UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/421,019	12/28/2021	11212838	PANW-2-1853US06	9820

3624 7590 12/08/2021

VOLPE KOENIG
30 SOUTH 17TH STREET, 18TH FLOOR
PHILADELPHIA, PA 19103

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):

Benoit Pelletier, Roxboro, CANADA;
Diana Pani, Montreal, CANADA;
Rocco DiGirolamo, Laval, CANADA;
Christopher R. Cave, Dollard-des-Ormeaux, CANADA;
Vincent Roy, Longueuil, CANADA;

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Pantech Wireless, LLC, Cedar Park, TX;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

ONEPLUS - EX. 1002
IPR2025-00763

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)

3624 7590 09/01/2021

VOLPE KOENIG
30 SOUTH 17TH STREET, 18TH FLOOR
PHILADELPHIA, PA 19103

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.

Electronically filed on December 1, 2021

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/421,019	05/23/2019	Benoit Pelletier	PANW-2-1853US06	9820

TITLE OF INVENTION: METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES

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	12/01/2021

EXAMINER	ART UNIT	CLASS-SUBCLASS
YUEN, KAN	2464	370-329000

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 Volpe Koenig
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: Pantech Wireless, LLC

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Cedar Park, TX

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 /Joseph P. Gushue/ Date December 1, 2021

Typed or printed name Joseph P. Gushue Registration No. 59,819

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

ONEPLUS - EX. 1002

Electronic Patent Application Fee Transmittal

Application Number:	16421019
Filing Date:	23-May-2019
Title of Invention:	METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES
First Named Inventor/Applicant Name:	Benoit Pelletier
Filer:	Joseph P. Gushue/Margaret Ferello
Attorney Docket Number:	PANW-2-1853US06

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:				
UTILITY APPL ISSUE FEE	1501	1	1200	1200

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**1200**

Electronic Acknowledgement Receipt

EFS ID:	44404615
Application Number:	16421019
International Application Number:	
Confirmation Number:	9820
Title of Invention:	METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES
First Named Inventor/Applicant Name:	Benoit Pelletier
Customer Number:	3624
Filer:	Joseph P. Gushue/Margaret Ferello
Filer Authorized By:	Joseph P. Gushue
Attorney Docket Number:	PANW-2-1853US06
Receipt Date:	01-DEC-2021
Filing Date:	23-MAY-2019
Time Stamp:	15:39:03
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	E2021B1F39414137
Deposit Account	220493
Authorized User	Margaret Ferello

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

37 CFR 1.17 (Patent application and reexamination processing fees)

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)	PANW_2_1853US06_Issue_Fee_Form_PTOL_85_efs.pdf	396035 a4965ecf4d26b0eda305737939fd5e76fb513369	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	38115 ebfaa801d8a16dc22d6e959b52bf978fafd152a4	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	434150		

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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Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

3624 7590 09/01/2021

VOLPE KOENIG
30 SOUTH 17TH STREET, 18TH FLOOR
PHILADELPHIA, PA 19103

EXAMINER
YUEN, KAN

ART UNIT	PAPER NUMBER
2464	

DATE MAILED: 09/01/2021

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/421,019	05/23/2019	Benoit Pelletier	PANW-2-1853US06	9820

TITLE OF INVENTION: METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES

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	12/01/2021

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.

ONEPLUS - EX. 1002

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)

3624 7590 09/01/2021

VOLPE KOENIG
30 SOUTH 17TH STREET, 18TH FLOOR
PHILADELPHIA, PA 19103

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.
16/421,019	05/23/2019	Benoit Pelletier	PANW-2-1853US06	9820

TITLE OF INVENTION: METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES

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	12/01/2021

EXAMINER	ART UNIT	CLASS-SUBCLASS
YUEN, KAN	2464	370-329000

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.
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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

ONEPLUS - EX. 1002

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.
16/421,019	05/23/2019	Benoit Pelletier	PANW-2-1853US06	9820

3624 7590 09/01/2021

VOLPE KOENIG
30 SOUTH 17TH STREET, 18TH FLOOR
PHILADELPHIA, PA 19103

EXAMINER	
YUEN, KAN	
ART UNIT	PAPER NUMBER
2464	

DATE MAILED: 09/01/2021

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.

ONEPLUS - EX. 1002

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.

ONEPLUS - EX. 1002

Notice of Allowability	Application No. 16/421,019	Applicant(s) Pelletier et al.	
	Examiner KAN YUEN	Art Unit 2464	AIA (FITF) Status No

-- 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 7/6/2021.
   ☐ 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 1-10 . 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 _____.

/KAN YUEN/
Primary Examiner, Art Unit 2464

ONEPLUS - EX. 1002

Notice of Pre-AIA or AIA Status

The present application is being examined under the pre-AIA first to invent provisions.

Allowable Subject Matter

1. Claims 1-10 are allowed. The prior art of record fails to disclose the feature the transmitter and the processor are configured to transmit uplink data based on the indicated uplink resources, the processor is configured to deactivate the indicated uplink resources in response to a MAC timer expiring, and the MAC timer is configured based on the MAC timer information indicated by the received RRC message, as recited in claims 1, 6.

Conclusion

2. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Damnjanovic (Pub No.: 2009/0046573).

Damnjanovic discloses System(s) and method(s) are provided for forward handover under radio link failure. A configurable criterion for radio link failure (RLF) is established through a reference threshold for a channel quality metric; the threshold (CQI.sub.TH) can be determined at least on a quality-of-service basis or a per-terminal basis. A low-overhead indication of RLF is conveyed as a NULL CQI when the channel quality metric is below threshold. Onset of RLF triggers preparation of forward handover (FHO) at a terminal within a predetermined timer, during which normal service can resume if link quality recovers above CQI.sub.TH. Forward handover is pursued once timer elapses. Preparation at the terminal can be complemented by preparation implemented in advanced to RLF condition, in accordance to a disparate threshold applied to terminal's measurements. Preparation of FHO includes backhaul exchange of operational information like buffered data, and context.

ONEPLUS - EX. 1002

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KAN YUEN whose telephone number is (571)270-1413. The examiner can normally be reached on Monday - Friday 11pm-7pm.

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, Ricky Ngo can be reached on 571-272-3139. 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 https://ppair-my.uspto.gov/pair/PrivatePair. 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.

/KAN YUEN/
Primary Examiner, Art Unit 2464

Notice of References Cited	Application/Control No. 16/421,019	Applicant(s)/Patent Under Reexamination Pelletier et al.	
	Examiner KAN YUEN	Art Unit 2464	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-20090046573-A1	02-2009	Damnjanovic; Aleksandar	H04W36/30	370/216
	B					
	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.

ONEPLUS - EX. 1002

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/421,019	Pelletier et al.
	Examiner	Art Unit
	KAN YUEN	2464

CPC - Searched*		
Symbol	**Date**	**Examiner**
H04L5/001 ; H04L5/0053 ; H04L5/0091 ; H04W52/0216 ; H04W72/0413 ; H04W72/1273 ; H04W76/27 ; H04W76/28 ; H04W76/20 ; Y02D70/00 ; Y02D70/1262 OR Y02D70/142 ; Y02D70/24 ; Y02D70/25	08/25/2021	KY
H04L1/1812 ; H04L5/0053 ; H04L5/0055 ; H04W28/04 ; H04W72/04 ; H04W72/0406 ; H04W72/12 ; H04W74/0833 ; H04W76/27 ; H04W76/38 ; H04W88/08	08/25/2021	KY

CPC Combination Sets - Searched*		
Symbol	**Date**	**Examiner**

US Classification - Searched*			
Class	**Subclass**	**Date**	**Examiner**

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

Search Notes		
Search Notes	**Date**	**Examiner**
EAST SEARCH;	08/25/2021	KY
INVENTORSHIP SEARCH	08/25/2021	KY
NPL SEARCH (STIC, GOOGLE SCHOLAR)	08/25/2021	KY

/KAN YUEN/ Primary Examiner, Art Unit 2464	

ONEPLUS - EX. 1002

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/421,019	Pelletier et al.
	Examiner	Art Unit
	KAN YUEN	2464

Interference Search			
US Class/CPC Symbol	**US Subclass/CPC Group**	**Date**	**Examiner**
	INTERFERENCE SEARCH PRINTOUT (SEE SEARCH PRINTOUT)	08/25/2021	KY

/KAN YUEN/ Primary Examiner, Art Unit 2464	

ONEPLUS - EX. 1002

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/421,019	Pelletier et al.
	Examiner	**Art Unit**
	KAN YUEN	2464

✓	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	08/25/2021								
1	1	=								
2	2	=								
3	3	=								
4	4	=								
5	5	=								
6	6	=								
7	7	=								
8	8	=								
9	9	=								
10	10	=								

ONEPLUS - EX. 1002

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/421,019	Pelletier et al.
	Examiner	**Art Unit**
	KAN YUEN	2464

CPC							
Symbol						**Type**	**Version**
H04W	/	74	/	0833		F	2013-01-01
H04W	/	72	/	12		I	2013-01-01
H04W	/	72	/	04		I	2013-01-01
H04W	/	76	/	27		I	2018-02-01
H04W	/	76	/	38		I	2018-02-01
H04W	/	28	/	04		I	2013-01-01
H04L	/	5	/	0053		I	2013-01-01
H04W	/	72	/	0406		I	2013-01-01
H04L	/	1	/	1812		I	2013-01-01
H04L	/	5	/	0055		I	2013-01-01
H04W	/	88	/	08		A	2013-01-01

CPC Combination Sets								
Symbol					**Type**	**Set**	**Ranking**	**Version**
	/		/					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	10	
/KAN YUEN/ Primary Examiner, Art Unit 2464	25 August 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	2

U.S. Patent and Trademark Office — Part of Paper No.: 20210825

ONEPLUS - EX. 1002

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/421,019	Pelletier et al.
	Examiner	**Art Unit**
	KAN YUEN	2464

INTERNATIONAL CLASSIFICATION					
CLAIMED					
H04W	/	74	/	08	

NON-CLAIMED					
	/		/		

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**

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

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	10	
/KAN YUEN/ Primary Examiner, Art Unit 2464	25 August 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	2

U.S. Patent and Trademark Office

Part of Paper No.: 20210825

ONEPLUS - EX. 1002

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/421,019	Pelletier et al.
	Examiner	**Art Unit**
	KAN YUEN	2464

☐ 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	1	10	10												
2	2														
3	3														
4	4														
5	5														
6	6														
7	7														
8	8														
9	9														

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	10	
/KAN YUEN/ Primary Examiner, Art Unit 2464	25 August 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	2

U.S. Patent and Trademark Office

Part of Paper No.: 20210825

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Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (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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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	16421019
Filing Date	2019-05-23
First Named Inventor	Benoit Pelletier
Art Unit	2464
Examiner Name	YUEN, KAN
Attorney Docket Number	PAN-2-1853US06

U.S.PATENTS Remove

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	8175604	B2	2012-05-08	Lohr et al.	
	2	8072932	B2	2011-12-06	Sun et al.	Corresponds to: WO 2007/082458 A1

If you wish to add additional U.S. Patent citation information please click the Add button. Add

U.S.PATENT APPLICATION PUBLICATIONS Remove

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	20070047451	A1	2007-03-01	Lohr et al.	
	2	20100220624	A1	2010-09-02	Ma et al.	
	3	20070060142	A1	2007-03-15	Reznik et al.	
	4	20100208688	A1	2010-08-19	Ma et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.Y/

ONEPLUS - EX. 1002

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16421019
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	First Named Inventor	Benoit Pelletier
	Art Unit	2464
	Examiner Name	YUEN, KAN
	Attorney Docket Number	PAN-2-1853US06

	5	20060092876	A1	2006-05-04	Kwak et al.	
	6	20080130533	A1	2008-06-05	Dottling et al.	
	7	20070047452	A1	2007-03-01	Lohr et al.	
	8	20060165045	A1	2006-07-27	Kim et al.	
	9	20080254804	A1	2008-10-16	Lohr et al.	
	10	20090088134	A1	2009-04-02	Ishii et al.	Corresponds to: WO 2007/023812 A1

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FOREIGN PATENT DOCUMENTS Remove

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	2009/019198	WO	A1	2009-02-12	NOKIA SIEMENS NETWORKS OY		
	2	2007-525036	JP	A	2007-08-30	ARRAYCOMM INC	* English abstract, copy of patent in Japanese and English translation of citing Office Action included.	
	3	2007-124493	JP	A	2007-05-17	SHARP CORP	* English abstract, copy of patent in Japanese and English translation of citing Office Action included.	

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ONEPLUS - EX. 1002

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	Filing Date	2019-05-23
	First Named Inventor	Benoit Pelletier
	Art Unit	2464
	Examiner Name	YUEN, KAN
	Attorney Docket Number	PAN-2-1853US06

NON-PATENT LITERATURE DOCUMENTS			Remove
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	/KAN YUEN/	Date Considered	08/25/2021

*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.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.Y/

ONEPLUS - EX. 1002

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	Filing Date	2019-05-23
	First Named Inventor	Benoit Pelletier
	Art Unit	2464
	Examiner Name	YUEN, KAN
	Attorney Docket Number	PAN-2-1853US06

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	/Joseph P. Gushue/	Date (YYYY-MM-DD)	
Name/Print	Joseph P. Gushue	Registration Number	59,819

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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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 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.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.Y/

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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L6	12,923	(timer same (RRC or (radio adj3 resource adj3 control)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/25 11:07
L7	14,054	(((uplink or ul or upstream$4) near6 (grant$4 or resource or prb)) with (RRC or (radio adj3 resource adj3 control)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/25 11:07
L8	3,637	L6 L7	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/25 11:07
L9	1,481	(expir$4 or expiration) same (deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/25 11:07
L10	282	L8 L9	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/25 11:07
L11	2	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") 10	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/25 11:08
S2	1,830	((Pelletier near3 Benoit) or (Pani near3 Diana) or (DiGirolamo near3 Rocco) or (Cave near3 Christopher) or (Roy near3 Vincent) or (Marinier near3 Paul) or (Zeira near3 Eldad)).in.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 16:06
S3	443	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 16:10

S4	13	S2 S3	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 16:10
S5	2,212	(mac near6 tim$4).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 16:11
S14	8,563	(timer same (RRC or (radio adj3 resource adj3 control)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 19:17
S15	8,446	(((uplink or ul or upstream$4) near6 (grant$4 or resource or prb)) with (RRC or (radio adj3 resource adj3 control)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 19:19
S16	2,077	S14 S15	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 19:21
S18	1,164	(expir$4 or expiration) same (deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:04
S19	163	S16 S18	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:06
S20	163	S16 S18	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:06
S23	101,356	((H04L5/001 OR H04L5/0053 OR H04L5/0091 OR H04W52/0216 OR H04W72/0413 OR H04W72/1273 OR H04W76/27 OR H04W76/28 OR H04W76/20 OR Y02D70/00 OR Y02D70/1262 OR Y02D70/142 OR Y02D70/24 OR Y02D70/25).CPC.)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:09

S25	106,674	((H04L1/1812 OR H04L5/0053 OR H04L5/0055 OR H04W28/04 OR H04W72/04 OR H04W72/0406 OR H04W72/12 OR H04W74/0833 OR H04W76/27 OR H04W76/38 OR H04W88/08).CPC.)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:09
S26	161,356	S23 or S25	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:10
S27	128	S20 S26	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:10
S28	128	S20 S26	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:10
S29	1,468	(expir$4 or expiration) same (terminat$4 or deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:17
S30	1,164	S18 S29	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:33
S31	601	S26 S30	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:34
S32	53	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S31	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:34
S34	280	(US-20060054117-$ | US-20070073578-$ | US-0008152-$ | US-0010278-$ | US-00189071-$ | US-0023629-$ | US-0026490-$ | US-0026623-$ | US-0039326-$ | US-0047445-$ | US-0049669-$ | US-	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:35

		0052229-$ | US-0053035-$ | US-0054117-$ | US-0054298-$ | US-0061881-$ | US-0068505-$ | US-0073578-$ | US-0086671-$ | US-0091652-$ | US-0098165-$ | US-0101299-$ | US-0103852-$ | US-0115871-$ | US-0116118-$ | US-0117860-$ | US-0125043-$ | US-0135113-$ | US-0135769-$ | US-0140154-$ | US-0142032-$ | US-0143074-$ | US-0164540-$ | US-0168704-$ | US-0168724-$ | US-0172739-$ | US-0180371-$ | US-0182065-$ | US-0189237-$ | US-0192766-$ | US-0194259-$ | US-0196239-$ | US-0206531-$ | US-0213059-$ | US-0214225-$ | US-0215005-$ | US-0216471-$ | US-0219868-$ | US-0223452-$ | US-0223609-$ | US-0225709-$ | US-0225739-$ | US-0249163-$ | US-0250504-$ | US-0251027-$ | US-0257407-$ | US-0268852-$ | US-0278143-$ | US-0280145-$ | US-0285791-$ | US-0309877-$ | US-0318170-$ | US-0327833-$ | US-20030223452-$ | US-20040052229-$ | US-20040068505-$ | US-20040117860-$ | US-20040089937-$ | US-20050026623-$ | US-20050053035-$ | US-20050054298-$ | US-20050101299-$ | US-20050180371-$ | US-20050249163-$ | US-20050250504-$ | US-20060023629-$ | US-20060026490-$ | US-20060039326-$ | US-20060116118-$ | US-20060140154-$ | US-20060142032-$ | US-20060172739-$ | US-20060182065-$ | US-20060251027-$ | US-20060280145-$ | US-20070047445-$ | US-20070115871-$ | US-20070135113-$ | US-20070189237-$ | US-20070206531-$ | US-20070213059-$ | US-20070223609-$ | US-20080008152-$ | US-20080049669-$ | US-20080125043-$ | US-20080192766-$ | US-20080194259-$ | US-20080214225-$ | US-20080268852-$ | US-20090010278-$ | US-20090061881-$ | US-20090086671-$ | US-20090135769-$ | US-20090143074-$ | US-20090168704-$ | US-20090168724-$ | US-20090196239-$ | US-20090219868-$ | US-				

		20090225709-$ | US-20090225739-$ | US-20090257407-$ | US-20090318170-$ | US-20100091652-$ | US-20100098165-$ | US-20100103852-$ | US-20100215005-$ | US-20100216471-$ | US-20100278143-$ | US-20100285791-$ | US-20100309877-$ | US-20110164540-$ | US-20120327833-$ | US-2305372-$ | US-5740949-$ | US-6167248-$ | US-6246692-$ | US-6721566-$ | US-6845238-$ | US-7079489-$ | US-7145889-$ | US-7406314-$ | US-7477609-$ | US-7480269-$ | US-7508792-$ | US-7643515-$ | US-7890094-$ | US-7894390-$ | US-8259752-$ | US-8989082-$ | US-9844093-$ | US-7180855-$).DID.				
S35	1	S31 S34	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:36
S36	1	S31 S34	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:36
S37	11	S14 S34	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:46
S38	1,246	((resource or grant) near7 (uplink or "UL" or upstream) same timer same ((high$4 near4 layer near4 signal$4) or RRC or (radio adj3 resource adj3 control)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:50
S39	173	S29 S38	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:53
S40	1	S34 S39	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:54
S41	2	S32 S39	US-PGPUB; USPAT;	AND	ON	2019/09/19 20:54

			USOCR; EPO; DERWENT			
S42	7,018	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with (timer)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 21:08
S43	549	S29 S42	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 21:10
S44	76	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S43	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 21:10
S45	76	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S43	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 21:10
S46	12,119	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with (timer or expir$4 or expiration or (tim$4 near4 limit$4))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 21:56
S47	4,084	S26 S46	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 21:57
S48	659	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S47	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 22:01
S49	6,843	(timer with (mac or (medium adj3 access adj3 control$4)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 22:02
S50	55	S48 S49	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 22:02

S51	55	S48 S49	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 22:03
S52	23,276	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) same (timer or expir$4 or expiration or (tim$4 near4 limit$4))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 22:10
S53	19,355	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 22:11
S54	3,147	S52 S53	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 22:12
S55	240	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S54	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 22:12
S56	23,276	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) same (timer or expir$4 or expiration or (tim$4 near4 limit$4))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 10:09
S57	19,355	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 10:09
S58	3,147	S56 S57	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 10:09
S59	240	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S58	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 10:09
S60	19,355	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with ((higher near3 signal$4 near3 layer) or	US-PGPUB; USPAT; USOCR;	AND	ON	2019/09/20 14:15

		RRC or (radio adj3 resource adj3 control))	EPO; DERWENT			
S61	3,274	(expir$4 or expiration) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:15
S62	1,542	S60 S61	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:16
S63	52	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S62	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:16
S64	52	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S62	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:16
S65	1	16/421019 (mac with tim$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:20
S66	6,843	(timer with (mac or (medium adj3 access adj3 control$4)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:20
S67	10,543	((timer or (tim$4 near2 (information or expir$4 or expiration))) with (mac or (medium adj3 access adj3 control$4)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:25
S68	19,355	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:29
S69	1,978	S67 S68	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:30

S70	1,468	(expir$4 or expiration) same (terminat$4 or deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:30
S71	160	S69 S70	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:31
S72	1	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S71	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:31
S73	96	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S69	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:31
S74	96	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S69	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:32
S75	2,730	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) same ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control)) same (timer or (tim$4 near4 (information or expir$4 or expiration)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 17:52
S76	1,105	((timer or (tim$4 near2 (information or expir$4 or expiration))) with (mac or (medium adj3 access adj3 control$4))) S75	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 17:53
S77	42	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S76	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 17:54
S78	42	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S76	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 17:54

S79	28,510	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) same ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 18:41
S80	13,191	(timer or (tim$4 near4 (information or expir$4 or expiration))) same ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 18:42
S81	6,525	S79 S80	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 18:42
S82	10,543	((timer or (tim$4 near2 (information or expir$4 or expiration))) with (mac or (medium adj3 access adj3 control$4)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 18:43
S83	1,907	S81 S82	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 18:44
S84	82	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S83	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 18:44
S85	82	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S83	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 18:44
S86	280	(US-20060054117-$ | US-20070073578-$ | US-0008152-$ | US-0010278-$ | US-00189071-$ | US-0023629-$ | US-0026490-$ | US-0026623-$ | US-0039326-$ | US-0047445-$ | US-0049669-$ | US-0052229-$ | US-0053035-$ | US-0054117-$ | US-0054298-$ | US-0061881-$ | US-0068505-$ | US-0073578-$ | US-0086671-$ | US-0091652-$ | US-0098165-$ | US-0101299-$ | US-0103852-$ | US-0115871-$ | US-0116118-$ | US-0117860-$ | US-0125043-$ | US-0135113-$ | US-	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 19:20

		0140154-$ | US-0142032-$ | US-0143074-$ | US-0164540-$ | US-0168704-$ | US-0168724-$ | US-0172739-$ | US-0180371-$ | US-0182065-$ | US-0189237-$ | US-0192766-$ | US-0194259-$ | US-0196239-$ | US-0206531-$ | US-0213059-$ | US-0214225-$ | US-0215005-$ | US-0216471-$ | US-0219868-$ | US-0223452-$ | US-0223609-$ | US-0225709-$ | US-0225739-$ | US-0249163-$ | US-0250504-$ | US-0251027-$ | US-0257407-$ | US-0268852-$ | US-0278143-$ | US-0280145-$ | US-0285791-$ | US-0309877-$ | US-0318170-$ | US-0327833-$ | US-20030223452-$ | US-20040052229-$ | US-20040068505-$ | US-20040117860-$ | US-20040089937-$ | US-20050026623-$ | US-20050053035-$ | US-20050054298-$ | US-20050101299-$ | US-20050180371-$ | US-20050249163-$ | US-20050250504-$ | US-20060023629-$ | US-20060026490-$ | US-20060039326-$ | US-20060116118-$ | US-20060140154-$ | US-20060142032-$ | US-20060172739-$ | US-20060182065-$ | US-20060251027-$ | US-20060280145-$ | US-20070047445-$ | US-20070115871-$ | US-20070135113-$ | US-20070189237-$ | US-20070206531-$ | US-20070213059-$ | US-20070223609-$ | US-20080008152-$ | US-20080049669-$ | US-20080125043-$ | US-20080192766-$ | US-20080194259-$ | US-20080214225-$ | US-20080268852-$ | US-20090010278-$ | US-20090061881-$ | US-20090086671-$ | US-20090135769-$ | US-20090143074-$ | US-20090168704-$ | US-20090168724-$ | US-20090196239-$ | US-20090219868-$ | US-20090225709-$ | US-20090225739-$ | US-20090257407-$ | US-20090318170-$ | US-20100091652-$ | US-20100098165-$ | US-20100103852-$ | US-20100215005-$ | US-20100216471-$ | US-20100278143-$ | US-20100285791-$ | US-20100309877-$ | US-20110164540-$ | US-20120327833-$ | US-2305372-$ | US-5740949-$ |				

		US-6167248-$ | US-6246692-$ | US-6721566-$ | US-6845238-$ | US-7079489-$ | US-7145889-$ | US-7406314-$ | US-7477609-$ | US-7480269-$ | US-7508792-$ | US-7643515-$ | US-7890094-$ | US-7894390-$ | US-8259752-$ | US-8989082-$ | US-9844093-$ | US-7180855-$).DID.				
S87	4	S85 S86	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 19:21
S88	4	S85 S86	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 19:21
S93	6,308	(terminat$4 or deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) near6 (message or packet or signal) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/23 11:27
S94	1,978	(terminat$4 or deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) near6 (message or packet or signal) with (allocat$4 or assign$4 or schedul$4) with (bs or (base adj2 station) or ap or (access adj2 point) or repeater or (node adj b) or bts or node$1b or node-b or enb or node$1b or enodeb or femto or femtocell or femto-cell)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/23 11:30
S95	1,295	S93 S94	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/23 11:31
S96	588	h04w72/$.cpc. S95	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/23 11:32
S97	117	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S96	US-PGPUB; USPAT; USOCR;	AND	ON	2019/09/23 11:32

			EPO; DERWENT			
S98	117	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S96	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/23 11:32
S99	1,830	((Pelletier near3 Benoit) or (Pani near3 Diana) or (DiGirolamo near3 Rocco) or (Cave near3 Christopher) or (Roy near3 Vincent) or (Marinier near3 Paul) or (Zeira near3 Eldad)).in.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/23 13:19
S100	443	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/23 13:19
S101	13	S99 S100	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/23 13:19
S102	2,212	(mac near6 tim$4).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/23 13:19
S103	1	S101 S102	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/23 13:19
S104	2	("20040068505").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2019/09/23 14:21
S105	2	("20100309877").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2019/09/23 14:22
S106	1,909	((Pelletier near3 Benoit) or (Pani near3 Diana) or (DiGirolamo near3 Rocco) or (Cave near3 Christopher) or (Roy near3 Vincent) or (Marinier near3 Paul) or (Zeira near3 Eldad)).in.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:51

S107	553	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:51
S108	13	S106 S107	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:51
S109	2,344	(mac near6 tim$4).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:51
S110	1	S108 S109	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:51
S111	6	("10306677").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2020/05/27 21:53
S112	4	("9313809").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2020/05/27 21:54
S113	3	("8774104").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2020/05/27 21:55
S114	1,909	((Pelletier near3 Benoit) or (Pani near3 Diana) or (DiGirolamo near3 Rocco) or (Cave near3 Christopher) or (Roy near3 Vincent) or (Marinier near3 Paul) or (Zeira near3 Eldad)).in.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S115	553	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S116	13	S106 S107	US-PGPUB; USPAT; USOCR;	AND	ON	2020/05/27 21:55

			EPO; DERWENT			
S117	2,344	(mac near6 tim$4).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S118	9,936	(timer same (RRC or (radio adj3 resource adj3 control)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S119	10,316	(((uplink or ul or upstream$4) near6 (grant$4 or resource or prb)) with (RRC or (radio adj3 resource adj3 control)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S120	2,574	S118 S119	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S121	1,267	(expir$4 or expiration) same (deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S122	203	S120 S121	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S123	203	S120 S121	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S124	116,237	((H04L5/001 OR H04L5/0053 OR H04L5/0091 OR H04W52/0216 OR H04W72/0413 OR H04W72/1273 OR H04W76/27 OR H04W76/28 OR H04W76/20 OR Y02D70/00 OR Y02D70/1262 OR Y02D70/142 OR Y02D70/24 OR Y02D70/25).CPC.)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S125	122,075	((H04L1/1812 OR H04L5/0053 OR H04L5/0055 OR H04W28/04 OR H04W72/04 OR H04W72/0406 OR	US-PGPUB; USPAT; USOCR;	AND	ON	2020/05/27 21:55

		H04W72/12 OR H04W74/0833 OR H04W76/27 OR H04W76/38 OR H04W88/08).CPC.)	EPO; DERWENT			
S126	182,217	S124 or S125	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S127	159	S123 S126	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S128	159	S123 S126	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S129	1,582	(expir$4 or expiration) same (terminat$4 or deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S130	1,267	S121 S129	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S131	673	S126 S130	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S132	53	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S131	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S133	280	(US-20060054117-$ | US-20070073578-$ | US-0008152-$ | US-0010278-$ | US-00189071-$ | US-0023629-$ | US-0026490-$ | US-0026623-$ | US-0039326-$ | US-0047445-$ | US-0049669-$ | US-0052229-$ | US-0053035-$ | US-0054117-$ | US-0054298-$ | US-0061881-$ | US-0068505-$ | US-	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55

		0073578-$ | US-0086671-$ | US-0091652-$ | US-0098165-$ | US-0101299-$ | US-0103852-$ | US-0115871-$ | US-0116118-$ | US-0117860-$ | US-0125043-$ | US-0135113-$ | US-0135769-$ | US-0140154-$ | US-0142032-$ | US-0143074-$ | US-0164540-$ | US-0168704-$ | US-0168724-$ | US-0172739-$ | US-0180371-$ | US-0182065-$ | US-0189237-$ | US-0192766-$ | US-0194259-$ | US-0196239-$ | US-0206531-$ | US-0213059-$ | US-0214225-$ | US-0215005-$ | US-0216471-$ | US-0219868-$ | US-0223452-$ | US-0223609-$ | US-0225709-$ | US-0225739-$ | US-0249163-$ | US-0250504-$ | US-0251027-$ | US-0257407-$ | US-0268852-$ | US-0278143-$ | US-0280145-$ | US-0285791-$ | US-0309877-$ | US-0318170-$ | US-0327833-$ | US-20030223452-$ | US-20040052229-$ | US-20040068505-$ | US-20040117860-$ | US-20040089937-$ | US-20050026623-$ | US-20050053035-$ | US-20050054298-$ | US-20050101299-$ | US-20050180371-$ | US-20050249163-$ | US-20050250504-$ | US-20060023629-$ | US-20060026490-$ | US-20060039326-$ | US-20060116118-$ | US-20060140154-$ | US-20060142032-$ | US-20060172739-$ | US-20060182065-$ | US-20060251027-$ | US-20060280145-$ | US-20070047445-$ | US-20070115871-$ | US-20070135113-$ | US-20070189237-$ | US-20070206531-$ | US-20070213059-$ | US-20070223609-$ | US-20080008152-$ | US-20080049669-$ | US-20080125043-$ | US-20080192766-$ | US-20080194259-$ | US-20080214225-$ | US-20080268852-$ | US-20090010278-$ | US-20090061881-$ | US-20090086671-$ | US-20090135769-$ | US-20090143074-$ | US-20090168704-$ | US-20090168724-$ | US-20090196239-$ | US-20090219868-$ | US-20090225709-$ | US-20090225739-$ | US-20090257407-$ | US-20090318170-$ | US-20100091652-$ | US-				

		20100098165-$ | US-20100103852-$ | US-20100215005-$ | US-20100216471-$ | US-20100278143-$ | US-20100285791-$ | US-20100309877-$ | US-20110164540-$ | US-20120327833-$ | US-2305372-$ | US-5740949-$ | US-6167248-$ | US-6246692-$ | US-6721566-$ | US-6845238-$ | US-7079489-$ | US-7145889-$ | US-7406314-$ | US-7477609-$ | US-7480269-$ | US-7508792-$ | US-7643515-$ | US-7890094-$ | US-7894390-$ | US-8259752-$ | US-8989082-$ | US-9844093-$ | US-7180855-$).DID.				
S134	1	S131 S133	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S135	1	S131 S133	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S136	11	S118 S133	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S137	1,490	((resource or grant) near7 (uplink or "UL" or upstream) same timer same ((high$4 near4 layer near4 signal$4) or RRC or (radio adj3 resource adj3 control)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S138	192	S129 S137	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S139	1	S133 S138	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S140	2	S132 S138	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55

S141	7,768	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with (timer)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S142	611	S129 S141	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S143	77	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S142	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S144	77	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S142	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S145	13,338	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with (timer or expir$4 or expiration or (tim$4 near4 limit$4))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S146	4,687	S126 S145	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S147	663	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S146	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S148	7,606	(timer with (mac or (medium adj3 access adj3 control$4)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S149	55	S147 S148	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S150	55	S147 S148	US-PGPUB; USPAT; USOCR;	AND	ON	2020/05/27 21:55

			EPO; DERWENT			
S151	25,326	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) same (timer or expir$4 or expiration or (tim$4 near4 limit$4))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S152	22,665	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S153	3,744	S151 S152	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S154	240	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S153	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S155	25,326	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) same (timer or expir$4 or expiration or (tim$4 near4 limit$4))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S156	22,665	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S157	3,744	S155 S156	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S158	240	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S157	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S159	22,665	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55

S160	3,797	(expir$4 or expiration) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S161	1,834	S159 S160	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S162	54	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S161	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S163	54	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S161	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S164	1	16/421019 (mac with tim$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S165	7,606	(timer with (mac or (medium adj3 access adj3 control$4)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S166	11,582	((timer or (tim$4 near2 (information or expir$4 or expiration))) with (mac or (medium adj3 access adj3 control$4)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S167	22,665	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S168	2,428	S166 S167	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S169	1,582	(expir$4 or expiration) same (terminat$4 or deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) with (allocat$4 or	US-PGPUB; USPAT; USOCR;	AND	ON	2020/05/27 21:55

		assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	EPO; DERWENT			
S170	201	S168 S169	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S171	1	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S170	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S172	97	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S168	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S173	97	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S168	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S174	3,296	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) same ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control)) same (timer or (tim$4 near4 (information or expir$4 or expiration)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S175	1,337	((timer or (tim$4 near2 (information or expir$4 or expiration))) with (mac or (medium adj3 access adj3 control$4))) S174	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S176	43	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S175	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S177	43	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S175	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S178	33,513	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) same ((higher near3 signal$4 near3	US-PGPUB; USPAT; USOCR;	AND	ON	2020/05/27 21:55

		layer) or RRC or (radio adj3 resource adj3 control))	EPO; DERWENT			
S179	15,405	(timer or (tim$4 near4 (information or expir$4 or expiration))) same ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S180	7,851	S178 S179	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S181	11,582	((timer or (tim$4 near2 (information or expir$4 or expiration))) with (mac or (medium adj3 access adj3 control$4)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S182	2,314	S180 S181	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S183	83	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S182	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S184	83	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S182	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S185	280	(US-20060054117-$ | US-20070073578-$ | US-0008152-$ | US-0010278-$ | US-00189071-$ | US-0023629-$ | US-0026490-$ | US-0026623-$ | US-0039326-$ | US-0047445-$ | US-0049669-$ | US-0052229-$ | US-0053035-$ | US-0054117-$ | US-0054298-$ | US-0061881-$ | US-0068505-$ | US-0073578-$ | US-0086671-$ | US-0091652-$ | US-0098165-$ | US-0101299-$ | US-0103852-$ | US-0115871-$ | US-0116118-$ | US-0117860-$ | US-0125043-$ | US-0135113-$ | US-0135769-$ | US-0140154-$ | US-0142032-$ | US-0143074-$ | US-0164540-$ | US-0168704-$ | US-	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55

		0172739-$ | US-0180371-$ | US-0182065-$ | US-0189237-$ | US-0192766-$ | US-0194259-$ | US-0196239-$ | US-0206531-$ | US-0213059-$ | US-0214225-$ | US-0215005-$ | US-0216471-$ | US-0219868-$ | US-0223452-$ | US-0223609-$ | US-0225709-$ | US-0225739-$ | US-0249163-$ | US-0250504-$ | US-0251027-$ | US-0257407-$ | US-0268852-$ | US-0278143-$ | US-0280145-$ | US-0285791-$ | US-0309877-$ | US-0318170-$ | US-0327833-$ | US-20030223452-$ | US-20040052229-$ | US-20040068505-$ | US-20040117860-$ | US-20040089937-$ | US-20050026623-$ | US-20050053035-$ | US-20050054298-$ | US-20050101299-$ | US-20050180371-$ | US-20050249163-$ | US-20050250504-$ | US-20060023629-$ | US-20060026490-$ | US-20060039326-$ | US-20060116118-$ | US-20060140154-$ | US-20060142032-$ | US-20060172739-$ | US-20060182065-$ | US-20060251027-$ | US-20060280145-$ | US-20070047445-$ | US-20070115871-$ | US-20070135113-$ | US-20070189237-$ | US-20070206531-$ | US-20070213059-$ | US-20070223609-$ | US-20080008152-$ | US-20080049669-$ | US-20080125043-$ | US-20080192766-$ | US-20080194259-$ | US-20080214225-$ | US-20080268852-$ | US-20090010278-$ | US-20090061881-$ | US-20090086671-$ | US-20090135769-$ | US-20090143074-$ | US-20090168704-$ | US-20090168724-$ | US-20090196239-$ | US-20090219868-$ | US-20090225709-$ | US-20090225739-$ | US-20090257407-$ | US-20090318170-$ | US-20100091652-$ | US-20100098165-$ | US-20100103852-$ | US-20100215005-$ | US-20100216471-$ | US-20100278143-$ | US-20100285791-$ | US-20100309877-$ | US-20110164540-$ | US-20120327833-$ | US-2305372-$ | US-5740949-$ | US-6167248-$ | US-6246692-$ | US-6721566-$ | US-6845238-$ | US-7079489-$ | US-7145889-$ | US-			

		7406314-$ | US-7477609-$ | US-7480269-$ | US-7508792-$ | US-7643515-$ | US-7890094-$ | US-7894390-$ | US-8259752-$ | US-8989082-$ | US-9844093-$ | US-7180855-$).DID.				
S186	4	S184 S185	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S187	4	S184 S185	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S190	6,651	(terminat$4 or deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) near6 (message or packet or signal) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S191	2,090	(terminat$4 or deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) near6 (message or packet or signal) with (allocat$4 or assign$4 or schedul$4) with (bs or (base adj2 station) or ap or (access adj2 point) or repeater or (node adj b) or bts or node$1b or node-b or enb or node$1b or enodeb or femto or femtocell or femto-cell)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S192	1,381	S190 S191	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S193	641	h04w72/$.cpc. S192	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S194	118	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S193	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55

S195	118	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S193	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S196	1,909	((Pelletier near3 Benoit) or (Pani near3 Diana) or (DiGirolamo near3 Rocco) or (Cave near3 Christopher) or (Roy near3 Vincent) or (Marinier near3 Paul) or (Zeira near3 Eldad)).in.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S197	553	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S198	13	S196 S197	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S199	2,344	(mac near6 tim$4).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S200	1	S198 S199	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S201	2	("20040068505").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2020/05/27 21:55
S202	2	("20100309877").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2020/05/27 21:55
S212	9,207	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with (timer or (tim$4 near3 (expir$4 or expiration)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 12:36
S213	11,856	(timer or (tim$4 near3 (expir$4 or expiration))) with (uplink or "UL" or upstream)	US-PGPUB; USPAT; USOCR;	AND	ON	2020/09/29 12:37

			EPO; DERWENT			
S214	3,310	S212 S213	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 12:38
S215	1,388	(timer or (tim$4 near3 (expir$4 or expiration))) with (uplink or "UL" or upstream) near7 (resource or tx or transmission) with (suspend$4 or stop$4 or disabl$4 or cancel$4 or deactivat$4 or halt$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 12:39
S216	890	S212 S215	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 12:39
S217	621	((H04L1/1812 OR H04L5/0053 OR H04L5/0055 OR H04W28/04 OR H04W72/04 OR H04W72/0406 OR H04W72/12 OR H04W74/0833 OR H04W76/27 OR H04W76/38 OR H04W88/08).CPC.) S216	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 12:40
S218	603	(mac or (medium adj2 access adj3 control)) with (timer or (tim$4 near3 (expir$4 or expiration))) with (uplink or "UL" or upstream) near7 (resource or tx or transmission) with (suspend$4 or stop$4 or disabl$4 or cancel$4 or deactivat$4 or halt$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 12:41
S219	380	S217 S218	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 12:42
S220	380	S217 S218	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 12:42
S221	0	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S220	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 12:43
S222	4	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S218	US-PGPUB; USPAT; USOCR;	AND	ON	2020/09/29 12:43

			EPO; DERWENT			
S223	238	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S214	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 13:00
S224	6	S215 S223	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 13:02
S225	6	S215 S223	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 13:02
S234	162	((deactivat$4 or de-activat$4 or cancel$4 or cancellat$4 or disabl$4) near10 tim$4) same (RRC or (radio adj3 resource adj2 control$3)) same (resource near4 (allocat$4 or schedul$4 or assign$4))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/03 21:59
S235	2,029	((deactivat$4 or de-activat$4 or cancel$4 or cancellat$4 or disabl$4) near10 tim$4) with (MAC or (medium near3 access near2 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/03 22:00
S236	43	S234 S235	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/03 22:01
S239	886	(RRC or (radio adj3 resource adj2 control$3)) same (resource near4 (allocat$4 or schedul$4 or assign$4)) same (timer)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/03 22:10
S240	426	(resource near4 (allocat$4 or schedul$4 or assign$4)) near9 (UL or uplink) same (timer or (timeout$4 or time$4-out or expir$4 or expiration)) same (deactivat$4 or de-activat$4 or cancel$4 or cancellat$4 or disabl$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/03 22:11
S241	101	S239 S240	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/03 22:11

S245	4,375	(RRC or (radio adj3 resource adj2 control$3)) with (resource) same (timer)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/03 22:14
S247	818	resource with (UL or uplink) same (timer or (timeout$4 or time$4-out or expir$4 or expiration)) same (deactivat$4 or de-activat$4 or cancel$4 or cancellat$4 or disabl$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/03 22:15
S249	287	S245 S247	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/03 22:15
S250	10,948	(timer or (timeout$4 or time$4-out or expir$4 or expiration)) with (mac or (medium adj3 access near2 control$3))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/03 22:16
S251	240	S249 S250	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/03 22:16
S252	1,955	((Pelletier near3 Benoit) or (Pani near3 Diana) or (DiGirolamo near3 Rocco) or (Cave near3 Christopher) or (Roy near3 Vincent) or (Marinier near3 Paul) or (Zeira near3 Eldad)).in.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/04 19:27
S253	630	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/04 19:27
S254	128	(mac near4 tim$4 near3 information).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/04 19:28
S255	29	(deactivat$4 near6 uplink near9 timer).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/04 19:28
S256	1	S252 S253 S254 S255	US-PGPUB; USPAT; USOCR;	AND	ON	2020/11/04 19:28

			EPO; DERWENT			
S257	128	(mac near4 tim$4 near3 information).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/04 19:28
S262	2	("20020097740").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2021/03/31 17:06
S263	2	("20020009774").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2021/03/31 17:11
S264	1,618	(rrc or (radio adj3 resource near2 control) or (high$4 adj3 (signal$4))) same (uplink or upstream or UL) near9 (resource or RB or subframe or sub-frame or frequenc$4 or carrier or slot) same (expir$4 or expiration or timer)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:28
S265	482,757	(deactivat$4 or stop$4 or end$3 or terminat$4 or clos$4 or disabl$4 or ceas$4 or off or halt$4 or cancel$4 or cancellation) same (expir$4 or expiration or timer)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:38
S266	1,297	S264 S265	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:42
S267	315,026	(deactivat$4 or stop$4 or end$3 or terminat$4 or clos$4 or disabl$4 or ceas$4 or off or halt$4 or cancel$4 or cancellation) with (expir$4 or expiration or timer)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:42
S268	1,132	S266 S267	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:42
S269	753	((H04L5/001 OR H04L5/0053 OR H04L5/0091 OR H04W52/0216 OR H04W72/0413 OR H04W72/1273 OR H04W76/27 OR H04W76/28 OR H04W76/20 OR Y02D70/00 OR	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:43

		Y02D70/1262 OR Y02D70/142 OR Y02D70/24 OR Y02D70/25).CPC.) S268				
S270	8	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S269	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:44
S271	10,652	(mac or (medium adj3 access adj3 control)) with (expir$4 or expiration or timer)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:45
S272	878	S266 S271	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:45
S273	611	((H04L5/001 OR H04L5/0053 OR H04L5/0091 OR H04W52/0216 OR H04W72/0413 OR H04W72/1273 OR H04W76/27 OR H04W76/28 OR H04W76/20 OR Y02D70/00 OR Y02D70/1262 OR Y02D70/142 OR Y02D70/24 OR Y02D70/25).CPC.) S272	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:45
S274	4	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S273	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:45
S275	139,620	((H04L1/1812 OR H04L5/0053 OR H04L5/0055 OR H04W28/04 OR H04W72/04 OR H04W72/0406 OR H04W72/12 OR H04W74/0833 OR H04W76/27 OR H04W76/38 OR H04W88/08).CPC.)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:47
S276	644	((H04L1/1812 OR H04L5/0053 OR H04L5/0055 OR H04W28/04 OR H04W72/04 OR H04W72/0406 OR H04W72/12 OR H04W74/0833 OR H04W76/27 OR H04W76/38 OR H04W88/08).CPC.) S272	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:47
S277	4	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S276	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:47
S278	3,424	(deactivat$4 or stop$4 or end$3 or terminat$4 or clos$4 or disabl$4 or ceas$4 or off or halt$4 or cancel$4 or	US-PGPUB; USPAT; USOCR;	AND	ON	2021/03/31 17:49

		cancellation) same (mac or (medium adj3 access adj3 control)) near8 (expir$4 or expiration or timer)	EPO; DERWENT			
S279	487	S278 S264	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:49
S280	119,847	((H04L5/001 OR H04L5/0053 OR H04L5/0091 OR H04W52/0216 OR H04W72/0413 OR H04W72/1273 OR H04W76/27 OR H04W76/28 OR H04W76/20 OR Y02D70/00 OR Y02D70/1262 OR Y02D70/142 OR Y02D70/24 OR Y02D70/25).CPC.)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:50
S281	139,620	((H04L1/1812 OR H04L5/0053 OR H04L5/0055 OR H04W28/04 OR H04W72/04 OR H04W72/0406 OR H04W72/12 OR H04W74/0833 OR H04W76/27 OR H04W76/38 OR H04W88/08).CPC.)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:50
S282	194,265	S280 or S281	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:50
S283	421	S282 S279	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:50
S284	0	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S283	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:50
S285	421	S282 S279	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:51
S289	1,991	((Pelletier near3 Benoit) or (Pani near3 Diana) or (DiGirolamo near3 Rocco) or (Cave near3 Christopher) or (Roy near3 Vincent) or (Marinier near3 Paul) or (Zeira near3 Eldad)).in.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 18:40
S290	704	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT; USOCR;	AND	ON	2021/03/31 18:40

			EPO; DERWENT			
S291	13	S289 S290	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 18:40
S292	4	(mac near4 timer near3 information).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 18:49
S293	1	S291 S292	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 18:49
S294	421	S282 S279	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 18:51
S299	1,389	(expir$4 or expiration) same (deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/04/01 10:45
S300	119,930	((H04L5/001 OR H04L5/0053 OR H04L5/0091 OR H04W52/0216 OR H04W72/0413 OR H04W72/1273 OR H04W76/27 OR H04W76/28 OR H04W76/20 OR Y02D70/00 OR Y02D70/1262 OR Y02D70/142 OR Y02D70/24 OR Y02D70/25).CPC.)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/04/01 10:45
S301	139,741	((H04L1/1812 OR H04L5/0053 OR H04L5/0055 OR H04W28/04 OR H04W72/04 OR H04W72/0406 OR H04W72/12 OR H04W74/0833 OR H04W76/27 OR H04W76/38 OR H04W88/08).CPC.)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/04/01 10:45
S302	194,402	S300 or S301	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/04/01 10:45
S303	1,714	(expir$4 or expiration) same (terminat$4 or deactivat$4 or disabl$4	US-PGPUB; USPAT;	AND	ON	2021/04/01 10:45

		or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	USOCR; EPO; DERWENT			
S304	1,389	S299 S303	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/04/01 10:45
S305	745	S302 S304	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/04/01 10:45
S306	2	("20020097740").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2021/04/01 11:22
S307	2,029	((Pelletier near3 Benoit) or (Pani near3 Diana) or (DiGirolamo near3 Rocco) or (Cave near3 Christopher) or (Roy near3 Vincent) or (Marinier near3 Paul) or (Zeira near3 Eldad)).in.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S308	794	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S309	14	S307 S308	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S310	2,654	(mac near6 tim$4).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S311	12,923	(timer same (RRC or (radio adj3 resource adj3 control)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S312	14,054	(((uplink or ul or upstream$4) near6 (grant$4 or resource or prb)) with (RRC or (radio adj3 resource adj3 control)))	US-PGPUB; USPAT; USOCR;	AND	ON	2021/08/24 14:20

			EPO; DERWENT			
S313	3,637	S311 S312	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S314	1,481	(expir$4 or expiration) same (deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S315	282	S313 S314	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S316	282	S313 S314	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S317	126,088	((H04L5/001 OR H04L5/0053 OR H04L5/0091 OR H04W52/0216 OR H04W72/0413 OR H04W72/1273 OR H04W76/27 OR H04W76/28 OR H04W76/20 OR Y02D70/00 OR Y02D70/1262 OR Y02D70/142 OR Y02D70/24 OR Y02D70/25).CPC.)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S318	148,556	((H04L1/1812 OR H04L5/0053 OR H04L5/0055 OR H04W28/04 OR H04W72/04 OR H04W72/0406 OR H04W72/12 OR H04W74/0833 OR H04W76/27 OR H04W76/38 OR H04W88/08).CPC.)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S319	203,953	S317 or S318	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S320	222	S316 S319	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S321	222	S316 S319	US-PGPUB; USPAT;	AND	ON	2021/08/24 14:20

			USOCR; EPO; DERWENT			
S322	1,809	(expir$4 or expiration) same (terminat$4 or deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S323	1,481	S314 S322	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S324	792	S319 S323	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S325	52	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S324	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S326	280	(US-20060054117-$ | US-20070073578-$ | US-0008152-$ | US-0010278-$ | US-00189071-$ | US-0023629-$ | US-0026490-$ | US-0026623-$ | US-0039326-$ | US-0047445-$ | US-0049669-$ | US-0052229-$ | US-0053035-$ | US-0054117-$ | US-0054298-$ | US-0061881-$ | US-0068505-$ | US-0073578-$ | US-0086671-$ | US-0091652-$ | US-0098165-$ | US-0101299-$ | US-0103852-$ | US-0115871-$ | US-0116118-$ | US-0117860-$ | US-0125043-$ | US-0135113-$ | US-0135769-$ | US-0140154-$ | US-0142032-$ | US-0143074-$ | US-0164540-$ | US-0168704-$ | US-0168724-$ | US-0172739-$ | US-0180371-$ | US-0182065-$ | US-0189237-$ | US-0192766-$ | US-0194259-$ | US-0196239-$ | US-0206531-$ | US-0213059-$ | US-0214225-$ | US-0215005-$ | US-0216471-$ | US-0219868-$ | US-0223452-$ | US-0223609-$ | US-0225709-$ | US-	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20

		0225739-$ | US-0249163-$ | US-0250504-$ | US-0251027-$ | US-0257407-$ | US-0268852-$ | US-0278143-$ | US-0280145-$ | US-0285791-$ | US-0309877-$ | US-0318170-$ | US-0327833-$ | US-20030223452-$ | US-20040052229-$ | US-20040068505-$ | US-20040117860-$ | US-20040089937-$ | US-20050026623-$ | US-20050053035-$ | US-20050054298-$ | US-20050101299-$ | US-20050180371-$ | US-20050249163-$ | US-20050250504-$ | US-20060023629-$ | US-20060026490-$ | US-20060039326-$ | US-20060116118-$ | US-20060140154-$ | US-20060142032-$ | US-20060172739-$ | US-20060182065-$ | US-20060251027-$ | US-20060280145-$ | US-20070047445-$ | US-20070115871-$ | US-20070135113-$ | US-20070189237-$ | US-20070206531-$ | US-20070213059-$ | US-20070223609-$ | US-20080008152-$ | US-20080049669-$ | US-20080125043-$ | US-20080192766-$ | US-20080194259-$ | US-20080214225-$ | US-20080268852-$ | US-20090010278-$ | US-20090061881-$ | US-20090086671-$ | US-20090135769-$ | US-20090143074-$ | US-20090168704-$ | US-20090168724-$ | US-20090196239-$ | US-20090219868-$ | US-20090225709-$ | US-20090225739-$ | US-20090257407-$ | US-20090318170-$ | US-20100091652-$ | US-20100098165-$ | US-20100103852-$ | US-20100215005-$ | US-20100216471-$ | US-20100278143-$ | US-20100285791-$ | US-20100309877-$ | US-20110164540-$ | US-20120327833-$ | US-2305372-$ | US-5740949-$ | US-6167248-$ | US-6246692-$ | US-6721566-$ | US-6845238-$ | US-7079489-$ | US-7145889-$ | US-7406314-$ | US-7477609-$ | US-7480269-$ | US-7508792-$ | US-7643515-$ | US-7890094-$ | US-7894390-$ | US-8259752-$ | US-8989082-$ | US-9844093-$ | US-7180855-$).DID.				

S327	1	S324 S326	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S328	1	S324 S326	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S329	11	S311 S326	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S330	2,034	((resource or grant) near7 (uplink or "UL" or upstream) same timer same ((high$4 near4 layer near4 signal$4) or RRC or (radio adj3 resource adj3 control)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S331	238	S322 S330	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S332	1	S326 S331	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S333	2	S325 S331	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S334	9,098	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with (timer)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S335	750	S322 S334	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S336	80	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S335	US-PGPUB; USPAT; USOCR;	AND	ON	2021/08/24 14:20

			EPO; DERWENT			
S337	80	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S335	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S338	15,493	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with (timer or expir$4 or expiration or (tim$4 near4 limit$4))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S339	5,738	S319 S338	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S340	665	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S339	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S341	9,417	(timer with (mac or (medium adj3 access adj3 control$4)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S342	56	S340 S341	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S343	56	S340 S341	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S344	29,033	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) same (timer or expir$4 or expiration or (tim$4 near4 limit$4))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S345	29,382	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20

S346	5,015	S344 S345	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S347	248	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S346	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S348	29,033	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) same (timer or expir$4 or expiration or (tim$4 near4 limit$4))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S349	29,382	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S350	5,015	S348 S349	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S351	248	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S350	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S352	29,382	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S353	4,822	(expir$4 or expiration) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S354	2,296	S352 S353	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S355	57	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S354	US-PGPUB; USPAT; USOCR;	AND	ON	2021/08/24 14:20

			EPO; DERWENT			
S356	57	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S354	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S357	9,417	(timer with (mac or (medium adj3 access adj3 control$4)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S358	13,959	((timer or (tim$4 near2 (information or expir$4 or expiration))) with (mac or (medium adj3 access adj3 control$4)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S359	29,382	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S360	3,473	S358 S359	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S361	1,809	(expir$4 or expiration) same (terminat$4 or deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S362	297	S360 S361	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S363	1	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S362	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S364	100	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S360	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20

S365	100	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S360	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S366	4,561	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) same ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control)) same (timer or (tim$4 near4 (information or expir$4 or expiration)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S367	1,896	((timer or (tim$4 near2 (information or expir$4 or expiration))) with (mac or (medium adj3 access adj3 control$4))) S366	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S368	46	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S367	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S369	46	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S367	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S370	43,581	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) same ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S371	20,166	(timer or (tim$4 near4 (information or expir$4 or expiration))) same ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S372	10,728	S370 S371	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S373	13,959	((timer or (tim$4 near2 (information or expir$4 or expiration))) with (mac or (medium adj3 access adj3 control$4)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S374	3,369	S372 S373	US-PGPUB; USPAT;	AND	ON	2021/08/24 14:20

			USOCR; EPO; DERWENT			
S375	86	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S374	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S376	86	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S374	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S377	280	(US-20060054117-$ | US-20070073578-$ | US-0008152-$ | US-0010278-$ | US-00189071-$ | US-0023629-$ | US-0026490-$ | US-0026623-$ | US-0039326-$ | US-0047445-$ | US-0049669-$ | US-0052229-$ | US-0053035-$ | US-0054117-$ | US-0054298-$ | US-0061881-$ | US-0068505-$ | US-0073578-$ | US-0086671-$ | US-0091652-$ | US-0098165-$ | US-0101299-$ | US-0103852-$ | US-0115871-$ | US-0116118-$ | US-0117860-$ | US-0125043-$ | US-0135113-$ | US-0135769-$ | US-0140154-$ | US-0142032-$ | US-0143074-$ | US-0164540-$ | US-0168704-$ | US-0168724-$ | US-0172739-$ | US-0180371-$ | US-0182065-$ | US-0189237-$ | US-0192766-$ | US-0194259-$ | US-0196239-$ | US-0206531-$ | US-0213059-$ | US-0214225-$ | US-0215005-$ | US-0216471-$ | US-0219868-$ | US-0223452-$ | US-0223609-$ | US-0225709-$ | US-0225739-$ | US-0249163-$ | US-0250504-$ | US-0251027-$ | US-0257407-$ | US-0268852-$ | US-0278143-$ | US-0280145-$ | US-0285791-$ | US-0309877-$ | US-0318170-$ | US-0327833-$ | US-20030223452-$ | US-20040052229-$ | US-20040068505-$ | US-20040117860-$ | US-20040089937-$ | US-20050026623-$ | US-20050053035-$ | US-20050054298-$ | US-20050101299-$ | US-20050180371-$ | US-	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20

		20050249163-$ | US-20050250504-$ | US-20060023629-$ | US-20060026490-$ | US-20060039326-$ | US-20060116118-$ | US-20060140154-$ | US-20060142032-$ | US-20060172739-$ | US-20060182065-$ | US-20060251027-$ | US-20060280145-$ | US-20070047445-$ | US-20070115871-$ | US-20070135113-$ | US-20070189237-$ | US-20070206531-$ | US-20070213059-$ | US-20070223609-$ | US-20080008152-$ | US-20080049669-$ | US-20080125043-$ | US-20080192766-$ | US-20080194259-$ | US-20080214225-$ | US-20080268852-$ | US-20090010278-$ | US-20090061881-$ | US-20090086671-$ | US-20090135769-$ | US-20090143074-$ | US-20090168704-$ | US-20090168724-$ | US-20090196239-$ | US-20090219868-$ | US-20090225709-$ | US-20090225739-$ | US-20090257407-$ | US-20090318170-$ | US-20100091652-$ | US-20100098165-$ | US-20100103852-$ | US-20100215005-$ | US-20100216471-$ | US-20100278143-$ | US-20100285791-$ | US-20100309877-$ | US-20110164540-$ | US-20120327833-$ | US-2305372-$ | US-5740949-$ | US-6167248-$ | US-6246692-$ | US-6721566-$ | US-6845238-$ | US-7079489-$ | US-7145889-$ | US-7406314-$ | US-7477609-$ | US-7480269-$ | US-7508792-$ | US-7643515-$ | US-7890094-$ | US-7894390-$ | US-8259752-$ | US-8989082-$ | US-9844093-$ | US-7180855-$).DID.				
S378	4	S376 S377	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S379	4	S376 S377	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S380	7,308	(terminat$4 or deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or	US-PGPUB; USPAT;	AND	ON	2021/08/24 14:20

		suspend$4 or halt$4) near6 (message or packet or signal) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	USOCR; EPO; DERWENT			
S381	2,335	(terminat$4 or deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) near6 (message or packet or signal) with (allocat$4 or assign$4 or schedul$4) with (bs or (base adj2 station) or ap or (access adj2 point) or repeater or (node adj b) or bts or node$1b or node-b or enb or node$1b or enodeb or femto or femtocell or femto-cell)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S382	1,569	S380 S381	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S383	767	h04w72/$.cpc. S382	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S384	118	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S383	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S385	118	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S383	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S386	2,029	((Pelletier near3 Benoit) or (Pani near3 Diana) or (DiGirolamo near3 Rocco) or (Cave near3 Christopher) or (Roy near3 Vincent) or (Marinier near3 Paul) or (Zeira near3 Eldad)).in.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S387	794	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S388	14	S386 S387	US-PGPUB; USPAT; USOCR;	AND	ON	2021/08/24 14:20

			EPO; DERWENT			
S389	2,654	(mac near6 tim$4).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:20
S390	1	S388 S389	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S391	2	("20040068505").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2021/08/24 14:21
S392	2	("20100309877").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2021/08/24 14:21
S393	2,029	((Pelletier near3 Benoit) or (Pani near3 Diana) or (DiGirolamo near3 Rocco) or (Cave near3 Christopher) or (Roy near3 Vincent) or (Marinier near3 Paul) or (Zeira near3 Eldad)).in.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S394	794	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S395	14	S393 S394	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S396	2,654	(mac near6 tim$4).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S397	1	S395 S396	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21

S398	6	("10306677").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2021/08/24 14:21
S399	4	("9313809").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2021/08/24 14:21
S400	3	("8774104").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2021/08/24 14:21
S401	2,029	((Pelletier near3 Benoit) or (Pani near3 Diana) or (DiGirolamo near3 Rocco) or (Cave near3 Christopher) or (Roy near3 Vincent) or (Marinier near3 Paul) or (Zeira near3 Eldad)).in.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S402	794	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S403	14	S393 S394	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S404	2,654	(mac near6 tim$4).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S405	12,923	(timer same (RRC or (radio adj3 resource adj3 control)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S406	14,054	(((uplink or ul or upstream$4) near6 (grant$4 or resource or prb)) with (RRC or (radio adj3 resource adj3 control)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S407	3,637	S405 S406	US-PGPUB; USPAT; USOCR;	AND	ON	2021/08/24 14:21

			EPO; DERWENT			
S408	1,481	(expir$4 or expiration) same (deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S409	282	S407 S408	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S410	282	S407 S408	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S411	126,088	((H04L5/001 OR H04L5/0053 OR H04L5/0091 OR H04W52/0216 OR H04W72/0413 OR H04W72/1273 OR H04W76/27 OR H04W76/28 OR H04W76/20 OR Y02D70/00 OR Y02D70/1262 OR Y02D70/142 OR Y02D70/24 OR Y02D70/25).CPC.)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S412	148,556	((H04L1/1812 OR H04L5/0053 OR H04L5/0055 OR H04W28/04 OR H04W72/04 OR H04W72/0406 OR H04W72/12 OR H04W74/0833 OR H04W76/27 OR H04W76/38 OR H04W88/08).CPC.)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S413	203,953	S411 or S412	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S414	222	S410 S413	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S415	222	S410 S413	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S416	1,809	(expir$4 or expiration) same (terminat$4 or deactivat$4 or disabl$4	US-PGPUB; USPAT;	AND	ON	2021/08/24 14:21

		or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	USOCR; EPO; DERWENT			
S417	1,481	S408 S416	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S418	792	S413 S417	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S419	52	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S418	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S420	280	(US-20060054117-$ | US-20070073578-$ | US-0008152-$ | US-0010278-$ | US-00189071-$ | US-0023629-$ | US-0026490-$ | US-0026623-$ | US-0039326-$ | US-0047445-$ | US-0049669-$ | US-0052229-$ | US-0053035-$ | US-0054117-$ | US-0054298-$ | US-0061881-$ | US-0068505-$ | US-0073578-$ | US-0086671-$ | US-0091652-$ | US-0098165-$ | US-0101299-$ | US-0103852-$ | US-0115871-$ | US-0116118-$ | US-0117860-$ | US-0125043-$ | US-0135113-$ | US-0135769-$ | US-0140154-$ | US-0142032-$ | US-0143074-$ | US-0164540-$ | US-0168704-$ | US-0168724-$ | US-0172739-$ | US-0180371-$ | US-0182065-$ | US-0189237-$ | US-0192766-$ | US-0194259-$ | US-0196239-$ | US-0206531-$ | US-0213059-$ | US-0214225-$ | US-0215005-$ | US-0216471-$ | US-0219868-$ | US-0223452-$ | US-0223609-$ | US-0225709-$ | US-0225739-$ | US-0249163-$ | US-0250504-$ | US-0251027-$ | US-0257407-$ | US-0268852-$ | US-0278143-$ | US-0280145-$ | US-0285791-$ | US-0309877-$ | US-	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21

		0318170-$ | US-0327833-$ | US-20030223452-$ | US-20040052229-$ | US-20040068505-$ | US-20040117860-$ | US-20040089937-$ | US-20050026623-$ | US-20050053035-$ | US-20050054298-$ | US-20050101299-$ | US-20050180371-$ | US-20050249163-$ | US-20050250504-$ | US-20060023629-$ | US-20060026490-$ | US-20060039326-$ | US-20060116118-$ | US-20060140154-$ | US-20060142032-$ | US-20060172739-$ | US-20060182065-$ | US-20060251027-$ | US-20060280145-$ | US-20070047445-$ | US-20070115871-$ | US-20070135113-$ | US-20070189237-$ | US-20070206531-$ | US-20070213059-$ | US-20070223609-$ | US-20080008152-$ | US-20080049669-$ | US-20080125043-$ | US-20080192766-$ | US-20080194259-$ | US-20080214225-$ | US-20080268852-$ | US-20090010278-$ | US-20090061881-$ | US-20090086671-$ | US-20090135769-$ | US-20090143074-$ | US-20090168704-$ | US-20090168724-$ | US-20090196239-$ | US-20090219868-$ | US-20090225709-$ | US-20090225739-$ | US-20090257407-$ | US-20090318170-$ | US-20100091652-$ | US-20100098165-$ | US-20100103852-$ | US-20100215005-$ | US-20100216471-$ | US-20100278143-$ | US-20100285791-$ | US-20100309877-$ | US-20110164540-$ | US-20120327833-$ | US-2305372-$ | US-5740949-$ | US-6167248-$ | US-6246692-$ | US-6721566-$ | US-6845238-$ | US-7079489-$ | US-7145889-$ | US-7406314-$ | US-7477609-$ | US-7480269-$ | US-7508792-$ | US-7643515-$ | US-7890094-$ | US-7894390-$ | US-8259752-$ | US-8989082-$ | US-9844093-$ | US-7180855-$).DID.				
S421	1	S418 S420	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21

S422	1	S418 S420	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S423	11	S405 S420	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S424	2,034	((resource or grant) near7 (uplink or "UL" or upstream) same timer same ((high$4 near4 layer near4 signal$4) or RRC or (radio adj3 resource adj3 control)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S425	238	S416 S424	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S426	1	S420 S425	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S427	2	S419 S425	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S428	9,098	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with (timer)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S429	750	S416 S428	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S430	80	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S429	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S431	80	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S429	US-PGPUB; USPAT; USOCR;	AND	ON	2021/08/24 14:21

			EPO; DERWENT			
S432	15,493	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with (timer or expir$4 or expiration or (tim$4 near4 limit$4))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S433	5,738	S413 S432	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S434	665	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S433	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S435	9,417	(timer with (mac or (medium adj3 access adj3 control$4)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S436	56	S434 S435	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S437	56	S434 S435	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S438	29,033	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) same (timer or expir$4 or expiration or (tim$4 near4 limit$4))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S439	29,382	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:21
S440	5,015	S438 S439	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22

S441	248	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S440	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S442	29,033	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) same (timer or expir$4 or expiration or (tim$4 near4 limit$4))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S443	29,382	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S444	5,015	S442 S443	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S445	248	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S444	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S446	29,382	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S447	4,822	(expir$4 or expiration) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S448	2,296	S446 S447	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S449	57	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S448	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S450	57	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S448	US-PGPUB; USPAT; USOCR;	AND	ON	2021/08/24 14:22

			EPO; DERWENT			
S451	9,417	(timer with (mac or (medium adj3 access adj3 control$4)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S452	13,959	((timer or (tim$4 near2 (information or expir$4 or expiration))) with (mac or (medium adj3 access adj3 control$4)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S453	29,382	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S454	3,473	S452 S453	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S455	1,809	(expir$4 or expiration) same (terminat$4 or deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S456	297	S454 S455	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S457	1	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S456	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S458	100	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S454	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S459	100	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S454	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22

S460	4,561	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) same ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control)) same (timer or (tim$4 near4 (information or expir$4 or expiration)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S461	1,896	((timer or (tim$4 near2 (information or expir$4 or expiration))) with (mac or (medium adj3 access adj3 control$4))) S460	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S462	46	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S461	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S463	46	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S461	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S464	43,581	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) same ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S465	20,166	(timer or (tim$4 near4 (information or expir$4 or expiration))) same ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S466	10,728	S464 S465	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S467	13,959	((timer or (tim$4 near2 (information or expir$4 or expiration))) with (mac or (medium adj3 access adj3 control$4)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S468	3,369	S466 S467	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22

S469	86	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S468	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S470	86	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S468	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S471	280	(US-20060054117-$ | US-20070073578-$ | US-0008152-$ | US-0010278-$ | US-00189071-$ | US-0023629-$ | US-0026490-$ | US-0026623-$ | US-0039326-$ | US-0047445-$ | US-0049669-$ | US-0052229-$ | US-0053035-$ | US-0054117-$ | US-0054298-$ | US-0061881-$ | US-0068505-$ | US-0073578-$ | US-0086671-$ | US-0091652-$ | US-0098165-$ | US-0101299-$ | US-0103852-$ | US-0115871-$ | US-0116118-$ | US-0117860-$ | US-0125043-$ | US-0135113-$ | US-0135769-$ | US-0140154-$ | US-0142032-$ | US-0143074-$ | US-0164540-$ | US-0168704-$ | US-0168724-$ | US-0172739-$ | US-0180371-$ | US-0182065-$ | US-0189237-$ | US-0192766-$ | US-0194259-$ | US-0196239-$ | US-0206531-$ | US-0213059-$ | US-0214225-$ | US-0215005-$ | US-0216471-$ | US-0219868-$ | US-0223452-$ | US-0223609-$ | US-0225709-$ | US-0225739-$ | US-0249163-$ | US-0250504-$ | US-0251027-$ | US-0257407-$ | US-0268852-$ | US-0278143-$ | US-0280145-$ | US-0285791-$ | US-0309877-$ | US-0318170-$ | US-0327833-$ | US-20030223452-$ | US-20040052229-$ | US-20040068505-$ | US-20040117860-$ | US-20040089937-$ | US-20050026623-$ | US-20050053035-$ | US-20050054298-$ | US-20050101299-$ | US-20050180371-$ | US-20050249163-$ | US-20050250504-$ | US-20060023629-$ | US-20060026490-$ | US-20060039326-$ | US-20060116118-$ | US-20060140154-$ |	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22

		US-20060142032-$ | US-20060172739-$ | US-20060182065-$ | US-20060251027-$ | US-20060280145-$ | US-20070047445-$ | US-20070115871-$ | US-20070135113-$ | US-20070189237-$ | US-20070206531-$ | US-20070213059-$ | US-20070223609-$ | US-20080008152-$ | US-20080049669-$ | US-20080125043-$ | US-20080192766-$ | US-20080194259-$ | US-20080214225-$ | US-20080268852-$ | US-20090010278-$ | US-20090061881-$ | US-20090086671-$ | US-20090135769-$ | US-20090143074-$ | US-20090168704-$ | US-20090168724-$ | US-20090196239-$ | US-20090219868-$ | US-20090225709-$ | US-20090225739-$ | US-20090257407-$ | US-20090318170-$ | US-20100091652-$ | US-20100098165-$ | US-20100103852-$ | US-20100215005-$ | US-20100216471-$ | US-20100278143-$ | US-20100285791-$ | US-20100309877-$ | US-20110164540-$ | US-20120327833-$ | US-2305372-$ | US-5740949-$ | US-6167248-$ | US-6246692-$ | US-6721566-$ | US-6845238-$ | US-7079489-$ | US-7145889-$ | US-7406314-$ | US-7477609-$ | US-7480269-$ | US-7508792-$ | US-7643515-$ | US-7890094-$ | US-7894390-$ | US-8259752-$ | US-8989082-$ | US-9844093-$ | US-7180855-$).DID.				
S472	4	S470 S471	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S473	4	S470 S471	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S474	7,308	(terminat$4 or deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) near6 (message or packet or signal) with (allocat$4 or assign$4 or schedul$4) near9 (prb or	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22

		resource or transmit$4 or transmission or communicat$6 or send$4)				
S475	2,335	(terminat$4 or deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) near6 (message or packet or signal) with (allocat$4 or assign$4 or schedul$4) with (bs or (base adj2 station) or ap or (access adj2 point) or repeater or (node adj b) or bts or node$1b or node-b or enb or node$1b or enodeb or femto or femtocell or femto-cell)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S476	1,569	S474 S475	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S477	767	h04w72/$.cpc. S476	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S478	118	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S477	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S479	118	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S477	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S480	2,029	((Pelletier near3 Benoit) or (Pani near3 Diana) or (DiGirolamo near3 Rocco) or (Cave near3 Christopher) or (Roy near3 Vincent) or (Marinier near3 Paul) or (Zeira near3 Eldad)).in.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S481	794	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S482	14	S480 S481	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:22
S483	2,654	(mac near6 tim$4).clm.	US-PGPUB; USPAT;	AND	ON	2021/08/24 14:22

			USOCR; EPO; DERWENT			
S484	1	S482 S483	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:23
S485	2	("20040068505").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2021/08/24 14:23
S486	2	("20100309877").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2021/08/24 14:23
S487	10,254	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with (timer or (tim$4 near3 (expir$4 or expiration)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:23
S488	13,673	(timer or (tim$4 near3 (expir$4 or expiration))) with (uplink or "UL" or upstream)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:23
S489	3,945	S487 S488	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:23
S490	1,622	(timer or (tim$4 near3 (expir$4 or expiration))) with (uplink or "UL" or upstream) near7 (resource or tx or transmission) with (suspend$4 or stop$4 or disabl$4 or cancel$4 or deactivat$4 or halt$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:23
S491	1,041	S487 S490	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:23
S492	720	((H04L1/1812 OR H04L5/0053 OR H04L5/0055 OR H04W28/04 OR H04W72/04 OR H04W72/0406 OR H04W72/12 OR H04W74/0833 OR	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:23

		H04W76/27 OR H04W76/38 OR H04W88/08).CPC.) S491				
S493	714	(mac or (medium adj2 access adj3 control)) with (timer or (tim$4 near3 (expir$4 or expiration))) with (uplink or "UL" or upstream) near7 (resource or tx or transmission) with (suspend$4 or stop$4 or disabl$4 or cancel$4 or deactivat$4 or halt$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:23
S494	440	S492 S493	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:23
S495	440	S492 S493	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:23
S496	0	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S495	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:23
S497	4	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S493	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:23
S498	242	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S489	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:23
S499	6	S490 S498	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:23
S500	6	S490 S498	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:23
S501	210	((deactivat$4 or de-activat$4 or cancel$4 or cancellat$4 or disabl$4) near10 tim$4) same (RRC or (radio adj3 resource adj2 control$3)) same	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:23

		(resource near4 (allocat$4 or schedul$4 or assign$4))				
S502	2,340	((deactivat$4 or de-activat$4 or cancel$4 or cancellat$4 or disabl$4) near10 tim$4) with (MAC or (medium near3 access near2 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:23
S503	64	S501 S502	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:23
S504	1,060	(RRC or (radio adj3 resource adj2 control$3)) same (resource near4 (allocat$4 or schedul$4 or assign$4)) same (timer)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:23
S505	513	(resource near4 (allocat$4 or schedul$4 or assign$4)) near9 (UL or uplink) same (timer or (timeout$4 or time$4-out or expir$4 or expiration)) same (deactivat$4 or de-activat$4 or cancel$4 or cancellat$4 or disabl$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:23
S506	122	S504 S505	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:23
S507	5,077	(RRC or (radio adj3 resource adj2 control$3)) with (resource) same (timer)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:23
S508	983	resource with (UL or uplink) same (timer or (timeout$4 or time$4-out or expir$4 or expiration)) same (deactivat$4 or de-activat$4 or cancel$4 or cancellat$4 or disabl$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:23
S509	344	S507 S508	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:23
S510	12,346	(timer or (timeout$4 or time$4-out or expir$4 or expiration)) with (mac or (medium adj3 access near2 control$3))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:23

S511	295	S509 S510	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:23
S512	2,029	((Pelletier near3 Benoit) or (Pani near3 Diana) or (DiGirolamo near3 Rocco) or (Cave near3 Christopher) or (Roy near3 Vincent) or (Marinier near3 Paul) or (Zeira near3 Eldad)).in.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:23
S513	794	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:23
S514	138	(mac near4 tim$4 near3 information).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:24
S515	29	(deactivat$4 near6 uplink near9 timer).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:24
S516	1	S512 S513 S514 S515	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:24
S517	138	(mac near4 tim$4 near3 information).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:24
S518	2	("20020097740").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2021/08/24 14:24
S519	2	("20020009774").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2021/08/24 14:24
S520	1,764	(rrc or (radio adj3 resource near2 control) or (high$4 adj3 (signal$4))) same (uplink or upstream or UL) near9 (resource or RB or subframe or sub-	US-PGPUB; USPAT; USOCR;	AND	ON	2021/08/24 14:24

		frame or frequenc$4 or carrier or slot) same (expir$4 or expiration or timer)	EPO; DERWENT			
S521	493,746	(deactivat$4 or stop$4 or end$3 or terminat$4 or clos$4 or disabl$4 or ceas$4 or off or halt$4 or cancel$4 or cancellation) same (expir$4 or expiration or timer)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:24
S522	1,417	S520 S521	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:24
S523	322,578	(deactivat$4 or stop$4 or end$3 or terminat$4 or clos$4 or disabl$4 or ceas$4 or off or halt$4 or cancel$4 or cancellation) with (expir$4 or expiration or timer)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:24
S524	1,233	S522 S523	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:24
S525	819	((H04L5/001 OR H04L5/0053 OR H04L5/0091 OR H04W52/0216 OR H04W72/0413 OR H04W72/1273 OR H04W76/27 OR H04W76/28 OR H04W76/20 OR Y02D70/00 OR Y02D70/1262 OR Y02D70/142 OR Y02D70/24 OR Y02D70/25).CPC.) S524	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:24
S526	8	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S525	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:24
S527	11,364	(mac or (medium adj3 access adj3 control)) with (expir$4 or expiration or timer)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:24
S528	976	S522 S527	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:24
S529	670	((H04L5/001 OR H04L5/0053 OR H04L5/0091 OR H04W52/0216 OR H04W72/0413 OR H04W72/1273 OR H04W76/27 OR H04W76/28 OR H04W76/20 OR Y02D70/00 OR	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:24

		Y02D70/1262 OR Y02D70/142 OR Y02D70/24 OR Y02D70/25).CPC.) S528				
S530	4	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S529	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:24
S531	148,556	((H04L1/1812 OR H04L5/0053 OR H04L5/0055 OR H04W28/04 OR H04W72/04 OR H04W72/0406 OR H04W72/12 OR H04W74/0833 OR H04W76/27 OR H04W76/38 OR H04W88/08).CPC.)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:24
S532	714	((H04L1/1812 OR H04L5/0053 OR H04L5/0055 OR H04W28/04 OR H04W72/04 OR H04W72/0406 OR H04W72/12 OR H04W74/0833 OR H04W76/27 OR H04W76/38 OR H04W88/08).CPC.) S528	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:24
S533	4	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S532	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:24
S534	3,704	(deactivat$4 or stop$4 or end$3 or terminat$4 or clos$4 or disabl$4 or ceas$4 or off or halt$4 or cancel$4 or cancellation) same (mac or (medium adj3 access adj3 control)) near8 (expir$4 or expiration or timer)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:24
S535	547	S534 S520	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:24
S536	126,088	((H04L5/001 OR H04L5/0053 OR H04L5/0091 OR H04W52/0216 OR H04W72/0413 OR H04W72/1273 OR H04W76/27 OR H04W76/28 OR H04W76/20 OR Y02D70/00 OR Y02D70/1262 OR Y02D70/142 OR Y02D70/24 OR Y02D70/25).CPC.)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:24
S537	148,556	((H04L1/1812 OR H04L5/0053 OR H04L5/0055 OR H04W28/04 OR H04W72/04 OR H04W72/0406 OR H04W72/12 OR H04W74/0833 OR H04W76/27 OR H04W76/38 OR H04W88/08).CPC.)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:24

S538	203,953	S536 or S537	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:24
S539	470	S538 S535	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:24
S540	0	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S539	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:24
S541	470	S538 S535	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:24
S542	2,029	((Pelletier near3 Benoit) or (Pani near3 Diana) or (DiGirolamo near3 Rocco) or (Cave near3 Christopher) or (Roy near3 Vincent) or (Marinier near3 Paul) or (Zeira near3 Eldad)).in.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:24
S543	794	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:24
S544	14	S542 S543	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:24
S545	4	(mac near4 timer near3 information).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:24
S546	1	S544 S545	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:25
S547	470	S538 S535	US-PGPUB; USPAT; USOCR;	AND	ON	2021/08/24 14:25

			EPO; DERWENT			
S548	1,481	(expir$4 or expiration) same (deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:25
S549	126,088	((H04L5/001 OR H04L5/0053 OR H04L5/0091 OR H04W52/0216 OR H04W72/0413 OR H04W72/1273 OR H04W76/27 OR H04W76/28 OR H04W76/20 OR Y02D70/00 OR Y02D70/1262 OR Y02D70/142 OR Y02D70/24 OR Y02D70/25).CPC.)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:25
S550	148,556	((H04L1/1812 OR H04L5/0053 OR H04L5/0055 OR H04W28/04 OR H04W72/04 OR H04W72/0406 OR H04W72/12 OR H04W74/0833 OR H04W76/27 OR H04W76/38 OR H04W88/08).CPC.)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:25
S551	203,953	S549 or S550	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:25
S552	1,809	(expir$4 or expiration) same (terminat$4 or deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:25
S553	1,481	S548 S552	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:25
S554	792	S551 S553	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 14:25
S555	2	("20020097740").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2021/08/24 14:25

S556	4	(mac near4 timer near3 information).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 15:23
S557	1	S556 S309	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/24 15:23
S578	24	("20070047451" or "20100220624" or "20070060142" or "20100208688" or "20060092876" or "20080130533" or "20070047452" or "20060165045" or "20080254804" or "20090088134" or "8175604" or "8072932").pn.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/25 10:43
S579	126,088	((H04L5/001 OR H04L5/0053 OR H04L5/0091 OR H04W52/0216 OR H04W72/0413 OR H04W72/1273 OR H04W76/27 OR H04W76/28 OR H04W76/20 OR Y02D70/00 OR Y02D70/1262 OR Y02D70/142 OR Y02D70/24 OR Y02D70/25).CPC.)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/25 10:45
S580	148,556	((H04L1/1812 OR H04L5/0053 OR H04L5/0055 OR H04W28/04 OR H04W72/04 OR H04W72/0406 OR H04W72/12 OR H04W74/0833 OR H04W76/27 OR H04W76/38 OR H04W88/08).CPC.)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/25 10:45
S581	12,923	(timer same (RRC or (radio adj3 resource adj3 control)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/25 10:46
S582	14,054	(((uplink or ul or upstream$4) near6 (grant$4 or resource or prb)) with (RRC or (radio adj3 resource adj3 control)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/25 10:46
S583	3,637	S581 S582	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/25 10:46
S584	1,481	(expir$4 or expiration) same (deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/25 10:46

		transmit$4 or transmission or communicat$6 or send$4)				
S585	282	S583 S584	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/25 10:46
S586	0	S578 S585	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/08/25 10:47

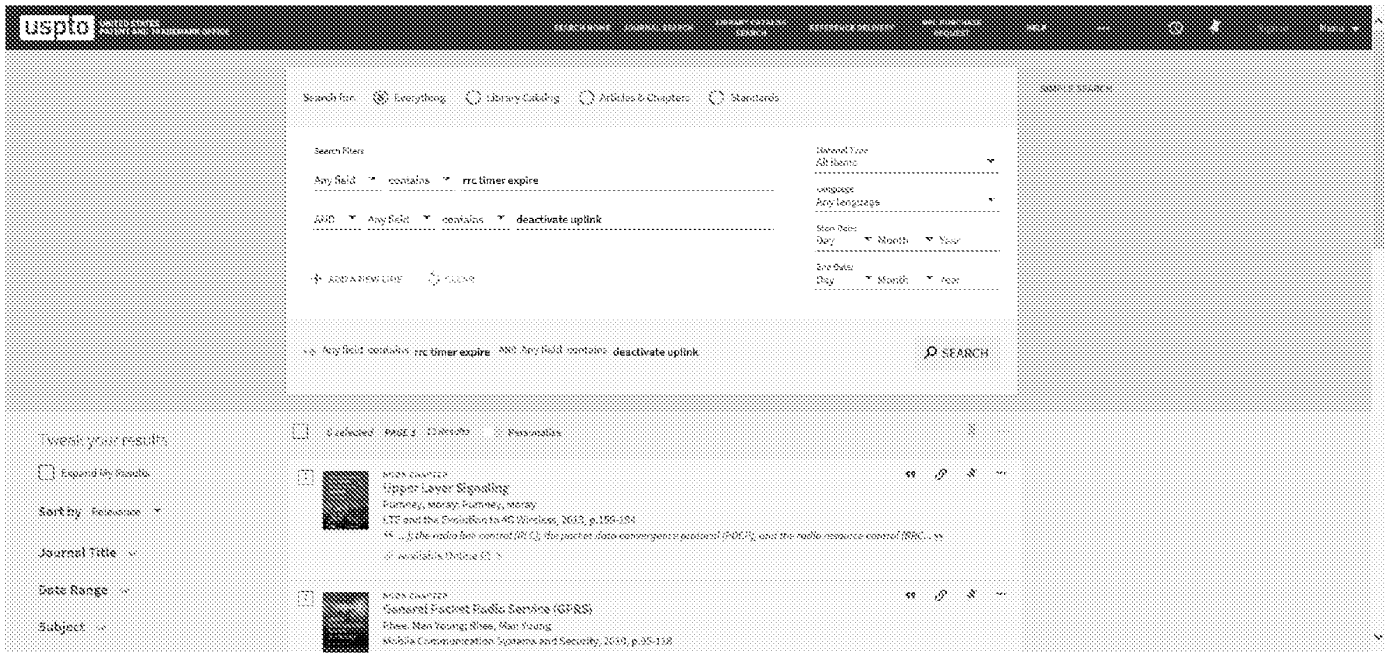
EAST Search History (Interference)

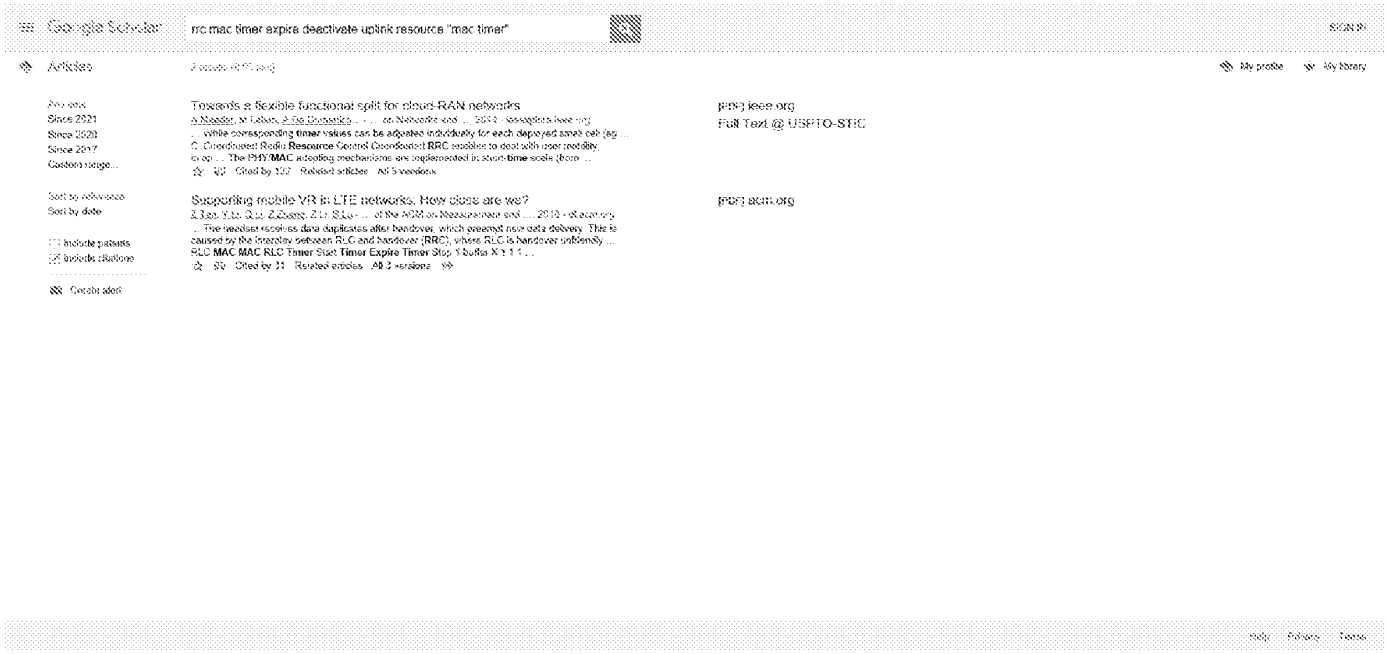
Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S9	2,212	(mac near6 tim$4).clm.	US-PGPUB; USPAT	AND	ON	2019/09/19 16:11
S10	443	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT	AND	ON	2019/09/19 16:11
S11	214	(deactivat$6 near5 uplink).clm.	US-PGPUB; USPAT	AND	ON	2019/09/19 16:12
S12	1	S9 S10 S11	US-PGPUB; USPAT	AND	ON	2019/09/19 16:12
S203	2,344	(mac near6 tim$4).clm.	US-PGPUB; USPAT	AND	ON	2020/05/27 21:50
S204	553	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT	AND	ON	2020/05/27 21:50
S205	231	(deactivat$6 near5 uplink).clm.	US-PGPUB; USPAT	AND	ON	2020/05/27 21:50
S206	1	S203 S204 S205	US-PGPUB; USPAT	AND	ON	2020/05/27 21:50
S207	2,344	(mac near6 tim$4).clm.	US-PGPUB; USPAT	AND	ON	2020/05/27 21:55
S208	553	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT	AND	ON	2020/05/27 21:55
S209	231	(deactivat$6 near5 uplink).clm.	US-PGPUB; USPAT	AND	ON	2020/05/27 21:55
S210	1	S203 S204 S205	US-PGPUB; USPAT	AND	ON	2020/05/27 21:55
S258	29	(deactivat$4 near6 uplink near9 timer).clm.	US-PGPUB; USPAT	AND	ON	2020/11/04 19:28
S259	630	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT	AND	ON	2020/11/04 19:28

S260	128	(mac near4 tim$4 near3 information).clm.	US-PGPUB; USPAT	AND	ON	2020/11/04 19:29
S261	1	S258 S259 S260	US-PGPUB; USPAT	AND	ON	2020/11/04 19:30
S295	2,531	(mac near6 tim$4).clm.	US-PGPUB; USPAT	AND	ON	2021/03/31 18:50
S296	704	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT	AND	ON	2021/03/31 18:50
S297	274	(deactivat$6 near5 uplink).clm.	US-PGPUB; USPAT	AND	ON	2021/03/31 18:50
S298	1	S295 S296 S297	US-PGPUB; USPAT	AND	ON	2021/03/31 18:50
S558	2,654	(mac near6 tim$4).clm.	US-PGPUB; USPAT	AND	ON	2021/08/24 14:20
S559	794	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT	AND	ON	2021/08/24 14:20
S560	299	(deactivat$6 near5 uplink).clm.	US-PGPUB; USPAT	AND	ON	2021/08/24 14:20
S561	1	S558 S559 S560	US-PGPUB; USPAT	AND	ON	2021/08/24 14:20
S562	2,654	(mac near6 tim$4).clm.	US-PGPUB; USPAT	AND	ON	2021/08/24 14:23
S563	794	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT	AND	ON	2021/08/24 14:23
S564	299	(deactivat$6 near5 uplink).clm.	US-PGPUB; USPAT	AND	ON	2021/08/24 14:23
S565	1	S562 S563 S564	US-PGPUB; USPAT	AND	ON	2021/08/24 14:23
S566	2,654	(mac near6 tim$4).clm.	US-PGPUB; USPAT	AND	ON	2021/08/24 14:23
S567	794	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT	AND	ON	2021/08/24 14:23
S568	299	(deactivat$6 near5 uplink).clm.	US-PGPUB; USPAT	AND	ON	2021/08/24 14:23
S569	1	S562 S563 S564	US-PGPUB; USPAT	AND	ON	2021/08/24 14:23
S570	29	(deactivat$4 near6 uplink near9 timer).clm.	US-PGPUB; USPAT	AND	ON	2021/08/24 14:24
S571	794	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT	AND	ON	2021/08/24 14:24
S572	138	(mac near4 tim$4 near3 information).clm.	US-PGPUB; USPAT	AND	ON	2021/08/24 14:24
S573	1	S570 S571 S572	US-PGPUB; USPAT	AND	ON	2021/08/24 14:24

S574	2,654	(mac near6 tim$4).clm.	US-PGPUB; USPAT	AND	ON	2021/08/24 14:25
S575	794	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT	AND	ON	2021/08/24 14:25
S576	299	(deactivat$6 near5 uplink).clm.	US-PGPUB; USPAT	AND	ON	2021/08/24 14:25
S577	1	S574 S575 S576	US-PGPUB; USPAT	AND	ON	2021/08/24 14:25

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Mobility performance and suitability of macro cell power-off in LTE dense small cell HetNets
K Ghoshal, G Zhou, P Legg - 2017 IEEE 18th International ..., 2017 - ieeexplore.ieee.org
... cell-specific RS RLF detection by T310 rrc. N310 =1, N311=1 as specified in [8] LI of UE Qout=-4 Sdß; Qacc= 7.2dB as specified in [8] L2 For **MAC**, RLC considering ... 3. RACH failure after **timer** T304 **expiry** [8, §7.1 ... 7 CDF of the s-cell RSRP measured at MG and transmission **time** ...
☆ 99 Cited by 30 Related articles All 2 versions

[PDF] ieee.org
Full Text @ USPTO-STIC

3GPP LTE and LTE advanced: 4G network radio interface
S Parkvall - 2008 - books.google.com
... 9.1.1 **Time** structure of the preamble ... Uplink Radio Interface Network processes Attachment procedure 2 NAS protocol Session establishment 3 **RRC** protocol System ... Connection control Measurements Beamforming control 4 Data link layer PDCP, RLC and **MAC** protocols 5 ...
☆ 99 Cited by 94 Related articles All 4 versions

[PDF] insa-lyon.fr

ieee Control Plane Protocols
H Yan, Dan Velez - 2008 - moodle.insa-lyon.fr
... case the UE rejects any connection establishment request until the wait **time** has elapsed ... NAS may abort an ongoing **RRC** connection establishment, for example upon NAS **timer expiry** ... radio **resource** configuration covers the configuration of the PDCP, RLC, **MAC** and physical ...
☆ 99 Cited by 9 Related articles All 5 versions

Exposing LTE security weaknesses at protocol inter-layer, and inter-radio interactions
MS Baig, FM Ayaz, S Li - ... Conference on Security and Privacy in ..., 2017 - Springer
... **MAC** and RLC protocols coordinate back and forth in a feedback channel loop to achieve reliable data ... and sends the LAU request to 3G network (step 4). At the same **time**, the attacker ... However, the **timer** value is carrier network dependent, which can also be defined as zero as ...
☆ 99 Cited by 13 Related articles All 4 versions

[PDF] 131.179.178.74

Video performance using adaptive DRX switching for LTE-A
S Alawadhi, S Mohamed, J Cosmas ... - 2017 IEEE ..., 2017 - ieeexplore.ieee.org
... Fig.5b. Sleep **time** (%), DRX=360 (ms) ... Inactivity **timer** (ms) Type 8 10 20 30 ... [6] TS 36.321 "Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); Medium Access Control (**MAC**) protocol specification," 3GPP, 2015 ...
☆ 99 Cited by 1 Related articles All 4 versions

[PDF] ieee.org
Full Text @ USPTO-STIC

3 G Radio Protocols
Y Markoyan, J Kaaranen, S Siddiqu... - 3 G Technology: 3 GPP ..., 2008 - Wiley Online Library
... Finally, to simplify the behavior, it was agreed to apply the window always (ie not only at handover) and remove the flush **timer** ... The second segment can then be built with the offset, but in non-real

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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
16/421,019	05/23/2019	2464	1720	PANW-2-1853US06	10	2

CONFIRMATION NO. 9820

CORRECTED FILING RECEIPT

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Date Mailed: 07/08/2021

Receipt is acknowledged of this non-provisional utility 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 FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

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Assignment For Published Patent Application

Pantech Wireless, LLC, Cedar Park, TX

Power of Attorney: The patent practitioners associated with Customer Number 03624

Domestic Priority data as claimed by applicant

This application is a CON of 14/876,337 10/06/2015 PAT 10306677
which is a CON of 14/319,608 06/30/2014 PAT 9313809
which is a CON of 12/238,910 09/26/2008 PAT 8774104
which claims benefit of 60/975,985 09/28/2007
and claims benefit of 60/982,528 10/25/2007
and claims benefit of 61/018,999 01/04/2008
and claims benefit of 61/025,441 02/01/2008
and claims benefit of 61/038,576 03/21/2008

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and claims benefit of 61/074,288 06/20/2008
and claims benefit of 61/083,409 07/24/2008

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

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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 16/421,019**

Projected Publication Date: Not Applicable

Non-Publication Request: No

Early Publication Request: No
Title

METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES

Preliminary Class

370

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.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application

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serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

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.

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Title 35, United States Code, Section 184

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NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/421,019	05/23/2019	Benoit Pelletier	PANW-2-1853US06

CONFIRMATION NO. 9820

3624
VOLPE KOENIG
30 SOUTH 17TH STREET, 18TH FLOOR
PHILADELPHIA, PA 19103

POA ACCEPTANCE LETTER

OC00000126804764

Date Mailed: 07/08/2021

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 07/06/2021.

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**.

/byemane/

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Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	16421019
	Filing Date	2019-05-23
	First Named Inventor	Benoit Pelletier
	Art Unit	2464
	Examiner Name	YUEN, KAN
	Attorney Docket Number	PAN-2-1853US06

U.S.PATENTS Remove

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	8175604	B2	2012-05-08	Lohr et al.	
	2	8072932	B2	2011-12-06	Sun et al.	Corresponds to: WO 2007/082458 A1

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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
	1	20070047451	A1	2007-03-01	Lohr et al.	
	2	20100220624	A1	2010-09-02	Ma et al.	
	3	20070060142	A1	2007-03-15	Reznik et al.	
	4	20100208688	A1	2010-08-19	Ma et al.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	First Named Inventor	Benoit Pelletier
	Art Unit	2464
	Examiner Name	YUEN, KAN
	Attorney Docket Number	PAN-2-1853US06

	5	20060092876	A1	2006-05-04	Kwak et al.	
	6	20080130533	A1	2008-06-05	Dottling et al.	
	7	20070047452	A1	2007-03-01	Lohr et al.	
	8	20060165045	A1	2006-07-27	Kim et al.	
	9	20080254804	A1	2008-10-16	Lohr et al.	
	10	20090088134	A1	2009-04-02	Ishii et al.	Corresponds to: WO 2007/023812 A1

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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	2009/019198	WO	A1	2009-02-12	NOKIA SIEMENS NETWORKS OY		
	2	2007-525036	JP	A	2007-08-30	ARRAYCOMM INC	* English abstract, copy of patent in Japanese and English translation of citing Office Action included.	
	3	2007-124493	JP	A	2007-05-17	SHARP CORP	* English abstract, copy of patent in Japanese and English translation of citing Office Action included.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16421019
	Filing Date	2019-05-23
	First Named Inventor	Benoit Pelletier
	Art Unit	2464
	Examiner Name	YUEN, KAN
	Attorney Docket Number	PAN-2-1853US06

NON-PATENT LITERATURE DOCUMENTS			Remove
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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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.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16421019
	Filing Date	2019-05-23
	First Named Inventor	Benoit Pelletier
	Art Unit	2464
	Examiner Name	YUEN, KAN
	Attorney Docket Number	PAN-2-1853US06

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	/Joseph P. Gushue/	Date (YYYY-MM-DD)	
Name/Print	Joseph P. Gushue	Registration Number	59,819

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.

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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.

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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the **PATENT APPLICATION** of:	
	Pelletier et al.
Application No.:	16/421,019
Filed:	May 23, 2019
For:	METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES
Group:	2464
Examiner:	Kan Yuen

Our File:	PANW-2-1853US06
Date:	July 6, 2021

INFORMATION DISCLOSURE STATEMENT

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

Sir:

Further to Applicant's Duty of Disclosure pursuant to 37 C.F.R. § 1.56, Applicant wishes to bring to the Examiner's attention the material cited on the enclosed PTO Form SB-08.

Copies of the newly cited documents are enclosed. Pursuant to 37 C.F.R. § 1.98(a)(2)(ii), copies of the newly cited U.S. publications and/or patent documents have not been included.

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This application is a continuation of U.S. Patent Application No. 14/876,337 filed October 6, 2015, which issued on May 28, 2019 as U.S. Patent No. 10,306,677, which is a continuation of U.S. Patent Application No. 14/319,608 filed June 30, 2014, which issued on April 12, 2016 as U.S. Patent No. 9,313,809, which is a continuation of U.S. Patent Application No. 12/238,910 filed September 26, 2008, which issued on July 8, 2014 as U.S. Patent No. 8,774,104, which claims the benefit of U.S. Provisional Patent Application Nos. 61/083,409 filed July 24, 2008, 61/074,288 filed June 20, 2008, 61/038,576, filed March 21, 2008, 61/025,441 filed February 1, 2008, 61/018,999 filed January 4, 2008, 60/982,528 filed October 25, 2007 and 60/975,985 filed September 28, 2007. This application is related to co-pending U.S. Patent Application No. 17/099,223, entitled "Method And Apparatus For Performing Random Access Transmissions", attorney docket number SIG-2-1853US07, filed November 16, 2020.

This application is also related to co-pending U.S. Application No. 16/516,893, filed July 19, 2019, which is a continuation of U.S. Application No. 15/836,302, filed December 8, 2017, which issued on July 23, 2019 as U.S. Patent No. 10,362,622, which is a continuation of U.S. Patent Application No. 15/182,218, filed June 14, 2016, which issued on December 12, 2017 as U.S. Patent No. 9,844,093, which is a continuation of U.S. Patent Application No. 15/049,922, filed February 22, 2016, which issued on June 21, 2016 as U.S. Patent No. 9,374,816, which is a continuation of U.S. Patent Application No. 12/256,964, filed October 23, 2008, which issued on February 23, 2016, as U.S. Patent No. 9,217,280, which claims the benefit of U.S. Provisional Patent

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Application No. 60/982,528, filed October 25, 2007 and U.S. Provisional Patent Application No. 61/018,567, filed January 2, 2008.

Applicant also wishes to bring to the Examiner's attention co-pending U.S. Application No. 17/099,386, filed November 16, 2020 and co-pending U.S. Application No. 17/099,407, filed November 16, 2020, both of which are continuations of co-pending U.S. Application No. 16/440,886, filed June 13, 2019, which is a continuation of U.S. Patent Application No. 15/782,532, filed October 12, 2017, which issued on June 18, 2019 as U.S. Patent No. 10,327,188, which is a continuation of U.S. Patent Application No. 15/135,616, filed April 22, 2016, which is a continuation of U.S. Patent Application No. 14/875,059, filed October 5, 2015, which is a continuation of U.S. Patent Application No. 13/665,734, filed October 31, 2012, which issued October 13, 2015, as U.S. Patent No. 9,161,285, which is a continuation of U.S. Patent Application No. 12/346,631, filed December 30, 2008, which issued December 4, 2012 as U.S. Patent No. 8,325,684, which claims priority from Provisional Application No. 61/018,567, which was filed January 2, 2008.

Pursuant to M.P.E.P § 609.04(a), since at least a portion of at least one item of information included in the PTO Form SB-08 is not available in the English language, enclosed is an English translation of a communication from a foreign patent office, dated March 3, 2021.

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It is respectfully requested that the Examiner consider these documents and return an initialed copy of the PTO Form SB-08 indicating consideration of the cited materials.

Respectfully submitted,

Pantech Wireless, LLC

By /Joseph P. Gushue/
Joseph P. Gushue
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Enclosures

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(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

PCT

(43) International Publication Date
12 February 2009 (12.02.2009)

(10) International Publication Number
WO 2009/019198 A1

(51) International Patent Classification:
H04Q 7/38 (2006.01)

(21) International Application Number:
PCT/EP2008/060097

(22) International Filing Date: 31 July 2008 (31.07.2008)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
07015719.3 9 August 2007 (09.08.2007) EP

(71) Applicant *(for all designated States except US)*: **NOKIA SIEMENS NETWORKS OY** [FI/FI]; Karaportti 3, FIN-02610 Espoo (FI).

(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: **PIRSKANEN, Juho** [FI/FI]; Ahkionkatu 16 A 2, FIN-33580 Tampere (FI). **WIMMER, Markus** [DE/PL]; ul. H. Sienkiewicza 44/34, PL-50-335 Wroclaw (PL).

(74) Common Representative: **NOKIA SIEMENS NETWORKS OY**; COO RTP IPR / Patent Administration, 80240 Munich (DE).

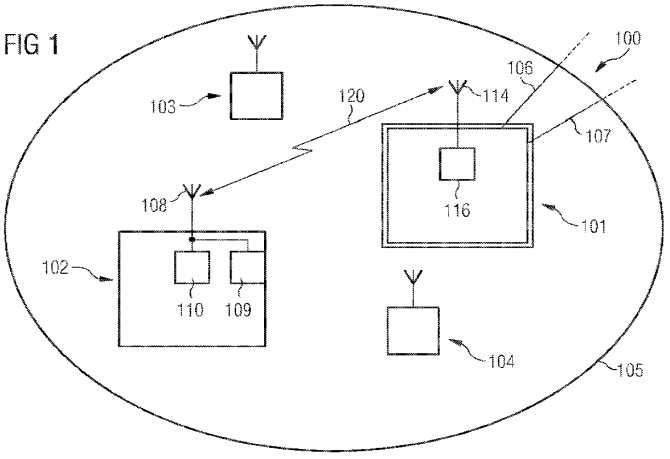
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(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

(54) **Title:** MOBILE COMMUNICATION TERMINAL, COMMUNICATION STATION, COMMUNICATION NETWORK, AND COMMUNICATION METHOD

FIG 1



(57) **Abstract:** A mobile communication terminal (102) adapted to be communicatively coupled to a communication station (101) of a communication network (100), the mobile communication terminal (102) comprising a station communication unit (108) adapted for exchanging communication messages with the communication station (101), and a communication message generation unit (110) adapted for generating a Common Control Channel information comprising message for transmission to the communication station (101) by the station communication unit (108), wherein the communication message generation unit (110) is adapted for rearranging the Common Control Channel information comprising message in accordance with a property of the Common Control Channel information comprising message before transmission to the communication station (101).

WO 2009/019198 A1

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DESCRIPTION

Mobile communication terminal, communication station, communication network, and communication method

Field of invention

The present invention relates to the field of mobile communication terminals. Furthermore, the invention relates to communication stations. Moreover, the invention relates to communication networks. Beyond this, the invention relates to communication methods.

Art Background

Universal Mobile Telecommunications System (UMTS) is one of the third-generation (3G) mobile phone technologies. UMTS is a broadband, packet-based transmission of text, digitized voice, video, and multimedia at high data rates, offering a set of services to mobile computer and phone users no matter where they are located in the world.

Summary of the Invention

There may be a need for a communication system providing a proper performance.

This need may be met by a mobile communication terminal, by a communication station, by a communication network, and by a communication method according to the independent claims. Further embodiments of the present invention are described by the dependent claims.

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According to an exemplary embodiment, a mobile communication terminal (such as a cellular phone) adapted to be communicatively (for instance in a wireless manner) coupled to a communication station (such as a base station) of a communication network (such as an UMTS network) is provided, the mobile communication terminal comprising a station communication unit (such as an antenna) adapted for exchanging communication messages with the communication station, and a communication message generation unit (which may have processing capabilities) adapted for generating a Common Control Channel information comprising message for transmission to the communication station by the station communication unit, wherein the communication message generation unit is adapted for rearranging the Common Control Channel message (for instance in one or a plurality of Transmission Time Intervals, TTI) in accordance with a property (for instance a size, a type, a transmission protocol, a time duration, a priority, etc.) of the Common Control Channel information comprising message before transmission to the communication station.

According to another exemplary embodiment, a communication station (such as a base station, for instance a node B) is provided which is adapted to be communicatively coupled (for instance for a wireless communication) to a mobile communication terminal of a communication network, wherein the communication station comprises a terminal communication unit (such as an antenna) adapted for exchanging communication messages with the mobile communication terminal, and a communication message evaluation unit (which may have processing capabilities) adapted for evaluating a Common Control Channel information comprising message received from the mobile communication terminal and being rearranged (for instance in one or a plurality of

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Transmission Time Intervals) in accordance with a property of the Common Control Channel information comprising message.

According to still another exemplary embodiment, a communication network (for instance a radio network, particularly a UMTS network) is provided, the communication network comprising a mobile communication terminal having the above mentioned features and a communication station having the above mentioned features, wherein the mobile communication terminal is communicatively coupled to the communication station.

According to yet another exemplary embodiment, a method of communicating in a communication network is provided, the communication method comprising communicatively coupling a mobile communication terminal to a communication station, generating, by the mobile communication terminal, a Common Control Channel information comprising message for transmission to the communication station, rearranging, by the mobile communication terminal, the Common Control Channel information comprising message (for instance in one or a plurality of Transmission Time Intervals) in accordance with a property of the Common Control Channel information comprising message before transmission to the communication station, and evaluating, by the communication station, the rearranged Common Control Channel information comprising message received from the mobile communication terminal.

According to still another exemplary embodiment of the invention, a program element (for instance a software routine, in source code or in executable code) is provided, which, when being executed by a processor, is adapted to control or carry out at least a part of a communication method having the above mentioned features.

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According to yet another exemplary embodiment of the invention, a computer-readable medium (for instance a CD, a USB stick, a floppy disk or a harddisk) is provided, in which a computer program is stored which, when being executed by a processor, is adapted to control or carry out at least a part of a communication method having the above mentioned features.

Data processing for communication purposes which may be performed according to embodiments of the invention can be realized by a computer program, that is by software, or by using one or more special electronic optimization circuits, that is in hardware, or in hybrid form, that is by means of software components and hardware components.

In the context of this application, the term "mobile communication terminal" may particularly denote any user equipment, particularly portable communication device. This term may particularly include mobile phones, personal digital assistants (PDAs), navigation systems, etc.

The term "communication station" may particularly denote any base station of a radio network. It may be coupled with one or a plurality of mobile communication terminals. Such a communication station may particularly be a base station (BS) in the context of UMTS (Universal Mobile Telecommunication Systems). Such a base station may be a central radio transmitter/receiver that may maintain communication with mobile radio telephones within a given range. The communication station may be installed at a fixed or stationary position.

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The term "communication unit" may particularly denote a transmitter, a receiver or a transmitter/receiver (transceiver) which allows for a unidirectional or bidirectional exchange of communication messages with a communication partner. Such a communication unit may particularly be a wireless communication unit, i.e. a communication system which communicates without the necessity of wires. However, wire-based communication is also covered by embodiments of the invention.

The term "Common Control Channel information comprising message" may particularly denote a message comprising information which may be usually included in a Common Control Channel (CCCH) message, as defined below. Particularly, the Common Control Channel information comprising message may be a Common Control Channel (CCCH) message itself. Alternatively, the Common Control Channel information comprising message may be a Protocol Data Unit (PDA), more particularly a Radio Link Control Protocol Data Unit (RLC PDU), which may also include information which is typically included in a CCCH message. In specific embodiments, the CCCH information comprising message may be TM RLC PDU. The content of a CCCH message are its information elements.

The term "Common Control Channel message" may particularly denote a control channel for a network such as a GSM network for use for initializing a communicative connection. Such a system, which may be implemented particularly in UMTS, may denote channels via which a mobile station or mobile communication terminal can be supplied with data/information regarding the network. Particularly, a mobile communication terminal may request allocation of a signalling channel via a CCCH channel. CCCH may support common procedures required to establish a dedicated link with the network and may include

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the RACH, FACH (Forward Access Channel) and PCH (paging channel).

The term "Transmission Time Interval" (TTI) may particularly denote an inter-arrival time of a Transport Block Set (TBS), and may be equal to the periodicity at which a Transport Block Set may be transferred by a physical layer on a radio interface. A TTI may be a multiple of a minimum interleaving period (for instance 10 ms, which may be the length of one radio frame). A MAC (Medium Access Control) may deliver one transport block set to the physical layer every TTI.

The term "rearranging" may particularly denote a change of the structure of the CCCH message. This may include a change in the order of components/blocks/segments of the message, a deletion of a portion of a message, extending a message by including additional information, assembling portions of the message to a larger message, etc. The term "rearranging" may include the concept of segmentation in transport.

According to an exemplary embodiment of the invention, a communication scheme for communicating between a mobile communication terminal such as a cellular phone and a communication station such as a base station is provided, wherein the flexibility in designing a Common Control Channel information comprising message is increased by allowing a rearrangement of such a Common Control Channel message in dependence of the characteristics of the Common Control Channel information comprising message. For example, when the Common Control Channel message exceeds a predetermined threshold size/dimension, the rearrangement may be performed by splitting the Common Control Channel message into multiple portions, even involving multiple Transmission Time Intervals. Taking this measure may enable the transmission of

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Common Control Channel messages without or with relaxed restrictions regarding message size, and therefore content of such a message.

According to an exemplary embodiment of the invention, a CCCH operation in HS-RACH may be enabled. In step 6 of the communication scheme illustrated in Fig. 2, CCCH data can be sent. According to an exemplary embodiments of the invention, specific mechanisms for restructuring and segmentation of CCCH messages in HS-RACH procedure are provided. Such a restructuring and segmentation may enable the transmission of CCCH without message property restrictions in multiple TTIs.

More particularly, in WCDMA REL99 to REL7, following three CCCH messages are sent uplink:

- RRC CONNECTION REQUEST
- CELL UPDATE
- URA UPDATE

According to an exemplary embodiment of the invention, the size of these messages is no more limited, so that they can be transmitted in a single TTI or in multiple TTIs. The segmentation of a CCCH message (that is one RLC SDU) in multiple RLC PDUs at the UE side and the combining of RLC PDUs to a single RLC SDU at the UTRAN side may be made possible. Different UEs can send RLC PDUs with the help of the RACH procedure at the same time, and for CCCH messages, an UE identifier may be included in MAC level. Therefore, UTRAN may be able to determine which PDUs should be combined together.

According to an exemplary embodiment of the invention, a WCDMA system may be provided which does not prohibit sending large CCCH messages in multiple RACH TTIs in the UL, which

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relaxes limitations of the above mentioned messages. If this limitation does not exist, then larger CCCH messages can be sent in uplink direction, which can be for instance exploited to reduce the call setup delay by sending the RRC CONNECTION REQUEST and INITIAL DIRECT TRANSFER concatenated or their IEs combined in a single message. Additionally the CCCH message can include more uplink measurement results which are currently limited by the available message size.

Particularly if HS-RACH is used, UL CCCH message segmentation may be enabled at the UM RLC entity instead of TM mode, or the segmentation is included at the MAC-e/es entity. The MAC-e/es entity may be used for restructuring.

In the following, further exemplary embodiments of the mobile communication terminal will be explained. However, these embodiments also apply to the communication station, to the communication network and to the method.

The communication message generation unit may be adapted for rearranging the Common Control Channel information comprising message in one or a plurality of Transmission Time Intervals (TTI) in accordance with a size of the Common Control Channel information comprising message. Particularly, a threshold data size of a Common Control Channel information comprising message may be defined. Even when such a threshold is exceeded, a transmission of the included data is possible, since the rearrangement may include the segmentation of the Common Control Channel information comprising message into a plurality of sub-portions, involving multiple Transmission Time Intervals, having a number in accordance with the required data size.

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Particularly, the communication message generation unit may segment the Common Control Channel information comprising message into a plurality of sub-messages which can be encoded in a plurality of Transmission Time Intervals. Such a segmentation may include a splitting of a data packet in a manner that it can be reassembled in accordance with a derivable scheme.

The communication message generation unit may be adapted for rearranging the Common Control Channel information comprising message in accordance with a granted uplink (UL) resource per Transmission Time Interval. Thus, even when a granted uplink (UL) resource per Transmission Time Interval varies (for instance is increased in future technology generations), the system may flexibly adapt its function in accordance with the changes.

The Common Control Channel message to be rearranged may be a Radio Resource Control Connection Request (RRC Connection Request) message. This may denote a procedure when a UE is in an idle mode and requests signalling connections. In this context, the UE may send an RRC Connection Request to the network. After receipt of an RRC Connection Setup message from the network, the UE may verify the UE identity. It may assume the state assigned by the network and may send a Connection Setup Complete message back.

It is also possible that the Common Control Channel message to be processed is a Cell Update message. Cell Update may be used by an UE to inform an UTRAN that the UE has switched to a new cell. It may be a forward handover procedure. Such a procedure may be triggered after change of the cell and after the UE has read information transmitted by an UTRAN.

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Furthermore, it is possible that the Common Control Channel message is an URA Update (UTRAN Registration Area Update) message. An UTRAN Registration Area (URA) may be denoted as an area covered by a number of cells, wherein an URA may be configured in UTRAN and may be broadcasted in relevant cells. An URA Update message may be used by an UE to inform the UTRAN that the UE has switched to a new URA. It may be triggered after change of a cell, or after an UE has read information broadcasted by an UTRAN indicating a change of URA.

Several cases may be distinguished:
a) a CCCH message can be formed consisting of a RRC Connection Request message and an Initial Direct Transfer message, or
b) a CCCH message can be formed consisting of a RRC Connection Request message, and RRC Connection Setup Complete and an Initial Direct Transfer message.

A Medium Access Control (MAC) entity may be provided for transporting the Common Control Channel information comprising message. Medium Access Control may denote a lower one of two sub-layers in a Data Link Layer. MAC may handle access to a shared medium and may be employed in the context of UMTS.

The mobile communication terminal may be adapted as a user equipment, particularly as a mobile phone. A mobile phone may be denoted as a device which behaves as a normal telephone while being able to move over a wide area. Mobile phones may allow connections to be made to the telephone network, normally bidirectionally dialling the other party's number on an in-built keypad. A mobile phone may also be denoted as a cellular telephone or a handheld mobile radio telephone for

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use in an area divided into sections, each with its own short range transmitter/receiver.

The mobile communication terminal and/or the communication station may be adapted for a communication in accordance with UMTS, particularly with UTRAN (UMTS Terrestrial Radio Access Network). UTRAN may be denoted as a hierarchical network of several radio network subsystems (RMS), which may be interconnected to one another and with a core network.

In the following, further exemplary embodiments of the communication station will be explained. However, these embodiments also apply to the mobile communication terminal, to the communication network and to the method.

The communication message evaluation unit may further be adapted for evaluating the received Common Control Channel information comprising message by restructuring content of the received Common Control Channel message. This restructuring may be inverse to the restructuring at the side of the user equipment, so that the original information may be retrieved at the side of the communication station.

Furthermore, disassembling of content of the Common Control Channel information comprising message may be performed by the communication station. This disassembling may include the separation of different components from a message, and may also include removal of a portion of a message, such as a header.

Beyond this, the communication station may also perform a reassembling of the content of the Common Control Channel information comprising message. Such a function may reassemble segments to complete an interpretable message.

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The communication message evaluation unit may comprise a Medium Access Control (MAC) entity for transporting the Common Control Channel information comprising message. The configuration of a Medium Access Control entity at the side of the mobile communication terminal (that is the UE) and at the side of the communication station (that is of the base station) may be coordinated or harmonized, so that the corresponding protocols or schemes are in accordance to one another.

It is possible that the Common Control Channel information comprising message is handled by a single (that is exactly one) Medium Access Control entity. Particularly, one Medium Access Control entity may be provided for all connected user equipments in common.

Alternatively, the Common Control Channel information comprising message may be transported or handled by a selected one of a plurality of preconfigured Medium Access Control entities in the communication station. In other words, a plurality of MAC entities may be provided each of which being capable of handling the message, wherein a presently non-occupied one of the MAC entities may be used at a time for performing a transport task. By taking this measure, a fast and complete performance at the side of the communication station can be ensured even in the scenario in which a lot of traffic occurs, for instance caused by multiple CCCH or other messages.

The communication station may also comprise a resource management unit adapted for queuing and subsequently working off multiple Common Control Channel information comprising messages received from a plurality of mobile communication

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terminals. In such a scenario, one MAC may be provided which serves several user equipments. In such a scenario, it may happen that several user equipments send a CCCH message at the same time. The management unit manages this data load and determines an order (for instance in accordance with the predetermined priority rule) to work off or process the individual messages.

In the following, the term "CCCH information comprising message" will be discussed in further detail.

According to one embodiment (which relates to the "first" embodiment below), TM RLC may be used for reordering, disassembly and segmentation/concatenation in the MAC-e entity. The TM RLC PDU provided by the TM RLC entity may be identical to the CCCH message.

According to other embodiments (which relate to the "second" and "third" embodiment below), any CCCH message delivered by higher layers to the UM RLC entity may be segmented in the UM RLC entity. UM RLC headers may be added to each segment, and padding may be done to achieve octet alignment. Thus, the UM RLC PDU provided by the UM RLC entity to the lower layers is not an CCCH message in this case, but includes corresponding information.

Therefore, in such embodiments "RLC PDU" (or "RLC PDU carrying CCCH message contents") may be considered as a "Common Control Channel information comprising message".

One exemplary aspect is to allow segmentation of a PDU containing a CCCH message. As segments may be transmitted based on HARQ principles, this can lead to out of order

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delivery of the segments, requiring a reordering in the UTRAN.

It has to be noted that embodiments of the invention have been described with reference to different subject matters. In particular, some embodiments have been described with reference to apparatus type claims whereas other embodiments have been described with reference to method type claims. However, a person skilled in the art will gather from the above and the following description that, unless otherwise notified, in addition to any combination of features belonging to one type of subject matter also any combination between features relating to different subject matters, in particular between features of the apparatus type claims and features of the method type claims is considered to be disclosed within this application.

The aspects and exemplary embodiments defined above and further aspects of the invention are apparent from the example of embodiment to be described hereinafter and are explained with reference to these examples of embodiment.

Brief Description of the Drawings

Fig. 1 schematically shows a communication system according to an exemplary embodiment of the invention.

Fig. 2 schematically shows a High Speed Random Access Channel (HS-RACH) procedure according to an exemplary embodiment of the invention.

Fig. 3 schematically shows an exemplary embodiment of the invention involving CCCH PDU segmentation in MAC-e/es at the UE side.

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Fig. 4 schematically shows an exemplary embodiment of the invention involving CCCH PDU restructuring, disassembly and reassembly in a MAC-e entity, Node B side.

Fig. 5 schematically shows an exemplary embodiment of the invention involving multiple pre-configured Iub data transport bearers, MAC-es and RLC entities for CCCH reception.

Fig. 6 schematically shows an exemplary embodiment of the invention involving single pre-configured Iub data bearer for CCCH reception.

Detailed Description

The illustration in the drawings is schematic. It is noted that in different figures, similar or identical elements are provided with the similar or identical reference signs.

In the following, referring to **Fig. 1**, a radio network 100 according to an exemplary embodiment of the invention will be explained.

Fig. 1 illustrates the radio network 100 formed by a communication station 101 such as a base station (BS), and by a number of mobile communication terminals 102 to 104.

In the following, a communication scheme between the mobile communication terminal 102 and the communication station 101 will be explained in detail. A communication scheme performed between the communication station 101 and the mobile communication terminals 103, 104 may be performed in a similar manner.

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As indicated schematically by reference numerals 106, 107, the communication station 101 may optionally be coupled to a central station and/or to one or more further communication stations by means of communication paths 106, 107, which may be wired, wireless or fibre optical connections.

Furthermore, an operating distance 105 is shown schematically in Fig. 1, i.e. a range within which a communication between the communication station 101 and a plurality of mobile communication terminals 102 to 104 such as mobile phones is enabled with sufficient data transmission quality.

As can be taken from Fig. 1, the mobile communication terminal 102 is adapted to be communicatively coupled to the communication station 101 of the communication network 100 and comprises a station communication unit 108 such as a sending and receiving antenna for bidirectionally exchanging communication messages with the communication station 101. Beyond this, the mobile communication terminal 102 comprises a communication message generation unit 110 which is adapted for generating a Common Control Channel message (CCCH message) for transmission to the communication station 101 by the station communication unit 108. The communication message generation unit 110 is further adapted for, if desired or necessary, rearranging the CCCH message in one or a plurality of Transmission Time Intervals (TTI) in accordance with the size of the CCCH message before transmission of the rearranged CCCH message to the communication station 101.

The communication station 101 is adapted to be communicatively coupled to the mobile communication terminal 102 and also to the mobile communication terminals 103, 104 of the communication network 100. The communication station

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101 comprises a terminal communication unit 114 such as a sender and receiver antenna adapted for bidirectionally exchanging communication messages with the mobile communication terminal 102, more particularly with the station communication unit 108 of the mobile communication terminal 102. Moreover, the communication station 101 comprises a communication message evaluation unit 116 which is adapted for evaluating a Common Control Channel message received from the mobile communication terminal 102 and being rearranged in one or a plurality of Transmission Time Intervals in accordance with a property of the Common Control Channel message.

In other words, the mobile communication terminal 102 and the communication station 101 are coordinated in such a manner that a rearrangement performed by the mobile communication terminal 102 can be interpreted by "reverse" processing by the communication station 101.

When the mobile communication terminal 102 prepares a CCCH message for transmission to the communication station 101, it analyzes the size of a corresponding message in view of a maximum or threshold data size. In case that it is recognized by the mobile communication terminal 102 that the maximum allowed size is exceeded, the CCCH message will, before transmission, be rearranged to meet the requirements of the communication scheme or protocol in the network 100. Particularly, the rearrangement may be performed in such a manner that a plurality of Transmission Time Intervals (TTI) are used for the message. However, rearrangement may also include restructuring, segmenting, deletion of unnecessary portions, compression, etc.

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Over a communication path 120 within a communication range 105, the rearranged CCCH message is then sent to the communication station 101. At the side of the communication station 101, the rearranged transmitted CCCH message is evaluated, that is particularly processed, etc. in order to extract the data content included therein. This may include procedures such as reassembling, disassembling, restructuring, decompressing, etc.

Moreover, Fig. 1 shows an input/output unit 109 which may also be denoted as a user interface unit. Via such a user interface unit 109, a user may bidirectionally communicate with the mobile communication terminal 102. Thus, the input/output unit 109 may comprise a keypad, buttons, etc., and/or may include a display on which results of a communication may be displayed. The input/output unit 113 may serve, together with further components which are not shown in Fig. 1, to allow to use the mobile communication terminal 102 as a mobile phone or cellular phone.

Particularly in the context of the usage of E-DCH as RACH shared channel and a collision detection for a random access procedure, it may be advantageous to create a base for high speed and high data rate random access, further on called herein "High Speed Random Access Channel" (HS-RACH). It is believed that techniques of HSUPA, such as fast inner loop power control, varying bitrate, Node B scheduling with grants, fast ACK/NACK for DL transmission can be used already in the random access phase.

When the UE sends a CCCH message while using HS-RACH, then following conditions may be fulfilled:
- The UE sends the RRC message RRC Connection Request, Cell Update or URA Update in REL7;

- The UE uses dedicated scrambling code for uplink transmission in HS-RACH. The scrambling code is not used by any other UE simultaneously after contention is solved.
- The MAC-e header contains a field which indicates the logical channel id (identifier) of the transmitted MAC-es PDU(s).
- In REL7 this has been the DDI field (Data Description Identifier). For HS-RACH, a logical channel id field may be provided.
- The DDI value or logical channel id value for CCCH may be standardized or broadcasted as system information.
- The UE has to wait for a response from UTRAN before it can start sending any other UL data. In other words, when sending the CCCH message, there should only (MAC-es) PDUs in the E-DCH buffer carrying a CCCH message.
- If the Scheduling Indicator (SI) field is included in the MAC-e header, and the total E-DCH buffer (TDBS field in SI) in the UE is reported to be empty, then UTRAN is informed that the complete CCCH message has been transmitted.
- No Soft handover is supported for UL CCCH messages on HS-RACH as in Rel99 RACH.

In the following, referring to **Fig. 2**, a communication scheme 200 according to an exemplary embodiment of the invention will be explained. In the communication scheme 200, a downlink portion 210 is distinguished from an uplink portion 220. A high speed preamble in the uplink portion 220 is denoted with reference numeral 230 in Fig. 2.

The described HS-RACH concept may be decomposed in several steps or phases, which are outlined below and which are indicated as well in Fig. 2:

(1) Determination of UL interference level for open loop power control

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(2) Release 99 random access procedure with power ramp-up using specific HS-RACH access slots and/or signatures indicated in SIB

(3) Access Grant and Resource Assignment

(4) Start of inner loop power control in UL, for instance on DPCCH.

(5) Start of inner loop power control in DL, for instance on F-DPCH.

(6) Start of UL data transmission, for instance on E-DPDCH/E-DPCCH

(7) subsequent Resource Assignment (update of existing resource assignment) and Collision detection and resolution

(8) ACK/NACK of UL data (ffs), for instance on E-HICH

(9) ACK/NACK of DL data (ffs) and CQI for link adaptation (ffs), for instance on HS-DPCCH

(10) Mechanisms at end of data transmission, end of HS-RACH resource allocation period, collision detection, etc.

In the following, several possibilities for implementing exemplary embodiments of the invention will be explained.

According to a first embodiment of the invention, restructuring, disassembly and segmentation/concatenation may be performed in the MAC-e entity.

According to such an embodiment, the MAC-e entity in UE and Node B are extended by functions allowing a separate handling of MAC-e and MAC-es PDUs carrying CCCH information.

For CCCH messages, the MAC-e/es entity at the UE side is extended by the following function:

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- segmentation: The CCCH message is sent without segmentation from the TM RLC entity in the UE to the MAC-e/es entity of the UE. The segmentation is performed if the received RLC PDU is larger than the maximum allowed length of the MAC-es payload.

- TSN setting: The UE starts the numbering of the TSN from the known (predefined) value for CCCH messages.

The MAC-e entity at the Node B side is extended by following functions:

- reordering/combining: This function reorders received MAC-es PDUs according to the received TSN and Node-B tagging (CFN, subframe number). MAC-es PDUs with consecutive TSNs are delivered to the disassembly function upon reception. As the first TSN value for CCCH message is known the MAC-e reordering can deliver all PDU having consecutive TSN value to the higher layers after receiving the known TSN value.

- disassembly: The disassembly function is responsible for disassembly of MAC-es PDUs. When a MAC-es PDU is disassembled the MAC-es header is removed, the MAC-es payload is extracted and delivered to concatenation function.

- reassembly: Reassembly function reassembles the MAC-es PDUs carrying segments of RLC PDU to complete RLC PDU

According to the first embodiment, the transport of a complete CCCH message is provided by the MAC-e/es entities to the higher layers.

Fig. 3 illustrates a processing scheme 300 in accordance with the first embodiment (at the UE side).

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Fig. 4 illustrates another processing scheme 400 in accordance with the first embodiment (at the Node B side).

In the following, a procedural description of this first embodiment will be given.

The transmission of a CCCH messages decomposes in following steps:

- The HS-RACH procedure is started (steps 1 to 5 in Fig. 2) as a CCCH message has to be transmitted. The UL transmission of the CCCH message is part of step 6 as described referring to Fig. 2.
- The transparent RLC entity in the UE delivers the CCCH message without segmentation to the MAC-e/es entity.
- The MAC-e/es entity segments the RLC PDU, if it is larger than the maximum allowed length of the MAC-es payload.
- The multiplexing and TSN setting entity starts the setting of the TSN for first MAC-es/e PDU known value.
- In the next step, the HARQ entity is responsible for storing MAC-e payloads and re-transmitting them.

The next steps continue at the UTRAN side.

- If a MAC-e PDU has been received by the HARQ entity, if forwards it to the De-multiplexing function.
- The de-mulitplexing function forwards the MAC-es PDU(s) to the reordering queue for CCCH. The identification of the reordering flow is done by a MAC-e field which identifies the logical channel (DDI or logical channel id).
- The Reordering function reorders received MAC-es PDUs according to the received TSN and Node-B tagging (CFN, subframe number). If a known value of the TSN is received the MAC-e PDU with consecutive TSN are immediately delivered to

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disassembly. Otherwise a normal reordering function is performed and with MAC-es PDUs with consecutive TSNs are delivered to the disassembly function upon reception and expiration of reordering timer such as T1.

- The disassembly function removes the MAC-es header and forwards the MAC-es SDUs to the reassembly function.
- The reassembly function combines the MAC-es SDUs. After receiving the complete RLC PDU it delivers it to the higher layers (i.e. it forwards it to the CCCH TM RLC).

When an RLC PDU is transmitted, the TSN of the first MAC-es containing RLC PDU content is set to a known value, for instance zero. With each subsequence MAC-es PDU, the TSN is incremented. When the last part of the RLC PDU is transmitted in a MAC-es PDU, then the Scheduling Information (SI) has to be added, which informs the Node B that the total E-DCH buffer is empty. In other words, the complete RLC PDU has been delivered. If the MAC-es/e PDU(s) carried on this last MAC-es entity are delivered to the reassembly function, the complete RLC PDU is present at the reassembly function and its delivery to the CCCH UL RLC entity is triggered.

According to a second embodiment of the invention, multiple "virtual" CCCH users may be involved, as will be described in the following:

HS-RACH feature aims to allow UEs in CELL_FACH state to have EDCH resources configured, i.e. for each logical channel, an RLC entity and MAC-es reordering queue are configured as well as one or several Iub data transport bearers from the Node B to the MAC-es entity. When running HS-RACH, the Node B grants EDCH radio resources to the UE. The UE sends its UL data; at the Node B the received MAC-es PDUs are mapped on the Iub data transport bearer(s) configured for this UE, transported

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to the UE's configured MAC-es entity, and reordered in the reordering queues.

One aspect regarding virtual CCCH users is to pre-configure multiple EDCH resources for CCCH reception, with one EDCH resource consisting of one RLC entity, one MAC-es reordering queue and one Iub data transport bearer. If a UE sends CCCH data, then the MAC-e selects one of the unused EDCH resources for CCCH reception. The transport and processing of MAC-e and MAC-es PDUs is then identical to the case where dedicated EDCH resources exist.

To send a CCCH message, following extension may be done at the UE side:

- The segmentation at UM RLC entity for CCCH is configured instead of TM RLC.
- No modification for MAC-es/e

To receive a CCCH message, following mechanisms and extensions may be performed at the UTRAN side:

-Pre-configuration of multiple UM RLC entities, MAC-es entities and Iub transport bearer. In detail: N triples (UM RLC, MAC-es, Iub data transport bearer) for CCCH reception are pre-configured in UTRAN:

- UM RLC entity for CCCH reception: The UM RLC entity receives RLC PDUs, reassembles them and forwards CCCH messages to the RRC entity.
- MAC-es entity for CCCH reception: The MAC-es entity for CCCH reception has the same functions defined as in REL6/7. The MAC-es entity provides its services to the higher layer UM RLC entity for CCCH reception, i.e. it forwards RLC PDUs to it.

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- Iub data transport bearer: An AAL2 Binding Identity is used to bind the Iub Data Transport Bearer to E-DCH. The Iub data transport bearer provided MAC-es PDU transport channel to the MAC-es entity for CCCH reception.

The pre-configuration can be implementation specific, for instance establishment, maintenance and release can be left to operation and maintenance.

The NBAP may have to be extended to allow the RNC to notify the Node B/cell about the pre-configured triples (UM RLC, MAC-es, Iub data transport bearer) for CCCH reception.

- MAC-e entity extension:
- UE id and Iub data transport channel demultiplexing: When granting EDCH resources to a UE during the HS-RACH procedure, the Node B automatically establishes a MAC-e entity for this UE. If a MAC-e PDU is received, and a field (for instance logical channel id or DDI) in the MAC-e header links the uplink transmission to CCCH, then
    - the Node B selects one of the Iub data transport bearer for CCCH reception from a pool of non-occupied Iub data transport bearer for CCCH reception - the selected Iub data transport bearer is marked as occupied
    - and then
    - transmits all MAC-es PDUs for the logical channel CCCH on this Iub data transport bearer till the HS-RACH radio resources are released for this UE. After the release of the HS-RACH radio resources, the Iub data transport bearer for CCCH reception is returned to the pool of non-occupied Iub data transport bearer for CCCH reception.

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The UE id and Iub data transport channel demultiplexing function may also be advantageous for DCCHs and DTCHs in HS-RACH: for instance in CELL_FACH, a dedicated UE id, MAC-es entity and Iub data transport channel(s) are configured. As soon as the UE identity is available at the MAC-e entity with the first successful reception of a MAC-e PDU, all received MAC-e PDUs must be multiplexed on the dedicated Iub data transport channel(s) for this UE. Therefore, the "UE id and Iub data transport channel demultiplexing" function may be advantageous for HS-RACH.

Fig. 5 illustrates a processing scheme 500 in accordance with the second embodiment.

Fig. 5 shows multiple pre-configured Iub data transport bearers, MAC-es and RLC entities for CCCH reception. If the logical channel id for CCCH reception is detected at MAC-e, the Node B selects one of the non-occupied MAC-d flows for MAC-es PDU transport. Each triple (RLC entity, MAC-es entity, Iub data transport bearer) for CCCH reception acts like a "virtually configured" EDCH user (Node B side).

In the following, a procedural description of the second embodiment will be given.

By operation and maintenance, n MAC-es entities for CCCH reception are pre-configured in the RNC for a cell/Node B. Each MAC-es entity for CCCH reception has a reordering and disassembly entity. For each MAC-es entity for CCCH reception there is one Iub transport bearer pre-configured. Each MAC-es entity for CCCH reception is connected with one pre-configured UM RLC entity.

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The HS-RACH procedure is started (step 1 to 5 of Fig. 2) as a CCCH message has to be transmitted. The UL transmission of the CCCH message is part of step 6 as described referring to Fig. 2.

UE operation:

1. The UM RLC entity for CCCH transmission segments the RRC SDU into sizes suitable for MAC-es/e, if needed. The segments are forwarded as RLC PDUs to the MAC-es/e entity. The operation in the MAC-es/e side of the UE continues as in REL6/7.

Node B operation:

1. The HS-RACH procedure is started (step 1 to 5 of Fig. 2) as a CCCH message has to be transmitted. The UL transmission of the CCCH message is part of step 6 as described referring to Fig. 2.

2. The first successfully received MAC-es PDU contains a UE identity and logical channel information (for instance in DDI-field, or equivalent field depending on MAC-e header evolution for REL8). After determining the logical channel id, the Node B knows that the UE sends data for the CCCH.

3. The Node B selects one of the Iub transport bearers to a MAC-es entity for CCCH reception, which is currently not used for CCCH data transport. The Node B uses this Iub transport bearer exclusively for this UE for the duration of the HS-RACH procedure. When the HS-RACH procedure ends, and physical resources granted on the radio interface are released, then this Iub transport bearer and its connected MAC-es entity for

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CCCH reception can be used for another UE requesting transport of CCCH data.

Neither the Iub transport bearer nor its MAC-es entity for CCCH reception have to be released after releasing the HS-RACH resources for a UE.

When the HS-RACH procedure ends, the Node B may signal this to the RNC, so that any buffered MAC-es PDU in the MAC-es entity is discarded, and any buffered RLC PDUs in the UM RLC entity are delivered to the higher layer/ or discarded.

4. At the MAC-es for CCCH entity reception reordering/combining and disassembly takes place as in REL6/7.

5. Each MAC-es for CCCH entity is connected to one UM RLC entity which concatenates all received RLC PDUs, before forwarding them to the higher layer.

This mechanism guarantees that only the common data of a single UE are re-ordered in a reordering queue. As a consequence higher data volumes can be transmitted on the CCCH.

According to a third embodiment of the invention, multiple "virtual" CCCH channels may be implemented.

UL data transmission for several configured logical channels may be supported in EDCH and HS-RACH.

An aspect of the third embodiment is to process the CCCH data flow from several users as if coming from a single user with multiple priority flows configured, whereby each priority

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queue serves one CCCH transmitting UE. One MAC-es entity and one Iub data transport bearer to this entity are preconfigured. Every MAC-es PDU for the CCCH received at the cell/Node B is mapped on this Iub data transport bearer. The reordering queue distribution function in the MAC-es uses the logical channel id (and possible other attributes) included in the prepended MAC-es header to distribute the MAC-es PDUs to their reordering queue. Instead of the logical channel id, a temporary UE id is send in the prepended MAC-es header. The temporary UE id is selected at the MAC-e entity, when a MAC-es PDU for CCCH has been received for the first time and is included to the preprended MAC-es header for all MAC-es PDUs for the CCCH, i.e. one temporary UE id and one reordering queue is used for a UE.

To send a CCCH message, the following extension may be done at the UE side:
- The segmentation at UM RLC entity for CCCH is configured instead of TM RLC
- No modification for MAC-es/e

To receive a CCCH message, following mechanisms and extensions may be performed at the UTRAN side:
- Iub data transport bearer for CCCH reception: One Iub data transport bearer for CCCH reception is configured. On this bearer, only MAC-es PDUs carrying UL CCCH information are transmitted. Each transmitted MAC-es PDU is accompanied by a so called “prepended MAC-es PDU header”, which includes a UE identity field: In CELL_DCH state, this field contains the logical channel id, etc. As every MAC-es PDU on this channel is carrying data for the logical channel CCCH, the bits of these field can be used to inform the receiver (MAC-es/RNC) that all MAC-es PDUs with the same id originated from a single UE.

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- MAC-e entity extension: UE id and Iub data transport channel demultiplexing: When granting EDCH resources to a UE during the HS-RACH procedure, the Node B automatically establishes a MAC-e entity for this UE. If a MAC-e PDU is received, and a logical channel id in the MAC-e header links the MAC-es PDU in the MAC-e PDU payload part to CCCH, then this function is used to

- select a temporary UE id from a pool of non-used identity values; This value is marked as used, and is used for this UE for the duration of the HS-RACH procedure; and then

- multiplexes all MAC-es PDUs for the logical channel CCCH on the pre-configured Iub data transport bearer for CCCH reception. Hereby the prepended MAC-es header has the temporary UE id included.

- After the release of the HS-RACH radio resources, the temporary UE id is marked as non-used.

The Node B may signal to the RNC that the use of a temporary UE id has ended.

- MAC-es extension in the RNC: There is one MAC-es entity for CCCH reception. The UE id in the prepended MAC-es header is used to route the MAC-es entity to the correct reordering queue, consisting of the reordering/combining and the disassembly function. If a MAC-es PDU header contains a previous unused UE id, then the RNC may create a new reordering queue and a new RLC entity for this UE id. If no MAC-es PDU for an existing reordering queue for a UE id appears for a defined period of time, or if (alternatively) the Node B signals that the UE id for an existing reordering queue is no longer used, then the reordering queue may be released, and any stored MAC-es PDUs are discarded. Also the RLC entity is released.

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-UM RLC for CCCH reception: This entity supports the concatenation of RLC PDUs received by a priority queue of a MAC-es entity for CCCH reception.

Fig. 6 illustrates a processing scheme 600 in accordance with the third embodiment.

Fig. 6 illustrates a single pre-configured Iub data bearer for CCCH reception. If the logical channel id for CCCH reception is detected at MAC-e, the Node B selects one of the non-used UE id values for MAC-es PDU transport. The MAC-es function reordering queue distribution forwards the MAC-es PDUs to the reordering queue associated with the UE id value, Node B side.

Next, a procedural description in accordance with the third embodiment will be explained.

By operation and maintenance, one MAC-es entity for CCCH reception is pre-configured in the RNC for a cell/Node B. In comprises one or several reordering and disassembly queues. Each queue is connected with one UM RLC entity. One Iub transport bearer pre-configured, which is linked to the MAC-es entity for CCCH reception.

The HS-RACH procedure is started (step 1 to 5 of Fig. 2) as a CCCH message has to be transmitted. The UL transmission of the CCCH message is part of step 6 as described referring to Fig. 2.

UE operation:

1. The UM RLC entity for CCCH transmission segments the RRC SDU into sizes suitable for MAC-es/e, if needed. The segments

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are forwarded as RLC PDUs to the MAC-es/e entity. The operation in the MAC-es/e side of the UE continues as in REL6/7.

Node B operation:

2. The first successfully received MAC-es PDU contains a UE identity and logical channel information (for instance in DDI-field, or equivalent field depending on MAC-e header evolution for REL8). After determining the logical channel id, the Node B knows that the UE sends data for the CCCH.

3. The Node B selects one of the "temporary UE ids" for CCCH reception within the set of available "temporary UE ids", which is currently not used by other MAC-e entities in the cell/Node B for CCCH data transport. The Node B uses this temporary UE id exclusively for this UE for the duration of the HS-RACH procedure. Each MAC-es PDU for CCCH received at the MAC-e entity is mapped on the preconfigured Iub data transport channel for CCCH. In the prepended MAC-es header, the temporary UE id is included.

When the HS-RACH procedure ends, and physical resources granted on the radio interface are released, then this temporary UE id can be used for another UE requesting transport of CCCH data. Neither the Iub transport bearer nor its MAC-es entity for CCCH reception have to be released after releasing the HS-RACH resources for a UE. When the HS-RACH procedure ends, the Node B may signal this to the RNC, so that any buffered MAC-es PDU in the MAC-es entity is discarded, and any buffered RLC PDUs in the UM RLC entity are delivered to the higher layer/ or discarded.

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4. At the MAC-es for CCCH entity the reordering queue distribution function is used to distribute the incoming MAC-es PDUs according to their temporary UE id. Then reordering/combining and disassembly takes place as in REL6/7.

In REL6/7, reordering queue distribution function is based on the DDI value. No modification of the reordering queue distribution function is performed, if for instance the temporary UE id is placed in the DDI field.

5. Each reordering and disassembly queue is connected to one UM RLC entity which concatenates all received RLC PDUs, before forwarding them to the higher layer.

This mechanism guarantees that only the common data of a single UE are re-ordered in a reordering queue. As a consequence higher data volumes can be transmitted on the CCCH.

Finally, it should be noted that the above-mentioned embodiments illustrate rather then limit the invention, and that those skilled in the art will be capable of designing many alternative embodiments without departing from the scope of the invention as defined by the appended claims. In the claims, any reference signs shall not be construed as limiting the claims. The word "comprising" and "comprises", and the like, does not exclude the presence of elements or steps other than those listed in any claim or the specification as a whole. The singular reference of an element does not exclude the plural reference of such elements and vice-versa. In a device claim enumerating several means, several of these means may be embodied by one and the same item of software or hardware. The mere fact that

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certain measures are recited in mutually different dependent claims does not indicate that a combination of these measures cannot be used to advantage.

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List of reference signs and abbreviations:

100	radio network
101	communication station
102	mobile communication terminal
103	mobile communication terminal
104	mobile communication terminal
105	operating distance
106	communication path
107	communication path
108	terminal communication unit
109	user interface
110	communication message generation unit
114	station communication unit
116	communication message evaluation unit
120	communicative coupling
200	communication scheme
210	downlink portion
220	uplink portion
230	high speed preamble
300	processing scheme
400	processing scheme
500	processing scheme
600	processing scheme
AC	Access Class
ACK	acknowledged
AI	Acquisition Indicator
AICH	Acquisition indicator channel
ASC	Access Service Class
CCCH	Common Control Channel
CQI	Channel Quality Indicator
DDI	Data Description Indicator
DPCCH	Dedicated Physical Control Channel
DPDCH	Dedicated Physical Data Channel

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DL	downlink
E-DCH	Enhanced Dedicated Channel
E-DPCCH	Enhanced Dedicated Physical Control Channel
E-DPDCH	Enhanced Dedicated Physical Data Channel
E-HICK	Enhanced Hybrid Automatic Request Indication Channel
F-DPCCH	Fractional Dedicated Physical Control Channel
MAC	Medium Access Control
MAC-e	Medium Access Control entity for EDCH in Node B
MAC-es	Medium Access Control entity for EDCH in RNC
MAC-es/e	Medium Access Control entity for EDCH in UE
NACK	non-acknowledged
HS-RACH	High Speed Random Access Channel
HS-SCCH	High Speed – Shared Control Channel
HSDPA	High Speed Downlink Packet Access
HSUPA	High Speed Uplink Packet Access
PDU	Protocol Data Unit
PRACH	Physical Random Access Channel
RACH	Random Access Channel
RLC	Radio Link Control
RRC	Radio Resource Control
SI	Scheduling Information
SDU	Service Data Unit
TSN	Transmission Sequence Number
TTI	Transmission Time Interval
UE	User Equipment
UL	uplink
URA	UTRAN Registration Area
WCDMA	Wideband Code Division Multiple Access

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CLAIMS:

1. A mobile communication terminal (102) adapted to be communicatively coupled to a communication station (101) of a communication network (100), the mobile communication terminal (102) comprising:

a station communication unit (108) adapted for exchanging communication messages with the communication station (101);

a communication message generation unit (110) adapted for generating a Common Control Channel information comprising message for transmission to the communication station (101) by the station communication unit (108);

wherein the communication message generation unit (110) is adapted for rearranging the Common Control Channel information comprising message in accordance with a property of the Common Control Channel information comprising message before transmission to the communication station (101).

2. The mobile communication terminal (102) according to claim 1,
adapted to be communicatively coupled to a communication station (101) according to any one of claims 12 to 21.

3. The mobile communication terminal (102) according to claim 1 or 2,
wherein the communication message generation unit (110) is adapted for rearranging the Common Control Channel information comprising message in a plurality of Transmission Time Intervals in accordance with a property of the Common Control Channel information comprising message.

4. The mobile communication terminal (102) according to any one of claims 1 to 3,

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wherein the communication message generation unit (110) is adapted for rearranging the Common Control Channel information comprising message in accordance with a size of the Common Control Channel information comprising message.

5. The mobile communication terminal (102) according to any one of claims 1 to 4,
wherein the communication message generation unit (110) is adapted for rearranging the Common Control Channel information comprising message in accordance with a granted uplink resource per Transmission Time Interval.

6. The mobile communication terminal (102) according to any one of claims 1 to 5,
wherein the communication message generation unit (110) is adapted for rearranging the Common Control Channel information comprising message in at least one manner of the group consisting of segmenting the Common Control Channel information comprising message, and restructuring the Common Control Channel information comprising message.

7. The mobile communication terminal (102) according to any one of claims 1 to 6,
wherein the Common Control Channel information comprising message is one of the group consisting of a Common Control Channel message, and a Radio Link Control Protocol Data Unit.

8. The mobile communication terminal (102) according to claim 7,
wherein the Common Control Channel message is one of the group consisting of a Radio Resource Control Connection Request message, a Cell Update message, and a Universal Mobile Telecommunications System Terrestrial Radio Access Network Registration Area Update message.

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9. The mobile communication terminal (102) according to any one of claims 1 to 8,
comprising a Medium Access Control entity adapted for transporting the Common Control Channel information comprising message.

10. The mobile communication terminal (102) according to any one of claims 1 to 9,
adapted as a user equipment, particularly as a mobile phone.

11. The mobile communication terminal (102) according to any one of claims 1 to 10,
adapted for a communication in accordance with a Universal Mobile Telecommunications System protocol, particularly in accordance with a Universal Mobile Telecommunications System Terrestrial Radio Access Network protocol.

12. A communication station (101) adapted to be communicatively coupled to a mobile communication terminal (102) of a communication network (100), the communication station (101) comprising:

a terminal communication unit (114) adapted for exchanging communication messages with the mobile communication terminal (102);

a communication message evaluation unit (116) adapted for evaluating a Common Control Channel information comprising message received from the mobile communication terminal (102) and being rearranged in accordance with a property of the Common Control Channel information comprising message.

13. The communication station (101) according to claim 10,

adapted to be communicatively coupled to a mobile communication terminal (102) according to any one of claims 1 to 11.

14. The communication station (101) according to claim 12 or 13,
wherein the communication message evaluation unit (116) is adapted for evaluating the Common Control Channel information comprising message in a plurality of Transmission Time Intervals.

15. The communication station (101) according to any one of claims 12 to 14,
wherein the communication message evaluation unit (116) is adapted for evaluating the received Common Control Channel information comprising message in at least one manner of the group consisting of restructuring content of the received Common Control Channel information comprising message, combining content of the received Common Control Channel information comprising message, disassembling content of the received Common Control Channel information comprising message, and reassembling content of the received Common Control Channel information comprising message.

16. The communication station (101) according to any one of claims 12 to 15,
wherein the Common Control Channel information comprising message is one of the group consisting of a Common Control Channel message, and a Radio Link Control Protocol Data Unit.

17. The communication station (101) according to claim 16,
wherein the Common Control Channel message is one of the group consisting of a Radio Resource Control Connection Request message, a Cell Update message, and a Universal

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Mobile Telecommunications System Terrestrial Radio Access Network Registration Area Update message.

18. The communication station (101) according to any one of claims 12 to 17,
comprising a Medium Access Control entity for transporting the Common Control Channel information comprising message.

19. The communication station (101) according to any one of claims 12 to 17,
comprising a plurality of preconfigured Medium Access Control entities for transporting the Common Control Channel information comprising message.

20. The communication station (101) according to any one of claims 12 to 19,
comprising a management unit adapted for queuing and subsequently working off a plurality of Common Control Channel information comprising messages received from a plurality of mobile communication terminals (102).

21. The communication station (101) according to any one of claims 12 to 20,
adapted for a communication in accordance with a Universal Mobile Telecommunications System protocol, particularly in accordance with a Universal Mobile Telecommunications System Terrestrial Radio Access Network protocol.

22. A communication network (100), the communication network (100) comprising
a mobile communication terminal (102) according to any one of claims 1 to 11;
a communication station (101) according to any one of claims 12 to 21;

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wherein the mobile communication terminal (102) is communicatively coupled to the communication station (101).

23. A method of communicating in a communication network (100), the method comprising

communicatively coupling a mobile communication terminal (102) to a communication station (101);

generating, by the mobile communication terminal (102), a Common Control Channel information comprising message for transmission to the communication station (101);

rearranging, by the mobile communication terminal (102), the Common Control Channel information comprising message in accordance with a property of the Common Control Channel information comprising message before transmission to the communication station (101);

evaluating, by the communication station (101), the rearranged Common Control Channel information comprising message received from the mobile communication terminal (102).

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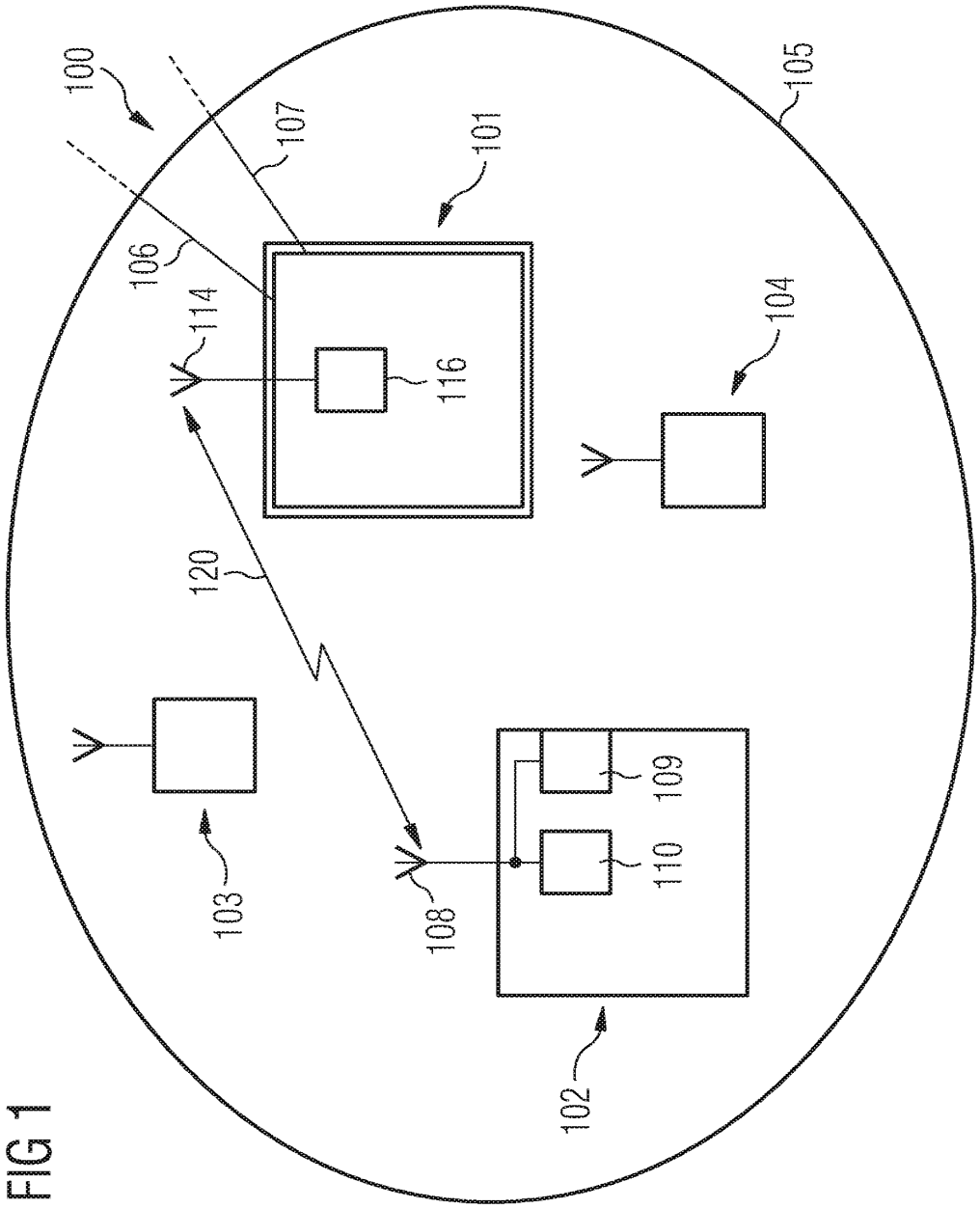
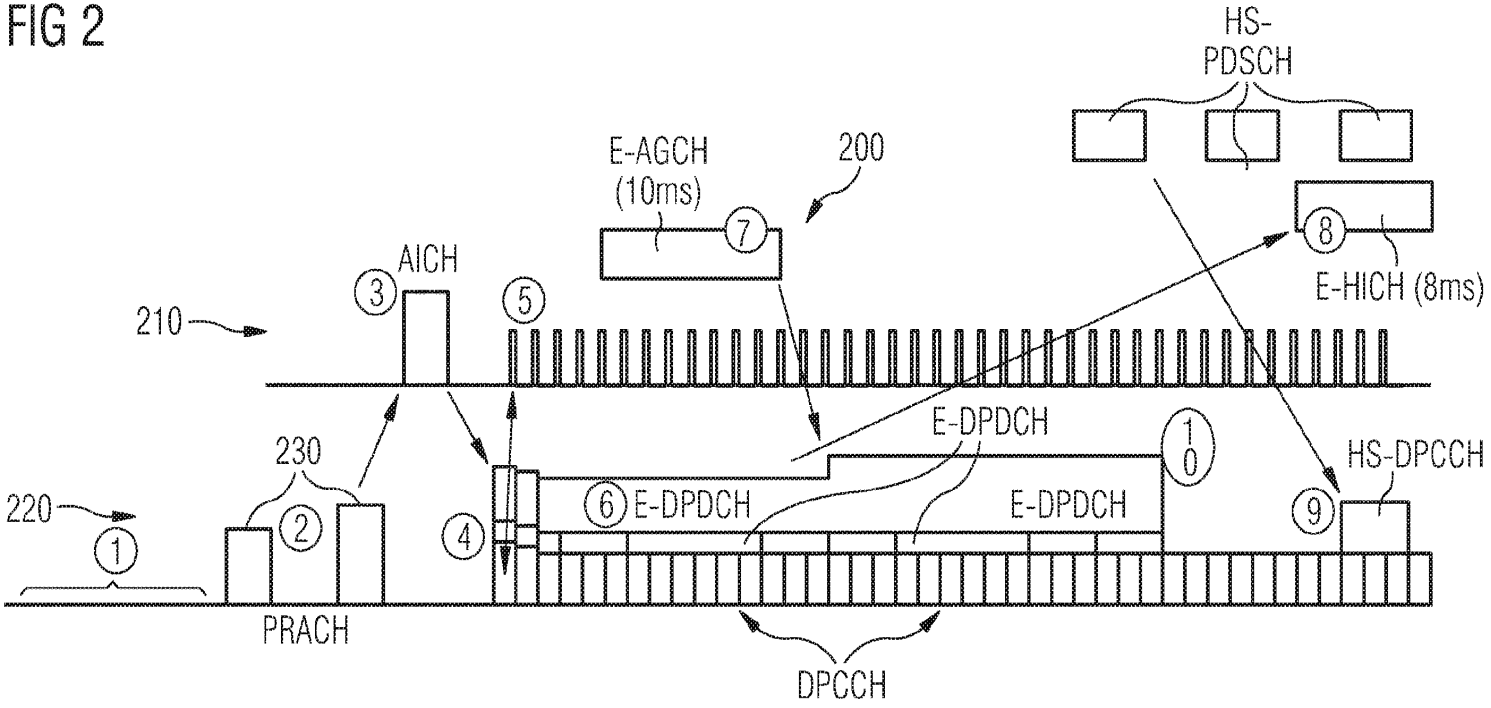


FIG 1

FIG 2



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FIG 3

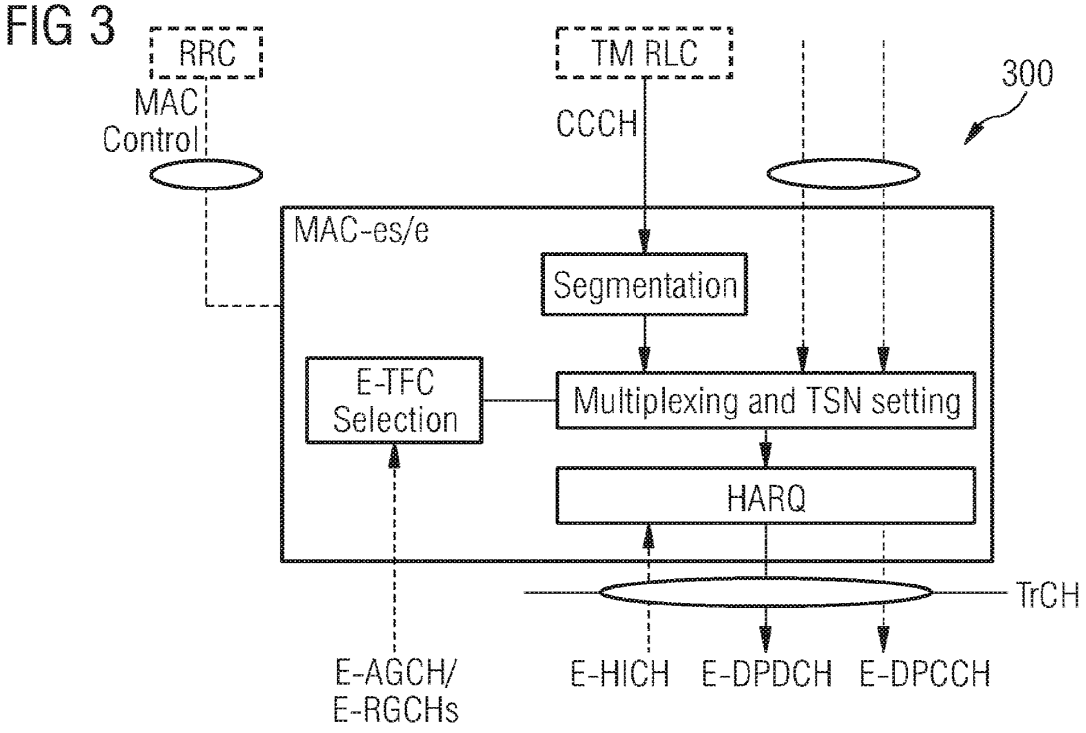

RRC
MAC Control
TM RLC
CCCH
300
MAC-es/e
Segmentation
E-TFC Selection
Multiplexing and TSN setting
HARQ
TrCH
E-AGCH/ E-RGCHs
E-HICH
E-DPDCH
E-DPCCH

FIG 4

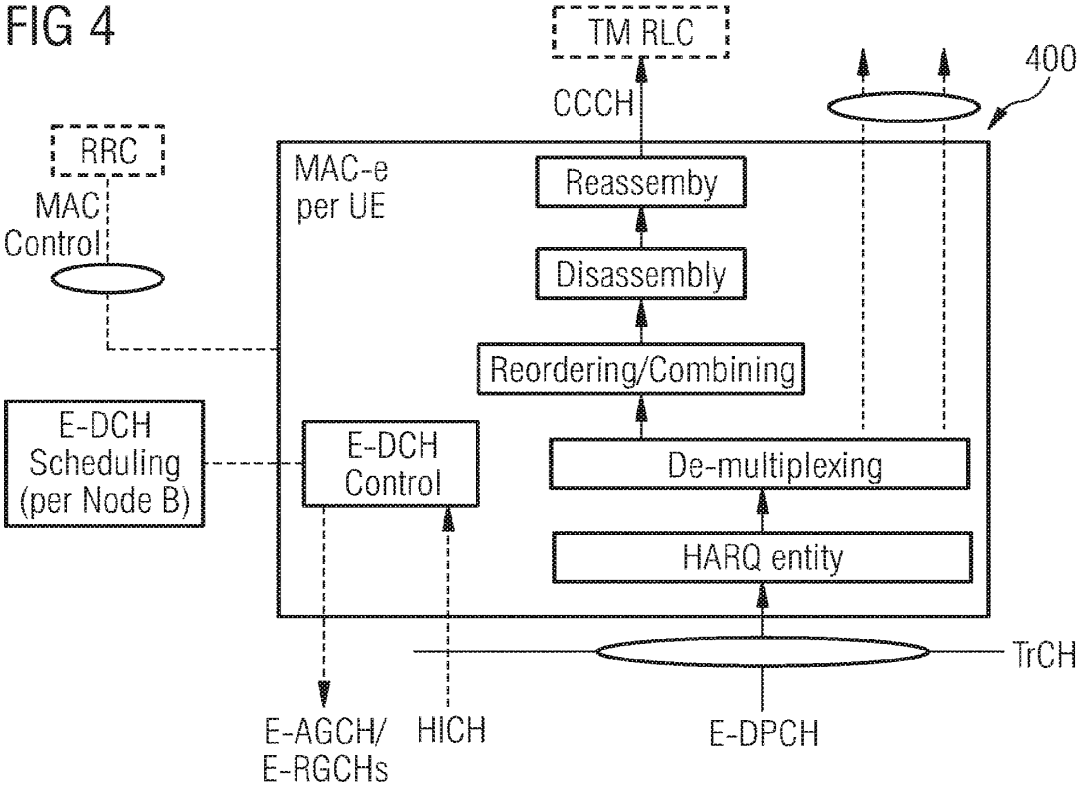

TM RLC
CCCH
400
RRC
MAC Control
MAC-e per UE
Reassemby
Disassembly
Reordering/Combining
E-DCH Scheduling (per Node B)
E-DCH Control
De-multiplexing
HARQ entity
TrCH
E-AGCH/ E-RGCHs
HICH
E-DPCH

FIG 5

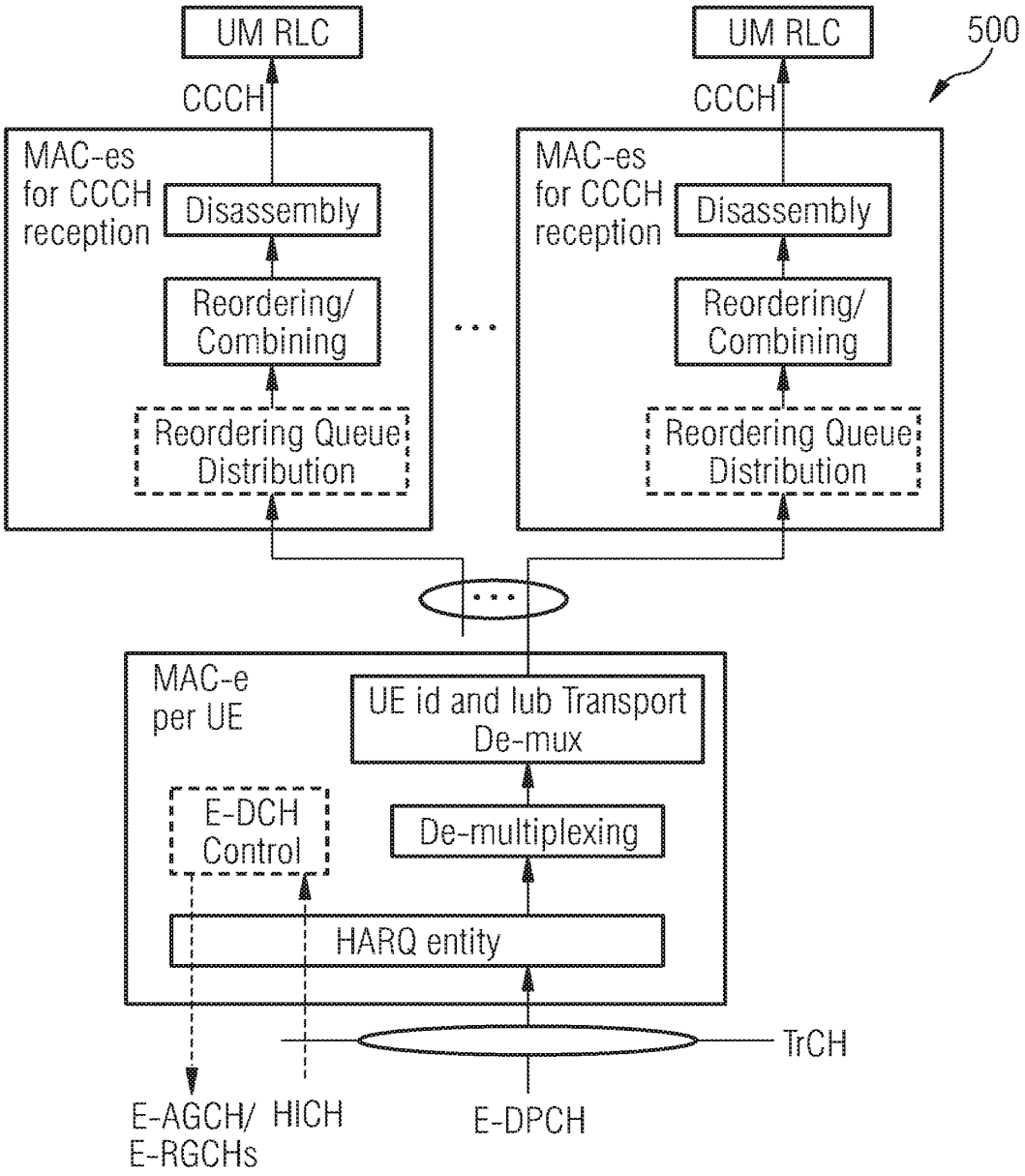
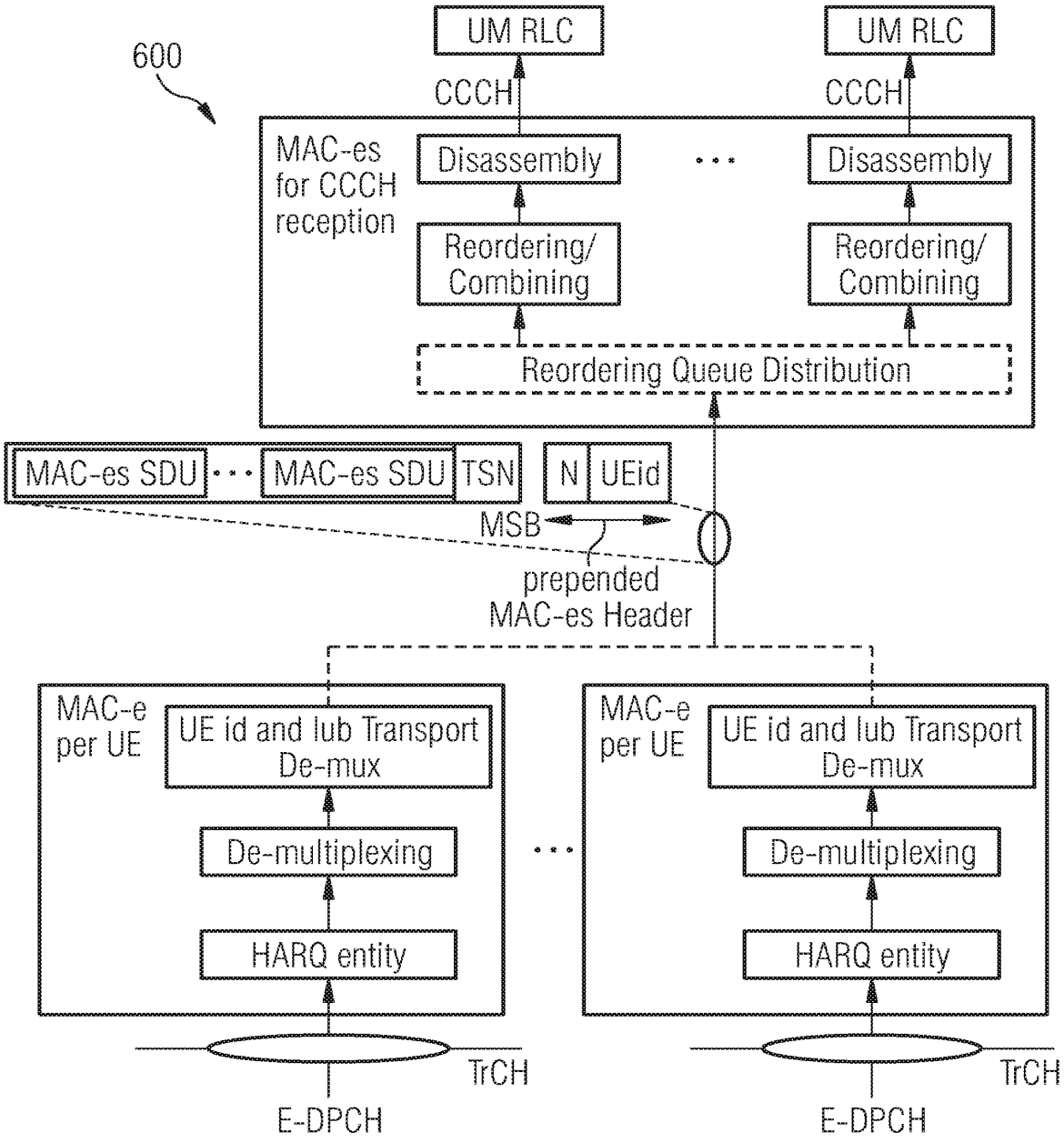

UM RLC
UM RLC
500
CCCH
CCCH
MAC-es for CCCH reception
Disassembly
Reordering/ Combining
Reordering Queue Distribution
MAC-es for CCCH reception
Disassembly
Reordering/ Combining
Reordering Queue Distribution
MAC-e per UE
UE id and Iub Transport De-mux
E-DCH Control
De-multiplexing
HARQ entity
TrCH
E-AGCH/ HICH E-RGCHs
E-DPCH

FIG 6



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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2008/060097

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04Q7/38

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)
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 practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005/266846 A1 (KIM MYEONG C [DE]) 1 December 2005 (2005-12-01) paragraph [0003] paragraph [0058] - paragraph [0064] paragraph [0075] - paragraph [0086] paragraph [0124] - paragraph [0129] paragraph [0132]	1-23

☐ 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 document 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
25 September 2008	02/10/2008

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Rothlübbers, C

Form PCT/ISA/210 (second sheet) (April 2005)

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INTERNATIONAL SEARCH REPORT

Information on patent family members

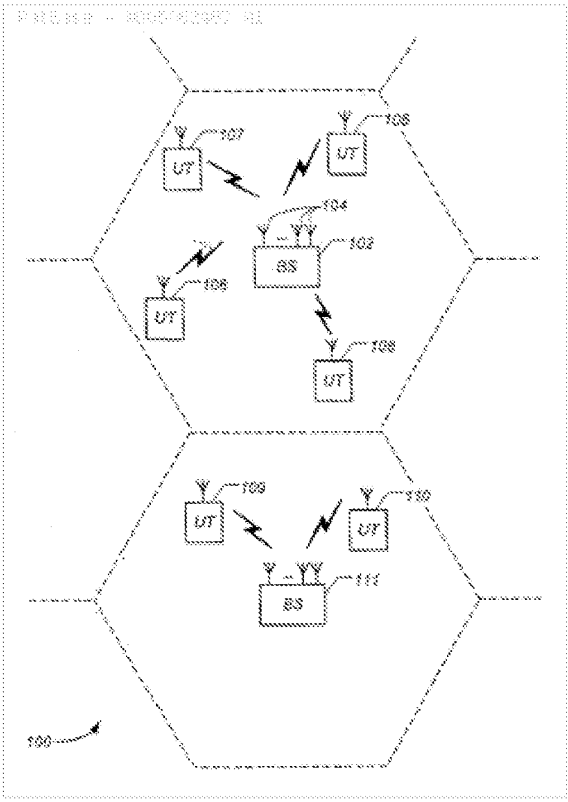
International application No
PCT/EP2008/060097

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2005266846 A1	01-12-2005	NONE	

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1) Family number: 32065431 (WO05062487 A1) © PatBase

Title: (WO05062487A1) [EN] REPETITIVE PAGING FROM WIRELESS DATA BASE STATION HAVING A SMART ANTENNA SYSTEM
[FR] RECHERCHE REPETITIVE DEPUIS UNE STATION DE BASE DE COMMUNICATION DE DONNEES SANS FIL A SYSTEME D'ANTENNE INTELLIGENTE



Abstract: (WO05062487A1)

[EN] A method, 19, and machine-readable medium for transmitting a downlink signal in a substantially non directional manner from a communication station to a first remote communication device on a downlink channel. The communication station includes a smart antenna system having an array of antenna elements. The method includes determining a first downlink smart antenna processing strategy for transmitting in a first non-directional manner, transmitting a first downlink message from the communication station in the first non-directional manner using the first downlink smart antenna processing strategy, and repeating transmitting the first downlink message from the communication station in a second non-directional manner. The repeated transmitting is non-identical repetition to facilitate the interference environment being different in the repetition.

[FR] L'invention concerne un procede et un support lisible par la machine pour la transmission de signal de liaison descendante, de facon sensiblement non directive, depuis une station de communication vers un premier dispositif de communication distant sur canal de liaison descendante. La station comprend un systeme d'antenne intelligente a reseau d'elements d'antenne. Le procede consiste a determiner une premiere strategie de traitement d'antenne intelligente sur liaison descendante pour la transmission selon un premier mode non directif, la transmission d'un premier message sur liaison descendante depuis la station de communication dans le premier mode non directif au moyen de la strategie susmentionnee, et repetition de la transmission du premier message sur liaison descendante depuis la station dans un second mode

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non directif. La transmission repetee est une repetition non identique facilitant la difference d'environnement de brouillage dans la repetition.

Family:	Publication number	Publication date	Application number	Application date
	AU2003304639 AA	20050714	AU20030304639	20031215
	DE10394345 T5	20061116	DE20031094345T	20031215
	GB200613881 A0	20060830	GB20060013881	20031215
	GB2426158 A1	20061115	GB20060013881	20031215
	GB2426158 B2	20080618	GB20060013881	20031215
	JP2007525036 T2	20070830	JP20050512431T	20031215
	KR101009329 B1	20110118	KR20067014223	20060714
	KR20060126711 A	20061208	KR20067014223	20031215
	WO05062487 A1	20050707	WO2003US39970	20031215

Priority: WO2003US39970 20031215

Number of Forward Citations: 10

Probable Assignee	ARRAYCOMM INC
Assignee(s): (std):	ARRAYCOMM INC ; ARRAYCOMM LLC
Inventor(s): (std):	TROTT MITCHELL D
Inventor(s):	MITCHELL D TROTT

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特表2007-525036
(P2007-525036A)
(43)公表日　平成19年8月30日(2007.8.30)

(51)Int.Cl.		F I			テーマコード（参考）
H04B 7/10	***(2006.01)***	H04B	7/10	A	5K022
H04B 7/26	***(2006.01)***	H04B	7/26	B	5K028
H04J 15/00	***(2006.01)***	H04J	15/00		5K059
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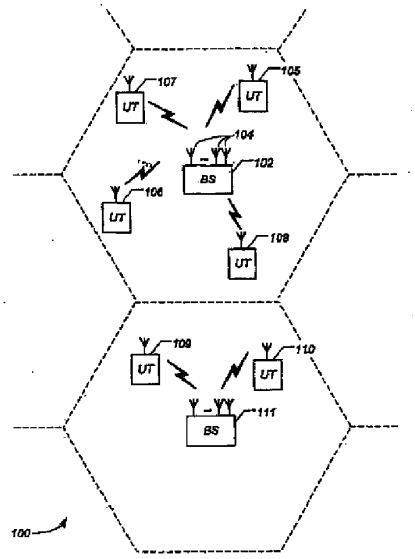
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(54)【発明の名称】スマート・アンテナ・システムを有する無線データ基地局からの繰り返しページング

(57)【要約】

通信局から第１のリモート通信デバイスに、ダウンリンク・チャネル上で、実質的に無指向性の形でダウンリンク信号を送信するための方法１９、およびマシン可読媒体。通信局は、アンテナ要素アレイを有するスマート・アンテナ・システムを含む。方法は、第１の無指向性の形で送信するための第１のダウンリンク・スマート・アンテナ処理戦略を決定すること、第１のダウンリンク・スマート・アンテナ処理戦略を使用して、通信局から第１の無指向性の形で第１のダウンリンク・メッセージを送信すること、および通信局から第２の無指向性の形で第１のダウンリンク・メッセージを送信することを繰り返すことを含む。繰り返される送信は、繰り返しにおいて干渉環境が異なることを促進させるために同一ではない繰り返しである。



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【特許請求の範囲】
【請求項１】
アンテナ要素アレイを有するスマート・アンテナ・システムを含む通信局から第１のリモート通信デバイスに、ダウンリンク・チャネル上で、実質的に無指向性の形でダウンリンク信号を送信する方法であって、
第１の無指向性の形で送信する第１のダウンリンク・スマート・アンテナ処理戦略を決定するステップと、
前記第１のダウンリンク・スマート・アンテナ処理戦略を使用して、前記第１の無指向性の形で前記通信局から第１のダウンリンク・メッセージを送信するステップと、
前記通信局から第１のダウンリンク・メッセージを第２の無指向性の形で送信することを繰り返すステップと
を含み、
前記繰り返される送信は、前記繰り返しにおいて干渉環境が異なることを促進させるために、同一ではない繰り返しである方法。
【請求項２】
前記第１の実質的に無指向性の形は前記第２の実質的に無指向性の形とは異なる請求項１に記載の方法。
【請求項３】
最初に送信された第１のダウンリンク・メッセージを前記第１のリモート通信デバイスが受信することに成功したか否かを前記通信局において判定するステップをさらに含み、
前記繰り返される送信は、前記第１のリモート通信デバイスが、最初に送信された第１のダウンリンク・メッセージを受信することに成功しなかったときに行われる請求項１に記載の方法。
【請求項４】
前記第１のダウンリンク・メッセージの送信と前記第１のダウンリンク・メッセージの繰り返される送信の間に、前記送信および前記繰り返される送信と同一のダウンリンク・チャネルで、他のリモート通信デバイスが、１つまたは複数の信号を受信するであろう要請されていないことが前記通信局に知られている１つまたは複数の他のリモート通信デバイスから、１つまたは複数の信号を前記通信局において受信するステップをさらに含み、
前記第１のダウンリンク処理戦略と前記第２のダウンリンク処理戦略の前記決定は、前記他のリモート通信デバイスから受信された前記信号を使用する請求項１に記載の方法。
【請求項５】
前記通信局は、通信システムの第１の基地局であり、前記第１のリモート通信デバイスは、前記第１の基地局に関連するリモート・ユーザ端末装置であり、
それぞれの他のリモート通信デバイスは、前記第１の基地局とは別個の１つまたは複数の他の基地局に関連するリモート・ユーザ端末装置である請求項４に記載の方法。
【請求項６】
前記第１の通信局は、従来のＴＤＭＡチャネルにおいて前記第１のリモート通信デバイスと通信することができる請求項１に記載の方法。
【請求項７】
前記第１の通信局は、従来のＣＤＭＡチャネルにおいて前記第１のリモート通信デバイスと通信することができる請求項１に記載の方法。
【請求項８】
前記第１の通信局は、従来のＦＤＭＡチャネルにおいて前記第１のリモート通信デバイスと通信することができる請求項１に記載の方法。
【請求項９】
前記第１の通信局はセルラー基地局を含む請求項１に記載の方法。
【請求項１０】
前記第１のリモート通信デバイスは第２の複数のアンテナ要素を含む請求項１に記載の方法。

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【請求項１１】
前記第１のリモート通信デバイスは前記第２の複数のアンテナ要素を含む第２のスマート・アンテナ・システムを含む請求項１０に記載の方法。
【請求項１２】
前記通信局は、外部のデータ・ネットワークおよび／または音声ネットワークに結合される請求項１に記載の方法。
【請求項１３】
前記外部ネットワークはインターネットを含む請求項１２に記載の方法。
【請求項１４】
前記第１のリモート通信デバイスは第１のリモート・ユーザ端末装置を含む請求項１に記載の方法。
【請求項１５】
前記第１のリモート・ユーザ端末装置は移動性である請求項１４に記載の方法。
【請求項１６】
前記第１の無指向性の形、および前記第２の無指向性の形で送信する前記ステップは、前記要請されていない通信デバイスに向かう干渉を軽減することを含む請求項４に記載の方法。
【請求項１７】
前記第１のスマート・アンテナ処理戦略は、前記受信するステップで前記通信局において受信された実質的な信号が全く存在しなかった第１の方向における送信のためのものであり、
前記第２のスマート・アンテナ処理戦略は、前記受信するステップで前記通信局において受信された実質的な信号が全く存在しなかった第２の方向における送信のためのものであり、
前記第１の方向と前記第２の方向が異なる請求項４に記載の方法。
【請求項１８】
前記第１のスマート・アンテナ処理戦略と前記第２のスマート・アンテナ処理戦略は、前記受信するステップで前記通信局において受信された前記信号の前記受信信号共分散から決定される請求項１７に記載の方法。
【請求項１９】
スマート・アンテナ処理戦略に従って第１のリモート通信デバイスと通信する、複数のアンテナ要素を含むスマート・アンテナ・システムと、
第１のダウンリンク・スマート・アンテナ処理戦略を決定するプロセッサと、
前記複数のアンテナ要素と前記プロセッサに結合され、前記第１のダウンリンク・スマート・アンテナ処理戦略を使用して、前記第１の無指向性の形で通信局から第１のダウンリンク・メッセージを送信するダウンリンク送信ユニットと
を含む通信局であって、
前記ダウンリンク送信ユニットは、第２の無指向性の形で通信局から前記第１のダウンリンク・メッセージを繰り返して送信し、前記繰り返される送信は、繰り返しにおいて干渉環境が異なることを促進させるように同一でない繰り返しである、前記通信局。
【請求項２０】
前記第１の実質的に無指向性の形、前記第２の実質的に無指向性の形とは異なる請求項１９に記載の通信局。
【請求項２１】
前記アンテナ要素複数に結合され、前記第１のダウンリンク・メッセージに応答して前記第１のリモート通信デバイスからアップリンク応答信号を受信するアップリンク受信ユニットをさらに含み、
前記ダウンリンク送信ユニットは、前記第１のリモート通信デバイスが、最初に送信された第１のダウンリンク・メッセージを受信することに成功しなかった場合、前記第１のダウンリンク・メッセージを送信することを繰り返す請求項１９に記載の通信局。

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【請求項２２】
前記複数のアンテナ要素と前記プロセッサに結合されたアップリンク受信ユニットであって、前記第１のダウンリンク・メッセージの前記送信と、前記第１のダウンリンク・メッセージの前記繰り返される送信の間に、前記送信および前記繰り返される送信と同一のダウンリンク・チャネルで、他のリモート通信デバイスが、１つまたは複数の信号を受信するであろう要請されていないことが前記通信局に知られている１つまたは複数の他のリモート通信デバイスから、１つまたは複数の信号を受信するユニットをさらに含む通信局であって、
前記プロセッサは、第２のダウンリンク・スマート・アンテナ処理戦略をさらに決定するものであり、前記プロセッサは、前記他のリモート通信デバイスから受信された前記信号を使用して、前記第１のダウンリンク戦略と前記第２のダウンリンク戦略を決定する請求項１９に記載の通信局。
【請求項２３】
前記通信局は、通信システムの第１の基地局であり、前記第１のリモート通信デバイスは、前記第１の基地局に関連するリモート・ユーザ端末装置であり、
それぞれの他のリモート通信デバイスは、前記第１の基地局とは別個の１つまたは複数の他の基地局に関連するリモート・ユーザ端末装置である請求項２２に記載の通信局。
【請求項２４】
従来のＴＤＭＡチャネルにおいて前記第１のリモート通信デバイスと通信することができる請求項１９に記載の通信局。
【請求項２５】
従来のＣＤＭＡチャネルにおいて前記第１のリモート通信デバイスと通信することができる請求項１９に記載の通信局。
【請求項２６】
従来のＦＤＭＡチャネルにおいて前記第１のリモート通信デバイスと通信することができる請求項１９に記載の通信局。
【請求項２７】
セルラー基地局を含む請求項１９に記載の通信局。
【請求項２８】
前記第１のリモート通信デバイスは第２の複数のアンテナ要素を含む請求項１９に記載の通信局。
【請求項２９】
前記第１のリモート通信デバイスは前記第２の複数のアンテナ要素を含む第２のスマート・アンテナ・システムを含む請求項２８に記載の通信局。
【請求項３０】
外部のデータ・ネットワークおよび／または音声ネットワークに結合された請求項１９に記載の通信局。
【請求項３１】
前記外部ネットワークはインターネットを含む請求項３０に記載の通信局。
【請求項３２】
前記第１のリモート通信デバイスは第１のリモート・ユーザ端末装置を含む請求項１９に記載の通信局。
【請求項３３】
前記第１のリモート・ユーザ端末装置は移動性である請求項３２に記載の通信局。
【請求項３４】
第１の無指向性の形と第２の無指向性の形は、前記要請されていない通信デバイスに向かう干渉を軽減することを含む請求項２２に記載の通信局。
【請求項３５】
前記第１のスマート・アンテナ処理戦略は、前記受信するステップで前記通信局において受信された実質的な信号が全く存在しなかった第１の方向における送信のためのもので

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あり、
前記第２のスマート・アンテナ処理戦略は、前記受信するステップで前記通信局において受信された実質的な信号が全く存在しなかった第２の方向における送信のためのものであり、
前記第１の方向と前記第２の方向は異なる請求項２２に記載の通信局。
【請求項３６】
前記第１のスマート・アンテナ処理戦略と前記第２のスマート・アンテナ処理戦略は、前記受信するステップで前記通信局において受信された前記信号の前記受信信号共分散から決定される請求項３５に記載の通信局。
【請求項３７】
マシンによって実行されると、アンテナ要素アレイを有するスマート・アンテナ・システムを含む通信局から第１のリモート通信デバイスに、ダウンリンク・チャネル上で、実質的に無指向性の形でダウンリンク信号を送信する方法であって、
第１の無指向性の形で送信する第１のダウンリンク・スマート・アンテナ処理戦略を決定するステップと、
前記第１のダウンリンク・スマート・アンテナ処理戦略を使用して、前記第１の無指向性の形で前記通信局から第１のダウンリンク・メッセージを送信するステップと、
前記通信局から第１のダウンリンク・メッセージを第２の無指向性の形で送信することを繰り返すステップとを含み、
前記繰り返される送信は、前記繰り返しにおいて干渉環境が異なることを促進させるために同一ではない繰り返しである方法を前記マシンが実行するようにさせるマシン実行可能命令セットを表す情報を格納しているマシン可読媒体。
【請求項３８】
前記第１の実質的に無指向性の形は前記第２の実質的に無指向性の形とは異なる請求項３７に記載のマシン可読媒体。
【請求項３９】
前記方法は、
前記第１のリモート通信デバイスが最初に送信された第１のダウンリンク・メッセージを受信することに成功したか否かを前記通信局において判定するステップをさらに含み、
前記繰り返される送信は、前記第１のリモート通信デバイスが、最初に送信された第１のダウンリンク・メッセージを受信することに成功しなかったときに行われる請求項３７に記載のマシン可読媒体。
【請求項４０】
前記方法は、
前記第１のダウンリンク・メッセージの前記送信と前記第１のダウンリンク・メッセージの前記繰り返される送信の間に、前記送信および前記繰り返される送信と同一のダウンリンク・チャネルで、他のリモート通信デバイスが、１つまたは複数の信号を受信するであろう要請されていないことが前記通信局に知られている１つまたは複数の他のリモート通信デバイスから、前記通信局において１つまたは複数の信号を受信するステップをさらに含み、
前記第１のダウンリンク処理戦略と前記第２のダウンリンク処理戦略の前記決定は、前記他のリモート通信デバイスから受信された前記信号を使用する請求項３７に記載のマシン可読媒体。
【請求項４１】
前記通信局は、通信システムの第１の基地局であり、前記第１のリモート通信デバイスは、前記第１の基地局に関連するリモート・ユーザ端末装置であり、
それぞれの他のリモート通信デバイスは、前記第１の基地局とは別個の１つまたは複数の他の基地局に関連するリモート・ユーザ端末装置である請求項４０に記載のマシン可読媒体。
【請求項４２】

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前記通信局は、従来のＴＤＭＡチャネルにおいて前記第１のリモート通信デバイスと通信することができる請求項３７に記載のマシン可読媒体。

【請求項４３】

前記通信局は、従来のＣＤＭＡチャネルにおいて前記第１のリモート通信デバイスと通信することができる請求項３７に記載のマシン可読媒体。

【請求項４４】

前記通信局は、従来のＦＤＭＡチャネルにおいて前記第１のリモート通信デバイスと通信することができる請求項３７に記載のマシン可読媒体。

【請求項４５】

前記通信局はセルラー基地局を含む請求項３７に記載のマシン可読媒体。

【請求項４６】

前記第１のリモート通信デバイスは、第２の複数のアンテナ要素を含む請求項３７に記載のマシン可読媒体。

【請求項４７】

前記第１のリモート通信デバイスは、前記第２の複数のアンテナ要素を含む第２のスマート・アンテナ・システムを含む請求項４６に記載のマシン可読媒体。

【請求項４８】

前記通信局は、外部のデータ・ネットワークおよび／または音声ネットワークに結合される請求項３７に記載のマシン可読媒体。

【請求項４９】

前記外部ネットワークはインターネットを含む請求項４８に記載のマシン可読媒体。

【請求項５０】

前記第１のリモート通信デバイスは第１のリモート・ユーザ端末装置を含む請求項３７に記載のマシン可読媒体。

【請求項５１】

前記第１のリモート・ユーザ端末装置は移動性である請求項５０に記載のマシン可読媒体。

【請求項５２】

前記第１の無指向性の形と前記第２の無指向性の形で送信する前記ステップは、前記要請されていない通信デバイスに向かう干渉を軽減することを含む請求項４０に記載のマシン可読媒体。

【請求項５３】

前記第１のスマート・アンテナ処理戦略は、前記受信するステップで前記通信局において受信された実質的な信号が全く存在しなかった第１の方向における送信のためのものであり、

前記第２のスマート・アンテナ処理戦略は、前記受信するステップで前記通信局において受信された実質的な信号が全く存在しなかった第２の方向における送信のためのものであり、

前記第１の方向と前記第２の方向が異なる請求項４０に記載のマシン可読媒体。

【請求項５４】

前記第１のスマート・アンテナ処理戦略と前記第２のスマート・アンテナ処理戦略は、前記受信するステップで前記通信局において受信された前記信号の前記受信信号共分散から決定される請求項５３に記載のマシン可読媒体。

【請求項５５】

第１の通信局とは別個の、１つまたは複数の他のリモート通信デバイスにそれぞれが関連する、少なくとも１つまたはいくつかの他の通信局を含む通信システムの前記第１の通信局であって、少なくとも１つの第１のリモート通信デバイスに関連し、アンテナ要素アレイを有するスマート・アンテナ・システムを含む前記第１の通信局からダウンリンクで第１のリモート通信デバイスにページングを行う方法であって、

前記第１の通信局が、前記第１の通信局の関連するリモート通信デバイスと通信する第

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１の順次時間間隔セットを提供するステップであって、前記第１のセットの各時間間隔は、選択された数のダウンリンク・コンベンショナル・チャネルを含む、前記提供するステップと、

前記第１のセットの第１の時間間隔の第１のダウンリンク・コンベンショナル・チャネルの間に、前記第１の通信局から前記第１のリモート通信デバイスに第１のページング信号を送信するステップと、

前記第１の時間間隔よりも後の時間間隔に送信を繰り返すステップであって、前記繰り返される送信は、前記第１のセットのダウンリンク・コンベンショナル・チャネルにおける、前記第１の通信局から前記第１のリモート通信デバイスへの第２のページング信号の送信である、前記繰り返すステップとを含み、

前記繰り返して送信するステップは、第１の送信ステップ中に第１のダウンリンク・コンベンショナル・チャネルにおいてダウンリンクでアクティブに受信するリモート通信デバイスのセットが、繰り返して送信するステップ中にページングのために使用されるダウンリンク・コンベンショナル・チャネルにおいてその繰り返して送信するステップ中にアクティブに受信するリモート通信デバイスのセットと異なるように促進させるために同一の繰り返し以外の戦略を使用することを特徴とする方法。

【請求項５６】

前記第１の通信局の各リモート通信デバイスは、前記デバイスが前記デバイスの基地局とアクティブに通信しているアクティブ状態と、前記デバイスが前記デバイスの識別を確立しているがアクティブに通信していないアイドル状態とを有し、

前記第１のリモート通信デバイスは、前記ページング信号の前記第１の送信ステップ中、アイドル状態にある請求項５５に記載の方法。

【請求項５７】

前記第１のリモート通信デバイスが、前記第１のページング信号を受信することに成功したか否かを示すフィードバックを、前記第１のリモート通信デバイスが前記第１の通信局に与えるステップと、

前記第１の通信局が、前記フィードバックから、前記ページング信号が、前記第１のリモート通信デバイスによって受信されることに成功したか否かを判定するステップをさらに含み、

前記繰り返して送信するステップは、前記第１のページング信号が、前記第１のリモート通信デバイスによって受信されることに成功しなかったと前記第１の通信局が判定した場合に実行される請求項５５に記載の方法。

【請求項５８】

前記繰り返して送信するステップの前記後の時点は、前記第１のセットの次の時間間隔である請求項５５に記載の方法。

【請求項５９】

各時間間隔内の前記選択された数のダウンリンク・コンベンショナル・チャネルのそれぞれは、前記時間間隔内の異なるダウンリンク・データ転送期間である請求項５５に記載の方法。

【請求項６０】

前記繰り返して送信するステップは、第１に送信するステップの前記第１のダウンリンク・トラフィック・データ転送コンベンショナル・チャネルとは異なるダウンリンク・コンベンショナル・チャネルにおいて行われる請求項５５に記載の方法。

【請求項６１】

前記時間間隔内の各ダウンリンク・データ転送期間は、少なくとも２つの部分期間に分割され、最初に送信するステップは、前記第１のダウンリンク・トラフィック・データ転送期間の第１の部分期間において行われ、前記繰り返して送信するステップは、前記第１のダウンリンク・トラフィック・データ転送期間の異なる部分期間において行われる請求項５９に記載の方法。

【請求項６２】

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前記時間間隔内の各ダウンリンク・トラフィック・データ転送期間は、少なくとも２つの部分期間に分割され、最初に送信するステップは、前記第１のダウンリンク・トラフィック・データ転送期間の第１の部分期間において行われ、前記繰り返して送信するステップは、異なるダウンリンク・トラフィック・データ転送期間の異なる部分期間において行われる請求項５９に記載の方法。

【請求項６３】

送信するステップを数回実行することを含み、繰り返しの回数は、前記リモート通信デバイスの近接性の推定値に依存し、送信するステップの各繰り返しは、別々のダウンリンク・トラフィック・データ転送コンベンショナル・チャネルにおいて、前記第１の順次時間間隔セットの異なる時間間隔である請求項６０に記載の方法。

【請求項６４】

第１の無指向性の形でダウンリンク信号を送信する第１のダウンリンク・スマート・アンテナ処理戦略を決定するステップと、

第２の無指向性の形でダウンリンク信号を送信する第２のダウンリンク・スマート・アンテナ処理戦略を決定するステップをさらに含む方法であって、

最初に送信するステップは、前記第１のダウンリンク戦略を使用して、前記第１の実質的に無指向性の形で送信し、

前記繰り返して送信するステップは、前記第２のダウンリンク戦略を使用して、前記第２の実質的に無指向性の形で送信し、

前記第１の実質的に無指向性の形は前記第２の実質的に無指向性の形とは異なる請求項５５に記載の方法。

【請求項６５】

前記第１の通信局からの前記ダウンリンク信号の前記送信中に、前記第１のダウンリンク・チャネルで１つまたは複数の信号をそれぞれが受信するであろう要請されていないリモート通信デバイスであることが前記第１の通信局に知られている、前記通信システムの１つまたは複数のリモート通信デバイスから、第１のアップリンク・コンベンショナル・チャネルにおいて送信された１つまたは複数の信号を受信するステップをさらに含み、

前記第１のダウンリンク・スマート・アンテナ処理戦略と前記第２のダウンリンク・スマート・アンテナ処理戦略は、前記１つまたは複数の要請されていないリモート通信デバイスからの前記信号を使用する請求項６４に記載の方法。

【請求項６６】

前記第１の無指向性の形と前記第２の無指向性の形で前記送信するステップは、前記第１のダウンリンク・コンベンショナル・チャネルにおいて前記要請されていないリモート通信デバイスに向かう干渉を軽減することを含む請求項６５に記載の方法。

【請求項６７】

前記第１のスマート・アンテナ処理戦略は、前記第１のアップリンク・コンベンショナル・チャネルにおいてアップリンクで受信された実質的な信号が全く存在しなかった第１の方向で、前記ダウンリンク信号を送信することを含み、

前記第２のスマート・アンテナ処理戦略は、前記第１のアップリンク・コンベンショナル・チャネルにおいてアップリンクで受信された実質的な信号が全く存在しなかった第２の方向で、前記ダウンリンク信号を送信することを含み、

前記第１の方向と前記第２の方向は、異なる、軽減する請求項６５に記載の方法。

【請求項６８】

前記第１のダウンリンク・スマート・アンテナ処理戦略と前記第２のダウンリンク・スマート・アンテナ処理戦略は、前記第１のアップリンク・コンベンショナル・チャネルで受信された前記信号の前記受信信号共分散から決定される請求項６７に記載の方法。

【発明の詳細な説明】

【関連出願】

【０００１】

（関連特許出願）

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本発明は、本発明の譲受人にそれぞれ譲渡された、参照によりそれぞれが本明細書に組み込まれている、以下の３つの同時に出願した係属中の米国特許出願に関連する。すなわち、
（１）Ｙｏｕｓｓｅｆｍｉｒ他に発行された「ＤＯＷＮＬＩＮＫ　ＴＲＡＮＳＭＩＳＳＩＯＮ　ＩＮ　Ａ　ＷＩＲＥＬＥＳＳ　ＤＡＴＡ　ＣＯＭＭＵＮＩＣＡＴＩＯＮ　ＳＹＳＴＥＭ　ＨＡＶＩＮＧ　Ａ　ＢＡＳＥ　ＳＴＡＴＩＯＮ　ＷＩＴＨ　Ａ　ＳＭＡＲＴ　ＡＮＴＥＮＮＡ　ＳＹＳＴＥＭ」という名称の整理／整理番号０１５６８５．Ｐ０３１、
（２）発明者Ｔｒｏｔｔ他に発行された「ＣＯＯＰＥＲＡＴＩＶＥ　ＰＯＬＬＩＮＧ　ＩＮ　Ａ　ＷＩＲＥＬＥＳＳ　ＤＡＴＡ　ＣＯＭＭＵＮＩＣＡＴＩＯＮ　ＳＹＳＴＥＭ　ＨＡＶＩＮＧ　ＳＭＡＲＴ　ＡＮＴＥＮＮＡ　ＰＲＯＣＥＳＳＩＮＧ」という名称の整理／参照番号０１５６８５．Ｐ０３４、
（３）発明者Ｂａｒｒａｔｔ他に発行された「ＮＯＮ－ＤＩＲＥＣＴＩＯＮＡＬ　ＴＲＡＮＳＭＩＴＴＩＮＧ　ＦＲＯＭ　Ａ　ＷＩＲＥＬＥＳＳ　ＤＡＴＡ　ＢＡＳＥ　ＳＴＡＴＩＯＮ　ＨＡＶＩＮＧ　Ａ　ＳＭＡＲＴ　ＡＮＴＥＮＮＡ　ＳＹＳＴＥＭ」という名称の整理／参照番号０１５６８５．Ｐ０２７。

【技術分野】

【０００２】

本発明は、無線通信に関し、より詳細には、基地局送信機／受信機（トランシーバ）と複数のリモート・ユーザ端末装置の間のセルラー無線通信システム、または類似の無線通信システムにおける、特に、変化する環境における無線通信のための、無線通信方法に関する。

【背景技術】

【０００３】

そのような通信システムでは、スマート・アンテナ・システムなどの指向性アンテナ・システムを使用して、通信リンクの信号対雑音比を高め、干渉を減らすことが望ましい。また、スマート・アンテナ・システムの使用は、マルチパスやフェージングへの耐性も提供する。

【０００４】

スマート・アンテナ・システムは、アンテナ要素アレイと、信号対雑音比を高め、かつ／または干渉を減らすようにスマート・アンテナ処理戦略を決定する機構とを含む。１つのスマート・アンテナ・システムは、いくつかの固定ビームを態様するビームフォーマと、ビームの１つまたは複数を結合するための機構とを含む「スイッチ・ビーム」システムである。スマート・アンテナ・システムは、代替として、特定の受信状況または送信状況のための処理戦略に従って適応させることが可能な無限に可変のアンテナ放射パターンを実現することができるスマート・アンテナ処理戦略決定機構を含む適応アンテナ・アレイ・システムであってもよい。

【０００５】

アップリンクにおける（ユーザ端末装置から基地局への）通信に、またはダウンリンクにおける（基地局からユーザ端末装置への）通信に、あるいは両方の通信段階における通信にスマート・アンテナ・システムを使用できる。

【０００６】

また、スマート・アンテナ・システムは、「ＳＤＭＡ」（空間分割多重アクセス）も可能である。ＳＤＭＡでは、基地局の複数のユーザ端末装置が、同一の「コンベンショナル」チャネルで、つまり、同一の周波数と時間チャネルで（ＦＤＭＡ－ＴＤＭＡシステムの場合）、または符号チャネルで（ＣＤＭＡシステムの場合）基地局と通信することが、同一チャネル・ユーザ端末装置が空間的に離れている限り、可能である。そのようなケースでは、スマート・アンテナ・システムは、同じコンベンショナル・チャネル内で、複数の「空間チャネル」を提供する。

【０００７】

セルラー・システムにおいて、送信ＲＦ環境と干渉環境は、比較的急速に変化すること

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がある。パケット化システムでは、それらの環境が、順次パケットを送る間に大きく変化する可能性がある。例えば、スマート・アンテナ・システムと、１つまたは複数のリモート・ユーザ端末装置とを有する基地局を含むセルラー・システムを考えてみる。急速に変化する環境において、適切なスマート・アンテナ処理戦略を決定することは、伝送期間と極めてよく一致する時間間隔中に移動体ユーザから受信されたアップリンク信号に適応できる必要がある。そのような適応は、通常、ユーザ端末装置から基地局への無線信号を使用し、スマート・アンテナ処理戦略は、そのような受信信号を使用して決定される。

【発明の開示】

【発明が解決しようとする課題】

【０００８】

急速に変化するＲＦと干渉の環境に適応する必要性が当技術分野において存在する。

【０００９】

ポーリング

１つまたは複数のユーザ端末装置セットをそれぞれが有するいくつかの基地局を含むセルラー・システムを考えてみる。当技術分野において、特定の基地局のスマート・アンテナ・システムに関するスマート・アンテナ処理戦略をどのように決定して、同一のチャネルで、ただし、他の基地局に信号を送信しているであろう同一チャネル・ユーザ端末装置からの干渉軽減を実現するかは知られている。そのような干渉軽減は、その特定の基地局において、干渉する同一チャネル・ユーザ端末装置から無線信号を受信し、所望の信号を干渉信号と区別することによって実現することができる。

【００１０】

その特定の基地局は、アップリンクにおける、他の基地局のユーザ端末装置からの干渉を軽減させること、またはダウンリンクにおける、他の基地局のユーザ端末装置に向かう干渉の軽減を行うことができないことがある。その特定の基地局は、他のユーザ端末装置への十分な無線周波数リンクを有さない、または他の基地局のユーザ端末装置に、どのようにポーリングを行うかについての情報を有さない可能性がある。

【００１１】

通信を開始すること

リモート・ユーザ端末装置との通信を開始する際、リモート・ユーザ端末装置は、システムからログオフしている可能性があり、あるいは、基地局とユーザ端末装置の間で、全く通信が行われていない、もしくは比較的最近、通信が行われた、または通信が、相当な沈黙時間を伴って、比較的遅いペースで行われる「アイドル」状態にある可能性がある。

【００１２】

基地局と、アイドル状態にあるユーザ端末装置との間で通信を開始することは、比較的困難である。ユーザ端末装置の位置が、例えば、端末装置が移動性であるために、未知である可能性がある。さらに、位置が知られている場合でも、干渉パターンが急速に変化して、基地局によって開始された（例えば、ページング）メッセージをうまく受信する可能性を低下させる相当な干渉が存在することがある。さらに、ページングのためのチャネルは、他の基地局のユーザ端末装置によって多く使用されている可能性がある。そのようなケースでは、要請された(desired)／意図されたユーザ端末装置に対する干渉は相当に大きいであろう。

【００１３】

同一の基地局の他のリモート端末装置によって、異なる空間チャネルで多く使用されているであろうコンベンショナル・チャネルで、ユーザ端末装置にページングを行うことが望ましいことがある。そのようなケースでは、ユーザ端末装置に対する干渉は相当に大きいであろう。

【００１４】

ユーザ端末装置にページングを行うようにページング・メッセージを送信することは、通常、理想的には、急速に変化する干渉を伴う環境内の未知の位置、場合によっては変化している位置におけるユーザ端末装置が、関連する基地局からそのようなページング（お

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よび他の制御信号）を受信することに成功する可能性を大きくする何らかの形で実施されることが理想的である。

【課題を解決するための手段】

【００１５】

本明細書で開示するのは、通信局から第１のリモート通信デバイスにダウンリンク・チャネル上で実質的に無指向性の形でダウンリンク信号を送信するための方法、装置、マシン可読媒体である。通信局は、アンテナ要素アレイを有するスマート・アンテナ・システムを含む。一実施態様では、方法は、第１の無指向性の形で送信するための第１のダウンリンク・スマート・アンテナ処理戦略を決定し、その第１のダウンリンク・スマート・アンテナ処理戦略を使用して通信局から第１の無指向性の形で第１のダウンリンク・メッセージを送信し、通信局から第１のダウンリンク・メッセージを第２の無指向性の形で送信することを繰り返すことを含む。繰り返される送信は、繰り返しにおいて干渉環境が異なることを促進させるために同一ではない繰り返しである。

【００１６】

一実施態様は、通信システムの第１の通信局からダウンリンクで第１のリモート通信デバイスにページングを行う方法を含む。通信システムは、１つまたは複数の他のリモート通信デバイスがそれぞれ関連する、第１の通信局とは別個の、少なくとも１つ又はいくつかの他の通信局を含む。第１の通信局は少なくとも１つの第１のリモート通信デバイスに関連し、アンテナ要素アレイを有するスマート・アンテナ・システムを含む。本方法は、第１の通信局が、その通信局の関連するリモート通信デバイスと通信するための第１の順次時間間隔セットを提供することを含み、第１のセットの各時間間隔は、選択された数のダウンリンク・コンベンショナル・チャネルを含む。本方法は、第１のセットの第１の時間間隔の第１のダウンリンク・コンベンショナル・チャネルの間に、第１の通信局から第１のリモート通信デバイスに第１のページング信号を送信し、第１の時間間隔よりも後の時間間隔に送信を繰り返すことを含み、繰り返される送信は、第１のセットのダウンリンク・コンベンショナル・チャネルにおける、第１の通信局から第１のリモート通信デバイスへの第２のページング信号の送信である。繰り返して送信するステップは、第１の送信ステップ中に第１のダウンリンク・コンベンショナル・チャネルにおいてダウンリンクでアクティブに受信するリモート通信デバイスのセットが、繰り返して送信するステップ中にページングのために使用されるダウンリンク・コンベンショナル・チャネルにおいてその繰り返して送信するステップ中にアクティブに受信するリモート通信デバイスのセットと異なるように促進させるために同一の繰り返し以外の戦略を使用する。

【発明を実施するための最良の形態】

【００１７】

セルラー・システムとそのスマート・アンテナ基地局

図１を参照すると、第１の基地局１０２と、少なくとも１つの第２の基地局１１１という少なくとも２つの基地局を有するセルラー無線通信システム１００が全体的に示されており、第１の基地局１０２は、アンテナ要素アレイ１０４を有するスマート・アンテナ・システムを含む。また、システム１００は、第１の基地局１０２と双方向パケット通信を行うための、複数のリモートの、場合により移動性のユーザ端末装置１０５、１０６、１０７、１０８を含み、かつ第２の基地局１１１などの他の基地局と双方向パケット通信を行うための、複数のリモートの、場合により移動性のユーザ端末装置１０９、１１０も含む。第１の基地局１０２は、ユーザ端末装置１０５、１０６、１０７、１０８に関連している一方、第２の基地局１１１は、ユーザ端末装置１０９および１１０に関連している。

【００１８】

第１の基地局１０２は、データ・ネットワークおよび／または音声ネットワークなどのネットワークに結合されている。また、１つまたは複数の第２の基地局１１１も、同一のネットワークに結合されている。一実施形態では、第１の基地局やその他の基地局１１１はインターネットに結合されている。

【００１９】

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図２Ａは、第１の基地局１０２の一実施形態を示す。基地局は、適応アンテナ・アレイ・システムであるスマート・アンテナ・システム２０３を含む。スマート・アンテナ・システム２０３は、アンテナ要素アレイ１０４を有し、かつ一実施形態では、送信機／受信機（「トランシーバ」）セット２０６として実装され、アレイ１０４の個別の各アンテナ要素につき１つの送信機と１つの受信機からなる送信機セットと受信機セットとを有するとともに、アップリンク・スマート・アンテナ処理とダウンリンク・スマート・アンテナ処理を実行する空間プロセッサ２０８を有する。

【００２０】

アップリンク・スマート・アンテナ処理は、トランシーバ・セットを介して個々のアンテナ要素から受け取られた信号を結合することを含み、ダウンリンク・スマート・アンテナ処理は、トランシーバ・セットを介して個々のアンテナ要素から送信するための複数のバージョンの信号を生成することを含む。制御コンピュータ２１０が、スマート・アンテナ処理を制御する。空間プロセッサ２０８と制御コンピュータ２１０は、１つまたは複数のデジタル信号処理デバイス（ＤＳＰ）を含み、アップリンクとダウンリンクのスマート・アンテナの処理と制御を実現するための他の任意の機構を使用する。

【００２１】

アップリンクで、スマート・アンテナ処理は、制御コンピュータ２１０の制御下で、受信信号を有利に結合するために、アップリンク重み付けパラメータ・セットに従って受信信号の振幅と位相に重み付けを行う。そのような結合は、アップリンク空間処理とアップリンク・スマート・アンテナ処理と呼ばれる。アップリンク・スマート・アンテナ処理戦略は、このケースでは、アップリンク重み付けパラメータ・セットによって定義される。そのような結合は、時間等化のための時間フィルタリングをさらに含むことが可能であり、空間処理と組み合わせられると、そのような結合は、アップリンク空間時間処理、または、やはり、アップリンク・スマート・アンテナ処理と呼ばれる。空間時間処理は、アンテナ要素のそれぞれを出所とする信号に関する時間処理パラメータを含むアップリンク重み付けパラメータ・セットによって定義される、アップリンク・スマート・アンテナ処理戦略に従って実行される。簡明にするため、アップリンク空間処理とアップリンク・スマート・アンテナ処理という用語は、本明細書では、アップリンク空間時間処理またはアップリンク空間処理を意味するものとする。

【００２２】

アップリンク戦略は、通常、基地局１０２のアンテナ要素において受信された信号に基づいて決定され、一実施形態では、ダウンリンク戦略も、アンテナ要素において受信された信号に基づいて決定される。

【００２３】

このため、一実施形態では、基地局１０２は、ダウンリンク・チャネルで関連するリモート・ユーザ端末装置にダウンリンク・データを送信するようにアンテナ要素に結合されたダウンリンク送信ユニットと、リモート・ユーザ端末装置からアップリンク信号を受信するようにアンテナ要素に結合されたアップリンク受信ユニットと、ダウンリンク送信ユニットに結合され、さらにアップリンク受信ユニットに結合され、アップリンク応答信号に基づいてダウンリンク・スマート・アンテナ処理戦略を決定するプロセッサとを含む。

【００２４】

一実施形態では、第１の基地局１０２のアンテナ要素１０４はそれぞれ、送信と受信の両方に使用され、別の実施形態では、複数のアンテナ要素は、受信と送信のために別々のアンテナを含むことに留意されたい。

【００２５】

１０５、１０６、１０７、１０８のようなユーザ端末装置は、通常、アンテナ・システムとトランシーバとを含み、入力デバイスおよび／または出力デバイス、および／または処理デバイスに結合されて、インターネット、またはその他のデータ通信ネットワークを介する音声通信および／またはデータ通信などの、様々なタイプの機能を提供することが可能である。そのようなユーザ端末装置は、移動性であっても、固定であってもよい。一

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実施形態では、アンテナ・システムは単一のアンテナでもよく、あるいは、別の実施形態では、複数のアンテナ要素を含み、ダイバーシチ受信とダイバーシチ送信を円滑にすることが可能である。さらに別の実施形態では、アンテナ・システムは、スマート・アンテナ・システムを含む。ユーザ端末装置は、一実施形態では、音声および／またはデータを互いの間で通信することさえできる。ユーザ端末装置に、またはユーザ端末装置の一部として結合されるのは、ラップトップ・コンピュータ、双方向ポケットベル、ＰＤＡ（携帯情報端末）、ビデオ・モニタ、オーディオ・プレーヤ、セルラー電話機、あるいは別の通信デバイス、または基地局などの通信局と無線で音声またはデータを通信することができる他のデバイスなどの１つまたは複数のコンピュータである。

【００２６】

リモート送信機１０５、１０６、１０７、１０８の１つから信号が受信されると、適応空間プロセッサ２０８は、アレイ１０４のアンテナ要素のそれぞれにおいて受信された信号の振幅と位相に応答し、存在するであろうマルチパス条件を補償したり、干渉を軽減させることを含め、ユーザ端末装置から基地局への信号リンクを有利に強化する指向性受信パターンを効果的に提供する形で、信号を結合するアップリンク空間処理を実行する。

【００２７】

重み付けパラメータによって定義されるアップリンク・スマート・アンテナ処理戦略を決定するための様々な技術が知られている。一実施形態では、既知の訓練シンボル・シーケンスが、アップリンク信号の中に含められる。実施形態の１つのバージョンは、戦略決定のために最小２乗法を使用する。別の実施形態では、「ブラインド(blind)」法が使用され、この方法によれば、アップリンク信号が有することが知られている１つまたは複数の特性、例えば、定数モジュラス(constant modulus)、または特定の変調フォーマットを有する基準信号が構築される。既知の信号、または構築された基準信号が、誤り信号を形成するのに使用され、アップリンク・スマート・アンテナ戦略決定は、その誤りに基づいて何らかの基準を最適化するアップリンク重み付けパラメータを決定する。一実施形態では、基準は最小２乗誤り基準である。

【００２８】

一実施形態は、「ＳＤＭＡ」（空間分割多重アクセス）に従って動作することさえ可能である。ＳＤＭＡでは、第１の基地局１０２に関連する複数のユーザ端末装置が、アップリンクで、同一の「コンベンショナル」チャネルで、つまり、同じ周波数と時間チャネルで（ＦＤＭＡ－ＴＤＭＡシステムの場合）、または同じ符号チャネルで（ＣＤＭＡシステムの場合）第１の基地局１０２と通信することが、同一チャネル・リモート・ユーザが空間的に離れている限り、可能である。そのようなケースでは、スマート・アンテナ・システムは、同じコンベンショナル・チャネル内で複数の「空間チャネル」を用意し、適応空間プロセッサ２０８は、要請(desired)端末装置とコンベンショナル・チャネルを共用する第１の基地局１０２に関連するリモート端末装置からの干渉を軽減させるようにアップリンク空間処理を実行する。

【００２９】

また、第１の基地局１０２は、存在する可能性があるマルチパス条件を補償すること、および干渉を軽減させることを含め、基地局からユーザ端末装置への信号リンクを有利に強化する指向性信号パターンを効果的に提供する形で、リモート・ユニット１０５、１０６、１０７、１０８の１つまたは複数に信号を送信するためにも使用される。また、ＳＤＭＡは、ダウンリンク方向でも可能であり、基地局が、同じコンベンショナル・チャネルで、関連するユーザ端末装置の複数に送信を行うことができる。つまり、同じコンベンショナル・チャネルは、複数の空間チャネルを有することになる。

【００３０】

ダウンリンクにおいて、空間プロセッサ２０８は、制御コンピュータ２１０の制御下で、ダウンリンク重み付けパラメータ・セットに従って信号の振幅と位相に重み付けを行うことにより、リモート端末装置に送信されるべき様々なバージョンの信号を生成する。そのような処理は、一般に、ダウンリンク空間処理またはダウンリンク・スマート・アンテ

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ナ処理と呼ばれる。ダウンリンク・スマート・アンテナ処理戦略は、そのケースでは、ダウンリンク重み付けパラメータによって決まる。そのような処理は、時間等化のための時間フィルタリングをさらに含むことが可能であり、重み付けと組み合わせられると、そのようなスマート・アンテナ処理は、ダウンリンク空間時間処理と呼ばれる。ダウンリンク空間時間処理は、アンテナ要素のそれぞれによって送信されるべき信号に関する時間処理パラメータを含むダウンリンク重み付けパラメータ・セットによって決まる、ダウンリンク・スマート・アンテナ処理戦略に従って実行される。簡明にするため、ダウンリンク空間処理とダウンリンク・スマート・アンテナ処理という用語は、本明細書では、ダウンリンク空間時間処理またはダウンリンク空間処理を意味するものとする。

【００３１】

このケースでは、ダウンリンク重み付けパラメータによって決まるダウンリンク・スマート・アンテナ処理戦略を決定するための様々な機構が知られている。一実施形態は、特定のユーザ端末装置とそれが関連する基地局との間のアップリンク周波数とダウンリンク周波数が同一であるように、時間ドメイン二重化（ＴＤＤ）を使用するＴＤＭＡシステムである通信システム１００で動作する。ダウンリンク重み付けパラメータは、通常、同一のユーザ端末装置に関するアップリンク重み付けパラメータから決定される。較正係数が、アップリンク重み付けパラメータからのダウンリンク重み付けパラメータを決定する際に含められて、信号が、アレイ１０４のアンテナ要素のそれぞれに結合された異なる受信チェーンと送信チェーンを通る際に生じる歪みの差、例えば、振幅偏移や位相偏移の差を補償する。そのようなチェーンには、アンテナ要素、ケーブル、フィルタ、ＲＦ受信機、ＲＦ送信機、物理的接続を含み、さらに、処理がデジタルである場合、アナログ－デジタル変換器を含む。例えば、本発明の譲受人にそれぞれ譲渡されている米国特許第５，５４６，０９０号、ならびに米国特許出願第０８／９４８，７７２号および米国特許出願第０９／２９５，４３４号が、較正のための方法と装置の説明を含む。

【００３２】

時間ドメイン二重化を使用しない通信システムにおける動作のための代替の実施形態、例えば、特定のユーザ端末装置と通信するためのアップリンク周波数とダウンリンク周波数が同一ではない周波数ドメイン二重化（ＦＤＤ）を使用するシステムにおいて動作する本発明の実施形態では、ユーザ端末装置に関する到達方向（ＤＯＡ）を決定することを含むが、それには限定されない、ユーザ端末装置から受信されたアップリンク信号からダウンリンク重み付けパラメータを決定するための様々な技術が利用可能である。

【００３３】

図２Ｂは、スイッチ・ビーム・システムであるスマート・アンテナ・システム２２３を含む第１の基地局１０２の代替の実施形態を示す。スマート・アンテナ・システム２２３は、アンテナ要素アレイ１０４と、アレイ１０４のアンテナ要素に関する固定ビーム・セットを形成するビーム形成ネットワーク２２５と、ビームフォーマ２２５の個別の各ビーム端子につき１つの送信機／受信機の、トランシーバ・セット２２７と、トランシーバ２２７のビームの１つまたは複数を結合するための結合器２２９とを有する。含まれる制御コンピュータ２３１は、スマート・アンテナ・システムを制御する。例示的なビームフォーマには、バトラー・マトリックスが含まれるが、これには限定されない。結合器２２９は、アップリンクで、またはダウンリンクで使用する固定ビームの１つまたは複数を選択し、１つまたは複数のビームを選択するスイッチング・ネットワークを含む。結合器２２９は、さらに、１つまたは複数のビームを結合するための機構を含むことがある。図２Ａの適応スマート・アンテナ・システムの場合と同様に、ダウンリンク通信のためにスイッチ・ビーム・スマート・アンテナ・システムをどのように制御するかを決定することは、アップリンク・スマート・アンテナ処理戦略を決定することとして言及される。ダウンリンク通信中の結合器２２９の処理は、ダウンリンク空間処理と呼ばれる。アップリンクに関して、結合は、受信信号を有利に結合するために、アップリンク重み付けパラメータ・セットに従って、選択されたビームに重み付けを行うことによって行われる。図２Ａの適応スマート・アンテナ・システムの場合と同様に、そのようなアップリンク結合は、アッ

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プリンク空間処理と呼ばれ、アップリンク通信に関する結合を決定することが、アップリンク・スマート・アンテナ処理戦略を決定することとして言及される。

【００３４】

より詳細には、リモート・ユニット１０５、１０６、１０７、１０８内部のリモート送信機の１つから信号が受信されると、ビーム結合器２２９が、アレイ１０４のアンテナ要素のそれぞれにおいて受信された信号に応答し、存在する可能性があるマルチパス条件を補償することや、本発明のある態様によれば、干渉を軽減させることを含め、ユーザ端末装置から基地局への信号リンクを強化する指向性信号パターンを効果的に提供する形で、ビームフォーマ２２５からのビームを結合するアップリンク空間処理を実行する。

【００３５】

やはり、図２Ｂを参照すると、ダウンリンクで、結合器が、信号を処理して、ビームフォーマ２２５の１つまたは複数の選択されたビームを介して送信する重み付きバージョンを決定する。結合器の処理は、存在する可能性があるマルチパス条件を補償することや、本発明のある態様によれば、干渉を軽減させることを含め、基地局からユーザ端末装置への送信を向上させるためである。

【００３６】

図２Ａの実施形態と図２Ｂの実施形態の両方において、本発明の一態様によれば、信号は、他の基地局１１１のリモート・ユニット１０９、１１０などの同一チャネル干渉源(interferer)からも受信される。空間処理は、他の基地局１１１のリモート・ユニット１０９、１１０などの、同一チャネル・ユーザからの干渉を軽減させる形で、それらの受信信号を使用する。

【００３７】

特に、移動可能なユーザ端末装置、またはマルチパス環境に関して、あるいはインターネットなどのコンピュータ・ネットワーク内のデータ通信に関して、あるいは、セルラー・システムにおけるような、そのような要因の組み合わせに関して、好適なスマート・アンテナ戦略の適応型決定は、変化するＲＦ環境と干渉環境のために、データ通信のその特定の時点で行われることが最良である。リモート・ユーザ端末装置が移動性であるケースでは、ユーザ端末装置の動きにより、ユーザ端末装置が、引き続くデータ伝送間に好適な場所と好適でない場所の間で移動する可能性がある。データ伝送のケース、例えば、通信システム１００が、インターネットなどのコンピュータ・ネットワークの一部である場合に、ユーザ端末装置と第１の基地局１０２の間で伝送されるデータのケースでは、干渉環境は、急速に変化している可能性がある。このため、第１の基地局１０２に関して、リモート端末装置１０９、１１０などの干渉源が、異なる時刻にそれぞれの第２の基地局１１１に送信を行っている可能性があり、そのような干渉パターンは、急速に変化する可能性がある。

【００３８】

基地局からの通信を開始すること

第１の基地局１０２からダウンリンクで通信を開始することに関して、最適なスマート・アンテナ処理戦略を迅速に決定するために、本発明の一実施形態によれば、第１の基地局１０２が、合意された論理制御チャネルにおいてユーザ端末装置に初期ダウンリンク・ページング・メッセージを送信して、第１の基地局１０２が、通信を開始することを所望することを示す。

【００３９】

ユーザ端末装置は、ログインしていないか、またはログインして、認証されているが、関連する基地局とアクティブな通信交換を行っていないアイドル状態にあるか、あるいは、関連する基地局とアクティブに通信しているアクティブ状態にある。ユーザ端末装置が、アイドル状態にある場合、基地局とユーザ端末装置はともに、通信を開始する準備ができている。さらに、基地局と、アイドルな端末装置はともに、基地局がユーザ端末装置にページングを行う、またはユーザ端末装置が、基地局との通信を開始する可能な１つまたは複数のチャネルのセットを示す情報を有する。

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【００４０】
ユーザ端末装置は、複数のチャネルで通信する能力を有し、このため、１つのチャネルでアイドルであり、別のチャネルでアクティブであることも可能であることに留意されたい。アイドルで意味するのは、関心対象のチャネルでアイドルということである。アイドルなユーザ端末装置は、他のチャネルではアイドルでない可能性があることを理解されたい。
【００４１】
ユーザ端末装置にページングを行うようにページング・メッセージを送信することは、比較的急速に変化する干渉を伴う環境内の、未知の、場合により変化している場所におけるユーザ端末装置が、関連する基地局からそのようなページング（および／または他の制御信号）を受信することに成功する確率を高めるような、何らかの形で実行されることが望ましい。
【００４２】
本発明の一態様は、ダウンリンク信号の送信中に、１つまたは複数のユーザ端末装置のそれぞれが、特定のダウンリンク・チャネルにおける１つまたは複数の信号を受信することが可能であるという点で、非要請ユーザ端末装置であることが基地局に知られている１つまたは複数のユーザ端末装置に向かう干渉を同時に軽減しながら、無指向性の形でダウンリンク信号を送信する。
【００４３】
本明細書で使用する無指向性の形とは、いずれの特定のユーザまたはユーザ群にもエネルギーを意図的に向かわせないことを指す。セクタ化されたシステムでは、これは、セクタ内で無指向性であることを意味する。さらに、実質的に無指向性というのも、場合により、異なる戦略をそれぞれが有する、繰り返される伝送のセットに全体的な伝送が分割される場合に、時間平均で無指向性であることを意味する。
【００４４】
本発明の一態様は、システム１００のような無線パケット・データ・システムにおいて、第１の基地局１０２のような基地局から特定のユーザ端末装置への通信を信頼できる形で開始するための方法を必要とする。本方法は、以下に説明するとおり、スマート・アンテナ・システムを有する基地局に特に役立つ。
【００４５】
本発明の一実施形態は、ユーザ端末装置に応答させるという明確な理由で、第１の基地局１０２によって、比較的に多量に符号化された、比較的低いレートのページング・メッセージを伝送することを含む。符号化は、ユーザ端末装置における比較的高い検出確率を容易にする方法の１つである。低レートの信号が送信されるのは、あまり多くの情報が伝送されていないからである。ユーザ端末装置は、そのページング・メッセージを検出し、応答する。次に、その応答が、基地局によって、後続の伝送に関する通信リンクについての情報を獲得するのに使用される。通信リンクについてのこの情報は、一般に、基地局とユーザ端末装置の間における信頼できる、比較的高いレートの（例えば、トラフィック・データ）通信をもたらす。また、他の基地局のユーザ端末装置も、同じコンベンショナル・チャネルで、それぞれの基地局に応答していることが可能であり、そのような応答も、第１の基地局１０２によって、後続のダウンリンク伝送またはアップリンク伝送における、干渉する同一チャネルのユーザ端末装置に対する干渉、またはそのような端末装置からの干渉を軽減させるのに使用できる。
【００４６】
複数のユーザ端末装置間でダウンリンク・データ伝送を共有するダウンリンク・チャネルにおけるページング
一実施形態では、ページング・メッセージは、第１の基地局１０２と１つまたは複数のユーザ端末装置の間で通信されているトラフィック・データなどの、他のデータと同じコンベンショナル・チャネルを占有することが可能な論理制御チャネルで送信される。
【００４７】

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さらに、ページング・メッセージは、他の基地局と、そのような他の基地局の１つまたは複数のユーザ端末装置との間で通信されているトラフィック・データまたはページング・データなどの他のデータと同じコンベンショナル・チャネルを占有することが可能な論理制御チャネルで、第１の基地局１０２から送信されてもよい。

【００４８】

さらに、ページング・メッセージは、第１の基地局１０２に関連する他のユーザ端末装置、１つまたは複数の他の基地局の他のユーザと同じコンベンショナル・チャネルを占有することが可能な論理制御チャネルで、第１の基地局１０２から送信されてもよい。

【００４９】

一実施形態は、各ユーザ端末装置に関して、ＵＴ＿Ｓｅｑｕｅｎｃｅと呼ばれる一意ページング・シーケンスを用意することを含む。このシーケンスは多くの形で生成できる。例えば、基地局識別番号および／またはユーザ端末装置識別番号が、ＰＮシーケンス・ジェネレータへの入力として使用される。次に、結果のビットが、変調され、結果のＩ／Ｑベースバンド・シーケンスが、ＵＴ＿Ｓｅｑｕｅｎｃｅを形成する。ＵＴ＿Ｓｅｑｕｅｎｃｅを生成する他の多くのやり方が可能である。例えば、ユーザ端末装置識別番号が、低レートの誤り訂正符号を使用して符号化され、符号化された番号が、ＸＯＲ動作によって、基地局識別番号のすべて、または一部で開始されたＰＮシーケンス・ジェネレータの出力とスクランブルされる。ＵＴ＿Ｓｅｑｕｅｎｃｅは、２つのユーザ端末装置が同一のページング・シーケンスを有する確率が比較的低くなるようになっており、一実施形態では、ＵＴ＿Ｓｅｑｕｅｎｃｅはシステム内の各ユーザ端末装置に一意である。一実施形態では、ＵＴ＿Ｓｅｑｕｅｎｃｅは、要請端末装置におけるＵＴ＿ｓｅｑｕｅｎｃｅの受信の成功の確率を高めるために、非常に大きい度合いの冗長性を与える符号化を含む。

【００５０】

各ユーザ端末装置は、合意された論理制御チャネルでリッスンし、その端末装置のＵＴ＿Ｓｅｑｕｅｎｃｅを検出しようと試みる。その論理制御チャネルは、制御チャネルであり、あるいは、本発明のある態様によれば、システム内の他のユーザ端末装置によってトラフィックのためにも使用される、コンベンショナル・チャネルである。

【００５１】

ユーザ端末装置は、その端末装置のＵＴ＿Ｓｅｑｕｅｎｃｅを検出することに成功するまで、ユーザ端末装置シーケンス検出基準を使用する。１つの検出方法は、相関を使用するもので、検出基準は相関しきい値を含む。

【００５２】

第１の基地局１０２は、何らかの合意された形で、要請端末装置がいずれのチャネルで、またはチャネル群でリッスンしているかを示す情報を有し、基地局は、そのチャネルでＵＴ＿Ｓｅｑｕｅｎｃｅを送信する。リッスンするチャネルまたはチャネル群は、例えば、ユーザ端末装置が、関連する基地局に登録（「ログイン」）している間の初期交換中に合意されるか、あるいは、事前設定されていてもよい。第１の基地局１０２は、干渉が通信を阻害する可能性を低くすることにより、ＵＴ＿Ｓｅｑｕｅｎｃｅの受信が成功する確率を高めるように、基地局のスマート・アンテナ・システムに関するスマート・アンテナ処理戦略を決定する。

【００５３】

ページングに先立ち、第１の基地局１０２は、ページングされるべきユーザ端末装置がアイドルであり、そのため、送信していないことが知られているが、第１の基地局１０２から、ページング・メッセージと同時に、同じコンベンショナル・チャネルでデータを受信している可能性がある第１の基地局１０２に関連する任意のユーザ端末装置またはユーザ端末装置群が、アップリンクで第１の基地局１０２に送信している期間中に、関連するユーザ端末装置の１つまたは複数から信号（「ページング受信前(prior-to-paging received)信号」）を受信することが可能である。

【００５４】

第１の基地局１０２は、ページング受信前信号を使用して、基地局１０２のスマート・

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アンテナ・システムに関するダウンリンク・スマート・アンテナ処理戦略を決定して、そのような同一チャネル・ユーザ端末装置にデータを同時に送信し、同じコンベンショナル・チャネルの異なる空間チャネルでページング・メッセージを送信する。

【００５５】

関連するユーザ端末装置から信号を受信することに加えて、第１の基地局１０２は、干渉源からも信号を受信していることが可能である。第１の基地局１０２は、自らの関連するユーザ端末装置からの信号を干渉源からの信号と区別する。一実施形態では、区別することは、ユーザ端末装置識別子を使用する。

【００５６】

また、ページング・メッセージとダウンリンクのコンベンショナル・チャネルを共有している可能性がある第１の基地局１０２に関連する他のユーザ端末装置は、全く存在しない可能性があることにも留意されたい。

【００５７】

１つまたは複数の他の基地局が通信システム内に含まれ、一実施形態では、他の基地局は、第１の基地局１０２と調整されて、第１の基地局１０２が、ページング受信前信号を受信することに加えて、第１の基地局１０２は、ページングされるべきユーザ端末装置にページングを行うのに先立って、他の基地局に関連する１つまたは複数の他のユーザ端末装置から信号（「他のユーザ端末装置受信(other-user-terminal received)信号」）を受信する。前記他のユーザ端末装置は、ページング・メッセージ中に、ページング・メッセージと同じコンベンショナル・チャネルで送信を受けることが可能な端末装置である。第１の基地局１０２は、基地局１０２の関連するユーザ端末装置信号からの信号を、他の基地局に関連する他のユーザ端末装置からの信号と区別する。他の基地局に関連する他のユーザ端末装置は、第１の基地局１０２からのページングと同時に、同じコンベンショナル・チャネルで、それぞれの関連する基地局からデータを受信することが可能であることに留意されたい。

【００５８】

各基地局は、調整されている２つの基地局が、基地局によって使用されるプロトコルが調整されることを含むように、その基地局の関連するユーザ端末装置と通信するために、プロトコルを使用する。

【００５９】

第１の基地局１０２は、ページング受信前信号と他のユーザ端末装置受信信号を使用して、基地局１０２のスマート・アンテナ・システムに関するダウンリンク・スマート・アンテナ処理戦略を決定して、第１の基地局１０２に関連するユーザ端末装置への干渉や、基地局１０２が、他のユーザ端末装置受信信号を受信する他のユーザ端末装置への干渉を軽減させながら、基地局１０２の関連する同一チャネル・ユーザ端末装置にデータを同時に送信し、同じコンベンショナル・チャネルの異なる空間チャネルでページング・メッセージを送信する。

【００６０】

一実施形態によれば、ダウンリンク・スマート・アンテナ処理戦略決定は、較正を使用することによってアップリンク重み付けパラメータから決定されたダウンリンク重み付けパラメータを使用する。アップリンク重み付けパラメータは、ページング受信前信号と他のユーザ端末装置受信信号に対応するアンテナ・アレイのアンテナ要素において受信された信号から決定される。

【００６１】

一実施形態では、スマート・アンテナ処理戦略決定は、ページング受信前信号と他のユーザ端末装置受信信号に対応するアンテナ・アレイのアンテナ要素において受信された信号の受信共分散マトリックスから、較正を使用して決定された送信共分散マトリックスを使用する。詳細には、戦略は、干渉するリモート・ユーザから着信する信号に関する干渉共分散マトリックスを使用する干渉軽減を含む。

【００６２】

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ページングのために使用されるべきコンベンショナル・チャネルで、基地局に関連するユーザ端末装置から基地局において受信されたすべての信号に関する、アンテナ要素上の受信信号のｍ×ｎマトリックスをZ_Rとする。各行は、ｍ個のアンテナの１つにおいて受信された信号のｎ個の複素値（Ｉ値とＱ値）サンプルのベクトルである。z_Rを、ｍ個のアンテナのそれぞれにおいて受信された信号と雑音を表す複素ランダム変数（Ｉ値とＱ値）のｍ×１ベクトルとする。受信共分散マトリックスは、$R_R = E[z_R z_R^H]$と定義され、ただし、Ｅ［．］は、期待値演算であり、上付き文字Ｈは、複素共役転置演算、つまり、エルミート転置を表し、したがって、ｍ個のアンテナ要素に関して、受信共分散マトリックスR_Rは、ｍ×ｍマトリックスである。望ましいアップリンク信号が全く存在しない場合、つまり、要請端末装置がアイドル状態にある場合に生じるように、干渉だけしかチャネルに存在しない場合、受信共分散マトリックスは、$R_{RI} = E[z_{RI} z_{RI}^H]$と定義される受信した干渉共分散マトリックスであり、ただし、z_{RI}は、送信側の干渉するリモート端末装置からアンテナ・アレイのｍ個のアンテナ要素の１つに着信する信号の複素値（Ｉ値とＱ値）ランダム変数のベクトルである。

【００６３】

受信した干渉共分散マトリックスは、干渉するリモート端末装置の平均空間挙動についての情報を含む。このマトリックスの固有ベクトルは、干渉によって占められる平均空間方向を定義する。受信した干渉共分散マトリックスの固有ベクトルは、固有値方向のそれぞれにおいて干渉によって占められる平均電力を示す。このため、比較的大きい固有値に関連する固有ベクトル方向は、比較的大きい量の平均干渉電力を受信する空間方向を示すのに対し、比較的小さい固有値に関連する固有ベクトル方向は、比較的少ない平均干渉電力を受信する空間方向を示す。

【００６４】

一実施形態では、期待値演算は、信号のサンプルを平均することによって実行される。つまり、$R_R = Z_R Z_R^H$であり、$R_{RI} = Z_{RI} Z_{RI}^H$であり、ただし、Z_{RI}は、望ましいアップリンク信号が全く存在しない基地局において受信された信号に関するアンテナ要素上の受信信号サンプルのｍ×ｎマトリックスであり、この場合も、各行は、ｍ個のアンテナの１つにおいて受信された信号のｎ個の複素値（Ｉ値とＱ値）サンプルのベクトルである。

【００６５】

一実施形態では、受信共分散マトリックスは、非要請の同一チャネル・ユーザ端末装置に向かう干渉を軽減させることを含む好適なダウンリンク処理戦略を決定するのに使用される。受信共分散マトリックスの計算中に送信している同一チャネル・ユーザ端末装置セットの一部が、第１の基地局が送信している際に受信もしている場合、そのような戦略は、干渉軽減を実現するために比較的効果的である。

【００６６】

本発明の一態様によれば、ページングに先立って、ページングされるべきユーザが、送信していない（すなわち、アイドル状態にある）ことが知られているが、ページング・メッセージと同時に、ページング・メッセージと同じコンベンショナル・チャネルで、ダウンリンクで受信することが可能な非要請ユーザ端末装置が、それぞれの基地局にアップリンクで送信している期間中にサンプリングを行うことにより、受信した干渉共分散マトリックスが決定される。

【００６７】

代替として、干渉共分散マトリックスは、ページングされるべきユーザ端末装置と、他のユーザ端末装置、つまり、ページングと同じコンベンショナル・チャネルで、同時に、ダウンリンクで後に受信している可能性がある端末装置とがともに、送信している時点で、第１の基地局１０２において受信された信号に対してアップリンク空間処理を実行することから決定されてもよい。アップリンク空間処理は、ページングされるべきユーザ端末装置からの信号を決定し、減算により干渉信号が決定される。

【００６８】

受信共分散マトリックスは、可能な同一チャネル・リモート端末装置が、データを送信

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している可能性が高く、要請端末装置がアイドルである時点で、第１の基地局１０２によって受信された信号（例えば、ページング受信前信号と他のユーザ端末装置受信信号）から決定される。この受信共分散マトリックスは、受信した干渉共分散マトリックスと等しく、かつ、干渉する送信機からの干渉軽減を含む信号を受信するためのスマート・アンテナ処理戦略を有利に決定するために使用される。

【００６９】

このため、非要請ユーザ端末装置に向けての干渉軽減を含め、ページングのための送信空間処理は、異なるアンテナ要素への電子装置チェーンや、異なるアンテナ要素からの電子装置チェーンにおける差を見込む較正、または別の動作が実行されるという条件付きで、非要請ユーザ端末装置が、アップリンクで送信している際に決定された受信した干渉共分散マトリックスから決定できる。詳細には、ページングを送信するためのダウンリンク空間処理に関するダウンリンク重み付けパラメータ・セットは、比較的小さい値、好ましくは、ただし、必然的にではなく、最小値を有する受信した干渉共分散マトリックスの固有ベクトルからとられる。

【００７０】

以下に説明するとおり、一実施形態によれば、システム１００の基地局と、基地局の関連するユーザ端末装置との間のアクティブなトラフィック通信は、シーケンス時間間隔（フレーム）セットの中で行われ、各フレームは、選択された数のダウンリンク・コンベンショナル・チャネル（例えば、ＴＤＭＡシステムの場合、期間）に分割されることに留意されたい。各ダウンリンク・コンベンショナル・チャネルに関して、アップリンクで関連する確認応答コンベンショナル・チャネル（例えば、ＴＤＭＡシステムの場合、期間）が存在する。以下の説明は、概ね、ＴＤＭＡシステムにおいて使用される本発明の一実施形態に当てはまるが、本発明は、ＴＤＭＡシステムには限定されない。

【００７１】

ＴＤＭＡシステムでは、各フレームが選択された数のダウンリンク・データ転送期間（タイムスロット）に分割されて、かつ、各ダウンリンク・データ転送期間ごとに、アップリンクで関連する確認応答転送期間（タイムスロット）が存在する。第１の基地局１０２と要請端末装置との間で通信が確立された後、第１の基地局１０２からユーザ端末装置へのダウンリンク・データ伝送には、より早期の関連する確認応答転送期間中における、そのユーザ端末装置からの確認応答信号が、ダウンリンク・データ伝送のダウンリンク・データ転送期間に関連するアップリンクにおける最新の確認応答転送期間が先行することが望ましい。ただし、必然的ではない。アップリンクで受信された確認応答信号は、第１の基地局１０２のスマート・アンテナ・システムに関する処理戦略を有利に決定して、その確認応答転送期間に関連する将来の一そうである必要はないが好ましくは次の一ダウンリンク・データ転送期間内で要請端末装置に送信を行うのに使用される。さらに、基地局によって使用される順次期間セットは、同一の基地局、または他の基地局の干渉しているユーザ端末装置からの他の確認応答も、第１の基地局１０２において受信されて、スマート・アンテナ処理戦略を決定するのに使用されるように調整される。このため、アップリンクで確認応答期間中にそれぞれの基地局に送信する通信システム１００のユーザ端末装置の数は、関連する将来のダウンリンク・データ転送期間中に、好ましくは、ただし、必然的にではなく、次のダウンリンク・データ転送期間中に送信を受けることが可能な、アクティブな要請端末装置セットのスーパーセットである。

【００７２】

特定のダウンリンク・データ転送期間中にアイドルなユーザ端末装置にページング・メッセージを送信するための一実施形態では、ダウンリンク・スマート・アンテナ処理戦略は、較正と、アップリンクで前の関連する確認応答転送期間中に受信された信号から決定された共分散マトリックスの最小固有値を有する固有ベクトルとを使用して決定される。

【００７３】

そのようなページング戦略を使用することは、アップリンクで、前の関連する確認応答転送期間中に第１の基地局１０２によって信号（例えば、ページング受信前信号と他のユ

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ーザ端末装置受信信号）が受信されたユーザ端末装置に対する干渉軽減を含む。送信側ユーザ端末装置からのそのような受信信号に対応する受信共分散マトリックスの固有ベクトルは、最小固有値より相当に大きい固有値を有する。このため、一実施形態では、ページング・メッセージは、アップリンクにおいて最小電力の干渉源であったものの方向で送信されて、同一チャネル・ユーザに向かう干渉を最小限に抑える。

【００７４】

代替の実施形態では、与えられたしきい値未満の値を有する送信（干渉）共分散マトリックスの固有ベクトルが、ページングのために使用するダウンリンク・スマート・アンテナ処理戦略（例えば、ダウンリンク重み付けパラメータ）を決定するために使用される。そのような固有ベクトルは、実質的に、送信干渉共分散マトリックスのゼロ空間内にある。

【００７５】

本明細書で述べる無指向性の形で送信することの我々の定義は、共分散マトリックスの比較的小さい固有ベクトルの方向にエネルギーを「向ける」ゼロ空間送信を含む。

【００７６】

さらに別の代替の実施形態では、可能な同一チャネル・リモート端末装置がデータを送信している可能性が高くかつ要請端末装置がアイドルであるときに決定された受信信号共分散マトリックスが、較正とともに使用されて、全方向放射パターンに従って他の方向でページング・メッセージを送信しながら、非要請の同一チャネル・ユーザの方向に特にゼロが向けられる。全方向パターンは、無指向性の形で送信することの特殊ケースである。セクタ化されたシステムでは、全方向とは、セクタ内で実質的に全方向であることを意味する。さらに、実質的に全方向というのも、場合により、異なる戦略をそれぞれが有する、繰り返される伝送のセットに全体的な伝送が分割される場合に、時間平均で、実質的に全方向であることを意味する。

【００７７】

１９９７年１２月１２日に出願され、本発明の譲受人に譲渡された、ゴールドバーグ（Ｇｏｌｄｂｕｒｇ）の米国特許出願第０８／９８８，５１９号が、任意の望ましい放射パターンを実現するダウンリンク空間処理重み付けパラメータを決定する一方法の説明を提供している。ゴールドバーグ法によれば、重みは、最適性基準を最適にすることによって決定される。本発明の代替の実施形態に関して、ゴールドバーグ法を、共分散マトリックスから決定された、干渉源らしい方向にゼロを向けることを含むように変更してもよい。

【００７８】

代替として、ＤＯＡ（到達方向）ベースの方法を使用して、ダウンリンク・スマート・アンテナ処理戦略を決定することもできる。

【００７９】

非要請ユーザ端末装置に向かう干渉を軽減させる代替の方法は、何らかのより早期の時点で、非要請ユーザ端末装置から第１の基地局１０２において受信された信号から、非要請ユーザ端末装置についてのサイド情報を形成することを含む。サイド情報は、第１の基地局１０２におけるデータベースの中に格納される。

【００８０】

非要請ユーザ端末装置についてのサイド情報は、その非要請ユーザ端末装置に向かう干渉を軽減させることを含む戦略を決定するのに使用できる、ユーザについての情報である。ユーザ端末装置についての、そのような格納されているサイド情報の例が、ユーザ端末装置の空間シグネチャである。例えば、「ＳＰＥＣＴＲＡＬＬＹ　ＥＦＦＩＣＩＥＮＴ　ＨＩＧＨ　ＣＡＰＡＣＩＴＹ　ＷＩＲＥＬＥＳＳ　ＣＯＭＭＵＮＩＣＡＴＩＯＮ　ＳＹＳＴＥＭＳ」という名称のバラット（Ｂａｒｒａｔ）他に発行された米国特許第５，５９２，４９０号、および「ＳＰＥＣＴＲＡＬＬＹ　ＥＦＦＩＣＩＥＮＴ　ＨＩＧＨ　ＣＡＰＡＣＩＴＹ　ＷＩＲＥＬＥＳＳ　ＣＯＭＭＵＮＩＣＡＴＩＯＮ　ＳＹＳＴＥＭＳ　ＷＩＴＨ　ＳＰＡＴＩＯ－ＴＥＭＰＯＲＡＬ　ＰＲＯＣＥＳＳＩＮＧ」という名称のオターステン（Ｏｔｔｅｒｓｔｅｎ）他に発行された米国特許第５，８２８，６５８号が、空間シグネ

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チャを使用して干渉を軽減させるいくつかの技術の説明を提供している。受信空間シグネチャは、基地局アレイが、干渉、または他のユーザ端末装置が全く存在しない場合に、特定のユーザ端末装置からの信号をどのように受信するかを特徴付ける。特定のユーザ端末装置の送信空間シグネチャは、リモート・ユーザ端末装置が、干渉が全く存在しない場合に、基地局からの信号をどのように受信するかを特徴付ける。送信空間シグネチャを、較正を使用して受信空間シグネチャから決定することができる。

【００８１】

サイド情報は、データベースから取り出され、非要請ユーザ端末装置の少なくとも１つに向けての干渉軽減を含むようにスマート・アンテナ処理戦略を決定するのに使用される。

【００８２】

サイド情報は、同一の第１の基地局１０２において、非要請ユーザ端末装置群から受信された信号から形成される。代替として、通信システムは、少なくとも１つの第２の基地局と、有線および／または無線であることが可能な基地局間通信機構とを含むことも可能である。１つまたは複数の他の基地局が、非要請ユーザ端末装置から信号を受信し、それぞれの非要請ユーザ端末装置に関するサイド情報形成ステップは、そのようなそれぞれの非要請ユーザ端末装置から信号を受信する他の基地局において行われる。サイド情報は、基地局間通信機構を使用して、第１の基地局１０２に通信される。そのような方法が使用される場合、他のそのような基地局は、非要請ユーザのいずれが、「本当に」望んでいないかを第１の基地局１０２に通信する。

【００８３】

他の形態のサイド情報には、１つまたは複数の非要請ユーザ端末装置のＤＯＡが含まれ、実際、非要請ユーザ端末装置からの受信信号が含まれる。

【００８４】

一実施形態は、ＴＤＤシステムにおいて動作する方法を実施するが、本発明は、ＦＤＤシステムにおける動作にも適用可能である。ＦＤＤシステムでは、送信チャネルと受信チャネルは、一般に、任意の所与の時点において互いに関連していない。ユーザ端末装置の到達方向からダウンリンク・スマート・アンテナ処理戦略を決定するために、ＤＯＡベースの技術を使用することが可能である。さらに、送信共分散マトリックスと受信共分散マトリックスは、ＦＤＤシステムにおいて、特に、アップリンク周波数が、ダウンリンク周波数に比較的近い場合、受信共分散マトリックスまたは干渉共分散マトリックスの計算において十分な時間平均が使用されると、通常、実質的に等しい。そのようなケースでは、較正を含む、アップリンク空間処理戦略から決定されたダウンリンク空間処理戦略を使用することにより、例えば、「ＳＰＡＴＩＯ－ＴＥＭＰＯＲＡＬ　ＰＲＯＣＥＳＳＩＮＧ　ＦＯＲ　ＣＯＭＭＵＮＩＣＡＴＩＯＮ」という名称の、発明者、ローリー（Ｒａｌｅｉｇｈ）他、クラリティ・ワイヤレス株式会社（Ｃｌａｒｉｔｙ　Ｗｉｒｅｌｅｓｓ，Ｉｎｃ．）の１９９８年３月５日に公開されたＰＣＴ国際特許出願公開ＷＯ９８／０９３８５において説明されるとおり、満足のいく結果がもたらされる。

【００８５】

また、本発明は、ＣＤＭＡシステムにも適用可能である。ＣＤＭＡシステムは、周波数チャネルにおける実質的にすべてのリソースを、少数のユーザ端末装置に与えることが多い。このため、送信側ユーザ端末装置に対応する受信共分散マトリックスの固有ベクトルに関連する固有値は、最小（すなわち、ゼロ空間）固有値よりも相当に大きい。

【００８６】

このため、本発明の一実施形態は、基地局が、無指向性の形で、要請端末装置にダウンリンク・メッセージを送信して（例えば、リモート端末装置にページングを行って）、その他のユーザ端末装置に対する干渉が同時に軽減されるようにする。さらに、一実施形態では、第１の基地局１０２は、１つまたは複数の他のユーザ端末装置に他のデータを同時に送信する。このため、本発明の実施形態は、同じコンベンショナル・チャネルで、方向付けられたトラフィック（継続中のトラフィック・データなどの）とブロードキャスト・

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トラフィック（ページなどの）を結合することも可能である。

【００８７】

反復ページング

ページング・メッセージの受信に成功したことに応答して、ユーザ端末装置は、第１の基地局１０２に信号を送信する。ユーザ端末装置は、合意されたチャネルでランダム・アクセス要求信号を基地局に送信することによって応答する。すると、第１の基地局１０２は、トラフィック通信のための周波数チャネルとダウンリンク転送期間を指定することを含め、アクセス割り当てメッセージをユーザ端末装置に送信する。また、アクセス割り当てメッセージは、ユーザ端末装置と基地局の間のリンクにおけるパス損失を測定することを含め、いくつかの制御機能を実行するため、および／または電力制御を実行するためにも使用できる。

【００８８】

ページング・メッセージは、好ましくは、ただし、必然的にではなく、比較的多量に符号化される。ユーザ端末装置の受信アンテナにおいて受信された信号から、そのような多量に符号化されたＵＴ＿Ｓｅｑｕｅｎｃｅを検出するための多くの方法が利用可能である。１つのそのような技術は相関を使用する。

【００８９】

このため、ランダム・アクセス要求信号は、要請端末装置が、その端末装置のＵＴ＿Ｓｅｑｕｅｎｃｅを検出することに成功したという、第１の基地局１０２に対する指示である。１つのバージョンでは、ランダム・アクセス要求信号がないことにより、要請端末装置がページの受信に成功しなかった基地局１２０に対するフィードバックがもたらされる。また、成功または失敗のフィードバックを与える他の方法も、本発明の他の諸実施形態において使用できる。

【００９０】

このため、一実施形態では、第１の基地局１０２は、要請端末装置が、ページを受信することに成功したか否かを示すフィードバックを受信する。

【００９１】

本発明の別の態様は、同一の繰り返しを使用して、すなわち、将来のフレームの同一の相対時間部分の中で、繰り返す形で同一のダウンリンク戦略を使用して、ページの伝送を１回、または複数回、繰り返すことにより、ページ受信検出が成功する確率をさらに高めるための方法である。同一でない繰り返しとは、ダウンリンク戦略の１つまたは複数、あるいは将来のフレームの相対時間部分が異なることを指す。一実施形態では、同一でない繰り返しを使用して、繰り返しにおいて異なる干渉環境を促進させて、これにより、要請端末装置が、同一の繰り返しのケースにおける確率よりも、ページを受信することに成功する累積の確率を高める。例えば、異なるスマート・アンテナ戦略を使用して、または異なるタイミングを使用して、干渉環境が異なる可能性を高くすることができる。異なるダウンリンク・スマート・アンテナ戦略を使用することにより、ダウンリンク戦略ダイバーシチがもたらされ、あるいは、異なる干渉環境においてページングを繰り返すことにより、干渉ダイバーシチがもたらされる。一実施形態では、ダウンリンク戦略ダイバーシチと干渉ダイバーシチがともに使用される。

【００９２】

一実施形態では、成功、またはページングを受けていないというフィードバックが使用される。第１のページの不成功の後、基地局は、一実施形態では、異なる無指向性ダウンリンク戦略を使用して、将来のフレームで、例えば、次のフレームでページングを繰り返す。

【００９３】

第１の実施形態では、異なる無指向性戦略は、干渉共分散マトリックス・ゼロ空間の中に実質的に入る固有ベクトルの別の１つに向けて送信して、ダウンリンク・ページングに関するスマート・アンテナ処理戦略を決定する。フレーム・シーケンスの将来のフレームにおいて繰り返すことにより、異なる干渉セットが存在する状態におけるページングがも

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たらされる可能性がある。というのは、干渉環境は、例えば、異なるユーザ端末装置セットが、次のフレームにおいてページングを受けている可能性があるため、急速に変化している可能性があるからである。ゼロ空間内で異なる固有ベクトルを使用することにより、異なる放射パターンにわたってページが向けられ、ダウンリンク戦略ダイバーシチがもたらされる。

【００９４】

干渉環境は、十分に急速に変化しない可能性もある。このため、第２の実施形態では、繰り返しは、順次期間セットの異なるダウンリンク・データ転送期間で実行される。例えば、ＴＤＭＡのケースでは、その期間は異なるタイムスロットと一致する。一般化すると、繰り返される伝送は、第１の伝送の特定のダウンリンク・トラフィック・データ転送コンベンショナル・チャネルとは異なるダウンリンク・コンベンショナル・チャネルで行われる。ＦＤＭＡシステムの場合、そのチャネルは異なる周波数である。

【００９５】

このため、第２の実施形態によれば、受信した干渉共分散マトリックスは、異なるダウンリンク・データ転送期間に関連する確認応答転送期間に受信される信号から決定され、最小固有値を有する受信した干渉共分散マトリックスの固有ベクトルを使用して、異なる干渉環境におけるページの繰り返しを円滑にするように、その異なるダウンリンク・データ転送期間中にページを送信する間の、スマート・アンテナ・システムに関するダウンリンク空間処理が決定される。

【００９６】

代替の諸実施形態は、干渉共分散マトリックスから必ずしも決定されないダウンリンク戦略を使用して、繰り返されるページングを実行する。さらに別の実施形態では、特定のユーザ端末装置に向けてのページは、未知の位置におけるユーザ端末装置が、ページを受信する確率を高めるように設計された、スマート・アンテナ・システムに関する一連の重み付けパラメータ・セットの異なるセットを使用して、繰り返し伝送される。例えば、１９９８年２月９日に出願され、本発明の譲受人に譲渡されたバラット他の米国特許出願第０９／０２０，６１９号が、そのようなシーケンスを決定するための諸技術を説明している。メッセージを順次に送信するのにスマート・アンテナ処理戦略において使用される重み付けパラメータ・シーケンスは、一実施形態によれば、ＤＦＴ（離散フーリエ変換）に基づく複素値重み付けパラメータ・セットの直交シーケンスである。ページの受信が成功する確率をさらに高めるため、ページ伝送の繰り返しは、異なる干渉環境におけるページの繰り返しを円滑にするように、異なるダウンリンク・データ転送期間中に行われる。

【００９７】

ページ繰り返しを使用する別の実施形態では、ページはそれぞれ、ブロード・ビーム、例えば、全方向ビームを使用して送信されるが、やはり、それぞれの異なる繰り返し中に、異なる干渉環境において確実に繰り返すページが生じるように、異なるダウンリンク・データ転送期間（例えば、異なるタイムスロット）中にページを送信する。全方向パターンで送信する方法は、例えば、ゴールドバーグの前述した米国特許出願第０８／９８８，５１９号において説明されるとおりである。

【００９８】

一実施形態では、各ダウンリンク・データ転送期間は、ページングの目的で、２つの部分に分けられる。ページは、任意のダウンリンク・データ転送期間の第１の半分、または第２の半分で送信される。これは、所与の数のダウンリンク・データ転送期間内で可能な、比較的より多くのページング・メッセージを提供する。また、これは、ページの繰り返しの間で干渉環境を変化させるための、さらに別の方法も提供する。ページが、ダウンリンク・データ転送期間の一方の半分で送信された後、次の繰り返しは、一実施形態では、異なるダウンリンク・データ転送期間である、次のフレームのダウンリンク・データ転送期間のもう一方の半分で送信される。このため、干渉環境は、少なくともページング伝送に関して、第１の伝送と第２の伝送の間で変化することが可能である。

【００９９】

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他の諸実施形態は、ダウンリンク・データ転送期間を２つより多くのページング期間に分割することを含むことも可能である。

【０１００】

図３は、ＴＤＭＡとともに使用される本発明の実施形態に関するフレームのシーケンスを示す。図３Ａは、３つの完全なフレームを示す。図３Ｂは、単一の（第Ｎ番の）フレームを示し、図３Ｃは、ダウンリンク・データ転送期間が、このケースでは、期間Ｄ３が、ページングの目的で、どのように第１の半分と第２の半分に分割されるかを示す。同様に、図４は、代替の全二重構成を示す。図４Ｃは、ダウンリンク・データ転送期間が、この例では、期間Ｄ３が、ページングの目的で、どのように第１の半分と第２の半分に分割されるかを示す。

【０１０１】

本発明の一実施形態では、繰り返しの回数は、ページングを行う基地局に対する要請端末装置の近さの推定値の関数である。ユーザ端末装置の近さは、初期登録（例えば、ログイン）中に推定されるか、または前の成功したページング・シーケンス中に推定される。ページングを行う基地局に近いと推定されたユーザ端末装置は、遠く離れていると推定されたユーザ端末装置よりも少ない干渉を経験するものと一般に、ただし、必然的にではなく、想定される。一実施形態では、推定される近さは、近い、遠い、非常に遠いのいずれかであり、近いユーザ端末装置は１回のページを受信し、すなわち、全く繰り返しを受信せず、遠くのユーザ端末装置は２回のページを受信し、すなわち、１回の繰り返しを受信し、非常に遠くのユーザ端末装置は２回の繰り返しを受信する。

【０１０２】

しかし、代替の諸実施形態は、様々な回数の繰り返しを決定するための他の基準を使用してもよい。スマート・アンテナ・システムを有する基地局から、スマート・アンテナ・システムを使用するユーザ端末装置にページを送信することを繰り返して、各繰り返しが、異なる干渉環境において行われるようにするための方法が、本発明の少なくとも１つの実施形態に従って開示されている。

【０１０３】

トラフィック通信

本発明の一実施形態では、基地局と、その基地局の関連するユーザ端末装置の間のトラフィック通信が無線プロトコルに従って行われる。無線プロトコルは、第１の基地局１０２が、基地局１０２の関連するユーザ端末装置と通信する第１の順次時間間隔（フレーム）セットを用意する。また、無線プロトコルは、無線通信システムの他の基地局セット１１１の各基地局に関する、さらなる順次時間間隔（フレーム）セットも用意する。

【０１０４】

図３は、１つのＴＤＭＡ実施形態のケースにおける伝送シーケンスを示す伝送タイム・チャート・セットを示す。図３Ａは、等しい期間を有する、一実施形態における隣接するフレーム・シーケンスに時間を全体的に分割することを示す。３つの完全なシーケンス・フレームが図３Ａに示されている。システム・タイミング制御の目的で、ユーザ端末装置が必要に応じて調べることができる同期チャネルが設けられる。代替の実施形態では、各シグナル・セグメントは、基地局のタイミング・シーケンスにすべてのリモート・ユーザ端末装置を同期させる、基地局からのフレーム・マーカ信号で始まる。

【０１０５】

本発明の一態様は、各フレーム内の信号の構成に主に関し、したがって、例示的なフレーム（フレームＮ）が、先行のフレーム（フレームＮ－１）の終端と、次のフレーム（フレームＮ＋１）の先頭とともに図３Ｂにより詳細に示されている。

【０１０６】

本発明の１つのＴＤＭＡ実施形態によるフレームは、選択された数のダウンリンク・データ転送期間（タイムスロット）Ｄ１、Ｄ２、Ｄ２・・・と、選択された数のアップリンク・データ転送期間（タイムスロット）Ｕ１、Ｕ２・・・とに細分される。また、各ダウンリンク・データ転送期間に１つが関連し、基地局に知られている、一実施形態では、固

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定された、関連するダウンリンク・データ転送期間に対する事前定義された関係を有する、アップリンクにおける、いくつかの確認応答転送期間（タイムスロット）ＡＫＤ１、ＡＫＤ２、ＡＫＤ３・・・も存在する。また、各アップリンク・データ転送期間に１つが関連し、基地局に知られている、一実施形態では、固定された、関連するアップリンク・データ転送期間に対する事前定義された関係を有する、アップリンクにおける、いくつかの確認応答転送期間（タイムスロット）ＡＫＵ１、ＡＫＵ２・・・も存在する。１つのＴＤＭＡ実施形態に関して、データ転送期間と、関連する確認応答転送期間との間の固定された関係は、タイムスロットによって指定される。つまり、データ・トラフィック期間に関する特定のタイムスロットにより、反対方向における、関連する確認応答転送期間に関するタイムスロットが決まる。さらに、一実施形態では、この関係は、システムのすべての基地局に関するすべての順次期間セットに関して同一である。

【０１０７】

ＴＤＭＡ実施形態の場合、各データ転送期間は、コンベンショナル・チャネルに相当することに留意されたい。

【０１０８】

図３Ｂに示される例では、４つのダウンリンク・データ転送期間が存在し、そのため、４つのアップリンク確認応答転送期間が存在し、２つのアップリンク・データ転送期間が存在し、そのため、２つのダウンリンク確認応答転送期間が存在する。ＳＤＭＡが、同一のタイムスロット中に、空間チャネルと呼ばれる複数の通信チャネルを円滑にすることを想い起こすと、図３Ｂの例は、ダウンリンクで通信する少なくとも４つのアクティブなユーザ端末装置と、アップリンクで通信する少なくとも２つのアクティブなユーザ端末装置に対応することに相当する。

【０１０９】

この時間間隔シーケンスの１つの特徴は、このシーケンスが、アップリンクとダウンリンクに関して、異なる数のデータ転送期間に対応できることである。データ通信では、例えば、基地局が、インターネットなどのコンピュータ・ネットワークに結合されている場合、通常、アップリンクにおけるよりも多くの通信がダウンリンクに存在する。本発明の一態様は、アップリンク・トラフィック・データ通信とダウンリンク・トラフィック・データ通信の間の非対称性に対処する。システムは、特定のチャネルにおいて対応されるべきアクティブなユーザ端末装置の数と、各方向におけるシステムのデータ転送要件やデータ転送容量に依存して、本明細書で示されるよりも多い数の、または少ない数の各タイプの期間を含むことが可能である。より高いデータ転送速度の場合、いずれの方向においても、より大きい数のユーザに、本発明の様々な実施形態は対応することができる。

【０１１０】

１つの代替の実施形態では、同一の数のアップリンク・データ転送期間とダウンリンク・データ転送期間が各順次時間間隔において存在し、したがって、用意されたダウンリンク・トラフィック・チャネル・セットの合計データ伝送容量は、用意されたアップリンク・トラフィック・チャネル・セットの合計データ伝送容量と同一である。

【０１１１】

ダウンリンク・トラフィック通信

ページが成功した後、第１の基地局１０２からのアクセス割り当てメッセージが、ダウンリンク転送期間（すなわち、ダウンリンク・トラフィック・チャネル）と、それに関連する確認応答転送期間（すなわち、関連するアップリンク・チャネル）とを第１の順次時間間隔セットの中の各順次時間間隔内で割り当てる。

【０１１２】

ページングを受けることに成功した（例えば、関連する基地局からの初期ダウンリンク・ページングの結果、アクセス割り当てメッセージを受信した）各ユーザ端末装置が、割り当てられたダウンリンク・トラフィック転送期間に対応する確認応答転送期間に、アップリンクでページング・シーケンスに（例えば、アクセス割り当てメッセージ）に応答する。第１の順次時間間隔セットと、さらなる順次時間間隔セットは、第２の基地局１１１

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などの他の基地局のユーザ端末装置からの応答を含め、初期ダウンリンク・ページング・シーケンスに対する（例えば、アクセス割り当てメッセージに対する）、アップリンクにおけるユーザ端末装置の応答が、第１の基地局１０２に知られている確認応答コンベンショナル・チャネルで、例えば、転送期間と周波数／符号チャネルで行われるようになっている。詳細には、１つのＴＤＭＡ実施形態では、基地局群のタイミングは、同期され、要請端末装置群の応答は、同一の周波数チャネルと同一のダウンリンク・データ転送期間で生じる可能性がある、第１の基地局１０２に関連する、またはその他の基地局１１１の他の同一チャネル・ユーザ端末装置群などの、干渉しているユーザ端末装置の可能な応答と時間が揃えられる。

【０１１３】

関連する基地局へのユーザ端末装置からの確認応答信号は、いくらかの訓練データといくらかの識別情報とを含む。一実施形態では、訓練データは識別情報を含む。識別情報によって、第１の基地局１０２は、自らの関連するユーザ端末装置からの信号を他の基地局のユーザ端末装置からの信号と区別することが容易になる。識別情報は、基地局識別子を含む。第１の基地局１０２は、応答（すなわち、確認応答）を受信し、訓練データと識別情報を使用して、ユーザ端末装置に関する将来のダウンリンク・データ転送期間中に、一実施形態では、次のダウンリンク・データ転送期間中にデータを送信するためのスマート・アンテナ処理戦略を決定する。

【０１１４】

ユーザ端末装置にダウンリンク・トラフィック・データを送信するための第１の基地局１０２の望ましいスマート・アンテナ処理戦略は、同一チャネル干渉源に向けられた干渉軽減を含むように決定されて、送信側基地局から、そのような他の同一チャネル・ユーザ端末装置に向かうそのような干渉が軽減されるようにする。さらに、ユーザ端末装置から確認応答信号を受信するための望ましいスマート・アンテナ処理戦略は、一実施形態では、同一チャネル干渉源からの干渉軽減を含むように決定される。

【０１１５】

一実施形態では、確認応答は、基地局からの信号がユーザ端末装置で受信することに成功したことのフィードバックを基地局に与える確認応答メッセージ（ＡＣＫ）を含む。基地局は、予期されるＡＣＫを受信しなかった場合、またはメッセージの受信が成功しなかったという情報のフィードバックを受けた場合、データの送信を再スケジュールする。

【０１１６】

第１の基地局１０２は、次に、指定されたダウンリンク・データ転送期間にデータ（すなわち、トラフィック・データ）をユーザ端末装置に送信する。アクティブなユーザ端末装置は、第１の基地局１０２からユーザ端末装置に送信されたダウンリンク・トラフィック・データを受信する。一実施形態では、ユーザ端末装置に送信されるダウンリンク信号は、トラフィック・データを通信することに加えて、ダウンリンク・ポーリング信号としても作用して、さらなる通信のためのスマート・アンテナ処理戦略を決定するための応答をアップリンクで獲得する。このため、ユーザ端末装置は、ダウンリンク・トラフィック・データに応答して、指定されたダウンリンク・データ転送期間にわたってアップリンクで次の確認応答転送期間中に、確認応答信号を基地局に送り返す。基地局は、その確認応答を受信し、同一のダウンリンク・データ転送期間に割り当てられた１つまたは複数の同一チャネルの干渉しているユーザ端末装置からの確認応答も受信して、ユーザ端末装置から受信されたそれらの信号を使用して、ユーザ端末装置に関する次の指定されたダウンリンク・データ転送期間中にデータをユーザ端末装置に有利に送信するスマート・アンテナ処理戦略を決定する。決定されるダウンリンク・スマート・アンテナ処理戦略には、他の基地局１１１の同一チャネル・リモート端末装置に向けての干渉軽減が含まれる。さらにまた、第１の基地局１０２は、干渉する同一チャネル・ユーザからの干渉軽減を含む形で、要求されたリモート端末装置と干渉する同一チャネル・リモート端末装置からの確認応答信号を有利に受信する、基地局１０２のスマート・アンテナ・システムに関する処理戦略も決定する。システムが、本発明の一実施形態に従って、同じコンベンショナル・チャ

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ネル内で、例えば、ＴＤＭＡシステムにおける同一のタイムスロット内で複数の空間チャネルも用意する場合、決定されるスマート・アンテナ処理戦略は、同じコンベンショナル・チャネルの他の空間チャネルにおける、同一の基地局１０２の同一チャネルの干渉するリモート端末装置に関する干渉軽減も含む。

【０１１７】

ユーザ端末装置から確認応答信号を受信するための所与の確認応答転送期間に、第１の基地局１０２は、ページング・シーケンス（例えば、アクセス割り当てメッセージ）に対する、またはダウンリンク・トラフィック・データに対する応答として、ユーザ端末装置からの確認応答を受信することに留意されたい。

【０１１８】

ダウンリンク・データ転送がそのように開始されると、ダウンリンク・トラフィック・データ転送は、フレームごとに、指定されたダウンリンク・データ転送期間において続けられる。各ダウンリンク・データ信号は、ダウンリンク・ポーリング信号としても作用する。ユーザ端末装置は、指定されたダウンリンク・データ転送期間に、関連する基地局からダウンリンク・データを受信し、次の指定された確認応答転送期間中に確認応答信号をその基地局に送り返す。確認応答信号は、同一の基地局、または他の基地局の他の同一チャネル・ユーザ端末装置からの他の確認応答信号とともに、基地局において受信され、やはり、基地局は、確認応答を最適に受信するためと、次の指定されたダウンリンク・データ転送期間に次のダウンリンク・データ信号を最適に送信するために、そのスマート・アンテナ・システムについて処理戦略を決定する。最適にということで意味されるのは、１つまたは複数の要請端末装置との通信を強化しながら、第１の基地局１０２が確認応答を受信する干渉しているユーザ端末装置から、およびそのユーザ端末装置に向かう干渉を軽減させるダウンリンク戦略を使用することである。

【０１１９】

このため、決定しているスマート・アンテナ処理戦略が、特定の確認応答転送期間中に受信された信号を使用し、かつ、その特定の確認応答転送期間に関連する次のダウンリンク・データ転送期間中にデータを送信するために使用されるケースでは、その次のダウンリンク・データ転送期間中に送信を受けるアクティブなユーザ端末装置セットは、先行する特定の確認応答転送期間中にそれぞれの基地局に送信するユーザ端末装置のセットのサブセットである。一実施形態では、先行する特定の確認応答転送期間に信号が受信されたユーザ端末装置だけが、次の関連するダウンリンク・データ転送期間にダウンリンクで送信を受ける。このため、ダウンリンク・データ転送期間の特定の１期間に基地局から送信を受けているアクティブな（すなわち、アイドル状態にない）ユーザ端末装置は、同一の特定のダウンリンク・データ転送期間に関連する、アップリンクにおける先行する確認応答転送期間に、先にデータを基地局に送信していることが分かっている。

【０１２０】

ユーザ端末装置からアップリンク通信の開始

本発明の別の態様によれば、第１の基地局１０２に関連するユーザ端末装置の１つからアップリンクで通信を開始する。ユーザ端末装置は、第１の基地局１０２へのデータ送信を開始しようと試みる際、合意された論理制御チャネルでランダム・アクセス要求信号をまず送信し、そのランダム・アクセス要求が、第１の基地局１０２によって受信される。これに応答して、第１の基地局１０２は、やはり合意された論理制御チャネルで、アクセス割り当てメッセージをユーザ端末装置に送信する。これは、ランダム・アクセス要求信号が受信されたことをユーザ端末装置に示す情報をユーザ端末装置に送信することを含み、また、ユーザ端末装置からアップリンクでデータ転送を受信するためのアップリンク・データ転送期間と周波数チャネルを指定するデータも含む。

【０１２１】

ユーザ端末装置は、これに応答して、指定されたアップリンク・トラフィック転送期間中にアップリンク・トラフィック・データを送信する。基地局は、ユーザ端末装置からアップリンク・データを受信する。また、第２の基地局１１１などの他の基地局のユーザ端

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末装置も、それぞれの基地局にアップリンク・トラフィック・データを送信しており、それらの信号が、第１の基地局１０２へのアップリンク・トラフィック信号に干渉する可能性がある。

【０１２２】

さらに、第１の基地局１０２が、ＳＤＭＡも提供する場合、コンベンショナル・チャネルを共用する、基地局１０２の関連する他のユーザ端末装置も、そのように干渉する可能性がある。本発明の一実施形態によれば、アップリンク・データは、基地局からのアクセス割り当てメッセージに対する応答として作用し、第１の基地局１０２が、その応答（すなわち、アップリンク・トラフィック・データ）を使用して、ユーザ端末装置からの信号を受信するためのスマート・アンテナ処理戦略を決定する。この一実施形態によれば、第１の基地局１０２に知られているアップリンク・コンベンショナル・チャネルで、例えば、データ転送期間と周波数／符号チャネルで、アクセス割り当てメッセージに応答してか、または継続するアップリンク・トラフィック・データとして、アップリンク・トラフィック信号が送信されるように、第１の順次時間間隔セットとさらなる順次時間間隔セットが指定される。第１の基地局１０２は、受信された信号から決定されたスマート・アンテナ処理戦略を使用してアップリンク・トラフィック信号を受信する。スマート・アンテナ処理戦略は、アクティブな関連するユーザ端末装置からデータ信号を受信するためのものである。一実施形態では、指定されたアップリンク・データ転送期間内の各アップリンク・トラフィック・データ信号は、スマート・アンテナ・システムに関する処理戦略を決定するための情報を基地局に与える訓練データを含む。訓練データは、識別情報を含む。一実施形態では、制御コンピュータは、スマート・アンテナ処理戦略が、同一のアップリンク・データ転送期間内でアップリンク・データを有利に受信するように、適合される。制御コンピュータが、同一のアップリンク・データ転送期間にデータを最適に受信するのに十分なだけ迅速にアップリンク・スマート・アンテナ処理戦略を決定する十分な計算能力を有さない代替の諸実施形態では、１つのアップリンク・データ転送期間内に受信されたデータからのアップリンク戦略決定が、スマート・アンテナ・システムによって、特定のユーザ端末装置に関する将来のフレームのアップリンク・データ転送期間に、将来、例えば次のアップリンク・データ転送期間にデータを受信するのに使用される。ＴＤＭＡ実施形態では、基地局群のタイミングが同期され、要請端末装置や、干渉している同一チャネル・ユーザ端末装置の、そのようなユーザ端末装置のそれぞれの基地局に送信するためのアップリンク・データ転送期間が、同一のタイムスロットで、同一の周波数チャネル内で生じる。

【０１２３】

一実施形態では、基地局は、アクティブなユーザ端末装置からアップリンク・トラフィック・データを受信することに成功すると、そのアップリンク・データ転送期間に関する、ダウンリンクにおける指定された確認応答転送期間中に、ユーザ端末装置に確認応答信号を送信する。このように、アップリンク・トラフィック・データ信号は、ユーザ端末装置からの逆ポーリング信号として使用され、その信号に対する応答は、基地局からの確認応答信号であり、その確認応答信号が通信が開始した後は、逆ポーリング確認応答信号とされる。このさらなる逆ポーリング確認応答信号に対する（すなわち、基地局からの確認応答に対する）応答が、基地局によって、基地局のスマート・アンテナ・システムに関する処理戦略をさらに決定するのに使用されてもよい。

【０１２４】

一実施形態では、ダウンリンクにおける確認応答が、ユーザ端末装置においてうまく受信される確率を高めるため、第１の基地局１０２は、確認応答が行われるアップリンク・トラフィック・データを使用して基地局１０２のスマート・アンテナ・システムに関する処理戦略を決定して、ダウンリンクにおいて次の指定された確認応答期間に、ユーザ端末装置に確認応答を有利に送信する。決定される戦略には、第１の基地局１０２によってアップリンク・トラフィック・データが受信される、他の基地局、または第１の基地局１０２の１つまたは複数の同一チャネル・ユーザ端末装置に向けての干渉軽減が含まれる。

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【０１２５】
一実施形態では、第１の基地局１０２からユーザ端末装置に送信される確認応答信号は、基地局における受信成功のフィードバックとしてのＡＣＫ（確認応答メッセージ）もユーザ端末装置に与える。また、確認応答メッセージは、（ＮＡＣＫ）否定応答メッセージ、または他のそのようなフィードバックであることも可能である。ＮＡＣＫを受信した場合、または予期されるＡＣＫを受信しなかった場合、またはメッセージが受信されなかったという情報をどのようにかフィードバックされた場合、ユーザ端末装置はデータの送信を再スケジュールする。さらに、確認応答信号は、ユーザ端末装置における受信の成功に役立つ訓練データを含む。さらに、一実施形態では、１つまたは複数のユーザ端末装置は、スマート・アンテナ・システムを含み、そのようなケースでは、アップリンク・トラフィックに対するダウンリンクにおける確認応答も、ユーザ端末装置のスマート・アンテナ・システムに関するスマート・アンテナ処理戦略を決定するのに使用できる。

【０１２６】
ユーザ端末装置から第１の基地局１０２へのアップリンク通信は、指定されたアップリンク・データ転送期間に、フレームごとに続けられる。基地局によって受信される各アップリンク・データが、他の干渉しているユーザ端末装置からの同一チャネル・アップリンク・トラフィック・データとともに使用されて、ユーザ端末装置からデータを受信するための、第１の基地局１０２におけるスマート・アンテナ・システムに関する処理戦略が決定され、基地局は、次に、基地局のアンテナ・システムが、基地局の関連するユーザ端末装置に、さらなる逆ポーリング確認応答信号として確認応答信号を送信するための処理戦略も決定する。

【０１２７】
本発明の一実施形態は、スマート・アンテナ・システムを有する１つだけの基地局において使用されるが、他の諸実施形態によれば、通信システム１００は、そのようなスマート・アンテナ・システムをそれぞれが含む複数の基地局を有することが可能である。一実施形態では、第１の基地局１０２と１つまたは複数の第２の基地局１１１は、同一に構成された順次時間間隔セットを使用し、したがって、第１の順次期間セットとさらなる順次時間間隔セットは同一の構造を有する。

【０１２８】
図３Ｂに示される信号は、ＴＤＤを含むＴＤＭＡシステムに関するものであり、したがって、アップリンク信号とダウンリンク信号が一緒にグループ化されて、基地局のスマート・アンテナ・システムがアップリンクからダウンリンクに切り替わる回数が減らされる。図３Ｂに示された信号の代替として、期間の順序は、例えば、基地局が、同一のユーザ端末装置と通信するためにダウンリンク周波数とアップリンク周波数が異なるＦＤＤ（周波数ドメイン二重化）を使用する場合、変わる可能性がある。１つのそのような代替形態が図３Ｄに示されている。図３Ｅは、図３Ｂの構成に類似しているが、フレーム境界が移動している別の代替形態を示す。図３Ｂの構成に対する他の多くの代替形態が、添付の特許請求の範囲に記載される本発明の範囲を逸脱することなく、可能である。

【０１２９】
トラフィック通信に関する代替の実施形態
図３に示されるフレーム構造を利用する一実施形態は、フレーム・セットのいずれのアップリンク・データ転送期間も、同一のユーザ端末装置に関するダウンリンク・データ転送期間に必ずしも関連していない半二重実施形態である。

【０１３０】
代替の半二重実施形態によれば、アップリンク・データ転送に確認応答するためのフレーム・シーケンスのフレーム内の確認応答転送期間は、ユーザ端末装置に対する将来の指定されたダウンリンク・データ転送期間の中に、例えば、次の指定されたダウンリンク・データ転送期間の中に含められる。このため、ダウンリンク・データ転送期間中にダウンリンクで転送されるデータは確認応答データを含むことがあり、かつ／または訓練データを含むこともある。さらに、アップリンク・データ転送期間ごとにダウンリンク・データ

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転送期間が存在する。

【０１３１】

さらに、別の代替の半二重実施形態によれば、ダウンリンク・データ転送に確認応答する（またはアクセス割り当てメッセージに応答する）ためのフレーム内の確認応答転送期間は、ユーザ端末装置に関する将来の指定されたアップリンク・データ転送期間の中に、例えば、次の指定されたアップリンク・データ転送期間の中に含められる。このため、アップリンク・データ転送期間中に転送されるデータは、訓練データおよび／または識別データ、および／または確認応答データを含むことがある。さらに、ダウンリンク・データ転送期間ごとにアップリンク・データ転送期間が存在する。

【０１３２】

図４は、全二重システムを利用し、このため、本明細書では、全二重の代替実施形態と呼ばれる、さらに別の代替の実施形態のケースにおける伝送シーケンスを示す伝送タイム・チャート・セットである。図４Ａは、等しい期間の隣接するフレーム・シーケンスに時間を全体的に分割することを示している。３つの完全な順次フレームが、図４Ａに示されている。

【０１３３】

特定のチャネルに関する例示的なデータ転送セグメントが、図４Ｂにさらに詳細に示されている。本発明の全二重の代替実施形態によるフレームは、いくつかのアップリンク・データ転送期間、Ｕ１、Ｕ２、Ｕ３・・・と、同一の数のダウンリンク・データ転送期間、Ｄ１、Ｄ２、Ｄ３・・・に細分される。図４Ｂに示される例では、少なくとも５つのアクティブなユーザ端末装置に対処することに対応する、５つのダウンリンク・データ転送期間と、５つのアップリンク・データ転送期間とが存在する。それぞれのアクティブなユーザ端末装置には、関連する基地局からのアクセス割り当てメッセージを使用して、本明細書で説明されるとおり、アップリンク・データ転送期間とダウンリンク・データ転送期間とが割り当てられる。他の諸実施形態は、各フレーム内に、より多い、またはより少ないダウンリンク・データ転送期間とアップリンク・データ転送期間を有してもよい。例えば、一実施形態は、各フレーム内に３つのアップリンク・データ転送期間と、３つのダウンリンク・データ転送期間とを有するフレーム構造を使用する。

【０１３４】

全二重の代替実施形態によれば、アップリンク・データ転送に確認応答するための時間間隔シーケンスのフレーム内の確認応答転送期間は、ユーザ端末装置に関する将来の指定されたダウンリンク・データ転送期間の中に、好ましくは、次の指定されたダウンリンク・データ転送期間の中に含められる。さらに、ダウンリンク・データ転送に確認応答する（またはアクセス割り当てメッセージに応答する）ための時間間隔シーケンスのフレーム内の確認応答転送期間は、ユーザ端末装置に関する将来の指定されたアップリンク・データ転送期間の中に、好ましくは、次の指定されたアップリンク・データ転送期間の中に含められる。

【０１３５】

基地局からデータ通信を開始することは、本明細書で説明する１つの半二重実施形態に関して前述したとおりに実行される。基地局はページング・メッセージをまず送信する。ユーザ端末装置は、ランダム・アクセス要求で応答する。基地局は、トラフィック通信のために使用するアップリンク期間とダウンリンク期間を指定することを含むアクセス割り当てメッセージで応答する。

【０１３６】

ユーザ端末装置は、アクセス割り当てメッセージを受信すると、割り当てられたアップリンク・トラフィック・チャネルの間に確認応答信号を送信する。その信号は、ユーザ端末装置と基地局の間の無線リンクに関する有利なスマート・アンテナ処理戦略を、ユーザ端末装置の関連する基地局が決定する際に使用するための訓練データおよび／または識別データを含む。第１の基地局１０２に関する順次期間セットは、第２の基地局１１１などの他の基地局群の基地局に関する順次期間セットと調整されて、ユーザ端末装置からの、

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アクセス割り当てメッセージに対する応答が基地局に知られている時間位置／周波数位置にあり、基地局、例えば、第１の基地局１０２が、基地局１０２の関連するユーザ端末装置からの干渉信号を含む信号だけでなく、第２の基地局１１１などの他の基地局に関連する同一チャネル・ユーザ端末装置からも信号を受信する。ユーザ端末装置と通信するための有利なスマート・アンテナ処理戦略は、同一チャネル干渉源からの干渉軽減（アップリンクにおける）と、同一チャネル干渉源に向けての干渉軽減（ダウンリンクにおける）を含むように決定される。

【０１３７】

さらに、基地局は、関連するユーザ端末装置の少なくとも１つからアップリンク・トラフィック・データを受信すると、基地局がアップリンク・データを受信したアップリンク・データ転送期間に対応するダウンリンク・データ転送期間に、そのようなユーザ端末装置に確認応答信号を送信する。

【０１３８】

このため、信号は、ユーザ端末装置によって、関連する基地局からのアクセス割り当てメッセージに応答してだけでなく、関連する基地局から受信されたダウンリンク・トラフィック・データに対する確認応答としても送信される。

【０１３９】

さらに、全二重の代替実施形態によれば、アップリンク・トラフィック・データは、訓練データと識別データも含み、基地局は、そのようなデータを使用して、基地局のスマート・アンテナ・システムに関する処理戦略を決定する。

【０１４０】

このため、ダウンリンク・データ転送期間中にダウンリンクで転送されるデータは、訓練データを含み、かつＡＣＫデータおよび／またはＮＡＣＫデータなどの確認応答データまたは確認応答のための他の機構を含む一方、アップリンク・データ転送期間中に転送されるデータは、訓練データおよび／または識別データ、および／またはＡＣＫデータおよび／またはＮＡＣＫデータなどの確認応答データ、あるいは他の何らかの確認応答データを含む。送信側エンティティは、ＮＡＣＫを受信した場合、または予期されるＡＣＫを受信しなかった場合、またはそれ以外の方法で、受信が不成功であったことを知った場合、データの送信を再スケジュールする。

【０１４１】

次に、本発明のさらに別の代替の実施形態を説明する。その代替の実施形態によれば、基地局から通信を開始するために、基地局１０２、１１１はそれぞれ、それぞれの関連するアクティブなユーザ端末装置に、そのようなユーザ端末装置からのデータ送信を受信するのに先立って、ダウンリンク・ポーリング信号を送信する。このポーリングは、本発明の実施形態に従って、特定のパケット・データ通信に関するスマート・アンテナ処理戦略の決定を円滑にするために行われる。一実施形態では、ダウンリンク・ポーリングは、第１の基地局１０２のための用意された第１の順次時間間隔セット内や、第２の基地局群１１１の各基地局のための用意されたさらなる順次時間間隔セット内で、第１の基地局１０２、１つまたは複数の第２の基地局１１１によって実行され、時間間隔のそれぞれは、順方向ポーリング期間と、順方向ポーリング期間にそれぞれが関連するいくつかの関連するアップリンク転送期間と、いくつかのトラフィック・データ転送期間とを含め、選択された数のダウンリンク転送期間を有するデータ転送セグメントを含む。

【０１４２】

図５は、この代替の実施形態のケースにおける伝送シーケンスを示す伝送タイム・チャート・セットである。図５Ａは、等しい期間の隣接するフレーム・シーケンスに時間が全体的に分割されていることを示す。各フレームは、セルラー・オーバーヘッドなどのシステム・オーバーヘッド信号を送受信するためのシグナル・セグメントとデータ転送セグメントとを含む。３つの完全な順次フレームが図５Ａに示されている。システム・タイミング制御の目的で、各シグナル・セグメントは、基地局からのフレーム・マーカ信号で始まり、すべてのリモート・ユニットを基地局のタイミング・シーケンスに同期させる。

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【０１４３】
本発明の一態様は、各フレームのデータ転送セグメント内の信号の構成に主に関し、したがって、特定のチャネルに関する例示的なデータ転送セグメントが図５Ｂにより詳細に示されている。
【０１４４】
本発明の代替の実施形態によるデータ転送セグメントは、いくつかの順方向ポーリング期間Ｆ１、Ｆ２、Ｆ３・・・、いくつかの逆方向ポーリング期間Ｒ１、Ｒ２、Ｒ３・・・、いくつかのトラフィック・データ転送期間Ｄ１、Ｄ２、Ｄ３・・・に細分される。図５Ｂに示された例では、少なくとも５つのアクティブなユーザ端末装置に対処することに対応する、５つの順方向ポーリング期間、５つの逆方向ポーリング期間、５つのトラフィック・データ転送期間が存在する。それぞれのアクティブなユーザ端末装置は信号チャネルに割り当てられ、かつ順方向ポーリング期間と逆方向ポーリング期間に割り当てられる。
【０１４５】
第１の基地局１０２とその他の基地局１１１は、それぞれの順方向ポーリング期間に基地局のダウンリンク・ポーリング信号を送信する。関連する基地局からポーリング信号を受信した各ユーザ端末装置は、順方向ポーリング期間に関連するアップリンク転送期間にポーリング信号に応答する。関連するアップリンク転送期間は、関連する基地局の順次時間間隔セットのトラフィック・データ転送期間の一部である。第１の順次時間間隔セットやさらなる順次時間間隔セットは、ダウンリンク・ポーリングに対するユーザ端末装置の応答が、第１の基地局１０２に知られている、関連するアップリンク転送期間と周波数チャネル／符号チャネルで行われるようになっている。
【０１４６】
基地局１０２は、それらの応答を受信し、それらの応答を使用して、スマート・アンテナ・システムに関するダウンリンク処理戦略を決定し、決定されたダウンリンク処理戦略を使用して、基地局１０２の関連するユーザ端末装置にデータ信号を送信する。１つのＴＤＭＡ実施形態では、基地局群のタイミングは同期され、要請端末装置１０５、１０６、１０７、１０８や、干渉しているユーザ端末装置１０９、１１０の、そのようなユーザ端末装置のそれぞれの基地局からのダウンリンク・ポーリングに対する応答は、同一のタイムスロットで、同一の周波数チャネルで行われる。決定されたスマート・アンテナ処理戦略は、そのような干渉する同一チャネル・リモート端末装置に向けての干渉軽減を含む。
【０１４７】
第１の基地局１０２に関連するユーザ端末装置の１つから通信を開始するため、ユーザ端末装置は、第１の基地局１０２にデータ伝送を送信することを希望する場合、逆方向ポーリング期間中、第１の基地局１０２によって受信される逆方向ポーリング信号を送信する。第１の基地局１０２が、次に、逆方向ポーリングが受信されたことをユーザ端末装置に示す情報をユーザ端末装置に送信することを含み、かつ、ユーザ端末装置からアップリンクでデータ転送を受信するためのトラフィック・データ転送期間と周波数チャネルを指定するデータを含む逆方向ポーリング確認応答信号をユーザ端末装置に送信する。
【０１４８】
次に、ユーザ端末装置は、指定されたアップリンク・トラフィック・データ転送期間中データ転送信号を送信する。データ転送信号は、図５Ｄに示されるとおり、アップリンク・トラフィック・データ転送期間の訓練データ・セグメントの中に訓練データを含む。基地局がユーザ端末装置から信号を受信する。また、第２の基地局１１１などの他の基地局も、それぞれ基地局からの逆方向ポーリング確認応答に応答する信号を受信していることがあり、それらの信号は、第１の基地局１０２へのデータ転送信号に干渉する可能性がある。本発明の一実施形態によれば、第１の順次時間間隔セットやさらなる順次時間間隔セットは、第１の基地局１０２に知られているアップリンク・トラフィック・データ転送期間と周波数／符号チャネルで、データ転送信号が逆方向ポーリング確認応答信号に応答して送信されるようになっている。第１の基地局１０２は、逆方向ポーリング確認応答に対する応答を受信し、それらの応答を使用して、基地局１０２のアクティブな関連するユー

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ザ端末装置から受信するための、スマート・アンテナ・システムに関する処理戦略を決定する。

【０１４９】

第１の基地局１０２は、次に、決定されたスマート・アンテナ処理戦略を使用して、基地局１０２の関連するユーザ端末装置からデータ信号を受信する。１つのＴＤＭＡ実施形態では、基地局群のタイミングは、同期され、要請端末装置１０５、１０６、１０７、１０８と干渉しているであろうユーザ端末装置１０９、１１０の、そのようなユーザ端末装置のそれぞれ基地局からの逆方向ポーリング確認応答に対する応答は、同一のタイムスロットで、同一の周波数チャネルで行われる。スマート・アンテナ処理戦略は、そのような干渉しているユーザからの干渉軽減を含むように決定される。

【０１５０】

一実施形態では、システム１００は、スマート・アンテナ・システムをそれぞれが有する第１の基地局１０２と、１つまたは複数の他の基地局１１１とを含み、第１の基地局１０２と他の基地局１１１は、同一に構成された順次時間間隔セットを使用し、したがって、第１の順次期間セットと、さらなる順次時間間隔セットは同一の構造を有する。別の実施形態では、第１の基地局１０２だけがスマート・アンテナ・システムを有する。

【０１５１】

図５Ｂに示された信号の代替として、図５Ｃに示されるとおり、逆方向ポーリング期間を第１に設け、順方向ポーリング期間を第２に設けることが有利である。その場合、基地局は、ユーザ端末装置からの逆方向ポーリング信号の受信に確認応答し、対応する順方向ポーリング期間中に、選択された逆方向ポーリング確認応答信号によってデータ転送セグメントを指定することができる。前述したとおり、順方向ポーリングのケースでは、確認応答は要求されない。というのは、データ転送期間の始めにおけるユーザ端末装置による訓練信号の送信が、基地局には、順方向ポーリング信号をユーザ端末装置が受信していることの十分な知識となるからである。

【０１５２】

代替の諸実施形態は、基地局によって送信されたオーバーヘッド・シグナルとポーリング信号の、リモート端末装置における受信が成功する確率を高める異なるやり方を使用することもできる。１つの代替の実施形態では、オーバーヘッド・シグナルとポーリング信号は、アレイ要素１０４（例えば、１９９７年１２月１２日に出願され、本発明の譲受人に譲渡された、ゴールドバーグの米国特許出願第０８／９８８，５１９号を参照されたい）を使用して、ブロード・ビームを介して送信される。

【０１５３】

代替の諸実施形態は、ユーザ端末装置に応答して訓練信号ではなく、パイロット・トーンをさらに使用することが可能である。他の代替の諸実施形態は、訓練信号またはパイロット・トーンを含むことが可能であり、そのようなケースでは、知られている「ブラインド」方法を使用して、第１の基地局１０２のスマート・アンテナ・システムに関する重み付けパラメータを決定することができる。

【０１５４】

さらに他の代替の諸実施形態では、基地局のスマート・アンテナ・システムに関する重み付けパラメータを獲得することを可能にする他の知られているポーリング構成に、変更を加えることができる。変更されることが可能な１つのそのようなプロトコルが、Ｚ．ＺｈａｎｇとＡ．Ｓ．Ａｍａｐｏｒａ、「Ｐｅｒｆｏｒｍａｎｃｅ ｏｆ ａ ｍｏｄｉｆｉｅｄ ｐｏｌｌｉｎｇ ｓｔｒａｔｅｇｙ ｆｏｒ ｂｒｏａｄｂａｎｄ ｗｉｒｅｌｅｓｓ ＬＡＮｓ ｉｎ ａ ｈａｒｓｈ ｆａｄｉｎｇ ｅｎｖｉｒｏｎｍｅｎｔ」、Ｐｒｏｃ．ＧＬＯＢＥＣＯＭ’９７、（「Ｚｈａｎｇ」）、Ａ．Ｓ．ＡｍａｐｏｒａおよびＳ．Ｖ．Ｋｒｉｓｈｎａｍｕｒｔｈｙ、「Ｎｅｗ ａｄａｐｔｉｖｅ ＭＡＣ ｌａｙｅｒ ｐｒｏｔｏｃｏｌ ｆｏｒ ｗｉｒｅｌｅｓｓ ＡＴＭ ｎｅｔｗｏｒｋｓ ｉｎ ｈａｒｓｈ ｆａｄｉｎｇ ａｎｄ ｉｎｔｅｒｆｅｒｅｎｃｅ ｅｎｖｉｒｏｎｍｅｎｔｓ」、Ｐｒｏｃ．ＩＣＵＰＣ’９７、Ｓａｎ Ｄｉｅｇｏ、ＣＡ、１９９７（「

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ＡｍａｐｏｒａとＫｒｉｓｈｎａｍｕｒｔｈｙ」）、Ｓ．Ｖ．Ｋｒｉｓｈｎａｍｕｒｔｈｙ、Ａ．Ｓ．Ａｍａｐｏｒａ、Ｍ．Ｚｏｒｚｉ、「Ｐｏｌｌｉｎｇ ｂａｓｅｄ ｍｅｄｉａ ａｃｃｅｓｓ ｐｒｏｔｏｃｏｌ ｆｏｒ ｕｓｅ ｗｉｔｈ ｓｍａｒｔ ａｄａｐｔｉｖｅ ａｒｒａｙ ａｎｔｅｎｎａｓ」、Ｐｒｏｃ．ＩＣＵＰＣ’９８、３３７～３４１頁、１９９８（「Ｋｒｉｓｈｎａｍｕｒｔｈｙ」）において提案されている。Ｚｈａｎｇは、基地局のスマート・アンテナ・システムが、各リモート端末装置を順次にポーリングすることにより、スマート・アンテナ・システムの重み付けパラメータを定期的に更新することを可能にする、トークン・ベースのプロトコルを提案している。リモート端末装置は、情報要求、または無変調パイロット・トーンでポーリング要求に応答し、いずれの応答が、重みを更新するのに使用されてもよい。本発明を組み込むようにＺｈａｎｇ法を変更するのに、基地局や１つまたは複数の他の基地局によって使用されるプロトコルを調整して、第２の基地局１１１などの他の基地局のリモート・ユーザ端末装置から受信される情報要求または無変調パイロット信号が、第１の基地局１０２に知られている時間位置／周波数位置で生じるようにし、第１の基地局１０２のスマート・アンテナ・システムに関する処理戦略を決定するのに使用されて、その他の基地局に関連するユーザ端末装置に対する、またはそのようなユーザ端末装置からの干渉軽減がもたらされるようにする。ＡｍａｐｏｒａとＫｒｉｓｈｎａｍｕｒｔｈｙは、Ｚｈａｎｇよりも高速な適応を可能にするというＭＡＣ（メディア・アクセス）プロトコルを提案している。各伝送には、いずれの方向でも、アレイをリモートに即時に適応させるのに使用される、リモート－基地局パイロット信号が即時に先行する。ＡｍａｐｏｒａとＫｒｉｓｈｎａｍｕｒｔｈｙ法の変更も同様である。Ｋｒｉｓｈｎａｍｕｒｔｈｙスキームでは、いずれのリモートも、そのリモートの情報要求を、基地局とそのリモートの間の任意の情報転送に便乗させることができる。したがって、先行するフレーム内で情報を転送していないリモートだけに、現在のフレーム内でポーリングが行われる。したがって、フレーム・サイズは、固定ではなく、少なくとも、含められるポーリングの数に応じて変化する。一変種では、基地局は、各ポーリングにおいて、リモートは、１つの未処理の要求を基地局に送信するという点で、限られたポーリングを使用し、第２の変種では、基地局が各リモートを網羅的にポーリングし、ポーリングされると、リモートはそのリモートの未処理の要求のすべてを送信する。また、変更されたＫｒｉｓｈｎａｍｕｒｔｈｙスキームが、本発明の代替の実施形態に取り入れられることも可能であり、その実施形態では、特定の基地局によって使用されるプロトコルが、他の基地局によって使用されるプロトコルと調整されて、リモート端末装置による応答が、特定の基地局に利用可能な時間位置／周波数位置で生じるようにされる。

【０１５５】

以上の説明の多くは、ＴＤＭＡシステムに関してであるが、本発明は、ＦＤＭＡシステムおよびＣＤＭＡシステムにおいて実施されることも可能である。

【０１５６】

本発明は、ハードウェア、ソフトウェア、またはハードウェアとソフトウェアの組み合わせで使用されてもよい。例えば、一実施形態では、本発明は、少なくとも部分的に、マシン可読媒体上に格納された情報によって実施され、その情報は、マシン（例えば、基地局またはユーザ端末装置などの通信デバイスによって使用されるデータ処理システム）によって実行されると、そのマシンが、本発明によって実現される方法の少なくとも一部分を実行するようにさせる命令セットを表す。媒体には、記憶材料（例えば、磁気記憶ディスク、光ディスク、その他）、および／またはメモリ・デバイス（例えば、ＲＯＭ、ＲＡＭ、ＤＲＡＭ、ＳＲＡＭ、その他）が含まれることが可能である。ＤＳＰ（デジタル信号プロセッサ）などの、１つまたは複数の汎用プロセッサおよび／または専用プロセッサも、本発明の実施形態に関連して動作する基地局またはユーザ端末装置によって使用されることが可能である。

【０１５７】

本発明の文脈におけるユーザ端末装置は、様々なタイプの通信デバイスを意味し、入力

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デバイスおよび／または出力デバイス、および／または処理デバイスに結合されて、インターネット通信ネットワーク、または他のデータ通信ネットワークを介する音声通信、データ通信などの様々なタイプの機能を提供することができる。

【０１５８】

本発明を通信の文脈で、特に、スマート・アンテナ・システムを有する少なくとも１つの基地局を使用するセルラー通信システムの文脈で説明してきたが、本発明は、そのような文脈に限定されず、様々な無線アプリケーションや無線システムで利用されてもよく、例えば、スマート・アンテナ・システムを含む通信局などの通信デバイスを含むシステムにおいて利用されてもよいことをさらに理解されたい。さらに、本発明は、いずれの１つのタイプのアーキテクチャまたは無線インタフェースにも限定されず、このため、ＴＤＭＡ、ＦＤＭＡ、またはＣＤＭＡ、およびＴＤＤもしくはＦＤＤ、あるいはその他のアーキテクチャ／プロトコルの１つ、または組み合わせに関連して利用されてもよい。

【０１５９】

このため、本発明の好ましい諸実施形態と考えられるものを説明してきたが、本発明の趣旨を逸脱することなく、諸実施形態に他の変更、およびさらなる変更を加えることもでき、すべてのそのような改変および変更が、本発明の範囲に含まれるものとされることが、当業者には認識されよう。

【図面の簡単な説明】

【０１６０】

【図１】少なくとも１つの基地局がスマート・アンテナ・システムを有する、少なくとも２つの基地局を含む通信システムを示す図である。

【図２】スマート・アンテナ・システムを使用する基地局の２つの実施形態を示し、Ａは、スマート・アンテナ・システムが、適応アンテナ・アレイ・システムであり、適応が、ベースバンドで行われる１つの構成を示し、Ｂは、ビーム形成ネットワークを含むスイッチ・ビーム・スマート・アンテナ・システムを有する代替の基地局を示す。

【図３】本発明の半二重実施形態による信号タイミング構成を示す図である。

【図４】本発明の全二重実施形態による信号タイミング構成を示す図である。

【図５】本発明の代替の実施形態による信号タイミング構成を示す図である。

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【図１】

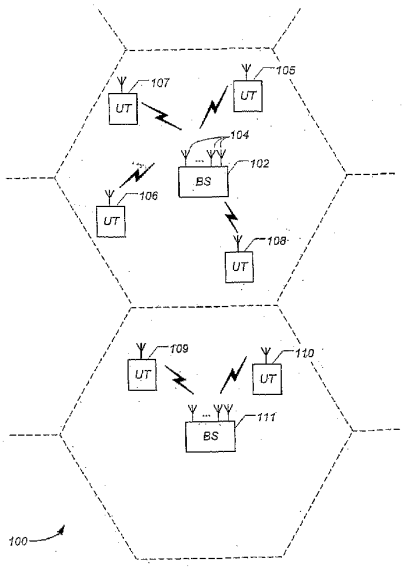


FIG. 1

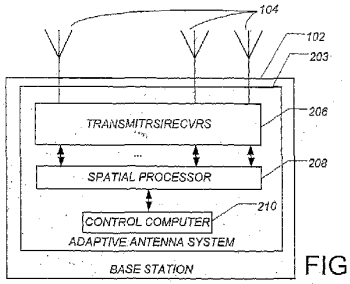


FIG. 2A

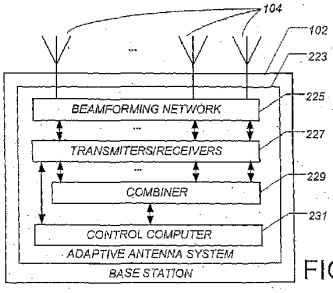


FIG. 2B

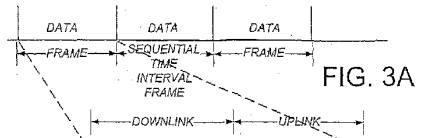


FIG. 3A

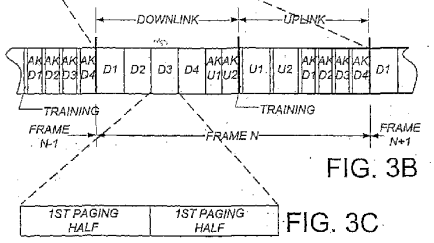


FIG. 3B

FIG. 3C

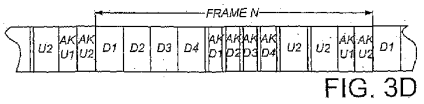


FIG. 3D

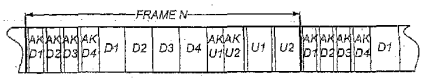


FIG. 3E

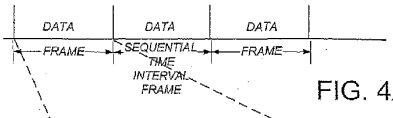


FIG. 4A

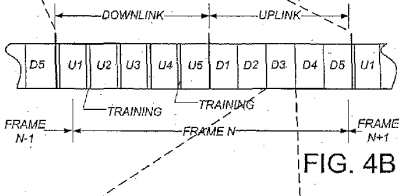


FIG. 4B

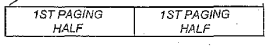


FIG. 4C

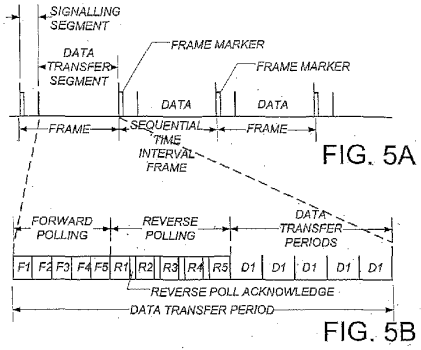


FIG. 5A

FIG. 5B

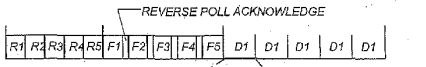


FIG. 5C

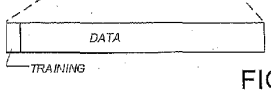


FIG. 5D

【国際調査報告】

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US03/39970

A. CLASSIFICATION OF SUBJECT MATTER
IPC(7) : H04B 7/00
US CL : 455/562
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)
U.S. : 455/562

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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6,141,567A (YOUSSEFMIR et al) 31 October 2000 (31.10.2000), whole document.	1-68
Y	US 6,470,195 B1 (MEYER) 22 October 2002 (22.10.2002), whole document.	1-68
Y	US 6,122,260A (LIU et al) 19 September 2000 (19.09.2000), whole document.	1-68
Y	US 6,615,024B1 (BOROS et al) 02 September 2003 (02.09.2003), whole document.	1-68

☐ 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 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
19 April 2004 (19.04.2004)	05 MAY 2004
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 305-3230	Authorized officer Pablo Tran Telephone No. (703)305-4700

Form PCT/ISA/210 (second sheet) (July 1998)

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Ｈ０４Ｂ	***7/06***	***(2006.01)***	Ｈ０４Ｂ	7/06	

(81)指定国 AP(BW,GH,GM,KE,LS,MW,MZ,SD,SL,SZ,TZ,UG,ZM,ZW),EA(AM,AZ,BY,KG,KZ,MD,RU,TJ,TM),EP(AT,BE,BG,CH,CY,CZ,DE,DK,EE,ES,FI,FR,GB,GR,HU,IE,IT,LU,MC,NL,PT,RO,SE,SI,SK,TR),OA(BF,BJ,CF,CG,CI,CM,GA,GN,GQ,GW,ML,MR,NE,SN,TD,TG),AE,AG,AL,AM,AT,AU,AZ,BA,BB,BG,BR,BW,BY,BZ,CA,CH,CN,CO,CR,CU,CZ,DE,DK,DM,DZ,EC,EE,EG,ES,FI,GB,GD,GE,GH,GM,HR,HU,ID,IL,IN,IS,JP,KE,KG,KP,KR,KZ,LC,LK,LR,LS,LT,LU,LV,MA,MD,MG,MK,MN,MW,MX,MZ,NI,NO,NZ,OM,PG,PH,PL,PT,RO,RU,SC,SD,SE,SG,SK,SL,SY,TJ,TM,TN,TR,TT,TZ,UA,UG,UZ,VC,VN,YU,ZA,ZM,ZW

Ｆターム(参考) 5K028 BB04 CC05 HH00
5K059 CC02 CC04 EE02
5K067 CC02 CC04 CC10 CC24 DD13 DD24 EE02 EE10 EE22 GG02
KK03

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Espacenet

JP2007124493A RANDOM ACCESS METHOD FOR FORWARD LINK, MOBILE STATION AND TRANSMITTER

Applicants: SHARP KK

Inventors: KATO YASUYUKI

Classifications:
IPC ***H04B1/707; H04J11/00; H04J13/00; H04W72/04; H04W72/12; H04W74/08;***

Priorities: JP2005316482A 2005-10-31

Application: JP2007124493A·2005-10-31

Publication: JP2007124493A·2007-05-17

Published as: JP2007124493A

RANDOM ACCESS METHOD FOR FORWARD LINK, MOBILE STATION AND TRANSMITTER

Abstract

PROBLEM TO BE SOLVED: To avoid collisions with other users even if many users access in random access from mobile stations through forward link in the VSCRF-CDMA or the IFDMA scheme. SOLUTION: The mobile station 11 redetermines a phase which is to be used for random access transmission to a base station with replacing an individual corresponding table 40-m included with user ID, quality of services QoS and mobile station class every time if collisions occur between another mobile station 11' and itself, and Ack cannot been received from the base station. COPYRIGHT: (C)2007,JPO&INPIT

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(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
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(P2007-124493A)
(43)公開日　平成19年5月17日(2007.5.17)

(51)Int.Cl.		F I			テーマコード（参考）
H04Q 7/38	(2006.01)	H04B	7/26	109N	5K022
H04J 13/00	(2006.01)	H04J	13/00	A	5K067
H04J 11/00	(2006.01)	H04J	11/00	Z	

審査請求 未請求　請求項の数 8　OL　（全 40 頁）

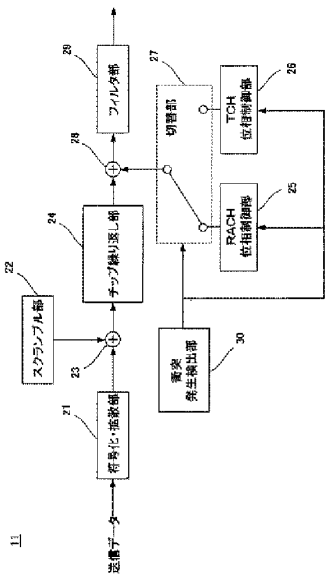
(21)出願番号　特願2005-316482 (P2005-316482)
(22)出願日　平成17年10月31日 (2005.10.31)

(71)出願人　000005049
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大阪府大阪市阿倍野区長池町２２番２２号
(74)代理人　100091096
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大阪府大阪市阿倍野区長池町２２番２２号
シャープ株式会社内

Ｆターム(参考)　5K022 DD01 DD13 DD19 DD23 DD33 EE02 EE14 EE21 EE31
5K067 AA11 AA15 BB04 CC01 CC10 DD11 DD17 DD23 DD24 EE02 EE10 FF02 GG01 HH22 HH23 JJ16

(54)【発明の名称】上りリンクのランダムアクセス方法、移動局、及び送信機

(57)【要約】
【課題】ＶＳＣＲＦ－ＣＤＭＡ方式やＩＦＤＭＡ方式の上りリンクでの移動局からのランダムアクセス時に、多数のユーザがアクセスしても、他ユーザとの衝突を回避する。
【解決手段】移動局１１では、基地局へのランダムアクセス送信の際における位相の決定を、他の移動局１１'との間で衝突が起こり、基地局からのＡｃｋを受信できない状態では、毎回、例えばユーザＩＤ，サービス品質ＱｏＳ，移動局クラスといった個別対応テーブル４０-ｍを取り替えながら位相を決定し直す。
【選択図】図３



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【特許請求の範囲】
【請求項1】
シングルキャリア通信方式を適用した通信システムで、複数の移動局がランダムアクセスチャネルを用いて一の基地局へ同時にアクセス可能な上りリンクのランダムアクセス方法であって、
移動局から基地局へ送出する送信データのくしの歯状スペクトルの送信方式を自身の移動局情報を基に決定する送信方式決定ステップ、
移動局から基地局へ送出する送信データのくしの歯状スペクトルを、該送信方式決定ステップで決定した送信方式でランダムアクセスチャネルを用いて送信する送信ステップ、
を有することを特徴とする上りリンクのランダムアクセス方法。
【請求項2】
シングルキャリア通信方式を適用した通信システムで、複数の移動局がランダムアクセスチャネルを用いて一の基地局へ同時にアクセス可能な上りリンクのランダムアクセス方法であって、
移動局から基地局へ送出する送信データのくしの歯状スペクトルの送信方式を自身の移動局情報を基に決定する送信方式決定ステップ、
移動局から基地局へ送出する送信データのくしの歯状スペクトルを、該送信方式決定ステップで決定した送信方式でランダムアクセスチャネルを用いて送信する送信ステップ、
該送信ステップにより移動局から送信されたランダムアクセスチャネルの送信データのくしの歯状スペクトルを基地局に送信した際の、送信先の基地局における受信可否を確認する受信確認ステップ、
該受信確認ステップにより基地局での受信が確認された場合は、ランダムアクセスチャネルを用いた通信からトラフィックチャネルを用いた通信に移行する一方、基地局で受信されなかったことが確認された場合は、今回とは別の自身の移動局情報を用いて前記送信方式決定ステップ及び送信ステップを実行する繰り返しステップ、
を有することを特徴とする上りリンクのランダムアクセス方法。
【請求項3】
前記送信方式決定ステップは、移動局から基地局へ送出する送信データのくしの歯状スペクトルの位相を決定する位相決定ステップであり、
前記送信ステップは、移動局から基地局へ送出する送信データのくしの歯状スペクトルに該位相決定ステップで決定した位相を乗算して送信する位相変更ステップである
ことを特徴とする請求項１又は２記載の上りリンクのランダムアクセス方法。
【請求項4】
前記送信方式決定ステップは、移動局から基地局へ送出する送信データのくしの歯状スペクトルの位相及びくしの歯数を決定する位相／くしの歯数決定ステップであり、
前記送信ステップは、移動局から基地局へ送出する送信データのくしの歯状スペクトルに該位相／くしの歯数決定ステップで決定した位相を乗算して、決定したくしの歯数分送信する位相変更／くしの歯数生成ステップである
ことを特徴とする請求項１又は２記載の上りリンクのランダムアクセス方法。
【請求項5】
前記送信方式決定ステップは、移動局から基地局へ送出する送信データのくしの歯状スペクトルの位相及び送信電力を決定する位相／送信電力決定ステップであり、
前記送信ステップは、移動局から基地局へ送出する送信データのくしの歯状スペクトルに該位相／くしの歯数決定ステップで決定した位相を乗算して、決定した送信電力で送信する位相変更／送信電力調整ステップである
ことを特徴とする請求項１又は２記載の上りリンクのランダムアクセス方法。
【請求項6】
前記送信方式決定ステップは、移動局から基地局へ送出する送信データのくしの歯状スペクトルの位相及び送信に用いるランダムアクセスチャネルのスロットを決定する位相／

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スロット決定ステップであり、
　前記送信ステップは、移動局から基地局へ送出する送信データのくしの歯状スペクトルに該位相／くしの歯数決定ステップで決定した位相を乗算して、決定したランダムアクセスチャネルのスロットに割り当てて送信する位相変更／スロット割り当てステップであることを特徴とする請求項１又は２記載の上りリンクのランダムアクセス方法。
【請求項7】
　上りリンクにシングルキャリア通信方式を適用した通信システムで用いられる移動局であって、
　基地局へランダムアクセスチャネルを用いて送出する送信データのくしの歯状スペクトルの位相を自身の移動局情報を基に決定する位相決定手段と、
　送信データのくしの歯状スペクトルに該位相決定手段により決定された位相を乗算し、送信データのくしの歯状スペクトルに時間軸のランダム性と周波数軸のランダム性とを付与する送信手段と
を備えていることを特徴とする移動局。
【請求項8】
　ランダムアクセスチャネルの送信データの符号化・拡散を行う符号化・拡散部と、
　該符号化・拡散部からの出力をスクランブルコードにより拡散するスクランブルコード拡散部と、
　該スクランブルコード拡散部の出力に基づいた所定回の繰り返しが行われたくしの歯状のスペクトルを生成するチップ繰り返し部と、
　該チップ繰り返し部の出力に位相を乗算し、ランダムアクセスチャネルの送信データのくしの歯状スペクトルの位相を変更する位相変更部と、
　該位相変更部によって位相を変更されたランダムアクセスチャネルの送信データのくしの歯状スペクトルを基地局に送信した際の、送信先の基地局における受信可否を確認する受信確認部と、
　基地局へランダムアクセスチャネルを用いて送出するランダムアクセスチャネルの送信データのくしの歯状スペクトルの位相を自身の移動局情報を基に決定し、前記位相変更部に供給出力するとともに、該受信確認部から確認結果に基づき、送信したくしの歯状スペクトルが送信先の基地局で受信されていない場合には、位相を今回とは別の移動局情報を基に決定して前記位相変更部に供給出力するＲＡＣＨ位相決定部と
を備えていることを特徴とする送信機。
【発明の詳細な説明】
【技術分野】
【0001】
　本発明は、ＶＳＣＲＦ－ＣＤＭＡ方式，ＩＦＤＭＡ方式，又はＤＦＴ－ｓｐｒｅａｄ ＯＦＤＭ方式等のシングルキャリア通信方式を利用した通信システムに係り、移動局から基地局への上りリンクの通信において通信開始時等に行われる上りリンクのランダムアクセス方法、及びその実行のための移動局、送信機に関する。
【背景技術】
【0002】
　現在、ＩＭＴ（International Mobile Telecommunication）－２０００と呼ばれる第３世代の移動体通信では、無線アクセス方式としてＷ－ＣＤＭＡ（Wideband Code Division Multiple Access）方式が採用されている。
【0003】
　Ｗ－ＣＤＭＡ方式の上りリンクのアクセス方法では、ランダムアクセスチャネルＲＡＣＨ（Random Access Channel）を用いて行われ、ランダムアクセスチャネルＲＡＣＨでの基本動作は、時間軸をタイムスロットと呼ばれる一定の時間幅に仕切り、各無線局がこの仕切りに従ってパケットを送信するSlotted ＡＬＯＨＡ（Additive Links Online Hawaii Area）方式を用いて行われる（非特許文献１参照）。
【0004】
　図２５は、Ｗ－ＣＤＭＡ方式の上りリンクのアクセス方法の説明図である。

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【0005】
この方式では、図２５に示したように、多数のユーザそれぞれが、ランダムアクセスチャネルＲＡＣＨを用いて、必要な時に決められた開始タイミングでプリアンブルと呼ばれる時間的に短い信号を送信し、基地局が移動局を検知した場合、移動局－基地局間でメッセージ等の通信が開始され、他ユーザとの衝突等により基地局が移動局を検知できない場合、移動局は、基地局が検知するまでプリアンブルの送信を繰り返すという方法がとられている。移動局は、基地局が移動局を検知したか否かを、ＡＩＣＨ（Acquisition Indication Channel）を用いた基地局からの応答の有・無によって検出する。
【0006】
また、プリアンブルには、１６種類のシグネチャと呼ばれる系列があり、ランダムアクセスチャネルＲＡＣＨへの送信タイミングとシグネチャとでユーザ間の衝突を抑える工夫がされている（非特許文献２）。
【0007】
一方、次世代移動通信方式の上りリンクアクセス技術として、３ＧＰＰ（3rd Generation Partnership Project）では，マルチキャリア通信方式やシングルキャリア通信方式等の様々な提案がされており、ＯＦＤＭ（Orthogonal Frequency Division Multiplexing）方式等のマルチキャリア通信方式よりＰＡＰＲ（Peak to Average Power Ratio：ピーク電力対平均電力の比）の特性に優れたＶＳＣＲＦ－ＣＤＭＡ（Variable Spreading and Chip Repetition Factors Code Division Multiple Access、可変拡散率・チップ繰り返し符号分割多元接続）方式（非特許文献３参照）やＩＦＤＭＡ（Interleaved Frequency Division Multiple Access）方式、及びＤＦＴ－ｓｐｒｅａｄ　ＯＦＤＭ（又はＤＦＴ（Discrete Fourier Transform）－Ｓ　ＯＦＤＭ）方式（非特許文献７及び８参照）等のシングルキャリア通信方式も数多く提案されている。
【0008】
ＩＦＤＭＡ方式は、データ変調後のシンボル系列を一定の周期でシンボル繰り返しすることにより、くしの歯状の周波数スペクトルを生成する。
【0009】
これに対し、ＶＳＣＲＦ－ＣＤＭＡ方式は、ＤＳ－ＣＤＭＡ（Direct Spread Code Division Multiple Access ）方式における時間領域の拡散の一部を、チップ繰り返しに割り当てることにより、シンボル繰り返しと同じ原理を用いて、くしの歯状スペクトラムを生成している。
【0010】
図２６は、ＶＳＣＲＦ－ＣＤＭＡ方式の上りリンクのアクセス方法の説明図である。
図２６に示すように、ＶＳＣＲＦ－ＣＤＭＡ方式の上りリンクでは、時間領域の拡散チップ（ＳＦチップ）をチップ繰り返しファクタ（ＣＲＦ：Chip Repetition Factor）回数分だけ繰り返して１シンボルとし、これを時間・周波数変換することによって、周波数領域に複数のくしの歯状スペクトラムを生成する構成になっている。
【0011】
また、ＤＦＴ－ｓｐｒｅａｄ　ＯＦＤＭ方式は、図２７，図２８に示すような構成及び原理になっている。
図２７は、ＤＦＴ－ｓｐｒｅａｄ　ＯＦＤＭ方式による送信側の構成図である。
図２８は、ＤＦＴ-ｓｐｒｅａｄ　ＯＦＤＭ方式の説明図である。
【0012】
ＤＦＴ－ｓｐｒｅａｄ　ＯＦＤＭ方式では、図２７に示すように、送信側は、Ｍシンボルのデータを Ｍ－ポイントＦＦＴ（Fast Fourier Transform）部７１で時間・周波数変換を行い、サブキャリアマッピング部７２でサブキャリアのマッピングを行った後、Ｎ－ポイントＩＦＦＴ（Inverse Fast Fourier Transform）部７３で周波数・時間変換することによってシングルキャリアを生成し、フィルタ部２９を介して出力する構成になっている。さらに詳述すると、サブキャリアマッピング部７２で、M-ポイントＦＦＴ部７１からの入力に対してゼロ信号を挿入し、N-ポイントＩＦＦＴ部７３に出力し、図２８に示す

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ように、Ｍシンボルのデータに関しての時間・周波数変換出力に対するゼロ信号の挿入位置を変化させることで、ＶＳＣＲＦ－ＣＤＭＡ方式やＩＦＤＭＡ方式で出力されるようなくしの歯状スペクトラムや局所化されたスペクトルを生成することができる。また、その際には、生成されるスペクトルの位相（サブキャリア位置）を変化させることもできる。図２８（ａ）に示すようなくしの歯状スペクトルを出力するためには、サブキャリアマッピング部７２で、Ｍ－ポイントＦＦＴ部７１から出力されるサブキャリア間に（Ｔ－１）個の０信号を挿入することよって、Ｔ個繰り返しのくしの歯状スペクトルを生成できる。なお、Ｔは、サブキャリアマッピング部７２によるサブキャリア増加倍率である。また、図２８（ｂ）に示すような局所化されたスペクトルを生成するためには、サブキャリアマッピング部７２で、Ｍ－ポイントＦＦＴ部７１から出力されるサブキャリア間に０信号を挿入しないようにすることよって、局所化されたスペクトルを生成することができる。

【0013】

【非特許文献1】“Physical channels and mapping of transport channels onto physical channels（ＦＤＤ）”，，３ＧＰＰ　ＴＳ２５．２１１；http://www.3gpp.org/ftp/Specs/html-info/25211.htm

【非特許文献2】立川敬二，“Ｗ－ＣＤＭＡ移動通信方式”，ＩＳＢＮ４－６２１－０４８９４－５，Ｐ４５

【非特許文献3】後藤喜和、川村輝雄、新博行、佐和橋衛「上りリンク可変拡散率・チップ繰り返し（ＶＳＣＲＦ）－ＣＤＭＡブロードバンド無線アクセス」電子情報通信学会信学技報　ＲＣＳ－２００３－６７

【非特許文献4】“Medium Access Control（ＭＡＣ） Protocol specification”，，３ＧＰＰ　ＴＳ　２５．３２１；http://www.3gpp.org/ftp/Specs/html-info/25321.htm

【非特許文献5】“Radio Resource Control（ＲＲＣ） Protocol specification”，，３ＧＰＰ　ＴＳ　２５．３３１；http://www.3gpp.org/ftp/Specs/html-info/25331.htm

【非特許文献6】“Interlayer procedures in Connected Mode”，，３ＧＰＰ　ＴＳ　２５．３０３；http://www.3gpp.org/ftp/Specs/html-info/25303.htm

【非特許文献7】R1-050621“Some aspects of single carrier transmission”，３ＧＰＰ　ＴＳＧ　ＲＡＮ　ＷＧ１　Ａｄ　Ｈｏｃ　Ｍｅｔｔｉｎｇ　ｏｎ　ＬＴＥ，Ｓｏｐｈｉａ　Ａｎｔｉｐｏｌｉｓ，Ｆｒａｎｃｅ，Ｊｕｎｅ　２０－２１，２００５

【非特許文献8】R1-050702“DFT-Spread OFDM with Pulse Shaping Filter in Frequency Domain in Evolved UTRA Uplink”，３ＧＰＰ　ＴＳＧ　ＲＡＮ　ＷＧ１　Ｍｅｔｔｉｎｇ＃４２　ｏｎ　ＬＴＥ，Ｌｏｎｄｏｎ，ＵＫ，Ａｕｇｕｓｔ　２９－Ｓｅｐｔｅｍｂｅｒ　２，２００５

【発明の開示】

【発明が解決しようとする課題】

【0014】

しかしながら、現在提案されているＶＳＣＲＦ－ＣＤＭＡ方式，ＩＦＤＭＡ方式，又はＤＦＴ－ｓｐｒｅａｄ　ＯＦＤＭ方式によるシングルキャリア通信方式に関する検討は、リンクレベルでの性能評価等が中心となって行われており、ランダムアクセスの制御方法は検討されていなかった。また、Ｗ－ＣＤＭＡのように最初にプリアンブルを送るというランダムアクセス方法では、時間軸でのアクセス制御方法のため無線リンクの確立までに時間がかかるという問題があった。また、ランダムアクセスチャネルＲＡＣＨは全周波数帯域（５ＭＨｚ）のスペクトル拡散信号のため、周波数軸でのランダム制御方法が利用できないという問題があった。

【0015】

本発明は、このような問題に鑑みてなされたものであり、上りリンクの通信方式にＶＳＣＲＦ－ＣＤＭＡ方式，ＩＦＤＭＡ方式，又はＤＦＴ－ｓｐｒｅａｄ　ＯＦＤＭ方式のシングルキャリア通信方式を採用した場合に、移動局からのランダムアクセス時に、多数のユーザがアクセスしても、他ユーザとの衝突を回避することができる上りリンクのランダムアクセス方法、移動局、及び送信機を提供することを目的とするものである。

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【課題を解決するための手段】
【0016】
上記した目的を達成するために、本発明の上りリンクのランダムアクセス方法は、ＶＳＣＲＦ－ＣＤＭＡ方式，ＩＦＤＭＡ方式，又はＤＦＴ－ｓｐｒｅａｄ　ＯＦＤＭ方式を適用したシングルキャリア方式の通信システムで、複数の移動局がランダムアクセスチャネルを用いて一の基地局へ同時にアクセス可能な上りリンクのランダムアクセス方法であって、移動局から基地局へ送出する送信データのくしの歯状スペクトルの送信方式を自身の移動局情報を基に決定する送信方式決定ステップ、移動局から基地局へ送出する送信データのくしの歯状スペクトルを、送信方式決定ステップで決定した送信方式でランダムアクセスチャネルを用いて送信する送信ステップ、を有することを特徴とする。
【0017】
また、本発明の上りリンクのランダムアクセス方法は、さらに、送信ステップにより移動局から送信されたランダムアクセスチャネルの送信データのくしの歯状スペクトルを基地局に送信した際の、送信先の基地局における受信可否を確認する受信確認ステップ、受信確認ステップにより基地局での受信が確認された場合は、ランダムアクセスチャネルを用いた通信からトラフィックチャネルを用いた通信に移行する一方、基地局で受信されなかったことが確認された場合は、今回とは別の自身の移動局情報を用いて前記送信方式決定ステップ及び送信ステップを実行する繰り返しステップ、を有することを特徴とする。
【0018】
また、本発明の移動局は、ＶＳＣＲＦ－ＣＤＭＡ方式，ＩＦＤＭＡ方式，又はＤＦＴ－ｓｐｒｅａｄ　ＯＦＤＭ方式を適用したシングルキャリア方式の通信システムで用いられる移動局であって、基地局へランダムアクセスチャネルを用いて送出する送信データのくしの歯状スペクトルの位相を自身の移動局情報を基に決定する位相決定手段と、送信データのくしの歯状スペクトルに該位相決定手段により決定された位相を乗算し、送信データのくしの歯状スペクトルに時間軸のランダム性と周波数軸のランダム性とを付与する送信手段とを備えていることを特徴とする。
【0019】
また、本発明の送信機は、ランダムアクセスチャネルの送信データの符号化・拡散を行う符号化・拡散部と、符号化・拡散部からの出力をスクランブルコードにより拡散するスクランブルコード拡散部と、スクランブルコード拡散部の出力に基づいた所定回の繰り返しが行われたくしの歯状のスペクトルを生成するチップ繰り返し部と、チップ繰り返し部の出力に位相を乗算し、ランダムアクセスチャネルの送信データのくしの歯状スペクトルの位相を変更する位相変更部と、位相変更部によって位相変更されたランダムアクセスチャネルの送信データのくしの歯状スペクトルを基地局に送信した際の、送信先の基地局における受信可否を確認する受信確認部と、基地局へランダムアクセスチャネルを用いて送出するランダムアクセスチャネルの送信データのくしの歯状スペクトルの位相を自身の移動局情報を基に決定し、位相変更部に供給出力するとともに、受信確認部から確認結果に基づき、送信したくしの歯状スペクトルが送信先の基地局で受信されていない場合には、位相を今回とは別の自身の移動局情報を基に決定して前記位相変更部に供給出力するＲＡＣＨ位相決定部とを備えていることを特徴とする。
【発明の効果】
【0020】
本発明によれば、移動局から基地局への上りリンクのアクセスの際に、ランダムアクセスチャネルを用いて移動局から基地局へ送信される送信データのくしの歯状スペクトラムに係り、くしの歯状スペクトラムを移動局から送信する度に毎回、このくしの歯状スペクトラムの位相を送信する移動局の移動局情報を用いて決定することによって、ランダムアクセスチャネルのランダム性が増し、ユーザ間での送信データのくしの歯状スペクトラムが衝突する可能性を少なくすることができる。
【0021】
また、データの優先度の高いユーザに対しては、くしの歯状スペクトラムの送信回数を

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データの優先度の低いユーザに対して増やすことで、ランダムアクセスの回数を実質的に増やすことでき、ランダムアクセスチャネルの効率的な運用ができる。

【0022】

また、データの優先度の高いユーザに対しては、送信するくしの歯状スペクトラムの周波数領域における数をデータの優先度の低いユーザに対して増やすことで、ランダムアクセスの回数を実質的に増やすことでき、ランダムアクセスチャネルの効率的な運用ができる。

【0023】

また、データの優先度の高いユーザに対しては、くしの歯状スペクトラムの送信電力をデータの優先度の低いユーザに対して大きくすることで、ユーザ間での送信データのくしの歯状スペクトラムが衝突する機会をできるだけ減らして、ランダムアクセスチャネルの効率的な運用ができる。

【0024】

また、くしの歯状スペクトラムを送信するランダムアクセスチャネルのスロット又はブロックに関しても、このくしの歯状スペクトラムを送信する移動局の移動局情報を基に決定することにより、さらにランダムアクセスチャネルのランダム性が増し、ユーザ間での送信データのくしの歯状スペクトラムが衝突する可能性を少なくすることができる。

【0025】

すなわち、本発明によれば、くしの歯状スペクトラムを送信する移動局の移動局情報を基に、送信するくしの歯状スペクトルの位相，送信回数，又は送信電力を決定することで、ランダムアクセスチャネルを用いて送信される送信データのくしの歯状スペクトラムについてのユーザ間の衝突を回避することができる。

【0026】

また、くしの歯状スペクトルの位相，送信回数，又は送信電力の決定には移動局情報を利用することで、ランダムアクセスチャネルに関する基地局からの報知情報を削減できる。

【発明を実施するための最良の形態】

【0027】

まず、本発明の実施の形態を説明するにあたって、本発明で想定する移動局から基地局への上りリンクのシステム構成について説明しておく。

【0028】

図１，図２は、本発明で想定する移動体通信システムにおける上りリンクのシステム構成図である。

【0029】

図１に示すように、本発明の想定するシステムでは、各移動局から基地局への上りリンクは、その時間軸を時間幅すなわち送信時間間隔（ＴＴＩ:Transmission Time Interval）が一定のタイムスロットによって仕切られたシステム構成になっている。各タイムスロットは、音声及びデータを送信するためのトラフィックチャネルＴＣＨや、移動局が基地局に対してトラヒックチャンネルＴＣＨを要求するのに用いるランダムアクセスチャネルＲＡＣＨ等の制御チャネルに割り当てられるようになっている。図１に示した例では、トラフィックチャネルＴＣＨは数スロットに割り当てられるのに対して、ランダムアクセスチャネルＲＡＣＨは１スロットに対し割り当てられるようなシステム構成になっている。

【0030】

その上で、移動局と基地局との間の通信は、図２に示すように、複数のサブキャリアを用いて、複数の移動局それぞれからスロットがブロック（Ｃｈｕｎｋ）単位で周波数・時間分割多重された構成で行われるようになっている。そして、ランダムアクセスチャネルＲＡＣＨのブロックは所定のサブキャリアに時間軸上に所定間隔を置いて配置され、複数の移動局が１つのブロックで同時に送信データを基地局に送信できるシステム構成になっている。これに対し、トラフィックチャネルＴＣＨのブロックは基地局からそれぞれ移動局に割り当てられ、割り当てられた移動局だけがそのトラフィックチャネルＴＣＨのブロ

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ックによって音声及びデータを送信することができるシステム構成になっている。

【0031】

なお、上述したランダムアクセスチャネルＲＡＣＨ（ランダムアクセススロット又はランダムアクセスブロック）、及びトラフィックチャネルＴＣＨ（トラフィックスロット又はトラフィックブロック）は、３ＧＰＰで検討されているコンテンションベースチャネルＣＢＣＨ：Contention-based Channel）、及びスケジュールチャネル（ＳＣＨ：Schedule Channel）にそれぞれ対応する。

【0032】

以下、図１，図２で想定したシステムを用いて、移動局が図１に示したランダムアクセスチャネルＲＡＣＨの送信データ（例えばシグネチャ等）のくしの歯状スペクトルを、図２に示したランダムアクセスチャネルＲＡＣＨのブロックを使用して基地局に送信する場合に適応させて、本発明の実施の形態について説明する。

【0033】

［第１の実施の形態］

図３は、本発明の一実施の形態による移動局の構成図である。

移動局１１は、符号化・拡散部２１，スクランブル部２２，乗算部２３，チップ繰り返し部２４，ＲＡＣＨ位相制御部２５，ＴＣＨ位相制御部２６，切替部２７，乗算部２８，フィルタ部２９，衝突発生検出部３０を備えて構成されている。

【0034】

符号化・拡散部２１は、入力されるランダムアクセスチャネルＲＡＣＨやトラフィックチャネルＴＣＨの送信データを、ターボ符号化等の符号化方式を用いて符号化し、ショートコードによる拡散を行う。

【0035】

スクランブル部２２は、セルサーチにより同定した基地局に割り当てられたスクランブルコードを生成する。

【0036】

乗算部２３は、符号化・拡散部２１から出力される符号化・拡散された送信データと、スクランブル部２２により生成されたスクランブルコードとを乗算し、スクランブルコードによりさらに拡散する。

【0037】

チップ繰り返し部２４は、基地局から指定されるか、又は予め決められたＣＲＦ回の繰り返しが行われたくしの歯状のスペクトルを生成する。

【0038】

ＲＡＣＨ位相制御部２５は、ランダムアクセス開始時に、ランダムアクセスチャネルＲＡＣＨでのくしの歯状スペクトルの位相を移動局１１自身の移動局情報から決定し、切替部２７を介して乗算部２８に供給する。

【0039】

ＴＣＨ位相制御部２６は、図示省略した移動局１１の受信系に接続され、基地局から移動局１１へ通知されたトラフィックチャネルＴＣＨで使用するくしの歯状スペクトルの位相情報を保存し、移動局１１から基地局へトラフィックチャネルＴＣＨの送信データを送信する場合には、この保存した位相情報の位相を、切替部２７を介して乗算部２８に供給する。

【0040】

切替部２７は、ＲＡＣＨ位相制御部２５、又はＴＣＨ位相制御部２６で生成された位相を、ランダムアクセスチャネルＲＡＣＨの送信データの送信、又はトラフィックチャネルＴＣＨの送信データに合わせて、選択的に乗算部２８に供給する。そのために、切替部２７は、ランダムアクセスチャネルＲＡＣＨの送信データの送信時はＲＡＣＨ位相制御部２５側を、トラフィックチャネルＴＣＨの送信データの送信時はＴＣＨ位相制御部２６側を、乗算部２８に接続する構成になっている。そして、切替部２７は、ランダムアクセスチャネルＲＡＣＨの送信開始に際して、ＲＡＣＨ位相制御部２５側を乗算部２８に接続する

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ようにイニシャライズされる構成になっている。

【0041】

乗算部２８は、切替部２７を介して供給される位相を、チップ繰り返し部２４で生成された送信データのくしの歯状スペクトルに乗算して、くしの歯状スペクトルのスペクトル位置を変更する。

【0042】

フィルタ部２９は、乗算部２８によりスペクトル位置を変更したくしの歯状スペクトルの帯域制御を行う。

【0043】

衝突発生検出部３０は、ＲＡＣＨ位相制御部２５で決定した位相で基地局宛に送信したランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルについて、他の移動局１１から送信されたランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルとの間で生じた衝突の有・無を検出・判定する。衝突発生検出部３０による判定結果は、ＲＡＣＨ位相制御部２５，ＴＣＨ位相制御部２６，切替部２７にそれぞれ制御情報として供給される。

【0044】

衝突発生検出部３０は、例えば、図示省略した移動局１１の受信系から、移動局１１からのランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルの送信に対応して基地局から返信される同期検出表示信号（以下，Ａｃｋと称する）の受信検出の供給が受けられる構成になっている。その上で、衝突発生検出部３０は、ＲＡＣＨ位相制御部２５による位相の決定の都度、予め定められた時間範囲内に基地局からのＡｃｋの受信検出が確認できていない場合は、他の移動局１１’との間でランダムアクセスチャネルＲＡＣＨでの衝突が生じたと判定し、予め定められた時間範囲内に基地局からのＡｃｋの受信検出が確認できた場合には、他の移動局１１’との間でランダムアクセスチャネルＲＡＣＨでの衝突が生じていない、すなわち基地局にランダムアクセスチャネルＲＡＣＨで送信したくしの歯状スペクトルが基地局により受信されたと判定する構成になっている。

【0045】

次に、上述したＲＡＣＨ位相制御部２５において、ランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルの位相の決定に利用される移動局情報について、説明しておく。

【0046】

このＲＡＣＨ位相制御部２５における位相の決定に利用される移動局情報としては，移動局シリアル番号，製造番号ＩＭＥＩ（International Mobile Equipment Identity），固有識別番号（Fixed identifier Number），移動機番号（Mobile Station Identity；User Equipment Identity），移動局クラス，ユーザＩＤ（User Identity），電話番号（Phone Number），サービス品質ＱｏＳ（Quality of services），アクセスクラスＡＣ（Access Class），アクセスサービスクラスＡＳＣ（Access Service Class）情報，ＵＳＩＭ（Universal Subscriber Identity Module：汎用加入者識別モジュール）カード情報、等が含まれる。

【0047】

この移動局情報は、例えば基地局により指定され、基地局からの共通制御チャネルＣＣＰＣＨ（Common Control Physical Channel）又は個別制御チャネルＤＰＣＣＨ（Dedicated Physical Control Channel）を受信することによって、取得することができる。

【0048】

また、この移動局情報には、前述した移動局情報をベースに、基地局によって予め決められた計算式，算出アルゴリズム等にしたがって事前に計算され、共通制御チャネルＣＣＰＣＨ又は個別制御チャネルＤＰＣＣＨで受信した基地局による移動局のランダムアクセスグルーピング情報、例えばＷ－ＣＤＭＡ方式のようなページングインジケーターチャネルＰＩＣＨ（Page Indication Channel）に含まれる着信群＃ｎ番情報等を利用することもできる。

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【0049】
そして、これら移動局情報は、時間変化に伴い更新したり、又は時間変化にかかわらず固定しておくこともできる。
【0050】
また、この移動局情報の中のアクセスサービスクラスＡＳＣ情報については，アクセスクラスＡＣ情報から生成されている。この場合、アクセスクラスＡＣは、ＵＳＩＭカードに保存され、最初の無線アクセスの時（RRC CONNECTION REQUEST等）のみに使用されて、その後にアクセスサービスクラスＡＳＣにマッピングされる構成になっている（非特許文献４，５，６参照）。
【0051】
次に、上記説明した移動局１１において、ランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルの位相を決定するアルゴリズムについて説明する。
【0052】
その説明にあたっては理解を容易にするため、ユーザＩＤ、サービス品質ＱｏＳ、及び移動局クラスといった３つの個別移動局情報を基に位相を決定する場合を例に説明する。
【0053】
しかしながら、実際に利用する個別移動局情報の数としては３つに限るものではなく、また、利用する個別移動局情報の種類としては、電話番号等の他の個別移動局情報を基にしてもよい。
【0054】
図４は、本実施の形態によるくしの歯状スペクトルの位相を決定するアルゴリズムを示すフローチャートである。
【0055】
移動局１１から基地局へランダムアクセスチャネルＲＡＣＨによりランダムアクセスする場合、移動局１１のＲＡＣＨ位相制御部２５は、その内部に備えられている移動局情報に対するくしの歯状スペクトルの位相を規定した移動局情報／位相対応テーブル４０を参照して、１つの位相を決定する（ステップＳ401）。
【0056】
図５は、移動局情報／位相対応テーブルの一実施例を示した図である。
図５に示した移動局情報／位相対応テーブル４０は、ユーザＩＤ，サービス品質ＱｏＳ，移動局クラスといった個別移動局情報それぞれと位相とが対応した３つの個別対応テーブル４０-１～４０-３を有した構成になっている。
【0057】
本実施の形態の場合、ＲＡＣＨ位相制御部２５は、その中から１つの個別対応テーブル４０-m（但し、この場合はm＝１～３）を適宜選択し、その選択した１つの個別対応テーブル４０-mの個別移動局情報に基づいて位相を決定する構成になっている。
【0058】
図４に戻り、移動局１１は、チップ繰り返し部２４で生成されたくしの歯状スペクトルに対してＲＡＣＨ位相制御部２５で決定した位相を乗算部２８で乗算し、フィルタ部２９を介して、ランダムアクセスチャネルＲＡＣＨで送信データのくしの歯状のスペクトルを基地局へ送信する（ステップＳ402）。
【0059】
基地局が移動局１１からのくしの歯状のスペクトルからなるランダムアクセスチャネルＲＡＣＨの送信データを受信した場合にはＡｃｋが返信され、移動局１１は、この基地局からのＡｃｋを受信した場合（ステップＳ403）、トラフィックチャネルＴＣＨの送信データの送信モードに移行する。
【0060】
このトラフィックチャネルＴＣＨでの通信データの送信モードへの移行は、図３に示した移動局１１では、ステップＳ401の位相決定後の予め定められた時間範囲内での衝突発生検出部３０によるＡｃｋの受信検出確認に基づく非衝突判定結果の供給によってなされ

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る。この衝突発生検出部３０からの非衝突判定結果の供給により、ＲＡＣＨ位相制御部２５は、その位相の決定及び供給を停止し、切替部２７は、ＴＣＨ位相制御部２６側を乗算部２８に切替接続し、ＴＣＨ位相制御部２６は先に基地局から通知されて保存されているトラフィックチャネルＴＣＨで使用するくしの歯状スペクトルの位相の供給を開始する。

【0061】

ところが、他ユーザとの衝突等が原因で移動局１１が基地局からのＡｃｋを検知できず、移動局１１で基地局からのＡｃｋが受信されない場合（ステップＳ403）、移動局１１では、ＲＡＣＨ位相制御部２５が、移動局情報／位相テーブル４０の最初に選択した個別対応テーブル４０-m以外の個別対応テーブル４０-m’から位相を決定する（ステップＳ404）。

【0062】

このＲＡＣＨ位相制御部２５による位相の決定し直しは、図３に示した移動局１１では、ステップＳ401の位相決定後の予め定められた時間範囲内での衝突発生検出部３０によるＡｃｋ受信の未検出に基づく衝突判定結果の供給によってなされる。この衝突発生検出部３０からの衝突判定の供給により、ＲＡＣＨ位相制御部２５は、前述したステップＳ404で説明した処理を実行し、切替部２７はＲＡＣＨ位相制御部２５側を乗算部２８に接続した状態に継続保持し、ＴＣＨ位相制御部２６は、未だトラフィックチャネルＴＣＨで使用するくしの歯状スペクトルの位相を供給開始しない。

【0063】

このため、移動局１１は、チップ繰り返し部２４で生成されたくしの歯状スペクトルに対してこの決定し直した位相を乗算部２８によって乗算し、フィルタ部２９を介して、再度、ランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルを送信する（ステップＳ405）。

【0064】

この再送信に対して、移動局１１が基地局からのＡｃｋを受信した場合（ステップＳ406）、移動局１１はトラフィックチャネルＴＣＨの送信データの送信モードに移行する一方、今度も基地局からのＡｃｋが受信されない場合は（ステップＳ406）、本実施の形態の場合は、残りの１つの個別対応テーブル４０-m”から位相を決定し（ステップＳ407）、再度、ランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルを送信する（ステップＳ408）。

【0065】

そして、移動局１１は、以上のステップＳ401～Ｓ408で説明した処理を、基地局からのＡｃｋが受信されるまで（ステップＳ403，Ｓ406，Ｓ409）、繰り返して行う構成になっている。

【0066】

この場合における位相の決定は、図５に示したような、予め定めてある移動局情報／位相テーブル４０から決定する構成とすることもできるし、別の構成からなる移動局情報／位相テーブル４０を用いて決定する構成とすることもできる。

【0067】

図６は、移動局情報／位相対応テーブルの別の実施例を示した図である。

この場合、予め移動局毎に基準となる位相が設定されており、移動局毎の位相の決定は、この基準となる位相を基づいて、図６に示したような移動局情報／位相テーブル４０を用いて行う。

【0068】

例えば、１回目の位相の決定は、基準となる位相に対してこの移動局情報／位相テーブル４０の一の個別対応テーブル４０-mにおける対応する位相分（図６の場合は、＋２θ，＋θ，０，－θ，－２θの中のいずれか１つ）だけ加算又は減算した値を位相として決定し、２回目以降の位相の決定は、基準となる位相に対して移動局情報／位相テーブル４０の残りの一の個別対応テーブル４０-m’から対応する位相分だけ加算又は減算した値を位相として決定する構成になっている。

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【0069】
なお、図５，図６で示したユーザＩＤは、移動局製造番号、電話番号又は通信会社から割り当てられたＩＤ等他の移動局情報からでも導出することもできる。
【0070】
さらにまた、ＲＡＣＨ位相制御部２５は、図５，図６で説明したような移動局情報／位相テーブル４０を予め備えていなくとも、数式を用いてその都度の演算によっても位相を決定する構成とすることもできる。
【0071】
このようにして構成された移動局１１によるランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルの具体的な送信状態について、図７により説明する。
【0072】
図７は、上述した移動局によるランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルの具体的な送信状態の説明図で、図７（ａ）は衝突が発生しない場合の説明図で、図７（ｂ）は衝突が発生した場合の説明図である。
【0073】
ここでは、移動局１１は、１回目はユーザＩＤ、２回目はサービス品質ＱｏＳ、３回目は移動局クラスの順で、基地局に送信するランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルの位相を、図５に示した個別対応テーブル４０-１～４０-３を用いて決定するものとして説明する。なお、図７（ｂ）に示した衝突が発生した場合の例では、くしの歯状のスペクトラムを相互にずらして重ねて図示することで、ユーザ間の衝突を表現している。
【0074】
図７（ａ）に示す送信状態は、ユーザＵＳＥＲ１，２，３，…は、互いに位相がα，β，γ，…と互いに位相が相違しており、ランダムアクセスチャネルブロック内でくしの歯状スペクトルの衝突が起きていない送信状態を示している。
【0075】
ところが、図７（ｂ）示す送信状態の１回目の送信では、ユーザＵＳＥＲ１，２，３は、互いに位相がαで同一であるため、ランダムアクセスチャネルブロック内でくしの歯状スペクトルの衝突が起きている状態が示されている。
【0076】
すなわち、このユーザＵＳＥＲ１，２，３それぞれの移動局１１-１～１１-３による１回目のランダムアクセスチャネルＲＡＣＨの通信データのくしの歯状スペクトルの送信（ランダムアクセス送信）では、ユーザＵＳＥＲ１，２，３それぞれのユーザＩＤ末尾が１であったため、図５に示したユーザＩＤ末尾に関しての個別対応テーブル４０-１（ユーザＩＤ／位相対応テーブル）では、ユーザＵＳＥＲ１，２，３それぞれの移動局１１-１～１１-３のＲＡＣＨ位相制御部２５が決定する位相がαになってしまい、互いに同位相となって衝突が発生してしまっていることによる。
【0077】
２回目のランダムアクセス送信は、図６に示したサービス品質ＱｏＳに関しての個別対応テーブル（サービス品質情報／位相対応テーブル）４０-２によって、仮にユーザＵＳＥＲ１のサービス品質ＱｏＳがＵＢＲ、ユーザＵＳＥＲ２，３のサービス品質ＱｏＳがＡＢＲであるとすると、ユーザＵＳＥＲ１の移動局１１-１から送信された位相αのくしの歯状スペクトルは、他の移動局１１-２，１１-３から送信された位相βのくしの歯状スペクトルとの間で衝突が発生しなくなり、今回の２回目のランダムアクセス送信では基地局が識別受信できるようになる。この結果、基地局は、ユーザＵＳＥＲ１の移動局１１-１から送信されたくしの歯状スペクトルを識別受信すると、ユーザＵＳＥＲ１の移動局１１-１に対してＡｃｋの返信を行う。これにより、ユーザＵＳＥＲ１の移動局１１-１は、基地局からのＡｃｋを受信して、基地局によって指定されたトラフィックチャネルＴＣＨを用い、基地局との間でデータの送信が行える状態に移行することになる。
【0078】

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これに対して、ユーザＵＳＥＲ２，３はそれぞれの移動局１１-２，１１-３の間では、サービス品質ＱｏＳが共にＡＢＲになっているため、それぞれのくしの歯状スペクトルの位相が同じβになってしまい、今回も衝突が発生してしまっている状態が示されている。

【0079】

３回目のランダムアクセス送信は、図５に示した移動局クラスに関しての個別対応テーブル（移動局クラス情報／位相対応テーブル）４０-３によって、仮にユーザＵＳＥＲ２の移動局クラスが２、ユーザＵＳＥＲ３の移動局クラスが４であるとすると、それぞれのくしの歯状スペクトルの位相がγ，βになり、互いの衝突が発生せず、ユーザＵＳＥＲ２，３の移動局１１-１，１１-２は基地局からのＡｃｋをそれぞれ受信できる状態であることが示されている。

【0080】

このように、移動局１１では、基地局へのランダムアクセス送信の際における位相の決定を、他の移動局１１’との間で衝突が起こり、基地局からのＡｃｋを受信できない状態では、毎回、例えばユーザＩＤ，サービス品質ＱｏＳ，移動局クラスといった個別対応テーブル４０-ｍを取り替えながら位相を決定し直すことにより、ランダム性が拡がり、他の移動局１１’との間でランダムアクセス送信が衝突する可能性を少なくすることができる。

【0081】

なお、本実施の形態の移動局１１におけるランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルの位相を決定するアルゴリズムは、図４で説明した実施例に限られるものではない。

【0082】

［第２の実施の形態］

図８は、本発明の第２の実施の形態による移動局の構成図である。

なお、その説明にあたって、図３に示した移動局１１の構成と同じ構成部分については同一符号を付し、その詳細な説明は省略する。

【0083】

本実施の形態では、移動局１２は、符号化・拡散部２１，スクランブル部２２，乗算部２３，M-ポイントＦＦＴ部７１，サブキャリアマッピング部７２，N-ポイントＩＦＦＴ部７３，ＲＡＣＨサブキャリア制御部７４，ＴＣＨサブキャリア制御部７５，切替部２７，フィルタ部２９，衝突発生検出部３０を備えて構成されている。

【0084】

本実施の形態の移動局１２は、図３に示した移動局１１のチップ繰り返し部２４に代えて、M-ポイントＦＦＴ部７１，サブキャリアマッピング部７２，N-ポイントＩＦＦＴ部７３を備えている。

【0085】

また、これに伴い、図３に示した移動局１１のＲＡＣＨ位相制御部２５，ＴＣＨ位相制御部２６に代えて、ＲＡＣＨサブキャリア制御部７４，ＴＣＨサブキャリア制御部７５を備えている。

【0086】

M-ポイントＦＦＴ部７１には、乗算部２３から、符号化・拡散部２１から出力される符号化・拡散された送信データとスクランブル部により生成されたスクランブルコードとを乗算した、スクランブルコードによりさらに拡散されたデータ系列が供給される。

【0087】

M-ポイントＦＦＴ部７１は、入力されたデータ系列に対してＦＦＴ処理を行い、時間・周波数変換し、Ｍシンボルからなる周波数データ系列をサブキャリアマッピング部７２に供給する。

【0088】

サブキャリアマッピング部７２は、ＲＡＣＨサブキャリア制御部７４、又はＴＣＨサブキャリア制御部７５から供給されるサブキャリア位置情報（位相情報）に基づいて、M-

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ポイントＦＦＴ部７１からのＭシンボルからなる周波数データ系列に対し、ゼロ信号を図２８で説明したようにして適宜位置に挿入し、Ｍシンボルからなる周波数データ系列をＮシンボル（Ｎ＞Ｍ）からなる周波数データ系列上にマッピングし、このＮシンボルからなる周波数データ系列をN-ポイントＩＦＦＴ部７３に供給する。

【0089】

N-ポイントＩＦＦＴ部７３は、サブキャリアマッピング部７２からのＮシンボルからなる周波数データ系列に対してＩＦＦＴ処理を行い、このＮシンボルからなる周波数データ系列を周波数・時間変換して、図２８に示したようなくしの歯状スペクトルを生成する。

【0090】

ＲＡＣＨサブキャリア制御部７４は、ランダムアクセス開始時に、ランダムアクセスチャネルＲＡＣＨでのくしの歯状スペクトルの位相（サブキャリア位置）を移動局１２自身の移動局情報から決定し、その決定した位相情報を切替部２７を介してサブキャリアマッピング部７２に供給し、サブキャリアマッピング部７２によるマッピングを制御する。

【0091】

ＴＣＨサブキャリア制御部７５は、図示省略した移動局１２の受信系に接続され、基地局から移動局１２へ通知されたトラフィックチャネルＴＣＨで使用するくしの歯状スペクトルの位相情報（サブキャリア位置情報）を保存し、移動局１２から基地局へトラフィックチャネルＴＣＨの送信データを送信する場合には、この保存した位相情報の位相（サブキャリア位置）を切替部２７を介してサブキャリアマッピング部７２に供給し、サブキャリアマッピング部７２によるマッピングを制御する。

【0092】

切替部２７は、ＲＡＣＨサブキャリア制御部７４、又はＴＣＨサブキャリア制御部７５で生成された位相情報を、ランダムアクセスチャネルＲＡＣＨの送信データの送信、又はトラフィックチャネルＴＣＨの送信データに合わせて、サブキャリアマッピング部７２に送る。そのために、切替部２７は、ランダムアクセスチャネルＲＡＣＨの送信データの送信時はＲＡＣＨサブキャリア制御部７４側を、トラフィックチャネルＴＣＨの送信データの送信時はＴＣＨサブキャリア制御部７５側を、サブキャリアマッピング部７２に接続する構成になっている。そして、切替部２７は、ランダムアクセスチャネルＲＡＣＨの送信開始に際して、ＲＡＣＨサブキャリア制御部７４側をサブキャリアマッピング部７２に接続するようにイニシャライズされる構成になっている。

【0093】

その上で、本実施の形態の移動局１２の場合も、前述の移動局１１の場合と同様にして、図４で説明したようなくしの歯状スペクトルの位相を決定するアルゴリズムを実行する。

【0094】

その際には、図３に示した移動局１１のＲＡＣＨ位相制御部２５，ＴＣＨ位相制御部２６に代わって、ＲＡＣＨサブキャリア制御部７４，ＴＣＨサブキャリア制御部７５が移動局１２から基地局へアクセスする場合（ステップＳ401，Ｓ404，Ｓ407で、ランダムアクセスチャネルＲＡＣＨによりランダムアクセスする場合も含む）の位相を決定し、移動局１１のチップ繰り返し部２４に代わって、M-ポイントＦＦＴ部７１，サブキャリアマッピング部７２，及びN-ポイントＩＦＦＴ部７３が、フィルタ部２９を介して、基地局へアクセスするための送信データのくしの歯状のスペクトルを基地局へ送信する（ステップＳ402，Ｓ405，Ｓ408で、ランダムアクセスチャネルＲＡＣＨで送信データのくしの歯状のスペクトルを基地局へ送信する場合も含む）。

【0095】

これにより、本実施の形態の移動局１２の場合も、前述した移動局１１の場合と同様な作用・効果を果たすことができる。

【0096】

［第３の実施の形態］

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次に、ランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルの位相を決定するアルゴリズムの別の実施の形態を、第３の実施の形態として説明する。

【0097】

本実施の形態では、移動局の構成は、前述した実施の形態の移動局１１，１２、例えば図３に示した第１の実施の形態の構成と同様であるが、そのＲＡＣＨ位相制御部２５は、さらに移動局情報／送信回数対応テーブル４１を備えた構成になっている。

【0098】

図９は、移動局情報／送信回数対応テーブルの一実施例としてのサービス品質／送信回数対応テーブルを示した図である。

【0099】

図９に示した移動局情報／送信回数対応テーブル４１の一実施例としてのサービス品質／送信回数対応テーブル４１は、個別移動局情報としてのサービス品質ＱｏＳと送信データについての送信回数とが対応したテーブル構成になっている。

【0100】

このサービス品質／送信回数対応テーブル４１をさらに備えた第２の実施の形態の移動局１１を用いて、くしの歯状スペクトルの位相を決定するアルゴリズムを、図１０に基づいて説明する。

【0101】

図１０は、本実施の形態によるくしの歯状スペクトルの位相を決定するアルゴリズムを示すフローチャートである。

【0102】

本実施の形態では、移動局１１から基地局へランダムアクセスする場合、移動局１１のＲＡＣＨ位相制御部２５は、まずこのサービス品質／送信回数対応テーブル４１を参照して、送信データのサービス品質ＱｏＳに対応した送信回数を最大再送信回数として決定する（ステップＳ1001）。

【0103】

次に、移動局１１のＲＡＣＨ位相制御部２５は、例えば図５に示したユーザＩＤ,サービス品質ＱｏＳ,移動局クラスそれぞれと位相とが対応した移動局情報／位相対応テーブル４０を参照して、１つの位相を決定する（ステップＳ1002）。また、その際、ＲＡＣＨ位相制御部２５は、その内部に設けられた同じ送信データの送信回数を計数する送信回数カウンタの値をリセットする。

【0104】

そして、移動局１１は、チップ繰り返し部２４で生成されたくしの歯状スペクトルに対してＲＡＣＨ位相制御部２５で決定した位相を乗算部２８で乗算し、フィルタ部２９を介して、ランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状のスペクトルを基地局へ送信する（ステップＳ1003）。

【0105】

移動局１１は、今回のランダムアクセスチャネルＲＡＣＨの送信データの基地局への送信に呼応した基地局からのＡｃｋを受信した場合（ステップＳ1004）、トラフィックチャネルＴＣＨでの送信データの送信モードに移行する。

【0106】

これに対して、他ユーザとの衝突等が原因で、移動局１１が基地局からのＡｃｋを検知できず、移動局１１で基地局からのＡｃｋが受信されない場合（ステップＳ1004）、移動局１１では、ＲＡＣＨ位相制御部２５が、その内部の送信回数カウンタの値をインクリメントし、この送信回数カウンタの値による送信実行回数がステップＳ1001の処理の実行によって決定された最大再送信回数に達したか否かを確認する（ステップＳ1005）。

【0107】

この確認の結果、未だ送信実行回数が最大再送信回数に達していない場合には、移動局１１は再びステップＳ1003以下の処理を実行し、ランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状のスペクトルを同じ位相で送信する（ステップＳ1003）。したがっ

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て、送信実行回数が最大再送信回数の範囲内で基地局からのＡｃｋが受信されるまで、移動局１１から基地局へランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状のスペクトルの送信が同じ位相で繰り返し行われることになる。

【0108】

一方、送信実行回数が最大再送信回数の範囲内で基地局からのＡｃｋが受信された場合は（ステップＳ1004）、移動局１１は、トラフィックチャネルＴＣＨでの送信データの送信モードに移行する。

【0109】

これに対して、送信実行回数が最大再送信回数の範囲内で基地局からのＡｃｋが受信されなかった場合は（ステップＳ1005）、移動局１１は、サービス品質Ｑｏｓに対応した送信待機期間の間、ランダムアクセスチャネルＲＡＣＨの送信を待機し（ステップＳ1006）、その待機後は、再びステップＳ1002以下の処理を実行し、基地局からのＡｃｋが受信されるまでランダムアクセスチャネルＲＡＣＨの送信を繰り返し実行する。

【0110】

なお、この場合におけるサービス品質Ｑｏｓに対応した送信待機期間の例としては、図９に示したサービス品質／送信回数対応テーブル４１における当該移動局１１のサービス品質ＱｏＳに対応した送信回数と、サービス品質／送信回数対応テーブル４１における最多送信回数との差以上の回数等が利用される。

【0111】

また、この送信待機期間後のステップＳ1002で示した位相の決定にあたっては、第１の実施の形態で図４により説明したように、それ以前に選択した個別対応テーブル４０-ｍ以外の個別対応テーブル４０-ｍ’から位相を決定することが可能である。

【0112】

さらに、ステップＳ1001で説明した最大再送信回数の決定も、個別移動局情報としてのサービス品質ＱｏＳに基づいて決定することに限らず、その他の個別移動局情報に対応させて設けた移動局情報／送信回数対応テーブル４１（例えば、移動局クラス／送信回数対応テーブル等）を用いて決定することも可能である。

【0113】

このようにして構成された移動局１１によるランダムアクセスチャネルＲＡＣＨのくしの歯状スペクトルの具体的な送信状態について、図１１により説明する。

【0114】

図１１は、上述した移動局によるランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルの具体的な送信状態の説明図で、衝突が発生した場合を示している。

【0115】

ここでは、移動局１１は、１回目はユーザＩＤ、２回目はサービス品質ＱｏＳ、３回目は移動局クラスの順で、基地局に送信するランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルの位相を、図５に示した移動局情報／位相テーブル４０を用いて決定するものとして説明する。

【0116】

図１１に示す送信状態の１回目の送信では、ユーザＵＳＥＲ１，２，３が同時にランダムアクセスチャネルＲＡＣＨでのくしの歯状スペクトルを送信したため、それぞれが送信したくしの歯状スペクトルの衝突が起きている状態が示されている。

【0117】

すなわち、この場合では、ユーザＵＳＥＲ１，２，３それぞれのユーザＩＤ末尾が共に１であったため、図５に示したユーザＩＤに関しての個別対応テーブル４０-１では、ユーザＵＳＥＲ１，２，３それぞれの移動局１１-１～１１-３のＲＡＣＨ位相制御部２５が決定する位相はαになってしまい、互いに同位相となって衝突が発生してしまっていることによる。

【0118】

また、この際、仮にユーザＵＳＥＲ１のサービス品質ＱｏＳがＣＢＲ、ユーザＵＳＥＲ

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２のサービス品質ＱｏＳがｎｒｔ－ＶＢＲ，ユーザＵＳＥＲ３のサービス品質ＱｏＳがＵＢＲであるとすると、図９に示した移動局情報／送信回数対応テーブルとしてのサービス品質／送信回数対応テーブル４１に基づいて、ユーザＵＳＥＲ１の移動局１１-１には最大再送信回数として３回が、ユーザＵＳＥＲ２の移動局１１-２には最大再送信回数として２回が、ユーザＵＳＥＲ３の移動局１１-３には最大再送信回数として１回が、それぞれのＲＡＣＨ位相制御部２５によって設定されている状態になっている。そのため、図９に示した例では、サービス品質／送信回数対応テーブル４１における最多送信回数が３回であることから、ユーザＵＳＥＲ１の移動局１１-１は、ランダムアクセスチャネルＲＡＣＨでのくしの歯状スペクトルの送信サイクルにしたがって毎回再送信され、ユーザＵＳＥＲ２の移動局１１-２は、その送信サイクルにしたがって２回再送信した後に１回だけ送信待機状態になり、ユーザＵＳＥＲ３の移動局１１-３は、その送信サイクルにしたがって１回だけ送信した後に３回送信待機状態になるようになっている。

【0119】

これにより、図１１に示す送信状態の２回目の送信では、ユーザＵＳＥＲ３の移動局１１-３からのランダムアクセスチャネルＲＡＣＨでのくしの歯状スペクトルの送信は休止となるため、その衝突は回避されるものの、ユーザＵＳＥＲ１，２の移動局１１-１，１１-２からはランダムアクセスチャネルＲＡＣＨでくしの歯状スペクトルが前回と同じ位相αで再送信されるため、今回も衝突が発生することになる。

【0120】

次の３回目の送信では、ユーザＵＳＥＲ２，３の移動局１１-２，１１-３それぞれからのランダムアクセスチャネルＲＡＣＨでのくしの歯状スペクトルの送信は休止となるため、その衝突は回避され、ユーザＵＳＥＲ１の移動局１１-１からだけランダムアクセスチャネルＲＡＣＨでくしの歯状スペクトルが前回と同じ位相αで再送信されるため、３回目も再送信で同じ位相αであっても今回は衝突が発生せず、基地局が識別受信できるようになる。これにより、ユーザＵＳＥＲ１の移動局１１-１は、基地局からのＡｃｋを受信して、基地局によって指定されたトラフィックチャネルＴＣＨを用い、基地局との間でデータの送信が行えるようになる。

【0121】

次の４回目の送信では、ユーザＵＳＥＲ３の移動局１１-３からのランダムアクセスチャネルＲＡＣＨでのくしの歯状スペクトルの送信は依然として休止となるため、送信待機状態が解除されたユーザＵＳＥＲ２の移動局１１-２からは、今度は図５に示した移動局情報／位相テーブル４０のサービス品質／位相テーブル４０-２を用いて決定された位相γでランダムアクセスチャネルＲＡＣＨでのくしの歯状スペクトルの送信が行われ、基地局が識別受信できるようになる。これにより、ユーザＵＳＥＲ２の移動局１１-２は、基地局からのＡｃｋを受信して、基地局によって指定されたトラフィックチャネルＴＣＨを用い、基地局との間でデータの送信が行えるようになる。

【0122】

次の５回目の送信では、既にユーザＵＳＥＲ１，２は基地局によって指定されたトラフィックチャネルＴＣＨを用いた送信に移行しているため、送信待機状態が解除されたユーザＵＳＥＲ３の移動局１１-３からは、今度は図５に示した移動局情報／位相テーブル４０のサービス品質／位相テーブル４０-２を用いて決定された位相αでランダムアクセスチャネルＲＡＣＨでのくしの歯状スペクトルの送信が行われ、基地局が識別受信できるようになる。これにより、ユーザＵＳＥＲ３の移動局１１-３は、基地局からのＡｃｋを受信して、基地局によって指定されたトラフィックチャネルＴＣＨを用い、基地局との間でデータの送信が行えるようになる。

【0123】

本実施の形態によれば、優先度の高いユーザに対して、ランダムアクセス送信の送信回数を増やすことで、さらにチャネルの効率的な運用ができる。

【0124】

［第４の実施の形態］

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次に、第４の実施の形態として、くしの歯状スペクトルの位相とくしの歯状スペクトルの本数を移動局情報に基づいて決定し、基地局にアクセスする実施の形態について説明する。

【0125】

図１２は、本実施の形態における移動局の構成図である。

なお、その説明にあたって、図３に示した移動局１１の構成と同じ構成部分については同一符号を付し、その詳細な説明は省略する。

【0126】

本実施の形態では、移動局１３は、符号化・拡散部２１-１,…,２１-ｎ，スクランブル部２２-１,…,２２-ｎ，乗算部２３-１,…,２３-ｎ，チップ繰り返し部２４-１,…,２４-ｎ，乗算部２８-１,…,２８-ｎ，フィルタ部２９，コピー部３１，ＲＡＣＨ位相・くしの歯数決定部３２，ＲＡＣＨ位相決定部３３-１,…,３３-ｎ，ＴＣＨ位相決定部３４-１,…,３４-ｎ，位相制御部３５-１,…,３５-ｎ，合成部３６，基地局受信検出部３７が備えられた構成になっている。

【0127】

コピー部３１は、ＲＡＣＨ位相・くしの歯数決定部３２で決定されたくしの歯数分だけ送信データを複製し、各送信系５０-１,…,５０-ｎの符号化・拡散部２１-１,…,２１-ｎに複製した送信データをそれぞれ供給する。

【0128】

ＲＡＣＨ位相・くしの歯数決定部３２は、ランダムアクセス送信の開始時に、ランダムアクセスチャネルＲＡＣＨでのくしの歯状スペクトルの生成数（以下、これをくしの歯数と称す）と基本位相情報とを移動局番号やサービスＱｏＳ等の移動局情報から決定し、決定したくしの歯数ｋをコピー部３１に供給するとともに、同じく決定したくしの歯状スペクトルの基本位相をくしの歯数に対応したＲＡＣＨ位相決定部３３-１,…,３３-ｋに供給する。

【0129】

また、ＲＡＣＨ位相・くしの歯数決定部３２は、図３に示した移動局１１のＲＡＣＨ位相制御部２５にも対応し、前述した第３の実施の形態で説明したように、送信データの移動局情報に対応した送信回数を最大再送信回数として決定する。

【0130】

各ＲＡＣＨ位相決定部３３-１,…,３３-ｎは、ＲＡＣＨ位相・くしの歯数決定部３２から供給されるくしの歯状スペクトルの基本位相をさらに変換し、この変換した位相を送信するランダムアクセスチャネルＲＡＣＨでのくしの歯状スペクトルについて決定した位相として、対応する位相制御部３５-１,…,３５-ｎに供給する。

【0131】

各ＲＡＣＨ位相決定部３３-１,…,３３-ｎは、くしの歯状スペクトルの基本位相を変換する際、例えば、互いに変換した位相が所定の位相角度θ１分だけずれるように、予めおのおのが構成されている。例えば、ＲＡＣＨ位相決定部３３-１は、ＲＡＣＨ位相・くしの歯数決定部３２が決定した基本位相をそのまま決定した位相として出力し、ＲＡＣＨ位相決定部３３-２は、ＲＡＣＨ位相・くしの歯数決定部３２が決定した基本位相に対してθ１分だけずらした位相を決定した位相として出力し、以下同様にして、ＲＡＣＨ位相決定部３３-ｋは、ＲＡＣＨ位相・くしの歯数決定部３２が決定した基本位相に対してｋθ１分だけずらした位相を決定した位相として出力する構成になっている。

【0132】

各ＴＣＨ位相決定部３４-１,…,３４-ｎは、図３に示した移動局１１のＴＣＨ位相制御部２６に対応するもので、図示省略した移動局１３の受信系にも接続され、基地局から移動局１３へ通知されたトラフィックチャネルＴＣＨで使用するくしの歯状スペクトルの位相を保存し、移動局１３から基地局へトラフィックチャネルＴＣＨの送信データを送信する場合には、この保存した位相を位相制御部３５-１,…,３５-ｎに供給する。

【0133】

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位相制御部３５-１,…,３５-ｎは、図３に示した移動局１１の切替部２７に対応し、対応したＲＡＣＨ位相決定部３３-１,…,３３-ｎ、又はＴＣＨ位相決定部３４-１,…,３４-ｎで決定された位相を、ランダムアクセスチャネルＲＡＣＨの送信データの送信、又はトラフィックチャネルＴＣＨの送信データに合わせて、選択的に乗算部２８-１,…,２８-ｎに供給制御する。

【0134】

位相制御部３５-１,…,３５-ｎは、ランダムアクセスチャネルＲＡＣＨの送信データの送信時はＲＡＣＨ位相決定部３３-１,…,３３-ｎから供給される位相情報を乗算部２８に供給出力する構成になっており、トラフィックチャネルＴＣＨの送信データの送信時はＴＣＨ位相決定部３４-１,…,３４-ｎで生成された位相情報乗算部２８に供給出力する構成になっている。

【0135】

合成部３６は、乗算部２８-１,…,２８-ｎで生成された位相のくしの歯状スペクトルを合成する。

【0136】

基地局受信検出部３７は、図３に示した移動局１１の衝突発生検出部３０に対応するもので、図示省略した移動局１３の受信系から、移動局１３からのランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルの送信に対して基地局から返信されるＡｃｋの受信検出の供給を受け、ＲＡＣＨ位相・くしの歯数決定部３２による基準位相の決定後、予め定められた時間範囲内に基地局からのＡｃｋの受信検出が確認できたか否かに基づき、移動局１３からのランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルに関しての基地局での受信を検出する。基地局受信検出部３７による検出結果は、ＲＡＣＨ位相・くしの歯数決定部３２及び位相制御部３５-１,…,３５-ｎに供給される。

【0137】

したがって、本実施の形態の移動局１３では、図３に示した第１の実施の形態の移動局１１の構成における、符号化・拡散部２１，スクランブル部２２，乗算部２３，チップ繰り返し部２４，ＲＡＣＨ位相制御部２５，ＴＣＨ位相制御部２６，切替部２７，乗算部２８，フィルタ部２９，衝突発生検出部３０によって構成される送信系５０が、ＲＡＣＨ位相・くしの歯数決定部３２により決定されるくしの歯数分だけ複数（５０-１,…,５０-ｎ）設けられた構成になっている。

【0138】

次に、上記説明した移動局１３において、ランダムアクセスチャネルＲＡＣＨでのくしの歯状スペクトルの位相情報を決定するアルゴリズムを説明する。

【0139】

図１３は、本実施の形態によるくしの歯状スペクトルの位相情報を決定するアルゴリズム示すフローチャートである。

【0140】

移動局１３から基地局へランダムアクセスチャネルＲＡＣＨによりランダムアクセスをする場合、移動局１３のＲＡＣＨ位相・くしの歯数決定部３２は、その内部に設けられた移動局情報／歯数情報対応テーブルとしての図９に示したサービス品質／歯数対応テーブル４１を参照して、送信データのサービス品質ＱｏＳに対応した送信回数を最大再送信回数として決定する（ステップＳ1301）。

【0141】

続いて、ＲＡＣＨ位相・くしの歯数決定部３２は、同じくその内部に設けられた、移動局情報に対するくしの歯状スペクトルの歯数を規定した移動局情報／歯数対応テーブル４２を参照して、ランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルの歯数を決定する（ステップＳ1302）。

【0142】

図１４は、移動局情報／歯数対応テーブルの一実施例を示した図である。

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図１４に示した移動局情報／歯数情報対応テーブル４２の場合は、個別移動局情報としてのサービス品質ＱｏＳとくしの歯状スペクトルの歯数とが対応したテーブル構成になっている。本実施の形態の場合、ＲＡＣＨ位相・くしの歯数決定部３２は、このサービス品質／歯数対応テーブル４２に基づいて位相情報を決定し、決定した歯数をコピー部３１に制御情報として供給する。

【0143】

続いて、ＲＡＣＨ位相・くしの歯数決定部３２は、同じくその内部に設けられ、移動局情報に対するくしの歯状スペクトルの基準位相を規定した、例えば図５に示したようなユーザＩＤ，サービス品質ＱｏＳ，移動局クラスといった個別移動局情報それぞれと位相とが対応した３つの個別対応テーブル４０-１～４０-３を有した構成の移動局情報／位相対応テーブル４０を参照して、１つの位相を決定する（ステップＳ1303）。

【0144】

この場合、ＲＡＣＨ位相・くしの歯数決定部３２は、例えば３つの個別対応テーブル４０-１～４０-３の中から１つの個別対応テーブル４０-m（但し、この場合はm＝１～３）を適宜選択し、その選択した１つの個別対応テーブル４０-mの個別移動局情報に基づいて位相を決定する。その際、ＲＡＣＨ位相・くしの歯数決定部３２は、その内部に設けられた同じ送信データの送信回数を計数する送信回数カウンタの値もリセットする。

【0145】

その上で、このＲＡＣＨ位相・くしの歯数決定部３２により決定されたくしの歯数ｋは、コピー部３１に供給され、コピー部３１によりこの決定されたくしの歯数ｋ分だけ送信データのコピーが行われ、コピーされた送信データは、予め定められた順番で、歯数ｋ分の送信系５０-１～５０-ｋの符号化・拡散部２１-１～２１-ｋにそれぞれ供給される。

【0146】

また、このＲＡＣＨ位相・くしの歯数決定部３２により決定された基準位相は、予め定められた順番で、歯数ｋ分の送信系５０-１～５０-ｋのＲＡＣＨ位相決定部３３-１～３３-ｋにそれぞれ供給される。

【0147】

そして、ランダムアクセス送信の当初は、送信系５０-１～５０-ｎそれぞれの位相制御部３５はＲＡＣＨ位相決定部３３-１～３３-ｎで決定された位相を乗算部２８-１～２８-ｎに供給するようにイニシャライズされているため、前述した送信データのコピーの供給を受けた送信系５０-１～５０-ｋ毎に、そのチップ繰り返し部２４からのランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルにＲＡＣＨ位相決定部３３-１～３３-ｋで決定された位相が乗算部２８-１～２８-ｋで乗算される。

【0148】

これにより、前述した送信データのコピーの供給を受けた送信系５０-１～５０-ｋそれぞれでは、ランダムアクセスチャネルＲＡＣＨの送信データを決定した位相でスペクトル位置を変更したくしの歯状スペクトルが生成され、これらくしの歯状スペクトルは合成部３６によって合成され、フィルタ部２９によって帯域制限された後、基地局に対して送信される。

【0149】

したがって、本実施の形態では、移動局１３は、ランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルを、送信系５０-１～５０-ｋのＲＡＣＨ位相決定部３３-１～３３-ｋがずらした位相間隔θ１分だけ相互に周波数間隔を空けて、ＲＡＣＨ位相・くしの歯数決定部３２で決定したくしの歯数ｋ分だけ、基地局へ送信する（ステップＳ1304）。

【0150】

移動局１３は、ステップＳ1304で、歯数ｋ分のランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルを位相間隔θ１分だけ相互に周波数間隔を空けて送信した後、今回のランダムアクセスチャネルＲＡＣＨの送信データの基地局への送信に呼応した基地局からのＡｃｋを受信した場合（ステップＳ1305）、トラフィックチャネルＴＣＨ

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での送信データの送信モードに移行する。

【0151】

これに対して、他ユーザとの衝突等が原因で移動局１３が基地局からのＡｃｋを検知できず、移動局１３で基地局からのＡｃｋが受信されない場合（ステップＳ1305）、移動局１３では、ＲＡＣＨ位相・くしの歯数決定部３２が、その内部の送信回数カウンタの値をインクリメントし、この送信回数カウンタの値が示す送信実行回数がステップＳ1301の処理の実行によって決定された最大再送信回数に達したか否かを確認する（ステップＳ1306）。

【0152】

この確認の結果、未だ送信実行回数が最大再送信回数に達していない場合には、移動局１３は再びステップＳ1304以下の処理の実行を繰り返す。

【0153】

一方、送信実行回数が最大再送信回数の範囲内で基地局からのＡｃｋが受信された場合は（ステップＳ1305）、移動局１３は、トラフィックチャネルＴＣＨでの送信データの送信モードに移行する。

【0154】

これに対して、送信実行回数が最大再送信回数の範囲内で基地局からのＡｃｋが受信されなかった場合は（ステップＳ1306）、移動局１３は、再びステップＳ1303以下の処理を実行し、基地局からのＡｃｋが受信されるまで繰り返し実行する。

【0155】

このようにして構成された移動局１３によるランダムアクセスチャネルＲＡＣＨのくしの歯状スペクトルの具体的な送信状態について、図１５により説明する。

【0156】

図１５は、上述した移動局によるランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルの具体的な送信状態の説明図で、図１５（ａ）は衝突が発生しない場合の説明図で、図１５（ｂ）は衝突が発生した場合の説明図である。

【0157】

ここでは、移動局１３は、そのＲＡＣＨ位相・くしの歯数決定部３２が１回目はユーザＩＤ、２回目はサービス品質ＱｏＳ、３回目は移動局クラスの順で、ＲＡＣＨ位相決定部３３-１～３３-ｋに供給する基準位相を、図5に示した移動局情報／位相対応テーブル４０の個別対応テーブル４０-１～４０-３を用いて決定するものとして説明する。なお、本説明では、ＲＡＣＨ位相・くしの歯数決定部３２が決定する最大再送信回数は、図9に示したサービス品質ＱｏＳ以外の移動局情報に関するものであって、ユーザＵＳＥＲ１，２，３とも、最大再送信回数は３回以上の値がそれぞれ設定されているもの仮定して説明する。

【0158】

図１５（ａ）に示す送信状態では、ユーザＵＳＥＲ１，２，３は、互いに基準位相がα，δ，εと相違しており、ランダムアクセスチャネルブロック内でくしの歯状スペクトルの衝突が起きていない送信状態を示している。

【0159】

そして、図9に示したサービス品質／歯数対応テーブル４１によって、ユーザＵＳＥＲ１はサービス品質ＱｏｓがＣＢＲでそのくしの歯が３つであるため、図１５（ａ）ではそのユーザＩＤ末尾を１とした場合は、位相αのくしの歯に２つのくしの歯が位相間隔θ１分だけ周波数間隔を有して付随し、合計３つの歯数のくしの歯状スペクトルによる送信状態が表されている。同様にして、ユーザＵＳＥＲ２はサービス品質Ｑｏｓがｒｔ－ＶＢＲでそのくしの歯が２つであるため、図１５（ａ）ではそのユーザＩＤ末尾を９とした場合は、位相εを基準にした合計２つの歯数のくしの歯状スペクトルによる送信状態が、ユーザＵＳＥＲ３はサービス品質ＱｏｓがＵＢＲでそのくしの歯が１つであるため、図１５（ａ）ではそのユーザＩＤ末尾が５である場合は、位相δを基準にした合計１つのくしの歯状スペクトルによる送信状態で表されている。

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【0160】
これに対して、図１５（ｂ）示す送信状態では、図１５（ａ）とはユーザＩＤ末尾だけ条件を異ならせ、ユーザＵＳＥＲ１，２，３それぞれのユーザＩＤ末尾が、１，２，２である場合の送信状態で表されている。
【0161】
この場合は、１回目のランダムアクセスチャネルＲＡＣＨの通信データのくしの歯状スペクトルの送信（ランダムアクセス送信）では、ユーザＵＳＥＲ１は、ユーザＩＤ末尾が１であり、サービス品質ＱｏｓがＣＢＲであるため、位相αを基準位相にした合計３つのくしの歯状スペクトルによる送信状態になっている。同様に、ユーザＵＳＥＲ２は、ユーザＩＤ末尾が２であり、サービス品質Ｑｏｓがｒｔ－ＶＢＲであるため、位相αを基準位相にした合計２つのくしの歯状スペクトルによる送信状態になっている。また、ユーザＵＳＥＲ３は、ユーザＩＤ末尾が２であり、サービス品質ＱｏｓがＵＢＲであったため、位相αを基準位相にした合計１つのくしの歯状スペクトルによる送信状態になっている。
【0162】
したがって、１回目のランダムアクセス送信では、ユーザＵＳＥＲ１，２，３は、互いに基準位相がαで同一であるため、基準位相αにおいては、ユーザＵＳＥＲ１，２，３それぞれのランダムアクセスチャネルＲＡＣＨの送信データの基準位相αを乗算して生成したくしの歯状スペクトルについては、その衝突が起きてしまう。
【0163】
ところが、本実施の形態の移動局１３においては、ユーザＵＳＥＲ１の移動局１３-１は位相αを基準位相にした合計３つの位相α，α＋θ１，α＋２θ１でくしの歯状スペクトルがそれぞれ送信状態になっているのに対し、ユーザＵＳＥＲ２，３の移動局１３-２，１３-３は位相αを基準にしていても、ユーザＵＳＥＲ２の場合は合計２つの位相α，α＋θ１で、ユーザＵＳＥＲ３の場合は基準位相αだけで、ユーザＵＳＥＲ２，３それぞれのくしの歯状スペクトルの合計２及び１は、ユーザＵＳＥＲ１のくしの歯状スペクトルの合計である３つよりも少ない送信状態になっている。
【0164】
そのため、ユーザＵＳＥＲ１の移動局１３-１から周波数間隔を位相間隔θ１分だけ異ならせて送信された合計３つのくしの歯状スペクトルの中には、基準位相が同じ位相αであっても、ユーザＵＳＥＲ２，３の移動局１３-２，１３-３それぞれから送信されたくしの歯状スペクトルと衝突しない位相（この場合は、位相α＋２θ１）のくしの歯状スペクトルが現れる。この結果、ユーザＵＳＥＲ１の移動局１３-１から送信された衝突しないくしの歯状スペクトルは、基地局によって識別受信されることとなり、ユーザＵＳＥＲ１の移動局１３-１は、１回目のランダムアクセス送信で基地局からのＡｃｋを受信して、基地局によって指定されたトラフィックチャネルＴＣＨを用い、基地局との間でデータの送信が行えるようになる。
【0165】
以下、同様の理由により、２回目のランダムアクセス送信ではユーザＵＳＥＲ２の移動局１３-２が、３回目のランダムアクセス送信ではユーザＵＳＥＲ３の移動局１３-３が、基地局からのＡｃｋを受信して、基地局によって指定されたトラフィックチャネルＴＣＨを用い、基地局との間でデータの送信が行えるようになる。
【0166】
図１６は、図１４に示した本実施の形態による移動局の変形例の構成図である。
図１６に示した移動局１３は、図１２に示した移動局１３のコピー部３１を無くすことで、符号化・拡散部２１及びスクランブル部２２を最小限にした場合の移動局を示している。なお、この移動局１３の構成及び作用は、図１２に示した移動局１３の場合と同様であるので、対応する構成要素については同一符号を付し、その説明は省略する。
【0167】
本実施の形態によれば、優先度の高いユーザに対して、ランダムアクセス送信で送信するランダムアクセスチャネルＲＡＣＨの通信データのくしの歯状スペクトルのくしの歯数

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を増やすことで、さらにチャネルの効率的な運用ができる。

【0168】

［第５の実施の形態］

次に、第５の実施の形態として、くしの歯状スペクトルの位相とくしの歯状スペクトルの本数を移動局情報に基づいて決定し、基地局にアクセスする別の実施の形態について説明する。

【0169】

本実施の形態では、移動局１３の構成は、図１２又は図１６に示した第３の実施の形態の構成とほぼ同様であるが、送信系５０-１～５０-ｎ毎に設けられていたＲＡＣＨ位相決定部３３-１～３３-ｎを廃し、その代わりにＲＡＣＨ位相・くしの歯数決定部３２がその決定したくしの歯数ｋに応じて送信系５０-１～５０-ｋ毎の位相を決定し、このくしの歯数ｋに対応する送信系５０-１～５０-ｋの位相制御部３５-１,…,３５-ｋに決定した位相をそれぞれ供給する構成になっている。

【0170】

この場合、ＲＡＣＨ位相・くしの歯数決定部３２は、第３の実施の形態による移動局１３と同様に、その内部に設けられた、移動局情報に対するくしの歯状スペクトルの歯数ｋを規定した移動局情報／歯数対応テーブル４２を参照して、ランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルの歯数ｋを決定する。

【0171】

なお、ＲＡＣＨ位相・くしの歯数決定部３２は、本実施の形態でも、移動局情報／歯数対応テーブル４２として、図１４に示したサービス品質ＱｏＳとくしの歯状スペクトルの歯数とが対応した移動局情報／歯数情報対応テーブル４２を利用するものとして説明する。

【0172】

そして、本実施の形態では、ＲＡＣＨ位相・くしの歯数決定部３２は、そのくしの歯状スペクトルの歯数ｋを基に、図５に示したような、送信系５０-１～５０-ｎに対応して複数設けられている個別対応テーブル４０-１～４０-ｎを有した構成の移動局情報／位相対応テーブル４０を参照して、決定した歯数ｋのくしの歯状スペクトルそれぞれの位相を決定する構成になっている。そして、ＲＡＣＨ位相・くしの歯数決定部３２で決定した各くしの歯状スペクトルのそれぞれ位相は、対応する位相制御部３５-１,…,３５-ｎに供給される構成になっている。

【0173】

このようにして構成された移動局１３によるランダムアクセスチャネルＲＡＣＨのくしの歯状スペクトルの具体的な送信状態について、図１７により説明する。

【0174】

図１７は、本実施の形態の移動局によるランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルの具体的な送信状態の説明図である。

【0175】

移動局１３は、そのＲＡＣＨ位相・くしの歯数決定部３２が、予め設定されている移動局１３自身のサービス品質ＱｏＳから送信するくしの歯状スペクトルのくしの歯数を、図１４に示したようなサービス品質／歯数情報対応テーブル４２を参照して決定する。

【0176】

図１４に示した例では、ユーザＵＳＥＲ１，２，３のサービス品質ＱｏＳは、それぞれＣＢＲ，ｒｔ－ＶＢＲ，ＵＢＲであるので、図１７に示した状態の場合は、ＲＡＣＨ位相・くしの歯数決定部３２は、くしの歯数ｋを、ユーザＵＳＥＲ１では３本、ユーザＵＳＥＲ２では２本、ユーザＵＳＥＲ３では１本と決定することになる。

【0177】

移動局１３は、くしの歯数ｋを決定すると、この決定したくしの歯数ｋを基に、対応する送信系５０-１～５０-ｋの位相を決定する。本実施の形態では、決定したくしの歯数ｋの順番毎に、すなわち利用する送信系５０-１～５０-ｋ毎に参照する図５に示した移動局

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情報／位相対応テーブル４０の個別対応テーブル４０-１～４０-ｎが予め既定されている。図１７に示した場合は、移動局１３は、そのＲＡＣＨ位相・くしの歯数決定部３２が、１本目のくしの歯状スペクトルの位相をユーザＩＤ末尾情報／位相対応テーブル４０-１により、２本目のくしの歯状スペクトルの位相を移動局クラス／位相対応テーブル４０-３により、３本目のくしの歯状スペクトルの位相をサービス品質／位相対応テーブル４０-２により、それぞれ決定する構成になっている。

【0178】

そのため、図１７に示した場合では、ユーザＵＳＥＲ１では、３本のくしの歯状スペクトルを送出するので、ユーザＩＤ，移動局クラス，サービス品質Ｑｏｓの３つで位相を決定し、それぞれ位相は、α、γ、εとなる。同様にして、ユーザＵＳＥＲ２では、２本のくしの歯状スペクトルを送出するので、ユーザＩＤ，移動局クラスの２つで位相を決定するため位相はα，εとなり、ユーザＵＳＥＲ３では、１本のくしの歯状スペクトルを送出するので、ユーザＩＤで位相を決定するため位相はαとなる。

【0179】

この結果、図１７の１回目の送信に示すように、ユーザＵＳＥＲ１，２，３の移動局１３-１，１３-２，１３-３がランダムアクセスチャネルＲＡＣＨで同時にくしの歯状スペクトルを送信した場合は、ユーザＵＳＥＲ１，２，３それぞれの位相αの１本目のくしの歯状スペクトル、及びユーザＵＳＥＲ１，２それぞれの位相εの２本目のくしの歯状スペクトルは衝突するけれども、ユーザＵＳＥＲ１の位相γの３本目のくしの歯状スペクトルは衝突しないため、基地局はユーザＵＳＥＲ１の移動局１３-１を検出できることになる。これにより、ユーザＵＳＥＲ１の移動局１３-１は、基地局からのＡｃｋを受信し、トラフィックチャネルＴＣＨでのデータの送信が開始される。

【0180】

図１７の２回目の送信に示すように、再度、基地局によって検出されていないユーザＵＳＥＲ２，３が同じ位相で送信すると、ユーザＵＳＥＲ２，３の位相αの１本目のくしの歯状スペクトルは衝突するけれど、ユーザＵＳＥＲ２の位相εの２本目のくしの歯スペクトルは衝突しないので、ユーザＵＳＥＲ２の移動局１３-２は、基地局からのＡｃｋを受信し、トラフィックチャネルＴＣＨでのデータの送信が開始される。

【0181】

図１７の３回目の送信に示すように、３回目はユーザＵＳＥＲ３の移動局１３-３のみの送信になるので、ユーザＵＳＥＲ３の位相αの１本目のくしの歯状スペクトルは、他のユーザＵＳＥＲ１，２とのくしの歯状スペクトルの衝突はもう起きないため、ユーザＵＳＥＲ２の移動局１３-３は、基地局からのＡｃｋを受信し、トラフィックチャネルＴＣＨでのデータの送信が開始される。

【0182】

本実施の形態によれば、優先度の高いユーザに対して、送信するくしの歯数を増やすことで、チャネルの効率的な運用ができる。

【0183】

［第６の実施の形態］

次に、第６の実施の形態として、くしの歯状スペクトルの位相を移動局情報を基に決定し、くしの歯状スペクトルの送信するサブキャリアの送信電力制御を行って、基地局にアクセスする実施の形態について説明する。

【0184】

図１８は、本実施の形態における移動局の構成図である。

なお、その説明にあたって、図３に示した移動局１１の構成と同じ構成部分については同一符号を付し、その詳細な説明は省略する。

【0185】

本実施の形態では、移動局１４は、符号化・拡散部２１，スクランブル部２２，乗算部２３，チップ繰り返し部２４，切替部２７，乗算部２８，フィルタ部２９，衝突発生検出部３０，ＲＡＣＨ位相／電力決定部６１，ＴＣＨ位相／電力決定部６２，送信制御部６３

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が備えられた構成になっている。

【0186】

ＲＡＣＨ位相／電力決定部６１は、図３に示した移動局１１のＲＡＣＨ位相制御部２５に対応し、前述した第１の実施の形態で説明したように、送信データの移動局情報に対応させてランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルの位相を決定するとともに、さらにランダムアクセスチャネルＲＡＣＨで送信データのくしの歯状スペクトルを無線出力する際の送信電力を決定する。

【0187】

ＴＣＨ位相／電力決定部６２は、図３に示した移動局１１のＴＣＨ位相制御部２６に対応し、前述した第１の実施の形態で説明したように、送信データの移動局情報に対応させてトラフィックチャネルＴＣＨの送信データのくしの歯状スペクトルの位相を決定するとともに、さらにトラフィックチャネルＴＣＨで送信データのくしの歯状スペクトルを無線出力する際の送信電力を決定する。

【0188】

ＲＡＣＨ位相／電力決定部６１及びＴＣＨ位相／電力決定部６２は、決定した位相を切替部２７を介して乗算部２８に供給するとともに、決定した電力の大きさを切替部２７を介して送信制御部６３にそれぞれ供給する。

【0189】

切替部２７は、乗算部２８，送信制御部６３に、ＲＡＣＨ位相／電力決定部６１によって決定した位相及び電力の大きさ、又はＴＣＨ位相／電力決定部６２によって決定した位相及び電力の大きさのいずれかを、衝突発生検出部３０の出力に基づいて選択的に供給する。

【0190】

送信制御部６３は、移動局１４から基地局への送信データの上りリンクにおける無線出力の送信電力を、ＲＡＣＨ位相／電力決定部６１又はＴＣＨ位相／電力決定部６２によって決定された電力の大きさに制御する。

【0191】

次に、上記説明した移動局１４において、ランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルの位相及び送信電力を決定するアルゴリズムについて説明する。

【0192】

図１９は、本実施の形態によるくしの歯状スペクトルの位相及び送信電力を決定するアルゴリズムを示すフローチャートである。

【0193】

移動局１４から基地局へランダムアクセスチャネルＲＡＣＨによりランダムアクセスする場合、そのＲＡＣＨ位相／電力決定部６１は、その内部に備えられている図５に示したような移動局情報／位相対応テーブル４０を参照して、例えば第１の実施の形態で説明したＲＡＣＨ位相制御部２５の場合と同様にして、１つの位相を決定する（ステップＳ1901）。

【0194】

なお、ＲＡＣＨ位相／電力決定部６１では、今回のランダムアクセスにおいて最初にランダムアクセスチャネルＲＡＣＨの送信データを送信する場合は、送信制御部６３による無線出力の送信電力の初期値に対応する電力の大きさが事前に決定されている。

【0195】

これにより、移動局１４は、チップ繰り返し部２４で生成されたくしの歯状スペクトルに対してＲＡＣＨ位相／電力決定部６１で決定した位相を乗算部２８で乗算し、フィルタ部２９を介して、ランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状のスペクトルを、送信制御部６３を介して、ＲＡＣＨ位相／電力決定部６１で決定した電力の大きさの送信電力をもって基地局へ送信する（ステップＳ1902）。

【0196】

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このランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状のスペクトル送信に対して、移動局１４が基地局からのＡｃｋを受信した場合（ステップＳ1903）、移動局１４はトラフィックチャネルＴＣＨの送信データの送信モードに移行する一方、基地局からのＡｃｋが受信されない場合は（ステップＳ1903）、本実施の形態の場合は、ＲＡＣＨ位相／電力決定部６１が今回の送信にあたって決定した電力の大きさを、例えば予め定められた所定量だけ大きな電力の大きさに決定し直す（ステップＳ1904）。

【0197】

そして、移動局１４は、ステップＳ1901～Ｓ1904で説明した処理を、基地局からのＡｃｋが受信されるまで（ステップＳ1903）、繰り返して行う構成になっている。なお、その際には、ＲＡＣＨ位相／電力決定部６１が決定する電力の大きさには、所定の制限値が設けられ、移動局１４は基地局からのＡｃｋが繰り返し受信できない場合であっても、ＲＡＣＨ位相／電力決定部６１は、この制限値を超える電力の大きさを決定しない構成とすることもできる。

【0198】

このようにして構成された移動局１４によるランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルの具体的な送信状態について、図２０により説明する。

【0199】

図２０は、本実施の形態の移動局によるランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルの具体的な送信状態の説明図である。

【0200】

ここでは、移動局１４は、そのＲＡＣＨ位相／電力決定部６１が、ランダムアクセスチャネルＲＡＣＨでのくしの歯状スペクトルの送信毎に、１回目はユーザＩＤ、２回目はサービス品質ＱｏＳ、３回目は移動局クラスの順で、乗算部２８に供給する位相を、図５に示した移動局情報／位相対応テーブル４０の個別対応テーブル４０-１～４０-３を用いて決定し、また、１回目よりも２回目、２回目よりも３回目の方が、電力の大きさが大きくなるようにして決定するものとして説明する。

【0201】

図２０の１回目の送信に示すように、ユーザＵＳＥＲ１，２の移動局１４-１，１４-２がランダムアクセスチャネルＲＡＣＨで同時にくしの歯状スペクトルを送信した場合は、ユーザＵＳＥＲ１，２はそれぞれのユーザＩＤ末尾が同じ１であるとすると、両者それぞれのランダムアクセスチャネルＲＡＣＨでのくしの歯状スペクトルの位相は、共にαになる。そのため、この１回目の送信では、ユーザＵＳＥＲ１，２それぞれのランダムアクセスチャネルＲＡＣＨでのくしの歯状スペクトル同士の衝突が起き、基地局は、ランダムアクセスチャネルＲＡＣＨにおけるユーザＵＳＥＲ１，２のくしの歯状スペクトルを検出できない。

【0202】

図２０に示した２回目の送信では、ユーザＵＳＥＲ１，２とも２回目の送信となり、ユーザＵＳＥＲ１のサービスＱｏＳがＵＢＲ、ユーザＵＳＥＲ２のサービスＱｏＳがｎｒｔ－ＶＢＲであるとすると、ユーザＵＳＥＲ１の位相はα、ユーザＵＳＥＲ２の位相はγとなるとともに、両者とも送信電力を１回目より上げて送信することになる。

【0203】

ランダムアクセスチャネルＲＡＣＨでのこのようなユーザＵＳＥＲ１，２による２回目のくしの歯状スペクトルの送信と同タイミングで、新たにユーザＵＳＥＲ３がランダムアクセスチャネルＲＡＣＨでくしの歯状スペクトルの送信を開始した場合を想定する。

【0204】

この場合、ユーザＵＳＥＲ３は１回目の送信となり、ユーザＩＤ末尾が６であるとすると、ランダムアクセスチャネルＲＡＣＨでのくしの歯状スペクトルの位相はγになる。

【0205】

したがって、図２０に示した２回目の送信では、ユーザＵＳＥＲ１の２回目の位相はαであるため、ユーザＵＳＥＲ２のくしの歯状スペクトルの２回目の位相γや、ユーザＵＳ

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ＥＲ３の１回目の位相γとは異なることとなり、基地局はユーザＵＳＥＲ１の移動局１４-１を検出できることになる。これにより、ユーザＵＳＥＲ１の移動局１４-１では、基地局からのＡｃｋを受信し、トラフィックチャネルＴＣＨでのデータの送信が開始されることとなる。

【0206】

また、図２０に示した２回目の送信では、ユーザＵＳＥＲ２の２回目のくしの歯状スペクトルは、ユーザＵＳＥＲ３の１回目の位相γと同じになるため、ユーザＵＳＥＲ２の２回目のくしの歯状スペクトルとユーザＵＳＥＲ３の１回目のくしの歯状スペクトルとの間で衝突が起きることになる。しかしながら、この場合は、両者の基地局に対する距離関係が同じであると仮定すると、ユーザＵＳＥＲ２のくしの歯状スペクトルの送信電力は、ユーザＵＳＥＲ３のくしの歯状スペクトルの電力よりも大きいため、基地局はユーザＵＳＥＲ２の移動局１３-２を検出できることになる。これにより、ユーザＵＳＥＲ２の移動局１４-２も、基地局からのＡｃｋを受信し、トラフィックチャネルＴＣＨでのデータの送信が開始されることになる。

【0207】

これに対して、ユーザＵＳＥＲ３のくしの歯状スペクトルの１回目の送信電力は、衝突を起こしたユーザＵＳＥＲ２のくしの歯状スペクトルの送信電力に比して低いため、基地局では、ユーザＵＳＥＲ２のくしの歯状スペクトルは、基地局による検出が困難である。

【0208】

図２０に示した３回目の送信では、ユーザＵＳＥＲ３はそのサービスＱｏＳがＡＢＲであるとすると、３回目のくしの歯状スペクトルの送信で位相がβになるが、他のユーザＵＳＥＲ１，２は既に基地局によって検出されてトラフィックチャネルＴＣＨの送信モードに移行し、ユーザＵＳＥＲ３の移動局１４-３のみの送信になるため、くしの歯状スペクトルの衝突は起きない。さらに、そのくしの歯状スペクトルの２回目の送信電力も、１回目よりも大きくなっている。したがって、ユーザＵＳＥＲ２の移動局１４-３でも、基地局からのＡｃｋを受信し、トラフィックチャネルＴＣＨでのデータの送信が開始されることになる。

【0209】

本実施の形態によれば、ランダムアクセスチャネルＲＡＣＨでのくしの歯状スペクトルの繰り返し送信回数に応じてその送信電力を徐々に大きくしていくことにより、基地局と公平に通信できる機会を与えられる。また、基地局から遠い位置にいるユーザに対しても通信機会を与えることができる。

【0210】

ここで、上記説明した第１～第６の実施の形態では、ランダムアクセスチャネルＲＡＣＨでの位相、くしの歯数、送信電力等の決定方法を示したが、この第１～第６の実施の形態を適宜組み合わせて実施することも可能である。

【0211】

［第７の実施の形態］

前述した第１～第６の実施の形態では、ランダムアクセスチャネルＲＡＣＨ内の位相、くしの歯数、送信電力等の決定方法を示したが、くしの歯状スペクトル自体の態様以外にも、ランダムアクセスチャネルＲＡＣＨで基地局に送信する送信データのくしの歯状スペクトルについて、移動局側でその送信に用いるランダムアクセスチャネルＲＡＣＨのランダムアクセスチャネルスロット（ブロック）を自身の移動局情報から選択し、その選択したランダムアクセスチャネルスロットを用いて送信データのくしの歯状スペクトルを基地局に送信することも可能である。その具体的な構成並びに手順について、図面に基づいて説明する。

【0212】

まず、本実施の形態で採用する、移動局から基地局へのアクセスに用いられる上りリンクのシステム例について説明する。

【0213】

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図２１は、移動局から基地局への上りリンクのシステム例の説明図である。

図２１に示すように、移動局から基地局への通信は、移動局から基地局への通信帯域をさらに複数の周波数帯域（周波数チャネル）に分け、各周波数帯域の時間方向の系列を一定の時間幅で仕切って構成されるスロット単位で行われる。そして、各周波数帯域の時間方向のスロット系列は、フレーム単位で管理され、１フレームは所定数のスロットが時間方向に連設配置された構成になっている。

【0214】

このような構成からなる移動局から基地局への上りリンクシステムにおいて、ランダムアクセスチャネルＲＡＣＨには、予め定められた周波数帯域の時間方向の系列上におけるフレーム内の所定スロットを、ランダムアクセスチャネルスロット（以下、ＲＡＣＨスロットと称する）として割り当てている。

【0215】

この結果、図２１に示すような上りリンクシステムにおいては、フレームタイミングの同期をとれば、各フレームのＲＡＣＨスロットそれぞれが、容易に識別できるようになっている。

【0216】

また、トラフィックチャネルＴＣＨには、ＲＡＣＨスロット以外のスロットがトラフィックチャネルスロット（以下、ＴＣＨスロットと称する）として利用される。

【0217】

以下、本実施の形態の説明では、フレーム単位で複数設けられたＲＡＣＨスロットそれぞれに、フレームの先頭から図２１に示したような番号１～Ｎを割り振って、複数のＲＡＣＨスロットそれぞれの識別がはかれるように便宜をはかった上で、説明する。

【0218】

図２２は、本実施の形態における移動局の構成図である。

なお、その説明にあたって、図３に示した移動局１１の構成と同じ構成部分については同一符号を付し、その詳細な説明は省略する。

【0219】

本実施の形態では、移動局１５は、符号化・拡散部２１，スクランブル部２２，乗算部２３，チップ繰り返し部２４，切替部２７，乗算部２８，フィルタ部２９，衝突発生検出部３０，ＲＡＣＨ位相／スロット決定部６５，ＴＣＨ位相／スロット／決定部６６，送信制御部６３が備えられた構成になっている。

【0220】

ＲＡＣＨ位相／スロット決定部６５は、図３に示した移動局１１のＲＡＣＨ位相制御部２５に対応し、前述した第１の実施の形態で説明したように、送信データの移動局情報に対応させてランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルの位相を決定するとともに、ランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルを基地局へ無線送信する際に、このくしの歯状スペクトルを送信する上りリンクシステムにおけるＲＡＣＨスロットの中のアクセススロットを決定する。

【0221】

ＴＣＨ位相／スロット決定部６６は、図３に示した移動局１１のＴＣＨ位相制御部２６に対応し、前述した第１の実施の形態で説明したように、送信データの移動局情報に対応させてトラフィックチャネルＴＣＨの送信データのくしの歯状スペクトルの位相を決定するとともに、トラフィックチャネルＴＣＨの送信データのくしの歯状スペクトルを基地局へ無線送信する際の、このくしの歯状スペクトルを送信する上りリンクシステムにおけるＴＣＨスロットの中のアクセススロットを決定する。

【0222】

ＲＡＣＨ位相／スロット決定部６５及びＴＣＨ位相／スロット決定部６６は、決定した位相を切替部２７を介して乗算部２８に供給するとともに、決定した上りリンクシステムにおけるアクセススロットを切替部２７を介して送信制御部６３にそれぞれ供給する。

【0223】

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切替部２７は、乗算部２８，送信制御部６３に、ＲＡＣＨ位相／スロット決定部６５によって決定した位相及びアクセススロット、又はＴＣＨ位相／スロット決定部６６によって決定した位相及びアクセススロットのいずれかを、衝突発生検出部３０の出力に基づいて選択的に供給する。

【0224】

送信制御部６３は、前述した第５の実施の形態とは異なり、切替部２７を介して選択的に供給されるＲＡＣＨ位相／スロット決定部６５又はＴＣＨ位相／スロット決定部６６によって決定した所望のアクセススロットに当てはめて，ランダムアクセスチャネルＲＡＣＨ又はトラフィックチャネルＴＣＨのくしの歯状スペクトルを送信する。

【0225】

次に、上記説明した移動局１５において、ランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルの位相と、このくしの歯状スペクトルを送信するＲＡＣＨスロットのアクセススロットを、移動局１５自身の移動局情報（例えば、ユーザＩＤ、サービスＱｏＳ、移動局クラス）から決定するアルゴリズムについて説明する。

【0226】

図２３は、本実施の形態によるくしの歯状スペクトルの位相及びアクセススロットを決定するアルゴリズムを示すフローチャートである。

【0227】

移動局１５から基地局へランダムアクセスチャネルＲＡＣＨによりランダムアクセスする場合、移動局１５のＲＡＣＨ位相／スロット決定部６５は、その内部に備えられている図２４に示した移動局情報に対する上りリンクシステムのフレーム内のＲＡＣＨスロットを規定した移動局情報／スロット対応テーブル４３を参照して、ＲＡＣＨスロットの中のアクセススロットを決定する（ステップS2301）。

【0228】

図２４は、移動局情報／スロット対応テーブルの一実施例を示した図である。

図２４に示した移動局情報／スロット対応テーブル４３は、ユーザＩＤ，サービス品質ＱｏＳ，移動局クラスといった個別移動局情報それぞれと、フレーム内のＲＡＣＨスロットの中のアクセススロットとが対応した３つの個別対応テーブル４３-１～４３-３を有した構成になっている。

【0229】

本実施の形態の場合、ＲＡＣＨ位相／スロット決定部６５は、図２４に示した移動局情報／スロット対応テーブル４３の３つの個別対応テーブル４３-１～４３-３中から１つの個別対応テーブル４３-ｊ（但し、この場合はｊ＝１～３）を適宜選択し、その選択した１つの個別対応テーブル４０-ｊの個別移動局情報に基づいてＲＡＣＨスロットの中のアクセススロットを決定する。

【0230】

例えば、選択した１つの個別対応テーブル４０-ｊとして、図２４に示したユーザＩＤ／スロット対応テーブル４３-１，サービス品質／スロット対応テーブル４３-２，移動局クラス／スロット対応テーブル４３-２の中で、ユーザＩＤ／スロット対応テーブル４３-１を選択し、移動局１５のユーザＩＤ末尾が３である場合は、ＲＡＣＨ位相／スロット決定部６５は、図２１に示した上りリンクシステムのフレーム内の、図中、２，７，…，Ｎ－３の番号を付したＲＡＣＨスロットを、アクセススロットに決定する。

【0231】

また、ＲＡＣＨ位相／スロット決定部６５は、このアクセススロットの決定とともに、移動局情報に対するくしの歯状スペクトルの位相を規定した移動局情報／位相対応テーブル４０を参照して、１つの位相を決定する（ステップS2302）。

【0232】

本実施の形態の場合、ＲＡＣＨ位相／スロット決定部６５は、図５に示した移動局情報／位相対応テーブル４０の３つの個別対応テーブル４０-１～４０-３中から１つの個別対応テーブル４０-ｍ（但し、この場合はｍ＝１～３）を適宜選択し、その選択した１つの

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個別対応テーブル４０-mの個別移動局情報に基づいて位相を決定する。

【0233】

なお、本実施の形態では、ＲＡＣＨ位相／スロット決定部６５は、ランダムアクセス送信に際して、１つの個別対応テーブル４３-ｊ，４０-mを選択し、この個別対応テーブル４３-ｊ，４０-mに基づいてアクセススロット，位相を決定した後に、そのランダムアクセス送信で再びアクセススロット，位相を決定し直す場合には、残りの個別対応テーブルの中から１つの個別対応テーブル４３-ｊ’，４０-m’を選択し、この個別対応テーブル４３-ｊ’，４０-m’に基づいてアクセススロット，位相を決定するようになっている。

【0234】

その際に選択する、移動局情報／位相対応テーブル４０の個別対応テーブル４０-mと移動局情報／スロット対応テーブル４３の個別対応テーブル４０-ｊとの移動局情報同士の組み合わせは、任意である。

【0235】

図２３に戻り、移動局１５は、チップ繰り返し部２４で生成されたくしの歯状スペクトルに対してＲＡＣＨ位相／スロット決定部６５で決定した位相を乗算部２８で乗算し、フィルタ部２９を介して、送信制御部６３に供給する。

【0236】

送信制御部６３は、本実施の形態では、切替部２７を介して選択的に供給されるＲＡＣＨ位相／スロット決定部６５で決定した所望のアクセススロットを用いて、ランダムアクセスチャネルＲＡＣＨの送信データの位相を乗算したくしの歯状スペクトルを送信する（ステップＳ2303）。例えば、図２１に示したフレーム内の、２，７，…，Ｎ－３の番号を付したＲＡＣＨスロットが決定されたアクセススロットとして供給されている場合は、フレーム内の、２，７，…，Ｎ－３の番号を付したＲＡＣＨスロットを用いて、ランダムアクセスチャネルＲＡＣＨの送信データの位相を乗算したくしの歯状スペクトルを送信する。

【0237】

移動局１５は、基地局からのＡｃｋを受信した場合（ステップＳ2304）、トラフィックチャネルＴＣＨの送信データの送信モードに移行する。

【0238】

このトラフィックチャネルＴＣＨでの通信データの送信モードへの移行は、図２２に示した移動局１５では、衝突発生検出部３０による非衝突判定結果の供給によってなされる。この衝突発生検出部３０からの非衝突判定結果の供給により、ＲＡＣＨ位相／スロット決定部６５は、その位相並びにアクセススロットの決定及び供給を停止し、切替部２７は、ＴＣＨ位相／スロット決定部６６側を乗算部２８並びに送信制御部６３に切替接続し、ＴＣＨ位相／スロット決定部６６による位相並びにアクセススロットの決定が開始され、ＴＣＨ位相／スロット決定部６６によって決定された位相並びにアクセススロットが、切替部２７を介して、乗算部２８並びに送信制御部６３に供給される。

【0239】

ところが、他ユーザとの衝突等が原因で移動局１５が基地局からのＡｃｋを検知できず、移動局１５で基地局からのＡｃｋが受信されない場合（ステップＳ2304）、移動局１５では、ＲＡＣＨ位相／スロット決定部６５が、移動局情報／位相テーブル４０の最初に選択した個別対応テーブル４０-m以外の個別対応テーブル４０-m’から位相を決定する（ステップＳ2305）。

【0240】

このＲＡＣＨ位相／スロット決定部６５による位相の決定し直しは、図２２に示した移動局１５では、衝突発生検出部３０による衝突判定結果の供給によってなされる。この衝突発生検出部３０からの衝突判定の供給により、ＲＡＣＨ位相／スロット決定部６５は、前述したステップＳ2305で説明した処理を実行し、切替部２７はＲＡＣＨ位相／スロット決定部６５側を乗算部２８に接続した状態に継続保持し、ＴＣＨ位相／スロット決定部６６は、未だトラフィックチャネルＴＣＨで使用するくしの歯状スペクトルの位相やアクセ

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ススロットを供給開始しない。

【0241】

このため、移動局１５は、チップ繰り返し部２４で生成されたくしの歯状スペクトルに対してこの決定し直した位相を乗算部２８によって乗算し、フィルタ部２９を介して、送信制御部６３に供給される。送信制御部６３では、次のフレームで、ＲＡＣＨ位相／スロット決定部６５が前回決定した同じアクセススロット（ブロック）を用いて、ランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルを再度送信する（ステップＳ2306）。

【0242】

この再送信に対して、移動局１５が基地局からのＡｃｋを受信した場合（ステップＳ2307）、移動局１５はトラフィックチャネルＴＣＨの送信データの送信モードに移行する一方、今度も基地局からのＡｃｋが受信されない場合は（ステップＳ2307）、本実施の形態の場合は、残りの１つの個別対応テーブル４０-m”から位相を決定し（ステップＳ2308）、再度、ランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルを、前々回決定した同じアクセススロット（ブロック）を用いて、送信する（ステップＳ2309）。

【0243】

この再々送信に対して、移動局１５が基地局からのＡｃｋを受信した場合（ステップＳ2310）、移動局１５はトラフィックチャネルＴＣＨの送信データの送信モードに移行する一方、今度も基地局からのＡｃｋが受信されない場合は（ステップＳ2310）、ステップＳ2301に戻り、移動局１５は、図２４に示した移動局情報／スロット対応テーブル４３の３つの個別対応テーブル４３-１～４３-３中の最初に選択した個別対応テーブル４０-ｊ以外の個別対応テーブル４０-ｊ’から位相を決定し、ステップＳ2302以下の処理を行う。

【0244】

移動局１５は、上述したステップＳ2301～Ｓ2309で説明した処理を、基地局からのＡｃｋが受信されるまで（ステップＳ2304，Ｓ2307，Ｓ2309）、繰り返して行う構成になっている。

【0245】

なお、本実施の形態では、ステップＳ2302，Ｓ2305，Ｓ2308で示したように位相の決定は、くしの歯状スペクトルの送信の都度行い、アクセススロットの決定は、ステップＳ2301で移動局情報／位相テーブル４０の個別対応テーブル４０-１～４０-３の一通りの使用の度に行う構成としたが、逆に、アクセススロットの決定をくしの歯状スペクトルの送信の都度行い、位相の決定は、移動局情報／スロットテーブル４３の個別対応テーブル４３-１～４３-３の一通りの使用の度に行う構成としてもよい。また、位相の決定、アクセススロットの決定とも、くしの歯状スペクトルの送信の都度行うようにしてもよい。

【0246】

本実施の形態によれば、ランダムアクセスチャネルＲＡＣＨのスロットに対しても、ランダム性を持たすことで、くしの歯状スペクトラムの位相制御による周波数領域のランダム性だけでなくアクセススロットによる時間、周波数領域のランダム性が追加され、更にユーザ間の衝突が起こり難くなる。

【0247】

さらに、上記各実施の形態を基に説明した本発明は、ＯＦＤＭＡを上りリンクに適応させた場合でも、サブキャリアの位置やサブキャリアの本数、送信電力等、上記各実施の形態に示した構成並びに方法を適用することができる。

【図面の簡単な説明】

【0248】

【図1】本発明で想定する移動体通信システムにおける各移動局から基地局への上りリンクのシステム構成図である。

【図2】本発明で想定する移動体通信システムにおける上りリンクのシステムの全体構成図である。

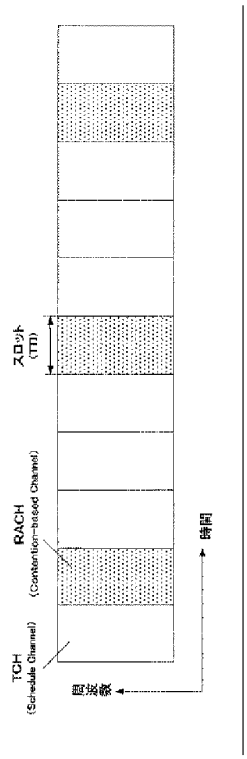
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【図3】本発明の第１の実施の形態による移動局の構成図である。
【図4】くしの歯状スペクトルの位相を決定するアルゴリズムを示すフローチャートである。
【図5】移動局情報／位相情報対応テーブルの一実施例を示した図である。
【図6】移動局情報／位相対応テーブルの別の実施例を示した図である。
【図7】本実施の形態の移動局によるランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルの具体的な送信状態の説明図である。
【図8】本発明の第２の実施の形態による移動局の構成図である。
【図9】本発明の第３の実施の形態による移動局における移動局情報／送信回数対応テーブルの一実施例を示した構成図である。
【図10】くしの歯状スペクトルの位相を決定するアルゴリズムを示すフローチャートである。
【図11】本実施の形態の移動局によるランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルの具体的な状態の説明図である。
【図12】本発明の第４の実施の形態による移動局の構成図である。
【図13】くしの歯状スペクトルの位相を決定するアルゴリズムを示すフローチャートである。
【図14】移動局情報／歯数対応テーブルの一実施例を示した図である。
【図15】本実施の形態の移動局によるランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルの具体的な送信状態の説明図である。
【図16】本発明の第４の実施の形態による移動局の変形例の構成図である。
【図17】本発明の第５の実施の形態による移動局におけるランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルの具体的な送信状態の説明図である。
【図18】本発明の第６の実施の形態としての移動局の構成図である。
【図19】くしの歯状スペクトルの位相及び送信電力を決定するアルゴリズムを示すフローチャートである。
【図20】本実施の形態の移動局によるランダムアクセスチャネルＲＡＣＨの送信データのくしの歯状スペクトルの具体的な送信状態の説明図である。
【図21】移動局から基地局への上りリンクのシステム例の説明図である。
【図22】本発明の第７の実施の形態による移動局の構成図である。
【図23】くしの歯状スペクトルの位相及びアクセススロットを決定するアルゴリズムを示すフローチャートである。
【図24】移動局情報／スロット対応テーブルの一実施例を示した図である。
【図25】Ｗ－ＣＤＭＡ方式の上りリンクのアクセス方法の説明図である。
【図26】ＶＳＣＲＦ－ＣＤＭＡ方式の上りリンクのアクセス方法の説明図である。
【図27】ＤＦＴ－ｓｐｒｅａｄ　ＯＦＤＭ方式による送信側の構成図である。
【図28】ＤＦＴ-ｓｐｒｅａｄ　ＯＦＤＭ方式の説明図である。
【符号の説明】
【0249】
１１，１２，１３，１４，１５　移動局
２１　符号化・拡散部
２２　スクランブル部
２３　乗算部
２４　チップ繰り返し部
２５　ＲＡＣＨ位相制御部
２６　ＴＣＨ位相制御部
２７　切替部
２８　乗算部
２９　フィルタ部
３０　衝突発生検出部

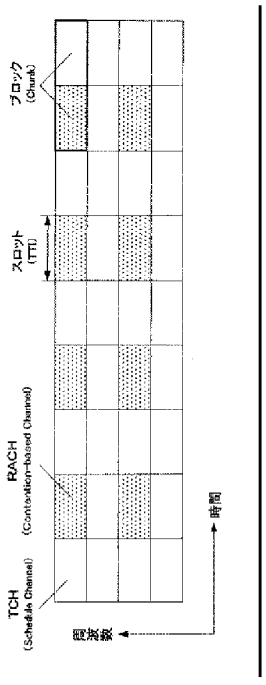
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３１　コピー部
３２　ＲＡＣＨ位相・くしの歯数決定部
３３　ＲＡＣＨ位相決定部
３４　ＴＣＨ位相決定部
３５　位相制御部
３６　合成部
３７　基地局受信検出部
４０　移動局情報／位相対応テーブル
４１　移動局情報／送信回数対応テーブル
４２　移動局情報／歯数対応テーブル
４３　移動局情報／スロット対応テーブル
５０　送信系
６１　ＲＡＣＨ位相／電力決定部
６２　ＴＣＨ位相／電力決定部
６３　送信制御部
６５　ＲＡＣＨ位相／スロット決定部
６６　ＴＣＨ位相／スロット決定部
７１　Ｍ－ポイントＦＦＴ部
７２　サブキャリアマッピング部
７３　Ｎ－ポイントＩＦＦＴ部
７４　ＲＡＣＨサブキャリア制御部
７５　ＴＣＨサブキャリア制御部

【図1】

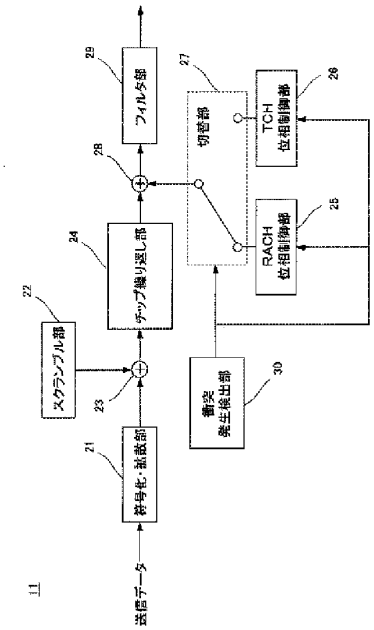


【図2】

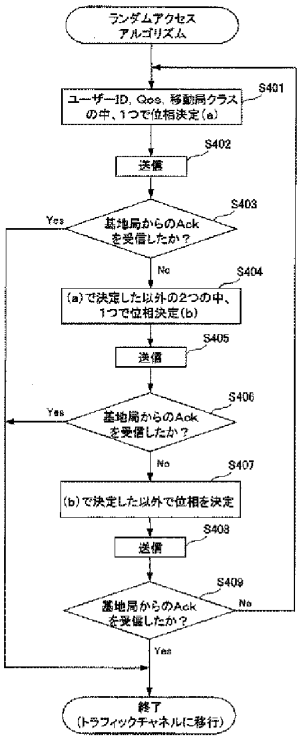


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【図3】



【図4】



【図5】

ユーザID末尾	位相
1 or 2	α
3 or 4	β
5 or 6	γ
7 or 8	δ
9 or 0	ε

40-1

Qos	位相
CBR	ε
rt-VBR	δ
nrt-VBR	γ
ABR	β
UBR	α

40-2

移動局クラス	位相
1	ε
2	γ
3	α
4	β
5	δ

40-3　40

移動局情報に対するくしの歯スペクトルの位相情報のテーブル

【図6】

ユーザID末尾	位相
1 or 2	+2θ
3 or 4	+θ
5 or 6	0
7 or 8	−θ
9 or 0	−2θ

40-1

Qos	位相
CBR	0
rt-VBR	+θ
nrt-VBR	+2θ
ABR	−θ
UBR	−2θ

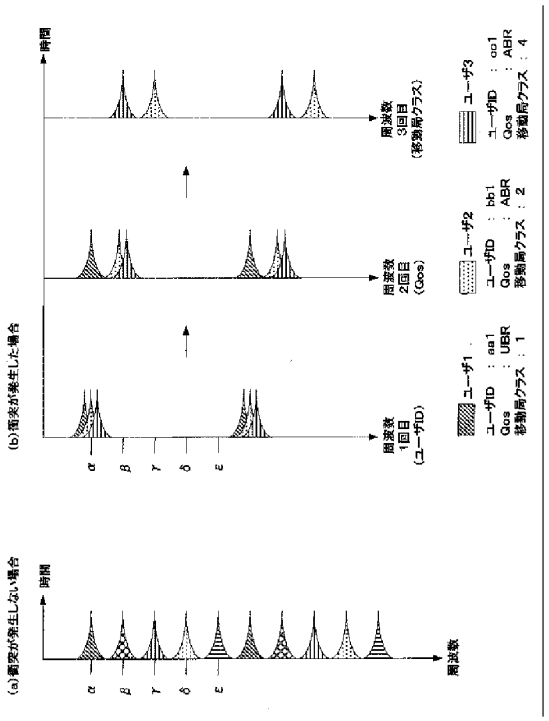
40-2

移動局クラス	位相
1	0
2	−2θ
3	−θ
4	+θ
5	+2θ

40-3　40

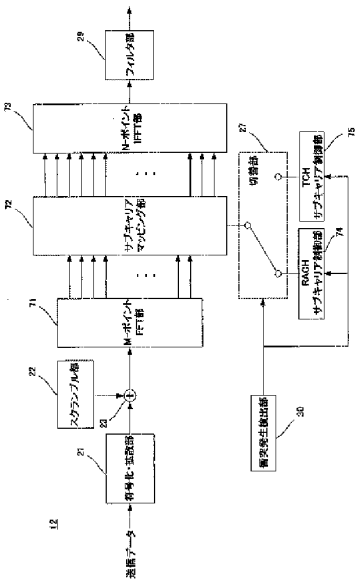
移動局情報に対するくしの歯スペクトルの位相情報のテーブル

【図7】



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【図8】



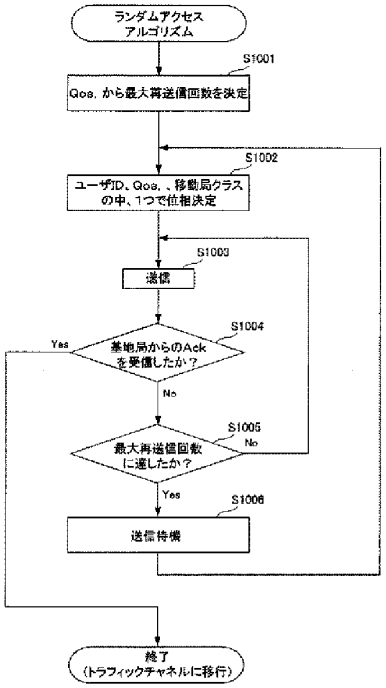
【図9】

41

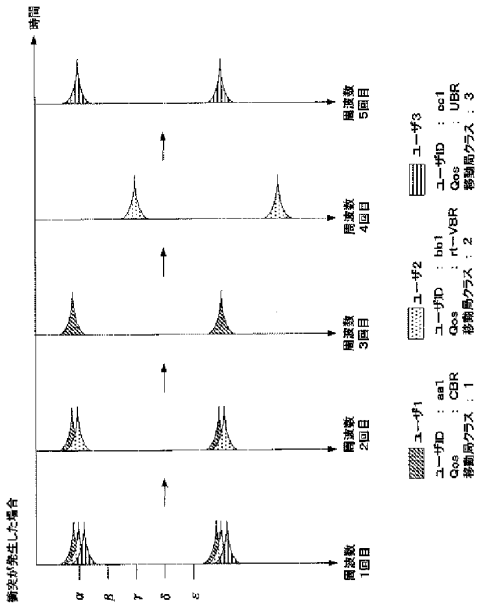
Qos	送信回数
CBR	3
rt-VBR	2
nrt-VBR	2
ABR	1
UBR	1

サービスQosに対する送信回数のテーブル

【図10】

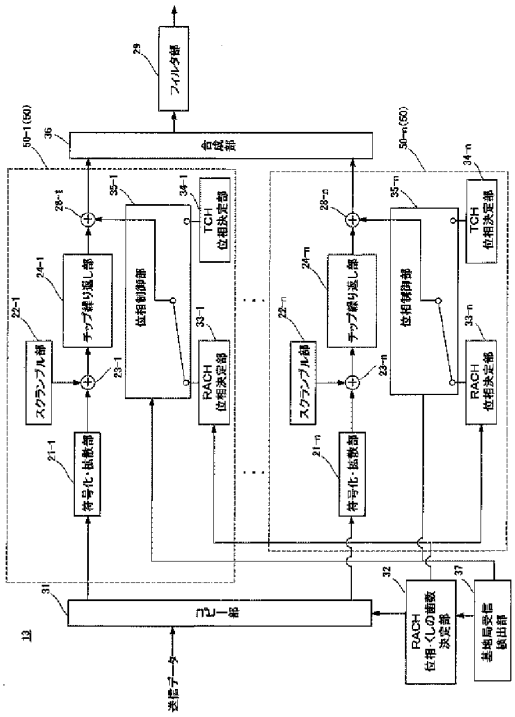


【図11】

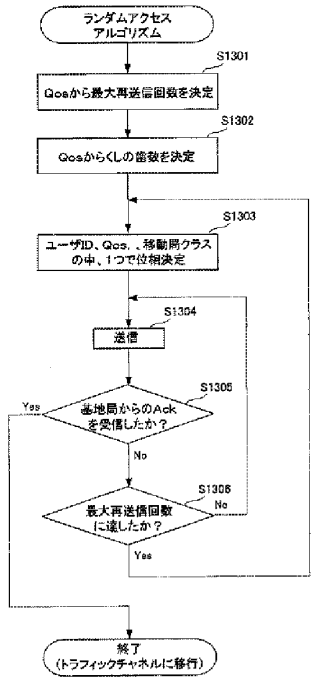


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【図12】



【図13】

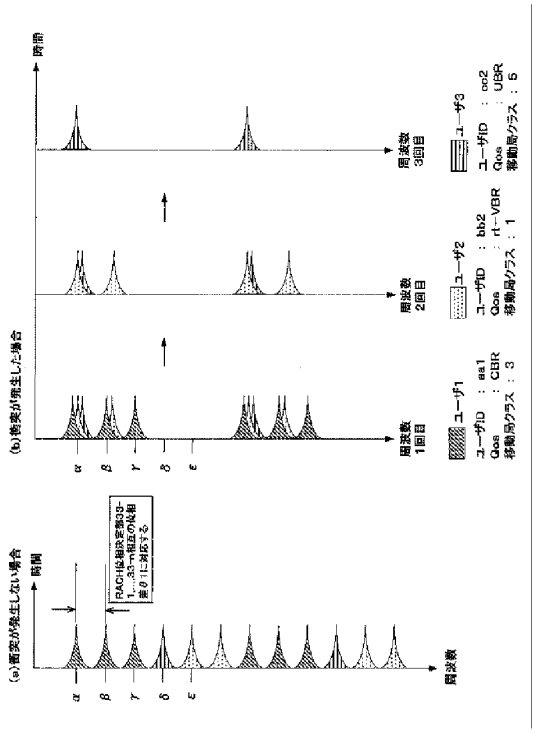


【図14】

Qos	くしの歯数
CBR	3
rt-VBR	2
nrt-VBR	2
ABR	1
UBR	1

Qosに対する送信するくしの歯スペクトルの本数のテーブル

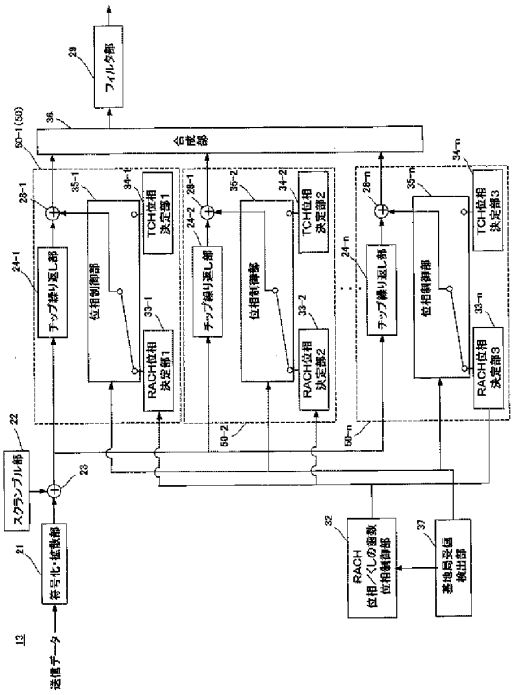
【図15】



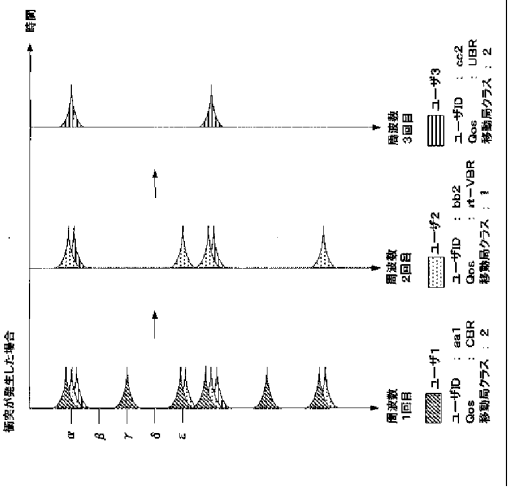
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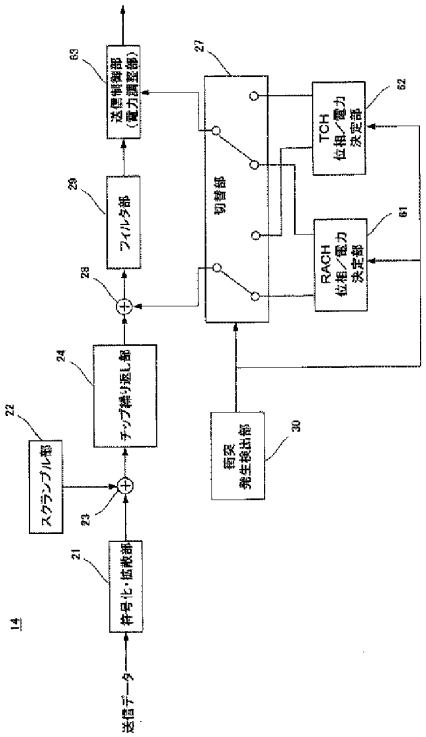
【図16】



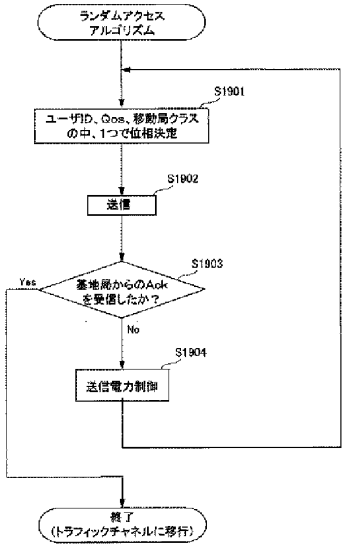
【図17】



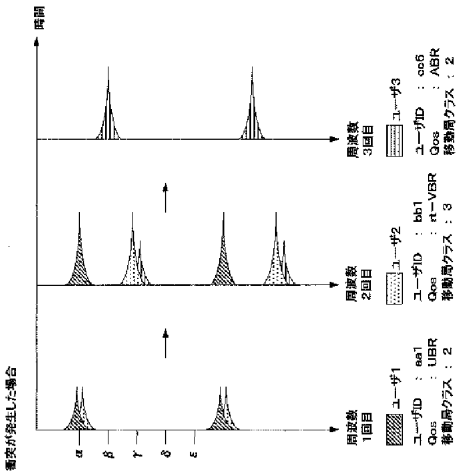
【図18】



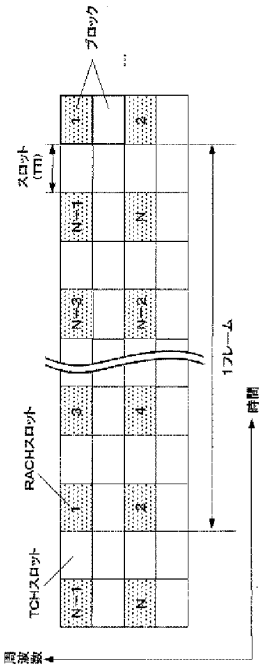
【図19】



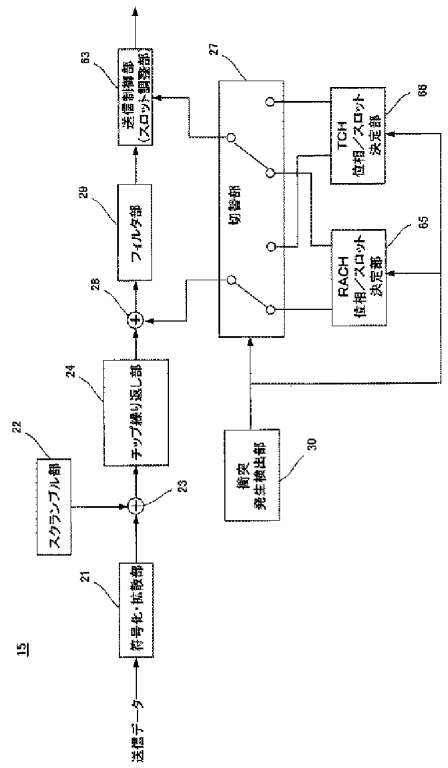
【図20】



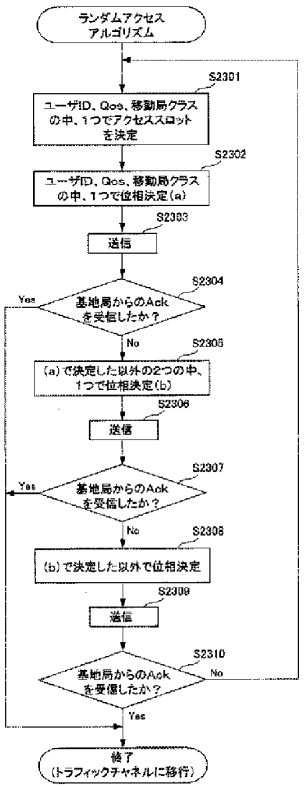
【図21】



【図22】



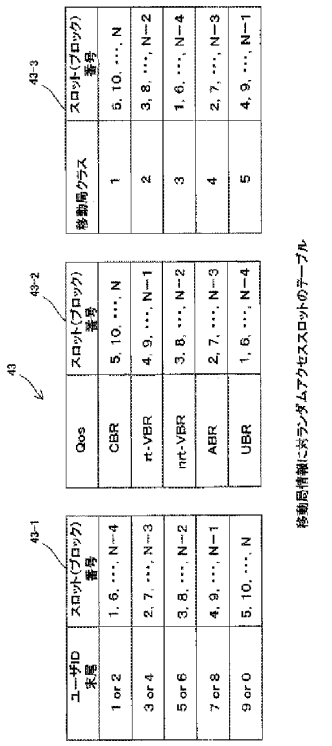
【図23】



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【図24】



ユーザID 末尾	スロット(ブロック)番号
1 or 2	1, 6, …, N−4
3 or 4	2, 7, …, N−3
5 or 6	3, 8, …, N−2
7 or 8	4, 9, …, N−1
9 or 0	5, 10, …, N

43-1

Qos	スロット(ブロック)番号
CBR	5, 10, …, N
rt-VBR	4, 9, …, N−1
nrt-VBR	3, 8, …, N−2
ABR	2, 7, …, N−3
UBR	1, 6, …, N−4

43-2

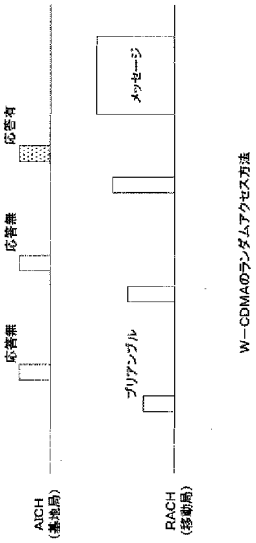
移動局クラス	スロット(ブロック)番号
1	5, 10, …, N
2	3, 8, …, N−2
3	1, 6, …, N−4
4	2, 7, …, N−3
5	4, 9, …, N−1

43-3

43

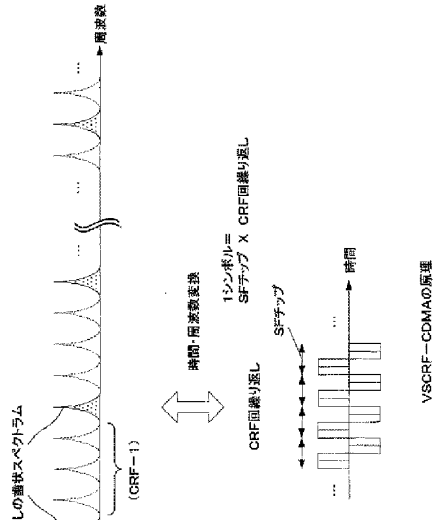
移動局情報に対するランダムアクセススロットのテーブル

【図25】



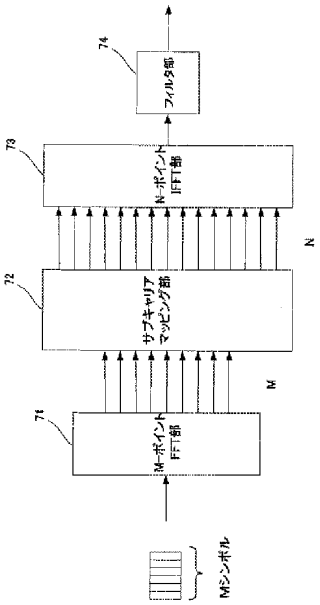
W−CDMAのランダムアクセス方法

【図26】

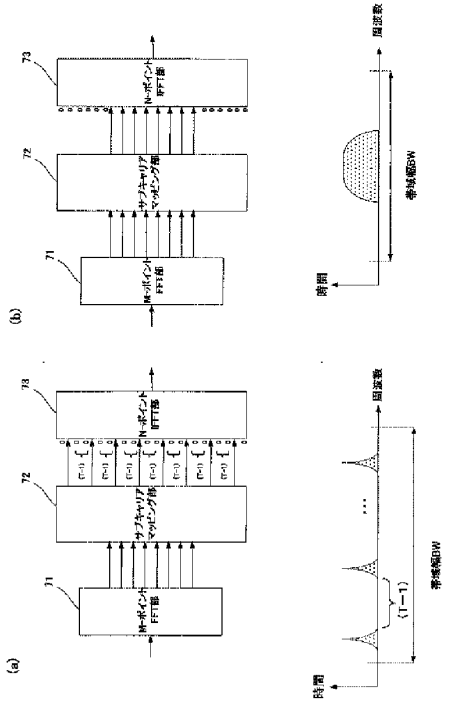


VSCRF−CDMAの原理

【図27】



【図28】


(b)
73
N-ポイント IFFT部
72
サブキャリア マッピング部
71
N-ポイント FFT部
周波数
帯域幅BW
時間
(a)
73
N-ポイント IFFT部
72
サブキャリア マッピング部
71
N-ポイント FFT部
周波数
帯域幅BW
(T−τ)
時間

ONEPLUS - EX. 1002

Electronic Patent Application Fee Transmittal

Application Number:	16421019
Filing Date:	23-May-2019
Title of Invention:	METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES
First Named Inventor/Applicant Name:	Benoit Pelletier
Filer:	Joseph P. Gushue/Margaret Ferello
Attorney Docket Number:	PANW-2-1853US06

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($)
Miscellaneous:				
RCE- 2ND AND SUBSEQUENT REQUEST	1820	1	2000	2000
		Total in USD ($)		**2000**

Electronic Acknowledgement Receipt

EFS ID:	43178646
Application Number:	16421019
International Application Number:	
Confirmation Number:	9820
Title of Invention:	METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES
First Named Inventor/Applicant Name:	Benoit Pelletier
Customer Number:	3624
Filer:	Joseph P. Gushue/Margaret Ferello
Filer Authorized By:	Joseph P. Gushue
Attorney Docket Number:	PANW-2-1853US06
Receipt Date:	06-JUL-2021
Filing Date:	23-MAY-2019
Time Stamp:	17:15:58
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$2000
RAM confirmation Number	E202176H16512922
Deposit Account	220493
Authorized User	Margaret Ferello

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

37 CFR 1.17 (Patent application and reexamination processing fees)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Continued Examination (RCE)	PANW_2_1853US06_RCE_20210706.pdf	1430214 f46dec6088839a77d9219cacb4337e072bbf2137	no	3
Warnings:					
Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	PANW_2_1853US06_SB08_SIDS_20210706_efs.pdf	1505695 9b4234668ffb423c794f7062280fd80eace16d28	no	5
Warnings:					
Information:					
3	Transmittal Letter	PANW_2_1853US06_IDS_Transmittal_Letter_20210706.pdf	91269 507ec0cc1043315e99438dc3998b630761d7a4e6	no	4
Warnings:					
Information:					
4	Foreign Reference	REF01_WO2009019198A1_efs.pdf	2442384 fb4dfe710de9258535daa95e5e18548214e257be	no	50
Warnings:					
Information:					
5	Foreign Reference	REF02_jp2007525036_EFS.pdf	825753 78d9965adc8da089b9d926afdc26d84469677c20	no	42
Warnings:					
Information:					
6	Foreign Reference	REF03_JP2007124493A_efs.pdf	3855381 e11e61e93968bd6263c3bafce2b9132d9dca6095	no	42
Warnings:					
Information:					

7	Other Reference-Patent/App/Search documents	OA01_PAN-2-1853JP06_EFS.pdf	454578 5c68bc6551e8c63c0ac2fc508227de8763e1f71e	no	5
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Warnings:					
Information:					
		Total Files Size (in bytes):	10635893		

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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.

Doc code: RCEX
Doc description: Request for Continued Examination (RCE)

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.

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

Application Number	16421019	Filing Date	2019-05-23	Docket Number (if applicable)	PANW-2-1853US06	Art Unit	2464
First Named Inventor	Pelletier et al.			Examiner Name	Kan Yuen		

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 Three (3) foreign references and one (1) foreign patent office communication

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 220493

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

Applicant Signature

ONEPLUS - EX. 1002

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	/Joseph P. Gushue/	Date (YYYY-MM-DD)	2021-07-06
Name	Joseph P. Gushue	Registration Number	59819

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.

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Privacy Act Statement

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

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

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

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

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PTO/AIA/80 (07-17)
Approved for use through 03/31/2021. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

[X] Practitioners associated with Customer Number: 03624

OR

[ ] Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number

Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

[X] The address associated with Customer Number: 03624

OR

[ ]

Firm or individual name Volpe Koenig		
Address		
City	State	Zip
Country		
Telephone	Email	

Assignee name and address: Pantech Wireless, LLC
3000 Polar Lane, Suite #202
Cedar Park, TX 78613

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of the practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee.

Signature	Date 9 June 2021
Name Pep Kim	Telephone (703) 829-0101
Title President, Pantech Wireless, LLC	

This collection of information is required by 37 CFR 1.31, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public, which is to update (and by the USPTO to process) the file of a patent or reexamination proceeding. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 18 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/AIA/96 (08-12)
Approved for use through 01/31/2013. 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 displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Pantech Wireless, LLC

Application No./Patent No.: 16/421,019 Filed/Issue Date: May 23, 2019

Titled: METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES

Pantech Wireless, LLC, a corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

B. ☑ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Benoit Pelletier, Diana Pani, Rocco DiGirolamo, Christoper R. Cave, Vincent Roy, Paul Marinier & Eldad M. Zeira To: INTERDIGITAL PATENT HOLDINGS, INC.

   The document was recorded in the United States Patent and Trademark Office at
   Reel 021966, Frame 0202, or for which a copy thereof is attached.

2. From: INTERDIGITAL PATENT HOLDINGS, INC. To: INTERDIGITAL HOLDINGS, INC.

   The document was recorded in the United States Patent and Trademark Office at
   Reel 031427, Frame 0772, or for which a copy thereof is attached.

This collection of information is required by 37 CFR 3.73(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.

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. 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 displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: INTERDIGITAL HOLDINGS, INC. To: INTERDIGITAL, INC.

The document was recorded in the United States Patent and Trademark Office at
Reel 031428, Frame 0063, or for which a copy thereof is attached.

4. From: INTERDIGITAL, INC. To: DST HOLDINGS, INC.

The document was recorded in the United States Patent and Trademark Office at
Reel 031428, Frame 0099, or for which a copy thereof is attached.

5. From: DST HOLDINGS, INC. To: SIGNAL TRUST FOR WIRELESS INNOVATION

The document was recorded in the United States Patent and Trademark Office at
Reel 031597, Frame 0485, or for which a copy thereof is attached.

6. From: SIGNAL TRUST FOR WIRELESS INNOVATION To: RNB WIRELESS LLC

The document was recorded in the United States Patent and Trademark Office at
Reel 055170, Frame 0866, or for which a copy thereof is attached.

☑ Additional documents in the chain of title are listed on a supplemental sheet(s).

☑ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Joseph P. Gushue/	July 6, 2021
Signature	Date
Joseph P. Gushue	59,819
Printed or Typed Name	Title or Registration Number

Form PTO/AIA/96 Supplemental Sheet

STATEMENT UNDER 37 CFR 3.73(c)

The interest identified in option 1 above is evidenced by option B below:

B. A chain of title from the inventors, of the patent application identified above, to the current assignee as follows:

7. From: RNB WIRELESS LLC To: PANTECH WIRELESS, LLC

The document was recorded on June 8, 2021 in the United States Patent and Trademark Office at:

Reel 056682, Frame 0095, or for which a copy thereof is attached.

Electronic Acknowledgement Receipt

EFS ID:	43176067
Application Number:	16421019
International Application Number:	
Confirmation Number:	9820
Title of Invention:	METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES
First Named Inventor/Applicant Name:	Benoit Pelletier
Customer Number:	3624
Filer:	Joseph P. Gushue/Margaret Ferello
Filer Authorized By:	Joseph P. Gushue
Attorney Docket Number:	RNB-2-1853US06
Receipt Date:	06-JUL-2021
Filing Date:	23-MAY-2019
Time Stamp:	17:01:48
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	Req to correct/update/change appl name until pay issue fee	PANW_2_1853US06_Request_Update_Change_Applicant.pdf	280053 af9dfaab673822ba519c85a011095fb4536f7895	no	2

Warnings:

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Information:					
2	Power of Attorney	PANW_2_1853US06_Power_of_Attorney_to_Prosecute_efs.pdf	103012 d9256390a6a77b5efad2ac2ef9e138dfb1f713d4	no	1
Warnings:					
Information:					
3	Assignee showing of ownership per 37 CFR 3.73	PANW_2_1853US06_Statement_3_73c_efs.pdf	167207 7c0e7b7722edd86b7050a7633f087c215be75309	no	3
Warnings:					
Information:					
			Total Files Size (in bytes):	550272	

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.

Doc Code: R46C.REQ
Document Description: Request under 37 CFR 1.46(c) to correct, update or change the applicant.

PTO/AIA/41 (04-15)
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 displays a valid OMB control number.

REQUEST TO CORRECT OR UPDATE THE NAME OF THE APPLICANT UNDER 37 CFR 1.46(c)(1), OR CHANGE THE APPLICANT UNDER 37 CFR 1.46(c)(2)

(FOR USE ONLY IN APPLICATIONS FILED ON OR AFTER SEPTEMBER 16, 2012)

Application Number	16/421,019
Filing Date	May 23, 2019
First Named Inventor	Benoit Pelletier
Art Unit	2464
Examiner Name	Kan Yuen
Practitioner Docket Number	PANW-2-1853US06

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

Applicant hereby **requests that the name of the applicant be corrected or updated under 37 CFR 1.46(c)(1), or that the applicant be changed under 37 CFR 1.46(c)(2),** in the above-identified application. **Requests under 37 CFR 1.46(c)(1) or (c)(2) cannot be submitted after payment of the issue fee or if the application has been patented.**

Please check the applicable box(es) below.

☐ 1. This request is to **correct or update the name of the applicant** (**under 37 CFR 1.46(c)(1)**) and includes:

☐ An application data sheet (ADS) in accordance with 37 CFR 1.76(c) with the corrected or updated information shown with markings (*e.g.*, underlining for insertions, strikethrough for deletions). A Corrected Web-based ADS may be used.

Note: Requests under 37 CFR 1.46(c)(1) may be filed to correct typographical errors in the name of the § 1.46 applicant, or for updating the name of the § 1.46 applicant (*i.e.*, where there is no change in the applicant itself but just in the applicant's name). See the Manual of Patent Examining Procedure (MPEP) section 605.01.

■ 2. This request is to **change the applicant** (**under 37 CFR 1.46(c)(2)**) and includes:

■ An application data sheet (ADS) in accordance with 37 CFR 1.76(c) that identifies the changes with proper markings (underlining for insertions and strikethrough for deletions). A Corrected Web-based ADS may be used.

■ A Statement Under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent). See MPEP 325.

I am the

☐ applicant* ■ attorney or agent of record Registration number 59,819 ☐ attorney or agent acting under 37 CFR 1.34 Registration number _____

Signature /Joseph P. Gushue/

Typed or printed name Joseph P. Gushue

Date July 6, 2021

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. *Juristic entities must be represented by a patent practitioner (See 37 CFR 1.31, applicable to any paper filed on or after September 16, 2012 that is presented on behalf of a juristic entity, regardless of application filing date). Submit multiple forms if more than one signature is required, see below**.

☐ ** Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.36. 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.

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.

UNITED STATES PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

Corrected Application Data Sheet

16421019 : METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES

~~Strike-through~~ indicates removal of data from existing record Underline indicates new data being added to the application If no data is shown, no data has been corrected

Inventor Information

Data of record	Updated Data

No data change in this section

Application Information

Title of Invention	METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES
Attorney Docket Number	PANW-2-1853US06
Entity Status	Regular Undiscounted

Domestic Benefit/National Stage Information

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c), 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(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.

Data of record	Updated Data
No data change in this section	

Foreign Priority Information

This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. 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).

Data of record	Updated Data
No data change in this section	

Applicant Information

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.

Data of record	Updated Data
~~RnB Wireless LLC~~ ~~---~~ ~~---~~ ~~Waco, TX---~~ ~~---~~ ~~Phone:---~~ ~~Email:---~~ ~~Fax:---~~ ~~Organization~~ ~~Applicant type: Assignee~~	
	Pantech Wireless, LLC

3000 Polar Lane
Suite 202
Cedar Park, TX 78613
UNITED STATES
Phone : ----
Email : ----
Fax : ----
Organization
Applicant type : Person to whom the inventor is obligated to assign

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.

Data of record	Updated Data
~~RnB Wireless LLC~~ ~~----~~ ~~----~~ ~~Waco, TX ----~~ ~~UNITED STATES~~ ~~Phone : ----~~ ~~Email : ----~~ ~~Fax : ----~~ ~~Organization~~	Pantech Wireless, LLC 3000 Polar Lane Suite 202 Cedar Park, TX 78613 UNITED STATES Phone : ---- Email : ---- Fax : ---- Organization

Signature

NOTE:

This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b).

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

Signature	First name	Last name	Registration #	Date
/Joseph P. Gushue/	Joseph P.	Gushue	59819	07/06/2021

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/421,019	**07/06/2021 05:03:28 PM ET**	**PANW-2-1853US06**

Title of Invention

METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	9820	FILED BY	Margaret Ferello
PATENT CENTER #	60233402	FILING DATE	05/23/2019
CUSTOMER #	3624	FIRST NAMED INVENTOR	Benoit Pelletier
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Joseph Gushue

Documents

TOTAL DOCUMENTS: 1

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
CorrectedADS.pdf	4	Application Data Sheet to update/correct info	80 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
CorrectedADS.pdf	C4C8D31309C958F54CF2357300C1352B58E98903A23DFFE5E5A582D489E45AB9F1912C3A07D00E4DE3B2F6B6ABA2FC2DEBC2E7EAE502DB4083944E557BBBF7FB

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 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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Volpe Koenig
30 SOUTH 17TH STREET, 18TH FLOOR
PHILADELPHIA, PA 19103

Courtesy Reminder for
Application Serial No: 16/421,019

Attorney Docket No: RNB-2-1853US06
Customer Number: 3624
Date of Electronic Notification: 04/07/2021

This is a courtesy reminder that new correspondence is available for this application. If you have not done so already, please review the correspondence. The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

An email notification regarding the correspondence was sent to the following email address(es) associated with your customer number:
eoffice@volpe-koenig.com

To view your correspondence online or update your email addresses, please visit us anytime at **https://ppair-my.uspto.gov/pair/PrivatePair.**
If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov or call 1-866-217-9197.

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NOTICE OF ALLOWANCE AND FEE(S) DUE

3624 7590 04/07/2021

Volpe Koenig
30 SOUTH 17TH STREET, 18TH FLOOR
PHILADELPHIA, PA 19103

EXAMINER	
YUEN, KAN	
ART UNIT	PAPER NUMBER
2464	

DATE MAILED: 04/07/2021

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/421,019	05/23/2019	Benoit Pelletier	RNB-2-1853US06	9820

TITLE OF INVENTION: METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES

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	07/07/2021

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.

ONEPLUS - EX. 1002

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)

3624 7590 04/07/2021

Volpe Koenig
30 SOUTH 17TH STREET, 18TH FLOOR
PHILADELPHIA, PA 19103

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.
16/421,019	05/23/2019	Benoit Pelletier	RNB-2-1853US06	9820

TITLE OF INVENTION: METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES

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	07/07/2021

EXAMINER	ART UNIT	CLASS-SUBCLASS
YUEN, KAN	2464	370-329000

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

ONEPLUS - EX. 1002

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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PHILADELPHIA, PA 19103

EXAMINER	
YUEN, KAN	
ART UNIT	PAPER NUMBER
2464	

DATE MAILED: 04/07/2021

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.

ONEPLUS - EX. 1002

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.

ONEPLUS - EX. 1002

Notice of Allowability	Application No. 16/421,019	Applicant(s) Pelletier et al.	
	Examiner KAN YUEN	Art Unit 2464	AIA (FITF) Status No

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

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

1. ☑ This communication is responsive to 12/16/2020.
   ☐ 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 1-10 . 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 _____.

/KAN YUEN/
Primary Examiner, Art Unit 2464

ONEPLUS - EX. 1002

Notice of Pre-AIA or AIA Status

The present application is being examined under the pre-AIA first to invent provisions.

Response to Arguments

1. Applicant's arguments, see remarks on pages 6-10, filed 12/16/2020, with respect to claims 1-10 have been fully considered and are persuasive. The 35 U.S.C. 103 Rejection of claims 1-10 has been withdrawn.

Allowable Subject Matter

2. Claims 1-10 are allowed. The prior art of record fails to disclose the feature the transmitter and the processor are configured to transmit uplink data based on the indicated uplink resources, the processor is configured to deactivate the indicated uplink resources in response to a MAC timer expiring, and the MAC timer is configured based on the MAC timer information indicated by the received RRC message, as recited in claims 1, 6.

Conclusion

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Teague et al. (Pub No.: 2006/0164993) and Choi et al. (Pub No.: 2002/0097740) are show systems which considered pertinent to the claimed invention.

Teague et al. discloses a method of managing an assignment of a resource assigned for transmitting data in communication system, the method transmitting a first data pattern on the assigned resource when there is no data to transmit on the assigned resource.

Choi et al. discloses a method for setting a common channel for a packet data service by an SRNC through a UE and a DRNC when the UE is handed over from a first Node B to a second Node B as

the UE moves to the second Node B, in a mobile communication system. The SRNC transmits service parameters including bit rate information for the packet data service to the DRNC, and receives information on a common channel determined based on the service parameters from the DRNC. The SRNC transmits information on the determined common channel to the UE through the DRNC and the second Node B, to allocate the determined common channel to the UE.

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to KAN YUEN whose telephone number is (571)270-1413. The examiner can normally be reached on Monday - Friday 11pm-7pm.

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, Ricky Ngo can be reached on 571-272-3139. 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 https://ppair-my.uspto.gov/pair/PrivatePair. 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.

/KAN YUEN/
Primary Examiner, Art Unit 2464

Notice of References Cited	Application/Control No. 16/421,019	Applicant(s)/Patent Under Reexamination Pelletier et al.	
	Examiner KAN YUEN	Art Unit 2464	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-20060164993-A1	07-2006	Teague; Edward Harrison	H04W76/25	370/235
*	B	US-20020097740-A1	07-2002	Choi, Sung-Ho	H04W36/10	370/441
	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.

ONEPLUS - EX. 1002

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/421,019	Pelletier et al.
	Examiner	Art Unit
	KAN YUEN	2464

CPC						
Symbol					Type	Version
H04W	/	74	/	0833	F	2013-01-01
H04W	/	72	/	12	I	2013-01-01
H04W	/	72	/	04	I	2013-01-01
H04W	/	76	/	27	I	2018-02-01
H04W	/	76	/	38	I	2018-02-01
H04W	/	28	/	04	I	2013-01-01
H04L	/	5	/	0053	I	2013-01-01
H04W	/	72	/	0406	I	2013-01-01
H04L	/	1	/	1812	I	2013-01-01
H04L	/	5	/	0055	I	2013-01-01
H04W	/	88	/	08	A	2013-01-01

CPC Combination Sets								
Symbol					Type	Set	Ranking	Version
	/		/					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	10	
/KAN YUEN/ Primary Examiner, Art Unit 2464	01 April 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	2

U.S. Patent and Trademark Office — Part of Paper No.: 20210401

ONEPLUS - EX. 1002

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/421,019	Pelletier et al.
	Examiner	**Art Unit**
	KAN YUEN	2464

INTERNATIONAL CLASSIFICATION					
CLAIMED					
H04W	/	74	/	08	

NON-CLAIMED					
	/		/		

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**

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

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	10	
/KAN YUEN/ Primary Examiner, Art Unit 2464	01 April 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	2

U.S. Patent and Trademark Office — Part of Paper No.: 20210401

ONEPLUS - EX. 1002

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/421,019	Pelletier et al.
	Examiner	Art Unit
	KAN YUEN	2464

☐ 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	1	10	10												
2	2														
3	3														
4	4														
5	5														
6	6														
7	7														
8	8														
9	9														

NONE (Assistant Examiner)	(Date)	Total Claims Allowed: 10	
/KAN YUEN/ Primary Examiner, Art Unit 2464 (Primary Examiner)	01 April 2021 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 2

U.S. Patent and Trademark Office

Part of Paper No.: 20210401

ONEPLUS - EX. 1002

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/421,019	Pelletier et al.
	Examiner	Art Unit
	KAN YUEN	2464

CPC - Searched*		
Symbol	**Date**	**Examiner**
H04L5/001 ; H04L5/0053 ; H04L5/0091 ; H04W52/0216 ; H04W72/0413 ; H04W72/1273 ; H04W76/27 ; H04W76/28 ; H04W76/20 ; Y02D70/00 ; Y02D70/1262 OR Y02D70/142 ; Y02D70/24 ; Y02D70/25	04/01/2021	KY
H04L1/1812 ; H04L5/0053 ; H04L5/0055 ; H04W28/04 ; H04W72/04 ; H04W72/0406 ; H04W72/12 ; H04W74/0833 ; H04W76/27 ; H04W76/38 ; H04W88/08	04/01/2021	KY

CPC Combination Sets - Searched*		
Symbol	**Date**	**Examiner**

US Classification - Searched*			
Class	**Subclass**	**Date**	**Examiner**

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

Search Notes		
Search Notes	**Date**	**Examiner**
EAST SEARCH;	04/01/2021	KY
INVENTORSHIP SEARCH	04/01/2021	KY
NPL SEARCH (STIC, GOOGLE SCHOLAR)	04/01/2021	KY

/KAN YUEN/ Primary Examiner, Art Unit 2464	

ONEPLUS - EX. 1002

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/421,019	Pelletier et al.
	Examiner	Art Unit
	KAN YUEN	2464

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
	INTERFERENCE SEARCH PRINTOUT (SEE SEARCH PRINTOUT)	04/01/2021	KY

/KAN YUEN/ Primary Examiner, Art Unit 2464	

ONEPLUS - EX. 1002

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/421,019	Pelletier et al.
	Examiner	**Art Unit**
	KAN YUEN	2464

✓	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	04/01/2021								
1	1	=								
2	2	=								
3	3	=								
4	4	=								
5	5	=								
6	6	=								
7	7	=								
8	8	=								
9	9	=								
10	10	=								

ONEPLUS - EX. 1002

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (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.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16421019
Filing Date	2019-05-23
First Named Inventor	Benoit Pelletier
Art Unit	2464
Examiner Name	YUEN, KAN
Attorney Docket Number	SIG-2-1853US06

U.S.PATENTS Remove

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] 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 Remove

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]

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.Y/

ONEPLUS - EX. 1002

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16421019
	Filing Date	2019-05-23
	First Named Inventor	Benoit Pelletier
	Art Unit	2464
	Examiner Name	YUEN, KAN
	Attorney Docket Number	SIG-2-1853US06

	1	LG ELECTRONICS INC., "Correction to handling of same priority logical channels," 3GPP TSG-RAN WG2 Meeting #53, Tdoc R2-061494, Shanghai, China, (May 8-12, 2006).

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

EXAMINER SIGNATURE

Examiner Signature	/KAN YUEN/	Date Considered	04/01/2021

*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.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.Y/

ONEPLUS - EX. 1002

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16421019
	Filing Date	2019-05-23
	First Named Inventor	Benoit Pelletier
	Art Unit	2464
	Examiner Name	YUEN, KAN
	Attorney Docket Number	SIG-2-1853US06

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	/Joseph P. Gushue/	Date (YYYY-MM-DD)	2020-11-09
Name/Print	Joseph P. Gushue	Registration Number	59,819

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

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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.

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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

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

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ONEPLUS - EX. 1002

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L6	1,389	(expir$4 or expiration) same (deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/04/01 10:45
L7	119,930	((H04L5/001 OR H04L5/0053 OR H04L5/0091 OR H04W52/0216 OR H04W72/0413 OR H04W72/1273 OR H04W76/27 OR H04W76/28 OR H04W76/20 OR Y02D70/00 OR Y02D70/1262 OR Y02D70/142 OR Y02D70/24 OR Y02D70/25).CPC.)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/04/01 10:45
L8	139,741	((H04L1/1812 OR H04L5/0053 OR H04L5/0055 OR H04W28/04 OR H04W72/04 OR H04W72/0406 OR H04W72/12 OR H04W74/0833 OR H04W76/27 OR H04W76/38 OR H04W88/08).CPC.)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/04/01 10:45
L9	194,402	L7 or L8	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/04/01 10:45
L10	1,714	(expir$4 or expiration) same (terminat$4 or deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/04/01 10:45
L11	1,389	L6 L10	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/04/01 10:45
L12	745	L9 L11	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/04/01 10:45

L19	2	("20020097740").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2021/04/01 11:22
S2	1,830	((Pelletier near3 Benoit) or (Pani near3 Diana) or (DiGirolamo near3 Rocco) or (Cave near3 Christopher) or (Roy near3 Vincent) or (Marinier near3 Paul) or (Zeira near3 Eldad)).in.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 16:06
S3	443	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 16:10
S4	13	S2 S3	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 16:10
S5	2,212	(mac near6 tim$4).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 16:11
S14	8,563	(timer same (RRC or (radio adj3 resource adj3 control)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 19:17
S15	8,446	(((uplink or ul or upstream$4) near6 (grant$4 or resource or prb)) with (RRC or (radio adj3 resource adj3 control)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 19:19
S16	2,077	S14 S15	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 19:21
S18	1,164	(expir$4 or expiration) same (deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:04
S19	163	S16 S18	US-PGPUB; USPAT;	AND	ON	2019/09/19 20:06

			USOCR; EPO; DERWENT			
S20	163	S16 S18	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:06
S23	101,356	((H04L5/001 OR H04L5/0053 OR H04L5/0091 OR H04W52/0216 OR H04W72/0413 OR H04W72/1273 OR H04W76/27 OR H04W76/28 OR H04W76/20 OR Y02D70/00 OR Y02D70/1262 OR Y02D70/142 OR Y02D70/24 OR Y02D70/25).CPC.)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:09
S25	106,674	((H04L1/1812 OR H04L5/0053 OR H04L5/0055 OR H04W28/04 OR H04W72/04 OR H04W72/0406 OR H04W72/12 OR H04W74/0833 OR H04W76/27 OR H04W76/38 OR H04W88/08).CPC.)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:09
S26	161,356	S23 or S25	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:10
S27	128	S20 S26	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:10
S28	128	S20 S26	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:10
S29	1,468	(expir$4 or expiration) same (terminat$4 or deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:17
S30	1,164	S18 S29	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:33

S31	601	S26 S30	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:34
S32	53	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S31	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:34
S34	280	(US-20060054117-$ | US-20070073578-$ | US-0008152-$ | US-0010278-$ | US-00189071-$ | US-0023629-$ | US-0026490-$ | US-0026623-$ | US-0039326-$ | US-0047445-$ | US-0049669-$ | US-0052229-$ | US-0053035-$ | US-0054117-$ | US-0054298-$ | US-0061881-$ | US-0068505-$ | US-0073578-$ | US-0086671-$ | US-0091652-$ | US-0098165-$ | US-0101299-$ | US-0103852-$ | US-0115871-$ | US-0116118-$ | US-0117860-$ | US-0125043-$ | US-0135113-$ | US-0135769-$ | US-0140154-$ | US-0142032-$ | US-0143074-$ | US-0164540-$ | US-0168704-$ | US-0168724-$ | US-0172739-$ | US-0180371-$ | US-0182065-$ | US-0189237-$ | US-0192766-$ | US-0194259-$ | US-0196239-$ | US-0206531-$ | US-0213059-$ | US-0214225-$ | US-0215005-$ | US-0216471-$ | US-0219868-$ | US-0223452-$ | US-0223609-$ | US-0225709-$ | US-0225739-$ | US-0249163-$ | US-0250504-$ | US-0251027-$ | US-0257407-$ | US-0268852-$ | US-0278143-$ | US-0280145-$ | US-0285791-$ | US-0309877-$ | US-0318170-$ | US-0327833-$ | US-20030223452-$ | US-20040052229-$ | US-20040068505-$ | US-20040117860-$ | US-20040089937-$ | US-20050026623-$ | US-20050053035-$ | US-20050054298-$ | US-20050101299-$ | US-20050180371-$ | US-20050249163-$ | US-20050250504-$ | US-20060023629-$ | US-20060026490-$ | US-20060039326-$ | US-20060116118-$ | US-20060140154-$ |	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:35

		US-20060142032-$ | US-20060172739-$ | US-20060182065-$ | US-20060251027-$ | US-20060280145-$ | US-20070047445-$ | US-20070115871-$ | US-20070135113-$ | US-20070189237-$ | US-20070206531-$ | US-20070213059-$ | US-20070223609-$ | US-20080008152-$ | US-20080049669-$ | US-20080125043-$ | US-20080192766-$ | US-20080194259-$ | US-20080214225-$ | US-20080268852-$ | US-20090010278-$ | US-20090061881-$ | US-20090086671-$ | US-20090135769-$ | US-20090143074-$ | US-20090168704-$ | US-20090168724-$ | US-20090196239-$ | US-20090219868-$ | US-20090225709-$ | US-20090225739-$ | US-20090257407-$ | US-20090318170-$ | US-20100091652-$ | US-20100098165-$ | US-20100103852-$ | US-20100215005-$ | US-20100216471-$ | US-20100278143-$ | US-20100285791-$ | US-20100309877-$ | US-20110164540-$ | US-20120327833-$ | US-2305372-$ | US-5740949-$ | US-6167248-$ | US-6246692-$ | US-6721566-$ | US-6845238-$ | US-7079489-$ | US-7145889-$ | US-7406314-$ | US-7477609-$ | US-7480269-$ | US-7508792-$ | US-7643515-$ | US-7890094-$ | US-7894390-$ | US-8259752-$ | US-8989082-$ | US-9844093-$ | US-7180855-$).DID.				
S35	1	S31 S34	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:36
S36	1	S31 S34	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:36
S37	11	S14 S34	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:46

S38	1,246	((resource or grant) near7 (uplink or "UL" or upstream) same timer same ((high$4 near4 layer near4 signal$4) or RRC or (radio adj3 resource adj3 control)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:50
S39	173	S29 S38	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:53
S40	1	S34 S39	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:54
S41	2	S32 S39	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:54
S42	7,018	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with (timer)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 21:08
S43	549	S29 S42	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 21:10
S44	76	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S43	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 21:10
S45	76	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S43	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 21:10
S46	12,119	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with (timer or expir$4 or expiration or (tim$4 near4 limit$4))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 21:56
S47	4,084	S26 S46	US-PGPUB; USPAT; USOCR;	AND	ON	2019/09/19 21:57

			EPO; DERWENT			
S48	659	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S47	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 22:01
S49	6,843	(timer with (mac or (medium adj3 access adj3 control$4)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 22:02
S50	55	S48 S49	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 22:02
S51	55	S48 S49	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 22:03
S52	23,276	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) same (timer or expir$4 or expiration or (tim$4 near4 limit$4))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 22:10
S53	19,355	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 22:11
S54	3,147	S52 S53	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 22:12
S55	240	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S54	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 22:12
S56	23,276	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) same (timer or expir$4 or expiration or (tim$4 near4 limit$4))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 10:09

S57	19,355	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 10:09
S58	3,147	S56 S57	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 10:09
S59	240	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S58	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 10:09
S60	19,355	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:15
S61	3,274	(expir$4 or expiration) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:15
S62	1,542	S60 S61	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:16
S63	52	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S62	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:16
S64	52	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S62	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:16
S65	1	16/421019 (mac with tim$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:20
S66	6,843	(timer with (mac or (medium adj3 access adj3 control$4)))	US-PGPUB; USPAT; USOCR;	AND	ON	2019/09/20 14:20

			EPO; DERWENT			
S67	10,543	((timer or (tim$4 near2 (information or expir$4 or expiration))) with (mac or (medium adj3 access adj3 control$4)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:25
S68	19,355	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:29
S69	1,978	S67 S68	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:30
S70	1,468	(expir$4 or expiration) same (terminat$4 or deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:30
S71	160	S69 S70	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:31
S72	1	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S71	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:31
S73	96	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S69	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:31
S74	96	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S69	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:32
S75	2,730	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) same ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control)) same (timer or (tim$4	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 17:52

		near4 (information or expir$4 or expiration)))				
S76	1,105	((timer or (tim$4 near2 (information or expir$4 or expiration))) with (mac or (medium adj3 access adj3 control$4))) S75	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 17:53
S77	42	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S76	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 17:54
S78	42	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S76	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 17:54
S79	28,510	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) same ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 18:41
S80	13,191	(timer or (tim$4 near4 (information or expir$4 or expiration))) same ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 18:42
S81	6,525	S79 S80	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 18:42
S82	10,543	((timer or (tim$4 near2 (information or expir$4 or expiration))) with (mac or (medium adj3 access adj3 control$4)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 18:43
S83	1,907	S81 S82	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 18:44
S84	82	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S83	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 18:44

S85	82	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S83	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 18:44
S86	280	(US-20060054117-$ | US-20070073578-$ | US-0008152-$ | US-0010278-$ | US-00189071-$ | US-0023629-$ | US-0026490-$ | US-0026623-$ | US-0039326-$ | US-0047445-$ | US-0049669-$ | US-0052229-$ | US-0053035-$ | US-0054117-$ | US-0054298-$ | US-0061881-$ | US-0068505-$ | US-0073578-$ | US-0086671-$ | US-0091652-$ | US-0098165-$ | US-0101299-$ | US-0103852-$ | US-0115871-$ | US-0116118-$ | US-0117860-$ | US-0125043-$ | US-0135113-$ | US-0135769-$ | US-0140154-$ | US-0142032-$ | US-0143074-$ | US-0164540-$ | US-0168704-$ | US-0168724-$ | US-0172739-$ | US-0180371-$ | US-0182065-$ | US-0189237-$ | US-0192766-$ | US-0194259-$ | US-0196239-$ | US-0206531-$ | US-0213059-$ | US-0214225-$ | US-0215005-$ | US-0216471-$ | US-0219868-$ | US-0223452-$ | US-0223609-$ | US-0225709-$ | US-0225739-$ | US-0249163-$ | US-0250504-$ | US-0251027-$ | US-0257407-$ | US-0268852-$ | US-0278143-$ | US-0280145-$ | US-0285791-$ | US-0309877-$ | US-0318170-$ | US-0327833-$ | US-20030223452-$ | US-20040052229-$ | US-20040068505-$ | US-20040117860-$ | US-20040089937-$ | US-20050026623-$ | US-20050053035-$ | US-20050054298-$ | US-20050101299-$ | US-20050180371-$ | US-20050249163-$ | US-20050250504-$ | US-20060023629-$ | US-20060026490-$ | US-20060039326-$ | US-20060116118-$ | US-20060140154-$ | US-20060142032-$ | US-20060172739-$ | US-20060182065-$ | US-20060251027-$ | US-20060280145-$ | US-20070047445-$ | US-20070115871-$ | US-20070135113-$ | US-	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 19:20

		20070189237-$ | US-20070206531-$ | US-20070213059-$ | US-20070223609-$ | US-20080008152-$ | US-20080049669-$ | US-20080125043-$ | US-20080192766-$ | US-20080194259-$ | US-20080214225-$ | US-20080268852-$ | US-20090010278-$ | US-20090061881-$ | US-20090086671-$ | US-20090135769-$ | US-20090143074-$ | US-20090168704-$ | US-20090168724-$ | US-20090196239-$ | US-20090219868-$ | US-20090225709-$ | US-20090225739-$ | US-20090257407-$ | US-20090318170-$ | US-20100091652-$ | US-20100098165-$ | US-20100103852-$ | US-20100215005-$ | US-20100216471-$ | US-20100278143-$ | US-20100285791-$ | US-20100309877-$ | US-20110164540-$ | US-20120327833-$ | US-2305372-$ | US-5740949-$ | US-6167248-$ | US-6246692-$ | US-6721566-$ | US-6845238-$ | US-7079489-$ | US-7145889-$ | US-7406314-$ | US-7477609-$ | US-7480269-$ | US-7508792-$ | US-7643515-$ | US-7890094-$ | US-7894390-$ | US-8259752-$ | US-8989082-$ | US-9844093-$ | US-7180855-$).DID.				
S87	4	S85 S86	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 19:21
S88	4	S85 S86	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 19:21
S93	6,308	(terminat$4 or deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) near6 (message or packet or signal) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/23 11:27
S94	1,978	(terminat$4 or deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) near6 (message or packet or signal) with (allocat$4 or	US-PGPUB; USPAT; USOCR;	AND	ON	2019/09/23 11:30

		assign$4 or schedul$4) with (bs or (base adj2 station) or ap or (access adj2 point) or repeater or (node adj b) or bts or node$1b or node-b or enb or node$1b or enodeb or femto or femtocell or femto-cell)	EPO; DERWENT			
S95	1,295	S93 S94	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/23 11:31
S96	588	h04w72/$.cpc. S95	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/23 11:32
S97	117	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S96	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/23 11:32
S98	117	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S96	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/23 11:32
S99	1,830	((Pelletier near3 Benoit) or (Pani near3 Diana) or (DiGirolamo near3 Rocco) or (Cave near3 Christopher) or (Roy near3 Vincent) or (Marinier near3 Paul) or (Zeira near3 Eldad)).in.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/23 13:19
S100	443	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/23 13:19
S101	13	S99 S100	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/23 13:19
S102	2,212	(mac near6 tim$4).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/23 13:19
S103	1	S101 S102	US-PGPUB; USPAT; USOCR;	AND	ON	2019/09/23 13:19

			EPO; DERWENT			
S104	2	("20040068505").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2019/09/23 14:21
S105	2	("20100309877").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2019/09/23 14:22
S106	1,909	((Pelletier near3 Benoit) or (Pani near3 Diana) or (DiGirolamo near3 Rocco) or (Cave near3 Christopher) or (Roy near3 Vincent) or (Marinier near3 Paul) or (Zeira near3 Eldad)).in.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:51
S107	553	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:51
S108	13	S106 S107	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:51
S109	2,344	(mac near6 tim$4).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:51
S110	1	S108 S109	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:51
S111	6	("10306677").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2020/05/27 21:53
S112	4	("9313809").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2020/05/27 21:54

S113	3	("8774104").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2020/05/27 21:55
S114	1,909	((Pelletier near3 Benoit) or (Pani near3 Diana) or (DiGirolamo near3 Rocco) or (Cave near3 Christopher) or (Roy near3 Vincent) or (Marinier near3 Paul) or (Zeira near3 Eldad)).in.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S115	553	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S116	13	S106 S107	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S117	2,344	(mac near6 tim$4).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S118	9,936	(timer same (RRC or (radio adj3 resource adj3 control)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S119	10,316	(((uplink or ul or upstream$4) near6 (grant$4 or resource or prb)) with (RRC or (radio adj3 resource adj3 control)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S120	2,574	S118 S119	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S121	1,267	(expir$4 or expiration) same (deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S122	203	S120 S121	US-PGPUB; USPAT;	AND	ON	2020/05/27 21:55

			USOCR; EPO; DERWENT			
S123	203	S120 S121	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S124	116,237	((H04L5/001 OR H04L5/0053 OR H04L5/0091 OR H04W52/0216 OR H04W72/0413 OR H04W72/1273 OR H04W76/27 OR H04W76/28 OR H04W76/20 OR Y02D70/00 OR Y02D70/1262 OR Y02D70/142 OR Y02D70/24 OR Y02D70/25).CPC.)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S125	122,075	((H04L1/1812 OR H04L5/0053 OR H04L5/0055 OR H04W28/04 OR H04W72/04 OR H04W72/0406 OR H04W72/12 OR H04W74/0833 OR H04W76/27 OR H04W76/38 OR H04W88/08).CPC.)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S126	182,217	S124 or S125	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S127	159	S123 S126	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S128	159	S123 S126	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S129	1,582	(expir$4 or expiration) same (terminat$4 or deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S130	1,267	S121 S129	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55

S131	673	S126 S130	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S132	53	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S131	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S133	280	(US-20060054117-$ | US-20070073578-$ | US-0008152-$ | US-0010278-$ | US-00189071-$ | US-0023629-$ | US-0026490-$ | US-0026623-$ | US-0039326-$ | US-0047445-$ | US-0049669-$ | US-0052229-$ | US-0053035-$ | US-0054117-$ | US-0054298-$ | US-0061881-$ | US-0068505-$ | US-0073578-$ | US-0086671-$ | US-0091652-$ | US-0098165-$ | US-0101299-$ | US-0103852-$ | US-0115871-$ | US-0116118-$ | US-0117860-$ | US-0125043-$ | US-0135113-$ | US-0135769-$ | US-0140154-$ | US-0142032-$ | US-0143074-$ | US-0164540-$ | US-0168704-$ | US-0168724-$ | US-0172739-$ | US-0180371-$ | US-0182065-$ | US-0189237-$ | US-0192766-$ | US-0194259-$ | US-0196239-$ | US-0206531-$ | US-0213059-$ | US-0214225-$ | US-0215005-$ | US-0216471-$ | US-0219868-$ | US-0223452-$ | US-0223609-$ | US-0225709-$ | US-0225739-$ | US-0249163-$ | US-0250504-$ | US-0251027-$ | US-0257407-$ | US-0268852-$ | US-0278143-$ | US-0280145-$ | US-0285791-$ | US-0309877-$ | US-0318170-$ | US-0327833-$ | US-20030223452-$ | US-20040052229-$ | US-20040068505-$ | US-20040117860-$ | US-20040089937-$ | US-20050026623-$ | US-20050053035-$ | US-20050054298-$ | US-20050101299-$ | US-20050180371-$ | US-20050249163-$ | US-20050250504-$ | US-20060023629-$ | US-20060026490-$ | US-20060039326-$ | US-20060116118-$ | US-20060140154-$ |	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55

		US-20060142032-$ | US-20060172739-$ | US-20060182065-$ | US-20060251027-$ | US-20060280145-$ | US-20070047445-$ | US-20070115871-$ | US-20070135113-$ | US-20070189237-$ | US-20070206531-$ | US-20070213059-$ | US-20070223609-$ | US-20080008152-$ | US-20080049669-$ | US-20080125043-$ | US-20080192766-$ | US-20080194259-$ | US-20080214225-$ | US-20080268852-$ | US-20090010278-$ | US-20090061881-$ | US-20090086671-$ | US-20090135769-$ | US-20090143074-$ | US-20090168704-$ | US-20090168724-$ | US-20090196239-$ | US-20090219868-$ | US-20090225709-$ | US-20090225739-$ | US-20090257407-$ | US-20090318170-$ | US-20100091652-$ | US-20100098165-$ | US-20100103852-$ | US-20100215005-$ | US-20100216471-$ | US-20100278143-$ | US-20100285791-$ | US-20100309877-$ | US-20110164540-$ | US-20120327833-$ | US-2305372-$ | US-5740949-$ | US-6167248-$ | US-6246692-$ | US-6721566-$ | US-6845238-$ | US-7079489-$ | US-7145889-$ | US-7406314-$ | US-7477609-$ | US-7480269-$ | US-7508792-$ | US-7643515-$ | US-7890094-$ | US-7894390-$ | US-8259752-$ | US-8989082-$ | US-9844093-$ | US-7180855-$).DID.				
S134	1	S131 S133	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S135	1	S131 S133	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S136	11	S118 S133	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55

S137	1,490	((resource or grant) near7 (uplink or "UL" or upstream) same timer same ((high$4 near4 layer near4 signal$4) or RRC or (radio adj3 resource adj3 control)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S138	192	S129 S137	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S139	1	S133 S138	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S140	2	S132 S138	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S141	7,768	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with (timer)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S142	611	S129 S141	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S143	77	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S142	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S144	77	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S142	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S145	13,338	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with (timer or expir$4 or expiration or (tim$4 near4 limit$4))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S146	4,687	S126 S145	US-PGPUB; USPAT; USOCR;	AND	ON	2020/05/27 21:55

			EPO; DERWENT			
S147	663	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S146	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S148	7,606	(timer with (mac or (medium adj3 access adj3 control$4)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S149	55	S147 S148	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S150	55	S147 S148	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S151	25,326	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) same (timer or expir$4 or expiration or (tim$4 near4 limit$4))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S152	22,665	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S153	3,744	S151 S152	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S154	240	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S153	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S155	25,326	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) same (timer or expir$4 or expiration or (tim$4 near4 limit$4))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55

S156	22,665	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S157	3,744	S155 S156	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S158	240	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S157	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S159	22,665	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S160	3,797	(expir$4 or expiration) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S161	1,834	S159 S160	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S162	54	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S161	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S163	54	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S161	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S164	1	16/421019 (mac with tim$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S165	7,606	(timer with (mac or (medium adj3 access adj3 control$4)))	US-PGPUB; USPAT; USOCR;	AND	ON	2020/05/27 21:55

			EPO; DERWENT			
S166	11,582	((timer or (tim$4 near2 (information or expir$4 or expiration))) with (mac or (medium adj3 access adj3 control$4)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S167	22,665	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S168	2,428	S166 S167	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S169	1,582	(expir$4 or expiration) same (terminat$4 or deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S170	201	S168 S169	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S171	1	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S170	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S172	97	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S168	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S173	97	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S168	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S174	3,296	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) same ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control)) same (timer or (tim$4	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55

		near4 (information or expir$4 or expiration)))				
S175	1,337	((timer or (tim$4 near2 (information or expir$4 or expiration))) with (mac or (medium adj3 access adj3 control$4))) S174	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S176	43	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S175	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S177	43	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S175	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S178	33,513	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) same ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S179	15,405	(timer or (tim$4 near4 (information or expir$4 or expiration))) same ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S180	7,851	S178 S179	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S181	11,582	((timer or (tim$4 near2 (information or expir$4 or expiration))) with (mac or (medium adj3 access adj3 control$4)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S182	2,314	S180 S181	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S183	83	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S182	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55

S184	83	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S182	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S185	280	(US-20060054117-$ | US-20070073578-$ | US-0008152-$ | US-0010278-$ | US-00189071-$ | US-0023629-$ | US-0026490-$ | US-0026623-$ | US-0039326-$ | US-0047445-$ | US-0049669-$ | US-0052229-$ | US-0053035-$ | US-0054117-$ | US-0054298-$ | US-0061881-$ | US-0068505-$ | US-0073578-$ | US-0086671-$ | US-0091652-$ | US-0098165-$ | US-0101299-$ | US-0103852-$ | US-0115871-$ | US-0116118-$ | US-0117860-$ | US-0125043-$ | US-0135113-$ | US-0135769-$ | US-0140154-$ | US-0142032-$ | US-0143074-$ | US-0164540-$ | US-0168704-$ | US-0168724-$ | US-0172739-$ | US-0180371-$ | US-0182065-$ | US-0189237-$ | US-0192766-$ | US-0194259-$ | US-0196239-$ | US-0206531-$ | US-0213059-$ | US-0214225-$ | US-0215005-$ | US-0216471-$ | US-0219868-$ | US-0223452-$ | US-0223609-$ | US-0225709-$ | US-0225739-$ | US-0249163-$ | US-0250504-$ | US-0251027-$ | US-0257407-$ | US-0268852-$ | US-0278143-$ | US-0280145-$ | US-0285791-$ | US-0309877-$ | US-0318170-$ | US-0327833-$ | US-20030223452-$ | US-20040052229-$ | US-20040068505-$ | US-20040117860-$ | US-20040089937-$ | US-20050026623-$ | US-20050053035-$ | US-20050054298-$ | US-20050101299-$ | US-20050180371-$ | US-20050249163-$ | US-20050250504-$ | US-20060023629-$ | US-20060026490-$ | US-20060039326-$ | US-20060116118-$ | US-20060140154-$ | US-20060142032-$ | US-20060172739-$ | US-20060182065-$ | US-20060251027-$ | US-20060280145-$ | US-20070047445-$ | US-20070115871-$ | US-20070135113-$ | US-	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55

		20070189237-$ | US-20070206531-$ | US-20070213059-$ | US-20070223609-$ | US-20080008152-$ | US-20080049669-$ | US-20080125043-$ | US-20080192766-$ | US-20080194259-$ | US-20080214225-$ | US-20080268852-$ | US-20090010278-$ | US-20090061881-$ | US-20090086671-$ | US-20090135769-$ | US-20090143074-$ | US-20090168704-$ | US-20090168724-$ | US-20090196239-$ | US-20090219868-$ | US-20090225709-$ | US-20090225739-$ | US-20090257407-$ | US-20090318170-$ | US-20100091652-$ | US-20100098165-$ | US-20100103852-$ | US-20100215005-$ | US-20100216471-$ | US-20100278143-$ | US-20100285791-$ | US-20100309877-$ | US-20110164540-$ | US-20120327833-$ | US-2305372-$ | US-5740949-$ | US-6167248-$ | US-6246692-$ | US-6721566-$ | US-6845238-$ | US-7079489-$ | US-7145889-$ | US-7406314-$ | US-7477609-$ | US-7480269-$ | US-7508792-$ | US-7643515-$ | US-7890094-$ | US-7894390-$ | US-8259752-$ | US-8989082-$ | US-9844093-$ | US-7180855-$).DID.				
S186	4	S184 S185	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S187	4	S184 S185	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S190	6,651	(terminat$4 or deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) near6 (message or packet or signal) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S191	2,090	(terminat$4 or deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) near6 (message or packet or signal) with (allocat$4 or	US-PGPUB; USPAT; USOCR;	AND	ON	2020/05/27 21:55

		assign$4 or schedul$4) with (bs or (base adj2 station) or ap or (access adj2 point) or repeater or (node adj b) or bts or node$1b or node-b or enb or node$1b or enodeb or femto or femtocell or femto-cell)	EPO; DERWENT			
S192	1,381	S190 S191	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S193	641	h04w72/$.cpc. S192	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S194	118	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S193	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S195	118	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S193	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S196	1,909	((Pelletier near3 Benoit) or (Pani near3 Diana) or (DiGirolamo near3 Rocco) or (Cave near3 Christopher) or (Roy near3 Vincent) or (Marinier near3 Paul) or (Zeira near3 Eldad)).in.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S197	553	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S198	13	S196 S197	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S199	2,344	(mac near6 tim$4).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S200	1	S198 S199	US-PGPUB; USPAT; USOCR;	AND	ON	2020/05/27 21:55

			EPO; DERWENT			
S201	2	("20040068505").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2020/05/27 21:55
S202	2	("20100309877").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2020/05/27 21:55
S212	9,207	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with (timer or (tim$4 near3 (expir$4 or expiration)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 12:36
S213	11,856	(timer or (tim$4 near3 (expir$4 or expiration))) with (uplink or "UL" or upstream)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 12:37
S214	3,310	S212 S213	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 12:38
S215	1,388	(timer or (tim$4 near3 (expir$4 or expiration))) with (uplink or "UL" or upstream) near7 (resource or tx or transmission) with (suspend$4 or stop$4 or disabl$4 or cancel$4 or deactivat$4 or halt$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 12:39
S216	890	S212 S215	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 12:39
S217	621	((H04L1/1812 OR H04L5/0053 OR H04L5/0055 OR H04W28/04 OR H04W72/04 OR H04W72/0406 OR H04W72/12 OR H04W74/0833 OR H04W76/27 OR H04W76/38 OR H04W88/08).CPC.) S216	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 12:40
S218	603	(mac or (medium adj2 access adj3 control)) with (timer or (tim$4 near3 (expir$4 or expiration))) with (uplink or "UL" or upstream) near7 (resource or tx or transmission) with (suspend$4 or	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 12:41

		stop$4 or disabl$4 or cancel$4 or deactivat$4 or halt$4)				
S219	380	S217 S218	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 12:42
S220	380	S217 S218	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 12:42
S221	0	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S220	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 12:43
S222	4	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S218	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 12:43
S223	238	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S214	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 13:00
S224	6	S215 S223	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 13:02
S225	6	S215 S223	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 13:02
S234	162	((deactivat$4 or de-activat$4 or cancel$4 or cancellat$4 or disabl$4) near10 tim$4) same (RRC or (radio adj3 resource adj2 control$3)) same (resource near4 (allocat$4 or schedul$4 or assign$4))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/03 21:59
S235	2,029	((deactivat$4 or de-activat$4 or cancel$4 or cancellat$4 or disabl$4) near10 tim$4) with (MAC or (medium near3 access near2 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/03 22:00

S236	43	S234 S235	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/03 22:01
S239	886	(RRC or (radio adj3 resource adj2 control$3)) same (resource near4 (allocat$4 or schedul$4 or assign$4)) same (timer)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/03 22:10
S240	426	(resource near4 (allocat$4 or schedul$4 or assign$4)) near9 (UL or uplink) same (timer or (timeout$4 or time$4-out or expir$4 or expiration)) same (deactivat$4 or de-activat$4 or cancel$4 or cancellat$4 or disabl$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/03 22:11
S241	101	S239 S240	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/03 22:11
S245	4,375	(RRC or (radio adj3 resource adj2 control$3)) with (resource) same (timer)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/03 22:14
S247	818	resource with (UL or uplink) same (timer or (timeout$4 or time$4-out or expir$4 or expiration)) same (deactivat$4 or de-activat$4 or cancel$4 or cancellat$4 or disabl$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/03 22:15
S249	287	S245 S247	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/03 22:15
S250	10,948	(timer or (timeout$4 or time$4-out or expir$4 or expiration)) with (mac or (medium adj3 access near2 control$3))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/03 22:16
S251	240	S249 S250	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/03 22:16
S252	1,955	((Pelletier near3 Benoit) or (Pani near3 Diana) or (DiGirolamo near3 Rocco) or (Cave near3 Christopher) or (Roy near3	US-PGPUB; USPAT; USOCR;	AND	ON	2020/11/04 19:27

		Vincent) or (Marinier near3 Paul) or (Zeira near3 Eldad)).in.	EPO; DERWENT			
S253	630	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/04 19:27
S254	128	(mac near4 tim$4 near3 information).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/04 19:28
S255	29	(deactivat$4 near6 uplink near9 timer).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/04 19:28
S256	1	S252 S253 S254 S255	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/04 19:28
S257	128	(mac near4 tim$4 near3 information).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/04 19:28
S262	2	("20020097740").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2021/03/31 17:06
S263	2	("20020009774").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2021/03/31 17:11
S264	1,618	(rrc or (radio adj3 resource near2 control) or (high$4 adj3 (signal$4))) same (uplink or upstream or UL) near9 (resource or RB or subframe or sub-frame or frequenc$4 or carrier or slot) same (expir$4 or expiration or timer)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:28
S265	482,757	(deactivat$4 or stop$4 or end$3 or terminat$4 or clos$4 or disabl$4 or ceas$4 or off or halt$4 or cancel$4 or cancellation) same (expir$4 or expiration or timer)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:38

S266	1,297	S264 S265	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:42
S267	315,026	(deactivat$4 or stop$4 or end$3 or terminat$4 or clos$4 or disabl$4 or ceas$4 or off or halt$4 or cancel$4 or cancellation) with (expir$4 or expiration or timer)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:42
S268	1,132	S266 S267	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:42
S269	753	((H04L5/001 OR H04L5/0053 OR H04L5/0091 OR H04W52/0216 OR H04W72/0413 OR H04W72/1273 OR H04W76/27 OR H04W76/28 OR H04W76/20 OR Y02D70/00 OR Y02D70/1262 OR Y02D70/142 OR Y02D70/24 OR Y02D70/25).CPC.) S268	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:43
S270	8	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S269	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:44
S271	10,652	(mac or (medium adj3 access adj3 control)) with (expir$4 or expiration or timer)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:45
S272	878	S266 S271	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:45
S273	611	((H04L5/001 OR H04L5/0053 OR H04L5/0091 OR H04W52/0216 OR H04W72/0413 OR H04W72/1273 OR H04W76/27 OR H04W76/28 OR H04W76/20 OR Y02D70/00 OR Y02D70/1262 OR Y02D70/142 OR Y02D70/24 OR Y02D70/25).CPC.) S272	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:45
S274	4	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S273	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:45

S275	139,620	((H04L1/1812 OR H04L5/0053 OR H04L5/0055 OR H04W28/04 OR H04W72/04 OR H04W72/0406 OR H04W72/12 OR H04W74/0833 OR H04W76/27 OR H04W76/38 OR H04W88/08).CPC.)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:47
S276	644	((H04L1/1812 OR H04L5/0053 OR H04L5/0055 OR H04W28/04 OR H04W72/04 OR H04W72/0406 OR H04W72/12 OR H04W74/0833 OR H04W76/27 OR H04W76/38 OR H04W88/08).CPC.) S272	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:47
S277	4	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S276	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:47
S278	3,424	(deactivat$4 or stop$4 or end$3 or terminat$4 or clos$4 or disabl$4 or ceas$4 or off or halt$4 or cancel$4 or cancellation) same (mac or (medium adj3 access adj3 control)) near8 (expir$4 or expiration or timer)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:49
S279	487	S278 S264	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:49
S280	119,847	((H04L5/001 OR H04L5/0053 OR H04L5/0091 OR H04W52/0216 OR H04W72/0413 OR H04W72/1273 OR H04W76/27 OR H04W76/28 OR H04W76/20 OR Y02D70/00 OR Y02D70/1262 OR Y02D70/142 OR Y02D70/24 OR Y02D70/25).CPC.)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:50
S281	139,620	((H04L1/1812 OR H04L5/0053 OR H04L5/0055 OR H04W28/04 OR H04W72/04 OR H04W72/0406 OR H04W72/12 OR H04W74/0833 OR H04W76/27 OR H04W76/38 OR H04W88/08).CPC.)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:50
S282	194,265	S280 or S281	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:50
S283	421	S282 S279	US-PGPUB; USPAT; USOCR;	AND	ON	2021/03/31 17:50

			EPO; DERWENT			
S284	0	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S283	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:50
S285	421	S282 S279	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 17:51
S288	0	11/841798 (rrc or (radio adj3 resource near2 control) or (high$4 adj3 (signal$4)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 18:19
S289	1,991	((Pelletier near3 Benoit) or (Pani near3 Diana) or (DiGirolamo near3 Rocco) or (Cave near3 Christopher) or (Roy near3 Vincent) or (Marinier near3 Paul) or (Zeira near3 Eldad)).in.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 18:40
S290	704	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 18:40
S291	13	S289 S290	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 18:40
S292	4	(mac near4 timer near3 information).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 18:49
S293	1	S291 S292	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 18:49
S294	421	S282 S279	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2021/03/31 18:51

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S9	2,212	(mac near6 tim$4).clm.	US-PGPUB; USPAT	AND	ON	2019/09/19 16:11
S10	443	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT	AND	ON	2019/09/19 16:11
S11	214	(deactivat$6 near5 uplink).clm.	US-PGPUB; USPAT	AND	ON	2019/09/19 16:12
S12	1	S9 S10 S11	US-PGPUB; USPAT	AND	ON	2019/09/19 16:12
S203	2,344	(mac near6 tim$4).clm.	US-PGPUB; USPAT	AND	ON	2020/05/27 21:50
S204	553	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT	AND	ON	2020/05/27 21:50
S205	231	(deactivat$6 near5 uplink).clm.	US-PGPUB; USPAT	AND	ON	2020/05/27 21:50
S206	1	S203 S204 S205	US-PGPUB; USPAT	AND	ON	2020/05/27 21:50
S207	2,344	(mac near6 tim$4).clm.	US-PGPUB; USPAT	AND	ON	2020/05/27 21:55
S208	553	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT	AND	ON	2020/05/27 21:55
S209	231	(deactivat$6 near5 uplink).clm.	US-PGPUB; USPAT	AND	ON	2020/05/27 21:55
S210	1	S203 S204 S205	US-PGPUB; USPAT	AND	ON	2020/05/27 21:55
S258	29	(deactivat$4 near6 uplink near9 timer).clm.	US-PGPUB; USPAT	AND	ON	2020/11/04 19:28
S259	630	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT	AND	ON	2020/11/04 19:28
S260	128	(mac near4 tim$4 near3 information).clm.	US-PGPUB; USPAT	AND	ON	2020/11/04 19:29
S261	1	S258 S259 S260	US-PGPUB; USPAT	AND	ON	2020/11/04 19:30
S295	2,531	(mac near6 tim$4).clm.	US-PGPUB; USPAT	AND	ON	2021/03/31 18:50
S296	704	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT	AND	ON	2021/03/31 18:50
S297	274	(deactivat$6 near5 uplink).clm.	US-PGPUB; USPAT	AND	ON	2021/03/31 18:50
S298	1	S295 S296 S297	US-PGPUB; USPAT	AND	ON	2021/03/31 18:50

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C:\Users\kyuen\Documents\EAST\Workspaces\16421019.wsp

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16421019
Filing Date	2019-05-23
First Named Inventor	Benoit Pelletier
Art Unit	2464
Examiner Name	YUEN, KAN
Attorney Docket Number	SIG-2-1853US06

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16421019
	Filing Date	2019-05-23
	First Named Inventor	Benoit Pelletier
	Art Unit	2464
	Examiner Name	YUEN, KAN
	Attorney Docket Number	SIG-2-1853US06

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EXAMINER SIGNATURE

Examiner Signature	/KAN YUEN/	Date Considered	04/01/2021

*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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ONEPLUS - EX. 1002

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16421019
	Filing Date	2019-05-23
	First Named Inventor	Benoit Pelletier
	Art Unit	2464
	Examiner Name	YUEN, KAN
	Attorney Docket Number	SIG-2-1853US06

CERTIFICATION STATEMENT

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

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. 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.

X 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	/Joseph P. Gushue/	Date (YYYY-MM-DD)	2020-12-24
Name/Print	Joseph P. Gushue	Registration Number	59,819

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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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:

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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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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

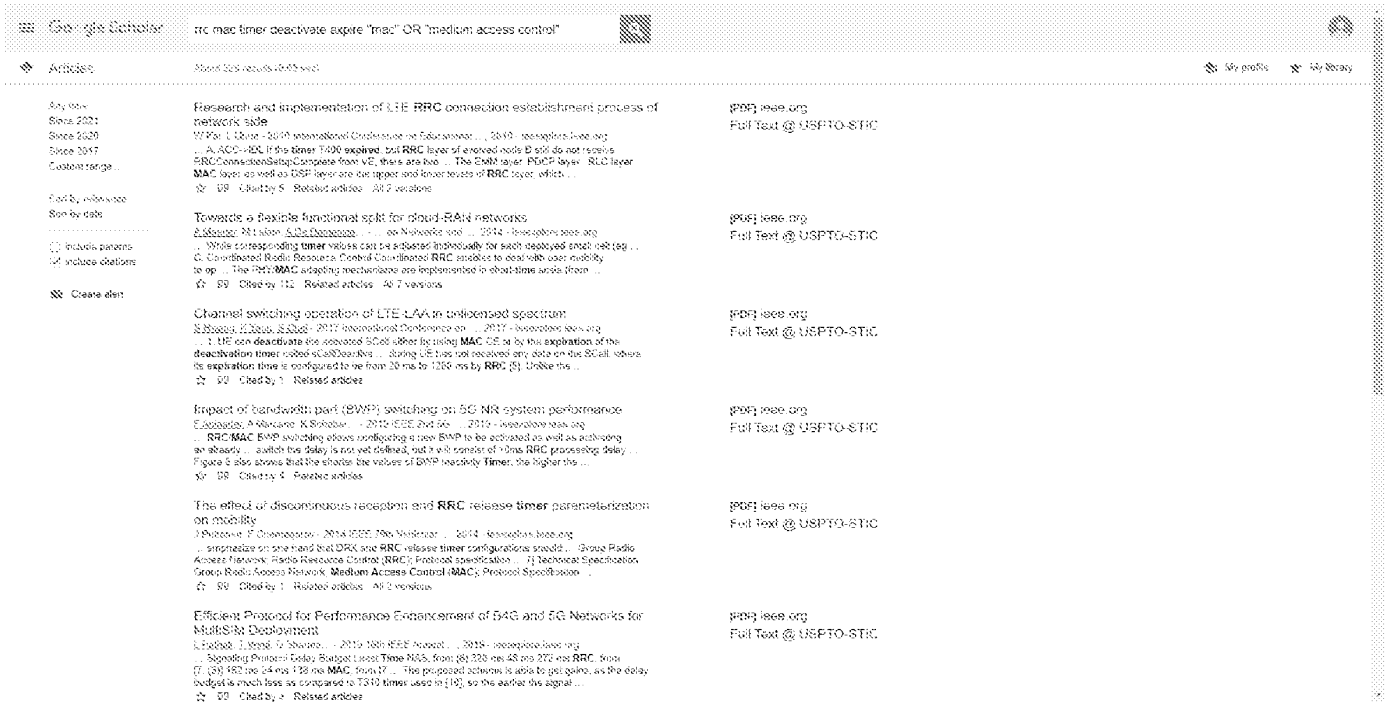
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

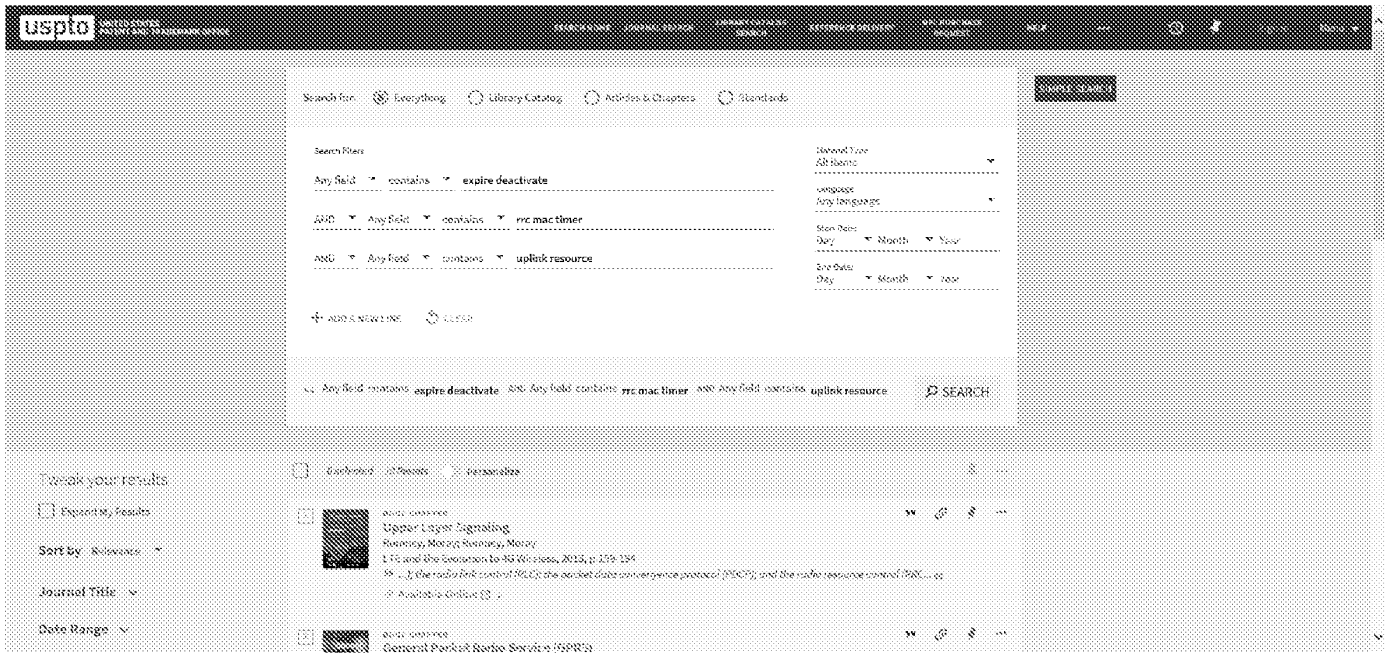
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

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

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Research and implementation of LTE RRC connection establishment process of network side
W Pan, L Qiao - 2009 International Conference on Education ..., 2009 - ieeexplore.ieee.org
... A.ACC->EX: If the timer T400 expired, but RRC layer of evolved node B still do not receive RRCConnectionSetupComplete from UE, there are two ... The EMM layer, PDCP layer, RLC layer, MAC layer, as well as DSP layer are due upper and lower levels of RRC layer, which ...
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Towards a flexible functional split for cloud-RAN networks
A Alleman, PM Liboa, A De Domenico ... - ... on Networks and ..., 2017 - ieeexplore.ieee.org
... While corresponding timer values can be adjusted individually for each deployed small cell (eg ... C. Coordinated Radio Resource Control Coordinated RRC enables to deal with user mobility to op ... The PHY/MAC adapting mechanisms are implemented in short-time scale (from ...
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Channel switching operation of LTE-LAA in unlicensed spectrum
N Mosely, H Xiao, S Choi - 2017 International Conference on ..., 2017 - ieeexplore.ieee.org
... 1. UE can deactivate the activated SCell after receiving MAC CE or by the expiration of the deactivation timer. nrSCellDeactivationTimer ... during UE has not received any data on the SCell, where its expiration time is configured to be from 20 ms to 1280 ms by RRC [9]. Unlike the ...
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Impact of bandwidth part (BWP) switching on 5G NR system performance
E Anouzaki, A Abdulaziz, K Sivanesan ... - 2019 IEEE 2nd 5G ..., 2019 - ieeexplore.ieee.org
... RRC/MAC BWP switching allows configuring a new BWP to be activated as well as activating an already ... switch this delay is not yet defined, but it will consist of >0ms RRC processing delay ... Figure 6 also shows that the shorter the values of BWP inactivity timer, the higher the ...
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The effect of discontinuous reception and RRC release timer parameterization on mobility
J Peisonen, F Chernogorov ... - 2013 IEEE 78th Vehicular ..., 2013 - ieeexplore.ieee.org
... emphasize on one hand that DRX and RRC release timer configurations should ... Evolved Radio Access Network; Radio Resource Control (RRC); Protocol specification ... 7] Technical Specification Group Radio Access Network; Medium Access Control (MAC); Protocol Specification ...
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Efficient Protocol for Performance Enhancement of 5AG and 5G Networks for MultiSIM Deployment
L Fotiadi, L Vergi, G Shanara ... - 2019 16th IEEE Annual ..., 2019 - ieeexplore.ieee.org
... Signalling Protocol Delay Budget Used Time NAS, from [8] 320 ms 48 ms 272 ms RRC, from [7, [39] 182 ms 24 ms 158 ms MAC, from [7 ... The proposed scheme is able to get gains, as the delay budget is much less as compared to T310 timer used in [10], so the earlier the signal ...
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uplink resource
SEARCH
Tweak your results
Expand my results
Sort by
Relevance
Journal Title
Date Range
Upper Layer Signaling
General Packet Radio Service (GPRS)

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the **PATENT APPLICATION** of:	
	Pelletier et al.
Application No.:	16/421,019
Filed:	May 23, 2019
For:	METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES
Group:	2464
Examiner:	Kan Yuen

Our File: SIG-2-1853US06
Date: November 9, 2020

INFORMATION DISCLOSURE STATEMENT

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

Sir:

Further to Applicant's Duty of Disclosure pursuant to 37 C.F.R. § 1.56, Applicant wishes to bring to the Examiner's attention the material cited on the enclosed PTO Form SB-08. A copy of the newly cited document is enclosed.

This application is a continuation of U.S. Patent Application No. 14/876,337 filed October 6, 2015, which issued on May 28, 2019 as U.S. Patent No. 10,306,677, which is a continuation of U.S. Patent Application No. 14/319,608 filed June 30, 2014, which issued on April 12, 2016 as U.S. Patent No. 9,313,809, which is a continuation of U.S.

/KAN YUEN/

6542879.1

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.Y/

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Patent Application No. 12/238,910 filed September 26, 2008, which issued on July 8, 2014 as U.S. Patent No. 8,774,104, which claims the benefit of U.S. Provisional Patent Application Nos. 61/083,409 filed July 24, 2008, 61/074,288 filed June 20, 2008, 61/038,576, filed March 21, 2008, 61/025,441 filed February 1, 2008, 61/018,999 filed January 4, 2008, 60/982,528 filed October 25, 2007 and 60/975,985 filed September 28, 2007.

This application is also related to co-pending U.S. Application No. 16/516,893, filed July 19, 2019, which is a continuation of U.S. Application No. 15/836,302, filed December 8, 2017, which issued on July 23, 2019 as U.S. Patent No. 10,362,622, which is a continuation of U.S. Patent Application No. 15/182,218, filed June 14, 2016, which issued on December 12, 2017 as U.S. Patent No. 9,844,093, which is a continuation of U.S. Patent Application No. 15/049,922, filed February 22, 2016, which issued on June 21, 2016 as U.S. Patent No. 9,374,816, which is a continuation of U.S. Patent Application No. 12/256,964, filed October 23, 2008, which issued on February 23, 2016, as U.S. Patent No. 9,217,280, which claims the benefit of U.S. Provisional Patent Application No. 60/982,528, filed October 25, 2007 and U.S. Provisional Patent Application No. 61/018,567, filed January 2, 2008.

Applicant also wishes to bring to the Examiner's attention co-pending U.S. Application No. 16/440,886, filed June 13, 2019, which is a continuation of U.S. Patent Application No. 15/782,532, filed October 12, 2017, which issued on June 18, 2019 as U.S. Patent No. 10,327,188, which is a continuation of U.S. Patent Application No.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.Y/

ONEPLUS - EX. 1002

15/135,616, filed April 22, 2016, which is a continuation of U.S. Patent Application No. 14/875,059 filed October 5, 2015, which is a continuation of U.S. Patent Application No. 13/665,734, filed October 31, 2012, which issued October 13, 2015, as U.S. Patent No. 9,161,285, which is a continuation of U.S. Patent Application No. 12/346,631, filed December 30, 2008, which issued December 4, 2012 as U.S. Patent No. 8,325,684, which claims priority from Provisional Application No. 61/018,567, which was filed January 2, 2008.

It is respectfully requested that the Examiner consider these documents and return an initialed copy of the PTO Form SB-08 indicating consideration of the cited materials.

Respectfully submitted,

Signal Trust for Wireless Innovation

By /Joseph P. Gushue/
Joseph P. Gushue
Registration No. 59,819
(215) 568-6400

Volpe Koenig
30 South 17th Street; Suite 1800
Philadelphia, PA 19103-4009
Telephone: (215) 568-6400
Facsimile: (215) 568-6499

JPG/pf
Enclosures (2)

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/421,019	05/23/2019	Benoit Pelletier	RNB-2-1853US06

CONFIRMATION NO. 9820

3624
Volpe Koenig
30 SOUTH 17TH STREET, 18TH FLOOR
PHILADELPHIA, PA 19103

POA ACCEPTANCE LETTER

OC000000124217164

Date Mailed: 03/19/2021

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 03/17/2021.

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**.

/byemane/

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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
16/421,019	05/23/2019	2464	1720	RNB-2-1853US06	10	2

CONFIRMATION NO. 9820

CORRECTED FILING RECEIPT

3624
Volpe Koenig
30 SOUTH 17TH STREET, 18TH FLOOR
PHILADELPHIA, PA 19103

OC000000124217188

Date Mailed: 03/19/2021

Receipt is acknowledged of this non-provisional utility 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 FIRST INVENTOR, 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 corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction 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 provided that the request is grantable.

Inventor(s)

Benoit Pelletier, Roxboro, CANADA;
Diana Pani, Montreal, CANADA;
Rocco DiGirolamo, Laval, CANADA;
Christopher R. Cave, Dollard-des-Ormeaux, CANADA;
Vincent Roy, Longueuil, CANADA;
Paul Marinier, Brossard, CANADA;
Eldad M. Zeira, Huntington, NY;

Applicant(s)

RnB Wireless LLC, Waco, TX;

Assignment For Published Patent Application

RnB Wireless LLC, Waco, TX

Power of Attorney: The patent practitioners associated with Customer Number 03624

Domestic Priority data as claimed by applicant

This application is a CON of 14/876,337 10/06/2015 PAT 10306677
which is a CON of 14/319,608 06/30/2014 PAT 9313809
which is a CON of 12/238,910 09/26/2008 PAT 8774104
which claims benefit of 60/975,985 09/28/2007
and claims benefit of 60/982,528 10/25/2007
and claims benefit of 61/018,999 01/04/2008
and claims benefit of 61/025,441 02/01/2008
and claims benefit of 61/038,576 03/21/2008

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and claims benefit of 61/074,288 06/20/2008
and claims benefit of 61/083,409 07/24/2008

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: 05/30/2019

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/421,019**

Projected Publication Date: Not Applicable

Non-Publication Request: No

Early Publication Request: No
Title

METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES

Preliminary Class

370

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.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application

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serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

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).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

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PTO/AIA/80 (07-17)
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POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

[X] Practitioners associated with Customer Number: 03624

OR

[ ] Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

[X] The address associated with Customer Number: 03624

OR

[ ]

Firm or individual name: Volpe Koenig		
Address		
City	State	Zip
Country		
Telephone	Email	

Assignee name and address: RnB Wireless LLC
800 Columbus Avenue, Suite 108, #7
Waco, TX 76701

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of the practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee.

Signature: [signature]	Date: 2/9/21
Name: Richard J. Fagan	Telephone: 484-995-2182
Title: Authorized Signatory, RnB Wireless LLC	

This collection of information is required by 37 CFR 1.31, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public, which is to update (and by the USPTO to process) the file of a patent or reexamination proceeding. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 18 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/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
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STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: RnB Wireless LLC

Application No./Patent No.: 16/421,019 Filed/Issue Date: May 23, 2019

Titled: METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES

RnB Wireless LLC, a corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

B. ☑ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Benoit Pelletier, Diana Pani, Rocco DiGirolamo, Christoper R. Cave, Vincent Roy, Paul Marinier & Eldad M. Zeira To: INTERDIGITAL PATENT HOLDINGS, INC.

   The document was recorded in the United States Patent and Trademark Office at
   Reel 021966, Frame 0202, or for which a copy thereof is attached.

2. From: INTERDIGITAL PATENT HOLDINGS, INC. To: INTERDIGITAL HOLDINGS, INC.

   The document was recorded in the United States Patent and Trademark Office at
   Reel 031427, Frame 0772, or for which a copy thereof is attached.

This collection of information is required by 37 CFR 3.73(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.

PTO/AIA/96 (08-12)
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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.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: INTERDIGITAL HOLDINGS, INC. To: INTERDIGITAL, INC.

The document was recorded in the United States Patent and Trademark Office at
Reel 031428, Frame 0063, or for which a copy thereof is attached.

4. From: INTERDIGITAL, INC. To: DST HOLDINGS, INC.

The document was recorded in the United States Patent and Trademark Office at
Reel 031428, Frame 0099, or for which a copy thereof is attached.

5. From: DST HOLDINGS, INC. To: SIGNAL TRUST FOR WIRELESS INNOVATION

The document was recorded in the United States Patent and Trademark Office at
Reel 031597, Frame 0485, or for which a copy thereof is attached.

6. From: SIGNAL TRUST FOR WIRELESS INNOVATION To: RNB WIRELESS LLC

The document was recorded in the United States Patent and Trademark Office at
Reel 055170, Frame 0866, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☑ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Joseph P. Gushue/	March 17, 2021
Signature	Date
Joseph P. Gushue	59,819
Printed or Typed Name	Title or Registration 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.

Electronic Acknowledgement Receipt

EFS ID:	42202264
Application Number:	16421019
International Application Number:	
Confirmation Number:	9820
Title of Invention:	METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES
First Named Inventor/Applicant Name:	Benoit Pelletier
Customer Number:	3624
Filer:	Joseph P. Gushue/Margaret Ferello
Filer Authorized By:	Joseph P. Gushue
Attorney Docket Number:	RNB-2-1853US06
Receipt Date:	17-MAR-2021
Filing Date:	23-MAY-2019
Time Stamp:	16:44:21
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	Req to correct/update/change appl name until pay issue fee	RNB_2_1853US06_Request_Update_Change_Applicant.pdf	273639 8184466dcac9330f65ca1371fc854ff49ad5237e	no	2

Warnings:

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Information:					
2	Power of Attorney	RNB_2_1853US06_Power_of_Attorney_to_Prosecute_Applications_efs.pdf	632221 2f153c5fc75f1707b53ca6e3e12b0a2929ca2353	no	1
Warnings:					
Information:					
3	Assignee showing of ownership per 37 CFR 3.73	RNB_2_1853US06_Statement_under_37_CFR_3_73c.pdf	132122 c26c18da9a38031bf1280641a9d9404fa5830eff	no	3
Warnings:					
Information:					
		Total Files Size (in bytes):	1037982		

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.

Doc Code: R46C.REQ
Document Description: Request under 37 CFR 1.46(c) to correct, update or change the applicant.

PTO/AIA/41 (04-15)
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 TO CORRECT OR UPDATE THE NAME OF THE APPLICANT UNDER 37 CFR 1.46(c)(1), OR CHANGE THE APPLICANT UNDER 37 CFR 1.46(c)(2)

(FOR USE ONLY IN APPLICATIONS FILED ON OR AFTER SEPTEMBER 16, 2012)

Application Number	16/421,019
Filing Date	May 23, 2019
First Named Inventor	Benoit Pelletier
Art Unit	2464
Examiner Name	Kan Yuen
Practitioner Docket Number	RNB-2-1853US06

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

Applicant hereby **requests that the name of the applicant be corrected or updated under 37 CFR 1.46(c)(1), or that the applicant be changed under 37 CFR 1.46(c)(2),** in the above-identified application. **Requests under 37 CFR 1.46(c)(1) or (c)(2) cannot be submitted after payment of the issue fee or if the application has been patented.**

Please check the applicable box(es) below.

☐ 1. This request is to **correct or update the name of the applicant** (**under 37 CFR 1.46(c)(1)**) and includes:

☐ An application data sheet (ADS) in accordance with 37 CFR 1.76(c) with the corrected or updated information shown with markings (*e.g.*, underlining for insertions, strikethrough for deletions). A Corrected Web-based ADS may be used.

Note: Requests under 37 CFR 1.46(c)(1) may be filed to correct typographical errors in the name of the § 1.46 applicant, or for updating the name of the § 1.46 applicant (*i.e.*, where there is no change in the applicant itself but just in the applicant's name). See the Manual of Patent Examining Procedure (MPEP) section 605.01.

■ 2. This request is to **change the applicant** (**under 37 CFR 1.46(c)(2)**) and includes:

■ An application data sheet (ADS) in accordance with 37 CFR 1.76(c) that identifies the changes with proper markings (underlining for insertions and strikethrough for deletions). A Corrected Web-based ADS may be used.

■ A Statement Under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent). See MPEP 325.

I am the

☐ applicant* ■ attorney or agent of record Registration number 59,819 ☐ attorney or agent acting under 37 CFR 1.34 Registration number _____

Signature /Joseph P. Gushue/

Typed or printed name Joseph P. Gushue

Date March 17, 2021

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. *Juristic entities must be represented by a patent practitioner (See 37 CFR 1.31, applicable to any paper filed on or after September 16, 2012 that is presented on behalf of a juristic entity, regardless of application filing date). Submit multiple forms if more than one signature is required, see below**.

☐ ** Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.36. 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.

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.

UNITED STATES PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

Corrected Application Data Sheet

16421019 : METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES

~~Strike-through~~ indicates removal of data from existing record Underline indicates new data being added to the application If no data is shown, no data has been corrected

Inventor Information

Data of record	Updated Data

No data change in this section

Application Information

Title of Invention	METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES
Attorney Docket Number	RNB-2-1853US06
Entity Status	Regular Undiscounted

Domestic Benefit/National Stage Information

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c), 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(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.

Data of record	Updated Data
No data change in this section	

Foreign Priority Information

This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. 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).

Data of record	Updated Data
No data change in this section	

Applicant Information

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.

Data of record	Updated Data
~~Signal Trust for Wireless Innovation~~ ~~---~~ ~~---~~ ~~Wilmington, DE ---~~ ~~---~~ ~~Phone: ---~~ ~~Email: ---~~ ~~Fax: ---~~ ~~Organization~~ ~~Applicant type: Assignee~~	
	RnB Wireless LLC

600 Columbus Avenue
Suite 106, #7
Waco, TX 76701
UNITED STATES
Phone : ----
Email : ----
Fax : ----
Organization
Applicant type : Assignee

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.

Data of record	Updated Data
~~Signal Trust for Wireless Innovation~~ ~~1011 Centre Road~~ ~~Suite 327~~ ~~Wilmington, DE 19805~~ ~~UNITED STATES~~ ~~Phone : ----~~ ~~Email : ----~~ ~~Fax : ----~~ ~~Organization~~	RnB Wireless LLC 600 Columbus Avenue Suite 106, #7 Waco, TX 76701 UNITED STATES Phone : ---- Email : ---- Fax : ---- Organization

Signature

NOTE:

This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b).

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

Signature	First name	Last name	Registration #	Date
/Joseph P. Gushue/	Joseph P.	Gushue	59819	03/17/2021

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/421,019	**03/17/2021 04:45:39 PM ET**	**RNB-2-1853US06**

Title of Invention

METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	9820	FILED BY	Margaret Ferello
PATENT CENTER #	60159077	FILING DATE	05/23/2019
CUSTOMER #	3624	FIRST NAMED INVENTOR	Benoit Pelletier
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Joseph Gushue

Documents

TOTAL DOCUMENTS: 1

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
CorrectedADS.pdf	4	Application Data Sheet to update/correct info	79 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
CorrectedADS.pdf	C4F56D3968FA39030D409CC4FC6D985EEFA10B22451749B4F8FC014A6830F2CF7772AEC85BF3B267F42DF94AFC83469EA22E520573D2EF98BB1B21A5ED720B32

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 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.
16/421,019	05/23/2019	Benoit Pelletier	SIG-2-1853US06	9820

3624 7590 12/30/2020

Volpe Koenig
30 SOUTH 17TH STREET, 18TH FLOOR
PHILADELPHIA, PA 19103

EXAMINER
YUEN, KAN

ART UNIT	PAPER NUMBER
2464	

NOTIFICATION DATE	DELIVERY MODE
12/30/2020	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):

eoffice@volpe-koenig.com

ONEPLUS - EX. 1002

Advisory Action Before the Filing of an Appeal Brief	**Application No.** 16/421,019	**Applicant(s)** Pelletier et al.	
	Examiner KAN YUEN	**Art Unit** 2464	**AIA (FITF) Status** No

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

THE REPLY FILED 16 December 2020 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

NO NOTICE OF APPEAL FILED

1. ☑ The reply was filed after a final rejection. No Notice of Appeal has been filed. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114 if this is a utility or plant application. Note that RCEs are not permitted in design applications. The reply must be filed within one of the following time periods:
   a) ☐ The period for reply expires ____ months from the mailing date of the final rejection.
   b) ☑ The period for reply expires on: (1) the mailing date of this Advisory Action; or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.
   c) ☐ A prior Advisory Action was mailed more than 3 months after the mailing date of the final rejection in response to a first after-final reply filed within 2 months of the mailing date of the final rejection.The current period for reply expires ____ months from the mailing date of *the prior Advisory Action* or SIX MONTHS from the mailing date of the final rejection, whichever is earlier.
   Examiner Note: If box 1 is checked, check either box (a), (b) or (c). ONLY CHECK BOX (b) WHEN THIS ADVISORY ACTION IS THE FIRST RESPONSE TO APPLICANTS FIRST AFTER-FINAL REPLY WHICH WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. ONLY CHECK BOX (c) IN THE LIMITED SITUATION SET FORTH UNDER BOX (c). See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) or (c) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

NOTICE OF APPEAL

2. ☐ The Notice of Appeal was filed on _____. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37CFR 41.37(a).

AMENDMENTS

3. ☑ The proposed amendments filed after a final rejection, but prior to the date of filing a brief, will not be entered because
   a) ☑ They raise new issues that would require further consideration and/or search (see NOTE below);
   b) ☐ They raise the issue of new matter (see NOTE below);
   c) ☐ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
   d) ☐ They present additional claims without canceling a corresponding number of finally rejected claims.
   NOTE: See Continuation Sheet (See 37CFR 1.116 and 41.33(a)).
4. ☐ The amendments are not in compliance with 37CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).
5. ☐ Applicants reply has overcome the following rejection(s): _____
6. ☐ Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
7. ☑ For purposes of appeal, the proposed amendment(s):(a) ☑ will not be entered, or (b) ☐ will be entered, and an explanation of how the new or amended claims would be rejected is provided below or appended.

AFFIDAVIT OR OTHER EVIDENCE

8. ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____
9. ☐ The affidavit or other evidence filed after final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).
10. ☐ The affidavit or other evidence filed after the date of filing the Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing of good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).
11. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

12. ☐ The request for reconsideration has been considered but does NOT place the application in condition for allowance because: _____.
13. ☐ Note the attached Information *Disclosure Statement*(s). (PTO/SB/08) Paper No(s). _____
14. ☑ Other: PTO-2323.

STATUS OF CLAIMS

15. The status of the claim(s) is (or will be) as follows:
    Claim(s) allowed:_____.
    Claim(s) objected to:_____.
    Claim(s) rejected:1-10.
    Claim(s) withdrawn from consideration:_____.

/KAN YUEN/ Primary Examiner, Art Unit 2464	

ONEPLUS - EX. 1002

Continuation of 3. NOTE: The Examiner thanks the applicant for filing the AFCP 2.0. The new amendment changes the scope of the claimed invention for example by adding new feature: "indicated by the received RRC message" as recited in claims 1 and 6. The new amendment doe not seem to put the case in condition for allowance. The new claim amendment raises a new issue(s) and therefore requires further search and/or reconsideration.

AFCP 2.0 Decision

Application No.	Applicant(s)	
16/421,019	Pelletier et al.	
Examiner	**Art Unit**	**AIA (FITF) Status**
KAN YUEN	2464	No

This is in response to the After Final Consideration Pilot request filed 16 December 2020.

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: See Continuation Sheet

   Examiner Note: Please attach an interview summary when necessary as described above.

ONEPLUS - EX. 1002

Continuation of Proper Request- B. 5. Other: The after final amendment was reviewed and it raises new issue(s) by adding new feature as recited in claims 1 and 6. The new amendment does not seem to put the case in condition for allowance. A new search and/or reconsideration is required.

DO NOT ENTER: /K.Y/

12/23/2020

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the **PATENT APPLICATION** of:	
	Pelletier et al.
Application No.:	16/421,019
Confirmation No.:	9820
Filed:	May 23, 2019
For:	METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES
Group:	2464
Examiner:	Kan Yuen

Our File: SIG-2-1853US06

Date: December 16, 2020

RESPONSE PURSUANT TO 37 C.F.R. §1.116

Mail Stop Final (via EFS)
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This Response is being filed in response to the Final Office Action dated November 16, 2020 and is submitted in conjunction with a Request for Consideration under AFCP.

Please amend the application without prejudice or disclaimer as follows:

ONEPLUS - EX. 1002

Doc code: RCEX
Doc description: Request for Continued Examination (RCE)

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.

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

Application Number	16421019	Filing Date	2019-05-23	Docket Number (if applicable)	SIG-2-1853US06	Art Unit	2464
First Named Inventor	Pelletier et al.			Examiner Name	Kan Yuen		

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 Response to Final Office Action with AFCP Request filed on December 16, 2020

☐ 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 220493

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

Applicant Signature

ONEPLUS - EX. 1002

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	/Joseph P. Gushue/	Date (YYYY-MM-DD)	2020-12-30
Name	Joseph P. Gushue	Registration Number	59819

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.

ONEPLUS - EX. 1002

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.

ONEPLUS - EX. 1002

Electronic Patent Application Fee Transmittal

Application Number:	16421019
Filing Date:	23-May-2019
Title of Invention:	METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES
First Named Inventor/Applicant Name:	Benoit Pelletier
Filer:	Joseph P. Gushue/Margaret Ferello
Attorney Docket Number:	SIG-2-1853US06

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($)
Miscellaneous:				
RCE- 1ST REQUEST	1801	1	1360	1360
		Total in USD ($)		**1360**

Electronic Acknowledgement Receipt

EFS ID:	41513910
Application Number:	16421019
International Application Number:	
Confirmation Number:	9820
Title of Invention:	METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES
First Named Inventor/Applicant Name:	Benoit Pelletier
Customer Number:	3624
Filer:	Joseph P. Gushue/Margaret Ferello
Filer Authorized By:	Joseph P. Gushue
Attorney Docket Number:	SIG-2-1853US06
Receipt Date:	30-DEC-2020
Filing Date:	23-MAY-2019
Time Stamp:	12:35:42
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$1360
RAM confirmation Number	E2020BTC36132394
Deposit Account	220493
Authorized User	Margaret Ferello

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

37 CFR 1.17 (Patent application and reexamination processing fees)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Continued Examination (RCE)	SIG_2_1853US06_RCE_20201230.pdf	1404725 bcbdaadfab83b1ae2d99efee12e8334f780203f9	no	3
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30536 4caf5609f92ceef2456bdf22fc4c0ee56e3ff467	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	1435261		

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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.

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 16/421,019	Filing Date 05/23/2019	☐ 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	12/30/2020	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 10	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".	/VIOLA D ROGERS/
*** 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.

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/421,019	Filing Date 05/23/2019	☐ 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	12/30/2020	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 10	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".	/VIOLA D ROGERS/
*** 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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Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

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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	16421019
Filing Date	2019-05-23
First Named Inventor	Benoit Pelletier
Art Unit	2464
Examiner Name	YUEN, KAN
Attorney Docket Number	SIG-2-1853US06

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	1	2005/022813	WO	A1	2005-03-10	QUALCOMM INCORPORATED		

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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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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16421019
	Filing Date	2019-05-23
	First Named Inventor	Benoit Pelletier
	Art Unit	2464
	Examiner Name	YUEN, KAN
	Attorney Docket Number	SIG-2-1853US06

	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.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16421019
	Filing Date	2019-05-23
	First Named Inventor	Benoit Pelletier
	Art Unit	2464
	Examiner Name	YUEN, KAN
	Attorney Docket Number	SIG-2-1853US06

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	/Joseph P. Gushue/	Date (YYYY-MM-DD)	2020-12-24
Name/Print	Joseph P. Gushue	Registration Number	59,819

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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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 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.

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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the **PATENT APPLICATION** of:	
	Pelletier et al.
Application No.:	16/421,019
Filed:	May 23, 2019
For:	METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES
Group:	2464
Examiner:	Kan Yuen

Our File: SIG-2-1853US06

Date: December 24, 2020

INFORMATION DISCLOSURE STATEMENT

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

Sir:

Further to Applicant's Duty of Disclosure pursuant to 37 C.F.R. § 1.56, Applicant wishes to bring to the Examiner's attention the material cited on the enclosed PTO Form SB-08. A copy of the newly cited document is enclosed.

This application is a continuation of U.S. Patent Application No. 14/876,337 filed October 6, 2015, which issued on May 28, 2019 as U.S. Patent No. 10,306,677, which is a continuation of U.S. Patent Application No. 14/319,608 filed June 30, 2014, which issued on April 12, 2016 as U.S. Patent No. 9,313,809, which is a continuation of U.S.

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Patent Application No. 12/238,910 filed September 26, 2008, which issued on July 8, 2014 as U.S. Patent No. 8,774,104, which claims the benefit of U.S. Provisional Patent Application Nos. 61/083,409 filed July 24, 2008, 61/074,288 filed June 20, 2008, 61/038,576, filed March 21, 2008, 61/025,441 filed February 1, 2008, 61/018,999 filed January 4, 2008, 60/982,528 filed October 25, 2007 and 60/975,985 filed September 28, 2007. This application is related to co-pending U.S. Patent Application entitled "Method And Apparatus For Performing Random Access Transmissions", attorney docket number SIG-2-1853US07, filed November 16, 2020.

This application is also related to co-pending U.S. Application No. 16/516,893, filed July 19, 2019, which is a continuation of U.S. Application No. 15/836,302, filed December 8, 2017, which issued on July 23, 2019 as U.S. Patent No. 10,362,622, which is a continuation of U.S. Patent Application No. 15/182,218, filed June 14, 2016, which issued on December 12, 2017 as U.S. Patent No. 9,844,093, which is a continuation of U.S. Patent Application No. 15/049,922, filed February 22, 2016, which issued on June 21, 2016 as U.S. Patent No. 9,374,816, which is a continuation of U.S. Patent Application No. 12/256,964, filed October 23, 2008, which issued on February 23, 2016, as U.S. Patent No. 9,217,280, which claims the benefit of U.S. Provisional Patent Application No. 60/982,528, filed October 25, 2007 and U.S. Provisional Patent Application No. 61/018,567, filed January 2, 2008.

Applicant also wishes to bring to the Examiner's attention co-pending U.S. Application No. 17/099,386, filed November 16, 2020 and co-pending U.S. Application

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No. 17/099,407, filed November 16, 2020, both of which are continuations of co-pending U.S. Application No. 16/440,886, filed June 13, 2019, which is a continuation of U.S. Patent Application No. 15/782,532, filed October 12, 2017, which issued on June 18, 2019 as U.S. Patent No. 10,327,188, which is a continuation of U.S. Patent Application No. 15/135,616, filed April 22, 2016, which is a continuation of U.S. Patent Application No. 14/875,059, filed October 5, 2015, which is a continuation of U.S. Patent Application No. 13/665,734, filed October 31, 2012, which issued October 13, 2015, as U.S. Patent No. 9,161,285, which is a continuation of U.S. Patent Application No. 12/346,631, filed December 30, 2008, which issued December 4, 2012 as U.S. Patent No. 8,325,684, which claims priority from Provisional Application No. 61/018,567, which was filed January 2, 2008.

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It is respectfully requested that the Examiner consider these documents and return an initialed copy of the PTO Form SB-08 indicating consideration of the cited materials.

Respectfully submitted,

Signal Trust for Wireless Innovation

By /Joseph P. Gushue/
Joseph P. Gushue
Registration No. 59,819
(215) 568-6400

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30 South 17th Street; Suite 1800
Philadelphia, PA 19103-4009
Telephone: (215) 568-6400
Facsimile: (215) 568-6499

JPG/pf
Enclosures (2)

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(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
10 March 2005 (10.03.2005)

PCT

(10) International Publication Number
WO 2005/022813 A1

(51) International Patent Classification[7]: H04L 1/00, H04Q 7/38

(21) International Application Number: PCT/US2004/027222

(22) International Filing Date: 20 August 2004 (20.08.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

60/497,456	21 August 2003 (21.08.2003)	US
60/497,457	21 August 2003 (21.08.2003)	US
10/922,405	19 August 2004 (19.08.2004)	US

(71) Applicant *(for all designated States except US)*: **QUALCOMM INCORPORATED** [US/US]; 5775 Morehouse Drive, San Diego, California 92121 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **GRILLI, Francesco** [IT/US]; 5350 Toscana Way, #402, San Diego, California 92122-5663 (US). **VAYANOS, Alkinoos Hector** [GR/US]; 1037 Diamond Street, San Diego, California 92109 (US). **CASACCIA, Lorenzo** [IT/US]; 1501-8 Reed Avenue, San Diego, California 92109 (US).

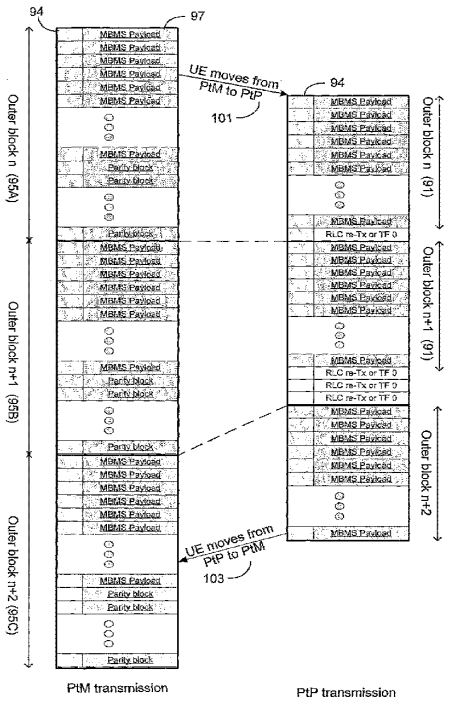
(74) Agent: **MADIL, Erin P.**; 5775 Morehouse Drive, San Diego, Califonia 92121 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,

[Continued on next page]

(54) Title: METHODS FOR SEAMLESS DELIVERY OF BROADCAST AND MULTICAST CONTENT ACROSS CELL BORDERS AND/OR BETWEEN DIFFERENT TRANSMISSION SCHEMES AND RELATED APPARATUS



(57) Abstract: Transmission techniques are provided that improve service continuity and reduce interruptions in delivery of content that can be caused by transitions that occur when the User Equipment (UE) moves from one cell to the other, or when the delivery of content changes from a Point-to-Point (PTP) connection to a Point-to-Multipoint (PTM) connection in the same serving cell, and vice-versa. Such transmission techniques enable seamless delivery of content across cell borders and/or between different transmission schemes such as Point-to-Multipoint (PTM) and Point-to-Point (PTP). Mechanisms for adjusting different streams and for recovering content from each data block during such transitions are also provided so that data is not lost during a transition. In addition, mechanisms for realigning data during decoding at a receiving terminal are also provided.

WO 2005/022813 A1

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ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

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METHODS FOR SEAMLESS DELIVERY OF BROADCAST AND MULTICAST CONTENT ACROSS CELL BORDERS AND/OR BETWEEN DIFFERENT TRANSMISSION SCHEMES AND RELATED APPARATUS

Claim of Priority under 35 U.S.C. §119

[0001] The present Application for Patent claims priority to Provisional Application No. 60/497,457 entitled "Method and Apparatus for Seamless Delivery of Broadcast and Multicast Content Across Cell Borders and/or Between Different Transmission Schemes" filed August 21, 2003 and Provisional Application No. 60/497,456 entitled "L2 Design for Outer Coding Scheme" filed August 21, 2003, both of which can be assigned to the assignee hereof and hereby expressly incorporated by reference herein.

BACKGROUND

Field

[0002] The present invention relates generally to communication systems, and more specifically to delivery of broadcast and multicast content.

Background

[0003] Wireless communication systems have traditionally been used to carry voice traffic and low data rate non-voice traffic. Today wireless communication systems are being implemented that also carry high data rate (HDR) multimedia traffic, such as video, data, and other types of traffic. Multimedia Broadcast and Multicast Service (MBMS) channels may be used to transmit streaming applications based on voice, audio and video data sources such as, radio broadcasts, television broadcasts, movies, and other types of audio or video content. Streaming data sources can tolerate delay and a certain amount of loss or bit errors, since these sources are sometimes intermittent and typically compressed. As such, the data-rate of transmissions arriving at the Radio Access Network (RAN) can be highly variable. Because application buffers are typically finite, the MBMS transmission mechanisms are needed that support variable source data-rates.

[0004] Base stations typically provide such multimedia traffic services to the subscriber stations by transmitting an information signal that can be often organized into a plurality of packets. A packet may be a group of bytes, including data (payload) and control

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elements, that are arranged into a specific format. The control elements may comprise, for example, a preamble and a quality metric that can include a cyclical redundancy check (CRC), parity bit(s), and other types of metrics. The packets are usually formatted into a message in accordance with a communication channel structure. The message travels between the origination terminal and the destination terminal, and can be affected by characteristics of the communication channel, such as, signal-to-noise ratio, fading, time variance, and other such characteristics. Such characteristics can affect the modulated signal differently in different communication channels. Among other considerations, transmission of a modulated information signal over a wireless communication channel requires selection of appropriate methods for protecting the information in the modulated signal. Such methods may comprise, for example, encoding, symbol repetition, interleaving, and other methods known to one of ordinary skill in the art. However, these methods increase overhead. Therefore, an engineering compromise between reliability of message delivery and the amount of overhead must be made.

[0005] The operator typically selects either a Point-to-Point (PTP) connection or a Point-to-Multipoint (PTM) connection on a cell by cell basis depending on the number of subscriber stations or User Equipment (UE) interested in receiving the MBMS content.

[0006] Point-to-Point (PTP) transmission uses dedicated channels to send the service to selected users in the coverage area. A "dedicated" channel carries information to/from a single subscriber station. In Point-to-Point (PTP) transmissions a separate channel can be used for transmission to each mobile station. Dedicated user traffic for one user service in the forward link or downlink direction can be sent, for example, through a logical channel called the Dedicated Traffic Channel (DTCH). Point-to-Point (PTP) communication services are typically most efficient, for example, if there are not enough users demanding a specific Multimedia Broadcast and Multicast Service (MBMS) in the coverage area. In such cases, Point-to-Point (PTP) transmission may be used in which the base station transmits the service only to the specific users who have requested the service. For example, in WCDMA systems it can be more efficient to use a dedicated channel or Point-to-Point (PTP) transmission until there are more than a predetermined number of mobile stations.

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[0007] A "broadcast communication" or "Point-to-Multipoint (PTM) communication" is a communication over a common communication channel to a plurality of mobile stations. A "common" channel carries information to/from multiple subscriber stations, and may be simultaneously used by several terminals. In a Point-to-Multipoint (PTM) communication service, a cellular base station may broadcast multimedia traffic service on a common channel if, for example, the number of users demanding the service exceeds a predetermined threshold number within the coverage area of the base station. In CDMA 2000 systems, broadcast or Point-to-Multipoint (PTM) transmission is typically used in lieu of the PtP transmission, since the PtM radio bearer is almost as efficient as the PtP radio bearer. Common channel transmissions from a particular base station may not necessarily be synchronized with common channel transmissions from other base stations. In a typical broadcast system one or more central stations serve content to a (broadcast net of users). The central station(s) can transmit information to either all subscriber stations or to a specific group of subscriber stations. Each subscriber station interested in a broadcast service monitors a common forward link signal. Point-to-Multipoint (PTM) transmissions can be sent on a downlink or forward common channel. This common broadcast forward link signal is typically broadcast on a unidirectional channel, such as the Common Traffic Channel (CTCH) that exists in the forward link or "downlink" direction. Because this channel is unidirectional, the subscriber station generally does not communicate with the base station since allowing all subscriber units to communicate back to the base station might overload the communication system. Thus, in the context of Point-to-Multipoint (PTM) communication services, when there is an error in the information received by the subscriber stations, the subscriber stations may not be able to communicate back to the base station. Consequently, other means of information protection can be desirable.

[0008] In CDMA 2000 systems, the subscriber station can soft combine in Point-to-Multipoint (PTM) transmission. Even when steps are taken to protect the information signal, the conditions of the communication channel can degrade such that the destination station cannot decode some of the packets transferred over dedicated channels. In such cases, one approach can be to simply re-transmit the non-decoded packets using an Automatic Retransmission reQuest (ARQ) made by the destination (subscriber) station to the origination (base) station. Retransmission helps ensure

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delivery of the data packet. In the event the data can not be delivered correctly, the user of RLC at the transmitting side can be notified.

[0009] The subscriber station typically undergoes transitions in a number of scenarios. These transitions can be classified in different ways. For example, transitions may be classified as "cross transitions" and "direct transitions." Transitions can also be classified as "inter-cell" transitions and "intra-cell" transitions.

[0010] Transitions between cells or transmission schemes can result in service interruption that can be undesirable to users. Problems may arise when the subscriber station or User Equipment (UE) moves from one cell to the other or when the delivery of Multimedia Broadcast and Multicast Service (MBMS) content changes from one mode to another mode in the serving cell. Transmissions from neighboring cells may be time-shifted with respect to one another by an amount $\Delta t1$. Moreover, additional delay can be introduced during a transition since the mobile station needs to determine system information in the target cell, which requires a certain amount of processing time $\Delta t2$. The data streams transmitted from different cells (or different transport channel types Point-to-Point (PTP)/Point-to-Multipoint (PTM)) may be offset relative to one another. Therefore, during Point-to-Multipoint (PTM) transmissions from different cells, the mobile station may receive the same block of content twice or some blocks of content may be lost, which can be undesirable in terms of Quality of Service. Transitions between cells and/or between Point-to-Point (PTP) transmission and Point-to-Multipoint (PTM) transmission could cause an interruption in service, depending on the duration of the transition and on the delay or misalignment between transmissions.

[0011] There is therefore a need in the art for transmission techniques that will provide service continuity and reduce interruptions in delivery of content that can be caused by transitions that occur when the User Equipment (UE) moves from one cell to the other, or caused by transitions that occur when the delivery of content changes from a Point-to-Point (PTP) connection to a Point-to-Multipoint (PTM) connection in the same serving cell, and vice-versa. Such transmission techniques would preferably enable seamless delivery of content across cell borders and/or between different transmission schemes such as Point-to-Multipoint (PTM) and Point-to-Point (PTP). Mechanisms for adjusting different streams and for recovering content from each data block during such transitions are also desirable so that data is not lost during a transition. It would also be

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desirable to provide mechanisms for realigning data during decoding at a receiving terminal.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] FIG. 1 is a diagram of a communication system.

[0013] FIG. 2 is a block diagram of the UMTS signaling protocol stack.

[0014] FIG. 3 is a block diagram of a packet switched user plane of the UMTS protocol stack.

[0015] FIG. 4 is a block diagram of an access stratum portion of the UMTS signaling protocol stack.

[0016] FIG. 5A is a block diagram of data transfer modes used in the Radio Link Control (RLC) layer of the UMTS signaling protocol stack, and various channels used in each layer.

[0017] FIG. 5B is a block diagram showing the architecture of the Radio Link Control (RLC) layer including various RLC data transfer modes.

[0018] FIG. 5C is a block diagram showing an entity for implementing the Radio Link Control (RLC) Acknowledged Mode (AM).

[0019] FIG. 6 is a diagram of a modified UMTS protocol stack having a Forward Error Correction Layer.

[0020] FIG. 7A shows an embodiment of a protocol structure of the access stratum that includes a forward error correction (FEC) layer.

[0021] FIG. 7B shows another embodiment of a protocol structure of the access stratum that includes a forward error correction (FEC) layer.

[0022] FIG. 8 is a diagram of an information block and outer code block corresponding to the information block.

[0023] FIG. 9A is a diagram showing an outer code block structure that can be applied to Multimedia Broadcast and Multicast Service (MBMS) data.

[0024] FIG. 9B is a diagram showing the outer code block structure of FIG. 9A in which multiple rows are sent per Transmission Time Interval (TTI).

[0025] FIG. 9C is a diagram showing the outer block structure of FIG. 9A in which each row is sent in multiple TTIs.

[0026] FIGs. 10A and 10B are diagrams that show the outer code blocks generated by the Forward Error Correction layer.

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[0027] FIG. 11 is an embodiment of a Forward Error Correction (FEC) layer used in a RLC UM+ entity.

[0028] FIG. 12A shows an encoding process for creating an outer code block from data units in which row sizes of the outer code block are fixed.

[0029] FIG. 12B shows an example of information transmitted over the air in FIG. 12A.

[0030] FIG. 13 shows an encoding process for creating an outer code block having a variable row size.

[0031] FIG. 14 is a diagram of an embodiment of a Forward Error Correction (FEC) header format.

[0032] FIG. 15 is an algorithm for enabling mobile stations to delay decoding by the time-offset between different logical streams.

[0033] FIG. 16 is a diagram that shows a temporal relationship between outer code blocks received by a mobile station as the mobile station transitions between receiving a Point-To-Multipoint (PTM) transmission from cell A and another Point-To-Multipoint (PTM) transmission from cell B.

[0034] FIG. 17 is a diagram that shows a temporal relationship between outer code blocks received by a mobile station as a transition between a Point-To-Multipoint (PTM) transmission and a Point-To-Point (PTP) transmission occurs.

[0035] FIG. 18 is a diagram that shows a temporal relationship between outer code blocks received by a mobile station during a transition or relocation between a Point-To-Point (PTP) transmission from Radio Network Controller (RNC) A and another Point-To-Point (PTP) transmission from Radio Network Controller (RNC) B.

DETAILED DESCRIPTION

[0036] The word "exemplary" is used herein to mean "serving as an example, instance, or illustration." Any embodiment described herein as "exemplary" is not necessarily to be construed as preferred or advantageous over other embodiments.

[0037] The term "mobile station" is used herein interchangeably with the terms "destination station," "subscriber station," "subscriber unit," "terminal" and "User Equipment (UE)," and is used herein to refer to the hardware, such as a base station, with which an access network, such as the UMTS Terrestrial Radio Access Network (UTRAN), communicates. In UMTS systems, the User Equipment (UE) is a device that allows a user to access UMTS network services and also preferably includes a USIM

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that contains all of a user's subscription information. A mobile station may be mobile or stationary, and can generally include any communicator, data device or terminal that communicates through a wireless channel or through a wired channel, for example, using fiber optic or coaxial cables. Mobile stations may be embodied in devices that include but that are not limited to PC card, compact flash, external or internal modem, or wireless or wireline phone.

[0038] The term "connection setup state" refers to the state in which a mobile station is in the process of establishing an active traffic channel connection with a base station.

[0039] The term "traffic state" refers to the state in which a mobile station has established an active traffic channel connection with a base station.

[0040] The term "communication channel" is used herein to mean a physical channel or a logical channel in accordance with the context.

[0041] The term "physical channel" is used herein to refer to a channel that carries user data or control information over the air interface. Physical channels are the "transmission media" that provide the radio platform through which the information is actually transferred, and serve to carry signaling and user data over the radio link. A physical channel typically comprises the combination of frequency scrambling code and channelization code. In the uplink direction, relative phase can be also included. A number of different physical channels can be used in the uplink direction based upon what the mobile station is attempting to do. In a UMTS system, the term physical channel may also refer to the different kinds of bandwidth allocated for different purposes over a Uu interface. The physical channels form the physical existence of the Uu interface between the User Equipment (UE) domain and the network access domain. Physical channels can be defined by physical mappings and attributes used to transfer data over the air interface.

[0042] The term "transport channel" is used herein to refer to a communication route for data transport between peer physical layer entities. Transport channels relate to the manner in which information is transmitted. Generally, there can be two types of transport channels known as Common Transport Channels and Dedicated Transport Channels. A transport channel can be defined by how and with what characteristics data can be transferred over the air interface on the physical layer, for example, whether using dedicated or common physical channels, or multiplexing of logical channels. Transport channels may serve as service access points (SAPs) for the physical layer. In

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a UMTS system, the transport channel describes how the logical channels can be transferred and maps these information flows to physical channels. Transport channels can be used to carry signaling and user data between the Medium Access Control (MAC) layer and the Physical Layer (L1). The Radio Network Controller (RNC) sees transport channels. Information passes to the physical layer from the MAC layer over any one of a number of transport channels that can be mapped to physical channels.

[0043] The term "logical channel" is used herein to refer to an information stream dedicated to the transfer of a specific type of information or the radio interface. Logical channels relate to the information being transmitted. A logical channel can be defined by what type of information is transferred, for example, signaling or user data, and can be understood as different tasks the network and terminal should perform at different point in time. Logical channels can be mapped into transport channels performing actual information transfer between the mobile station domain and the access domain. Information passes via logical channels that can be mapped through transport channels which can be mapped to physical channels.

[0044] The term "dedicated channel" is used herein to refer to a channel that is typically dedicated to, or reserved for, a specific user, and that carries information to or from a specific mobile station, subscriber unit, or user equipment. A dedicated channel typically carries information intended for a given user, including data for the actual service as well as higher layer control information. A dedicated channel can be identified by a certain code on a certain frequency. A dedicated channel can be bi-directional to potentially allow for feedback.

[0045] The term "common channel" is used herein to refer to a transport channel that carries information to/from multiple mobile stations. In a common channel information may be shared among all mobile stations. A common channel can be divided between all users or a group of users in a cell.

[0046] The term "Point-to-Point (PTP) communication" is used herein to mean a communication transmitted over a dedicated, physical communication channel to a single mobile station.

[0047] The terms "broadcast communication" or "Point-to-Multipoint (PTM) communication" can be used herein to refer to a communication over a common communication channel to a plurality of mobile stations.

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[0048] The term "reverse link or uplink channel" is used herein to refer to a communication channel/link through which the mobile station sends signals to a base station in the radio access network. This channel may also be used to transmit signals from a mobile station to a mobile base station or from a mobile base station to a base station.

[0049] The term "forward link or downlink channel" is used herein to mean a communication channel/link through which a radio access network sends signals to a mobile station.

[0050] The term "Transmission Timing Interval" (TTI) is used herein to refer to how often data arrives from higher layers to the physical layer. A Transmission Timing Interval (TTI) may refer to the inter-arrival time of a Transport Block Set (TBS), and is approximately equal to the periodicity at which a TBS is transferred by the physical layer on the radio interface. Data sent on a Transport Channel during a TTI can be coded and interleaved together. A TTI can span multiple radio frames, and can be a multiple of the minimum interleaving period. The start positions of the TTIs for different transport channels that can be multiplexed together for a single connection are time aligned. TTIs have a common starting point. The Medium Access Control delivers one Transport Block Set to the physical layer every TTI. Different transport channels mapped on the same physical channel can have different Transmission Timing Interval (TTI) durations. Multiple PDUs can be sent in one TTI.

[0051] The term "packet" is used herein to mean a group of bits, including data or payload and control elements, arranged into a specific format. The control elements may comprise, for example, a preamble, a quality metric, and others known to one skilled in the art. Quality metric comprises, for example, a cyclical redundancy check (CRC), a parity bit, and others known to one skilled in the art.

[0052] The term "access network" is used herein to mean equipment necessary for accessing the network. The access network may comprise a collection or network of base stations (BS) and one or more base station controllers (BSC). The access network transports data packets between multiple subscriber stations. The access network may be further connected to additional networks outside the access network, such as a corporate intranet or the Internet, and may transport data packets between access terminals and such outside networks. In the UMTS system the access network can be referred to as the UMTS Terrestrial Radio Access Network (UTRAN).

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[0053] The term "core network" is used herein to refer to the switching and routing capability for connecting to either the Public Switched Telephone Network (PSTN), for circuit switched calls in the circuit switched (CS) domain, or the Packet Data Network (PSDN) for packet-switched calls in the packet switched (PS) domain. The term "core network" also refers to the routing capability for mobility and subscriber location management and for authentication services. The core network includes network elements needed for switching and subscriber control.

[0054] The term "base station" is used herein to refer to an "origination station" that includes the hardware with which mobile station communicates. In the UMTS system, the term "node B" can be used interchangeably with the term "base station." A base station may be fixed or mobile.

[0055] The term "cell" is used herein to refer to either hardware or a geographic coverage area depending on the context in which the term is used.

[0056] The term "Service Data Unit (SDU)" is used herein to refer to a data unit exchanged with the protocol sitting above the protocol of interest.

[0057] The term "Payload Data Unit (PDU)" is used herein to refer to a data unit exchanged with the protocol sitting below the protocol of interest. If the identity of the protocol of interest is ambiguous, then a specific mention will be made in the name. For example, FEC-PDUs are the PDUs of the FEC layer.

[0058] The term "soft handoff" is used herein to mean a communication between a subscriber station and two or more sectors, wherein each sector belongs to a different cell. The reverse link communication can be received by both sectors, and the forward link communication can be simultaneously carried on the two or more sectors' forward links.

[0059] The term "softer handoff" is used herein to mean a communication between a subscriber station and two or more sectors, wherein each sector belongs to the same cell. The reverse link communication can be received by both sectors, and the forward link communication can be simultaneously carried on one of the two or more sectors' forward links.

[0060] The term "erasure" is used herein to mean failure to recognize a message and can also be used to refer to a set of bits which can be missing at the time of decoding.

[0061] The term "cross transition" may be defined as a transition from Point-to-Point (PTP) transmission to Point-to-Multipoint (PTM) transmission, or vice-versa. The four

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possible cross transitions are from Point-to-Point (PTP) transmission in cell A to Point-to-Multipoint (PTM) transmission in cell B, from Point-to-Multipoint (PTM) transmission in cell A to Point-to-Point (PTP) transmission in cell B, from Point-to-Point (PTP) transmission in cell A to Point-to-Multipoint (PTM) transmission in cell A, and from Point-to-Multipoint (PTM) transmission in cell A to Point-to-Point (PTP) transmission in cell A.

[0062] The term "direct transition" may be defined as transitions from one Point-to-Point transmission to another Point-to-Point transmission and transitions from Point-to-Multipoint transmission to Point-to-Multipoint transmission. The two possible direct transitions are from Point-to-Point (PTP) in cell A to Point-to-Point (PTP) transmission in cell B, and from Point-to-Multipoint (PTM) transmission in cell A to Point-to-Multipoint (PTM) transmission in cell B.

[0063] The term "inter-cell transition" is used to refer to a transition across cell boundaries. The four possible inter-cell transitions are from Point-to-Point (PTP) transmission in cell A to Point-to-Point (PTP) transmission in cell B, from Point-to-Multipoint (PTM) transmission in cell A to Point-to-Multipoint (PTM) transmission in cell B, from Point-to-Point (PTP) transmission in cell A to Point-to-Multipoint (PTM) transmission in cell B, and from Point-to-Multipoint (PTM) transmission in cell A to Point-to-Point (PTP) transmission in cell B. Generally, the most frequent transition is the Point-to-Multipoint (PTM) transmission to Point-to-Multipoint (PTM) transmission across cell boundaries.

[0064] The term "intra-cell transition" is used to refer to transitions within a cell from one mode to another mode. The two possible intra-cell transitions are from Point-to-Point (PTP) transmission in cell A to Point-to-Multipoint (PTM) transmission in cell A, and from Point-to-Multipoint (PTM) transmission in cell A to Point-to-Point (PTP) transmission in cell A.

[0065] The term "radio bearer" is used to refer to a service provided by Layer 2 for transfer of user data between User Equipment (UE) and the UMTS Terrestrial Radio Access Network (UTRAN).

[0066] Embodiments of the invention will now be discussed in which aspects discussed above are implemented in a WCDMA or UMTS communications system. FIGs. 1-5C explain some aspects of a conventional UMTS or WCDMA system in which aspects of the inventions described herein could be applied in this description is provided only for

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purposes of illustration and limitation. It should be appreciated that aspects of the invention can also be applicable in other systems carrying both voice and data such as GSM systems and CDMA 2000 systems conforming to the "3rd Generation Partnership Project" (3GPP), embodied in a set of documents including Document Nos. 3G TS 25.211, 3G TS 25.212, 3G TS 25.213, and 3G TS 25.214 (the W-CDMA standard), or "TR-45.5 Physical Layer Standard for cdma2000 Spread Spectrum Systems" (the IS-2000 standard), and GSM specifications such as TS 04.08 (the Mobile radio interface layer 3 specification), TS 05.08 (Radio Subsystem Link Control), and TS 05.01 (Physical Layer on the Radio Path (General Description)).

[0067] For example, although the description specifies that the radio access network 20 can be implemented using the Universal Terrestrial Radio Access Network (UTRAN) air interface, alternatively, in a GSM/GPRS system, the access network 20 could be a GSM/EDGE Radio Access Network (GERAN), or in an inter-system case it could be comprise cells of a UTRAN air interface and cells of a GSM/EDGE air interface.

UMTS Network Topology

[0068] FIG. 1 is a block diagram of a communication system according to the UMTS network topology. A UMTS system includes User Equipment (UE) 10, an access network 20, and a core network 30. The UE 10 is coupled to the access network which is coupled to the core network 30 which can be coupled to an external network.

[0069] The UE 10 includes mobile equipment 12 and a Universal Subscriber Identity Module (USIM) 14 that contains a user's subscription information. The Cu interface not shown) is the electrical interface between the USIM 14 and the mobile equipment 12. The UE 10 is generally a device that allows a user to access UMTS network services. The UE 10 may be a mobile such as a cellular telephone, a fixed station, or other data terminal. The mobile equipment may be, for an example, a radio terminal used for radio communications over an air interface (Uu). The Uu interface is the interface through which the UE accesses the fixed part of the system. The USIM is generally an application that resides on a "smartcard" or other logic card that includes a microprocessor. The smart card holds the subscriber identity, performs authentication algorithms, and stores authentication in encryption keys and subscription information needed at the terminal.

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[0070] The access network 20 includes the radio equipment for accessing the network. In a WCDMA system, the access network 20 is the Universal Terrestrial Radio Access Network (UTRAN) air interface. The UTRAN includes at least one Radio Network Subsystem (RNS) that includes at least one base station or "node B" 22 coupled to at least one Radio Network Controller (RNC) 24.

[0071] The RNC controls the radio resources of the UTRAN. The RNCs 24 of the access network 20 communicate with the core network 30 via the Iu interface. The Uu interface, Iu interface 25, Iub interface, and Iur interface allow for internetworking between equipment from different vendors and are specified in the 3GPP standards. Implementation of the Radio Network Controller (RNC) varies from vendor to vendor, and therefore will be described in general terms below.

[0072] The Radio Network Controller (RNC) 24 serves as the switching and controlling element of the UMTS Terrestrial Radio Access Network (UTRAN), and is located between the Iub interface and Iu interface 25. The RNC acts as a service access point for all services the UTRAN provides to the core network 30, for example, management of connections to the user equipment. The Iub interface 23 connects a node B 22 and an Radio Network Controller (RNC) 24. The Iu interface connects the UTRAN to the core network. The Radio Network Controller (RNC) provides a switching point between the Iu bearer and the base stations. The User Equipment (UE) 10 may have several radio bearers between itself and the Radio Network Controller (RNC) 24. The radio bearer is related to the User Equipment (UE) context which is a set of definitions required by the Iub in order to arrrage common connections and dedicated connections between the User Equipment (UE) and Radio Network Controller (RNC). The respective RNCs 24 may communicate with each other over an optional Iur interface that allows soft handover between cells connected to different nodes 22. The Iur interface thus allows for inter-RNC connections. In such cases, a serving RNC maintains the Iu connection 25 to the core network 30 and performs selector and outer loop power control functions, while a drift RNC transfers frames that can be exchanged over the Iur interface to mobile station 10 via one or more base stations 22.

[0073] The RNC that controls one node B 22 can be referred to as the controlling RNC of the node B, and controls the load and congestion of its own cells, and also executes admission control and code allocations for new radio links to be established in those cells.

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[0074] RNCs and base stations (or node Bs) can be connected via and communicate over the Iub interface 23. The RNCs control use of the radio resources by each base station 22 coupled to a particular RNC 24. Each base station 22 controls one or more cells and provides a radio link to the mobile station 10. The base station may perform interface processing such as channel coding and interleaving, rate adaptation and spreading. The base station also performs basic radio resource management operations such as the interloop power control. The base station 22 converts the data flow between the Iub and Uu interfaces 23, 26. The base station 22 also participates in radio resources management. An over-the air interface Uu 26 couples each base station 22 to the mobile station 10. The base stations can be responsible for radio transmission in one or more cells to the mobile station 10, and for radio reception in one or more cells from the mobile station 10.

[0075] The core network 30 includes all of the switching and routing capability for (1) connecting to either the PSTN 42 if a circuit switched call is present or to a Packet Data Network (PDN) is a packet-switched call is present, (2) mobility and subscriber location management, and (3) authentication services. The core network 30 can include a home location register (HLR) 32, a mobile switching services center/visitor location register (MSC/VLR) 34, a gateway mobile switching center (GMSC) 36, a serving general packet radio service support node (SGSN) 38, and a gateway GPRS support node (GGSN) 40.

[0076] The core network 30 may be coupled to an external circuit-switched (CS) network 42 that provides circuit-switched connections, such as Public Switched Telephone Network (PSTN) or (ISDN), if a packet switched call is present, or may be coupled to a PS network 44, such as the Internet, that provides connections for packet data services if a packet switched call is present.

UMTS Signaling Protocol Stack

[0077] FIG. 2 is a block diagram of the UMTS signaling protocol stack 110. The UMTS signaling protocol stack 110 includes an access stratum and a non-access stratum (NAS).

[0078] The access stratum typically includes a physical layer 120, layer 2 130 which includes a medium access control (MAC) layer 140 and a radio link control (RLC) layer

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150, and a radio resource control (RRC) layer 160. The various layers of the access stratum will be described in greater detail below.

[0079] The UMTS non-access stratum layer is essentially the same as GSM upper layers and can be divided into a circuit switched portion 170 and a packet switched portion 180. The circuit switched portion 170 includes a connection management (CM) layer 172 and a mobility management (MM) layer 178. The CM layer 172 handles circuit-switched calls and includes various sublayers. The call control (CC) sublayer 174 executes functions such as establish and release. The supplementary services (SS) sublayer 176 executes functions such as call forwarding and three-way calling. A short message services (SMS) sublayer 177 executes short message services. The MM layer 178 handles location updating and authentication for circuit-switched calls. The packet switched portion 180 includes a session management (SM) sublayer 182 and a GPRS mobility management (GMM) sublayer 184. The session management (SM) sublayer 182 handles packet-switched calls by executing functions such as establish and release, and also includes a short message services (SMS) section 183. The GMM sublayer 184 handles location updating and authentication for packet-switched 1alls.

[0080] FIG. 3 is a block diagram of a packet switched user plane of the UMTS protocol stack. The stack includes an access stratum (AS) layer and a non-access stratum (NAS) layer. The NAS layer includes the application layer 80 and the Packet Data Protocol (PDP) layer 90. The application layer 80 is provided between the User Equipment (UE) 10 and the remote user 42. The PDP layer 90, such as IP or PPP, is provided between the GGSN 40 and the User Equipment (UE) 10. Lower layer packet protocols (LLPP) 39 are provided between the remote user 42 and the SGSN 38. Iu interface protocols 25 are provided between the Radio Network Controller (RNC) 24 and the SGSN 38, and Iub interface protocols are provided between the Radio Network Controller (RNC) 24 and node B 22. Other portions of the AS layer will be described below.

Access Stratum (AS) layer

[0081] FIG. 4 is a block diagram of the access stratum portion of the UMTS signaling protocol stack. The conventional access stratum includes the physical layer (L1) 120, the data link layer (L2) 130 having sublayers including Medium Access Control (MAC) layer 140, Radio Link Control (RLC) layer 150, Packet Data Convergence Protocol

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(PDCP) layer 156, Broadcast/Multicast Control (BMC) layer 158, and a Radio Resource Control (RRC) layer 160. These layers will be further described below.

[0082] Radio bearers carry user data 163 between application layers and layer two (L2) 130. The control plane signaling 161 can be used for all UMTS specific control signaling, and includes the application protocol in the signaling bearer for transporting the application protocol messages. The application protocol can be used for setting up bearers to the UE 10. The user plane transports all user plane information 163 sent and received by the user such as a coded voice in a voice call or the packets in an internet connection. The user plane information 163 carries the data stream and the data bearers for those data streams. Each data stream can be characterized by one or more frame protocols specified for that interface.

[0083] The Radio Resource Control (RRC) layer 160 functions as the overall controller of the access stratum, and confiogures all other layers in the access stratum. The RRC layer 160 generates control plane signaling 161 that controls the Radio Link Control Units 152, the physical layer (L1) 120, the Medium Access Control (MAC) layer 140, the Radio Link Control (RLC) layer 150, the Packet Data Convergence Protocol (PDCP) layer 156, and the Broadcast/Multicast Control (BMC) layer 158. The Radio Resource Control (RRC) layer 160 determines the types of measurements to make, and reports those measurements. The RRC layer 160 also serves as the control and signaling interface to the non-access stratum.

[0084] More specifically, the RRC layer 160 broadcasts system information messages that include both access stratum and non-access stratum information elements to all User Equipment (UE) 10. The RRC layer 160 establishes, maintains, and releases a Radio Resource Control (RRC) connection between the UTRAN 20 and the UE 10. The UE RRC requests the connection, whereas the UTRAN RRC sets up and releases the connection. The RRC layer 160 also establishes, reconfigures, and releases Radio Bearers between the UTRAN 20 and the UE 10, with the UTRAN 20 initiating these operations.

[0085] The RRC layer 160 also handles various aspects of User Equipment (UE) 10 mobility. These procedures depend on the UE State, whether the call is a circuit switched or packet switched call, and the Radio Access Technology (RAT) of the new cell. The RRC layer 160 also pages the UE 10. The UTRAN RRC pages the UE

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regardless of whether the UE is listening to the paging channel or the paging indicator channel. The UE's RRC notifies the upper layers of the core network (CN) 30.

[0086] Data link layer (L2) 130 includes a Medium Access Control (MAC) sublayer 40, a Radio Link Control (RLC) sublayer 150, a Packet Data Convergence Protocol (PDCP) sublayer 156, and a Broadcast/Multicast Control (BMC) sublayer 158.

[0087] The broadcast and multicast control protocol (BMC) 158 covnveys, over the radio interface, messages originating from the cell broadcast center by adapting broadcast/multicast service originating from the broadcast domain on the radio interface. The BMC protocol 158 offers a service called "a radio bearer," and exists in the user plane. The BMC protocol 158 and RNC store the cell broadcast messages received over the CBC-RNC interface for scheduled transmission. On the UTRAN side, the BMC 158 calculates the required transmission rate for the cell broadcast service based on the messages that can be received over the CBC-RNC interface (not shown) and requests appropriate CTCH/FACH resources from the RRC. The BMC protocol 158 also receives scheduling information together with each cell broadcast message over the CBC-RNC interface. Based on this scheduling information, on the UTRAN side the BMC generates scheduled messages and scheduled BMC message sequences accordingly. On the user equipment side, the BMC evaluates the schedule messages and indicates the scheduling parameters to the RRC which can be then used by the RRC to configure the lower layers for discontinuous reception. The BMC also transmits the BMC messages, such as scheduling and cell broadcast messages according to a schedule. Non-corrupted cell broadcast messages can be delivered to the upper layer. Part of the control signaling between the UE 10 and the UTRAN 20 can be Radio Resource Control (RRC) 160 messages that carry all parameters required to set up, modify and release layer 2 protocol 130 and layer 1 protocol 120 entities. RRC messages carry in their payload all of the higher layer signaling. The Radio Resource Control (RRC) controls the mobility of user equipment in the connected mode by signaling such as measurements, handovers and cell updates.

[0088] The Packet Data Convergence Protocol (PDCP) 156 exists in the user plane for services from the PS domain. Services offered by the PDCP can be called radio bearers. The Packet Data Convergence Protocol (PDCP) provides header compression services. The Packet Data Convergence Protocol (PDCP) 156 contains compression methods that can provide better spectral efficiency for services transmitting IP packets over the radio.

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Any of several header compression algorithms can be utilized. The PDCP compresses redundant protocol information at the transmitting entity and decompresses at the receiving entity. The header compression method can be specific to the particular network layer, transport layer, or upper layer protocol combinations, for example, TCP/IP and RTP/UDP/IP. The PDCP also transfers user data that it receives in the form of a PDCP Service Data Units (SDU) from the non-access stratum and forwards them to the RLC entity, and vice versa. The PDCP also provides support for lossless SRNS relocation. When the PDCP uses an Acknowledged Mode (AM) RLC with in sequence delivery, PDCP entities which can be configured to support losses RSRNS relocation have Protocol Data Unit (PDU) sequence numbers, which together with unconfirmed PDCP packets can be forwarded to the new SRNC during relocation.

[0089] The RLC layer 150 offers services to higher layers (e.g., the non access stratum) via service access points (SAPs) which can be used by higher layer protocols in the UE side and by the IURNAP protocol in the UTRAN side. Service access points (SAPS) describe how the RLC layer handles the data packets. All higher layer signaling, such as mobility management, call control, session management etc., can be encapsulated in RLC messages for transmission of the radio interface. The RLC layer 150 includes various Radio Link Control Entities 152 coupled to the MAC layer 140 via logical channels that carry the signaling information and user data.

[0090] On the control plane 161, the RLC services can be used by the RLC layer for signaling transport. On the user plane 163, the RLC services can be used either by the service specific protocol layers PDCP or BMC or by other higher layer user plane functions. The RLC services can be called signaling radio bearers in the control plane 161 and radio bearers in the user plane 163 for services that do not utilize the PDCP 156 or user plane protocols. In other words, the RLC layer 150 provides services in the control plane 161 called signaling radio bearers (SRBs), and in the user plane 163 provides services called a radio bearers (RBs) if the PDCP and BMC protocols can not be used by that service. Otherwise, the RB service can be provided by the PDCP layer 156 or BMC layer 158.

[0091] The Radio Link Control (RLC) layer 150 performs framing functions to user and control data, that include segmentation/concatenation and padding functionality. The RLC layer 150 typically provides segmentation and retransmission services to the Radio Resource Control (RRC) 160 layer for control data in the control plane 161 and to the

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application layer for user data in the user plane 163. The RLC layer typically performs segmentation/reassembly of variable length higher layer Protocol Data Units (PDUs) into/from smaller RLC Protocol Data Units (PDUs). One Radio Link Control (RLC) Protocol Data Unit (PDU) typically carries one PDU. The Radio Link Control (RLC) PDU size can be set, for example, according to the smallest possible bit rate for the service using the Radio Link Control (RLC). As will be discussed below, for variable rate services, several Radio Link Control (RLC) PDUs can be transmitted during one transmission time interval (TTI) when any bit rate higher than the lowest one it used. The RLC transmitting entity also performs concatenation. If the contents of a Radio Link Control (RLC) Service Data Unit (SDU) do not fill an integer number of Radio Link Control (RLC) PDUs, the first segment of the next Radio Link Control (RLC) SDU may be put into the Radio Link Control (RLC) PDU in concatenation with the last segment of the previous RLC SDU. The RLC transmitting entity also typically performs a padding function. When the remaining data to be transmitted does not fill an entire Radio Link Control (RLC) PDU of a given size, the remainder of that data field can be filled with padding bits. According to aspects of the invention discussed below with reference to FIGS. 11-13, for example, techniques can be provided for reducing or eliminating the amount of padding that is utilized.

[0092] The RLC receiving entity detects duplicates of received Radio Link Control (RLC) PDUs and ensures that the result in the higher layer PDU is delivered once to the upper layer. The RLC layer also controls the rate at which the PRLC transmitting entity may send information to an RLC receiving entity.

[0093] FIG. 5A is a block diagram of that illustrates the data transfer modes used in the Radio Link Control (RLC) layer of the UMTS signaling protocol stack, and that shows possible mappings of logical, transport and physical UMTS channels with respect to the access stratum. One skilled in the art will appreciate that all mappings would not necessarily be defined at the same time for a given User Equipment (UE), and multiple instantiations of some mappings may occur simultaneously. For example, a voice call might use three Dedicated Traffic Channel (DTCH) logical channels mapped to three Dedicated Channel (DCH) transport channels. Moreover, some channels shown in FIG. 5, such as CPICH, SCH, DPCCH, AICH and PICH, exist in the physical layer context, and do not carry upper layer signaling or user data. The contents of these channels can be defined at the physical layer 120 (L1).

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[0094] Each RLC instance in the Radio Link Control (RLC) layer can be configured by the Radio Resource Control (RRC) layer 160 to operate in one of three modes: the transparent mode (TM), unacknowledged mode (UM), or acknowledged mode (AM), which are described in detail below with reference to FIG. 5B. The three data transfer modes indicate the mode in which the Radio Link Control (RLC) is configured for a logical channel. The transparent and unacknowledged mode RLC entities are defined to be unidirectional whereas the acknowledged mode entities are bi-directional. Normally, for all RLC modes, the CRC error detection is performed on the physical layer and the result of the CRC check is delivered to the RLC together with the actual data. Depending on the specific requirements of each mode, these modes perform some or all of the functions of the RLC layer 150, which include segmentation, reassembly, concatenation, padding, retransmission control, flow control, duplicate detection, in-sequence delivery, error correction and ciphering. These functions are described in more detail below with reference to FIGs. 5B and 5C. According to an aspect of the invention discussed herein, a new Radio Link Control (RLC) data transfer mode can be provided.

[0095] The MAC layer 140 offers services to the RLC layer 150 by means of logical channels that are characterized by the type of data transmitted. The Medium Access Control (MAC) layer 140 maps and multiplexes logical channels to transport channels. The MAC layer 140 identifies the User Equipment (UE) that are on common channels. The MAC layer 140 also multiplexes/demultiplexes higher layer PDUs into/from transport blocks delivered to/from the physical layer on common transport channels. The MAC handles service multiplexing for common transport channels since it can not be done in the physical layer. When a common transport channel carries data from dedicated type logical channels, the Medium Access Control (MAC) header includes an identification of the UE. The MAC layer also multiplexes and demultiplexes higher layer PDUs into/from transport block sets delivered to or from the physical layer on dedicated transport channels.

[0096] The MAC layer 140 receives RLC PDUs together with status information on the amount of data in the RLC transmission buffer. The MAC layer 140 compares the amount of data corresponding to the transport channel with thresholds set by the RRC layer 160. If the amount of data is too high or too low, then the MAC sends a measurement report on traffic volume status to the RRC. The RRC layer 160 can also

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request that the MAC layer 160 sends these measurements periodically. The RRC layer 160 uses these reports for triggering reconfiguration of the radio bearers and/or transport channels.

[0097] The MAC layer also selects an appropriate transport format (TF) for each transport channel depending on the instantaneous source rates of the logical channels. The MAC layer 140 provides priority handling of data flows by selecting "high bit rate" and "low bit rate" transport formats (TFs) for different data flows. Packet switched (PS) data is inherently bursty, and thus the amount of data available to send varies from frame to frame. When more data is available, the MAC layer 140 may choose one of the higher data rates, however, when both signaling and user data are available the MAC layer 140 chooses between them to maximize the amount of data sent from the higher priority channel. The transport format (TF) can be selected with respect to the transport format combinations (TFCs) which can be defined by admission control for each connection.

[0098] The Medium Access Control (MAC) layer also performs ciphering. Each radio bearer can be ciphered separately. The ciphering details are described in the 3GPP TS 33.102.

[0099] In a system such as WCDMA there are three types of transport channels that can be used to transmit packet data. These channels are known as a common transport channel, a dedicated transport channel, and a shared transport channel. In the downlink, the transport channel packet data is selected by a packet scheduling algorithm. In the uplink, the transport channel is selected by the mobile 10 based on the parameters set by the packet scheduling algorithm.

[00100] Common channels can be, for example, the random access channel RACH in the uplink and the forward access channel FACH in the downlink. Both carry signaling data and user data. Common channels have a low set up time. Because common channels can be used for signaling before connections are set up, common channels can be used to send packets immediately without any long set up time. There are typically a few RACH or FACH per sector. Common channels do not have a feed back channel and therefore typically use open loop power control or fixed power. Moreover, common channels can not use soft handover. Thus, the link level performance of common channels can be worse than that of dedicated channels and more interference can be generated than with dedicated channels. Consequently, common channels can be

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more suitable for transmitting small individual packets. Applications to be used in common channels would be applications such as short message services, and short text emails. Sending a single request to a web page could also fit well into the concept of common channels however in the case of larger data amounts, common channels suffer from poor radio performance.

[00101] Dedicated channels can use fast power control and soft handover features that improve radio performance, and less interference is typically generated than with the common channels. However, setting up a dedicated channel takes more time than accessing common channels. Dedicated channels can have variable bit rates from a few kilobytes per second up to 2 megabytes per second. Because the bit rate changes during transmission, the downlink orthogonal code must be allocated according to the highest bit rate. Therefore, the variable bit rate dedicated channels consume valuable downlink orthogonal code space.

[00102] The physical layer (L1) 120 couples to the MAC layer 140 via transport channels that carry signaling information and user data. The physical layer 120 offers services to the MAC layer via transport channels that can be characterized by how and with what characteristics data is transferred.

[00103] The physical layer (L1) 120 receives signaling and user data over the radio link via physical channels. The physical layer (L1) typically performs multiplexing and channel coding including CRC calculation, forward-error correction (FEC), rate matching, interleaving transport channel data, and multiplexing transport channel data, as well as other physical layer procedures such as acquisition, access, page, and radio link establishment/failure. The physical layer (L1) may also be responsible for spreading and scrambling, modulation, measurements, transmit diversity, power weighting, handover, compressed mode and power control.

[00104] FIG. 5B is a block diagram showing the architecture of the Radio Link Control (RLC) layer. As mentioned above, each RLC entity or instance 152 in the Radio Link Control (RLC) layer 150 can be configured by the Radio Resource Control (RRC) layer 160 to operate in one of three data transfer modes: the transparent mode (TM), unacknowledged mode (UM), or acknowledged mode (AM). The data transfer mode for the user data can be controlled by a Quality of Service (QoS) setting.

[00105] The TM is unidirectional and includes a transmitting TM entity 152A and an receiving TM entity 152B. In transparent mode no protocol order is added to higher

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layer data. Erroneous protocol data units (PDUs) can be discarded or marked erroneous. Streaming type transmission can be used in which higher layer data is typically not segmented, though in special cases, transmissions of limited segmentations/reassembly capability can be accomplished. When segmentation/reassembly is used, it can be negotiated in the radio bearer set up procedure.

[00106] The UM is also unidirectional and includes a transmitting UM entity 152C and a receiving UM entity 152D. An UM RLC entity is defined as unidirectional because no association between the uplink and downlink is needed. Data delivery is not guaranteed in UM. The UM can be used, for example, for certain RRC signaling procedures where the acknowledgment and retransmissions are not part of the RRC procedure. Examples of user services that utilize the unacknowledged mode RLC are the cell broadcast service and voice over IP. Received erroneous data can be either marked or discarded depending on the configuration. A timer-based discard without explicit signaling function can be applied, thus RLC PDUs which can not be transmitted within a specified time can simply be removed from the transmission buffer. In the unacknowledged data transfer mode, the PDU structuring includes sequence numbers, and a sequence number check can be performed. The sequence number check helps guarantee the integrity of reassembled PDUs and provides a means of detecting corrupted Radio Link Control (RLC) SDUs by checking the sequence number in Radio Link Control (RLC) PDUs when they are reassembled into a Radio Link Control (RLC) SDU. Any corrupted Radio Link Control (RLC) SDUs can be discarded. Segmentation and concatenation can also be provided in the Unacknowledged Mode (UM).

[00107] In acknowledged mode, RLC AM entity is bi-directional and capable of piggybacking an indication of the status of the link in the opposite direction into user data. FIG. 5C is a block diagram showing an entity for implementing the Radio Link Control (RLC) Acknowledged Mode (AM) entity and how an AM PDU can be constructed. Data packets (RLC SDUs) received from higher layers via AM-SAP can be segmented and/or concatenated 514 to Protocol Data Units (PDU) of a fixed length. The length of the Protocol Data Unit is a semi-static value decided in the radio bearer set up, and can be changed through the RRC radio bearer reconfiguration procedure. For concatenation or padding purposes, bits carrying information on the length and extension can be inserted into the beginning of the last Protocol Data Unit or data from an SDU can be included. If several SDUs fit into one PDU, they can be concatenated in

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the appropriate length indicators (LIs) can be inserted in the beginning of the PDU. The PDUs can be then placed in the transmission buffer 520, which can also take care of retransmission management.

[00108] The PDU can be constructed by taking one PDU from the transmission buffer 520, adding a header for it, and if the data in the PDU does not fill the whole RLC PDU, a padding field or piggyback status message can be appended. The piggyback status message can originate either from the receiving side or from the transmitting side to indicate an RLCSDU discard. The header contains the RLC PDU sequence number (SN), a pollbit (P), which can be used to request status from the peer entity, and optionally a length indicator (LI) which can be used if concatenation of SDUs, padding, or a piggyback PDU takes place in the RLC PDU.

[00109] The Acknowledged Mode (AM) is typically used for packet type services, such as internet browsing and email downloading. In the acknowledged mode, an automatic repeat request (ARQ) mechanism can be used for error correction. Any received packets with errors can be retransmitted. The quality versus delay performance of the RLC can be controlled by the RRC through configuration of a number of retransmissions provided by the RLC. If the RLC can not deliver the data correctly, for example, if the maximum number of retransmission has been reached or the transmission time has been exceeded, then the upper layer is notified and the Radio Link Control (RLC) SDU can be discarded. The peer entity can also be informed of the SDU discard operation by sending a move receiving window command in a status message so that also the receiver removes all PDUs belonging to the discarded Radio Link Control (RLC) SDU.

[00110] The RLC can be configured for both in-sequence and out-of-sequence delivery. With in-sequence delivery the order of the higher layer of PDUs can be maintained, whereas out-of-sequence delivery forwards higher layer PDUs as soon as they are completely received. The RLC layer provides in sequence delivery of higher layer PDUs. This function preserves the order of higher layer PDUs that were submitted for transfer by the RLCs. If this function is not used, out of sequence delivery can be provided. In addition to data PDU delivery, status and reset control procedures can be signaled between peer RLC entities. The control procedures can even use a separate logical channel, thus, one AM RLC entity can either use one or two logical channels.

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[00111] Ciphering can be performed in the RLC layer for acknowledged and unacknowledged RLC modes. In FIG. 5C, the AM RLC PDU is ciphered 540, excluding the two first two bits which comprise the PDU sequence number and the pollbit. The PDU sequence number is one input parameter to the ciphering algorithm, and it must be readable by the peer entity to perform the ciphering. The 3GPP specification TS33.102 describes ciphering.

[00112] The PDU can be then forwarded to the MAC layer 140 via logical channels. In Fig. 5C, extra logical channels (DCCH/DTCH) are indicated by dash lines which illustrate that one RLC entity can be configured to send the control PDUs and data PDUs using different logical channels. The receive side 530 of the AM entity receives RLC AM PDUs through one of the logical channels from the MAC layer. Errors can be checked with the physical layer CRC which can be calculated over the whole RLC PDU. The actual CRC check can be performed in the physical layer and the RLC entity receives the result of the CRC check together with data after deciphering the whole header and possible piggyback status information can be extracted from the RLC PDU. If the received PDU was a strong message or if the status information is piggybacked to an AM PDU, the control information (status message) can be passed to the transmitting side which checks its retransmission buffer against the received status information. The PDU number from the RLC header is used for deciphering 550 and also when storing the ciphered PDU into the receive buffer. Once all PDUs belonging to a complete SDU are in the receive buffer, the SDU can be reassembled. Although not shown, checks for in sequence delivery and duplicate detection can then be performed before the RLC SDU is delivered to a higher layer.

[00113] When the User Equipment (UE) or mobile station moves between PTM transmission and Point-to-Point (PTP) transmission (or changes cells), the RLC entity 152 is reinitialized. This can undesirably result in loss of any data sitting in Radio Link Control (RLC) buffers. As noted above, problems may arise when the mobile station moves from one cell to another or when the delivery of Multimedia Broadcast and Multicast Service (MBMS) content changes from a Point-to-Point (PTP) transmission mode to Point-to-Multipoint (PTM) transmission mode in the serving cell.

[00114] It is desirable to preserve continuity of Multimedia Broadcast and Multicast Service (MBMS) during transitions between Point-to-Point (PTP) transmission and Point-to-Multipoint (PTM) transmission, or during transitions that occur between

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different cells (e.g., handover), and to avoid the submission of duplicate information. To preserve continuity of MBMS service and to avoid the submission of duplicate information, the Layer 2 150 should be capable of re-aligning the data coming from the two streams. This synchronization cannot be provided by the physical layer since the network terminating point might be different in each mode. If Forward Error Correction (FEC) is performed below the RLC layer 150, as is the case in 3GPP2, data can be lost during any transition between Point-to-Multipoint (PTM) transmission and Point-to-Point (PTP) transmission, and vice-versa. In addition, this would require physical layer synchronization and sharing of the same Medium Access Control (MAC) among multiple cells (e.g., having common scheduling). As such, this can cause problems in 3GPP2 where such assumptions do not apply.

Point-to-Point (PTP) Transmission

[00115] Assuming that the application has a significant delay tolerance, the most efficient data transfer mode for Point-to-Point (PTP) transmissions is Radio Link Control (RLC) Acknowledged Mode (AM). For example, the RLC acknowledged mode (AM) is typically used for packet switched data transfer over dedicated logical channels (PTP). The RLC operates in acknowledged mode (AM) on dedicated logical channels. As shown in FIG. 5A, dedicated user traffic for one user service in the downlink direction can be sent through a logical channel known as the Dedicated Traffic Channel (DTCH).

[00116] In Acknowledged Mode (AM), the reverse link is available for retransmission requests if the data has errors. The RLC transmits Service Data Units (SDUs) and guarantees delivery to its peer entity by means of retransmission. If RLC can not deliver the data correctly, the user of RLC at the transmitting side is notified. Operating in RLC AM is generally much more power efficient at the expense of introducing additional delay.

Point-to-Multipoint (PTM) Transmission

[00117] The Common Traffic Channel (CTCH) is a unidirectional channel existing in the downlink direction and it can be used when transmitting information either to all terminals or a specific group of terminals. Both of these data transfer modes use unidirectional common channels that do not have a reverse-link channel set up.

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[00118] It would be desirable to provide an architecture that allows MBMS service to switch transparently between Point-to-Point (PTP) and Point-to-Multipoint (PTM) modes of transmission. To obtain good performance when transitioning between Point-to-Point (PTP) and Point-to-Multipoint (PTM) modes of transmission, it would also be desirable to provide an architecture that allows switching between different Radio Link Control (RLC) modes. This can, for example, help reduce power requirements.

[00119] Aspects of the present invention will now be described with reference to embodiments shown and described with reference to FIGS. 6 through 19. These features, can among other things, help to preserve service continuity during such transitions by use of a new Forward Error Correction (FEC) layer.

[00120] FIG. 6 is a diagram of a modified UMTS protocol stack having a Forward Error Correction (FEC) layer operable in a Forward Error Correction (FECd) mode and a Forward Error Correction (FECc) mode. The Forward Error Correction (FEC) layer allows the underlying Radio Link Control (RLC) entity 152 to change from one Radio Link Control (RLC) data transfer mode to another Radio Link Control (RLC) data transfer mode when the User Equipment (UE) changes from Point-to-Point (PTP) transmission to Point-to-Multipoint (PTM) transmission, while maintaining service continuity. According to this embodiment, the FEC Layer can operate in a first mode (FECc) or in a second mode (FECd). In one implementation, the first mode (FECc) can utilize parity blocks and the second mode (FECd) can operate without parity blocks. The impact of changing between between the FECd and FECc modes can be much lower than changing between RLC modes and can be seamless such that no data loss occurs during the transition.

[00121] The Forward Error Correction (FECc) mode can utilize outer-coding techniques to protect user data. This can be particularly effective over common channels. The Forward Error Correction (FECc) mode allows functionality typically found in the Unacknowledged Mode (UM), such as framing (segmentation and concatenation) and sequence number addition, to take place above the Radio Link Control (RLC) layer. As a result, the Radio Link Control (RLC) layer can use transparent mode (TM) for Point-to-Multipoint (PTM) transmissions because traditional Unacknowledged Mode (UM) functions can be performed at the Forward Error Correction (FEC) layer. Although this functionality can be duplicated in Radio Link Control (RLC) Acknowledged Mode (AM), gains due to ARQ make up for this duplication.

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[00122] By positioning the Forward Error Correction (FEC) or outer-coding layer above the Radio Link Control (RLC) layer, the sequence number can be added in a layer which is independent of Radio Link Control (RLC). Use of additional overhead, such as sequence number, with unacknowledged transmissions can enable realignment of the Protocol Data Units (PDUs) with an Encoder Packet (EP) during asynchronous transmission of MBMS data. Because the sequence numbers are added at a layer above Radio Link Control (RLC), the sequence numbers are common in both Point-to-Point (PTP) transmission and Point-to-Multipoint (PTM) transmission, and therefore when a transition occurs from Point-to-Multipoint (PTM) transmission to Point-to-Point (PTP) transmission, continuity of sequence numbers can be maintained. This allows data to be realigned so that duplication of data and/or missed data can be avoided.

[00123] Outer coding could also be used in Point-to-Point (PTP) transmission, which could potentially gain the system some power and/or reduce the delay for re-transmissions. Multimedia Broadcast and Multicast Service (MBMS) data can be delay tolerant to an extent. In Point-to-Point (PTP) transmissions, a feedback path is provided. This makes use of Radio Link Control (RLC) Acknowledged Mode (AM) more efficient due to use of ARQ retransmissions when needed that are generally more radio efficient than an FEC scheme in which additional parity blocks are always sent. As such, addition of parity blocks to the MBMS payload data is unnecessary on dedicated logical channels, for example, Point-to-Point (PTP).

[00124] FIGs. 7A and 7B show embodiments of a protocol structures of the access stratum that include a forward error correction (FEC) layer 157 disposed above the Radio Link Control (RLC) layer 150. An embodiment of the Forward Error Correction (FEC) layer is described with reference to FIG. 11.

[00125] The Forward Error Correction (FEC) layer 157 receives user-plane information 163 directly over the user plane radio bearers. Because the Forward Error Correction (FEC) layer sits on top of the Radio Link Control (RLC) layer, FEC-Protocol Data Units (PDUs) correspond to the RLC-Service Data Units (SDUs). The FEC layer preferably supports arbitrary SDU sizes (constrained to multiples of 8 bits), variable-rate sources, out-of-sequence reception of packets from lower layers, and reception of duplicate packets from lower layers. FEC PDU sizes can be constrained to multiples of 8 bits.

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[00126] As described in greater detail below with reference to FIG. 9A, the FEC layer 157 segments and concatenates higher layer blocks of user data, such as SDUs, into equal size rows. Each row can also be referred to as an inner block. Each Protocol Data Unit (PDU) may include overhead. The overhead may include Length Indicators (LIs) that indicate the beginning of the last Protocol Data Unit (PDU) where data from a particular block of user data, such as a Service Data Unit (SDU), can be located. The collection of PDUs comprise an Encoder Packet (EP) or "encoder matrix." The number of PDUs included in an Encoder Packet (EP) depends, among other factors, on the outer-code that is used. Packing each encoder "matrix" row into an independent or separate Transmission Timing Interval (TTI) can enhance physical layer performance. To reduce buffering burdens, shorter Transmission Timing Interval (TTI) durations can be used.

[00127] The Encoder Packet (EP) can then be passed through an outer-code encoder to generate the parity rows. As will be described in greater detail below with reference to FIG. 9A, the FEC layer 157 may perform outer-coding by providing the functionality of a Reed Solomon (RS) coder in the UMTS Terrestrial Radio Access Network (UTRAN) 20 and may perform outer-decoding by providing the functionality of a Reed Solomon decoder in the User Equipment (UE) 10.

[00128] The parity rows generated by the outer encoder can be added to the Encoder Packet (EP), and placed in a transmission buffer as a group of inner blocks. Each inner block has information added to it to produce a Protocol Data Unit (PDU). The group of PDUs can then be transmitted.

[00129] This FEC layer 157 also allows for the recovery of data belonging to a single EP, even if different inner blocks are received from different cells. This can be achieved through the transmission of a Sequence Number (SN) in the header of each Protocol Data Unit (PDU). In one embodiment, a System Frame Number (SFN) this can help maintain data alignment relative to the Encoder Packet (EP). Sequence numbers are discussed in greater detail throughout this document, for example, with reference to FIGS. 10A and 10B.

[00130] The FEC layer 157 may also perform padding and reassembly; transfer of user data; and perform in-sequence delivery of upper layer PDUs, duplicate detection, and sequence number checks.

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[00131] In the embodiments shown in FIGS. 6 through 7A, the Forward Error Correction (FEC) layer 157 is shown between the Packet Data Convergence Protocol (PDCP) layer 156 and Radio Link Control (RLC) layer 150 (e.g., at the same level as (BMC) layer and below the Packet Data Convergence Protocol (PDCP) layer). By placing the Forward Error Correction (FEC) layer 157 just above the Radio Link Control (RLC) layer 150, performance of the outer code can be optimized since the inner block size matches the "gold" packet size of the packets that are sent over the air. Nevertheless, it should be appreciated that the Forward Error Correction (FEC) layer is shown here only for purposes of illustration and not limitation. Packet Data Convergence Protocol (PDCP) layer 156 may be used on top of Forward Error Correction (FEC) layer 157 for its header compression capabilities. It should be noted that currently the Packet Data Convergence Protocol (PDCP) layer 156 is defined for Point-to-Point (PTP) transmission that uses dedicated logical channels. As shown in FIG. 7B, the Forward Error Correction (FEC) layer may be provided anywhere within the Access Stratum above the Radio Link Control (RLC) layer or in the application layer. The Forward Error Correction (FEC) layer may be below or above the Packet Data Convergence Protocol (PDCP) layer. If FEC is performed at the application layer 80, it can apply equally to GSM and WCDMA even though the "gold" packet size would be different for the two.

Outer Code Design

[00132] The new Forward Error Correction (FEC) layer can perform outer-coding on user plane information. FIG. 8 is a diagram that shows an information block 91 and an outer code block 95 to illustrate the concept of outer block code structures. FIG. 9A is a diagram showing an example of how outer code block structures can be applied to Multimedia Broadcast and Multicast Service (MBMS) data 91. Outer-coding can improve physical layer performance when broadcasting delay-tolerant content over an entire cell. Outer codes can, for example, help avoid loss of data during transition between cells and during transitions between Point-To-Point (PTP) transmission mode and Point-To-Multipoint (PTM) transmission mode.

[00133] An outer code block 95 can be represented in the form of a matrix that includes k Protocol Data Units 91 and N-k parity rows 93. In outer block coding, data can be assembled into large encoder packet or information block 91 by organizing user data

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into k payload rows by segmenting, concatenating, and padding data (including insertion of over head into inner blocks), and then encoding the resulting information block 91 to generate N-k parity rows 93 that can be added to the information block 91 to produce an outer code block 95. The parity blocks 93 add redundancy information to the information block 91. The individual rows of the outer code block can then eventually be transmitted over single or multiple Transmission Timing Intervals (TTIs). Redundancy information for the set of Protocol Data Units (PDUs) can allow the original information to be reconstructed even if some of the PDUs are lost during transmission.

[00134] FIG. 9A shows an exemplary outer code structure known as a Reed-Solomon (RS) block code. Reed-Solomon (RS) codes can be used to detect and correct channel errors. The outer-code shown in FIG. 9A is a systematic (n,k) block code, where each Reed-Solomon (RS) code symbol comprises a byte of information defined by a row and a column. Each column comprises a Reed-Solomon (RS) code word. If n lost blocks are to be recovered, then at least n parity blocks are required. As such, the amount of memory required increases as the number of parity blocks increases. In Reed-Solomon (RS) coding, *N-k* parity symbols can be added to the *k* systematic symbols to generate a code word. In other words, a code word of a Reed-Solomon (RS) code [*N,k*] has *k* information or "systematic" symbols and *N-k* parity symbols. *N* is the length of the code, and *k* is the dimension of the code. For every k information bytes, the code produces n coded symbols, the first k of which can be identical to the information symbols. Each row can be referred to as an "inner block," and represents the payload per Transmission Timing Interval (TTI). In regular WCDMA systems, transmission may occur, for example, over the basic WCDMA structure of 20 ms frames (TTIs). The parity symbols can be derived from the systematic symbols using a generator matrix $G_{k\times N}$. defined as:

$$m_{1\times k} \cdot G_{k\times N} = c_{1\times N} \quad \text{(Equation 1)}$$

$$m_{1\times k} = \text{Information word} = [m_0\ m_1\ \ldots\ m_{k-1}] \quad \text{(Equation 2)}$$

$$c_{1\times N} = \text{Code word} = [c_0\ c_1\ \ldots\ c_{N-1}] \quad \text{(Equation 3)}$$

where m_i, c_i belong to an arbitrary Galois Field. For example, if the symbol of a Reed-Solomon (RS) code word is a bit, then the Galois Field of dimension 2 (GF(2)) would be used to describe the decoding operations. In one embodiment, if the symbol is an octet, then the Galois Field of dimension 256 GF(256) can be used to describe the

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decoding operations. In this case, each information column consists of 1-byte per row. Each information column can be encoded using a [N, k] Reed-Solomon (RS) code over the Galois Field of dimension 256 GF(256). If there are M-bytes per row, the outer block is encoded M times. Therefore, there are N*M bytes per outer block 95.

Erasure decoding

[00135] The outer code structure allows for erasure correction. If the decoder already knows which symbols are in error, the reconstruction of the erroneous systematic symbols requires a relatively little amount of computation. An encoder packet (EP) or matrix refers to the entire set of data at the output of the outer encoder. Redundancy information is taken column wise from each row, and each row that is transmitted has a CRC appended to it that must check to confirm that the data has been sent correctly. In the case of MBMS transmissions, a CRC can be used in each transport channel block that indicates whether an inner block 91 is in error or not, and if the CRC fails, it can be assumed that all the symbols in the block are in error. In an embodiment, if a given inner block 97 is in error, then all bits for that block can be erased. The term "erasure" refers to each symbol belonging to an erroneous block whose CRC has failed. Symbols, which are not erasures, can be assumed correct. Neglecting the CRC undetected error probability, then each Nx1 column contains correct and erased symbols.

[00136] The received vector r can be written as:

$$r_{1\times N} = [c_0 \ e \ e \ c_3 \ c_4 \ e \ c_6 \ c_8 \ \ldots \ c_{N-1}] \qquad \text{(Equation 4)}$$

where e identifies the erasures.

[00137] Erasure decoding allows up to N-k erroneous symbols to be corrected. Because symbols, which are not erasures, can be assumed to be correct, the error correction property of RS codes is typically much better than that of typical RS codes. The size of the CRC used in each inner block should be large enough to ensure that the probability of undetected errors does not exceed the residual outer block probability. For example, if a 16 bit CRC is used in the inner blocks, then the lower bound of the residual outer block error rate will be $2^{-16} = 1.5 \cdot 10^{-5}$. If there can be no errors in the first k inner blocks, the RS decoding need not be performed since the systematic symbols are identical to the information symbols.

[00138] It can be noted that as soon as k blocks with good CRCs are received, the decoding of the outer block can be performed, without waiting for the reception of all

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the N inner blocks. In order to perform erasure decoding, the modified gernerator matrix $\Omega_{k\times k}$ can be derived from the generator matrix $G_{k\times N}$ by removing all the columns corresponding to erasures or unnecessary blocks, for example, only the first k good received symbols can be used to identify the modified generator matrix $\Omega_{k\times k}$. The original information word m can be recovered as follows:

$$m_{1\times k} = [\Omega_{k\times k}]^{-1} \cdot \acute{r}_{1\times k} \qquad \text{(Equation 5)}$$

where $\acute{r}_{1\times k}$ is the modified received vector obtained with the first k good symbols. The erasure decoding complexity can therefore be reduced to the complexity of a $k\times k$ matrix inversion. Thus, use of RS erasure decoding can greatly simplify the computational complexity of RS decoding.

Impact of Data Packing on Outer Code Performance

[00139] As will be discussed below with reference to FIGs. 11-13, outer-coding may be used in conjunction with variable-rate data sources without resulting in exceedingly large overhead if the amount of padding and overhead sent over the air is limited by the particular outer-coding scheme. In the outer-code scheme discussed above, data can be packed into blocks of a given size, and a shortened Reed-Solomon code can be run across the blocks. The encoded packet data can be packed into TTIs in at least two different ways that will now be described with reference to FIGS. 9A and 9B.

[00140] FIG. 9B is a diagram showing the outer code block structure of FIG. 9A in which multiple rows can be sent per Transmission Time Interval (TTI). According to another aspect of the invention, the data from one row is transmitted in a single TTI. In another embodiment, data from one Encoder Packet (EP) row is put into one TTI such that each TTI contains data from that Encoder Packet (EP) row. As such, each of the rows can be transmitted in a separate WCDMA frame or Transmission Timing Interval (TTI). Transmitting each row in one TTI will provide better performance. In FIG. 9B, both k and n are divided by the number of rows per TTI, and the errors in a row can be totally correlated. This creates an appreciable difference when looking at the EP error rate versus the TTI error rate.

[00141] FIG. 9C is a diagram showing the outer block structure of FIG. 9A in which each row can be sent in multiple TTIs. It should be appreciated that while FIG. 9C illustrates sending each row of the Encoder Packet (EP) over four TTIs (TTI0 – TTI3), in reality each row could be sent over any number of TTIs. Since each column is an

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outer code code-word, each of the four distinct transmission "phases" (TTI0 – TTI3) amounts to an independent outer code. In order for the entire packet to be recovered it would be necessary that all of these independent outer codes decode correctly.

[00142] FIGs. 10A and 10B are diagrams that show the outer code blocks generated by the Forward Error Correction layer.

[00143] The FECc mode can be used on common or Point-to-Multipoint (PTM) logical channels to construct outer case blocks 95 by adding parity rows or blocks 93 to the MBMS payload data 91. Each outer block 95 includes a plurality of inner blocks 91, 93. Identifying the sequence of inner blocks and their position relative to encoder packets can allow each available inner block to be placed in the correct position so that outer-decoding can be done correctly. In one embodiment, each inner block includes a header 94 that identifies the inner block by an inner block number m and an outer block number n. For example, outer block n includes a data portion 91 with m inner Multimedia Broadcast and Multicast Service (MBMS) payload blocks, and a redundancy portion 93 having M-(m+1) inner parity blocks. According to this embodiment, the sequence number space can be optimized for MBMS and can be defined by a number of distinct sequence numbers, for example, 0 through 127. The sequence number space should be big enough so that the same sequence number will not appear after a reception gap caused by a transition of any kind. The receiving UE should be able to determine the order of the inner blocks, even if some inner blocks are lost. If the UE loses more inner blocks than can be identified by the whole sequence number space, the UE will not be able to reorder the inner blocks correctly. The sequence number of the same inner block is identical across the FECd blocks and FECc blocks. The FECd blocks do not include the redundancy portion 93 utilized in the FECc blocks. The FECd entity and FECc entity may use the same bit rate over the air.

Transmitting Side

[00144] The transmitting Forward Error Correction (FEC) entity 410 includes a Service Data Unit (SDU) buffer 412 for receiving SDUs, a segmentation and concatenation unit 414, an outer encoder 416 that performs Reed-Solomon (RS) encoding, a sequence number generator 418 that adds a sequence number to the encoded PDUs, a transmit buffer 420 transmits the PDUs over the logical channels 406, and a scheduling unit 422.

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[00145] The Service Data Unit (SDU) buffer 412 receives user data (FEC SDUs) in the form of Service Data Units (SDUs) on radio bearer 402 as indicated by the arrow, and stores FEC SDUs from the higher layers. The receive buffer 412 communicates to the scheduling unit 422 how much data will be transmitted.

[00146] As discussed above, the amount of time it takes to fill-up an Encoder Packet (EP) will typically vary since the source data-rate typically varies. As explained with reference to FIG. 13, frame-fill efficiency can be improved by having flexibility in deciding when to start packing the data. The amount of padding introduced can be reduced by delaying the creation of the EP as much as possible based on the jitter tolerance of the receiving FEC entity 430.

[00147] The scheduling entity 422 can decide when to start the encoding. The scheduler 422 preferably determines how long it is possible to wait before a packet needs to be sent out, based on QoS profile for that particular service. Once the scheduler 422 establishes that enough data has accumulated, or that the maximum acceptable packet transmission delay has been exhausted, it triggers the creation of an Encoder Packet (EP) 91. The segmentation and concatenation unit 414 splits the Service Data Unit (SDU) into the various rows and generates the Length Indicators (LIs).

[00148] The scheduling unit 422 preferably decides the optimal row size of the EP or Protocol Data Unit (PDU) so that the SDUs fit exactly into the number of rows (e.g., 12). Alternatively, the scheduler 422 selects an FEC PDU size, from of those configured by the RRC, that will result in the least possible padding, and requests that the Segmentation & Concatenation function 414 formats the SDUs into k blocks of size PDU_size – FEC_Header_size. This formatting can vary. Examples of different types of formatting are discussed below with reference to FIGS. 12-13. The total amount of data considered should include the overhead that will be incorporated by the concatenation and segmentation function 414. To generate the Encoder Packet (EP), the scheduler 422 requests that the concatenation and segmentation function 414 produce k PDUs of that size. This size includes re-assembly information. In one embodiment, the PDUs can have sizes in multiples of 8 bits, and the data of consecutive PDUs correspond to different symbols in the code-words.

[00149] The k PDU blocks can then be run through the outer encoder 416 which performs, Reed-Solomon (RS) encoding. The outer encoder 416 encodes the data in the Encoder Packet (EP) matrix by generating and appending redundancy or parity

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information to the Encoder Packet (EP) matrix to create an outer code block. In an embodiment, the outer-code can be assumed to be an (n, k) erasure-decoding block code and the outer encoder generates n-k parity blocks. The encoder performs the encoding on k rows of information of equal length and delivers to the lower sub-layer n Protocol Data Units (PDUs) of that same size. The first k blocks are identical to the ones it receives, and the following n-k blocks correspond to the parity information.

[00150] The scheduler 422 also monitors time alignment or relative timing of PTM streams, and performs transmissions to adjust the alignment of different logical streams. For example, during re-configurations, the time alignment between PTP and PTM logical streams can be adjusted to benefit the service continuity. The best performance can be obtained when the streams are perfectly synchronous.

[00151] Different base stations (or different modes of transmission PTP, Point-to-Multipoint (PTM)) transmit the same content stream, but the streams can be misaligned. However, if the Encoder Packet (EP) format of the data streams is the same, then the information on each stream is exactly the same. Adding a sequence number to each outer block allows the User Equipment (UE) to combine the two streams since the User Equipment (UE) will know the relationship between the two streams.

[00152] The sequence number generator 418 appends a sequence number at the front of each block, in the same sequence as what was used in the encoder 416 to create PDUs. In an embodiment, the sequence number generator adds, for example, an eight bit sequence number at the front of each outer code block to generate PDUs. Additional overhead information can also be added to the outer code block. The sequence number space should be large enough to accommodate the worse case time-difference between streams. Therefore, in another embodiment, a sequence number space of 20 can be used, and at least 5 bits can be reserved in each header for the sequence number. This header can be appended to the outer code block after the Reed-Solomon (RS) encoding is performed, and therefore this "outer" header is not protected by the outer-code. Sequence numbers are preferably also added to for parity blocks, even if they can not be transmitted. In one embodiment, the sequence number phase can be aligned with the encoder packet boundary. A sequence number roll-over would correspond to the reception of a new encoder packet.

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Forward Error Correction (FEC) Header Format

[00153] As noted above, synchronization of data streams can be achieved by introducing a sequence number that includes information associated with the PDU ordering. In addition to re-ordering and duplicate detection, the sequence number allows the data from respective sources that are included in an encoder packet to be realigned. This sequence number can explicitly identify the order in which each packet should be considered. This sequence number can make up an "FEC header" that can be appended to both information Payload Units (PDUs) and parity blocks after the encoding is performed. The sequence number should not be protected by the outer-code since it is needed for the decoding.

[00154] FIG. 14 is a diagram of an embodiment of a Forward Error Correction (FEC) header format. To facilitate alignment of the data with the Encoder Packet (EP), the sequence number can be split to include a reserved portion (R) 402, a Encoder Packet (EP) portion 404 that identifies the EP (EPSN), and an intra Encoder Packet that identifies the location of a particular inner block within the Encoder Packet (IEPSN) 406.

[00155] It is desirable for the FEC layer 400 to be able to inter-operate with all Radio Link Control (RLC) modes. Since Radio Link Control (RLC) AM and Radio Link Control (RLC) UM both require Service Data Units (SDUs) to have sizes in multiples of 8 bits, then it would be desirable for the FEC layer 400 to also adhere to this requirement. Because the outer-code for the FEC layer 400 operates on byte size increments of data, the Encoder Packet (EP) row size would also need to be an integer number of bytes. Hence, the FEC header size 401 should also be a multiple of 8 bits for the FEC Protocol Data Unit (PDU) size to be acceptable for Radio Link Control (RLC). In one embodiment in which the Forward Error Correction (FEC) header 401 can be one byte, with a reserved portion (R) 402 comprising a single bit, the portion that identifies the EP (EPSN) 404 comprising 3 bits, and the IEP portion that identifies the location of the PDU within the Encoder Packet (IEPSN) 406 comprising 4 bits. In this embodiment, an 8 bit sequence number is used since it is expected that one PDU will be sent per TTI and since the transmission timing of different cells is not expected to drift by more than 100 ms.

[00156] The transmit buffer 420 stores the PDUs until a frame of data accumulates. When the PDUs are requested, the transmit buffer 420 transmits the frames one by one

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over the radio interface (Uu) via a logical channel to MAC layer. The MAC layer then communicates the PDUs via transport channels to the physical layer where the PDUs can be eventually communicated to the UE 10.

Receiving Side

[00157] Still referring to FIG. 11, the receiving Forward Error Correction (FEC) entity 430 includes a receive buffer/ reordering/ duplicate detection unit 438, a sequence number removal unit 436, an outer decoder 434 that performs Reed-Solomon (RS) decoding, and a reassembly unit/ Service Data Unit (SDU) transmit buffer 432.

[00158] Information rows of the EP matrix correspond to PDUs. To support outer coding the receiving Forward Error Correction (FEC) entity 430 accumulates a number of FEC PDUs before triggering the outer decoding. To achieve continuous reception, despite the need to decode encoder packets, the User Equipment (UE) buffers the incoming Protocol Data Units (PDUs) while performing the decoding.

[00159] The receive buffer 438 may accumulate PDUs until the entire Encoder Packet (EP) is received or until the scheduling unit (not shown) is satisfied that there are no more retransmissions for the Encoder Packet (EP). Once it is decided that there will be no more data received for a given encoder-packet, missing PDUs can be identified as erasures. In other words, PDUs that did not pass the CRC test will be replaced by erasures in the de-coding process.

[00160] Because some blocks could be dropped during transmission, and also because different data streams may have different delays, the receiving Forward Error Correction (FEC) entity 430 performs duplicate detection and potentially re-ordering of received blocks in the receive buffer/ reordering/ duplicate detection unit 438. The sequence number can be used in each FEC Protocol Data Unit (PDU) to assist with reordering/ duplicate detection. The sequence number can be used in the receive buffer 438 to reorder the data received out of order. Once PDUs are reordered, the duplicate detection unit detects duplicate PDUs in the Encoder Packet (EP) based on their sequence numbers, and eliminates any duplicates.

[00161] The sequence numbers can then be removed. The sequence number removal unit 436 removes the sequence number from the Encoder Packet (EP) since the sequence number can not be part of the block sent to the Reed-Solomon (RS) decoder.

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[00162] The data can then be passed to the outer-decoding function 434 to recover missing information. The outer decoder 434 receives the Encoder Packet (EP), and, if necessary, Reed-Solomon (RS) decodes the Encoder Packet (EP) by using the parity information to regenerate any erroneous or missing rows. For example, if all k Protocol Data Units (PDUs) containing information are not received correctly, or fewer than k out of n PDUs are not received correctly, then the Protocol Data Units (PDUs), up to the size of the parity PDUs, outer decoding can then be performed to recover the missing information PDUs. At least one parity PDU will be available at the receiver whenever outer decoding is performed. If all k Protocol Data Units (PDUs) containing information are received correctly, or fewer than k out of n PDUs are received correctly, then decoding is unnecessary. The information Protocol Data Units (PDUs) can then be delivered to the re-assembly function 432.

[00163] Independently of whether the outer decoding was successful or not, the information rows can then be delivered to the re-assembly unit/function 432. The reassembly unit 432 reassembles or reconstructs the SDUs from the information rows of the Encoder Packet (EP) matrix using the Length Indicators (LIs). Once SDUs are successfully put together, the Service Data Unit (SDU) transmit buffer 432 transmits the Service Data Units (SDUs) over the radio bearer 440 to deliver the SDUs to the higher layers.

[00164] At the receiving Forward Error Correction (FEC) entity 430, enabling UEs to delay the decoding by a time-offset between different logical streams can allow the system to take full advantage of potential out-of-sequence reception of data due to lack of synchronization between logical streams. This smoothes out service during hand-offs as well as transitions between PTP and PTM. An algorithm for enabling UEs to delay the decoding by the time-offset between different logical streams is discussed with reference to FIG. 15.

Encoder Packet (EP) Options: Fixed or Variable Row Size

[00165] The FEC or outer-code entity has flexibility as to when Protocol Data Units (PDUs) can be constructed since the Protocol Data Units (PDUs) do not need to be sent continuously at every Transmission Timing Interval (TTI). This can result in better frame-fill efficiency, and less padding overhead.

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[00166] If desired, the outer-code entity can generate a payload at each Transmission Timing Interval (TTI). Protocol Data Units (PDUs) can be constructed in real-time as Service Data Units (SDUs) can be received from the higher layers. If there is not enough data to build a Protocol Data Unit (PDU), then the RLC can add padding.

Fixed Row Size Encoder Packets (EPs)

[00167] When encoding the SDUs 201-204 it is desirable to reduce amount of padding that will be transmitted as much as possible.

[00168] In one embodiment, the row size of the Encoder Packet (EP) matrix 205 may be of a fixed size. A priori knowledge of the Encoder Packet (EP) matrix 205 row size can allow alignment of the data back to their original configuration. Because the row size of SDUs 201-204 that will be sent within is known in advance, transmission can start as soon as the data is received without waiting to see how much data is to be sent.

[00169] FIG. 12A shows an example of an encoding process for creating an outer code block 214 from data units 201-204 in which row sizes of the outer code block 214 can be fixed. In this example, user data takes the form of a plurality of Service Data Units (SDUs) 201-204 that include an arbitrary size block of bits, the size of which depends upon the particular application (video, voice, etc.).

[00170] In order to be able to transmit FEC SDUs of arbitrary sizes, segmentation, concatenation and padding can be performed at FEC level. Although concatenation is not strictly necessary, its absence would lead to significant degradation in higher layer data throughput.

[00171] The higher layer SDUs 201-204 can first be formatted into this fixed PDU size. In this embodiment, a segmentation/concatenation function generates inner blocks of a fixed size that can be indicated to the subscriber unit. At step 220, the group of inner blocks can be segmented and concatenated to become part of an encoder packet matrix 205 that includes inner blocks, padding 208 to the extent necessary, and length indicators (LIs) 206 that can be used to point to an end of the Service Data Unit (SDU) 201-204 by indicating how many SDUs end in a given row of the EP. The outer encoder, discussed below, uses these inner blocks to produce redundancy blocks.

[00172] In the Radio Link Control (RLC), a Length Indicator (LI) indicates the end of each Service Data Unit (SDU) which is identified relative to the Protocol Data Unit (PDU), rather than the Service Data Unit (SDU). This helps in reducing the overhead

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since the PDU size is typically smaller than that of the Service Data Unit (SDU). For example, a Length Indicator (LI) can be used to indicate the last octet of each FEC Service Data Unit (SDU) ending within the Payload Data Unit (PDU). The "Length Indicator" can be set to the number of octets between the end of the FEC header and up to the last octet of an FEC SDU segment. The Length Indicator (LI) can be preferably included in the PDUs that that Length Indicator (LI) refers to. In other words, the Length Indicators (LIs) preferably refer to the same Payload Data Unit (PDU) and are preferably in the same order as the FEC SDUs that the Length Indicator (LI) refers to.

[00173] When the outer block is received, information, such as Length Indicators (LIs), can be used to let the receiver know where the Service Data Unit (SDU) and/or padding start and end.

[00174] Because it is not possible to use a bit in the FEC Header to indicate the presence of a Length Indicator (LI), the FEC layer adds a fixed header within the payload that indicates the presence of Length Indicators (LIs). An inner header or LI provides all the information needed for re-constructing the SDUs 201-204. The LI can be included in the RLC-PDU to which it refers. The presence of the first LI can be indicated by a flag included in the sequence number header of the RLC-PDU. A bit in each LI can be used to indicate its extension. To allow the length of the Length Indicators (LIs) to change with FEC PDU size, a new special value for the one byte Length Indicators (LIs) may be introduced indicating that the previous SDU ended one byte short of filling the last PDU. The Length Indicators (LIs) presence bit can be implemented in a variety of ways, two of which are discussed below.

[00175] In one embodiment, a Length Indicator (LI) presence bit can be provided in each protocol data unit (PDU). For example, a byte can be added at the beginning of each Encoder Packet (EP) row, and a bit in that byte indicates the presence of the LI. The entire first byte of each Protocol Data Unit (PDU) may be reserved for this "presence bit." In order to accommodate this presence bit, the length indicator data can be shortened by one bit. Providing a presence bit in each Pocket Unit (PDU) allows SDUs to be decoded when the EP decoding fails, even if the first PDU is missing. This can result in lower residual error rate. Providing a presence bit in each PDU also allows for real-time concatenation/segmentation.

[00176] In another embodiment, a Length Indicator (LI) presence bits can be provided in the first PDU. Instead of adding the overhead at the beginning of each PDU, the

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presence bits for all k information PDUs can be added at the beginning of the first PDU of the EP. Providing the presence bit at the beginning of Encoder Packet (EP) results in less overhead when having large SDUs and/or small PDUs.

[00177] After segmentation and concatenation, the EP 205 includes a number of rows occupied by at least one of the plurality of Service Data Units (SDUs) 201-204 and padding blocks. The row size of an outer block can be designed so that each row can be transmitted during one Transmission Timing Interval (TTI) at a peak data rate. Service Data Units (SDUs) generally can not be aligned with the amount of data sent during a Transmission Timing Interval (TTI). Thus, as shown in FIG. 11, the second and fourth SDUs 202, 204 do not fit into the Transmission Timing Interval (TTI) of first and second rows, respectively, of the EP. In this example, the EP has 12 rows available for data, and the four SDUs 201-204 can be packed into the first three rows of these 12 rows. The remaining rows of the EP 205 can be occupied by padding blocks 208. Thus, the second SDU 202 can be split so that a first portion of the second Service Data Unit (SDU) 202 starts in the first row of "information block" and a second portion of the second SDU 202 ends in the second row. Similarly, the third SDU must be split so that a first portion of the third Service Data Unit (SDU) 203 starts in the second row and a second portion of the third SDU 203 ends in the third row. The fourth Service Data Unit (SDU) 204 fits within the third row, and the remainder of the third row can be filled with padding blocks 208. In this example, the Encoder Packet (EP) 213 is mostly made up of padding 208.

[00178] The encoder uses the EP to generate redundancy or parity information. At step 240, an encoder encodes the intermediate packet matrix 205 encoded by adding outer parity blocks 214 to generate an outer code block 213 that is 16 blocks in length. The encoder extracts 8 bits of data from each column of each block to create resulting data 210. A Reed-Solomon (RS) encoder encodes the resulting data 210 to obtain four rows of redundancy or parity information 212. The parity information 212 can be used to generate outer parity blocks 214 that can be appended to the EP matrix 205 to generate the 16 block outer code block 213.

[00179] FIG. 12B shows an example of the information transmitted over the air in the example discussed above. At step 260, after adding additional overhead that includes the sequence number to each row of the EP 205, the 16 block outer code block 213 can be transmitted over the air as Protocol Data Units (PDUs) 214. The full or entire

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Encoder Packet (EP) 213 matrix is not transmitted in the Protocol Data Units (PDU) 214 sent on the downlink. Rather, the Protocol Data Units (PDU) include the information bits 201-204 and the length indicators (LIs) 206 of the Encoder Packet (EP) matrix 213. Since the Encoder Packet (EP) 213 row size is fixed and therefore known at the receiver, it is unnecessary to actually transmit the padding 208 over the air. Padding information 208 is not transmitted on the downlink since the padding values are known, and therefore there is no need to transmit the padding information 208. For example, if the padding can be made up of a known sequence of bits such as all zeros, all ones, or an alternate pattern of zeros and ones, the receiver can pad the Protocol Data Units (PDUs) 214 up to the nominal Encoder Packet (EP) 213 row length. Therefore, during transmission, instead of selecting the PDU size equal to the EP row size, the smallest available EP size that carries all the information bits 201-204 and re-assembly overhead (e.g., LIs) 206 can be utilized.

[00180] Although the encoder matrix row size is fixed, the FEC PDU size could be selected from a given set at each transmission such that each includes all the information part of a single encoder matrix row (the padding could be excluded). When receiving a PDU of size smaller than the encoder matrix row size, the UE can pad up to that size with a known bit sequence. This allows the inner block size to remain fixed, without increasing the load on the air interface. Using a fixed row size Encoder Packet (EP) 213 can thus eliminate the need to wait until all the data is available before starting to transmit Protocol Data Units (PDUs), and can also eliminate the need to send padding.

[00181] If the algorithm above is implemented to handle variable rate transmission, then a rate equalization scheme can be used in which all encoder packet matrix rows have constant size. Smaller PDUs could be used when padding makes up part of the PDU. The padding can be made up of a specific bit sequence, and can be located at the very end of the data. At the receiver, the size of the blocks received from the lower layers can be equalized to a base-line size by appending padding at the end.

[00182] If a predefined sequence of bits can be used for padding, this padding is not transmitted over the air. The receiver does not need to know the actual encoder packet row size unless the receiver needs to run the outer-decoding. Basic SDU re-assembly does not require knowledge of the amount of padding at the end of a PDU. If all the PDUs containing information from the first k Encoder Packet (EP) rows are received,

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then outer decoding is unnecessary. By contrast, if at least one PDUs containing information from the first k Encoder Packet (EP) rows is missing, then at least one of the PDUs containing the data from a parity row is needed. Since parity rows not generally padded, the size can be used as a reference for the actual encoder packet size that needs to be assumed.

Variable Row Size Encoder Packets (EPs)

[00183] FIG. 13 shows an encoding process for creating an outer code block 313 having a variable row size.

[00184] This aspect of the invention relates to flexible outer block coding of data transmitted over the air interface. This encoding process results in less padding being transmitted so that frame fill efficiency increases. The Encoder Packet (EP) 305 rows can be variable size, and a different sized outer block can be sent for each Transmission Timing Interval (TTI). Preferably, the row size of the Encoder Packet (EP) 305 changes such that the SDUs fit exactly into the number of rows (e.g., 12) of the Encoder Packet (EP) matrix 305. In this embodiment, the FEC layer must wait for all of the data to be available before building the EP so that the FEC layer may determine the optimal row size. The row size can be selected from a number of different sizes based on the amount of data available so as to limit padding. The row size of the Encoder Packet (EP) can be linked to the set of PDU sizes that are configured for the S-CCPCH. Depending on the amount of data available at the time when the encoder packet 305 needs to be generated, the row size that results in the least padding can be selected. By decreasing the size of the outer block 313 so that the block size can be smaller in each frame, data can be sent at a reduced transmission rate since less data is sent over the same TTI duration. Using a variable row size of the Encoder Packet (EP) 305 helps stabilize power requirements across all transmissions for Encoder Packets (EPs), and also utilizes less parity overhead 314. This embodiment works well with Point-to-Multipoint (PTM) transmissions in systems such as WCDMA in which the underlying wireless protocol allows the size of the transport block sent in each Transmission Timing Interval (TTI) to be varied.

[00185] At step 320, a plurality of Service Data Units (SDUs) 201-204 can be segmented and concatenated to generate an Encoder Packet (EP) matrix 305 in which length indicators (LIs) 206 can be used to point to an end of the Service Data Unit (SDU) 201-

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204. Length Indicators (LIs) can be included in the last row in which each Service Data Unit (SDU) terminates.

[00186] At step 330, redundancy or parity information is generated on a column basis by extracting eight bits of data from each data block, and the resulting data 310 can be sent to a Reed-Solomon (RS) encoder to obtain parity information 312. Because the rows of the Encoder Packet (EP) matrix 305 are smaller, less redundancy information can be generated.

[00187] At step 340 encoding continues, as the parity information 312 is used to generate outer parity blocks 314 that can be appended to the twelve block Encoder Packet (EP) matrix 305 to thereby generate an outer code block that in this example is 16 blocks in length. This embodiment avoids padding transmission which improves transmission efficiency since the entire outer code block 313 is occupied by either SDUs, Length Indicators (LIs) 206, and/or redundancy information 314. In this specific example no padding was needed. It should be appreciated that, however, in some cases because the number of configured sizes of the PDU will be limited, and some padding may be needed albeit a reduced amount of padding. This results in greater frame fill efficiency, and can also allow a more constant power to be maintained across the entire Encoder Packet (EP). This is desirable in CDMA systems that utilize power control schemes.

[00188] Although not shown, transmission of PDUs over the air would occur in a manner similar to that discussed above with respect to step 260 of FIG. 12.

[00189] FIG. 11 is an embodiment of an outer coding or Forward Error Correction (FEC) layer 400 having a RLC Unacknowledged Mode (UM) + entity (RLC UM+) provided above the Radio Link Control (RLC) layer. Typically, the Radio Link Control (RLC) provides framing for higher layers. Here, the FEC layer that sits above Radio Link Control (RLC) performs framing.

[00190] The outer coding layer 400 includes a transmitting Forward Error Correction (FEC) entity 410 that communicates over the radio interface (Uu) 404, via logical channels 406, with a receiving Forward Error Correction (FEC) entity 430.

Re-ordering/duplicate detection

[00191] FIG. 15 is a re-ordering protocol or algorithm for enabling mobile stations 10 to delay decoding by the time-offset between different logical streams.

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[00192] The receiving Forward Error Correction (FEC) entity 430 uses the sequence number to determine the position of a given PDU within the EP matrix. For example, a part of the sequence number (PSN) identifies the position of the PDU in the Encoder Packet (EP).

[00193] This algorithm assumes that, at most, data from two encoder packets (EP) are received before decoding can be initiated. In the description below, the Encoder Packet (EPd) is the next Encoder Packet (EP) in sequence to be decoded, and the Encoder Packet (EPb) is the Encoder Packet (EP) that is being buffered. The Encoder Packet (EPb) follows Encoder Packet (EPd). UE implementations needing the full encoder packet transmission time to perform the RS decoding will need to do double-buffering in order to be able to decode sequential packets. The UE therefore stores at least n+k of the maximum size rows of the encoder matrix (k and n being respectively the number of information rows and the total number of rows including parity ones). A UE having a faster decoding engine can reduce this requirement, though no lower than n+1. For example, if the UE has a certain amount of buffer space (XtraBffr) beyond that needed to receive sequential packets based on its decoding capability, and if a 64kbps stream is assumed, delaying the decoding by 100ms without increasing the computational requirements would require an 800 byte increase in buffer size.

[00194] At block 1410, it can be determined whether a new Forward Error Correction (FEC) Protocol Data Unit (PDU) is received. If a new Forward Error Correction (FEC) Protocol Data Unit (PDU) is not received, then the process restarts at block 1410. If a new Forward Error Correction (FEC) Protocol Data Unit (PDU) is received, at block 1420 a determination can be made whether the new Forward Error Correction (FEC) Protocol Data Unit (PDU) belongs to the next Encoder Packet (EPd) in sequence to be decoded.

[00195] If the Forward Error Correction (FEC) Protocol Data Unit (PDU) does not belong to the next Encoder Packet (EP) in sequence to be decoded, then at block 1421, a determination can be made whether the Forward Error Correction (FEC) Protocol Data Unit (PDU) belongs to the Encoder Packet (EPb) that is being buffered. If the Forward Error Correction (FEC) Protocol Data Unit (PDU) does not belong to the Encoder Packet (EPb) that is being buffered, then at block 1440 the Protocol Data Unit (PDU) can be discarded. If the Forward Error Correction (FEC) Protocol Data Unit (PDU) does belong to the Encoder Packet (EPb) that is being buffered, then at block 1423 the

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Protocol Data Unit (PDU) can be added to the buffer of EPb in the associated position. At block 1425, it can be determined whether the amount of data for EPb exceeds XtraBffr. If at block 1426 it is determined that the amount of data for EPb does not exceed XtraBffr, then the process restarts at block 1410. If the amount of data for EPb exceeds XtraBffr, then at block 1428, the transmitting entity attempts to deliver complete SDUs from EPd. Then, at block 1430, the remainder of EPd can be flushed from the buffer, and at block 1434 EPb can be set to EPd.

[00196] If it is determined at block 1420 that the Forward Error Correction (FEC) Protocol Data Unit (PDU) belongs to EPd, then at block 1422, the Protocol Data Unit (PDU) can be added to the buffer of EPd in the associated position. At block 1424, it can be determined whether the buffer has k individual PDUs for EPd. If the buffer does not have k individual PDUs for EPd, then at block 1426, the process restarts at block 1410. If the buffer does have k individual PDUs for EPd, then at block 1427 the decoder performs outer decoding for EPd, and then at block 1428, the transmitting entity attempts to deliver complete SDUs from EPd. Then, at block 1430, the remainder of EPd can be flushed from the buffer, and at block 1434 EPb can be set to EPd.

[00197] FIG. 16 is a diagram that shows a temporal relationship between outer code blocks received by a mobile station as the mobile station transitions between receiving a Point-To-Multipoint (PTM) transmission from cell A 99 and another Point-To-Multipoint (PTM) transmission from cell B 99. Some aspects of FIG. 16 are discussed further in United States Patent Applications US-2004-0037245-A1 and US-2004-0037246-A1 to Grilli, et al., filed August 21, 2002, and United States Patent Application US-2003-0207696-A1 to Willenegger, et al., filed May 6, 2002, which are hereby incorporated by reference in their entirety.

[00198] The scenario depicted assumes certain UMTS Terrestrial Radio Access Network (UTRAN) 20 and User Equipment (UE) 10 requirements. For example, if the UTRAN 20 sends content using the same outer block coding across cells, then the same numbering should be used on blocks carrying the same data or payload in neighbor cells. Outer blocks of the same number have are transmitted relatively time-aligned. The maximum misalignment of PTM transmission across the cells is controlled by the Radio Network Controller (RNC) 24. The UTRAN 20 controls the delay jitter on Point-to-Multipoint (PTM) transmission across cells. The UE 10 should be capable of decoding an outer block while the next one is being received. Therefore, a buffer space

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in the UE should preferably accommodate at least two outer blocks 95A-95C since memory for one outer block is needed to accumulate the current outer block. Memory should also be capable of accumulating inner blocks of "rows" if the outer blocks during Reed-Solomon (RS) decoding, and to compensate for inaccuracies in the time alignment across base stations 22.

[00199] In cell A 98, during transmission of outer block n 95A, a transition occurs during transmission of the second inner Multimedia Broadcast and Multicast Service (MBMS) payload block. The slope of arrow 96, which illustrates the User Equipment (UE) 10 transition from cell A 98 to cell B 99, is non-horizontal since some time elapses during the transition. By the time the User Equipment (UE) 10 reaches cell B 99, the fifth block of Multimedia Broadcast and Multicast Service (MBMS) payload data is being transmitted. As such, the User Equipment (UE) 10 misses the second through fourth blocks due to the time misalignment of the respective transmissions and the time that elapses during the transition. If enough blocks are received in cell B 99, the outer block n 95A may nevertheless be decoded because the parity blocks can be utilized to reconstruct the missed blocks.

[00200] Later, during the transmission of outer block n+2 95C, the User Equipment (UE) 10 experiences another transition from cell B 99 to cell A 98, that occurs at the fifth inner Multimedia Broadcast and Multicast Service (MBMS) payload block of outer block n+2 95C. In this situation, fewer inner blocks are lost during the transition, and the outer blocks may still be recovered.

[00201] The use of outer code blocks can help reduce the likelihood of any service interruption. To ensure that the error recovery will work, the same blocks should be sent on each transmission path which means that the parity blocks should be constructed in the same way in each transmission path. (The Multimedia Broadcast and Multicast Service (MBMS) payload blocks are necessarily the same in each path since it is a broadcast transmission.) Performing Forward Error Correction (FEC) at the upper application layer 80 helps ensure that the parity blocks will be identical in each transmission path since the encoding is done in the Forward Error Correction (FEC) layer 157 and is therefore the same for each outer block. By contrast, if encoding is done in a lower layer, for example, at the individual Radio Link Control (RLC) entities 152, then some coordination is required since the parity blocks would be different in each transmission path.

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Transition from Point-to-Multipoint (PTM) to Point-to-Point (PTP)

[00202] FIG. 17 is a diagram that shows a temporal relationship between outer code blocks received by a mobile station 10 as a transition between a Point-To-Multipoint (PTM) transmission and a Point-To-Point (PTP) transmission occurs. The scheme shown in FIG. 17 applies, for example, to systems that utilize Point-to-Point (PTP) transmissions, such as WCDMA and GSM systems.

[00203] An aspect of the present invention relates to forward error correction by adding parity information or blocks to inner MBMS "payload" or data blocks during PTM transmission. Each outer code block transmitted in a PTM transmission comprises at least one inner payload block and at least one of inner parity block. The error correcting capabilities of outer code blocks can significantly reduce and tends to eliminate the loss of MBMS content or "payload" during transitions, such as when the UE moves from one cell to the other, or when the delivery of MBMS content changes from a PTM connection to a PTP connection in the same serving cell, and vice-versa.

[00204] As noted above, a given cell can transmit to a subscriber 10 using either a PTP or a PTM transmisson scheme. For example, a cell that normally transmits a broadcast service in a PTM transmission mode may choose to set up a dedicated channel and transmit in a PTP mode (only to a certain subscriber 10) if the demand within that cell for the service falls below a certain threshold. Likewise, a cell that normally transmits content on a dedicated channel (PTP) to individual subscribers may decide to broadcast the content to multiple users over a common channel. In addition, a given cell might transmit content in PTP transmission mode whereas another cell might transmit the same content in a PTM transmission mode. A transition occurs when the mobile station 10 moves from one cell to another, or when the number of subscribers within a cell changes triggering a change in the transmission scheme from PTP to PTM or vice-versa.

[00205] During a Point-to-Multipoint (PTM) transmission of outer block n 95A, a transition occurs during transmission of the fourth inner Multimedia Broadcast and Multicast Service (MBMS) payload block. The slope of arrow 101, which illustrates the User Equipment (UE) transition from a Point-to-Multipoint (PTM) transmission to a Point-to-Point (PTP) transmission, is non-horizontal since some time elapses during the transition. When a transition from PTM 101 to PTP occurs, the over-the-air bit rate remains approximately the same. Point-to-Point (PTP) transmissions typically have a

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bit error rate of less than one percent (e.g., during transmission there is one error or less in every 100 payload blocks). By contrast, in Point-to-Multipoint (PTM) transmission a higher bit error rate can be assumed. For example, in one embodiment, the base station generates an outer block once for every 16 transmission time intervals (TTIs), and twelve of these TTIs can be occupied by payload blocks and four TTIs can be occupied by parity blocks. The maximum number of block errors that can be tolerated should be 4 inner blocks out of 16 (12 fundamental blocks +4 parity blocks). As such, the maximum tolerated block error rate would be 1/4.

[00206] When the mobile station transitions 101 from a Point-to-Multipoint (PTM) transmission to Point-to-Point (PTP) transmission, some of the inner blocks can be lost. Assuming that Point-to-Multipoint (PTM) transmissions and Point-to-Point (PTP) transmissions have approximately the same bit rate at the physical layer (L1), then the PTP transmission will allow the MBMS payload blocks to be sent faster than PTM transmission since, on average, the percentage of retransmitted blocks would typically be lower than the percentage of parity blocks. In other words, Point-to-Point (PTP) transmissions are typically much faster than Point-to-Multipoint (PTM) transmissions since, statistically speaking, the number of parity blocks is much larger than the number of Radio Link Control (RLC) retransmissions (Re-Tx). Because the transition 101 is from a Point-to-Multipoint (PTM) transmission to Point-to-Point (PTP) transmission that is typically much faster, when the User Equipment (UE) 10 transitions 101 to a Point-to-Point (PTP) transmission, the first block of Multimedia Broadcast and Multicast Service (MBMS) payload data is being transmitted. As such, neither the time misalignment of the respective transmissions, nor the time that elapses during the transition 101, causes any of the blocks to be missed. Therefore, when moving from Point-to-Multipoint (PTM) transmission to Point-to-Point (PTP) transmission, the lost payload block may be made up by simply restarting from the beginning of the current outer block once the PTP link has been established on the target cell. The network can compensate by starting PTP transmission from the beginning of the same outer block, i.e. with the first inner block. The network can then recover the delay introduced by the transition due to the faster delivery of complete outer blocks. Reducing loss of data during transitions reduces interruptions in delivery of MBMS content that can be caused by such transitions.

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[00207] Later, during the PTP transmission of outer block n+2, the User Equipment (UE) 10 undergoes another transition 103 to a Point-to-Multipoint (PTM) transmission mode. In FIG. 12, this transition 103 from Point-to-Point (PTP) to Point-to-Multipoint (PTM) occurs at the last inner Multimedia Broadcast and Multicast Service (MBMS) payload block of outer block n+2. In this situation, many of the inner Multimedia Broadcast and Multicast Service (MBMS) payload blocks in outer block n+2 have already been transmitted except for the last inner block. FEC is typically utilized in situations where feedback is not available. Because PTP transmissions utilize a dedicated channel, and therefore have feedback capability on the reverse link, use of FEC is not as beneficial. In order to minimize or eliminate the loss of data in the cross transitions, UMTS Terrestrial Radio Access Network (UTRAN) 20 preferably relies on the low residual block error rate of the RLC Acknowledged Mode (AM) in PTP transmission to recover all the inner blocks that could be lost during a transition to PTM transmission. In other words, normal layer 2 retransmissions can be utilized to retransmit any packets in which error(s) are detected in the original transmission. Thus, as shown in FIG. 17, parity blocks are not needed in PTP transmissions. If errors are present in the payload blocks during a Point-to-Point (PTP) transmission, the outer block may nevertheless be decoded because the Radio Link Control (RLC) layer will request retransmission of any erroneous blocks. That is, when there is an error during the PTP transmission, the mobile station 10 either requests retransmission (re-Tx) or when all of the blocks are correct, no retransmission takes place and a transport format zero (TF0) can be utilized. Outer coding is preferably done in layer 2 of the protocol stack so that the size of each inner block 97 fits exactly into one Transmission Timing Interval (TTI) since this can enhance coding efficiency.

[00208] If Forward Error Correction (FEC) outer coding is done at an upper layer of the protocol stack such as the application layer, then parity blocks will be sent regardless of the transmission scheme (Point-to-Point (PTP) or Point-to-Multipoint (PTM)). As such, parity blocks would also be appended to Point-to-Point (PTP) transmissions.

[00209] As noted above, in PTP transmission the use of parity blocks is not necessary, since more efficient retransmission schemes can be used in lieu of forward error correction. Since parity blocks are preferably not transmitted in PTP transmission, the delivery of a complete outer block can be on average faster than in PTM, assuming the same bit rate over the air. This allows the UE to compensate for the interruptions

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caused by the Point-to-Multipoint (PTM) to Point-to-Point (PTP) transitions, since the PTP transmission can be anticipated with respect to the PTM transmission. The User Equipment (UE) can recover the outer block correctly by combining (1) inner blocks received in Point-to-Point (PTP) transmission, either in the new cell or after transition, with (2) inner blocks received in Point-to-Multipoint (PTM) transmission, either in the old cell or before transition. The User Equipment (UE) can combine inner blocks received before the transitions and inner blocks received after the transition that belong to the same outer block. For example, User Equipment (UE) 10 can combine the inner Multimedia Broadcast and Multicast Service (MBMS) payload blocks in outer block n+2 that are received via Point-to-Point (PTP) transmission with the inner Multimedia Broadcast and Multicast Service (MBMS) payload blocks in outer block n+2 and parity blocks that are received via Point-to-Multipoint (PTM) transmission. UMTS Terrestrial Radio Access Network (UTRAN) 20 can facilitate this process by slightly "anticipating" the transmission of outer blocks to all the users that receive MBMS content from PTP links with respect to the transmission on PTM links.

[00210] Because the UTRAN anticipates the transmission of outer blocks with respect to the PTM transmission, "seamless" transitions from PTP to PTM are possible. As a result, delivery of MBMS content across cell borders and/or between different transmission schemes such as PTM and PTP is also "seamless." This "time anticipation," can be expressed in number of inner blocks. When the User Equipment (UE) 10 transitions to a PTM transmission, even if a communication link does not exist during the transition time, the User Equipment (UE) 10 can lose up to "time anticipation" number of inner blocks without compromising the QoS of the MBMS reception. If the UE starts MBMS reception directly in PTP, the UTRAN could apply the "time anticipation" immediately at the beginning of the PTP transmission since the UTRAN 20 can slowly anticipate the transmission of outer blocks by avoiding empty inner blocks (TF 0), until the anticipation reaches the required "time anticipation" number of inner blocks. From that point onward, UTRAN can keep the "time anticipation" constant.

[00211] In Point-to-Multipoint (PTM), UE specific feedback information available in the Radio Network Controller (RNC) can not be relied upon. In the Point-to-Point (PTP) transmission, the UE 10 could inform the RNC of the number of last outer block correctly received before the transition. This should apply to any transition to PTP

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(from PTM or from PTP). If this feedback is not deemed acceptable, UTRAN 20 can estimate the last outer block that was most likely received by the User Equipment (UE) 10 before the state transition. This estimate could be based on the knowledge of the maximum time inaccuracy foreseeable between distinct cell transmissions, and based on the outer block currently being transmitted or that will soon be transmitted in the target cell.

[00212] The Forward Error Correction (FEC) can be performed so that any blocks lost during the transition can be recovered. This results in a "seamless" transition by reducing the likelihood that content will be lost during a transition. This scheme assumes that the transition from Point-to-Point (PTP) to Point-to-Multipoint (PTM) transmission occurs while the same outer block is being transmitted from each source, which typically occurs given the duration of an outer block with respect to the duration of a transition.

[00213] The amount of memory in the UE 10 can be traded off with the accuracy in the time alignment of PTM transmissions across neighboring cells. By relaxing the memory requirement in the User Equipment (UE) 10, the time accuracy of PTM UTRAN 20 transmissions can be increased.

[00214] FIG. 18 is a diagram that shows a temporal relationship between outer code blocks received by a mobile station during a transition or relocation between a Point-To-Point (PTP) transmission from Radio Network Controller (RNC) A and another Point-To-Point (PTP) transmission from Radio Network Controller (RNC) B. The term RNC can be used interchangeably with the term "Base Station Controller (BSC)." During a "relocation" the User Equipment (UE) 10 transitions from a Point-to-Point (PTP) transmission of a content stream in an area controlled by a first RNC A 124 to Point-to-Point (PTP) transmission of the same content stream in an area controlled by a second RNC B 224. Retransmissions (re-Tx) can be used to compensate for any missed MBMS payload blocks. The direct transition from Point-to-Point (PTP) to Point-to-Point (PTP) between cells can be performed similarly to a Release '99 soft handover or hard handover. Even without coordination between the two RNCs A,B, the target RNC A 124 should be able to figure out the latest whole outer block received by the UE 10. This estimate could be based on the timing of the MBMS content received by the RNC 24 on the Iu interface 25. When using PTP transmission, the RNC 24 can make up an

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initial delay, and no part of the MBMS content will be lost even without requiring lossless SRNS relocation.

[00215] One skilled in the art will appreciate that although the flowchart diagrams can be drawn in sequential order for comprehension, certain steps can be carried out in parallel in an actual implementation. Furthermore, unless indicate otherwise, method steps can me interchanged without departing form the scope of the invention.

[00216] 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.

[00217] Those of skill would further appreciate that the various illustrative logical blocks, modules, circuits, and algorithm steps described in connection with the embodiments disclosed herein may be implemented as electronic hardware, computer software, 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 can be 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 invention.

[00218] The various illustrative logical blocks, modules, and circuits described in connection with the embodiments disclosed herein may be implemented or performed with 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, or any combination thereof designed to perform the functions described herein. 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

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microprocessors, one or more microprocessors in conjunction with a DSP core, or any other such configuration.

[00219] The steps of a method or algorithm described in connection with the embodiments 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 may reside in RAM memory, flash memory, ROM memory, EPROM memory, EEPROM memory, registers, hard disk, a removable disk, a CD-ROM, or any other form of storage medium known in the art. An exemplary storage medium can be coupled to the processor such the processor can read information from, and write information to, the storage medium. In the alternative, the storage medium may be integral to the processor. The processor and the storage medium may reside in an ASIC. The ASIC may reside in a user terminal. In the alternative, the processor and the storage medium may reside as discrete components in a user terminal.

[00220] The previous description of the disclosed embodiments is provided to enable any person skilled in the art to make or use the present invention. Various modifications to these embodiments will be readily apparent to those skilled in the art, and the generic principles defined herein may be applied to other embodiments without departing from the spirit or scope of the invention. For example, although the description specifies that the radio access network 20 can be implemented using the Universal Terrestrial Radio Access Network (UTRAN) air interface, alternatively, in a GSM/GPRS system, the access network 20 could be a GSM/EDGE Radio Access Network (GERAN), or in an inter-system case it could be comprise cells of a UTRAN air interface and cells of a GSM/EDGE air interface. Thus, the present invention is not intended to be limited to the embodiments shown herein but is to be accorded the widest scope consistent with the principles and novel features disclosed herein.

[00221] A portion of the disclosure of this patent document contains material which is subject to copyright protection. The copyright owner has no objection to the facsimile reproduction by anyone of the patent document or the patent disclosure, as it appears in the Patent and Trademark Office patent file or records, but otherwise reserves all copyright rights whatsoever.

[00222] **WHAT IS CLAIMED IS:**

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CLAIMS

1. A method of communicating information over a channel, comprising:

framing rows of a first-type of information comprising payload data in a first format over a radio bearer from a first source to generate rows of a second-type of information;

encoding rows of the second-type of information to generate rows of redundancy information comprising parity blocks;

appending the rows of redundancy information to the rows of second-type information to produce an outer code block that comprises rows of the payload data in the second format and the parity blocks;

adding overhead information to each row of the outer code block, wherein the overhead information includes a sequence number; and

transmitting the outer code block to a radio link control layer.

2. A method according to claim 1, further comprising:

receiving the outer code block from the first source.

3. A method according to claim 2, further comprising:

receiving a second packet from a second source that is identical to the rows of second-type information when a wireless communicator undergoes a transition; and

using the sequence number to realign the outer code block with the second packet

4. A method according to claim 1, wherein the second-type of information comprises payload data in a second format and in some cases padding information.

5. A method according to claim 1, wherein the sequence number provided before encoding allows the radio link control layer to change modes when a wireless communicator undergoes a transition.

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6. A method according to claim 1, wherein the encoding comprises outer-encoding and is performed independent of the radio link control layer.

7. A method according to claim 1, wherein the channel is a unidirectional, common logical channel.

8. A method according to claim 7, wherein the channel is a unidirectional downlink channel.

9. A method according to claim 8, wherein the common logical channel carries information that is broadcast to one or more terminals.

10. A method of transmitting a first outer code block and a second outer code block to a wireless communicator, comprising:

transmitting the first block, wherein the first block has at least one data row and at least one redundancy row, and wherein the each row has a overhead information that includes a sequence number, wherein the second block consists of only data rows; and

when the wireless communicator undergoes a transition, using the sequence number to align the first block with the second block.

11. A protocol structure for a communication system, comprising:

a radio link control layer; and

a forward error correction layer disposed above the radio link control layer,

wherein the forward error correction layer receives a first-type of information over a radio bearer before the first-type of information reaches the radio link control layer,

wherein the forward error correction layer frames the first-type of information into equal size frames before the first-type of information reaches the radio link control layer to generate a second-type of information,

wherein the forward error correction layer uses the second-type of information to generate rows of redundancy information that are added to the second-type of information to generate an outer code block,

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wherein the forward error correction layer adds a sequence number to each frame, before transmitting to the radio link control layer.

12. A protocol structure according to claim 11, wherein the source is a first source, and wherein the outer code block is transmitted over a common logical channel.

13. A protocol structure according to claim 12, wherein the sequence number allows second type of information to be realigned, during a transition, with another second-type of information from a second source.

14. A method of encoding information before transmitting the information on a common channel in a system that includes a radio link control layer, comprising:

receiving the information from a radio bearer; and

outer block coding the information before passing the information to a radio link control layer.

15. A method according to claim 14, wherein the information comprises content and wherein outer block coding, comprises:

organizing the content into data blocks;

encoding the data blocks to generate parity blocks; and

adding the parity blocks to the data blocks to produce an encoder packet, wherein the parity blocks are configured to be used to reconstruct any data blocks lost during transmission.

16. A method according to claim 15, further comprising:

adding overhead information to each block in the encoder packet that identifies that block by a sequence number that includes an inner block number and an outer block number.

17. A method according to claim 15, wherein each block is transmitted in a single frame.

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18. A method according to claim 15, wherein each block is transmitted in a plurality of frames.

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FIG. 1

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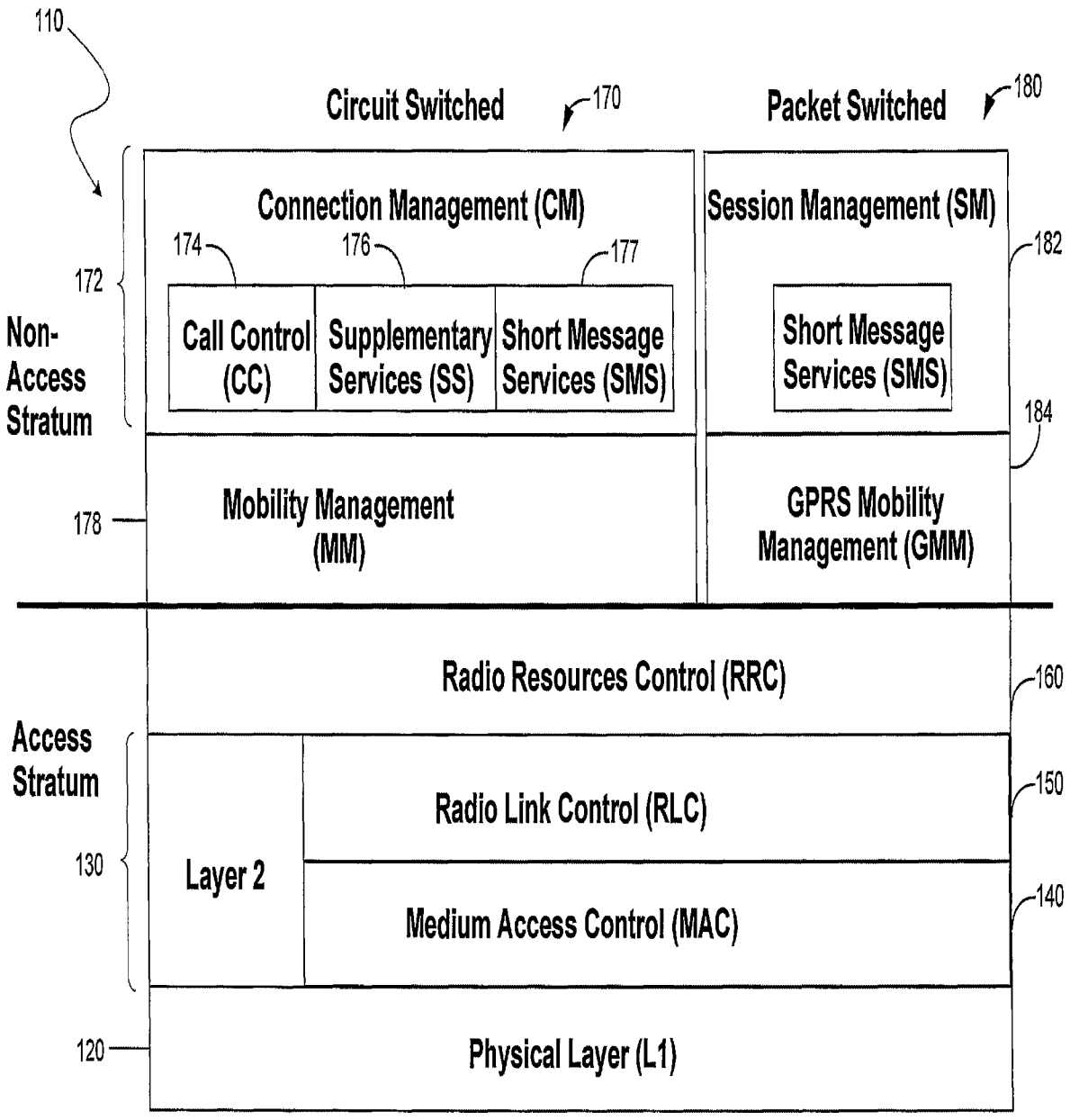


FIG. 2

ONEPLUS - EX. 1002

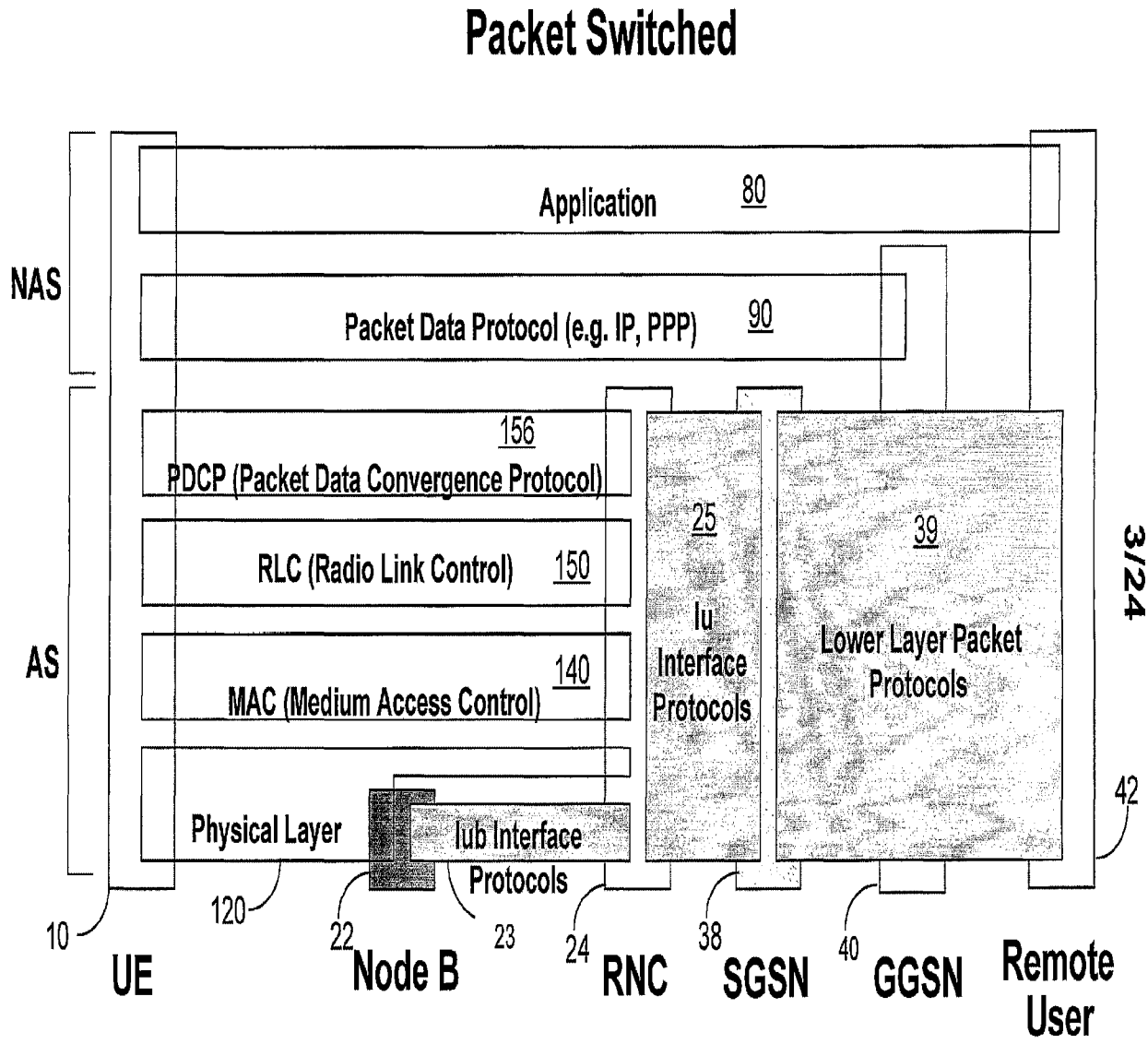


FIG. 3

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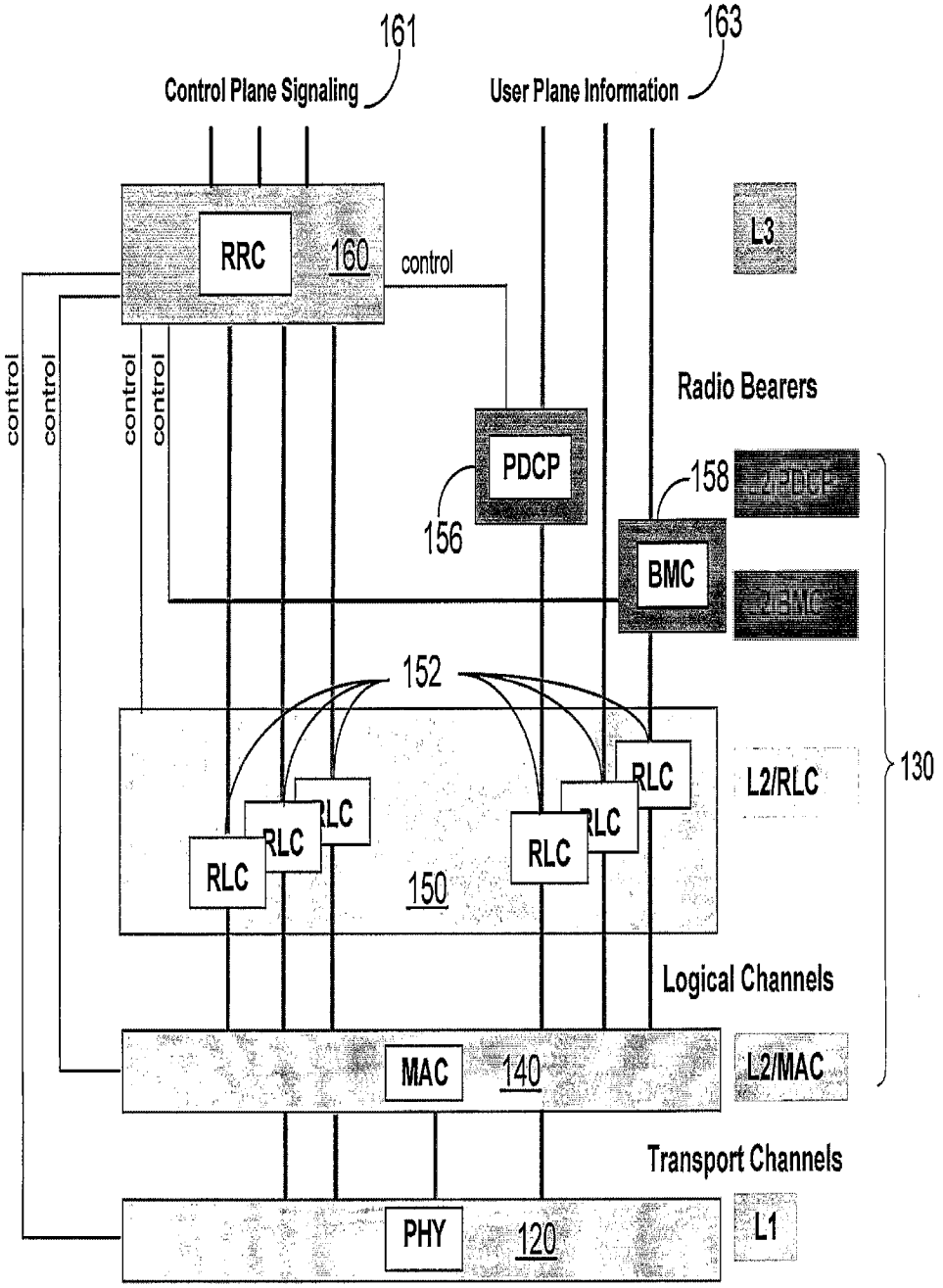


FIG. 4

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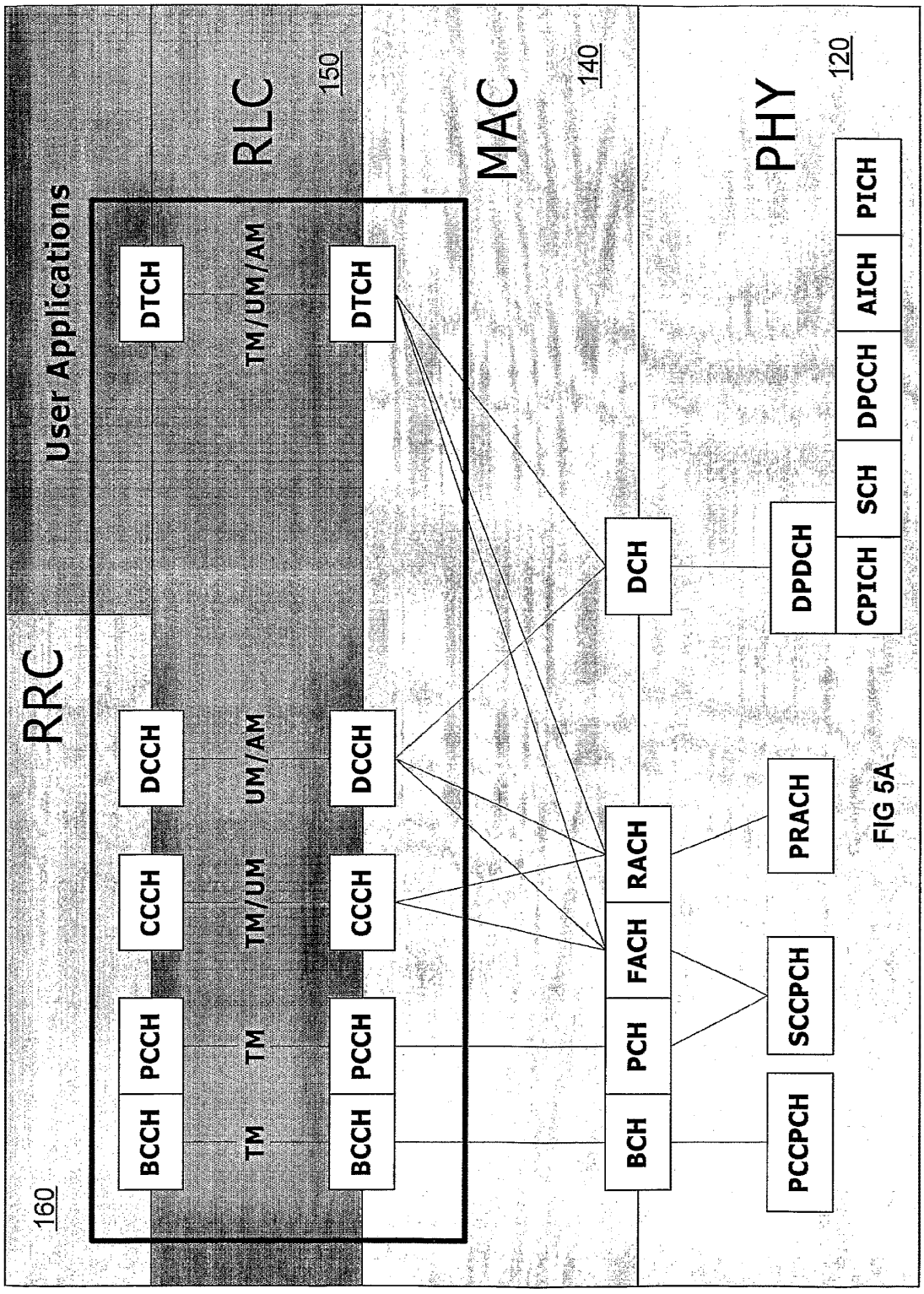

RRC
User Applications
160
RLC
150
MAC
140
PHY
120
BCCH
PCCH
CCCH
DCCH
DTCH
TM
TM/UM
UM/AM
TM/UM/AM
BCH
PCH
FACH
RACH
DCH
PCCPCH
SCCPCH
PRACH
DPDCH
CPICH
SCH
DPCCH
AICH
PICH

FIG 5A

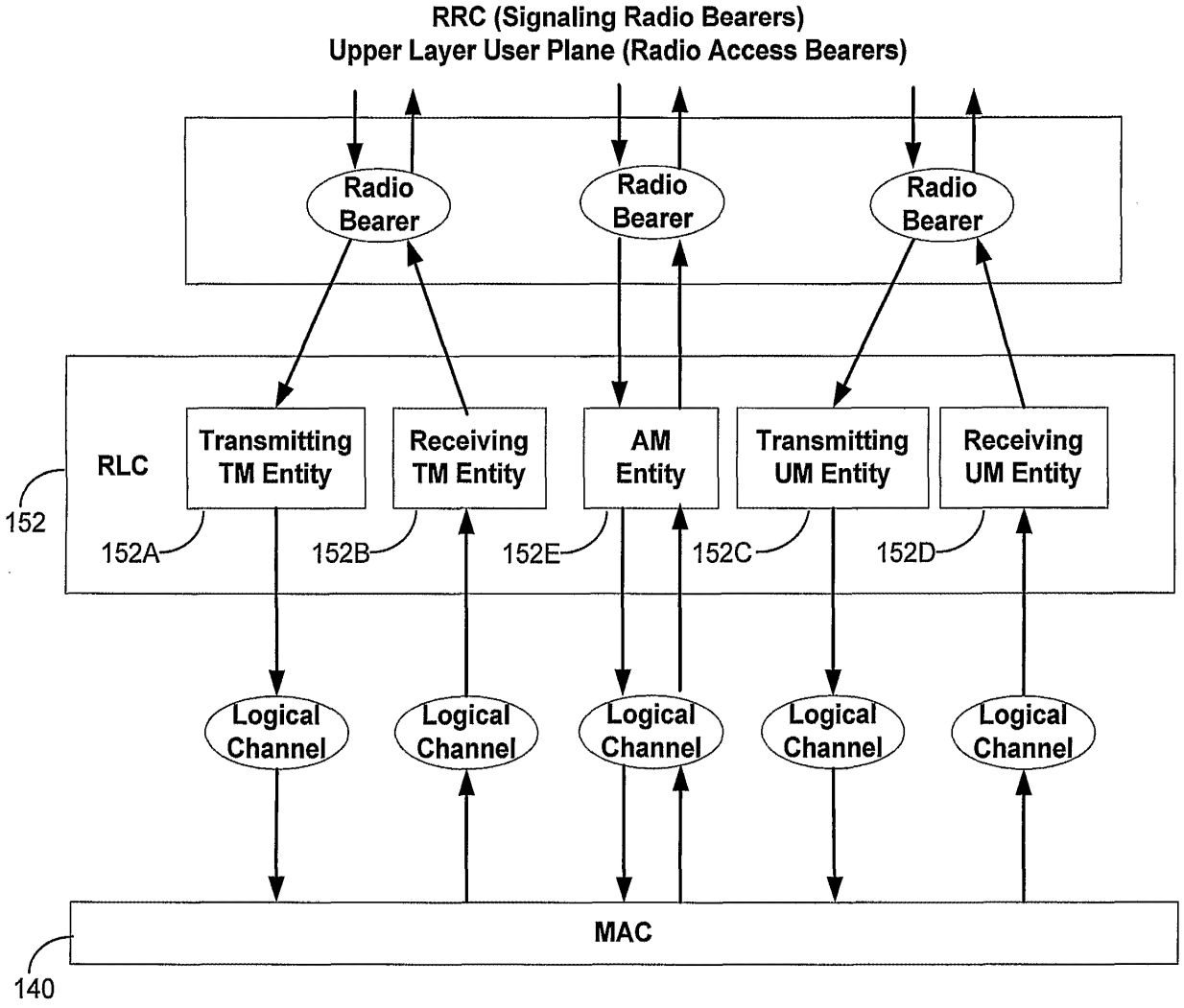


FIG. 5B

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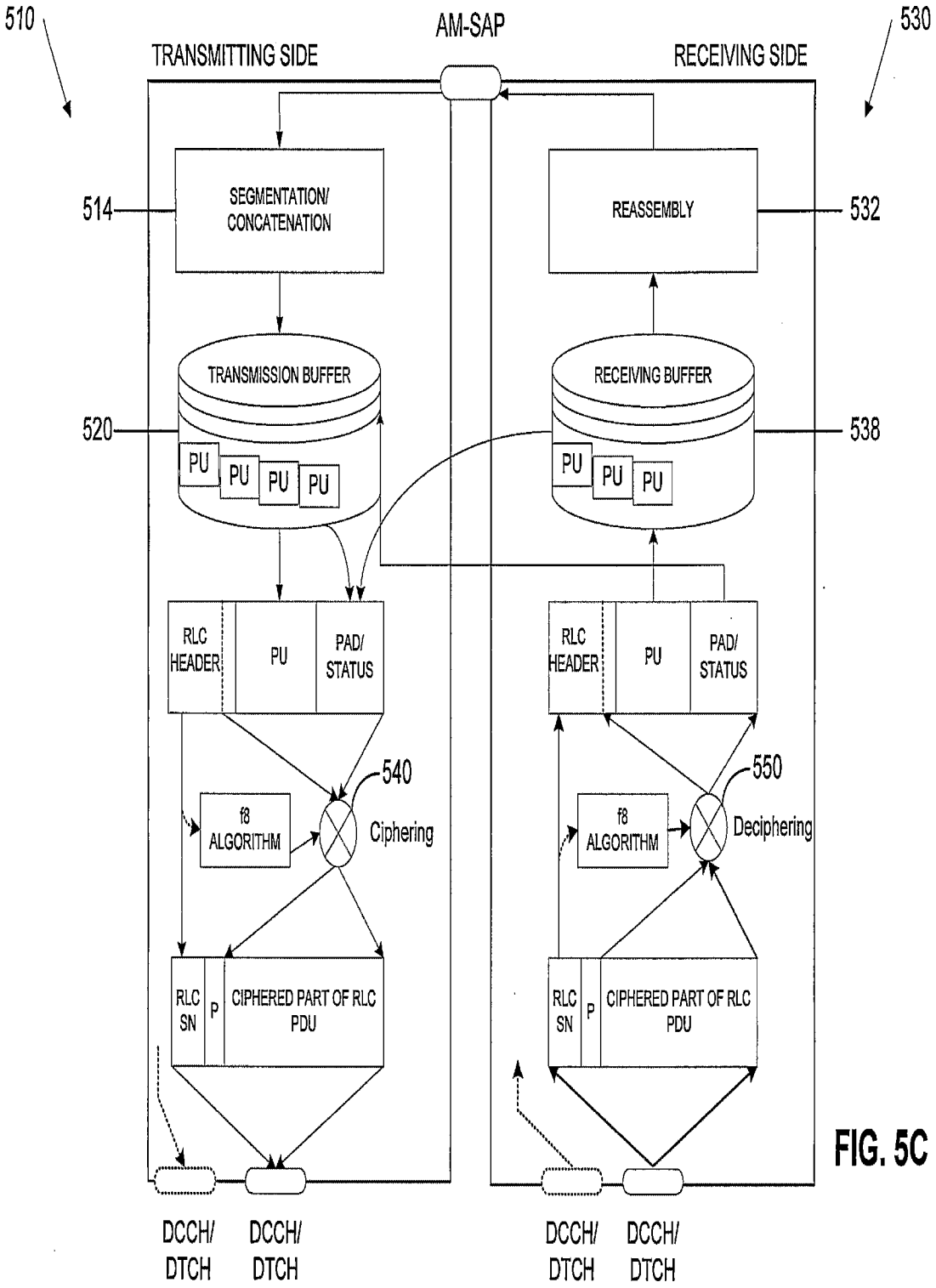


FIG. 5C

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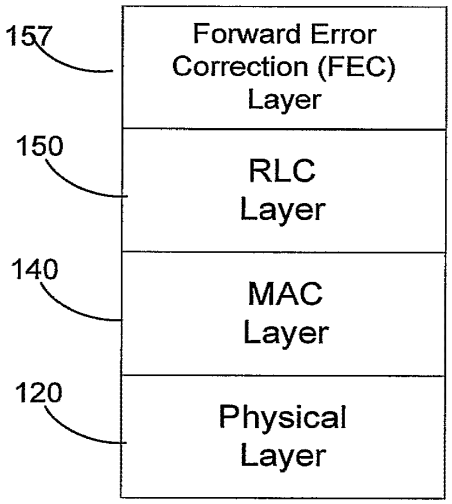

157
Forward Error Correction (FEC) Layer
150
RLC Layer
140
MAC Layer
120
Physical Layer

FIG. 6

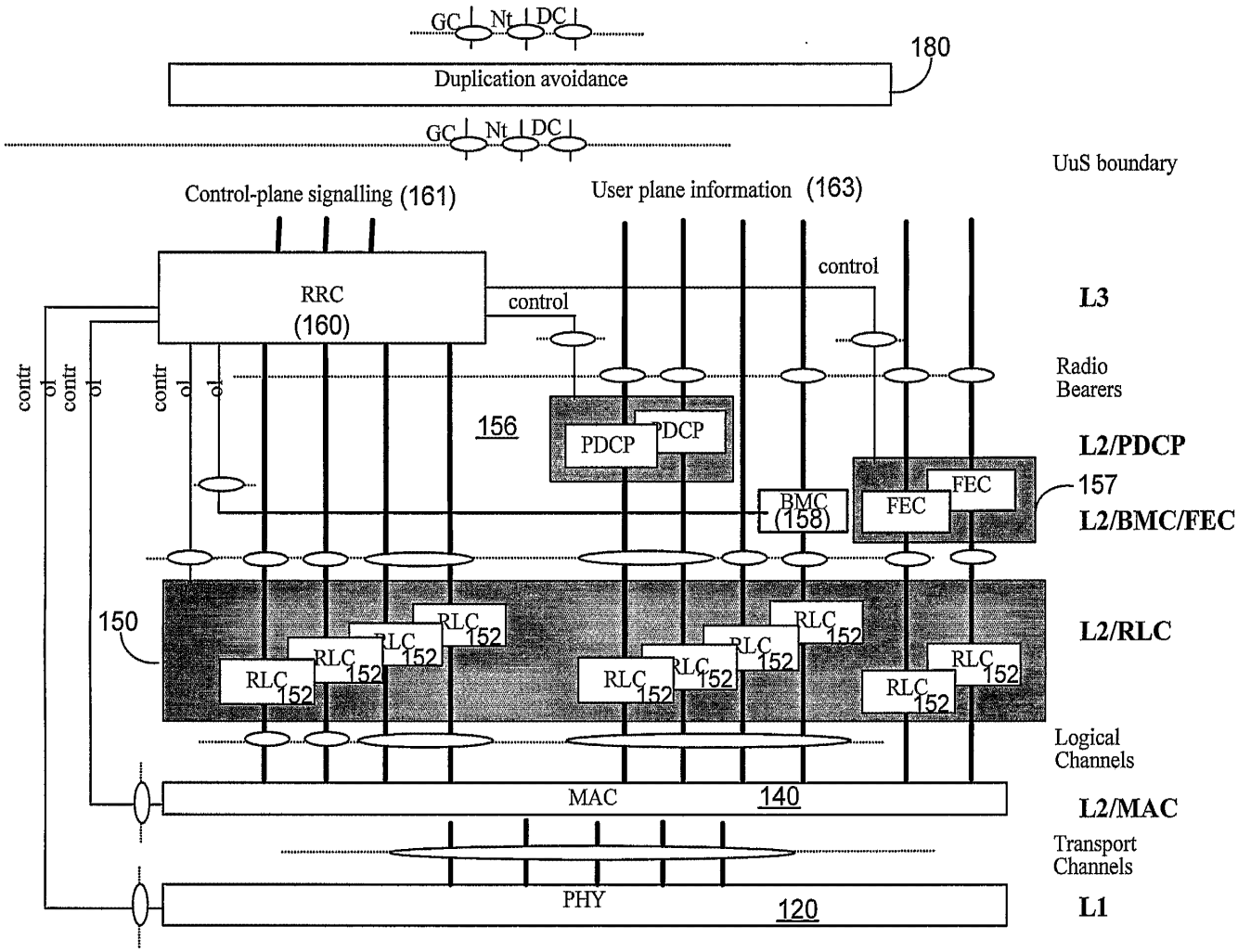


FIG. 7A

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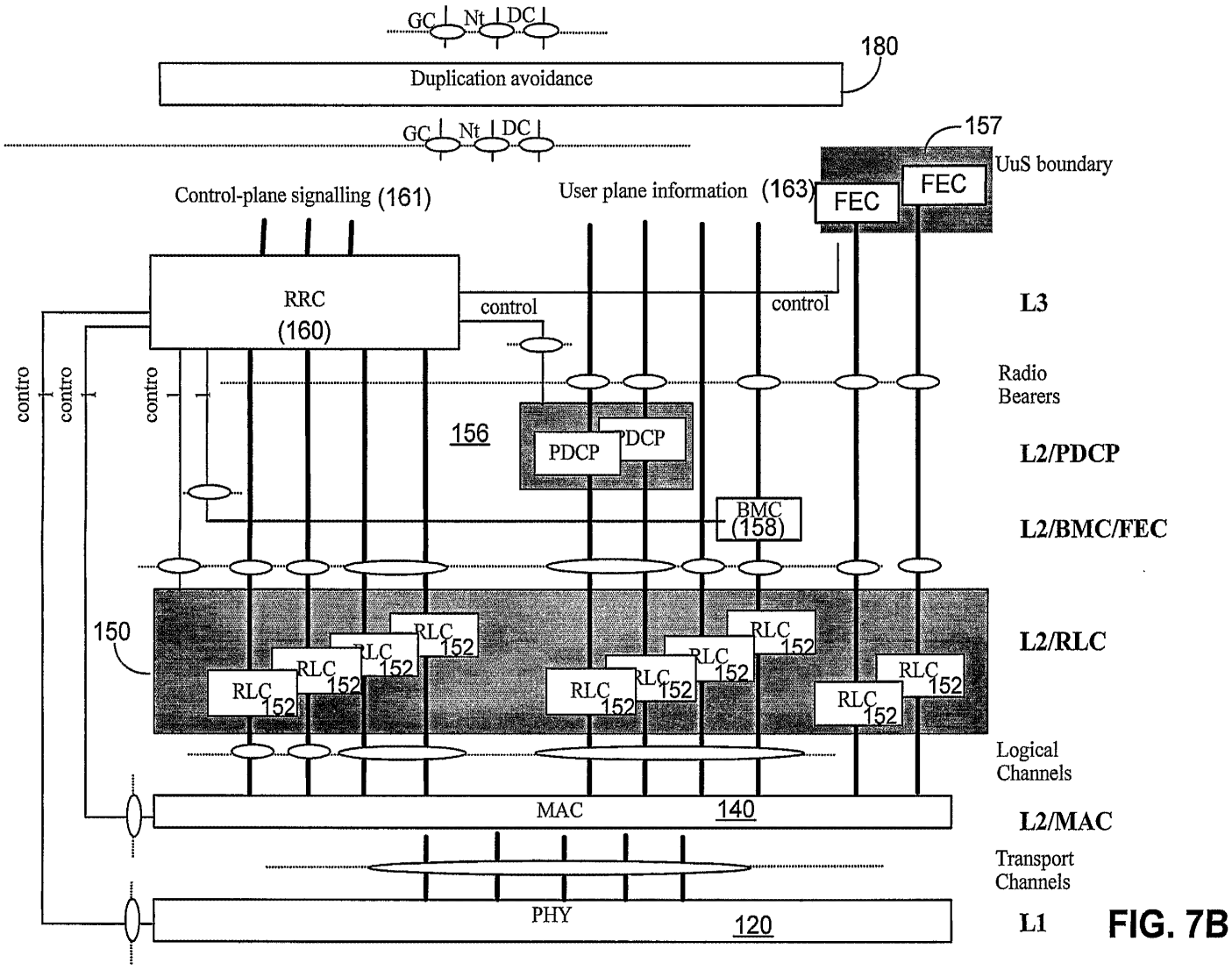

GC
Nt
DC
180
Duplication avoidance
GC
Nt
DC
157
UuS boundary
FEC
FEC
Control-plane signalling (161)
User plane information (163)
RRC
(160)
control
control
L3
contro
contro
contro
Radio
Bearers
156
PDCP
PDCP
L2/PDCP
BMC
(158)
L2/BMC/FEC
150
RLC
152
L2/RLC
Logical
Channels
MAC
140
L2/MAC
Transport
Channels
PHY
120
L1

FIG. 7B

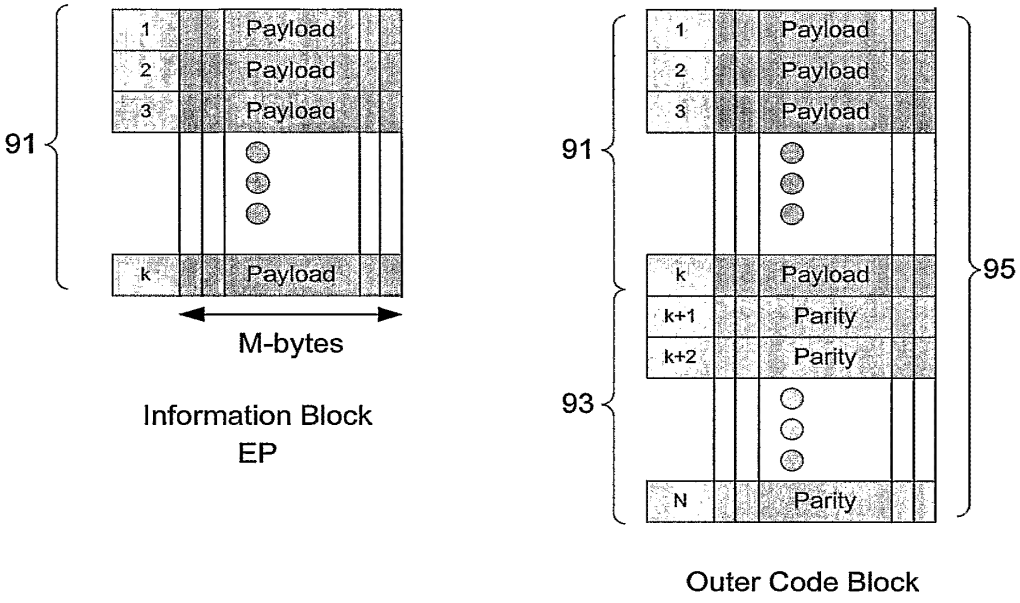

91
1
Payload
2
Payload
3
Payload
k
Payload
M-bytes
Information Block
EP
91
93
95
1
Payload
2
Payload
3
Payload
k
Payload
k+1
Parity
k+2
Parity
N
Parity
Outer Code Block

FIG. 8

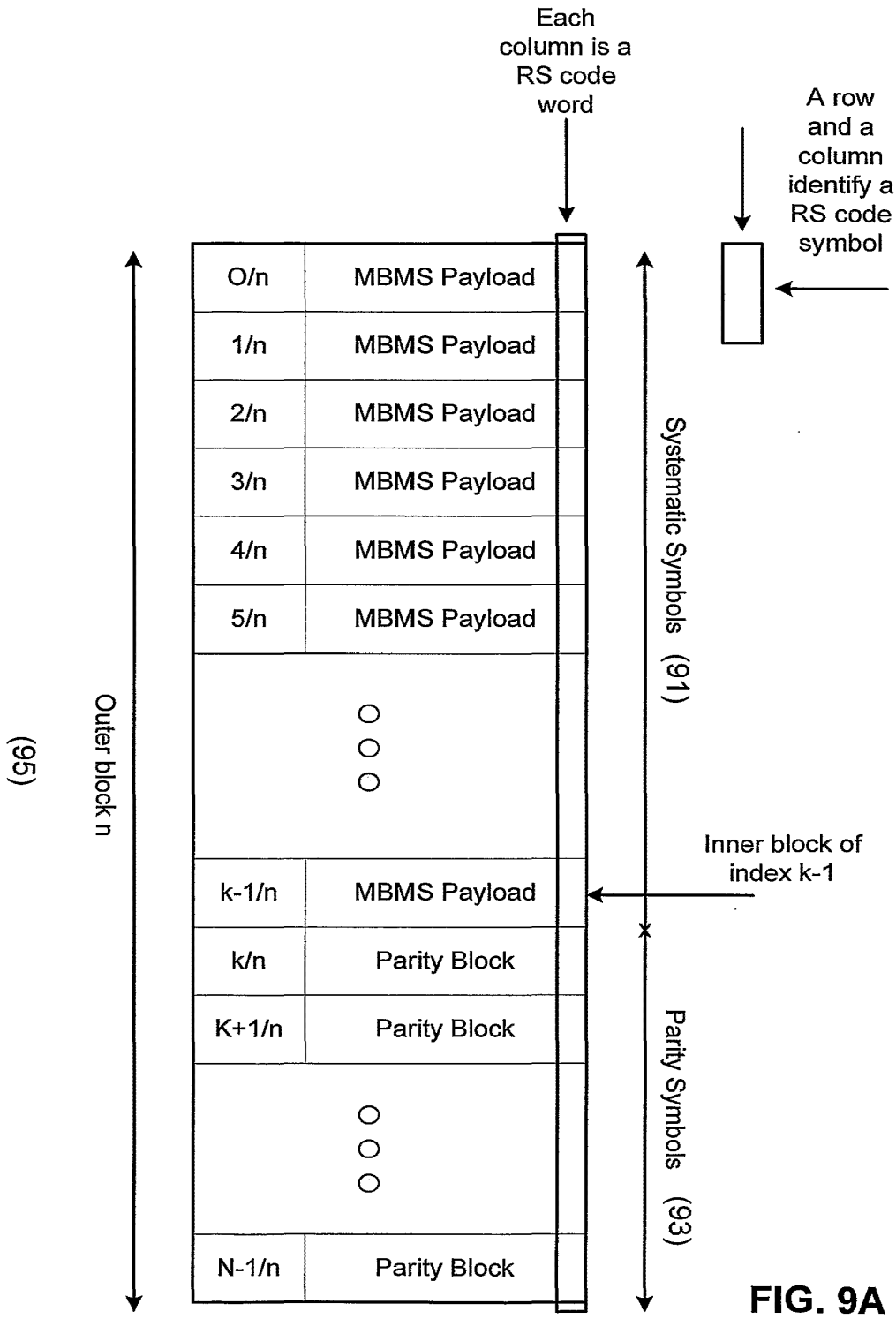

Each column is a RS code word
A row and a column identify a RS code symbol
O/n MBMS Payload
1/n MBMS Payload
2/n MBMS Payload
3/n MBMS Payload
4/n MBMS Payload
5/n MBMS Payload
k-1/n MBMS Payload
k/n Parity Block
K+1/n Parity Block
N-1/n Parity Block
Systematic Symbols (91)
Parity Symbols (93)
Inner block of index k-1
Outer block n
(95)

FIG. 9A

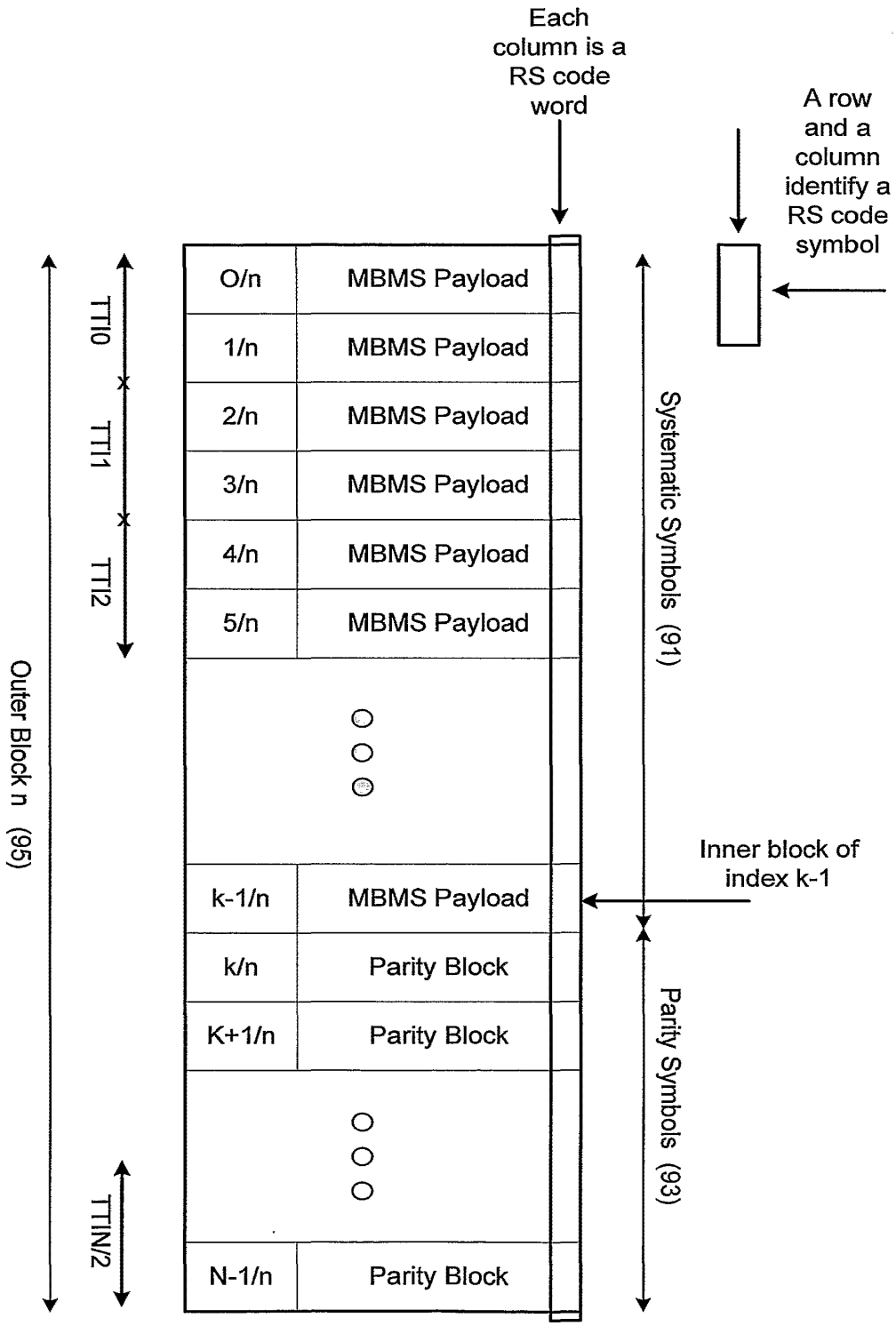

Each column is a RS code word
A row and a column identify a RS code symbol
O/n
MBMS Payload
1/n
MBMS Payload
2/n
MBMS Payload
3/n
MBMS Payload
4/n
MBMS Payload
5/n
MBMS Payload
k-1/n
MBMS Payload
k/n
Parity Block
K+1/n
Parity Block
N-1/n
Parity Block
Systematic Symbols (91)
Parity Symbols (93)
Inner block of index k-1
Outer Block n (95)
TTI0
TTI1
TTI2
TTIN/2

FIG. 9B

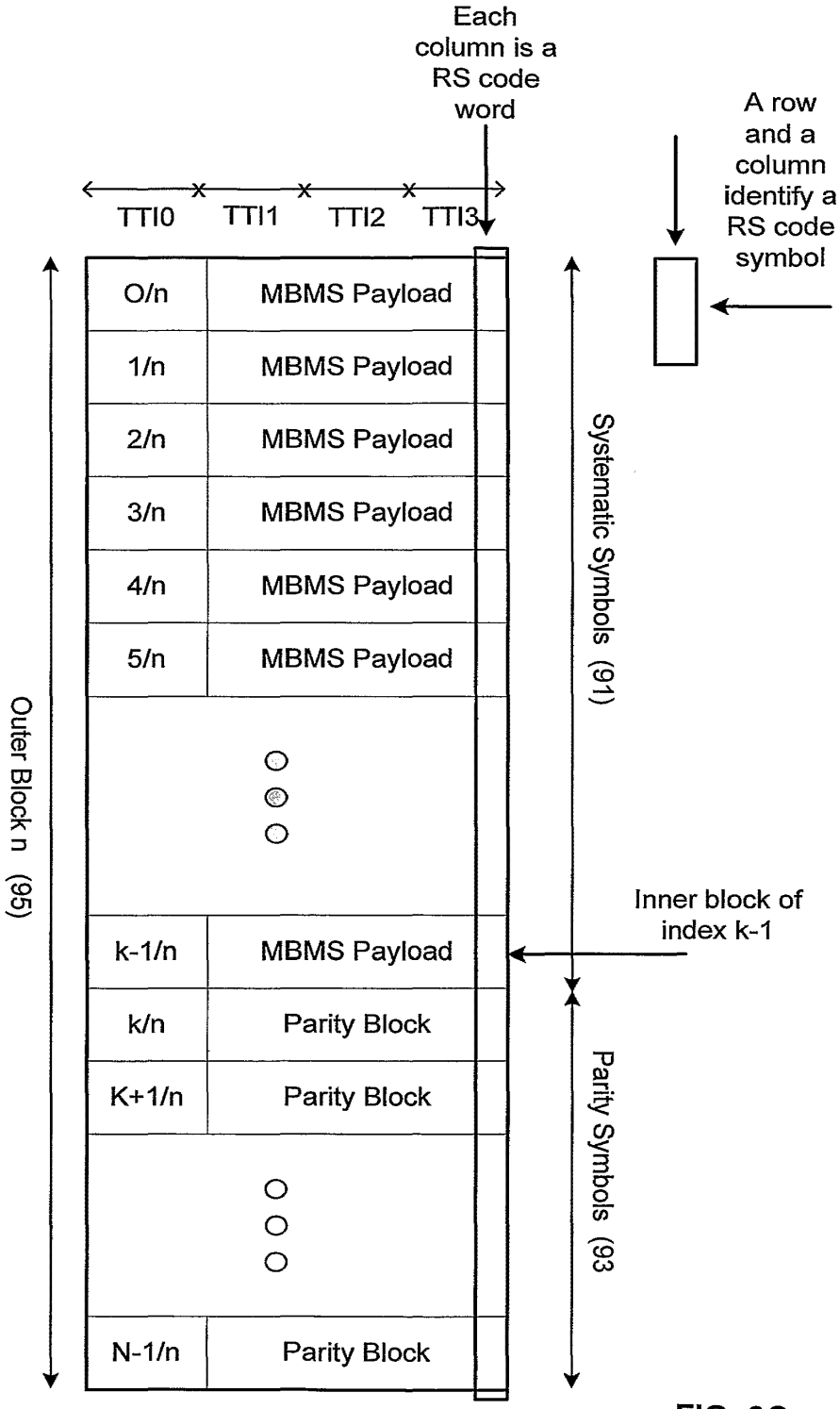
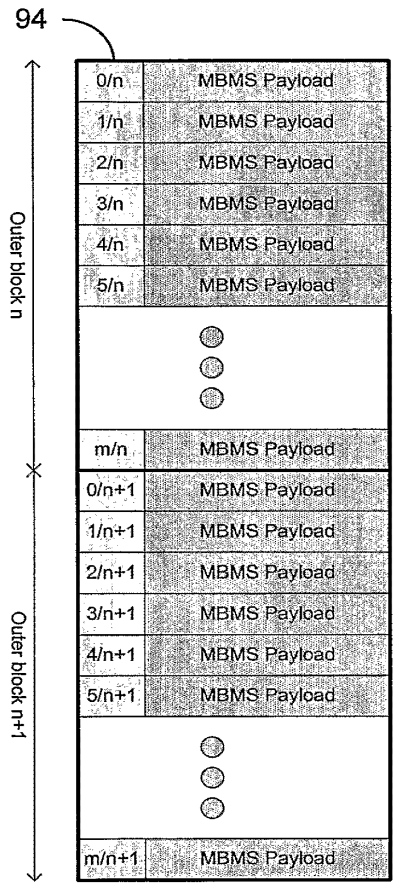
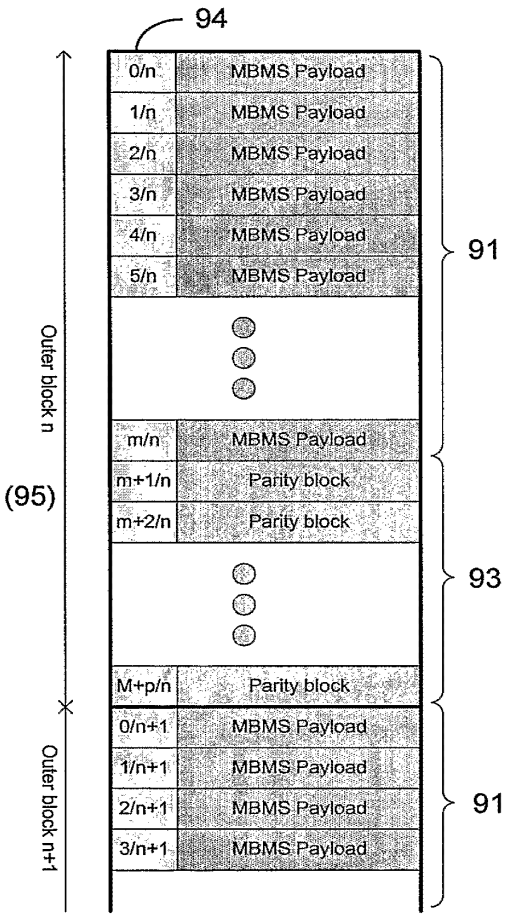

Each column is a RS code word
A row and a column identify a RS code symbol
TTI0
TTI1
TTI2
TTI3
O/n
MBMS Payload
1/n
MBMS Payload
2/n
MBMS Payload
3/n
MBMS Payload
4/n
MBMS Payload
5/n
MBMS Payload
k-1/n
MBMS Payload
k/n
Parity Block
K+1/n
Parity Block
N-1/n
Parity Block
Outer Block n (95)
Systematic Symbols (91)
Parity Symbols (93
Inner block of index k-1

FIG. 9C



FECd blocks

FIG. 10A



FECc blocks

FIG. 10B

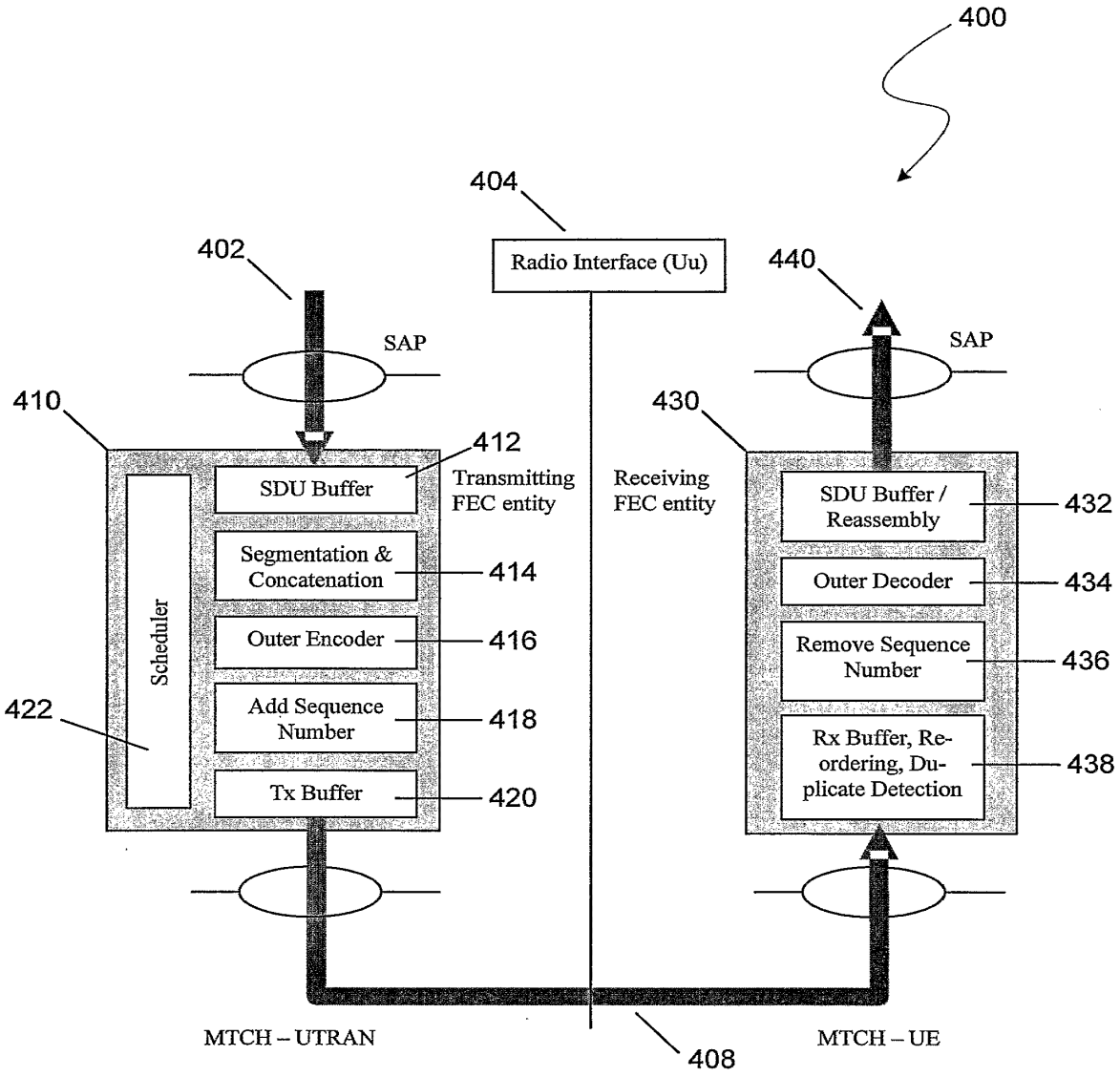

400
404
Radio Interface (Uu)
402
SAP
440
SAP
410
430
412
Transmitting FEC entity
Receiving FEC entity
SDU Buffer
SDU Buffer / Reassembly
432
Segmentation & Concatenation
414
Outer Decoder
434
Outer Encoder
416
Remove Sequence Number
436
Scheduler
422
Add Sequence Number
418
Rx Buffer, Re-ordering, Du-plicate Detection
438
Tx Buffer
420
MTCH – UTRAN
MTCH – UE
408

FIG. 11

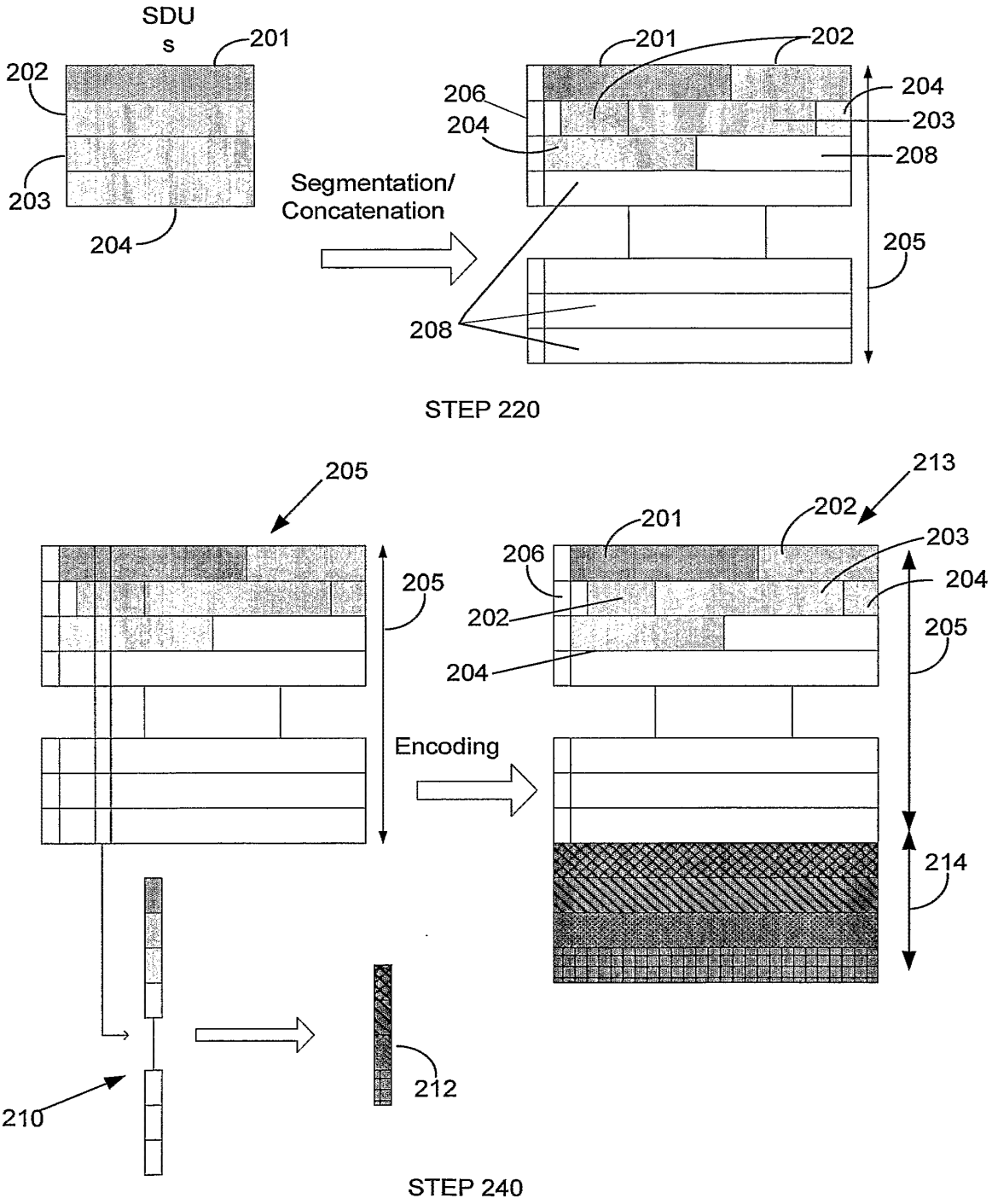
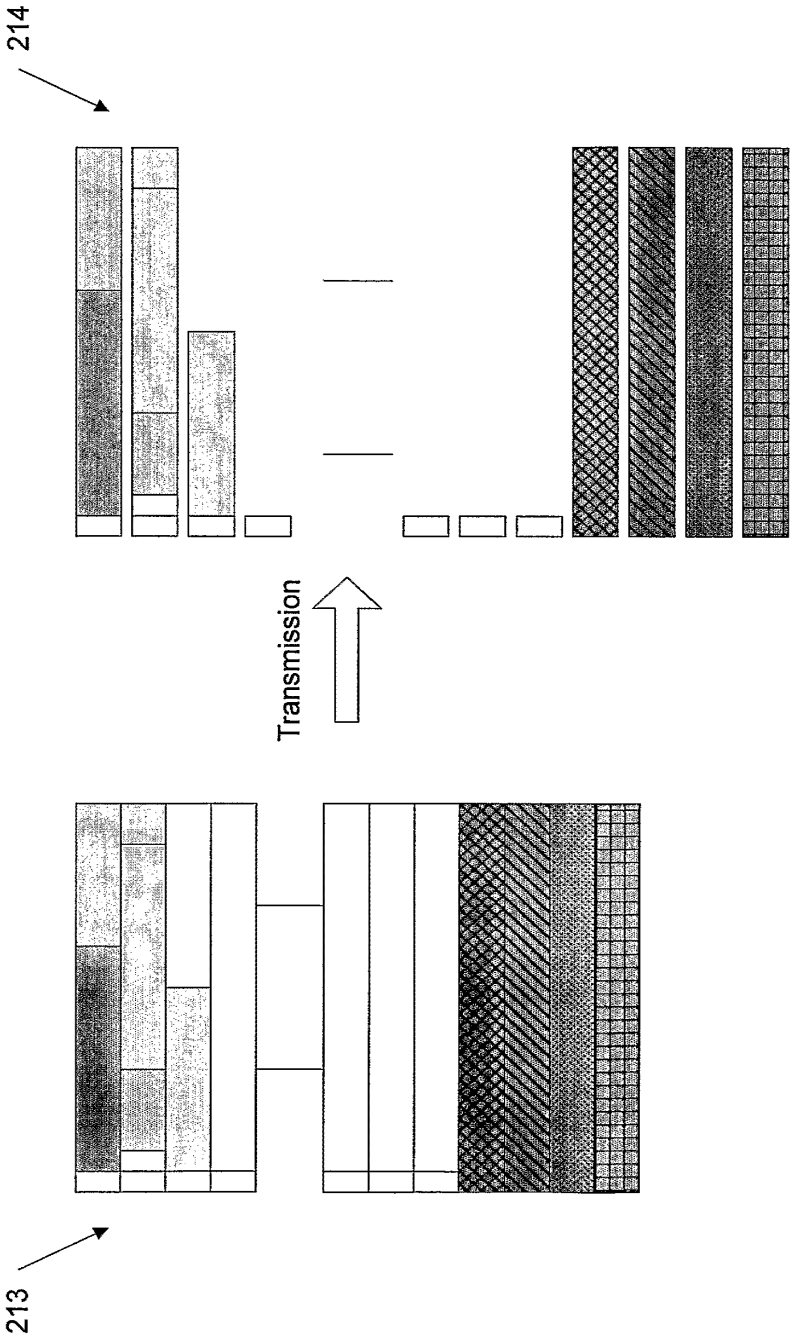

SDU
s
201
202
203
204
Segmentation/
Concatenation
206
208
205
STEP 220
213
Encoding
214
210
212
STEP 240

FIG. 12A



Step 260

FIG. 12B

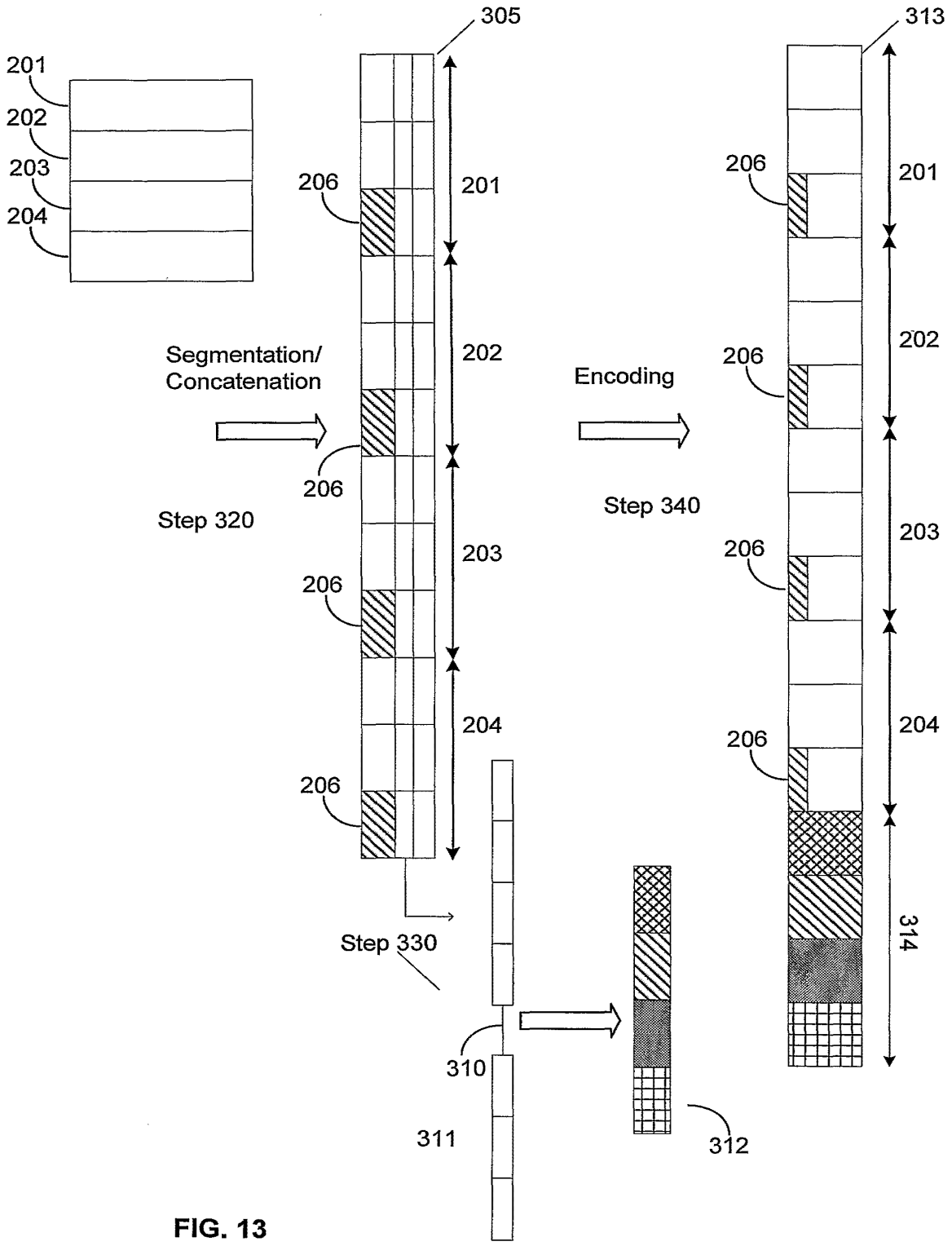

201
202
203
204
305
206
201
202
206
Segmentation/
Concatenation
Step 320
203
206
204
206
Step 330
310
311
312
Encoding
Step 340
313
206
201
206
202
206
203
206
204
314

FIG. 13

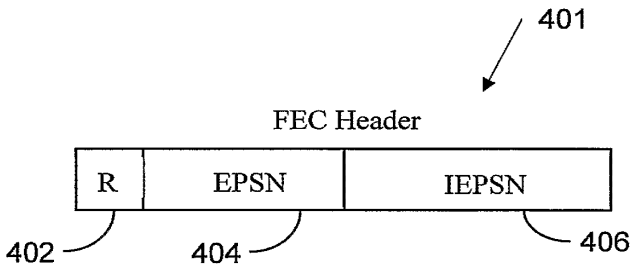


FIG. 14

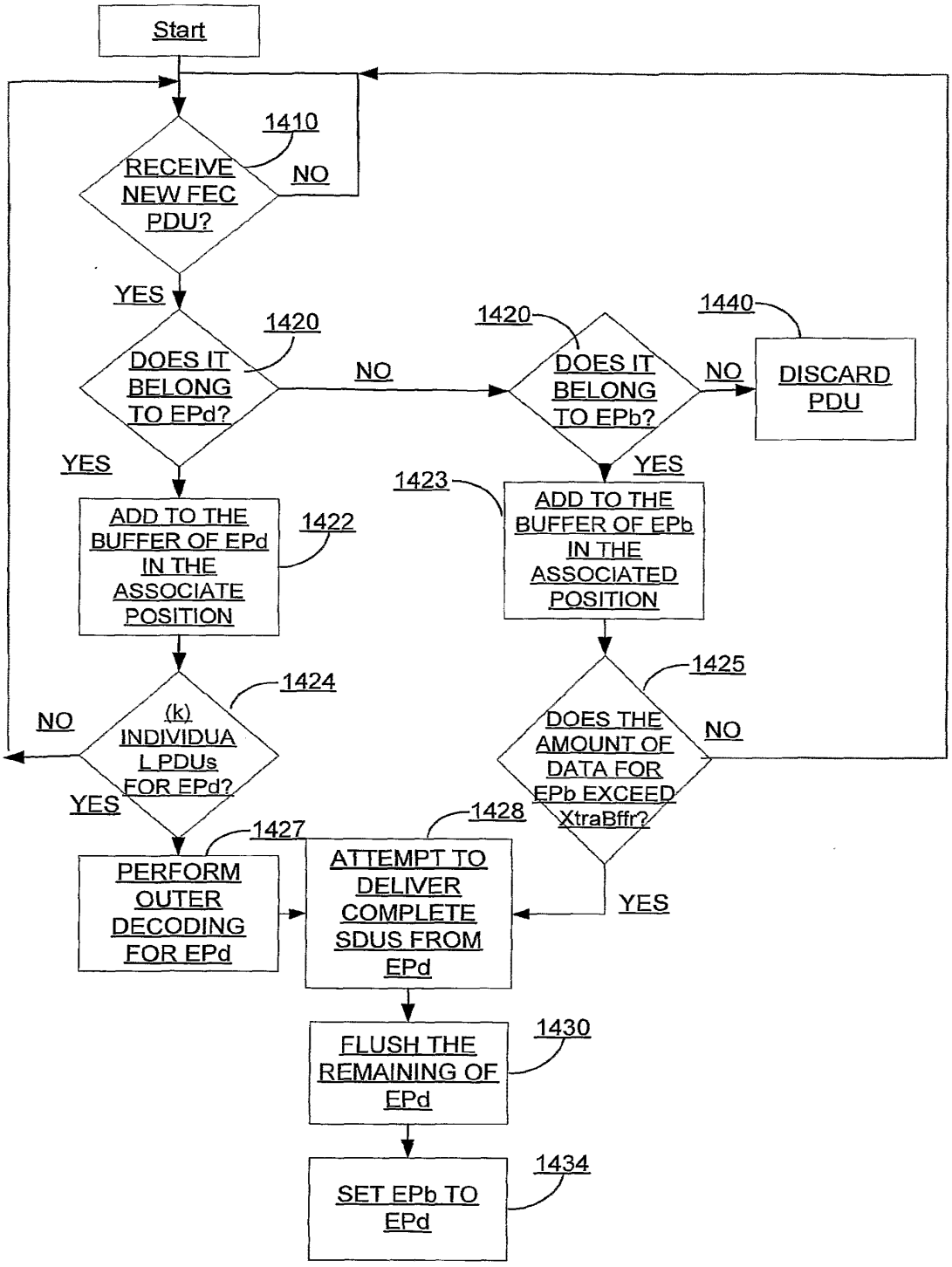

Start
1410
RECEIVE NEW FEC PDU?
NO
YES
1420
DOES IT BELONG TO EPd?
NO
1420
DOES IT BELONG TO EPb?
NO
1440
DISCARD PDU
YES
YES
1423
ADD TO THE BUFFER OF EPd IN THE ASSOCIATE POSITION
1422
ADD TO THE BUFFER OF EPb IN THE ASSOCIATED POSITION
1424
(k) INDIVIDUAL PDUs FOR EPd?
NO
YES
1425
DOES THE AMOUNT OF DATA FOR EPb EXCEED XtraBffr?
NO
YES
1427
PERFORM OUTER DECODING FOR EPd
1428
ATTEMPT TO DELIVER COMPLETE SDUS FROM EPd
1430
FLUSH THE REMAINING OF EPd
1434
SET EPb TO EPd

FIG. 15

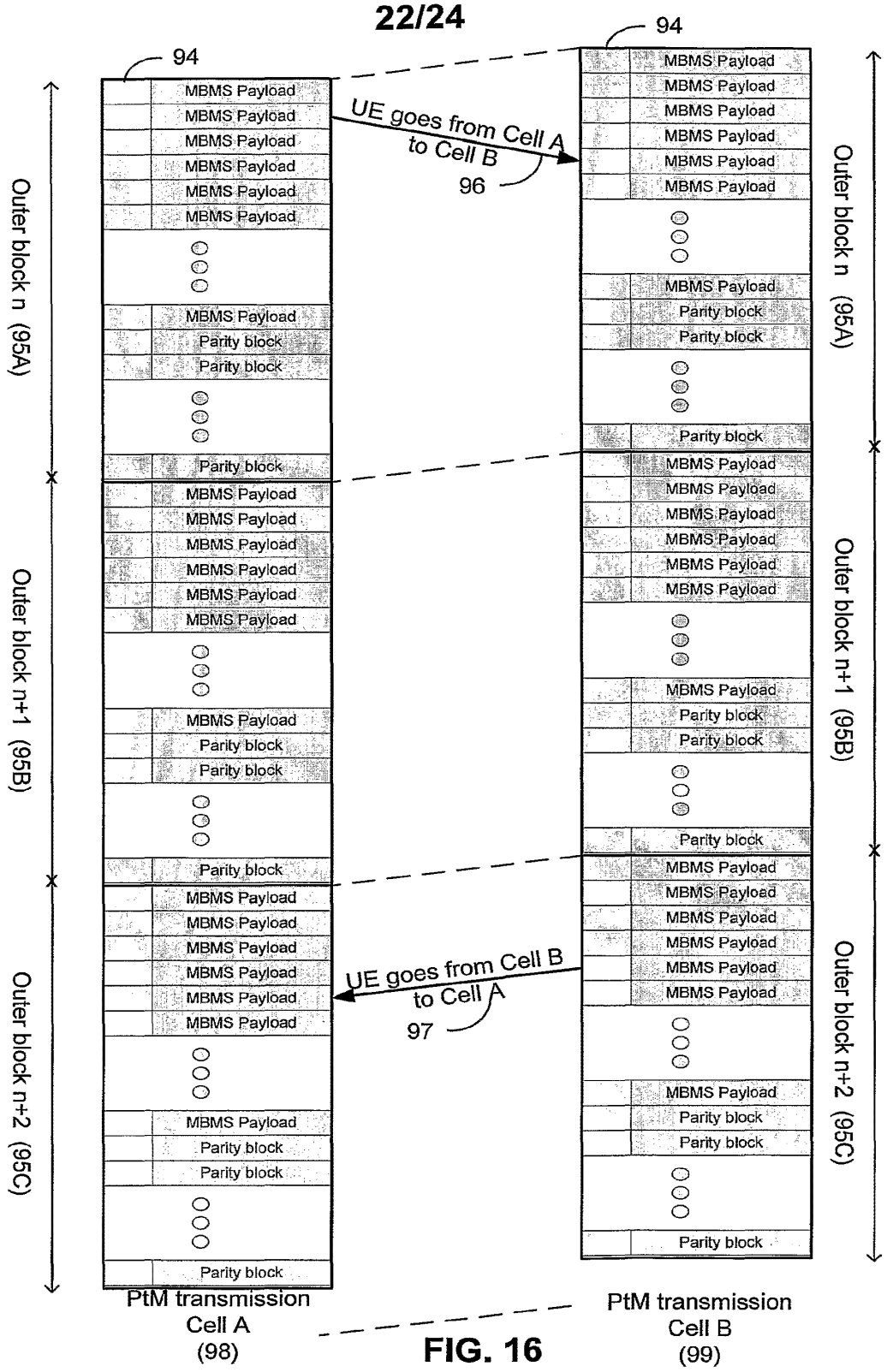

94
MBMS Payload
Parity block
UE goes from Cell A to Cell B
96
UE goes from Cell B to Cell A
97
Outer block n (95A)
Outer block n+1 (95B)
Outer block n+2 (95C)
PtM transmission Cell A (98)
PtM transmission Cell B (99)

FIG. 16

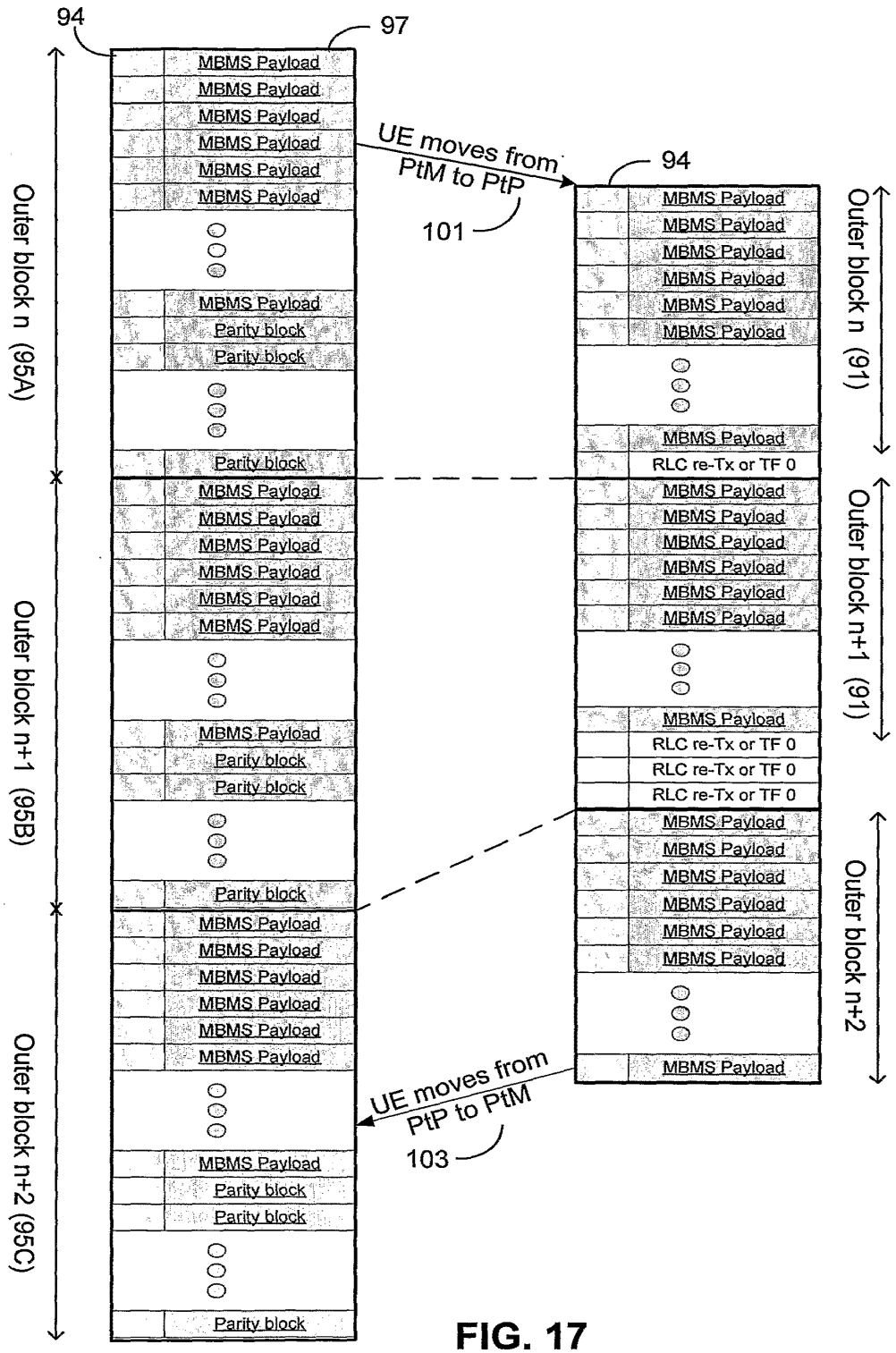

94
97
MBMS Payload
Parity block
Outer block n (95A)
Outer block n+1 (95B)
Outer block n+2 (95C)
UE moves from PtM to PtP
101
94
RLC re-Tx or TF 0
Outer block n (91)
Outer block n+1 (91)
Outer block n+2
UE moves from PtP to PtM
103
PtM transmission
PtP transmission

FIG. 17

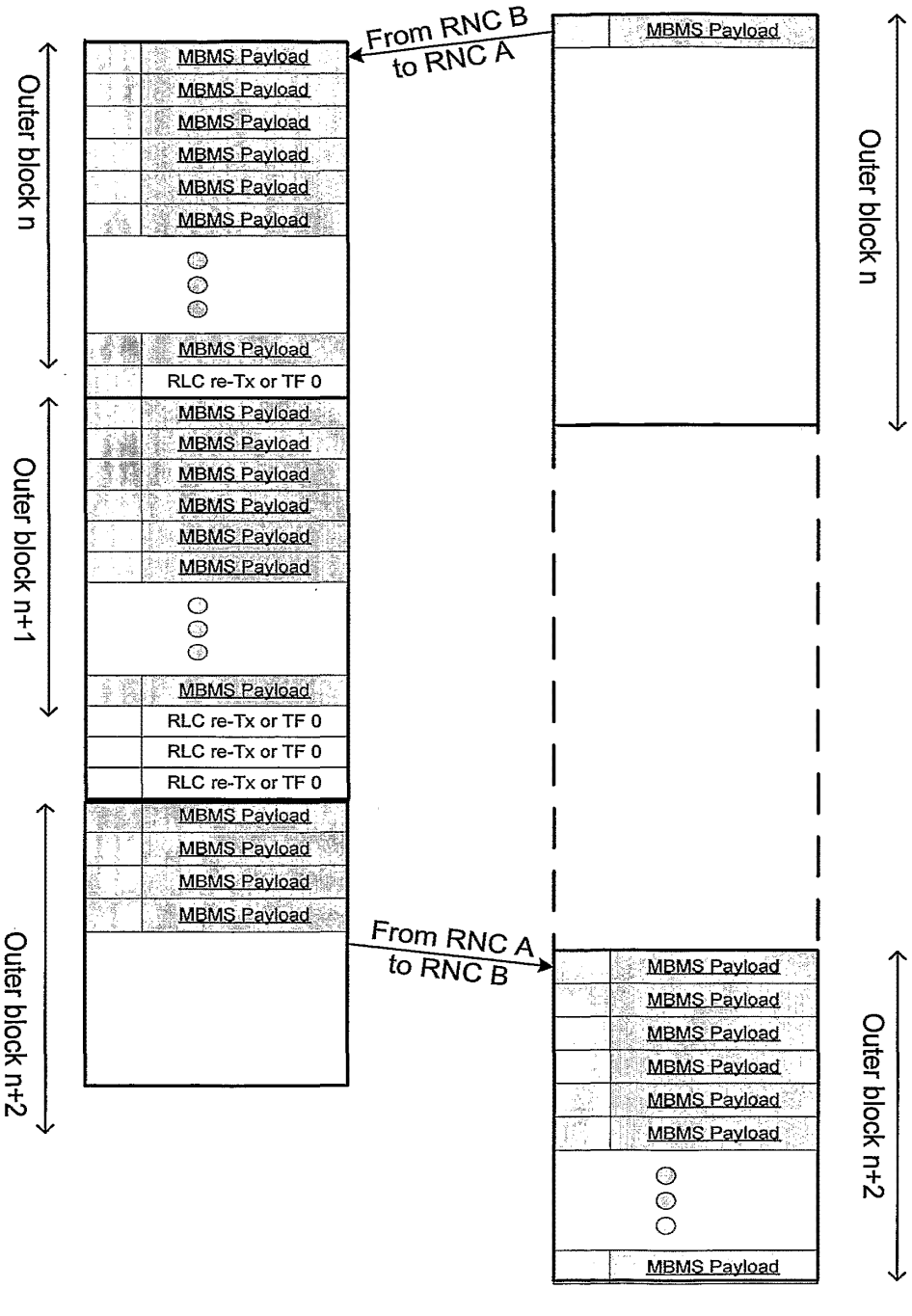


FIG. 18

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/US2004/027222

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04L1/00 H04Q7/38

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 7 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 practical, search terms used)
EPO-Internal, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	WO 03/096149 A (QUALCOMM INC) 20 November 2003 (2003-11-20) abstract page 21 - page 29; figures 4a-4f	1-18
P,X	QUALCOMM: "Transition between PtP and PtM in MBMS" 3GPP TSG-RAN2-37, 'Online! 29 August 2003 (2003-08-29), XP002312407 Retrieved from the Internet: URL:http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_37/Docs/> the whole document	1-18

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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"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

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
12 January 2005	27/01/2005

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Martínez Martínez, V

Form PCT/ISA/210 (second sheet) (January 2004)

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	ERICSSON: "Bit rate and retransmission aspects for p-t-m MBMS in GERAN" 3GPP TSG GERAN-15, 'Online! 27 June 2003 (2003-06-27), XP002312408 Retrieved from the Internet: URL:http://www.3gpp.org/ftp/tsg_geran/TSG_GERAN/GERAN_15_Fort_Lauderdale/Docs/> the whole document	1-18
A	SIEMENS: "Threshold for p-t-m MBMS delivery" 3GPP TSG GERAN-14, 'Online! 11 April 2003 (2003-04-11), XP002312409 Retrieved from the Internet: URL:http://www.3gpp.org/ftp/tsg_geran/TSG_GERAN/GERAN_14_Munich/Docs/> the whole document	1-18
A	QUALCOMM: "On support for Outer coding" 3GPP TSG-RAN 1-29, 'Online! 8 November 2002 (2002-11-08), XP002312410 Retrieved from the Internet: URL:http://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_29/Docs/Zips/> the whole document	1-18
A	QUALCOMM: "MBMS design considerations" 3GPP TSG RAN WG1-28, 'Online! 22 August 2002 (2002-08-22), XP002312411 Retrieved from the Internet: URL:http://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_28/Docs/Zips/> the whole document	1-18
A	MCAULEY A J: "RELIABLE BROADBAND COMMUNICATION USING A BURST ERASURE CORRECTING CODE" COMPUTER COMMUNICATION REVIEW, ASSOCIATION FOR COMPUTING MACHINERY. NEW YORK, US, vol. 20, no. 4, 1 September 1990 (1990-09-01), pages 297-306, XP000168063 ISSN: 0146-4833 abstract page 303 - page 304; figure 2	1-18

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WANG G ET AL: "Error protection for scalable image over 3g-ip network" PROCEEDINGS 2002 INTERNATIONAL CONFERENCE ON IMAGE PROCESSING. ICIP 2002. ROCHESTER, NY, SEPT. 22 - 25, 2002, INTERNATIONAL CONFERENCE ON IMAGE PROCESSING, NEW YORK, NY : IEEE, US, vol. VOL. 2 OF 3, 22 September 2002 (2002-09-22), pages 733-736, XP010608076 ISBN: 0-7803-7622-6 abstract; figure 1	1-18
A	BOYCE J M: "Packet loss resilient transmission of MPEG video over the Internet - Principles, Protocols, and Architecture" SIGNAL PROCESSING. IMAGE COMMUNICATION, ELSEVIER SCIENCE PUBLISHERS, AMSTERDAM, NL, vol. 15, no. 1-2, September 1999 (1999-09), pages 7-24, XP004180635 ISSN: 0923-5965 page 10; figure 1	1-18
A	KALLIOKULJU J: "User plane architecture of 3rd generation mobile telecommunication network" IEEE INTERNATIONAL CONFERENCE ON NETWORKS. ICON. PROCEEDINGS OF ICON, XX, XX, 28 September 1999 (1999-09-28), pages 270-278, XP010354980 the whole document	1-18

ONEPLUS - EX. 1002

INTERNATIONAL SEARCH REPORT

Information on patent family members

:ernational Application No
PCT/US2004/027222

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 03096149 A	20-11-2003	US 2003207696 A1	06-11-2003
		WO 03096149 A2	20-11-2003

Form PCT/ISA/210 (patent family annex) (January 2004)

Electronic Patent Application Fee Transmittal

Application Number:	16421019
Filing Date:	23-May-2019
Title of Invention:	METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES
First Named Inventor/Applicant Name:	Benoit Pelletier
Filer:	Joseph P. Gushue/Margaret Ferello
Attorney Docket Number:	SIG-2-1853US06

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($)
Miscellaneous:				
SUBMISSION- INFORMATION DISCLOSURE STMT	1806	1	260	260
		Total in USD ($)		**260**

Electronic Acknowledgement Receipt

EFS ID:	41487954
Application Number:	16421019
International Application Number:	
Confirmation Number:	9820
Title of Invention:	METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES
First Named Inventor/Applicant Name:	Benoit Pelletier
Customer Number:	3624
Filer:	Joseph P. Gushue/Margaret Ferello
Filer Authorized By:	Joseph P. Gushue
Attorney Docket Number:	SIG-2-1853US06
Receipt Date:	24-DEC-2020
Filing Date:	23-MAY-2019
Time Stamp:	15:20:31
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$260
RAM confirmation Number	E2020BNF21051693
Deposit Account	220493
Authorized User	Margaret Ferello

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

37 CFR 1.17 (Patent application and reexamination processing fees)

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)	SIG_2_1853US06_IDS_Form_SB08_20201222.pdf	1351226 a8d38df3818a0d1eda8a723da8a234957ab69ecc	no	4
Warnings:					
Information:					
A U.S. Patent Number Citation or a U.S. Publication Number Citation is required in the Information Disclosure Statement (IDS) form for autoloading of data into USPTO systems. You may remove the form to add the required data in order to correct the Informational Message if you are citing U.S. References. If you chose not to include U.S. References, the image of the form will be processed and be made available within the Image File Wrapper (IFW) system. However, no data will be extracted from this form. Any additional data such as Foreign Patent Documents or Non Patent Literature will be manually reviewed and keyed into USPTO systems.					
2	Transmittal Letter	SIG_2_1853US06_IDS_Transmittal_20201224.pdf	89630 ef0bf7cfb2625e03bced3a243939a72e90df4963	no	4
Warnings:					
Information:					
3	Foreign Reference	SIG_2_1853US06_WO2005022813A1.pdf	8343867 5ba372ca0d06e54f00f45e1fb0c0cc72a544992f	no	89
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	30539 d8d2b0691c8951dfff610c0f7a2d20f79aa12317	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	9815262		

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)
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 16/421,019	Filing Date 05/23/2019	☐ 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	12/16/2020	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 10	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".	/PEGGY S YARBOROUGH/
*** 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.

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the **PATENT APPLICATION** of:	
	Pelletier et al.
Application No.:	16/421,019
Confirmation No.:	9820
Filed:	May 23, 2019
For:	METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES
Group:	2464
Examiner:	Kan Yuen

Our File: SIG-2-1853US06

Date: December 16, 2020

RESPONSE PURSUANT TO 37 C.F.R. §1.116

Mail Stop Final (via EFS)
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This Response is being filed in response to the Final Office Action dated November 16, 2020 and is submitted in conjunction with a Request for Consideration under AFCP.

Please amend the application without prejudice or disclaimer as follows:

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Amendments to the Claims:

This listing of the claims will replace all prior versions of the claims in the application:

1. (Currently Amended) A wireless transmit/receive unit (WTRU) comprising:

a receiver;

a transmitter; and

a processor; ~~and~~

wherein[[:]]

the receiver and the processor are configured to receive at least one radio resource control (RRC) message indicating uplink resources for WTRU and medium access control (MAC) timer information[[;]],

the transmitter and the processor are configured to transmit uplink data based on the indicated uplink resources~~; and~~,

the processor is configured to deactivate the indicated uplink resources in response to a MAC timer expiring, and

the MAC timer is ~~being~~ configured based on the MAC timer information indicated by the received RRC message.

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2. (Original) The WTRU of claim 1 wherein the receiver and the processor are configured to receive an uplink grant associated with the indicated uplink resources and the transmitter and the processor are configured to transmit using the indicated uplink resources based on the grant.

3. (Original) The WTRU of claim 2 wherein based on the receipt of the uplink grant, the WTRU does not deactivate the indicated uplink resources.

4. (Original) The WTRU of claim 1 wherein the receiver and the processor are configured to receive a deactivation message and the processor is configured to deactivate the uplink resources based on the received deactivation message.

5. (Original) The WTRU of claim 1 wherein the MAC timer is based on a number of frames.

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6. (Currently Amended) A method comprising:

receiving, by a wireless transmit/receive unit (WTRU), at least one radio resource control (RRC) message indicating uplink resources for WTRU and medium access control (MAC) timer information;

transmitting, by the WTRU, uplink data based on the indicated uplink resources; and

deactivating, by the WTRU, the indicated uplink resources in response to a MAC timer expiring, wherein the MAC timer is configured based on the MAC timer information indicated by the received RRC message.

7. (Original) The method of claim 6 further comprising receiving, by the WTRU, an uplink grant associated with the indicated uplink resources and transmitting, by the WTRU, using the indicated uplink resources based on the grant.

8. (Original) The method of claim 7 wherein based on the receipt of the uplink grant, the WTRU does not deactivate the indicated uplink resources.

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9. (Original) The method of claim 7 further comprising receiving, by the WTRU, a deactivation message and deactivating, by the WTRU, the uplink resources based on the received deactivation message.

10. (Original) The method of claim 7 wherein the MAC timer is based on a number of frames.

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REMARKS/ARGUMENTS

After the foregoing Amendment, claims 1–10 are currently pending in this application. Claims 1 and 6 are amended. No new matter is added.

Request for an Interview

If any of the claims submitted herewith will be rejected by the Examiner, the Applicant respectfully requests a telephonic interview.

Claim Rejections - 35 U.S.C. §103

Claims 1-3, 5-8 and 10 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over U.S. Publication No. 2008/0117891 to Damnjanovic et al. (hereinafter "Damnjanovic") in view of U.S. Publication No. 2007/0081492 to Petrovic et al. (hereinafter "Petrovic"). The Applicant respectfully disagrees.

Damnjanovic discloses techniques for efficiently assigning resources for spurts of traffic in a wireless communication system (see paragraph [0008]). In Damnjanovic, a UE may receive data to send on uplink resources (e.g., from a VoIP application), send a request for resources in response to receiving the data to send, and receive the resource assignment in response to the request (see paragraph [0064]). The UE may then send the data based on the resource assignment, set a

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timer to the predetermined time period after sending the data, send more data if available and if the timer has not expired, reset the timer after sending more data, and relinquish the resource assignment when the timer expires (see Damnjanovic, paragraph [0064]).

In other words, Damnjanovic teaches the use of a timer where the timer is set by the UE after sending data on an uplink resource. Damnjanovic is silent regarding any teaching or suggestion regarding receiving a RRC message indicating timer information as recited in the pending independent claims.

Damnjanovic fails to teach or suggest the use of at least one RRC message indicating allocated resources and MAC timer information, wherein the MAC timer is configured based on the MAC timer information, as recited in the pending independent claims, and the Examiner seems to agree (see page 3 of the Final Office Action). The Applicant submits that Petrovic fails to cure the deficiencies of Damnjanovic.

Petrovic discloses a technique for controlling a radio cell change of a UE from a first radio cell to a second radio cell, wherein the first and the second radio cell is controlled by at least one base station of a mobile communication system (see Petrovic, paragraph [0001]). Figure 13 of Petrovic shows the signaling of a cell change procedure according to an embodiment.

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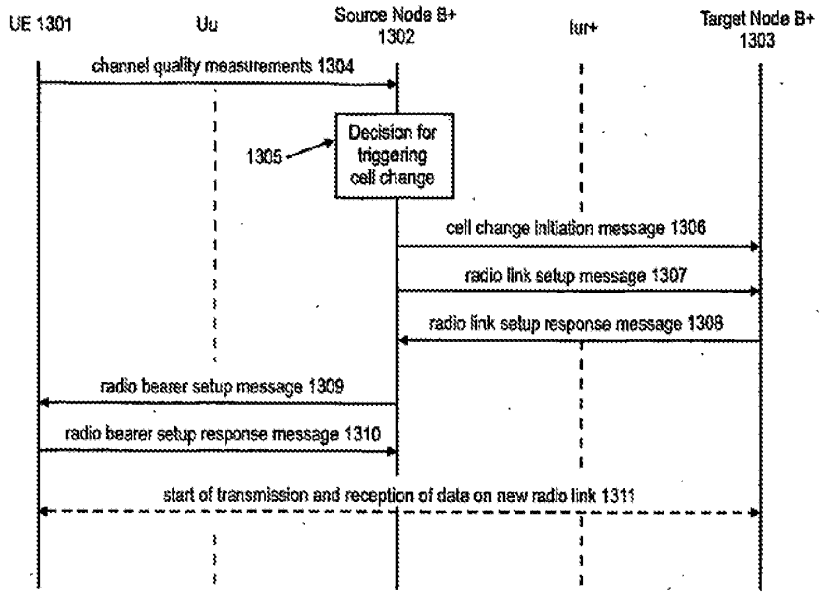


Fig. 13

As shown above, the source Node B sends a radio bearer setup message to the UE (see Petrovic, paragraph [0143]). The radio bearer setup message may inform the UE about the establishment of the new radio link in the target cell to be used upon the cell change and may comprise the activation time information (see Petrovic, paragraphs [0079] and [0143]). Next, the UE sends the source Node B a radio bearer setup response message and then the UE starts data transmissions on the new radio link (see Petrovic, paragraphs [0143]-[0144]).

Petrovic teaches that an activation time has to be determined in order to optimize the time delay between the decision of a base station to assign a UE to

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another radio cell (see Petrovic, paragraph [0120]). Petrovic defines the activation time as the time instant at which the base station controlling the target cell starts transmitting data to the communication terminal (see paragraph [0121]). The determination of the activation time for a cell change should consider that all transmission data packets pending for the transmission in the source Node B should be successfully transmitted before activation time (see Petrovic, paragraph [0123]).

As shown above, Petrovic teaches the transmission of an "activation time" to a communication terminal performing a cell change. The "activation time" of Petrovic is defined as the time instant at which the base station controlling the target cell starts transmitting data (see Petrovic, paragraph [0121]).

The Examiner is equating Petrovic's "activation time" with the "MAC timer information" found in the pending independent claims. This is not correct because Petrovic's "activation time" relates to the receipt of downlink data from a base station, while the claimed "MAC timer information" relates to the deactivation of uplink resources at a WTRU.

Petrovic fails to teach or suggest the transmission of any information to a communication terminal that the communication terminal uses to set a timer used for deactivating uplink resources as recited in the pending independent claims.

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Accordingly, Damnjanovic and Petrovic, used alone or in combination, are silent regarding any teaching or suggestion regarding "receiving ... MAC timer information ... and ... deactivating ... the indicated uplink resources in response to a MAC timer expiring, wherein the MAC timer is configured based on the MAC timer information indicated by the received RRC message," as recited in the amended independent claims.

Claims 2-3, 7-8, and 10 are dependent upon claims 1 and 6, and the Applicant believes these claims are allowable over the cited references of record for at least the same reasons provided above in connection with independent claims 1 and 6.

Claims 4 and 9 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Damnjanovic in view of Petrovic, as applied to claim 1 above, and further in view of U.S. Publication No. 2007/0135130 to Lee (hereinafter "Lee").

Claims 4 and 9 are dependent upon claims 1 and 6, and the Applicant believes these claims are allowable over the cited references of record for the same reasons provided above as Lee fails to cure the deficiencies of Damnjanovic and Petrovic.

Based on the arguments presented above, withdrawal of the 35 U.S.C. 103(a) rejection of claims 1-10 is respectfully requested.

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Conclusion

If the Examiner believes that any additional minor formal matters need to be addressed in order to place this application in condition for allowance, or that a telephonic interview will help to materially advance the prosecution of this application, the Examiner is invited to contact the undersigned by telephone at the Examiner's convenience.

In view of the foregoing, Applicant respectfully submits that the present application is in condition for allowance and a notice to that effect is respectfully requested.

Respectfully submitted,

Signal Trust for Wireless Innovation

By /Joseph P. Gushue/
Joseph P. Gushue
Registration No. 59,819

Volpe Koenig
30 South 17th Street, Suite 1800
Philadelphia, PA 19103-4009
Telephone: (215) 568-6400
Facsimile: (215) 568-6499

JPG/pf
Enclosure

ONEPLUS - EX. 1002

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:
SIG-2-1853US06	16/421,019	May 23, 2019
First Named Inventor:	**Title:**	
Pelletier et al.	METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES	

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
/Joseph P. Gushue/	December 16, 2020
Name (Print/Typed)	**Practitioner Registration No.**
Joseph P. Gushue	59,819

***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.

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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:	41406361
Application Number:	16421019
International Application Number:	
Confirmation Number:	9820
Title of Invention:	METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES
First Named Inventor/Applicant Name:	Benoit Pelletier
Customer Number:	3624
Filer:	Joseph P. Gushue/Margaret Ferello
Filer Authorized By:	Joseph P. Gushue
Attorney Docket Number:	SIG-2-1853US06
Receipt Date:	16-DEC-2020
Filing Date:	23-MAY-2019
Time Stamp:	16:42:26
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		SIG_2_1853US06_Response_Final_AFCP.pdf	154984 c4103c5d28e80bba8fcfccbaebb26b2450d42952	yes	11

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Response After Final Action	1	1
	Claims	2	5
	Applicant Arguments/Remarks Made in an Amendment	6	11

Warnings:					
Information:					
2	After Final Consideration Program Request	SIG_2_1853US06_Request_AFCP_Form_SB_434.pdf	1115881 9ca02876e18113a25e0923a986c99fdbd3a2a085	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	1270865		

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.

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the **PATENT APPLICATION** of:	
	Pelletier et al.
Application No.:	16/421,019
Confirmation No.:	9820
Filed:	May 23, 2019
For:	METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES
Group:	2464
Examiner:	Kan Yuen

Our File: SIG-2-1853US06

Date: December 16, 2020

RESPONSE PURSUANT TO 37 C.F.R. §1.116

Mail Stop Final (via EFS)
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This Response is being filed in response to the Final Office Action dated November 16, 2020 and is submitted in conjunction with a Request for Consideration under AFCP.

Please amend the application without prejudice or disclaimer as follows:

ONEPLUS - EX. 1002

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.
16/421,019	05/23/2019	Benoit Pelletier	SIG-2-1853US06	9820

3624 7590 11/16/2020

Volpe Koenig
30 SOUTH 17TH STREET, 18TH FLOOR
PHILADELPHIA, PA 19103

EXAMINER
YUEN, KAN

ART UNIT	PAPER NUMBER
2464	

NOTIFICATION DATE	DELIVERY MODE
11/16/2020	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):

eoffice@volpe-koenig.com

ONEPLUS - EX. 1002

Office Action Summary	**Application No.** 16/421,019	**Applicant(s)** Pelletier et al.	
	Examiner KAN YUEN	**Art Unit** 2464	**AIA (FITF) Status** No

-- 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 9/8/2020.

☐ 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) 1-10 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) 1-10 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: _____.

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DETAILED ACTION

Notice of Pre-AIA or AIA Status

The present application is being examined under the pre-AIA first to invent provisions.

Response to Arguments

1. Applicant's arguments filed on 9/8/2020 have been fully considered but they are not persuasive.

Regarding claim 1, the applicant argues that the Petrovic fails to disclose the feature: "… to receive a RRC message indicating uplink resources for WTRU and medium access control (MAC) timer information;" and "wherein the MAC timer being configured based on the MAC timer information." Particularly, the applicant argues that Petrovic teaches the transmission of an "activation time" to a communication terminal performing a cell change. The "activation time" of Petrovic is defined as the time instant at which the base station controlling the target cell tarts transmitting data (see para. 0121). The applicant further argues that the Examiner is equating Petrovic's "activation time" with the "MAC timer information" is not correct, because Petrovic's "activation time" is related to the receipt of downlink data from a base station while the claimed "MAC timer information" is related to the deactivation of uplink resources at a WTRU. The Examiner respectfully disagrees and will further explain the ground of rejection.

The Examiner would like to highlight the teaching of Damnjanovic et al. in fig. 5, steps 512-516; para. 0064. In step 512, the UE receives resource assignment indicating uplink resources for UE. The UE may then send the data based on the resource assignment (see para. 0064). Set a timer to the predetermined time period after sending the data, send more data if available and if the timer has not expired, reset the timer after sending more data and relinquish the resource assignment when the timer expires (see para. 0064). In other words, Damnjanovic et al. explicitly discloses the receiver and the

processor configured to *receive resource assignment indicating uplink resource*; and transmitter and the processor configured to transmit uplink data based on the indicated up link resource; and the processor configured to *relinquish/deactivate uplink resources in response to the timer expires*.

Damnjanovice et al. explicitly discloses the feature for *using the timer to deactivate uplink resources when the timer expires*; however, Damnjanovic et al. does not explicitly disclose the feature to receive both the timer information and resource assignment via a RRC message. Petrovic et al. from the same or similar fields of endeavor discloses the feature where the UE receives both i) the timer information and ii) the information relating to the setup of the radio link via a RRC protocol message (Petrovic et al. see fig. 13, step 1309; see para. 0079, 0143, 0144). Thus, the UE is configured to receive the RRC message including both *i) the timer information and ii) the information relating to the setup of the radio link,* wherein the information relating to the link setup is the radio link resource being allocated for setting up a radio link. Further the timer is determined based on MAC packets (see para. 0123), so that the timer is broadly interpreted as the MAC timer. Therefore based on the broadest reasonable interpretation (BRI), the timer is being configured based on the MAC packets (e.g., MAC timer information).

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the disclosure of Damnjanovic et al. and to implement with the feature or ***the teaching*** as taught by Petrovic et al. to configure the UE to receive both i) timer information and ii) resource assignment via the RRC protocol message from the base station. The motivation would be to improve transmission reliability.

The applicant's argument is not persuasive and the applicant is suggested to further define the claim to expedite case prosecution.

Examiner's Note

2. **The Applicant is welcome to request a telephonic interview** if the Applicant has any questions or requires any additional information that would further or expedite the prosecution of the application.

Claim Rejections - 35 USC § 103

3. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under pre-AIA 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.

3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

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

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-3, 5-8, 10 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Damnjanovic et al. (Pub No.: 2008/0117891) in view of Petrovic et al. (Pub No.: 2007/0081492).

Regarding claim 1, Damnjanovic et al. discloses **a wireless transmit/receive unit (WTRU)** (see fig. 2; UE 116) **comprising:**

a receiver (see RCVR 254 in fig. 2)**; a transmitter** (see TMTR 254 in fig. 2)**; and a processor** (see processor 270 in fig. 2)**; and wherein: the receiver and the processor are configured to receive uplink resources for WTRU** (Damnjanovic et al. see para. 0064; the UE may receive the resource assignment in response to the request);

the transmitter and the processor are configured to transmit uplink data based on the indicated uplink resources (Damnjanovic et al. see para. 0064; the UE may then send the data based on the resource assignment, set a timer to the predetermined time period after sending the data); **and**

the processor is configured to deactivate the indicated uplink resources in response to a timer expiring (Damnjanovic et al. see para. 0064; relinquish the resource assignment when the timer expires).

However, Damnjanovic et al. does not explicitly disclose the feature to receive a radio resource control (RRC) message indicating allocated resources and MAC timer information, wherein MAC timer being configured based on the MAC timer information.

Petrovic et al. from the same or similar fields of endeavor discloses the feature to **receive a radio resource control (RRC) message indicating allocated resources** (read as information relating to link setup) **and MAC timer information** (read as the activation time), **wherein MAC timer being configured based on the MAC timer information** (Petrovic et al. see para. 0078, 0079, 0123; the activation time and the information relating to the setup of a radio link may be transmitted to the communication terminal in a radio bearer setup message of a radio resource control (RRC) protocol, wherein in determination of the appropriate activation time for a cell change, the determination process should consider that all transmission data packets (e.g. in form of MAC-hs PDUs) pending for the transmission). In other words, the activation time and information relating to link setup are transmitted

via a RRC message, wherein the information relating to the link setup is the radio link resource being allocated for setting up a radio link. The activation time is determined based on MAC packets.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the disclosure of Damnjanovic et al. and to implement with the feature/teaching of Petrovic et al. to allow allocated resources and timing information to be sent via the RRC protocol, wherein the timing information is based on MAC-hs PDUs.

The motivation would be to improve transmission reliability.

Claim 6 is rejected similarly to claim 1.

Regarding claims 2, 7, Damnjanovic et al. discloses the feature wherein the receiver and the processor are configured to receive an uplink grant associated with the indicated uplink resources and the transmitter and the processor are configured to transmit using the indicated uplink resources based on the grant (Damnjanovic et al. see para. 0007).

Regarding claims 3, 8, Damnjanovic et al. discloses the feature wherein based on the receipt of the uplink grant, the WTRU does not deactivate the indicated uplink resources (Damnjanovic et al. see para. 0007).

Regarding claims 5, 10, Petrovic et al. discloses the feature wherein the MAC timer is based on a number of frames (Petrovic et al. see para. 0078, 0079, 0123; wherein in determination of the appropriate activation time for a cell change, the determination process should consider that all transmission data packets (e.g. in form of MAC-hs PDUs) pending for the transmission). The activation time is determined based on all numbers of MAC packets pending for transmission.

4. Claims 4, 9 rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Damnjanovic et al. (Pub No.: 2008/0117891) in view of Petrovic et al. (Pub No.: 2007/0081492) as applied to claim 1 above, and further in view of Lee (Pub No.: 2007/0135130).

Regarding claims 4, 9, Damnjanovic et al. in view of Petrovic et al. does not explicitly disclose the feature wherein the receiver and the processor are configured to receive a deactivation message and the processor is configured to deactivate the uplink resources based on the received deactivation message.

Lee from the same or similar fields of endeavor discloses the feature wherein the receiver and the processor are configured to receive a deactivation message and the processor is configured to deactivate the uplink resources based on the received deactivation message (Lee see fig. 6, T6; para. 0070, 0078-0082).

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the disclosure of Damnjanovic et al. and to implement with the feature/teaching of Petrovic et al. to receive deactivation scheduling grant message from the base station and the mobile stops the packet transmission based on the deactivation scheduling grant message.

The motivation would be to decrease network interference.

Conclusion

5. **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.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KAN YUEN whose telephone number is (571)270-1413. The examiner can normally be reached on Monday - Friday 11pm-7pm.

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, Ricky Ngo can be reached on 571-272-3139. 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 https://ppair-my.uspto.gov/pair/PrivatePair. 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.

/KAN YUEN/
Primary Examiner, Art Unit 2464

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/421,019	Pelletier et al.
	Examiner	Art Unit
	KAN YUEN	2464

CPC - Searched*		
Symbol	**Date**	**Examiner**
H04L5/001 ; H04L5/0053 ; H04L5/0091 ; H04W52/0216 ; H04W72/0413 ; H04W72/1273 ; H04W76/27 ; H04W76/28 ; H04W76/20 ; Y02D70/00 ; Y02D70/1262 OR Y02D70/142 ; Y02D70/24 ; Y02D70/25	11/04/2020	KY
H04L1/1812 ; H04L5/0053 ; H04L5/0055 ; H04W28/04 ; H04W72/04 ; H04W72/0406 ; H04W72/12 ; H04W74/0833 ; H04W76/27 ; H04W76/38 ; H04W88/08	11/04/2020	KY

CPC Combination Sets - Searched*		
Symbol	**Date**	**Examiner**

US Classification - Searched*			
Class	**Subclass**	**Date**	**Examiner**

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

Search Notes		
Search Notes	**Date**	**Examiner**
EAST SEARCH; MANUAL SEARCH H04L5/0053	11/04/2020	KY
INVENTORSHIP SEARCH	11/04/2020	KY
NPL SEARCH (STIC, 3GPP, IEEE XPLORE, GOOGLE SCHOLAR)	11/04/2020	KY

/KAN YUEN/ Primary Examiner, Art Unit 2464	

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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/421,019	Pelletier et al.
	Examiner	Art Unit
	KAN YUEN	2464

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

/KAN YUEN/ Primary Examiner, Art Unit 2464	

ONEPLUS - EX. 1002

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/421,019	Pelletier et al.
	Examiner	**Art Unit**
	KAN YUEN	2464

✓	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	11/04/2020								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
	6	✓								
	7	✓								
	8	✓								
	9	✓								
	10	✓								

ONEPLUS - EX. 1002

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1,955	((Pelletier near3 Benoit) or (Pani near3 Diana) or (DiGirolamo near3 Rocco) or (Cave near3 Christopher) or (Roy near3 Vincent) or (Marinier near3 Paul) or (Zeira near3 Eldad)).in.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/04 19:27
L2	630	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/04 19:27
L3	128	(mac near4 tim$4 near3 information).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/04 19:28
L4	29	(deactivat$4 near6 uplink near9 timer).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/04 19:28
L5	1	1 2 3 4	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/04 19:28
L8	128	(mac near4 tim$4 near3 information).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/04 19:28
S2	1,830	((Pelletier near3 Benoit) or (Pani near3 Diana) or (DiGirolamo near3 Rocco) or (Cave near3 Christopher) or (Roy near3 Vincent) or (Marinier near3 Paul) or (Zeira near3 Eldad)).in.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 16:06
S3	443	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 16:10
S4	13	S2 S3	US-PGPUB; USPAT;	AND	ON	2019/09/19 16:10

			USOCR; EPO; DERWENT			
S5	2,212	(mac near6 tim$4).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 16:11
S14	8,563	(timer same (RRC or (radio adj3 resource adj3 control)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 19:17
S15	8,446	(((uplink or ul or upstream$4) near6 (grant$4 or resource or prb)) with (RRC or (radio adj3 resource adj3 control)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 19:19
S16	2,077	S14 S15	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 19:21
S18	1,164	(expir$4 or expiration) same (deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:04
S19	163	S16 S18	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:06
S20	163	S16 S18	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:06
S23	101,356	((H04L5/001 OR H04L5/0053 OR H04L5/0091 OR H04W52/0216 OR H04W72/0413 OR H04W72/1273 OR H04W76/27 OR H04W76/28 OR H04W76/20 OR Y02D70/00 OR Y02D70/1262 OR Y02D70/142 OR Y02D70/24 OR Y02D70/25).CPC.)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:09
S25	106,674	((H04L1/1812 OR H04L5/0053 OR H04L5/0055 OR H04W28/04 OR	US-PGPUB; USPAT;	AND	ON	2019/09/19 20:09

		H04W72/04 OR H04W72/0406 OR H04W72/12 OR H04W74/0833 OR H04W76/27 OR H04W76/38 OR H04W88/08).CPC.)	USOCR; EPO; DERWENT			
S26	161,356	S23 or S25	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:10
S27	128	S20 S26	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:10
S28	128	S20 S26	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:10
S29	1,468	(expir$4 or expiration) same (terminat$4 or deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:17
S30	1,164	S18 S29	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:33
S31	601	S26 S30	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:34
S32	53	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S31	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:34
S34	280	(US-20060054117-$ | US-20070073578-$ | US-0008152-$ | US-0010278-$ | US-00189071-$ | US-0023629-$ | US-0026490-$ | US-0026623-$ | US-0039326-$ | US-0047445-$ | US-0049669-$ | US-0052229-$ | US-0053035-$ | US-0054117-$ | US-0054298-$ | US-	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:35

		0061881-$ | US-0068505-$ | US-0073578-$ | US-0086671-$ | US-0091652-$ | US-0098165-$ | US-0101299-$ | US-0103852-$ | US-0115871-$ | US-0116118-$ | US-0117860-$ | US-0125043-$ | US-0135113-$ | US-0135769-$ | US-0140154-$ | US-0142032-$ | US-0143074-$ | US-0164540-$ | US-0168704-$ | US-0168724-$ | US-0172739-$ | US-0180371-$ | US-0182065-$ | US-0189237-$ | US-0192766-$ | US-0194259-$ | US-0196239-$ | US-0206531-$ | US-0213059-$ | US-0214225-$ | US-0215005-$ | US-0216471-$ | US-0219868-$ | US-0223452-$ | US-0223609-$ | US-0225709-$ | US-0225739-$ | US-0249163-$ | US-0250504-$ | US-0251027-$ | US-0257407-$ | US-0268852-$ | US-0278143-$ | US-0280145-$ | US-0285791-$ | US-0309877-$ | US-0318170-$ | US-0327833-$ | US-20030223452-$ | US-20040052229-$ | US-20040068505-$ | US-20040117860-$ | US-20040089937-$ | US-20050026623-$ | US-20050053035-$ | US-20050054298-$ | US-20050101299-$ | US-20050180371-$ | US-20050249163-$ | US-20050250504-$ | US-20060023629-$ | US-20060026490-$ | US-20060039326-$ | US-20060116118-$ | US-20060140154-$ | US-20060142032-$ | US-20060172739-$ | US-20060182065-$ | US-20060251027-$ | US-20060280145-$ | US-20070047445-$ | US-20070115871-$ | US-20070135113-$ | US-20070189237-$ | US-20070206531-$ | US-20070213059-$ | US-20070223609-$ | US-20080008152-$ | US-20080049669-$ | US-20080125043-$ | US-20080192766-$ | US-20080194259-$ | US-20080214225-$ | US-20080268852-$ | US-20090010278-$ | US-20090061881-$ | US-20090086671-$ | US-20090135769-$ | US-20090143074-$ | US-20090168704-$ | US-20090168724-$ | US-20090196239-$ | US-20090219868-$ | US-20090225709-$ | US-20090225739-$ | US-20090257407-$ | US-20090318170-			

		$ | US-20100091652-$ | US-20100098165-$ | US-20100103852-$ | US-20100215005-$ | US-20100216471-$ | US-20100278143-$ | US-20100285791-$ | US-20100309877-$ | US-20110164540-$ | US-20120327833-$ | US-2305372-$ | US-5740949-$ | US-6167248-$ | US-6246692-$ | US-6721566-$ | US-6845238-$ | US-7079489-$ | US-7145889-$ | US-7406314-$ | US-7477609-$ | US-7480269-$ | US-7508792-$ | US-7643515-$ | US-7890094-$ | US-7894390-$ | US-8259752-$ | US-8989082-$ | US-9844093-$ | US-7180855-$).DID.				
S35	1	S31 S34	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:36
S36	1	S31 S34	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:36
S37	11	S14 S34	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:46
S38	1,246	((resource or grant) near7 (uplink or "UL" or upstream) same timer same ((high$4 near4 layer near4 signal$4) or RRC or (radio adj3 resource adj3 control)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:50
S39	173	S29 S38	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:53
S40	1	S34 S39	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 20:54
S41	2	S32 S39	US-PGPUB; USPAT; USOCR;	AND	ON	2019/09/19 20:54

			EPO; DERWENT			
S42	7,018	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with (timer)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 21:08
S43	549	S29 S42	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 21:10
S44	76	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S43	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 21:10
S45	76	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S43	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 21:10
S46	12,119	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with (timer or expir$4 or expiration or (tim$4 near4 limit$4))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 21:56
S47	4,084	S26 S46	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 21:57
S48	659	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S47	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 22:01
S49	6,843	(timer with (mac or (medium adj3 access adj3 control$4)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 22:02
S50	55	S48 S49	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 22:02

S51	55	S48 S49	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 22:03
S52	23,276	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) same (timer or expir$4 or expiration or (tim$4 near4 limit$4))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 22:10
S53	19,355	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 22:11
S54	3,147	S52 S53	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 22:12
S55	240	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S54	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/19 22:12
S56	23,276	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) same (timer or expir$4 or expiration or (tim$4 near4 limit$4))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 10:09
S57	19,355	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 10:09
S58	3,147	S56 S57	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 10:09
S59	240	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S58	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 10:09
S60	19,355	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with ((higher near3 signal$4 near3 layer) or	US-PGPUB; USPAT; USOCR;	AND	ON	2019/09/20 14:15

		RRC or (radio adj3 resource adj3 control))	EPO; DERWENT			
S61	3,274	(expir$4 or expiration) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:15
S62	1,542	S60 S61	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:16
S63	52	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S62	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:16
S64	52	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S62	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:16
S65	1	16/421019 (mac with tim$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:20
S66	6,843	(timer with (mac or (medium adj3 access adj3 control$4)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:20
S67	10,543	((timer or (tim$4 near2 (information or expir$4 or expiration))) with (mac or (medium adj3 access adj3 control$4)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:25
S68	19,355	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:29
S69	1,978	S67 S68	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:30

S70	1,468	(expir$4 or expiration) same (terminat$4 or deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:30
S71	160	S69 S70	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:31
S72	1	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S71	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:31
S73	96	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S69	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:31
S74	96	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S69	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 14:32
S75	2,730	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) same ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control)) same (timer or (tim$4 near4 (information or expir$4 or expiration)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 17:52
S76	1,105	((timer or (tim$4 near2 (information or expir$4 or expiration))) with (mac or (medium adj3 access adj3 control$4))) S75	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 17:53
S77	42	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S76	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 17:54
S78	42	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S76	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 17:54

S79	28,510	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) same ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 18:41
S80	13,191	(timer or (tim$4 near4 (information or expir$4 or expiration))) same ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 18:42
S81	6,525	S79 S80	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 18:42
S82	10,543	((timer or (tim$4 near2 (information or expir$4 or expiration))) with (mac or (medium adj3 access adj3 control$4)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 18:43
S83	1,907	S81 S82	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 18:44
S84	82	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S83	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 18:44
S85	82	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S83	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 18:44
S86	280	(US-20060054117-$ | US-20070073578-$ | US-0008152-$ | US-0010278-$ | US-00189071-$ | US-0023629-$ | US-0026490-$ | US-0026623-$ | US-0039326-$ | US-0047445-$ | US-0049669-$ | US-0052229-$ | US-0053035-$ | US-0054117-$ | US-0054298-$ | US-0061881-$ | US-0068505-$ | US-0073578-$ | US-0086671-$ | US-0091652-$ | US-0098165-$ | US-0101299-$ | US-0103852-$ | US-0115871-$ | US-0116118-$ | US-0117860-$ | US-0125043-$ | US-0135113-$ | US-	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 19:20

		0140154-$ | US-0142032-$ | US-0143074-$ | US-0164540-$ | US-0168704-$ | US-0168724-$ | US-0172739-$ | US-0180371-$ | US-0182065-$ | US-0189237-$ | US-0192766-$ | US-0194259-$ | US-0196239-$ | US-0206531-$ | US-0213059-$ | US-0214225-$ | US-0215005-$ | US-0216471-$ | US-0219868-$ | US-0223452-$ | US-0223609-$ | US-0225709-$ | US-0225739-$ | US-0249163-$ | US-0250504-$ | US-0251027-$ | US-0257407-$ | US-0268852-$ | US-0278143-$ | US-0280145-$ | US-0285791-$ | US-0309877-$ | US-0318170-$ | US-0327833-$ | US-20030223452-$ | US-20040052229-$ | US-20040068505-$ | US-20040117860-$ | US-20040089937-$ | US-20050026623-$ | US-20050053035-$ | US-20050054298-$ | US-20050101299-$ | US-20050180371-$ | US-20050249163-$ | US-20050250504-$ | US-20060023629-$ | US-20060026490-$ | US-20060039326-$ | US-20060116118-$ | US-20060140154-$ | US-20060142032-$ | US-20060172739-$ | US-20060182065-$ | US-20060251027-$ | US-20060280145-$ | US-20070047445-$ | US-20070115871-$ | US-20070135113-$ | US-20070189237-$ | US-20070206531-$ | US-20070213059-$ | US-20070223609-$ | US-20080008152-$ | US-20080049669-$ | US-20080125043-$ | US-20080192766-$ | US-20080194259-$ | US-20080214225-$ | US-20080268852-$ | US-20090010278-$ | US-20090061881-$ | US-20090086671-$ | US-20090135769-$ | US-20090143074-$ | US-20090168704-$ | US-20090168724-$ | US-20090196239-$ | US-20090219868-$ | US-20090225709-$ | US-20090225739-$ | US-20090257407-$ | US-20090318170-$ | US-20100091652-$ | US-20100098165-$ | US-20100103852-$ | US-20100215005-$ | US-20100216471-$ | US-20100278143-$ | US-20100285791-$ | US-20100309877-$ | US-20110164540-$ | US-20120327833-$ | US-2305372-$ | US-5740949-$ |				

		US-6167248-$ | US-6246692-$ | US-6721566-$ | US-6845238-$ | US-7079489-$ | US-7145889-$ | US-7406314-$ | US-7477609-$ | US-7480269-$ | US-7508792-$ | US-7643515-$ | US-7890094-$ | US-7894390-$ | US-8259752-$ | US-8989082-$ | US-9844093-$ | US-7180855-$).DID.				
S87	4	S85 S86	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 19:21
S88	4	S85 S86	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/20 19:21
S93	6,308	(terminat$4 or deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) near6 (message or packet or signal) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/23 11:27
S94	1,978	(terminat$4 or deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) near6 (message or packet or signal) with (allocat$4 or assign$4 or schedul$4) with (bs or (base adj2 station) or ap or (access adj2 point) or repeater or (node adj b) or bts or node$1b or node-b or enb or node$1b or enodeb or femto or femtocell or femto-cell)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/23 11:30
S95	1,295	S93 S94	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/23 11:31
S96	588	h04w72/$.cpc. S95	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/23 11:32
S97	117	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S96	US-PGPUB; USPAT; USOCR;	AND	ON	2019/09/23 11:32

			EPO; DERWENT			
S98	117	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S96	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/23 11:32
S99	1,830	((Pelletier near3 Benoit) or (Pani near3 Diana) or (DiGirolamo near3 Rocco) or (Cave near3 Christopher) or (Roy near3 Vincent) or (Marinier near3 Paul) or (Zeira near3 Eldad)).in.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/23 13:19
S100	443	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/23 13:19
S101	13	S99 S100	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/23 13:19
S102	2,212	(mac near6 tim$4).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/23 13:19
S103	1	S101 S102	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2019/09/23 13:19
S104	2	("20040068505").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2019/09/23 14:21
S105	2	("20100309877").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2019/09/23 14:22
S106	1,909	((Pelletier near3 Benoit) or (Pani near3 Diana) or (DiGirolamo near3 Rocco) or (Cave near3 Christopher) or (Roy near3 Vincent) or (Marinier near3 Paul) or (Zeira near3 Eldad)).in.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:51

S107	553	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:51
S108	13	S106 S107	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:51
S109	2,344	(mac near6 tim$4).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:51
S110	1	S108 S109	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:51
S111	6	("10306677").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2020/05/27 21:53
S112	4	("9313809").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2020/05/27 21:54
S113	3	("8774104").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2020/05/27 21:55
S114	1,909	((Pelletier near3 Benoit) or (Pani near3 Diana) or (DiGirolamo near3 Rocco) or (Cave near3 Christopher) or (Roy near3 Vincent) or (Marinier near3 Paul) or (Zeira near3 Eldad)).in.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S115	553	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S116	13	S106 S107	US-PGPUB; USPAT; USOCR;	AND	ON	2020/05/27 21:55

			EPO; DERWENT			
S117	2,344	(mac near6 tim$4).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S118	9,936	(timer same (RRC or (radio adj3 resource adj3 control)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S119	10,316	(((uplink or ul or upstream$4) near6 (grant$4 or resource or prb)) with (RRC or (radio adj3 resource adj3 control)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S120	2,574	S118 S119	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S121	1,267	(expir$4 or expiration) same (deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S122	203	S120 S121	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S123	203	S120 S121	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S124	116,237	((H04L5/001 OR H04L5/0053 OR H04L5/0091 OR H04W52/0216 OR H04W72/0413 OR H04W72/1273 OR H04W76/27 OR H04W76/28 OR H04W76/20 OR Y02D70/00 OR Y02D70/1262 OR Y02D70/142 OR Y02D70/24 OR Y02D70/25).CPC.)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S125	122,075	((H04L1/1812 OR H04L5/0053 OR H04L5/0055 OR H04W28/04 OR H04W72/04 OR H04W72/0406 OR	US-PGPUB; USPAT; USOCR;	AND	ON	2020/05/27 21:55

		H04W72/12 OR H04W74/0833 OR H04W76/27 OR H04W76/38 OR H04W88/08).CPC.)	EPO; DERWENT			
S126	182,217	S124 or S125	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S127	159	S123 S126	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S128	159	S123 S126	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S129	1,582	(expir$4 or expiration) same (terminat$4 or deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S130	1,267	S121 S129	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S131	673	S126 S130	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S132	53	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S131	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S133	280	(US-20060054117-$ | US-20070073578-$ | US-0008152-$ | US-0010278-$ | US-00189071-$ | US-0023629-$ | US-0026490-$ | US-0026623-$ | US-0039326-$ | US-0047445-$ | US-0049669-$ | US-0052229-$ | US-0053035-$ | US-0054117-$ | US-0054298-$ | US-0061881-$ | US-0068505-$ | US-	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55

		0073578-$ | US-0086671-$ | US-0091652-$ | US-0098165-$ | US-0101299-$ | US-0103852-$ | US-0115871-$ | US-0116118-$ | US-0117860-$ | US-0125043-$ | US-0135113-$ | US-0135769-$ | US-0140154-$ | US-0142032-$ | US-0143074-$ | US-0164540-$ | US-0168704-$ | US-0168724-$ | US-0172739-$ | US-0180371-$ | US-0182065-$ | US-0189237-$ | US-0192766-$ | US-0194259-$ | US-0196239-$ | US-0206531-$ | US-0213059-$ | US-0214225-$ | US-0215005-$ | US-0216471-$ | US-0219868-$ | US-0223452-$ | US-0223609-$ | US-0225709-$ | US-0225739-$ | US-0249163-$ | US-0250504-$ | US-0251027-$ | US-0257407-$ | US-0268852-$ | US-0278143-$ | US-0280145-$ | US-0285791-$ | US-0309877-$ | US-0318170-$ | US-0327833-$ | US-20030223452-$ | US-20040052229-$ | US-20040068505-$ | US-20040117860-$ | US-20040089937-$ | US-20050026623-$ | US-20050053035-$ | US-20050054298-$ | US-20050101299-$ | US-20050180371-$ | US-20050249163-$ | US-20050250504-$ | US-20060023629-$ | US-20060026490-$ | US-20060039326-$ | US-20060116118-$ | US-20060140154-$ | US-20060142032-$ | US-20060172739-$ | US-20060182065-$ | US-20060251027-$ | US-20060280145-$ | US-20070047445-$ | US-20070115871-$ | US-20070135113-$ | US-20070189237-$ | US-20070206531-$ | US-20070213059-$ | US-20070223609-$ | US-20080008152-$ | US-20080049669-$ | US-20080125043-$ | US-20080192766-$ | US-20080194259-$ | US-20080214225-$ | US-20080268852-$ | US-20090010278-$ | US-20090061881-$ | US-20090086671-$ | US-20090135769-$ | US-20090143074-$ | US-20090168704-$ | US-20090168724-$ | US-20090196239-$ | US-20090219868-$ | US-20090225709-$ | US-20090225739-$ | US-20090257407-$ | US-20090318170-$ | US-20100091652-$ | US-				

		20100098165-$ | US-20100103852-$ | US-20100215005-$ | US-20100216471-$ | US-20100278143-$ | US-20100285791-$ | US-20100309877-$ | US-20110164540-$ | US-20120327833-$ | US-2305372-$ | US-5740949-$ | US-6167248-$ | US-6246692-$ | US-6721566-$ | US-6845238-$ | US-7079489-$ | US-7145889-$ | US-7406314-$ | US-7477609-$ | US-7480269-$ | US-7508792-$ | US-7643515-$ | US-7890094-$ | US-7894390-$ | US-8259752-$ | US-8989082-$ | US-9844093-$ | US-7180855-$).DID.				
S134	1	S131 S133	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S135	1	S131 S133	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S136	11	S118 S133	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S137	1,490	((resource or grant) near7 (uplink or "UL" or upstream) same timer same ((high$4 near4 layer near4 signal$4) or RRC or (radio adj3 resource adj3 control)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S138	192	S129 S137	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S139	1	S133 S138	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S140	2	S132 S138	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55

S141	7,768	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with (timer)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S142	611	S129 S141	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S143	77	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S142	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S144	77	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S142	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S145	13,338	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with (timer or expir$4 or expiration or (tim$4 near4 limit$4))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S146	4,687	S126 S145	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S147	663	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S146	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S148	7,606	(timer with (mac or (medium adj3 access adj3 control$4)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S149	55	S147 S148	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S150	55	S147 S148	US-PGPUB; USPAT; USOCR;	AND	ON	2020/05/27 21:55

			EPO; DERWENT			
S151	25,326	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) same (timer or expir$4 or expiration or (tim$4 near4 limit$4))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S152	22,665	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S153	3,744	S151 S152	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S154	240	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S153	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S155	25,326	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) same (timer or expir$4 or expiration or (tim$4 near4 limit$4))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S156	22,665	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S157	3,744	S155 S156	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S158	240	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S157	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S159	22,665	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55

S160	3,797	(expir$4 or expiration) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S161	1,834	S159 S160	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S162	54	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S161	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S163	54	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S161	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S164	1	16/421019 (mac with tim$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S165	7,606	(timer with (mac or (medium adj3 access adj3 control$4)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S166	11,582	((timer or (tim$4 near2 (information or expir$4 or expiration))) with (mac or (medium adj3 access adj3 control$4)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S167	22,665	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S168	2,428	S166 S167	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S169	1,582	(expir$4 or expiration) same (terminat$4 or deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) with (allocat$4 or	US-PGPUB; USPAT; USOCR;	AND	ON	2020/05/27 21:55

		assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	EPO; DERWENT			
S170	201	S168 S169	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S171	1	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S170	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S172	97	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S168	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S173	97	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S168	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S174	3,296	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) same ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control)) same (timer or (tim$4 near4 (information or expir$4 or expiration)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S175	1,337	((timer or (tim$4 near2 (information or expir$4 or expiration))) with (mac or (medium adj3 access adj3 control$4))) S174	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S176	43	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S175	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S177	43	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S175	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S178	33,513	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) same ((higher near3 signal$4 near3	US-PGPUB; USPAT; USOCR;	AND	ON	2020/05/27 21:55

		layer) or RRC or (radio adj3 resource adj3 control))	EPO; DERWENT			
S179	15,405	(timer or (tim$4 near4 (information or expir$4 or expiration))) same ((higher near3 signal$4 near3 layer) or RRC or (radio adj3 resource adj3 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S180	7,851	S178 S179	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S181	11,582	((timer or (tim$4 near2 (information or expir$4 or expiration))) with (mac or (medium adj3 access adj3 control$4)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S182	2,314	S180 S181	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S183	83	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S182	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S184	83	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S182	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S185	280	(US-20060054117-$ | US-20070073578-$ | US-0008152-$ | US-0010278-$ | US-00189071-$ | US-0023629-$ | US-0026490-$ | US-0026623-$ | US-0039326-$ | US-0047445-$ | US-0049669-$ | US-0052229-$ | US-0053035-$ | US-0054117-$ | US-0054298-$ | US-0061881-$ | US-0068505-$ | US-0073578-$ | US-0086671-$ | US-0091652-$ | US-0098165-$ | US-0101299-$ | US-0103852-$ | US-0115871-$ | US-0116118-$ | US-0117860-$ | US-0125043-$ | US-0135113-$ | US-0135769-$ | US-0140154-$ | US-0142032-$ | US-0143074-$ | US-0164540-$ | US-0168704-$ | US-	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55

		0172739-$ | US-0180371-$ | US-0182065-$ | US-0189237-$ | US-0192766-$ | US-0194259-$ | US-0196239-$ | US-0206531-$ | US-0213059-$ | US-0214225-$ | US-0215005-$ | US-0216471-$ | US-0219868-$ | US-0223452-$ | US-0223609-$ | US-0225709-$ | US-0225739-$ | US-0249163-$ | US-0250504-$ | US-0251027-$ | US-0257407-$ | US-0268852-$ | US-0278143-$ | US-0280145-$ | US-0285791-$ | US-0309877-$ | US-0318170-$ | US-0327833-$ | US-20030223452-$ | US-20040052229-$ | US-20040068505-$ | US-20040117860-$ | US-20040089937-$ | US-20050026623-$ | US-20050053035-$ | US-20050054298-$ | US-20050101299-$ | US-20050180371-$ | US-20050249163-$ | US-20050250504-$ | US-20060023629-$ | US-20060026490-$ | US-20060039326-$ | US-20060116118-$ | US-20060140154-$ | US-20060142032-$ | US-20060172739-$ | US-20060182065-$ | US-20060251027-$ | US-20060280145-$ | US-20070047445-$ | US-20070115871-$ | US-20070135113-$ | US-20070189237-$ | US-20070206531-$ | US-20070213059-$ | US-20070223609-$ | US-20080008152-$ | US-20080049669-$ | US-20080125043-$ | US-20080192766-$ | US-20080194259-$ | US-20080214225-$ | US-20080268852-$ | US-20090010278-$ | US-20090061881-$ | US-20090086671-$ | US-20090135769-$ | US-20090143074-$ | US-20090168704-$ | US-20090168724-$ | US-20090196239-$ | US-20090219868-$ | US-20090225709-$ | US-20090225739-$ | US-20090257407-$ | US-20090318170-$ | US-20100091652-$ | US-20100098165-$ | US-20100103852-$ | US-20100215005-$ | US-20100216471-$ | US-20100278143-$ | US-20100285791-$ | US-20100309877-$ | US-20110164540-$ | US-20120327833-$ | US-2305372-$ | US-5740949-$ | US-6167248-$ | US-6246692-$ | US-6721566-$ | US-6845238-$ | US-7079489-$ | US-7145889-$ | US-			

		7406314-$ | US-7477609-$ | US-7480269-$ | US-7508792-$ | US-7643515-$ | US-7890094-$ | US-7894390-$ | US-8259752-$ | US-8989082-$ | US-9844093-$ | US-7180855-$).DID.				
S186	4	S184 S185	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S187	4	S184 S185	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S190	6,651	(terminat$4 or deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) near6 (message or packet or signal) with (allocat$4 or assign$4 or schedul$4) near9 (prb or resource or transmit$4 or transmission or communicat$6 or send$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S191	2,090	(terminat$4 or deactivat$4 or disabl$4 or stop$4 or cancel$4 or cancellation or suspend$4 or halt$4) near6 (message or packet or signal) with (allocat$4 or assign$4 or schedul$4) with (bs or (base adj2 station) or ap or (access adj2 point) or repeater or (node adj b) or bts or node$1b or node-b or enb or node$1b or enodeb or femto or femtocell or femto-cell)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S192	1,381	S190 S191	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S193	641	h04w72/$.cpc. S192	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S194	118	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S193	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55

S195	118	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S193	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S196	1,909	((Pelletier near3 Benoit) or (Pani near3 Diana) or (DiGirolamo near3 Rocco) or (Cave near3 Christopher) or (Roy near3 Vincent) or (Marinier near3 Paul) or (Zeira near3 Eldad)).in.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S197	553	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S198	13	S196 S197	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S199	2,344	(mac near6 tim$4).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S200	1	S198 S199	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/05/27 21:55
S201	2	("20040068505").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2020/05/27 21:55
S202	2	("20100309877").PN.	US-PGPUB; USPAT; USOCR; EPO; DERWENT	OR	OFF	2020/05/27 21:55
S212	9,207	(allocat$4 or assign$4 or schedul$4) with (resource or grant or channel) with (timer or (tim$4 near3 (expir$4 or expiration)))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 12:36
S213	11,856	(timer or (tim$4 near3 (expir$4 or expiration))) with (uplink or "UL" or upstream)	US-PGPUB; USPAT; USOCR;	AND	ON	2020/09/29 12:37

			EPO; DERWENT			
S214	3,310	S212 S213	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 12:38
S215	1,388	(timer or (tim$4 near3 (expir$4 or expiration))) with (uplink or "UL" or upstream) near7 (resource or tx or transmission) with (suspend$4 or stop$4 or disabl$4 or cancel$4 or deactivat$4 or halt$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 12:39
S216	890	S212 S215	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 12:39
S217	621	((H04L1/1812 OR H04L5/0053 OR H04L5/0055 OR H04W28/04 OR H04W72/04 OR H04W72/0406 OR H04W72/12 OR H04W74/0833 OR H04W76/27 OR H04W76/38 OR H04W88/08).CPC.) S216	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 12:40
S218	603	(mac or (medium adj2 access adj3 control)) with (timer or (tim$4 near3 (expir$4 or expiration))) with (uplink or "UL" or upstream) near7 (resource or tx or transmission) with (suspend$4 or stop$4 or disabl$4 or cancel$4 or deactivat$4 or halt$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 12:41
S219	380	S217 S218	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 12:42
S220	380	S217 S218	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 12:42
S221	0	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S220	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 12:43
S222	4	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S218	US-PGPUB; USPAT; USOCR;	AND	ON	2020/09/29 12:43

			EPO; DERWENT			
S223	238	(@rlad<"20070928" or @ad<"20070928" or @ptad<"20070928") S214	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 13:00
S224	6	S215 S223	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 13:02
S225	6	S215 S223	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/09/29 13:02
S234	162	((deactivat$4 or de-activat$4 or cancel$4 or cancellat$4 or disabl$4) near10 tim$4) same (RRC or (radio adj3 resource adj2 control$3)) same (resource near4 (allocat$4 or schedul$4 or assign$4))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/03 21:59
S235	2,029	((deactivat$4 or de-activat$4 or cancel$4 or cancellat$4 or disabl$4) near10 tim$4) with (MAC or (medium near3 access near2 control))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/03 22:00
S236	43	S234 S235	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/03 22:01
S239	886	(RRC or (radio adj3 resource adj2 control$3)) same (resource near4 (allocat$4 or schedul$4 or assign$4)) same (timer)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/03 22:10
S240	426	(resource near4 (allocat$4 or schedul$4 or assign$4)) near9 (UL or uplink) same (timer or (timeout$4 or time$4-out or expir$4 or expiration)) same (deactivat$4 or de-activat$4 or cancel$4 or cancellat$4 or disabl$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/03 22:11
S241	101	S239 S240	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/03 22:11

S245	4,375	(RRC or (radio adj3 resource adj2 control$3)) with (resource) same (timer)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/03 22:14
S247	818	resource with (UL or uplink) same (timer or (timeout$4 or time$4-out or expir$4 or expiration)) same (deactivat$4 or de-activat$4 or cancel$4 or cancellat$4 or disabl$4)	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/03 22:15
S249	287	S245 S247	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/03 22:15
S250	10,948	(timer or (timeout$4 or time$4-out or expir$4 or expiration)) with (mac or (medium adj3 access near2 control$3))	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/03 22:16
S251	240	S249 S250	US-PGPUB; USPAT; USOCR; EPO; DERWENT	AND	ON	2020/11/03 22:16

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L6	29	(deactivat$4 near6 uplink near9 timer).clm.	US-PGPUB; USPAT	AND	ON	2020/11/04 19:28
L7	630	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT	AND	ON	2020/11/04 19:28
L9	128	(mac near4 tim$4 near3 information).clm.	US-PGPUB; USPAT	AND	ON	2020/11/04 19:29
L10	1	6 7 9	US-PGPUB; USPAT	AND	ON	2020/11/04 19:30
S9	2,212	(mac near6 tim$4).clm.	US-PGPUB; USPAT	AND	ON	2019/09/19 16:11
S10	443	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT	AND	ON	2019/09/19 16:11
S11	214	(deactivat$6 near5 uplink).clm.	US-PGPUB; USPAT	AND	ON	2019/09/19 16:12
S12	1	S9 S10 S11	US-PGPUB; USPAT	AND	ON	2019/09/19 16:12

S203	2,344	(mac near6 tim$4).clm.	US-PGPUB; USPAT	AND	ON	2020/05/27 21:50
S204	553	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT	AND	ON	2020/05/27 21:50
S205	231	(deactivat$6 near5 uplink).clm.	US-PGPUB; USPAT	AND	ON	2020/05/27 21:50
S206	1	S203 S204 S205	US-PGPUB; USPAT	AND	ON	2020/05/27 21:50
S207	2,344	(mac near6 tim$4).clm.	US-PGPUB; USPAT	AND	ON	2020/05/27 21:55
S208	553	(rrc near9 uplink near6 resource).clm.	US-PGPUB; USPAT	AND	ON	2020/05/27 21:55
S209	231	(deactivat$6 near5 uplink).clm.	US-PGPUB; USPAT	AND	ON	2020/05/27 21:55
S210	1	S203 S204 S205	US-PGPUB; USPAT	AND	ON	2020/05/27 21:55

11/4/2020 7:34:22 PM
C:\Users\kyuen\Documents\EAST\Workspaces\16421019.wsp

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (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.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16421019
Filing Date	2019-05-23
First Named Inventor	Benoit Pelletier
Art Unit	2464
Examiner Name	YUEN, KAN
Attorney Docket Number	SIG-2-1853US06

U.S.PATENTS Remove

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
	1	20020009774	A1	2002-07-25	Choi et al.	
	2	20090011795	A1	2009-01-08	Fukui et al.	
	3	20100309877	A1	2010-12-09	Damnjanovic et al.	
	4	20070230398	A1	2007-10-04	Jiang	

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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]

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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	/KAN YUEN/	Date Considered	11/04/2020

*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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	Examiner Name	YUEN, KAN
	Attorney Docket Number	SIG-2-1853US06

CERTIFICATION STATEMENT

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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	/Joseph P. Gushue/	Date (YYYY-MM-DD)	2020-08-11
Name/Print	Joseph P. Gushue	Registration Number	59,819

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 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.

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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.

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	1	1777080	CN	A	2006-05-24	BEIJING SAMSUNG COMM TECH RES	* English abstract, copy of patent in Chinese and English translation of citing Office Action included.	

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	Application Number	16421019
	Filing Date	2019-05-23
	First Named Inventor	Benoit Pelletier
	Art Unit	2464
	Examiner Name	YUEN, KAN
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Examiner Signature	/KAN YUEN/	Date Considered	11/04/2020

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	Examiner Name	YUEN, KAN
	Attorney Docket Number	SIG-2-1853US06

	1	LG ELECTRONICS INC., "Correction to handling of same priority logical channels," 3GPP TSG-RAN WG2 Meeting #53, Tdoc R2-061494, Shanghai, China, (May 8-12, 2006).

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	Application Number	16421019
	Filing Date	2019-05-23
	First Named Inventor	Benoit Pelletier
	Art Unit	2464
	Examiner Name	YUEN, KAN
	Attorney Docket Number	SIG-2-1853US06

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	/Joseph P. Gushue/	Date (YYYY-MM-DD)	2020-11-09
Name/Print	Joseph P. Gushue	Registration Number	59,819

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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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 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.

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Electronic Acknowledgement Receipt

EFS ID:	41067798
Application Number:	16421019
International Application Number:	
Confirmation Number:	9820
Title of Invention:	METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES
First Named Inventor/Applicant Name:	Benoit Pelletier
Customer Number:	3624
Filer:	Joseph P. Gushue/Margaret Ferello
Filer Authorized By:	Joseph P. Gushue
Attorney Docket Number:	SIG-2-1853US06
Receipt Date:	09-NOV-2020
Filing Date:	23-MAY-2019
Time Stamp:	14:44:56
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	Transmittal Letter	SIG_2_1853US06_IDS_Transmittal_Letter_20201109.pdf	88986 10bcbdff06b2ea35e2eb1c433d319e5a8c1d39bc	no	3
Warnings:					

Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	SIG_2_1853US06_IDS_Form_SB08_20201109.pdf	1226178 93d7bbbf2a5cc1cf1c68efc06e6c738ce4f561d6	no	4
Warnings:					
Information:					
A U.S. Patent Number Citation or a U.S. Publication Number Citation is required in the Information Disclosure Statement (IDS) form for autoloading of data into USPTO systems. You may remove the form to add the required data in order to correct the Informational Message if you are citing U.S. References. If you chose not to include U.S. References, the image of the form will be processed and be made available within the Image File Wrapper (IFW) system. However, no data will be extracted from this form. Any additional data such as Foreign Patent Documents or Non Patent Literature will be manually reviewed and keyed into USPTO systems.					
3	Non Patent Literature	NPL01_SIG_2_1853US06_R2_061494_EFS.pdf	110886 a7c76352163069d4bed65953f611f971a14442be	no	9
Warnings:					
Information:					
			Total Files Size (in bytes):	1426050	

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.

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the **PATENT APPLICATION** of:	
Pelletier et al.	
Application No.: 16/421,019	
Filed: May 23, 2019	Our File: SIG-2-1853US06
For: METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES	Date: November 9, 2020
Group: 2464	
Examiner: Kan Yuen	

INFORMATION DISCLOSURE STATEMENT

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

Sir:

Further to Applicant's Duty of Disclosure pursuant to 37 C.F.R. § 1.56, Applicant wishes to bring to the Examiner's attention the material cited on the enclosed PTO Form SB-08. A copy of the newly cited document is enclosed.

This application is a continuation of U.S. Patent Application No. 14/876,337 filed October 6, 2015, which issued on May 28, 2019 as U.S. Patent No. 10,306,677, which is a continuation of U.S. Patent Application No. 14/319,608 filed June 30, 2014, which issued on April 12, 2016 as U.S. Patent No. 9,313,809, which is a continuation of U.S.

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Patent Application No. 12/238,910 filed September 26, 2008, which issued on July 8, 2014 as U.S. Patent No. 8,774,104, which claims the benefit of U.S. Provisional Patent Application Nos. 61/083,409 filed July 24, 2008, 61/074,288 filed June 20, 2008, 61/038,576, filed March 21, 2008, 61/025,441 filed February 1, 2008, 61/018,999 filed January 4, 2008, 60/982,528 filed October 25, 2007 and 60/975,985 filed September 28, 2007.

This application is also related to co-pending U.S. Application No. 16/516,893, filed July 19, 2019, which is a continuation of U.S. Application No. 15/836,302, filed December 8, 2017, which issued on July 23, 2019 as U.S. Patent No. 10,362,622, which is a continuation of U.S. Patent Application No. 15/182,218, filed June 14, 2016, which issued on December 12, 2017 as U.S. Patent No. 9,844,093, which is a continuation of U.S. Patent Application No. 15/049,922, filed February 22, 2016, which issued on June 21, 2016 as U.S. Patent No. 9,374,816, which is a continuation of U.S. Patent Application No. 12/256,964, filed October 23, 2008, which issued on February 23, 2016, as U.S. Patent No. 9,217,280, which claims the benefit of U.S. Provisional Patent Application No. 60/982,528, filed October 25, 2007 and U.S. Provisional Patent Application No. 61/018,567, filed January 2, 2008.

Applicant also wishes to bring to the Examiner's attention co-pending U.S. Application No. 16/440,886, filed June 13, 2019, which is a continuation of U.S. Patent Application No. 15/782,532, filed October 12, 2017, which issued on June 18, 2019 as U.S. Patent No. 10,327,188, which is a continuation of U.S. Patent Application No.

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15/135,616, filed April 22, 2016, which is a continuation of U.S. Patent Application No. 14/875,059 filed October 5, 2015, which is a continuation of U.S. Patent Application No. 13/665,734, filed October 31, 2012, which issued October 13, 2015, as U.S. Patent No. 9,161,285, which is a continuation of U.S. Patent Application No. 12/346,631, filed December 30, 2008, which issued December 4, 2012 as U.S. Patent No. 8,325,684, which claims priority from Provisional Application No. 61/018,567, which was filed January 2, 2008.

It is respectfully requested that the Examiner consider these documents and return an initialed copy of the PTO Form SB-08 indicating consideration of the cited materials.

Respectfully submitted,

Signal Trust for Wireless Innovation

By /Joseph P. Gushue/
Joseph P. Gushue
Registration No. 59,819
(215) 568-6400

Volpe Koenig
30 South 17th Street; Suite 1800
Philadelphia, PA 19103-4009
Telephone: (215) 568-6400
Facsimile: (215) 568-6499

JPG/pf
Enclosures (2)

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Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (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.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	16421019
	Filing Date	2019-05-23
	First Named Inventor	Benoit Pelletier
	Art Unit	2464
	Examiner Name	YUEN, KAN
	Attorney Docket Number	SIG-2-1853US06

U.S.PATENTS Remove

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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FOREIGN PATENT DOCUMENTS Remove

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	1777080	CN	A	2006-05-24	BEIJING SAMSUNG COMM TECH RES	* English abstract, copy of patent in Chinese and English translation of citing Office Action included.	

If you wish to add additional Foreign Patent Document citation information please click the Add button Add

NON-PATENT LITERATURE DOCUMENTS Remove

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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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16421019
	Filing Date	2019-05-23
	First Named Inventor	Benoit Pelletier
	Art Unit	2464
	Examiner Name	YUEN, KAN
	Attorney Docket Number	SIG-2-1853US06

	1		

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

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.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16421019
	Filing Date	2019-05-23
	First Named Inventor	Benoit Pelletier
	Art Unit	2464
	Examiner Name	YUEN, KAN
	Attorney Docket Number	SIG-2-1853US06

CERTIFICATION STATEMENT

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See attached certification statement.

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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	/Joseph P. Gushue/	Date (YYYY-MM-DD)	2020-09-30
Name/Print	Joseph P. Gushue	Registration Number	59,819

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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the **PATENT APPLICATION** of:	
	Pelletier et al.
Application No.:	16/421,019
Filed:	May 23, 2019
For:	METHOD AND APPARATUS FOR TRANSMITTING UPLINK DATA ON UPLINK RESOURCES
Group:	2464
Examiner:	Kan Yuen

Our File: SIG-2-1853US06

Date: September 30, 2020

INFORMATION DISCLOSURE STATEMENT

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

Sir:

Further to Applicant's Duty of Disclosure pursuant to 37 C.F.R. § 1.56, Applicant wishes to bring to the Examiner's attention the material cited on the enclosed PTO Form SB-08. A copy of the newly cited document is enclosed.

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Patent Application No. 12/238,910 filed September 26, 2008, which issued on July 8, 2014 as U.S. Patent No. 8,774,104, which claims the benefit of U.S. Provisional Patent Application Nos. 61/083,409 filed July 24, 2008, 61/074,288 filed June 20, 2008, 61/038,576, filed March 21, 2008, 61/025,441 filed February 1, 2008, 61/018,999 filed January 4, 2008, 60/982,528 filed October 25, 2007 and 60/975,985 filed September 28, 2007.

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ONEPLUS - EX. 1002

15/135,616, filed April 22, 2016, which is a continuation of U.S. Patent Application No. 14/875,059 filed October 5, 2015, which is a continuation of U.S. Patent Application No. 13/665,734, filed October 31, 2012, which issued October 13, 2015, as U.S. Patent No. 9,161,285, which is a continuation of U.S. Patent Application No. 12/346,631, filed December 30, 2008, which issued December 4, 2012 as U.S. Patent No. 8,325,684, which claims priority from Provisional Application No. 61/018,567, which was filed January 2, 2008.

Pursuant to M.P.E.P § 609.04(a), since at least a portion of at least one item of information included in the PTO Form SB-08 is not available in the English language, enclosed is an English translation of a communication from a foreign patent office, dated August 28, 2020.

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It is respectfully requested that the Examiner consider these documents and return an initialed copy of the PTO Form SB-08 indicating consideration of the cited materials.

Respectfully submitted,

Signal Trust for Wireless Innovation

By /Joseph P. Gushue/
Joseph P. Gushue
Registration No. 59,819
(215) 568-6400

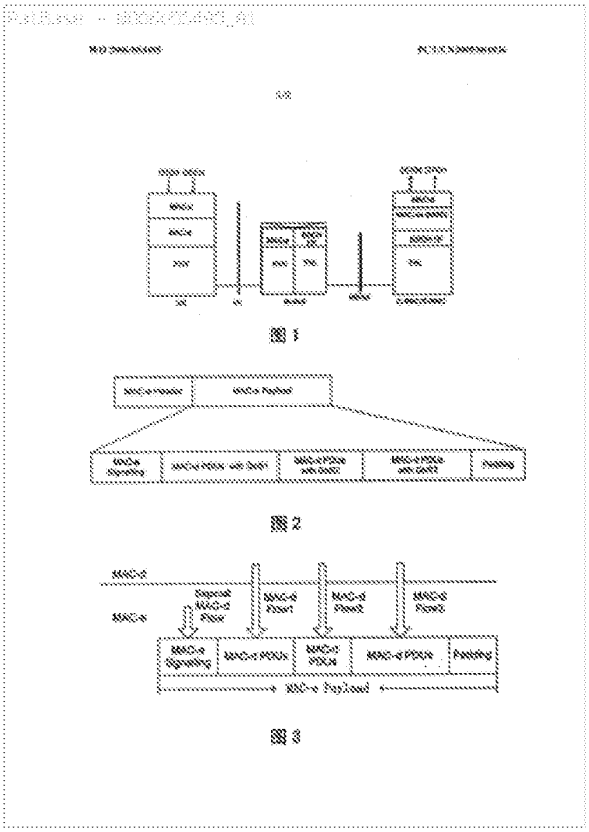
Volpe and Koenig, P.C.
30 South 17th Street; Suite 1800
Philadelphia, PA 19103-4009
Telephone: (215) 568-6400
Facsimile: (215) 568-6499

JPG/JMB/pf
Enclosures (3)

ONEPLUS - EX. 1002

1) Family number: 33026030 (WO06053495 A1) © PatBase

Title: (CN1777080B) [EN] MAC-E SIGNALLING TRANSMISSION METHOD



Abstract: (CN1777080B)

[EN] The invention relates to a transmission method for MAC-e signaling. The method comprises the steps as follow: the QoS attribute of the MAC-e signaling is set through a RNC and then an UE is informed; the QoS of the whole MAC-e PDU is determined according to the QoS attribute of the MAC-e signaling and the QoS attribute of data in the event that the MAC-e PDU comprise any MAC-e signaling information during the data transmission of UE; and the emission power of the MAC-e PDU is determined through the UE according to the determined QoS, thereby implementing the transmission of MAC-e PDU. The invention is characterized in that the UE can accurately determine the QoS attribute of the whole MAC-e PDU according to the demands of MAC-e signaling when the MAC-e PDU comprise any MAC-e signaling, thereby effectively implementing the transmission of MAC-e PDU by properly utilizing the emission power.

Family:	Publication number	Publication date	Application number	Application date
	CN1777080 A	20060524	CN200410104655	20041231
	CN1777080 B	20101006	CN200410104655	20041231
	WO06053495 A1	20060526	WO2005CN001936	20051116

Priority: CN200410092588 20041116 CN200410104655 20041231

Number of Forward Citations: 2

Assignee(s): (std): BEIJING SAMSUNG COMM TECH RES ; BEIJING SAMSUNG

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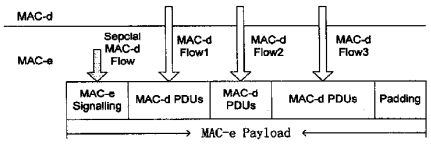
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MAC - e 信令的传输方法

[57] 摘要

一种 MAC - e 信令的传输方法，包括步骤：RNC 对 MAC - e 信令配置 QoS 属性，并通知 UE；UE 在进行数据传输时，如果 MAC - e PDU 中包含了 MAC - e 信令信息，UE 根据 MAC - e 信令的 QoS 和数据的 QoS 属性确定整个 MAC - ePDU 的 QoS；UE 根据确定后的 QoS 决定 MAC - e PDU 的发射功率，从而进行 MAC - e PDU 传输。 在本发明中，当 MAC - e PDU 中包含 MAC - e Signalling 时，UE 能够根据 MAC - e Signalling 的需要，准确的确定整个 MAC - e PDU 的 QoS 属性，从而能合理的使用发射功率，有效的对 MAC - e Signalling 进行传输。



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1.一种MAC-e信令的传输方法，包括步骤：

1）RNC对MAC-e信令配置QoS属性，并通知UE；

2）UE在进行数据传输时，如果MAC-e PDU中包含了MAC-e信令信息，UE根据MAC-e信令的QoS和数据的QoS属性确定整个MAC-e PDU的QoS；

3）UE根据确定后的QoS决定MAC-e PDU的发射功率,从而进行MAC-e PDU传输。

2．根据权利要求1所述的方法，其特征在于还包括：

UE结合基站对MAC-e PDU的确认信息，确定是重传还是终止该MAC-e信令的传输。

3.根据权利要求1所述的方法，其特征在于MAC-e信令的QoS属性包括功率偏移量PO。

4.根据权利要求1所述的方法，其特征在于MAC-e信令的QoS属性包括最大重传次数。

5.根据权利要求1所述的方法，其特征在于在步骤2)中，当MAC-e PDU中仅包含MAC-e信令而没有数据时，MAC-e信令的QoS就是MAC-e PDU的QoS。

6.根据权利要求1所述的方法，其特征在于在步骤2)中，当MAC-e PDU中同时包含MAC-e信令和数据时，整个MAC-e PDU的QoS由其中的数据部分的QoS来决定。

7.根据权利要求1所述的方法，其特征在于在步骤2)中，当MAC-e PDU中同时包含MAC-e信令和数据时，如果所含MAC-e信令的类型为“长度大但频率低”型，整个MAC-e PDU的QoS是MAC-e信令和数据中要求最

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严格的QoS；如果所含MAC-e信令的类型为“长度小但频率高”型，整个MAC-e PDU的QoS是所含数据中要求最严格的QoS。

8.根据权利要求3所述的方法，其特征在于在配置MAC-e 信令的QoS的功率偏移量PO时，通过RRC信令或者系统信息广播通知UE。

9．根据权利要求3所述的方法，其特征在于在配置MAC-e 信令的QoS的功率偏移量PO时，通过Iub/Iur接口信令通知Node B。

10.根据权利要求4所述的方法，其特征在于当不给MAC-e信令配置最大重传次数时，整个MAC-e PDU的最大重传次数由数据部分决定。

11．根据权利要求10所述的方法，其特征在于MAC-e信令的传输次数不受MAC-e PDU的最大重传次数的限制。

12．根据权利要求3所述的方法，其特征在于对于QoS中最大重传次数，为MAC-e信令配置一个固定值。

13．根据权利要求12所述的方法，其特征在于所述固定值由UTRAN决定，并通知UE和Node B，或在标准中指定。

14.根据权利要求2所述的方法,其特征在于当MAC-e PDU没有被任何一个基站收到且传输次数没有达到MAC-e PDU的最大重传次数时，整个MAC-e PDU进行重传。

15.根据权利要求2所述的方法,其特征在于当MAC-e PDU被某个(些)基站收到，但没有被所有的必收基站收到或传输次数已经达到MAC-e PDU的最大重传次数，则MAC-e PDU中的数据部分不需要重新传输，而MAC-e信令需要重新进行传输。

16.根据权利要求2所述的方法,其特征在于当MAC-e PDU被所有的必收基站成功接收后，停止该MAC-e信令的传输。

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17.根据权利要求2所述的方法,其特征在于当MAC-e信令被所有的必收基站成功接收之前，MAC-e信令内容发生了变化时，则停止传输旧的MAC-e信令，开始传输更新后的MAC-e信令。

18．根据权利要求15至17之一所述的方法，其特征在于所述必收基站至少为一个。

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MAC-e信令的传输方法

技术领域

本发明涉及第三代移动通信，特别涉及MAC-e信令的传输的方法。

背景技术

第二代移动通信系统包括GSM (Global System for Mobile Communications) and IS (Interim Standard)-95，主要目标是提供话音业务。GSM采用了TDMA (时分多址)技术，于1992年商用，主要用于欧洲和中国。而IS-95采用的是码分多址技术，主要用于美国和韩国。

目前，移动通信技术已经演进为第三代移动通信系统，除了提供话音业务外，还提供高速率和高质量的数据业务和多媒体业务。第三代移动通信系统包括3GPP(3rd Generation Project Partnership)国际标准化组织研究的异步CDMA系统 (或称WCDMA系统，或称UMTS)，即各基站之间的定时是异步的，和3GPP2 (3rd Generation Project Partnership 2) 国际标准化组织研究的同步CDMA系统 (或称CDMA2000)，即各基站之间的定时是相同的。

同步和异步的第三代移动通信系统都在对提供高速率、高质量的数据分组业务进行标准化。例如： 3GPP 对HSDPA (高速下行接入) 进行了标准化，从而提高下行的数据速率，而3GPP2也在对1xEV-DV (Evolution-Data and Voice) 进行标准化。3GPP又继续进行上行分组数据传输的增强（EUDCH），从而提高上行的容量和覆盖。EUDCH与Rel99/4/5的上行DCH相比，引入了HARQ (混合自动重传请求) 机制，并且正在考

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虑使用比Rel99/4/5的上行DCH要短的TTI(传输时间间隔),例如与HSDPA一样是2ms。

为了支持EUDCH,与WCDMA系统R99的规范相比,增加了一些新的信道。新增加的传输信道称为E-DCH,EUDCH所支持的业务将被映射到该传输信道。新增加的物理信道有增强型专用物理数据信道(E-DPDCH)和增强型专用物理控制信道(E-DPCCH)。图4所示为引入EUDCH后,所有的物理信道的种类。它包括Rel99中的专用物理控制信道(DPCCH),专用物理数据信道(DPDCH),和Rel5中用于HSDPA的上行专用物理控制信道HS-DPCCH,以及引入EUDCH后的增加E-DPDCH和E-DPCCH。E-DPDCH用于传输来自E-DCH传输信道的数据,而E-DPCCH传输用于E-DPDCH译码的控制信息,如E-TFI(数据包的大小和传输格式),调度信息,HARQ信息(如接收序列号RSN)等。

同HSDPA相似,为了支持所引入的HARQ技术,EUDCH在MAC层也增加了新的实体,参见图1。UE和Node B中,新的MAC实体称为MAC-e,在RNC上增加的实体称为MAC-es。MAC-e和物理层之间的通道就是新定义的E-DCH传输信道,E-DCH中数据包称为MAC-e PDU。MAC-e和MAC-d实体之间的通道是MAC-d Flow,MAC-d Flow中传输的数据包是MAC-d PDU。

UE端MAC-e实体的主要功能是:根据Node B的调度命令和当前UE的可用的发射功率,决定发送的数据包MAC-e PDU的大小,然后再选取适当数量的MAC-d PDU装载到一个MAC-e PDU中,并交由物理层进行数据发送。另一个主要功能是根据Node B的反馈,MAC-e PDU的QoS要求等,决定是否重新传输之前发送的MAC-e PDU,即HARQ的功能。在发送数据的同时,一些有关UE的状态信息也会随MAC-d PDU封装在MAC-e PDU中。有关UE的状态信息有,当前可用的发射功率,内存中待发送的数据量的大小等,它们都是对Node B调度十分有用的参考信息。由于这些信息通过MAC-e PDU传输,并终止在Node B的MAC层,因此称之为MAC-e信令(以下称为 MAC-e Signalling)。Node B的MAC-e实体的主要功能是,根据对UE发送的MAC-e PDU成功接收与否,生成ACK/NACK。如果成功接收MAC-e PDU后,解析其中的MAC-e Signalling

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信息，对UE的数据速率进行调度（产生调度命令），并将MAC-e Payload中除去MAC-e Signalling和填充比特以外的数据发送至RNC。RNC的MAC-es实体的主要功能是，对接收到的数据进行排序。

MAC-e PDU的结构见图2。一个MAC-e PDU 包含MAC-e Header和MAC-e Payload两部分。MAC-e Header指示后面的MAC-e Payload的数据结构。MAC-e Payload由MAC-e Signalling，一个或者多个MAC-d PDU，和一些填充比特(Padding)组成。MAC-e Signalling就是前面提到的对Node B的调度有用的UE状态信息。但并不是在每个MAC-e PDU中都含有MAC-e Signalling的，它只是根据调度需要，在某些需要的时候进行传输。通过MAC-e Header能够指示出，MAC-e Payload是否包含了MAC-e Signalling的信息。MAC-d PDU是MAC-e Payload的主要内容，它是来自一些MAC-d Flow的数据包。填充比特只是当前面的所有信息不能构成某个指定的MAC-e PDU的长度时，用来进行填充。从图2中也可以看出，QoS属性不同的MAC-d PDU可以封装在同一个MAC-e PDU内。正因为MAC-e PDU中可能包含QoS属性不同的MAC-d PDU，所以必须有一个能够确定整个MAC-e PDU的QoS属性的方法。

目前，3GPP已经有了一个确定MAC-e PDU的QoS属性的方法，但是该方法没有考虑MAC-e PDU中包含MAC-e Signaling的情况。该方法的具体描述是：当一个MAC-e PDU中仅包含一种QoS属性的MAC-d PDU时，该QoS就是整个MAC-e PDU的QoS；当一个MAC-e PDU中包含多个QoS属性不同的MAC-d PDU时，整个MAC-e PDU的QoS是所有的MAC-d PDU的QoS中,要求最严格的QoS。这里所说的QoS主要包含两个属性，一个是功率偏移量(Power Offset简称PO)，另一个是最大重传次数。UTRAN为每个MAC-d Flow配置QoS属性。MAC-d PDU的QoS就是其所属的MAC-d Flow的QoS属性。也就是说，当一个MAC-e PDU中包含多个QoS属性不同的MAC-d PDU时，UE确定的整个MAC-e PDU的PO就是所有MAC-d PDU的PO值中最大的一个，UE确定的整个MAC-e PDU的最大重传次数是所有的MAC-d PDU对应最大重传次数中的最大值。

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当一个MAC-e PDU的QoS属性确定了以后，UE就能够根据QoS(主要是功率偏移量PO)结合其它信息来确定传输该数据包时的发射功率。具体的方法是：网络提前配置在参考QoS下每一个E-TFI对应的增益因子ß (E-DPDCH/DPCCH的功率比值)，以及每一种QoS和参考QoS之间的功率偏移量PO。UE首先根据MAC-e PDU的E-TFI对应的增益因子确定MAC-e PDU的发射功率，然后再根据这个MAC-e PDU的QoS和参考QoS属性之间的功率偏移量PO，对发射功率进行修正，最终确定该MAC-e PDU的发射功率。

由上面的描述可以看到目前3GPP在确定MAC-e PDU的QoS属性的时候没有考虑MAC-e PDU中包含MAC-e Signaling的情况。但是，MAC-e Signalling中所承载的信息对于调度是必需的，因此在确定MAC-e PDU的QoS属性的时候也是必须要考虑MAC-e Signaling的QoS属性。目前，上行的调度信息含有，速率增加请求，发送功率，内存中待发送数据量的大小等。由于这些信息是用于Node B调度的信息，而Node B本身只有MAC层和物理层，所以这些信息不可能在MAC之上的层进行传输。由于这些信息需要的比特数比较多，且又不是在每帧都需要传输的信息，所以目前，3GPP基本上倾向于，速率增加请求(Rate Request,只需要一个比特)定义在物理层的帧结构中，其它的两种信息放在MAC-e Signalling中进行传输。

由于MAC-e Signalling中所传内容的性质，确定了它必须尽快的由UE传送至Node B，在较大的传输时延后到达Node B就没有了意义。如果在确定MAC-e PDU的QoS属性时，没有考虑到其中包含了MAC-e Signalling，可能会出现这样的问题：MAC-e Signalling所在的MAC-e PDU的传输时延要求非常低，该MAC-e PDU的发射功率比较小，导致了该数据包进行了多次重传后才成功接收。而此时，MAC-e Signalling中的信息已经失效，因为此时，UE的发射功率或者内存中待发送数据量已经发生的变化。

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