9	÷	✓	✓	✓	✓	✓			
	10	÷	✓	✓	✓	✓	✓			
	11	÷	✓	✓	✓	✓	✓			
	12	÷	✓	✓	✓	✓	✓			
	13	÷	✓	✓	✓	✓	✓			
	14	÷	✓	✓	✓	✓	✓			

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	139,324	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/03/08 13:36
L2	10,900	L1 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/03/08 13:36
L3	2,931	L2 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/03/08 13:36
L4	361	L3 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/03/08 13:36
L5	112	@ay<"2017" and L4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/03/08 13:36
L6	139,324	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/03/08 13:36
L7	10,900	L6 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/03/08 13:36
L8	2,931	L7 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/03/08 13:36
L9	361	L8 and ((Transmission adj2 Time adj2 Interval) TTI) with (first	US-PGPUB; USPAT; USOCR;	OR	ON	2021/03/08 13:36

		second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	FPRS; EPO; JPO; DERWENT; IBM_TDB			
L10	112	@ay<"2017" and L9	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/03/08 13:36
L11	48	L10 and (transport$4 adj2 block)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/03/08 13:36
S1	2	"20180035470".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:17
S2	2	S1 and (frame msg$1)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:26
S3	82,131	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:29
S4	5,501	S3 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:33
S5	1,227	S4 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:35
S6	78	S5 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:37
S7	66	@ay<"2017" and S6	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 17:41

S8	95,587	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S9	6,513	S8 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S10	1,554	S9 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S11	128	S10 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S12	82	@ay<"2017" and S11	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S13	3	S12 and Numerology	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S14	2	"20160366705".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:44
S15	0	S14 and Numerology	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:47
S16	7	S8 and Numerology with (message) same (preamble)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:01
S17	1	@ay<"2017" and S16	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	OR	ON	2019/01/24 16:01

			DERWENT; IBM_TDB			
S18	3	"20180035470".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:15
S19	0	("455" "370").clas. and Numerology with (message) same (preamble)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:17
S20	7	Numerology with (message) same (preamble)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18
S21	1	@ay<"2017" and S20	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18
S22	0	("455" "370").clas. and Numerology with (message)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18
S23	16	("455" "370").clas. and Numerology same (preamble)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18
S24	15	@ay<"2017" and S23	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18
S25	525	("455" "370").clas. and Numerology	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 17:59
S26	8	("20150099528" "20170280400")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/28 10:05

S27	5	("20150099528" "20170280400").pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/28 10:05
S28	98,999	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S29	6,750	S28 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S30	1,631	S29 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S31	146	S30 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S32	86	@ay<"2017" and S31	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S33	98,999	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S34	6,750	S33 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S35	1,631	S34 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S36	146	S35 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	OR	ON	2019/03/20 12:01

		(frame message msg sub$1frame band sub$1band packet)	DERWENT; IBM_TDB			
S37	86	@ay<"2017" and S36	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S38	7	(US-20170339546-$ or US-20170019931-$ or US-20160366705-$ or US-20150365977-$ or US-20090316811-$ or US-20140334448-$ or US-20070268812-$).did.	US-PGPUB	OR	ON	2019/03/20 12:19
S39	2	S38 and (off$1set) with (tim$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:19
S40	2	"20160366705".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:20
S41	16	S37 and (off$1set) with (tim$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:25
S42	2	"20180359785".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:32
S43	333	("455" "370").clas. and (off$1set) with (tim$4) with ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:39
S44	333	@ay<"2017" and S43	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:40
S45	27	S44 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:40

S46	59	("455" "370").clas. and (off$1set) with (tim$4) with ((Transmission adj2 Time adj2 Interval) TTI) near3 (data information)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:50
S47	59	@ay<"2017" and S46	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:50
S48	5	("455" "370").clas. and (duration) same (off$1set) with (tim$4) with ((Transmission adj2 Time adj2 Interval) TTI) near3 (data information)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 13:40
S49	2	"20160366705" and (tim$4 interval window)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 14:38
S50	2	"20160366705" and (tim$4 interval window TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 14:38
S51	1	"20100177675".pn. and (off$1set start$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 14:52
S52	2	"20160366705" and (Msg3 (third adj messag$4))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 14:55
S53	105,281	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
S54	7,343	S53 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
S55	1,827	S54 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	OR	ON	2019/07/25 15:03

			DERWENT; IBM_TDB			
S56	181	S55 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
S57	93	@ay<"2017" and S56	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
S58	59	("455" "370").clas. and (off$1set) with (tim$4) with ((Transmission adj2 Time adj2 Interval) TTI) near3 (data information)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
S59	59	@ay<"2017" and S58	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
S60	112,688	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:36
S61	8,130	S60 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:36
S62	2,058	S61 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:36
S63	214	S62 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:36
S64	100	@ay<"2017" and S63	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:36

S65	112,688	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:37
S66	8,130	S65 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:37
S67	2,058	S66 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:37
S68	214	S67 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:37
S69	100	@ay<"2017" and S68	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:37
S70	42	S69 and (transport$4 adj2 block)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:38
S71	3	S69 and (transport$4 adj2 block) with (msg message)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:39
S72	4	("20090252125" "20160183243").pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 11:08
S73	2	"20120147830".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:19
S74	120,052	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	OR	ON	2020/04/21 12:33

			DERWENT; IBM_TDB			
S75	8,779	S74 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
S76	2,276	S75 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
S77	250	S76 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
S78	104	@ay<"2017" and S77	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
S79	120,052	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
S80	8,779	S79 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
S81	2,276	S80 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
S82	250	S81 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
S83	104	@ay<"2017" and S82	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33

S84	43	S83 and (transport$4 adj2 block)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
S85	120,052	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:34
S86	8,779	S85 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:34
S87	2,276	S86 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:34
S88	250	S87 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:34
S89	104	@ay<"2017" and S88	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:34

3/8/2021 1:38:53 PM
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PTO/SB/08a (02-18)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16052505
	Filing Date	2018-08-01
	First Named Inventor	Wei-Yu CHEN
	Art Unit	2642
	Examiner Name	Pakee FANG
	Attorney Docket Number	ASUP152US

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							☐

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NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /P.F/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16052505
	Filing Date	2018-08-01
	First Named Inventor	Wei-Yu CHEN
	Art Unit	2642
	Examiner Name	Pakee FANG
	Attorney Docket Number	ASUP152US

	1	Corresponding European Patent Application No. 17183827.9, Office Action dated September 25, 2020.	☐
	2	"3 Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Layer Procedures (Release 13)", 3GPP STANDARD; 3GPP TS 36.213, 3RD GENERATION PARTNERSHIP PROJECT (3GPP) MOBILE COMPETENCE CENTRE; 650, ROUTE DES LUCIOLES; F-06921 SOPHIA-ANTIPOLIS CEDED; FRANCE vol. RAN WG1, no. V13.2.0, 30 June 2016, pgs 45-254.	☐

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EXAMINER SIGNATURE

Examiner Signature	/PAKEE FANG/	Date Considered	03/08/2021

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Signature	/Ali Assar/	Date (YYYY-MM-DD)	2020-10-09
Name/Print	Ali Assar	Registration Number	65,848

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Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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	First Named Inventor	Wei-Yu CHEN
	Art Unit	2642
	Examiner Name	Pakee FANG
	Attorney Docket Number	ASUP152US

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	1	2016072843	JP	A	2016-05-09	KDDI CORP	Entire Document with English Abstract	☒
	2	2014511080	JP	A	2014-05-01	HUAWEI TECHNOLOGIES CO., LTD	Entire Document with English Abstract	☒

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	1	Corresponding Japanese patent application no. 2019-201501, Office Action mailed February 2, 2021. English Translation.	☒

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Examiner Signature	/PAKEE FANG/	Date Considered	03/08/2021

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Name/Print	Ali Assar	Registration Number	65,848

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	1	20070268812	A1	2007-11-22	YOON et al.	
	2	20100278064	A1	2010-11-04	JEONG	

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	1	102422568	CN	A	2012-04-18	SAMSUNG ELECTRONICS CO LTD.	Entire Document with English Abstract	☒
	2	105052065	CN	A	2015-11-11	QUALCOMM INC	Entire Document with English Abstract	☒

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	3	105122710	CN	A	2015-12-02	QUALCOMM INC	Entire Document with English Abstract	☒
	4	102740407	CN	A	2012-10-17	ZTE CORP	Entire Document with English Abstract	☒

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/052,505	Filing Date 08/01/2018	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $460 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	07/29/2021	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 14	Minus	** 20	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0		x $480 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/RAMONA D WILSON/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. 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 12 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, 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.

Docket No. **1050153-US-P2** **ASUP152US**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re **PATENT** application of:

Applicant: Wei-Yu Chen

Serial No.: 16/052,505

For: METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM

Filing Date: August 1, 2018

Examiner: PAKEE FANG

Art Unit: 2642

REPLY TO THE NON-FINAL OFFICE ACTION DATED APRIL 30, 2021

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

Dear Commissioner,

Favorable reconsideration of the above-identified application is respectfully requested in view of the following remarks and amendments.

AMENDMENTS

IN THE CLAIMS:

Please consider claims 1-14 as follows:

1. (Previously Presented) A method of a UE (User Equipment) for performing random access procedure, comprising:

the UE transmits a preamble to a network;

the UE receives a Msg2, associated with downlink, containing a TTI (Transmission Timer Interval) information of a Msg3, associated with uplink, from the network in response to the preamble, wherein the TTI information, contained in the Msg2 associated with downlink, of the Msg3, associated with uplink, includes a TTI duration of the Msg3, associated with uplink, and a start timing offset of the Msg3, associated with uplink; and

the UE performs a single (TB) transport block of Msg3 transmission to the network according to the TTI information of the Msg3.

2. (Original) The method of claim 1, further comprising:

the UE selects the TTI information of the Msg3 based on random access purpose, if there are multiple TTI information of the Msg3 in the Msg2.

3. (Original) The method of claim 1, further comprising:

the UE selects the TTI information of the Msg3 based on a PRACH (Physical Random Access Channel) resource set of the preamble transmission or a preamble set of the preamble transmission, if there are multiple TTI information of the Msg3 in the Msg2.

4. (Original) The method of claim 1, further comprising:

the UE selects the TTI information of the Msg3 based on highest priority of logical channel having data available for transmission, if there are multiple TTI information of the Msg3 in the Msg2.

5. (Original) The method of claim 1, wherein the TTI information of the Msg3 is included in a RAR (Random Access Response) for responding the preamble.

6. (Original) The method of claim 1, wherein the TTI information of the Msg3 is included in a common field for multiple RARs in the Msg2.

7. (Original) The method of claim 1, wherein the Msg2 is a random access response.

8. (Previously Presented) A User Equipment (UE), comprising:

a control circuit;

a processor installed in the control circuit; and

a memory installed in the control circuit and operatively coupled to the processor;

wherein the processor is configured to execute a program code stored in the memory to:

transmit a preamble to a network;

receive a Msg2, associated with downlink, containing a TTI (Transmission Time Interval) information of a Msg3, associated with uplink, from the network in response to the preamble, wherein the TTI information, contained in the Msg2 associated with downlink, of the Msg3, associated with uplink, includes a TTI duration of the Msg3, associated with uplink, and a start timing offset of the Msg3, associated with uplink; and

perform a single (TB) transport block of Msg3 transmission to the network according to the TTI information of the Msg3.

9. (Original) The UE of claim 8, wherein the processor is further configured to execute the program code stored in the memory to:

select the TTI information of the Msg3 based on random access purpose, if there are multiple TTI information of the Msg3 in the Msg2.

10. (Original) The UE of claim 8, wherein the processor is further configured to execute the program code stored in the memory to:

select the TTI information of the Msg3 based on a PRACH (Physical Random Access Channel) resource set of the preamble or a preamble set of the preamble transmission, if there are multiple TTI information of the Msg3 in the Msg2.

11. (Original) The UE of claim 8, wherein the processor is further configured to execute the program code stored in the memory to:

select the TTI information of the Msg3 based on highest priority of logical channel having available data, if there are multiple TTI information of the Msg3 in the Msg2.

12. (Original) The UE of claim 8, wherein the TTI information of the Msg3 is included in a RAR (Random Access Response) for responding the preamble.

13. (Original) The UE of claim 8, wherein the TTI information of the Msg3 is included in a common field for multiple RARs in the Msg2.

14. (Original) The UE of claim 8, wherein the Msg2 is a random access response.

REMARKS

Claims 1-14 are pending in the application, and are all rejected. No claims are amended herein. Reconsideration of the application in light of the following remarks is respectfully requested.

I. REJECTION OF CLAIMS 1-14 UNDER 35 U.S.C. 112(a)

Claims 1-14 are rejected under 35 U.S.C. 112(a) or 35 U.S.C. 112 (pre-AIA), first paragraph, as allegedly failing to comply with the written description requirement. Withdrawal of this rejection is respectfully requested for at least the following reasons.

The Office Action provides (on page 3) that:

> Under close examination for claims 1 and 8, the Applicant's original filed specification and/or drawings fail to address the newly added limitations e.g., "*the UE receives a Msg2, **associated with downlink**, containing a TTI (Transmission Timer Interval) information of a Msg3, **associated with uplink**, from the network in response to the preamble, wherein the TTI information, contained in the Msg2 **associated with downlink**, of the Msg3, **associated with uplink**, includes a TTI duration of the Msg3, **associated with uplink**, and a start timing offset of the Msg3, **associated with uplink**;*" or the like

The Office Action thus seems to assert that the application allegedly does not provide sufficient support for the pending claims, in particular for indicating that Msg2 is associated with downlink, and that Msg3 is associated with uplink.

However, this assertion is believed to be erroneous, as the instant application is believed to provide support for the subject matter of the pending claims.

For example, the Abstract of the instant application provides for:

> [Abstract] A method and apparatus are disclosed, from the perspective of the UE, for performing random access procedure. In one embodiment, the method includes the UE receiving a message from a network. The message includes a TTI information of Msg3. In addition, the method

> includes the UE transmitting a preamble to the network. The method also includes the UE receiving a Msg2 from the network for responding the preamble. The method further includes the UE performing a Msg3 transmission to the network according to the TTI information of Msg3. (Emphasis added)

It may be appreciated that "UE receiving a Msg2 from the network," as provided by the instant application, may provide support for Msg2 being associated with downlink.

It may further be appreciated that "the UE performing a Msg3 transmission to the network," as provided by the instant application, may provide support for Msg3 being associated with uplink.

Accordingly, claims 1-14 are believed to comply with the written description requirement.

Therefore, withdrawal of the rejection and allowance of the pending claims is respectfully requested.

II. CONCLUSION

For at least the above reasons, the claims currently under consideration are believed to be in condition for allowance. It is to be appreciated that while reference may be made back to certain parts of the application in this Reply (e.g., page numbers, line numbers, Figs., etc.), that such referencing is not to be interpreted in a limiting manner (e.g., to limit the scope of the claims and/or features therein to the particular portion(s) referenced), but is instead merely done for purposes of explanation, illustration and/or ease of understanding, for example. Additionally, at least one of A and B and/or the like generally comprises A or B and/or both A and B. Also, first, second, third, etc. are generally merely used as names, designators, etc. and are not necessarily meant to imply an ordering, temporal relation, etc. Although the present communication may include alterations to the application or claims, or characterizations of claim scope or referenced art, the Applicant is not conceding that previously pending claims are not patentable over the cited references. Rather, any alterations or characterizations are being made to facilitate expeditious prosecution of this application. 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 Applicants have made any disclaimers or disavowals of any subject matter supported by the present application.

Should the Examiner feel that a telephone interview would be helpful to facilitate favorable prosecution of the above-identified application, the Examiner is invited to contact the undersigned at the telephone number provided below.

Should any fees be due as a result of the filing of this response, the Commissioner is hereby authorized to charge the Deposit Account Number 50-5088, **ASUP152US**.

Respectfully submitted,

COOPER LEGAL GROUP, LLC

By: /Ali Assar/

Ali Assar
Reg. No. 65,848

Cooper Legal Group, LLC
6505 Rockside Road, Suite 330
Independence, OH 44131
Telephone (216) 654-0090 x 1084
Fax (216) 373-3450

Electronic Acknowledgement Receipt

EFS ID:	43377376
Application Number:	16052505
International Application Number:	
Confirmation Number:	1082
Title of Invention:	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM
First Named Inventor/Applicant Name:	Wei-Yu Chen
Customer Number:	92096
Filer:	William Joseph Cooper/Jennifer Meinyk
Filer Authorized By:	William Joseph Cooper
Attorney Docket Number:	ASUP152US
Receipt Date:	29-JUL-2021
Filing Date:	01-AUG-2018
Time Stamp:	13:17:51
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		ASUP152US_R03.pdf	275219 6b8f73f5d026eb82612d5c1c479ca3e4b1bdd5a1	yes	8

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
	Claims	2	4
	Applicant Arguments/Remarks Made in an Amendment	5	8
Warnings:			
Information:			
	Total Files Size (in bytes):	275219	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P.O. Box 1450
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/052,505	08/01/2018	Wei-Yu Chen	ASUP152US	1082

92096 7590 08/06/2021

Cooper Legal Group LLC
6505 Rockside Road
Suite 330
Independence, OH 44131

EXAMINER	
FANG, PAKEE	

ART UNIT	PAPER NUMBER
2642	

NOTIFICATION DATE	DELIVERY MODE
08/06/2021	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):

docketing@cooperlegalgroup.com

Office Action Summary	**Application No.** 16/052,505	**Applicant(s)** Chen et al.	
	Examiner PAKEE FANG	**Art Unit** 2642	**AIA (FITF) Status** Yes

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

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 07/29/2021.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☑ This action is **FINAL.** 2b) ☐ This action is non-final.

3)☐ 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.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-14 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1-14 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, 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.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ 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)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The amendment filed on 07/29/2021 has been entered and considered by Examiner. Claims 1 - 14 are presented for examination. **This Action is made FINAL.**

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1-14 are rejected under 35 U.S.C. 112(a) or 35 U.S.C. 112 (pre-AIA), first paragraph, as failing to comply with the written description requirement. The claim(s) contains NEW subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Under close examination for claims 1 and 8, the Applicant's original filed specification and/or drawings fail to address the newly added limitations e.g., "*the UE receives a Msg2,* ***associated with downlink****, containing a TTI (Transmission Timer Interval) information of a Msg3,* ***associated with uplink****, from the network in response to the preamble, wherein the TTI information, contained in the Msg2* ***associated with downlink****, of the Msg3,* ***associated with uplink****, includes a TTI duration of the Msg3,* ***associated with uplink****, and a start timing offset of the Msg3,* ***associated with uplink***;" or the like. Furthermore, Applicant fails to distinctly point out on the Remark & Argument Section anything remotely related to uplink or downlink. The phrase downlink is nowhere to be found in the filed specification. The Examiner respectfully request the Applicant to withdraw all the new matter added to the current examination.

Applicant is welcome to point out explicitly where in the specification the Examiner can find support for the newly-added limitations if Applicant believes otherwise.

All dependent claims base on the rejected base claim is also rejected.

Response to Arguments

4. Applicant's arguments filed 07/29/2021 have been fully considered but they are not persuasive.

5. With regard to the references failing to teach every element recited in the independent claims; the Examiner respectfully disagrees with the arguments by the Applicant. Even though, the Examiner acknowledges Applicant's invention may possess some novel features, the claims are written too broad that can be read on the current cited prior art(s). Further actions must be taken to explicitly claim those novel features of the current application.

With regard to the argument for the 112 rejection, the applicant failed to show where the claimed limitations can be found in the filed specification. A mere statement stating the filed specification addresses the amendment in the claim limitation is insufficient to overcome the rejection. Thus, the rejection is maintained.

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Inquiries

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to PAKEE FANG whose telephone number is (571)270-3633. The Examiner can normally be reached on Mon-Fri 9:00AM-5:00PM.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, Applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, PÉREZ-GUTIÉRREZ RAFAEL can be reached on 571-272-**7915.** The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. 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.

/PAKEE FANG/
Primary Examiner, Art Unit 2642

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/052,505	Chen et al.
	Examiner	**Art Unit**
	PAKEE FANG	2642

✓	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	12/19/2018	03/20/2019	07/25/2019	12/19/2019	04/21/2020	03/08/2021	08/02/2021		
	1	÷	✓	✓	✓	✓	✓	✓		
	2	÷	✓	✓	✓	✓	✓	✓		
	3	÷	✓	✓	✓	✓	✓	✓		
	4	÷	✓	✓	✓	✓	✓	✓		
	5	÷	✓	✓	✓	✓	✓	✓		
	6	÷	✓	✓	✓	✓	✓	✓		
	7	÷	✓	✓	✓	✓	✓	✓		
	8	÷	✓	✓	✓	✓	✓	✓		
	9	÷	✓	✓	✓	✓	✓	✓		
	10	÷	✓	✓	✓	✓	✓	✓		
	11	÷	✓	✓	✓	✓	✓	✓		
	12	÷	✓	✓	✓	✓	✓	✓		
	13	÷	✓	✓	✓	✓	✓	✓		
	14	÷	✓	✓	✓	✓	✓	✓		

Samsung Exhibit 1002, Page 495 of 564
Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/052,505	Chen et al.
	Examiner	Art Unit
	PAKEE FANG	2642

CPC - Searched*		
Symbol	Date	Examiner
H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607	03/20/2019	PF

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner
455	combined text	03/20/2019	PF

* 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
East, Google, Investor search	03/20/2019	PF
updated search	07/25/2019	PF
updated search	12/19/2019	PF
updated search	04/21/2020	PF
updated search	03/08/2021	PF
updated search	08/02/2021	PF

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

Samsung Exhibit 1002, Page 496 of 564
Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/052,505	Chen et al.
	Examiner	Art Unit
	PAKEE FANG	2642

Samsung Exhibit 1002, Page 497 of 564
Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	144,987	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:10
L2	11,689	L1 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:10
L3	3,197	L2 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:10
L4	402	L3 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:10
L5	115	@ay<"2017" and L4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:10
L6	5	L5 and (transport$4 adj2 block) with (msg message)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:10
L7	144,987	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:10
L8	11,689	L7 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:10
L9	3,197	L8 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR;	OR	ON	2021/08/02 15:10

			FPRS; EPO; JPO; DERWENT; IBM_TDB			
L10	402	L9 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:10
L11	115	@ay<"2017" and L10	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:10
L12	49	L11 and (transport$4 adj2 block)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:10
L13	144,987	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:10
L14	11,689	L13 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:10
L15	3,197	L14 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:10
L16	402	L15 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:10
L17	115	@ay<"2017" and L16	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:10
L18	2	"20180359785".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:13

L19	2	"20180359785".pn. and (up$1link$4 down$1link$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:14
S1	2	"20180035470".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:17
S2	2	S1 and (frame msg$1)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:26
S3	82,131	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:29
S4	5,501	S3 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:33
S5	1,227	S4 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:35
S6	78	S5 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:37
S7	66	@ay<"2017" and S6	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 17:41
S8	95,587	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S9	6,513	S8 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	OR	ON	2019/01/24 15:43

			DERWENT; IBM_TDB			
S10	1,554	S9 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S11	128	S10 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S12	82	@ay<"2017" and S11	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S13	3	S12 and Numerology	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S14	2	"20160366705".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:44
S15	0	S14 and Numerology	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:47
S16	7	S8 and Numerology with (message) same (preamble)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:01
S17	1	@ay<"2017" and S16	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:01
S18	3	"20180035470".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:15

S19	0	("455" "370").clas. and Numerology with (message) same (preamble)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:17
S20	7	Numerology with (message) same (preamble)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18
S21	1	@ay<"2017" and S20	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18
S22	0	("455" "370").clas. and Numerology with (message)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18
S23	16	("455" "370").clas. and Numerology same (preamble)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18
S24	15	@ay<"2017" and S23	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18
S25	525	("455" "370").clas. and Numerology	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 17:59
S26	8	("20150099528" "20170280400")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/28 10:05
S27	5	("20150099528" "20170280400").pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/28 10:05
S28	98,999	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	OR	ON	2019/03/20 12:01

			DERWENT; IBM_TDB			
S29	6,750	S28 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S30	1,631	S29 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S31	146	S30 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S32	86	@ay<"2017" and S31	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S33	98,999	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S34	6,750	S33 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S35	1,631	S34 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S36	146	S35 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S37	86	@ay<"2017" and S36	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01

S38	7	(US-20170339546-$ or US-20170019931-$ or US-20160366705-$ or US-20150365977-$ or US-20090316811-$ or US-20140334448-$ or US-20070268812-$).did.	US-PGPUB	OR	ON	2019/03/20 12:19
S39	2	S38 and (off$1set) with (tim$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:19
S40	2	"20160366705".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:20
S41	16	S37 and (off$1set) with (tim$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:25
S42	2	"20180359785".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:32
S43	333	("455" "370").clas. and (off$1set) with (tim$4) with ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:39
S44	333	@ay<"2017" and S43	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:40
S45	27	S44 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:40
S46	59	("455" "370").clas. and (off$1set) with (tim$4) with ((Transmission adj2 Time adj2 Interval) TTI) near3 (data information)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:50
S47	59	@ay<"2017" and S46	US-PGPUB; USPAT; USOCR;	OR	ON	2019/03/20 12:50

			FPRS; EPO; JPO; DERWENT; IBM_TDB			
S48	5	("455" "370").clas. and (duration) same (off$1set) with (tim$4) with ((Transmission adj2 Time adj2 Interval) TTI) near3 (data information)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 13:40
S49	2	"20160366705" and (tim$4 interval window)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 14:38
S50	2	"20160366705" and (tim$4 interval window TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 14:38
S51	1	"20100177675".pn. and (off$1set start$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 14:52
S52	2	"20160366705" and (Msg3 (third adj messag$4))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 14:55
S53	105,281	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
S54	7,343	S53 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
S55	1,827	S54 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
S56	181	S55 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03

S57	93	@ay<"2017" and S56	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
S58	59	("455" "370").clas. and (off$1set) with (tim$4) with ((Transmission adj2 Time adj2 Interval) TTI) near3 (data information)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
S59	59	@ay<"2017" and S58	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
S60	112,688	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:36
S61	8,130	S60 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:36
S62	2,058	S61 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:36
S63	214	S62 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:36
S64	100	@ay<"2017" and S63	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:36
S65	112,688	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:37
S66	8,130	S65 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	OR	ON	2019/12/19 11:37

			DERWENT; IBM_TDB			
S67	2,058	S66 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:37
S68	214	S67 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:37
S69	100	@ay<"2017" and S68	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:37
S70	42	S69 and (transport$4 adj2 block)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:38
S71	3	S69 and (transport$4 adj2 block) with (msg message)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:39
S72	4	("20090252125" "20160183243").pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 11:08
S73	2	"20120147830".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:19
S74	120,052	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
S75	8,779	S74 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33

S76	2,276	S75 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
S77	250	S76 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
S78	104	@ay<"2017" and S77	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
S79	120,052	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
S80	8,779	S79 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
S81	2,276	S80 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
S82	250	S81 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
S83	104	@ay<"2017" and S82	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
S84	43	S83 and (transport$4 adj2 block)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
S85	120,052	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	OR	ON	2020/04/21 12:34

			DERWENT; IBM_TDB			
S86	8,779	S85 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:34
S87	2,276	S86 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:34
S88	250	S87 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:34
S89	104	@ay<"2017" and S88	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:34
S90	139,324	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/03/08 13:36
S91	10,900	S90 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/03/08 13:36
S92	2,931	S91 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/03/08 13:36
S93	361	S92 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/03/08 13:36
S94	112	@ay<"2017" and S93	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/03/08 13:36

S95	139,324	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/03/08 13:36
S96	10,900	S95 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/03/08 13:36
S97	2,931	S96 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/03/08 13:36
S98	361	S97 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/03/08 13:36
S99	112	@ay<"2017" and S98	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/03/08 13:36
S100	48	S99 and (transport$4 adj2 block)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/03/08 13:36

8/2/2021 3:20:58 PM
C:\Users\pfang\Documents\EAST\Workspaces\16052505.wsp

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/052,505	08/01/2018	Wei-Yu Chen	ASUP152US	1082

92096 7590 10/20/2021

Cooper Legal Group LLC
1388 Ridge Road, Unit 1
Hinckley, OH 44233

EXAMINER	
FANG, PAKEE	

ART UNIT	PAPER NUMBER
2642	

NOTIFICATION DATE	DELIVERY MODE
10/20/2021	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):

docketing@cooperlegalgroup.com

Applicant-Initiated Interview Summary	**Application No.** 16/052,505	**Applicant(s)** Chen et al.		
	Examiner PAKEE FANG	**Art Unit** 2642	**AIA (First Inventor to File) Status** Yes	**Page** 1 of 1

All Participants (applicant, applicants representative, PTO personnel)	**Title**	**Type**
PAKEE FANG	Primary Examiner	Telephonic
Ali Assar	Attorney	

Date of Interview: 14 October 2021

Issues Discussed:

35 U.S.C. 112

Applicant persuasively discussed the background of the invention and the perceived novelty of the current claimed invention. Applicant furthermore descriptively explained how the current claimed invention is proper. Applicant proposed to removing the structure elements of the downlink, and amend the claim language of the said element to overcome the 112 rejection. However, No agreement was reach at the time of this interview. Upon receiving an official response, an updated search and/or consideration must be required.

/PAKEE FANG/ Primary Examiner, Art Unit 2642	

Applicant is reminded that a complete written statement as to the substance of the interview must be made of record in the application file. It is the applicants responsibility to provide the written statement, unless the interview was initiated by the Examiner and the Examiner has indicated that a written summary will be provided. See MPEP 713.04
Please further see:
MPEP 713.04
Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews, paragraph (b)
37 CFR § 1.2 Business to be transacted in writing

Applicant recordation instructions: The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

Agenda

1. A method of a UE (User Equipment) for performing random access procedure, comprising:

the UE transmits a preamble to a network;

the UE receives **a Msg2, associated with downlink**, containing a TTI (Transmission Timer Interval) information of **a Msg3, associated with uplink**, from the network in response to the preamble, wherein the TTI information, contained in the Msg2 associated with downlink, of the Msg3, associated with uplink, includes a TTI duration of the Msg3, associated with uplink, and a start timing offset of the Msg3, associated with uplink; and

the UE performs a single (TB) transport block of Msg3 transmission to the network according to the TTI information of the Msg3. (Emphasis added)

The Abstract of the instant application provides for:

> [Abstract] A method and apparatus are disclosed, from the perspective of the UE, for performing random access procedure. In one embodiment, the method includes the UE receiving a message from a network. The message includes a TTI information of Msg3. In addition, the method includes the UE transmitting a preamble to the network. The method also includes the UE receiving a Msg2 from the network for responding the preamble. The method further includes the UE performing a Msg3 transmission to the network according to the TTI information of Msg3. (Emphasis added)

It may be appreciated that "UE receiving a Msg2 from the network," as provided by the instant application, may provide support for Msg2 being associated with downlink.

It may further be appreciated that "the UE performing a Msg3 transmission to the network," as provided by the instant application, may provide support for Msg3 being associated with uplink.

Docket No. **1050153-US-P2** **ASUP152US**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re **PATENT** application of:

Applicant: Wei-Yu Chen

Serial No.: 16/052,505

For: METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM

Filing Date: August 1, 2018

Examiner: PAKEE FANG

Art Unit: 2642

REPLY TO THE FINAL OFFICE ACTION DATED AUGUST 6, 2021

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

Dear Commissioner,

Favorable reconsideration of the above-identified application is respectfully requested in view of the following remarks and amendments.

AMENDMENTS

IN THE CLAIMS:

Please amend claims 1 and 8 as follows:

1. (Currently Amended) A method of a UE (User Equipment) for performing random access procedure, comprising:

the UE transmits a preamble to a network;

the UE receives a Msg2~~, associated with downlink,~~ containing a TTI (Transmission Timer Interval) information of a Msg3, associated with uplink, from the network in response to the preamble, wherein the TTI information, contained in the Msg2 ~~associated with downlink~~, of the Msg3, associated with uplink, includes a TTI duration of the Msg3, associated with uplink, and a start timing offset of the Msg3, associated with uplink; and

the UE performs a single (TB) transport block of Msg3 transmission to the network according to the TTI information of the Msg3.

2. (Original) The method of claim 1, further comprising:

the UE selects the TTI information of the Msg3 based on random access purpose, if there are multiple TTI information of the Msg3 in the Msg2.

3. (Original) The method of claim 1, further comprising:

the UE selects the TTI information of the Msg3 based on a PRACH (Physical Random Access Channel) resource set of the preamble transmission or a preamble set of the preamble transmission, if there are multiple TTI information of the Msg3 in the Msg2.

4. (Original) The method of claim 1, further comprising:

the UE selects the TTI information of the Msg3 based on highest priority of logical channel having data available for transmission, if there are multiple TTI information of the Msg3 in the Msg2.

5. (Original) The method of claim 1, wherein the TTI information of the Msg3 is included in a RAR (Random Access Response) for responding the preamble.

6. (Original) The method of claim 1, wherein the TTI information of the Msg3 is included in a common field for multiple RARs in the Msg2.

7. (Original) The method of claim 1, wherein the Msg2 is a random access response.

8. (Currently Amended) A User Equipment (UE), comprising:

a control circuit;

a processor installed in the control circuit; and

a memory installed in the control circuit and operatively coupled to the processor;

wherein the processor is configured to execute a program code stored in the memory to:

transmit a preamble to a network;

receive a Msg2~~, associated with downlink,~~ containing a TTI (Transmission Time Interval) information of a Msg3, associated with uplink, from the network in response to the preamble, wherein the TTI information, contained in the Msg2 ~~associated with downlink~~, of the Msg3, associated with uplink, includes a TTI duration of the Msg3, associated with uplink, and a start timing offset of the Msg3, associated with uplink; and

perform a single (TB) transport block of Msg3 transmission to the network according to the TTI information of the Msg3.

9. (Original) The UE of claim 8, wherein the processor is further configured to execute the program code stored in the memory to:

select the TTI information of the Msg3 based on random access purpose, if there are multiple TTI information of the Msg3 in the Msg2.

10. (Original) The UE of claim 8, wherein the processor is further configured to execute the program code stored in the memory to:

select the TTI information of the Msg3 based on a PRACH (Physical Random Access Channel) resource set of the preamble or a preamble set of the preamble transmission, if there are multiple TTI information of the Msg3 in the Msg2.

11. (Original) The UE of claim 8, wherein the processor is further configured to execute the program code stored in the memory to:

select the TTI information of the Msg3 based on highest priority of logical channel having available data, if there are multiple TTI information of the Msg3 in the Msg2.

12. (Original) The UE of claim 8, wherein the TTI information of the Msg3 is included in a RAR (Random Access Response) for responding the preamble.

13. (Original) The UE of claim 8, wherein the TTI information of the Msg3 is included in a common field for multiple RARs in the Msg2.

14. (Original) The UE of claim 8, wherein the Msg2 is a random access response.

REMARKS

Initially, the undersigned would like to thank the Examiner for his time in discussing this matter in an interview on 10/14/2021. Pending claims and rejections were discussed during the interview. The Examiner provided feedback and indicated that amending claims based upon the feedback would advance prosecution. At least some of the claims have been amended based upon the feedback of the Examiner. Accordingly, allowance of the pending claims is respectfully requested. An invitation to contact the undersigned is hereby extended should the same be thought to advance prosecution.

Claims 1-14 are pending in the application, and are all rejected. Claims 1 and 8 are amended herein. Reconsideration of the application in light of the following remarks is respectfully requested.

I. REJECTION OF CLAIMS 1-14 UNDER 35 U.S.C. 112(a)

Claims 1-14 are rejected under 35 U.S.C. 112(a) or 35 U.S.C. 112 (pre-AIA), first paragraph, as allegedly failing to comply with the written description requirement. Withdrawal of this rejection is respectfully requested for at least the following reasons.

In the interview on 10/14/2021, the Examiner provided feedback and indicated that amending claims based upon the feedback would advance prosecution. **Independent claims 1 and/or 8** are amended based upon the feedback of the Examiner and are therefore believed to overcome the rejection. At least some support may be provided in the Abstract, [0124], [0125] and/or [0154] of the instant application.

For example, the instant application provides for:

> [Abstract] A method and apparatus are disclosed, from the perspective of the UE, for performing random access procedure. In one embodiment, the method includes the UE receiving a message from a network. The message includes a TTI information of Msg3. In addition, the method includes the UE transmitting a preamble to the network. The method also includes the UE receiving a Msg2 from the network for responding the preamble. The method further includes the UE performing a Msg3

> transmission to the network according to the TTI information of Msg3. (Emphasis added)
>
> [0124] The Msg3 transmission is scheduled according to UL (Uplink) grant field in the RAR. In this solution, additional TTI information is added into RAR for scheduling Msg3. In one embodiment, the new TTI information can be a new field in RAR or a new field in Msg2 for a specific preamble or added into UL grant field. A possible exemplary embodiment is shown in FIG. 9. (Emphasis added)
>
> [0125] Solution 2—Common field in Msg2. In Solution 2, the TTI information is also carried in Msg2 similar to Solution 1. The Msg2 may include multiple RARs. And sub-header of a RAR will indicate the RAR is for which preamble. However, since the TTI length has limited choices, there may be no need to repeatedly include the redundant information. Hence, it is proposed to use common field(s) in Msg2 to carry TTI information. A possible example is shown in FIG. 10. The TTI information 1 could be provided to preamble set 1 (e.g., rapid 0˜20), and the TTI information 2 could be provided to preamble set 2 (e.g., rapid 21˜40). (Emphasis added)
>
> [0154] The Msg3 transmission is scheduled according to UL (Uplink) grant field in the RAR. In this solution, additional information is added into RAR for adjusting Msg3 start timing offset. In one embodiment, the additional information can be a new field in RAR or a new field in Msg2 for a specific preamble or added into UL grant field. (Emphasis added)

It may further be appreciated that “the UE performing a Msg3 transmission to the network” and/or “Msg3 transmission is scheduled according to UL (Uplink)” as provided by the instant application, may provide support for Msg3 being associated with uplink.

Accordingly, claims 1-14 are believed to comply with the written description requirement.

Notably, at least some amendments are made herein to advance prosecution, and are not an acknowledgment that claims 1-14, as previously presented, failed to comply with the written description requirement.

For example, it may be appreciated that “UE receiving a Msg2 from the network,” as provided by the instant application, may provide support for Msg2 being associated with downlink. It is further noted that in U.S. Patent Application No. 15/663,674, to

which the instant application claims priority, claim 5 provides for “wherein the message is a downlink control signal”.

Therefore, withdrawal of the rejection and allowance of the pending claims is respectfully requested.

II. CONCLUSION

For at least the above reasons, the claims currently under consideration are believed to be in condition for allowance. It is to be appreciated that while reference may be made back to certain parts of the application in this Reply (e.g., page numbers, line numbers, Figs., etc.), that such referencing is not to be interpreted in a limiting manner (e.g., to limit the scope of the claims and/or features therein to the particular portion(s) referenced), but is instead merely done for purposes of explanation, illustration and/or ease of understanding, for example. Additionally, at least one of A and B and/or the like generally comprises A or B and/or both A and B. Also, first, second, third, etc. are generally merely used as names, designators, etc. and are not necessarily meant to imply an ordering, temporal relation, etc. Although the present communication may include alterations to the application or claims, or characterizations of claim scope or referenced art, the Applicant is not conceding that previously pending claims are not patentable over the cited references. Rather, any alterations or characterizations are being made to facilitate expeditious prosecution of this application. 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 Applicants have made any disclaimers or disavowals of any subject matter supported by the present application.

Should the Examiner feel that a telephone interview would be helpful to facilitate favorable prosecution of the above-identified application, the Examiner is invited to contact the undersigned at the telephone number provided below.

Should any fees be due as a result of the filing of this response, the Commissioner is hereby authorized to charge the Deposit Account Number 50-5088, **ASUP152US**.

Respectfully submitted,

COOPER LEGAL GROUP, LLC

By: /Ali Assar/

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Doc Code: A.NE.AFCP
Document Description: After Final Consideration Pilot Program Request

PTO/SB/434 (05-13)

CERTIFICATION AND REQUEST FOR CONSIDERATION UNDER THE AFTER FINAL CONSIDERATION PILOT PROGRAM 2.0

Practitioner Docket No.:	Application No.:	Filing Date:
ASUP152US	16/052,505	August 1, 2018
First Named Inventor:	**Title:**	
Wei-Yu Chen	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM	

APPLICANT HEREBY CERTIFIES THE FOLLOWING AND REQUESTS CONSIDERATION UNDER THE AFTER FINAL CONSIDERATION PILOT PROGRAM 2.0 (AFCP 2.0) OF THE ACCOMPANYING RESPONSE UNDER 37 CFR 1.116.

1. The above-identified application is (i) an original utility, plant, or design nonprovisional application filed under 35 U.S.C. 111(a) [a continuing application (*e.g.*, a continuation or divisional application) is filed under 35 U.S.C. 111(a) and is eligible under (i)], or (ii) an international application that has entered the national stage in compliance with 35 U.S.C. 371(c).
2. The above-identified application contains an outstanding final rejection.
3. Submitted herewith is a response under 37 CFR 1.116 to the outstanding final rejection. The response includes an amendment to at least one independent claim, and the amendment does not broaden the scope of the independent claim in any aspect.
4. This certification and request for consideration under AFCP 2.0 is the only AFCP 2.0 certification and request filed in response to the outstanding final rejection.
5. Applicant is willing and available to participate in any interview requested by the examiner concerning the present response.
6. This certification and request is being filed electronically using the Office's electronic filing system (EFS-Web).
7. Any fees that would be necessary consistent with current practice concerning responses after final rejection under 37 CFR 1.116, *e.g.*, extension of time fees, are being concurrently filed herewith. [There is no additional fee required to request consideration under AFCP 2.0.]
8. By filing this certification and request, applicant acknowledges the following:

- Reissue applications and reexamination proceedings are not eligible to participate in AFCP 2.0.
- The examiner will verify that the AFCP 2.0 submission is compliant, *i.e.*, that the requirements of the program have been met (see items 1 to 7 above). For compliant submissions:
  - The examiner will review the response under 37 CFR 1.116 to determine if additional search and/or consideration (i) is necessitated by the amendment and (ii) could be completed within the time allotted under AFCP 2.0. If additional search and/or consideration is required but cannot be completed within the allotted time, the examiner will process the submission consistent with current practice concerning responses after final rejection under 37 CFR 1.116, *e.g.*, by mailing an advisory action.
  - If the examiner determines that the amendment does not necessitate additional search and/or consideration, or if the examiner determines that additional search and/or consideration is required and could be completed within the allotted time, then the examiner will consider whether the amendment places the application in condition for allowance (after completing the additional search and/or consideration, if required). If the examiner determines that the amendment does not place the application in condition for allowance, then the examiner will contact the applicant and request an interview.
    - The interview will be conducted by the examiner, and if the examiner does not have negotiation authority, a primary examiner and/or supervisory patent examiner will also participate.
    - If the applicant declines the interview, or if the interview cannot be scheduled within ten (10) calendar days from the date that the examiner first contacts the applicant, then the examiner will proceed consistent with current practice concerning responses after final rejection under 37 CFR 1.116.

Signature	Date
/Ali Assar/	November 3, 2021
Name (Print/Typed)	**Practitioner Registration No.**
Ali Assar	65,848

***Note**: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.*

☐ * Total of _____ forms are submitted.

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.

Electronic Acknowledgement Receipt

EFS ID:	44190754
Application Number:	16052505
International Application Number:	
Confirmation Number:	1082
Title of Invention:	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM
First Named Inventor/Applicant Name:	Wei-Yu Chen
Customer Number:	92096
Filer:	William Joseph Cooper/Jennifer Meinyk
Filer Authorized By:	William Joseph Cooper
Attorney Docket Number:	ASUP152US
Receipt Date:	03-NOV-2021
Filing Date:	01-AUG-2018
Time Stamp:	11:02:06
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		ASUP152US_R04.pdf	41782 0662aaa89ff4dcfb019db638a006ab5a0c8c59085	yes	9

	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Response After Final Action		1	1	
	Claims		2	4	
	Applicant Arguments/Remarks Made in an Amendment		5	9	
Warnings:					
Information:					
2	After Final Consideration Program Request	ASUP152US_R04_AFCP.pdf	226187 1f5ad983817959c41e49b8d6ac522df4816c8a7a	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	267969		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

<u>New Applications Under 35 U.S.C. 111</u>
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
<u>National Stage of an International Application under 35 U.S.C. 371</u>
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
<u>New International Application Filed with the USPTO as a Receiving Office</u>
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/052,505	Filing Date 08/01/2018	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $460 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	11/03/2021	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 14	Minus	** 20	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0		x $480 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/ALLYSON PURNELL/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. 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 12 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, 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.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

92096 7590 12/01/2021

Cooper Legal Group LLC
1388 Ridge Road, Unit 1
Hinckley, OH 44233

EXAMINER	
FANG, PAKEE	
ART UNIT	PAPER NUMBER
2642	

DATE MAILED: 12/01/2021

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/052,505	08/01/2018	Wei-Yu Chen	ASUP152US	1082

TITLE OF INVENTION: METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM

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	03/01/2022

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 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity 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 and an extra copy of the form should be submitted. 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.

PTOL-85 (Rev. 02/11)

Samsung Exhibit 1002, Page 528 of 564
Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

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)

92096 7590 12/01/2021

Cooper Legal Group LLC
1388 Ridge Road, Unit 1
Hinckley, OH 44233

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.
16/052,505	08/01/2018	Wei-Yu Chen	ASUP152US	1082

TITLE OF INVENTION: METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM

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	03/01/2022

EXAMINER	ART UNIT	CLASS-SUBCLASS
FANG, PAKEE	2642	455-450000

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/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 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. _____

PTOL-85 Part B (08-18) Approved for use through 01/31/2020 OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Samsung Exhibit 1002, Page 529 of 564
Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/052,505	08/01/2018	Wei-Yu Chen	ASUP152US	1082

92096 7590 12/01/2021

Cooper Legal Group LLC
1388 Ridge Road, Unit 1
Hinckley, OH 44233

EXAMINER	
FANG, PAKEE	
ART UNIT	PAPER NUMBER
2642	

DATE MAILED: 12/01/2021

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.

PTOL-85 (Rev. 02/11)

Samsung Exhibit 1002, Page 530 of 564
Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

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. 16/052,505	Applicant(s) Chen et al.	
	Examiner PAKEE FANG	Art Unit 2642	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 the claims filed on 11/03/2021.
   ☐ 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 1-14 . 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 _____.
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 PTO-2323.

/PAKEE FANG/
Primary Examiner, Art Unit 2642

Samsung Exhibit 1002, Page 532 of 564
Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

DETAILED ACTION

Response to Amendment

1. The amendment filed on 11/03/2021 has been entered and considered by Examiner. Claims 1-14 are presented for examination.

Allowable Subject Matter

2. Claims 1-14 are allowed.

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

Mujtaba disclose (Figs. 1-7) a User Equipment (UE), comprising: a control circuit; a processor installed in the control circuit; and a memory installed in the control circuit and operatively coupled to the processor [0029, 0032, 0043, 0046-49]; wherein the processor is configured to execute a program code stored in the memory to:

transmit a preamble to a network (Step 502/602) [0060-61, 0070-73];

receive a Msg2 containing a TTI (Transmission Time Interval) information of a Msg3 from the network in response to the preamble (Step 504/604) [0062, 0074-79],

wherein the TTI information of the Msg3 includes a TTI duration of the Msg3 [0008, 0076, 0095] and a start timing offset of the Msg3; and

perform Msg3 transmission to the network according to the TTI information of the Msg3 [0076, 0080, 0063-65].

Ai discloses wherein the TTI information of the Msg includes a TTI duration of the Msg and a start timing offset of the Msg [0067].

Lohr discloses (Figs. 7-15) perform a single (TB) transport block of Msg transmission to the network according to the TTI information of the Msg [0164, 0120, 0183, 0187].

However, all cited prior arts of record fail to disclose in claims 1, and 8 the rationale and reasoning stated in Applicant's Arguments/Remarks filed on 08/04/2020 and 11/03/2021.

Inquiries

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to PAKEE FANG whose telephone number is (571)270-3633. The Examiner can normally be reached on Mon-Fri 9AM - 5PM.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, PÉREZ-GUTIÉRREZ RAFAEL can be reached on 571-272-**7915.** The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. 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.

/PAKEE FANG/
Primary Examiner, Art Unit 2642

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/052,505	Chen et al.
	Examiner	**Art Unit**
	PAKEE FANG	2642

✓	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	12/19/2018	03/20/2019	07/25/2019	12/19/2019	04/21/2020	03/08/2021	08/02/2021	11/15/2021	
	1	÷	✓	✓	✓	✓	✓	✓	=	
	2	÷	✓	✓	✓	✓	✓	✓	=	
	3	÷	✓	✓	✓	✓	✓	✓	=	
	4	÷	✓	✓	✓	✓	✓	✓	=	
	5	÷	✓	✓	✓	✓	✓	✓	=	
	6	÷	✓	✓	✓	✓	✓	✓	=	
	7	÷	✓	✓	✓	✓	✓	✓	=	
	8	÷	✓	✓	✓	✓	✓	✓	=	
	9	÷	✓	✓	✓	✓	✓	✓	=	
	10	÷	✓	✓	✓	✓	✓	✓	=	
	11	÷	✓	✓	✓	✓	✓	✓	=	
	12	÷	✓	✓	✓	✓	✓	✓	=	
	13	÷	✓	✓	✓	✓	✓	✓	=	
	14	÷	✓	✓	✓	✓	✓	✓	=	

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/052,505	Chen et al.
	Examiner	**Art Unit**
	PAKEE FANG	2642

CPC						
Symbol					**Type**	**Version**
H04W	/	74	/	0833	F	2013-01-01
H04W	/	74	/	006	I	2013-01-01
H04W	/	48	/	16	I	2013-01-01
H04W	/	72	/	1284	I	2013-01-01
H04L	/	1	/	1607	A	2013-01-01

CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
	/		/					

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	14	
/PAKEE FANG/ Primary Examiner, Art Unit 2642	15 November 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	11

U.S. Patent and Trademark Office — Part of Paper No.: 20211115

Samsung Exhibit 1002, Page 536 of 564
Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/052,505	Chen et al.
	Examiner	**Art Unit**
	PAKEE FANG	2642

INTERNATIONAL CLASSIFICATION				
CLAIMED				
H04W	/	74	/	00

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**
455	450

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

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	14	
/PAKEE FANG/ Primary Examiner, Art Unit 2642	15 November 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	11

U.S. Patent and Trademark Office — Part of Paper No.: 20211115

Samsung Exhibit 1002, Page 537 of 564
Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/052,505	Chen et al.
	Examiner	Art Unit
	PAKEE FANG	2642

☑ 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												
	2		11												
	3		12												
	4		13												
	5		14												
	6														
	7														
	8														
	9														

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	14	
/PAKEE FANG/ Primary Examiner, Art Unit 2642	15 November 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	11

U.S. Patent and Trademark Office — Part of Paper No.: 20211115

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Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

AFCP 2.0 Decision	Application No.	Applicant(s)	
	16/052,505	Chen et al.	
	Examiner	Art Unit	AIA (FITF) Status
	PAKEE FANG	2642	Yes

This is in response to the After Final Consideration Pilot request filed 03 November 2021.

1. **Improper Request** – The AFCP 2.0 request is improper for the following reason(s) and the after final amendment submitted with the request will be treated under pre-pilot procedure.

   ☐ An AFCP 2.0 request form PTO/SB/434 (or equivalent document) was not submitted.

   ☐ A non-broadening amendment to at least one independent claim was not submitted.

   ☐ The request is not the first proper AFCP 2.0 request submitted in response to the most recent final rejection.

   ☐ Other: _____

2. **Proper Request**

   A. After final amendment submitted with the request will not be treated under AFCP 2.0.
   The after final amendment cannot be reviewed and a search conducted within the guidelines of the pilot program.

   ☐ The after final amendment will be treated under pre-pilot procedure.

   B. Updated search and/or completed additional consideration.
   The examiner performed an updated search and/or completed additional consideration of the after final amendment within the time authorized for the pilot program. The result(s) of the updated search and/or completed additional consideration are:

   ☑ 1. All of the rejections in the most recent final Office action are overcome and a Notice of Allowance is issued herewith.

   ☐ 2. The after final amendment would not overcome all of the rejections in the most recent final Office action . See attached interview summary for further details.

   ☐ 3. The after final amendment was reviewed, and it raises a new issue(s). See attached interview summary for further details.

   ☐ 4. The after final amendment raises new issues, but would overcome all of the rejections in the most recent final Office action. A decision on determining allowability could not be made within the guidelines of the pilot. See attached interview summary for further details, including any newly discovered prior art.

   ☐ 5. Other: _____

   Examiner Note: Please attach an interview summary when necessary as described above.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/052,505	Chen et al.
	Examiner	Art Unit
	PAKEE FANG	2642

CPC - Searched*		
Symbol	Date	Examiner
H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607	03/20/2019	PF

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner
455	combined text	03/20/2019	PF

* 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
East, Google, Investor search	03/20/2019	PF
updated search	07/25/2019	PF
updated search	12/19/2019	PF
updated search	04/21/2020	PF
updated search	03/08/2021	PF
updated search	08/02/2021	PF
updated search	11/15/2021	PF

Samsung Exhibit 1002, Page 540 of 564
Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/052,505	Chen et al.
	Examiner	Art Unit
	PAKEE FANG	2642

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
	combined text	11/15/2021	PF

Samsung Exhibit 1002, Page 541 of 564
Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
IPR2024-01036

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	155,240	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/11/15 09:45
L2	12,645	L1 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/11/15 09:45
L3	3,399	L2 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/11/15 09:45
L4	435	L3 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/11/15 09:45
L5	116	@ay<"2017" and L4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/11/15 09:45
L6	155,240	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/11/15 09:45
L7	12,645	L6 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/11/15 09:45
L8	3,399	L7 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/11/15 09:45
L9	435	L8 and ((Transmission adj2 Time adj2 Interval) TTI) with (first	US-PGPUB; USPAT; USOCR;	OR	ON	2021/11/15 09:45

		second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	FPRS; EPO; JPO; DERWENT; IBM_TDB			
L10	116	@ay<"2017" and L9	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/11/15 09:45
L11	155,240	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/11/15 09:45
L12	12,645	L11 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/11/15 09:45
L13	3,399	L12 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/11/15 09:45
L14	435	L13 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/11/15 09:45
L15	116	@ay<"2017" and L14	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/11/15 09:45
L16	50	L15 and (transport$4 adj2 block)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/11/15 09:45
L17	155,240	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/11/15 09:45
L18	12,645	L17 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/11/15 09:45

L19	3,399	L18 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/11/15 09:45
L20	435	L19 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/11/15 09:45
L21	116	@ay<"2017" and L20	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/11/15 09:45
L22	50	L21 and (transport$4 adj2 block)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/11/15 09:45
S1	2	"20180035470".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:17
S2	2	S1 and (frame msg$1)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:26
S3	82,131	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:29
S4	5,501	S3 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:33
S5	1,227	S4 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 16:35
S6	78	S5 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	OR	ON	2018/05/21 16:37

		(frame message msg sub$1frame band sub$1band packet)	DERWENT; IBM_TDB			
S7	66	@ay<"2017" and S6	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/05/21 17:41
S8	95,587	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S9	6,513	S8 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S10	1,554	S9 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S11	128	S10 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S12	82	@ay<"2017" and S11	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S13	3	S12 and Numerology	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:43
S14	2	"20160366705".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:44
S15	0	S14 and Numerology	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 15:47

S16	7	S8 and Numerology with (message) same (preamble)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:01
S17	1	@ay<"2017" and S16	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:01
S18	3	"20180035470".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:15
S19	0	("455" "370").clas. and Numerology with (message) same (preamble)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:17
S20	7	Numerology with (message) same (preamble)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18
S21	1	@ay<"2017" and S20	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18
S22	0	("455" "370").clas. and Numerology with (message)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18
S23	16	("455" "370").clas. and Numerology same (preamble)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18
S24	15	@ay<"2017" and S23	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/24 16:18
S25	525	("455" "370").clas. and Numerology	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	OR	ON	2019/01/24 17:59

			DERWENT; IBM_TDB			
S26	8	("20150099528" "20170280400")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/28 10:05
S27	5	("20150099528" "20170280400").pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/01/28 10:05
S28	98,999	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S29	6,750	S28 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S30	1,631	S29 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S31	146	S30 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S32	86	@ay<"2017" and S31	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S33	98,999	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S34	6,750	S33 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01

S35	1,631	S34 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S36	146	S35 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S37	86	@ay<"2017" and S36	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:01
S38	7	(US-20170339546-$ or US-20170019931-$ or US-20160366705-$ or US-20150365977-$ or US-20090316811-$ or US-20140334448-$ or US-20070268812-$).did.	US-PGPUB	OR	ON	2019/03/20 12:19
S39	2	S38 and (off$1set) with (tim$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:19
S40	2	"20160366705".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:20
S41	16	S37 and (off$1set) with (tim$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:25
S42	2	"20180359785".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:32
S43	333	("455" "370").clas. and (off$1set) with (tim$4) with ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:39
S44	333	@ay<"2017" and S43	US-PGPUB; USPAT; USOCR;	OR	ON	2019/03/20 12:40

			FPRS; EPO; JPO; DERWENT; IBM_TDB			
S45	27	S44 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:40
S46	59	("455" "370").clas. and (off$1set) with (tim$4) with ((Transmission adj2 Time adj2 Interval) TTI) near3 (data information)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:50
S47	59	@ay<"2017" and S46	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 12:50
S48	5	("455" "370").clas. and (duration) same (off$1set) with (tim$4) with ((Transmission adj2 Time adj2 Interval) TTI) near3 (data information)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/03/20 13:40
S49	2	"20160366705" and (tim$4 interval window)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 14:38
S50	2	"20160366705" and (tim$4 interval window TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 14:38
S51	1	"20100177675".pn. and (off$1set start$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 14:52
S52	2	"20160366705" and (Msg3 (third adj messag$4))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 14:55
S53	105,281	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03

S54	7,343	S53 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
S55	1,827	S54 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
S56	181	S55 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
S57	93	@ay<"2017" and S56	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
S58	59	("455" "370").clas. and (off$1set) with (tim$4) with ((Transmission adj2 Time adj2 Interval) TTI) near3 (data information)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
S59	59	@ay<"2017" and S58	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/07/25 15:03
S60	112,688	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:36
S61	8,130	S60 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:36
S62	2,058	S61 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:36
S63	214	S62 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	OR	ON	2019/12/19 11:36

		(frame message msg sub$1frame band sub$1band packet)	DERWENT; IBM_TDB			
S64	100	@ay<"2017" and S63	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:36
S65	112,688	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:37
S66	8,130	S65 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:37
S67	2,058	S66 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:37
S68	214	S67 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:37
S69	100	@ay<"2017" and S68	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:37
S70	42	S69 and (transport$4 adj2 block)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:38
S71	3	S69 and (transport$4 adj2 block) with (msg message)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/12/19 11:39
S72	4	("20090252125" "20160183243").pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 11:08

S73	2	"20120147830".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:19
S74	120,052	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
S75	8,779	S74 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
S76	2,276	S75 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
S77	250	S76 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
S78	104	@ay<"2017" and S77	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
S79	120,052	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
S80	8,779	S79 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
S81	2,276	S80 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
S82	250	S81 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	OR	ON	2020/04/21 12:33

		(frame message msg sub$1frame band sub$1band packet)	DERWENT; IBM_TDB			
S83	104	@ay<"2017" and S82	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
S84	43	S83 and (transport$4 adj2 block)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:33
S85	120,052	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:34
S86	8,779	S85 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:34
S87	2,276	S86 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:34
S88	250	S87 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:34
S89	104	@ay<"2017" and S88	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2020/04/21 12:34
S90	139,324	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/03/08 13:36
S91	10,900	S90 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/03/08 13:36

S92	2,931	S91 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/03/08 13:36
S93	361	S92 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/03/08 13:36
S94	112	@ay<"2017" and S93	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/03/08 13:36
S95	139,324	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/03/08 13:36
S96	10,900	S95 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/03/08 13:36
S97	2,931	S96 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/03/08 13:36
S98	361	S97 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/03/08 13:36
S99	112	@ay<"2017" and S98	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/03/08 13:36
S100	48	S99 and (transport$4 adj2 block)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/03/08 13:36
S101	144,987	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	OR	ON	2021/08/02 15:10

			DERWENT; IBM_TDB			
S102	11,689	S101 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:10
S103	3,197	S102 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:10
S104	402	S103 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:10
S105	115	@ay<"2017" and S104	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:10
S106	5	S105 and (transport$4 adj2 block) with (msg message)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:10
S107	144,987	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:10
S108	11,689	S107 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:10
S109	3,197	S108 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:10
S110	402	S109 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:10

S111	115	@ay<"2017" and S110	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:10
S112	49	S111 and (transport$4 adj2 block)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:10
S113	144,987	(H04W74/0833, H04W48/16, H04W72/1284, H04W74/006, H04L1/1607).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:10
S114	11,689	S113 and (preamble heading) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:10
S115	3,197	S114 and ((Transmission adj2 Time adj2 Interval) TTI)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:10
S116	402	S115 and ((Transmission adj2 Time adj2 Interval) TTI) with (first second new third fourth) with (frame message msg sub$1frame band sub$1band packet)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:10
S117	115	@ay<"2017" and S116	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:10
S118	2	"20180359785".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:13
S119	2	"20180359785".pn. and (up$1link$4 down$1link$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/08/02 15:14

11/15/2021 9:55:16 AM
C:\Users\pfang\Documents\EAST\Workspaces\16052505.wsp

Document Description: Issue Fee Payment (PTO-85B)

Issue Fee Transmittal Form

Application Number	Filing Date	First Named Inventor	Atty. Docket No.	Confirmation No.
16052505	01-Aug-2018	Wei-Yu Chen	ASUP152US	1082

TITLE OF INVENTION :

METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM

Entity Status	Application Type	Art Unit	Class - Subclass	EXAMINER
Regular Undiscounted	Utility under 35 USC 111(a)	2642	450000	

Issue Fee Due	Publication Due	Total Fee(s) Due	Date Due	Prev. Paid Fee
$1200	$0	$1200	01-Mar-2022	$0

1.Change of Correspondence Address and/or Indication Of Fee Address (37 CFR 1.33 & 1.363)

Current Correspondence Address:	Current Indicated Fee Address :
92096 Cooper Legal Group LLC 1388 Ridge Road, Unit 1 Hinckley OH 44233 UNITED STATES 216-654-0090 docketing@cooperlegalgroup.com	
☐ Change of correspondence address requested, system generated AIA/122-EFS form attached	☐ Fee Address indication requested, system generated SB/47-EFS form attached

2.Entity Status

Change in Entity Status

○ Applicant certifying micro entity status; system generated Micro Entity certification form attached. See 37 CFR 1.29.
Note: Absent a valid certification of micro entity status, issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment. If this box is checked, you will be prompted to choose a micro entity status on the gross income basis (37 CFR 1.29(a)) or the institution of higher education basis (37 CFR 1.29(d)), and make the applicable certification online.

○ Applicant asserting small entity status. See 37 CFR 1.27.
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.

◉ Applicant changing to regular undiscounted fee status.
Note: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

Doc Code: IFEE PTOL/85B-EFS

Document Description: Issue Fee Payment (PTO-85B)

3.The Following Fee(s) Are Submitted:

☒ Issue Fee	☐ I authorize USPTO to apply my previously paid issue fee to the current fees due
☐ Publication Fee	☐ The Director is hereby authorized to apply my previously paid issue fee to the current fee due and to charge deficient fees to Deposit Account Number _____
☐ Advance Order - # of copies _____	☐ If **in addition to** the payment of the issue fee amount submitted with this form, there are any discrepancies in any amount(s) due, the Director is authorized to charge any deficiency, or credit any overpayment, to Deposit Account Number _____ . The **issue fee must be submitted** with this form. **If payment of the issue fee does not accompany this form, checking this box and providing a deposit account number will NOT be effective to satisfy full payment of the fee(s) due.**

4.Firm and/or Attorney Names To Be Printed

NOTE: If no name is listed, no name will be printed
For printing on the patent front page, list to be displayed as entered

1. COOPER LEGAL GROUP, LLC
2.
3.

5.Assignee Name(s) and Residence Data To Be Printed

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

Name	City	State	Country	Category
ASUSTek Computer Inc.	Taipei City		TAIWAN	corporation

6.Signature

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 has filed and has been granted power of attorney in this application. I also certify that this Fee(s) Transmittal form is being transmitted to the USPTO via EFS-WEB on the date indicated below.

Signature	/William Joseph Cooper/	**Date**	02-17-2022
Name	William Joseph Cooper	**Registration Number**	44629

WEB IFEE 1.0

Electronic Patent Application Fee Transmittal

Application Number:	16052505
Filing Date:	01-Aug-2018
Title of Invention:	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM
First Named Inventor/Applicant Name:	Wei-Yu Chen
Filer:	William Joseph Cooper/Jennifer Meinyk
Attorney Docket Number:	ASUP152US

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
UTILITY APPL ISSUE FEE	1501	1	1200	1200
PUBL. FEE- EARLY, VOLUNTARY, OR NORMAL	1504	1	0	0
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**1200**

Electronic Acknowledgement Receipt	
EFS ID:	45020735
Application Number:	16052505
International Application Number:	
Confirmation Number:	1082
Title of Invention:	METHOD AND APPARATUS FOR IMPROVING MSG3 TRANSMISSION OF RANDOM ACCESS PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM
First Named Inventor/Applicant Name:	Wei-Yu Chen
Customer Number:	92096
Filer:	William Joseph Cooper/Jennifer Meinyk
Filer Authorized By:	William Joseph Cooper
Attorney Docket Number:	ASUP152US
Receipt Date:	17-FEB-2022
Filing Date:	01-AUG-2018
Time Stamp:	11:29:13
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$1200
RAM confirmation Number	E20222GB29094586
Deposit Account	505088
Authorized User	Jennifer Meinyk
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.20 (Post Issuance fees) 37 CFR 1.21 (Miscellaneous fees and charges)	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	Web85b.pdf	62504 8e36bb4fca63114a99223b18795b404087c41f1d	no	2
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	40462 d1e530e2ffe081de8cdfb66d19ca14e1aa294644	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	102966		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/052,505	03/29/2022	11291052	ASUP152US	1082

92096 7590 03/09/2022

Cooper Legal Group LLC
1388 Ridge Road, Unit 1
Hinckley, OH 44233

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

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 Data Management (ODM) at (571)-272-4200.

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

Wei-Yu Chen, Taipei City, TAIWAN;
Li-Chih Tseng, Taipei City, TAIWAN;

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

ASUSTek Computer Inc., Taipei City, TAIWAN;

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