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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.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/682,854	06/08/2021	11032000	IPW2-USCN213316	1678

3624 7590 05/19/2021
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.

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

Paul Howard, Bristol, UNITED KINGDOM;
Intellectual Ventures II LLC, Wilmington, DE;

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.

IR103 (Rev. 10/09)

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 02/04/2021
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.

John D. Wilt	(Typed or printed name)
/John D. Wilt/	(Signature)
May 4, 2021	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/682,854	11/13/2019	Paul Howard	IPW2-USCN213316	1678

TITLE OF INVENTION: COMMUNICATIONS IN A WIRELESS NETWORK

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	05/04/2021

EXAMINER	ART UNIT	CLASS-SUBCLASS
ABELSON, RONALD B	2476	370-280000

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

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

Intellectual Ventures II LLC

Wilmington, DE

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. 220493

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 /John D. Wilt/

Date May 4, 2021

Typed or printed name John D. Wilt

Registration No. 76,110

Electronic Patent Application Fee Transmittal				
Application Number:		16682854		
Filing Date:		13-Nov-2019		
Title of Invention:		COMMUNICATIONS IN A WIRELESS NETWORK		
First Named Inventor/Applicant Name:		Paul Howard		
Filer:		John D. Wilt/Caren Burgoon		
Attorney Docket Number:		IPW2-USCN213316		
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:	42633961
Application Number:	16682854
International Application Number:	
Confirmation Number:	1678
Title of Invention:	COMMUNICATIONS IN A WIRELESS NETWORK
First Named Inventor/Applicant Name:	Paul Howard
Customer Number:	3624
Filer:	John D. Wilt/Caren Burgoon
Filer Authorized By:	John D. Wilt
Attorney Docket Number:	IPW2-USCN213316
Receipt Date:	04-MAY-2021
Filing Date:	13-NOV-2019
Time Stamp:	16:20:42
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	E202154G22081878
Deposit Account	220493
Authorized User	Caren Burgoon
<p>The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:</p> <p>37 CFR 1.16 (National application filing, search, and examination fees)</p> <p>37 CFR 1.17 (Patent application and reexamination processing fees)</p>	

37 CFR 1.19 (Document supply fees)
 37 CFR 1.20 (Post Issuance fees)
 37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	IPW2_USCN213316_IssueFeePaymentTransmittal_20210504.pdf	117260 4fedd8f84f9024081b819ed29f63ef855c9238b0	no	1

Warnings:

Information:

2	Fee Worksheet (SB06)	fee-info.pdf	30509 185c96df912281a6562e59a4cfd4d3fc3eb57a3	no	2
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Warnings:

Information:

Total Files Size (in bytes): 147769

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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



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NOTICE OF ALLOWANCE AND FEE(S) DUE

3624 7590 02/04/2021
Volpe Koenig
30 SOUTH 17TH STREET, 18TH FLOOR
PHILADELPHIA, PA 19103

EXAMINER

ABELSON, RONALD B

ART UNIT

PAPER NUMBER

2476

DATE MAILED: 02/04/2021

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/682,854	11/13/2019	Paul Howard	IPW2-USCN213316	1678

TITLE OF INVENTION: COMMUNICATIONS IN A WIRELESS NETWORK

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	05/04/2021

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.

PART B - FEE(S) TRANSMITTAL

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Commissioner for Patents
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3624 7590 02/04/2021
Volpe Koenig
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PHILADELPHIA, PA 19103

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/682,854	11/13/2019	Paul Howard	IPW2-USC213316	1678

TITLE OF INVENTION: COMMUNICATIONS IN A WIRELESS NETWORK

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nonprovisional	UNDISCOUNTED	\$1200	\$0.00	\$0.00	\$1200	05/04/2021

EXAMINER	ART UNIT	CLASS-SUBCLASS
ABELSON, RONALD B	2476	370-280000

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☐ 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,

1 _____

(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.

2 _____

3 _____

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

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(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.

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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. _____



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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Alexandria, Virginia 22313-1450
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/682,854	11/13/2019	Paul Howard	IPW2-USCN213316	1678
3624	7590	02/04/2021	EXAMINER	
Volpe Koenig			ABELSON, RONALD B	
30 SOUTH 17TH STREET, 18TH FLOOR			ART UNIT	
PHILADELPHIA, PA 19103			PAPER NUMBER	
			2476	
DATE MAILED: 02/04/2021				

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.

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

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

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

Privacy Act Statement

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

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

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

Notice of Allowability	Application No. 16/682,854	Applicant(s) Howard, Paul	
	Examiner RONALD B ABELSON	Art Unit 2476	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 1/20/21.
☐ 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 1-24. 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)	5. ☐ Examiner's Amendment/Comment
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.	6. ☐ Examiner's Statement of Reasons for Allowance
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.	7. ☐ Other _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____.	

/RONALD B ABELSON/ Primary Examiner, Art Unit 2476	
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<i>Search Notes</i> 	Application/Control No. 16/682,854	Applicant(s)/Patent Under Reexamination Howard, Paul
	Examiner RONALD B ABELSON	Art Unit 2476

CPC - Searched*		
Symbol	Date	Examiner
h04b7/2643	01/27/2021	RA
h04j3/1694	01/27/2021	RA
h04l5/0053	01/27/2021	RA
h04w52/146 h04w72/0406 h04w72/042 h04w72/0446	01/27/2021	RA

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
CPC combined with limited text search in EAST	01/27/2021	RA

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<i>Search Notes</i> 	Application/Control No. 16/682,854	Applicant(s)/Patent Under Reexamination Howard, Paul
	Examiner RONALD B ABELSON	Art Unit 2476

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
h04b	7/2643	01/27/2021	RA
h04j	3/1694	01/27/2021	RA
h04l	5/0053	01/27/2021	RA
h04w	52/146, 72/0406, 72/042, 72/0446	01/27/2021	RA

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Issue Classification 	Application/Control No. 16/682,854	Applicant(s)/Patent Under Reexamination Howard, Paul
	Examiner RONALD B ABELSON	Art Unit 2476

CPC						
Symbol					Type	Version
H04B	/	7	/	2643	F	2013-01-01
H04W	/	72	/	0406	I	2013-01-01
H04J	/	3	/	1694	I	2013-01-01
H04L	/	5	/	0053	I	2013-01-01
H04W	/	52	/	146	I	2013-01-01
H04W	/	72	/	042	I	2013-01-01
H04W	/	72	/	0446	I	2013-01-01
H04W	/	52	/	54	A	2013-01-01

CPC Combination Sets					
Symbol		Type	Set	Ranking	Version
	/		/		

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	24	
/RONALD B ABELSON/ Primary Examiner, Art Unit 2476 (Primary Examiner)	27 January 2021 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

U.S. Patent and Trademark Office

Part of Paper No.: 20210121

Issue Classification 	Application/Control No. 16/682,854	Applicant(s)/Patent Under Reexamination Howard, Paul
	Examiner RONALD B ABELSON	Art Unit 2476

INTERNATIONAL CLASSIFICATION			
CLAIMED			
H04B	/	7	/ 26
H04W	/	72	/ 04
H04W	/	52	/ 14
H04J	/	3	/ 16
H04L	/	5	/ 00
NON-CLAIMED			
	/		/

US ORIGINAL CLASSIFICATION	
CLASS	SUBCLASS

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

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	24	
/RONALD B ABELSON/ Primary Examiner, Art Unit 2476 (Primary Examiner)	27 January 2021 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

Issue Classification 	Application/Control No. 16/682,854	Applicant(s)/Patent Under Reexamination Howard, Paul
	Examiner RONALD B ABELSON	Art Unit 2476

☐ 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	19	19										
2	2	11	11	20	20										
3	3	12	12	21	21										
4	4	13	13	22	22										
5	5	14	14	23	23										
6	6	15	15	24	24										
7	7	16	16												
8	8	17	17												
9	9	18	18												

NONE (Assistant Examiner) _____ (Date) _____		Total Claims Allowed: 24	
/RONALD B ABELSON/ Primary Examiner, Art Unit 2476 (Primary Examiner) _____ (Date) 27 January 2021		O.G. Print Claim(s) 1	O.G. Print Figure 1

<i>Index of Claims</i> 	Application/Control No. 16/682,854	Applicant(s)/Patent Under Reexamination Howard, Paul
	Examiner RONALD B ABELSON	Art Unit 2476

✓	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	01/25/2020	06/25/2020	10/16/2020	01/27/2021					
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3	3	✓	✓	✓	=					
4	4	✓	✓	✓	=					
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23	23	✓	✓	✓	=					
24	24	✓	✓	✓	=					

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1	"16682854"	US-PGPUB; USPAT; EPO; JPO	OR	ON	2021/01/27 07:38
L2	0	1 and (number field).clm.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2021/01/27 07:38
L3	1	1 and (number field)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2021/01/27 07:38
L4	6	plcch with (number field) with bit with feedback	US-PGPUB; USPAT; EPO; JPO	OR	ON	2021/01/27 07:40
L5	40,701	h04b7/2643 h04j3/1694 h04I5/0053 h04w52/146 h04w72/0406 h04w72/042 h04w72/0446	US-PGPUB; USPAT; EPO; JPO	OR	ON	2021/01/27 07:41
L6	40,701	L5	US-PGPUB; USPAT; EPO; JPO	OR	ON	2021/01/27 07:41
L7	2	6 and plcch with bit with feedback	US-PGPUB; USPAT; EPO; JPO	OR	ON	2021/01/27 07:41
S1	0	"16682854"	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/24 16:38
S2	4	11/646,692	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/24 16:39
S3	1	S2 and (time adj1 interval).clm.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/24 16:40
S4	0	S2 and (condition).clm.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/24 17:28
S5	4	S2 and (condition) with physical	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/24 17:28
S6	137	uplink adj2 control adj1 channel with channel adj1 condition	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/24 17:29

S7	7	uplink adj2 physical adj1 control adj1 channel with channel adj1 condition	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/24 17:30
S8	1	"20030022683".pn.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/24 18:37
S9	0	S8 and multiplex\$3	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/24 18:37
S10	1	S8 and tdd	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/24 18:37
S11	6,975	pdsch with multiplex\$3	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/24 18:38
S12	0	pdsch with share near4 control with multiplex\$3	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/24 18:39
S13	1,805	pdsch with channel near4 control with multiplex\$3	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/24 18:39
S14	872,927	pdsch with control adj1 channelwith multiplex\$3	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/24 18:39
S15	1,548	pdsch with control adj1 channel with multiplex\$3	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/24 18:39
S16	1,548	pdsch with control adj1 channel with multiplex\$3	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/24 18:39
S17	1	"20070077151".pn.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/24 20:53
S18	1	"20070265017".pn.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/24 20:53
S19	126	(ishii and hanaki).inv.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2020/01/25 08:29
S20	21	(ishii and hanaki).inv. and call.ti.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2020/01/25 08:31
S21	1	"2005346319".pn.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/25 08:42

S22	1	"20080144600".pn.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/25 09:14
S23	4	("20020077151" "20040022213" "20020172208" "20080144600").pn.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/25 09:30
S24	1	"20080090528".pn.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/26 08:18
S25	0	S24 and (time adj1 multiplex\$3)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/26 08:23
S26	1	S24 and (time multiplex\$3)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/26 08:23
S27	0	S24 and (time multiplex\$3) same (pusch pucch)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/26 08:24
S28	1	S24 and (time multiplex\$3 pusch pucch)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/26 08:24
S29	1	S24 and (time multiplex\$3 pusch pucch)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/26 08:26
S30	1	S24 and (pusch same pucch)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/26 08:27
S31	0	multiplex43 with (pusch with pucch)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/26 08:29
S32	3,707	multiplex\$3 with (pusch with pucch)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/26 08:29
S33	999	time adj1 multiplex\$3 same (pusch same pucch)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/26 08:30
S34	6,756	multiplex\$3 same (pusch same pucch)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/26 08:32
S35	5,757	S34 not S33	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/26 08:32
S36	6,745	multiplex\$3 same (pusch same pucch)	US-PGPUB; USPAT	OR	ON	2020/01/26 08:33
S37	2,587	multiplex\$3 same (pusch same pucch)	USPAT	OR	ON	2020/01/26 08:33

S38	4,158	multiplex\$3 same (pusch same pucch)	US-PGPUB	OR	ON	2020/01/26 08:38
S39	2,324	multiplex\$3 with (pusch with pucch)	US-PGPUB	OR	ON	2020/01/26 08:39
S40	3,731	multiplex\$3 same (pusch with pucch)	US-PGPUB	OR	ON	2020/01/26 08:39
S41	1,407	S40 not S39	US-PGPUB	OR	ON	2020/01/26 08:39
S42	86	time adj1 multiplex\$3 with (uplink with shared with control)	US-PGPUB	OR	ON	2020/01/26 08:45
S43	155	time adj1 multiplex\$3 with (uplink with shared with control)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/26 08:45
S44	1	"20040028020".pn.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/28 08:07
S45	0	S44 and header	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/28 08:08
S46	0	S44 and rv same tbs	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/28 08:08
S47	1	S44 and (rv redundancy) same (transport tbs)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/01/28 08:09
S48	31,861	h04b7/2643 h04j3/1694 h04i5/0053 h04w52/146 h04w72/0406 h04w72/042 h04w72/0446	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/02/04 08:35
S49	1,825	pdsch with channel near4 control with multiplex\$3	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/02/04 08:35
S50	853	S48 and S49	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/02/04 08:35
S51	1	"20200083952".pn.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/20 07:56
S52	1	"20070265017".pn.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/20 08:05
S53	1	S52 and pdsch	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/20 08:05

S54	0	S51 and p-ccpch	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/20 08:07
S55	0	S51 and ccpch	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/20 08:07
S56	1	S51 and ("206" "208")	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/20 08:07
S57	14	downlink adj1 beacon with timeslot	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/20 08:08
S58	5,760	pdsch with (beacon timeslot slot)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/20 08:11
S59	2,211	pdsch with shar\$3 with (beacon timeslot slot)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/20 08:11
S60	19	pdsch with shar\$3 with (beacon)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/20 08:12
S61	449	pdsch with ccpch	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/20 08:22
S62	40	pdsch with ccpch with (slot timeslot)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/20 08:25
S63	1	"20040022213".pn.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/20 09:18
S64	0	S63 and pdsch	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/20 09:38
S65	1	S63 and downlink with control	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/20 09:39
S66	0	"20070058595".pn. and pdsch	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/20 13:05
S67	1	"20070058595".pn. and downlink	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/06/20 13:05
S68	1	"20040170132".pn.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/10/04 09:59

S69	2	beacon with pdsch with (timeslot time adj1 slot)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/10/04 10:02
S70	68	(identical "same") with pdsch with (timeslot time adj1 slot)	US-PGPUB; USPAT; EPO; JPO	OR	ON	2020/10/04 10:07

1/27/2021 7:42:13 AM

C:\Users\rabelson\Documents\EAST\Workspaces\16682854.wsp

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the **PATENT APPLICATION** of:

Intellectual Ventures II LLC

Application No.: 16/682,854

Confirmation No.: 1678

Filed: November 13, 2019

For: COMMUNICATIONS IN A
WIRELESS NETWORK

Group: 2476

Examiner: Ronald B. Abelson

Our File:

IPW2-USCN213316

Date: January 20, 2021

RESPONSE PURSUANT TO 37 C.F.R. §1.111

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

This Response is being timely filed in response to the Non-Final Office Action
dated October 21, 2020.

Please amend the application without prejudice or disclaimer as follows:

Electronic Acknowledgement Receipt	
EFS ID:	41693552
Application Number:	16682854
International Application Number:	
Confirmation Number:	1678
Title of Invention:	COMMUNICATIONS IN A WIRELESS NETWORK
First Named Inventor/Applicant Name:	Paul Howard
Customer Number:	3624
Filer:	John D. Wilt/Caren Burgoon
Filer Authorized By:	John D. Wilt
Attorney Docket Number:	IPW2-USCN213316
Receipt Date:	20-JAN-2021
Filing Date:	13-NOV-2019
Time Stamp:	15:37:14
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		IPW2_USCN213316_NFOAReply_20210120.pdf	152574 a4ac4fc02e97bc9364ed0bdeac9c81978a8bd915	yes	17

	Multipart Description/PDF files in .zip description		
	Document Description	Start	End
	Applicant Arguments/Remarks Made in an Amendment	10	17
	Claims	2	9
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
Warnings:			
Information:			
Total Files Size (in bytes):		152574	
<p>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.</p> <p><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.</p> <p><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.</p> <p><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.</p>			

Applicant: Intellectual Ventures II LLC

Application No.: 16/682,854

REMARKS/ARGUMENTS

After the foregoing Amendment, claims 1-24 are currently pending in this application. Claims 1, 7, 13, and 19 are amended.

Support for the amendments can be found throughout the specification, in particular, at least paragraphs [0028]–[0031] of the U.S. Patent Publication 2020/0083952 A1. No new matter has been added.

Applicant respectfully requests the entry of the amendments and reconsideration of the application in view of the amendments and the remarks below.

Claim Rejections - 35 U.S.C. §103

Claims 1, 2, 6-8, 12-14, 18-20, and 24 are rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over Japanese Patent Publication No. JP 2005-346319 (for translation see US Patent Publication No. 2007/0265017) to Ishii (hereinafter “Ishii”) in view of U.S. Patent Publication No. 2002/0077151) to Matthews (hereinafter “Matthews”), U.S. Patent Publication No. 2004/0022213 to Choi (hereinafter “Choi”), and U.S. Patent Publication No. 2004/0170132 to Shin (hereinafter “Shin”), and U.S. Patent Publication No. 2005/0058103 to Jeong (hereinafter “Jeong”).

Applicant respectfully traverses the §103 rejection and submits that independent claim 1 recites features not taught, suggested, or otherwise yielded by

Applicant: Intellectual Ventures II LLC

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any proper combination of the cited references. Accordingly, the Applicant submits that the amended claims are patentable for at least the following reasons:

For example, claim 1, as amended, herein recites, in part:

...wherein the uplink physical signal is used to determine channel conditions by a base station and in the same time interval that the uplink physical signal is sent, a plurality of UEs transmit uplink physical signals in the same time interval; and

the receiver and the processor are further configured to receive, on a physical control channel, control information, wherein the control information is based on the determined channel conditions, wherein physical control channels are transmitted in a same time slot with other physical channels in a plurality of predetermined time slots in a downlink frame, wherein other time slots of the downlink frame do not include a physical control channel, wherein a number of bits sent over the physical control channel is based on a number of fields of control information to be sent to the UE.

None of the cited references teach or suggest that the uplink physical signal is used to determine channel conditions by a base station in the same time interval that the uplink physical signal is sent, a plurality of UEs transmit uplink physical signals in the same time interval and wherein a number of bits sent over the physical control channel is based on a number of fields of control information to be sent to the UE.

Ishii discloses a call admission control device in a communication system for transmitting a packet to a plurality of mobile stations. Further, the call admission of a new mobile station is controlled based on at least one of a number and a ratio of mobile stations that cannot satisfy a predetermined minimum transmission data rate in the plurality of mobile stations. However, Ishii fails to disclose, teach, or suggest,

Applicant: Intellectual Ventures II LLC

Application No.: 16/682,854

that the uplink physical signal is used to determine channel conditions by a base station and in the same time interval that the uplink physical signal is sent, a plurality of UEs transmit uplink physical signals in the same time interval and wherein a number of bits sent over the physical control channel is based on a number of fields of control information to be sent to the UE.

Matthew discloses a plurality of nanoCell base stations that provide radio connectivity among mobile stations. Further, the plurality of nanoCell base stations includes a plurality of transceivers that provides base station functionality via a controller for managing the transceivers, and determining the communications connectivity paths between base station and mobile station functions. However, Matthew fails to disclose, teach, or suggest the uplink physical signal is used to determine channel conditions by a base station in the same time interval that the uplink physical signal is sent, a plurality of UEs transmit uplink physical signals in the same time interval and wherein a number of bits sent over the physical control channel is based on a number of fields of control information to be sent to the UE.

Choi discloses an apparatus for determining channel quality indicator (CQI) report cycles for user equipments (UEs). The Node B receives CQI information from the UEs receiving a high-speed downlink packet access (HSDPA) service. The Node B determines recommended CQI report cycles based on the number of UEs and the CQI information, and transmits the determined recommended CQI report cycles to the SRNC via the CRNC. The SRNC then determines CQI report cycles for the UEs

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referring to the recommended CQI report cycles, and transmits the determined CQI report cycles to the UEs and the Node B. However, Choi fails to disclose, teach, or suggest that the uplink physical signal is used to determine channel conditions by a base station in the same time interval that the uplink physical signal is sent, a plurality of UEs transmit uplink physical signals in the same time interval and wherein a number of bits sent over the physical control channel is based on a number of fields of control information to be sent to the UE. Determining and transmitting a CQI value to the Node B which then determines an MCS level is not the same as determining channel conditions by a base station in the same time interval that the uplink physical signal is sent, a plurality of UEs transmit uplink physical signals in the same time interval.

Shin discloses a method of determining uplink power requirements for a transceiver in a wireless communication system that includes obtaining measurements from a beacon signal occupying a first timeslot in a frame; obtaining measurements from at least one additional channel having a known transmitted signal strength and occupying a second timeslot in the frame; and utilizing the measurements to determine a path loss estimate. However, Shin fails to disclose, teach, or suggest the uplink physical signal is used to determine channel conditions by a base station in the same time interval that the uplink physical signal is sent, a plurality of UEs transmit uplink physical signals in the same time interval and wherein a number of bits sent over the physical control channel is based on a number

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of fields of control information to be sent to the UE. Identifying physical channels in a time slot in a frame that does not include a physical control channel is not the same as wherein other time slots of the downlink frame do not include a physical control channel, wherein a number of bits sent over the physical control channel is based on a number of fields of control information to be sent to the UE.

Jeong discloses a method for a UE to detect active channelization codes including channelization codes used by other UEs which are different from at least one channelization code assigned to the UE. Further, for transmission/reception to/from a Node B in an assigned time slot in a mobile communication system, where each of time slots of a radio channel frame is identified by a plurality of code channels, each having a unique channelization code. However, Jeong fails to disclose, teach, or suggest that the uplink physical signal is used to determine channel conditions by a base station in the same time interval that the uplink physical signal is sent, a plurality of UEs transmit uplink physical signals in the same time interval and wherein a number of bits sent over the physical control channel is based on a number of fields of control information to be sent to the UE. The Examiner alleges on page 7 of the OA that, “Jeong teaches physical control channels are transmitted in a same time slot with other physical channels in a plurality of predetermined time slots in a downlink frame (When one UE occupies all physical channels in one downlink time slot, or a plurality of UEs share all the physical channels in one downlink time slot, [0035]).” We respectfully disagree with this assumption since we believe this is a

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unicast transmission or a multicast transmission, respectfully. However, the claim was amended to include, “wherein other time slots of the downlink frame do not include a physical control channel, wherein a number of bits sent over the physical control channel is based on a number of fields of control information to be sent to the UE.

Accordingly, Applicant’s amended independent claim 1 is patentable over the Ishii, Matthew, Choi, Shins, and Jeong references, whether taken alone or in combination with one another. Although not identical, Applicant’s amended and independent claims 7, 13, and 19 recite features similar to Applicant’s amended independent claim 1, and are therefore patentable over the cited art of record for at least the same reasons provided above.

Claims 3, 9, 15, and 21 are rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over the combination as applied to claim 1 above, and further in view of U.S. Patent Publication No. 2002/0172208 to Malkamaki (hereinafter “Malkamaki”).

Malkamaki discloses a HARQ process with a modification that allows in-sequence delivery of protocol data units (PDUs) to the radio link control layer (RLC) of the receiving wireless terminal. However, Malkamaki fails to disclose, teach, or suggest the uplink physical signal is used to determine channel conditions by a base station and in the same time interval that the uplink physical signal is sent, a

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plurality of UEs transmit uplink physical signals in the same time interval and wherein a number of bits sent over the physical control channel is based on a number of fields of control information to be sent to the UE.

Claims 4, 5, 10, 11, 16, 17, 22, and 23 are rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over the combination as applied to claim 1 above, and further in view of U.S. Patent Publication No. 2008/0144600 to Anderson (hereinafter “Anderson”).

Anderson discloses a method of sending user equipment specific information to a plurality of user equipment to maximize channel efficiency. However, Anderson fails to disclose, teach, or suggest, wherein physical control channels that are transmitted in a same time slot with other physical channels in a plurality of predetermined time slots in a downlink frame, wherein other time slots of the downlink frame do not include a physical control channel. Therefore, Anderson does not cure the deficiencies of Ishii, Matthew, Choi, Shins, and Jeong. Based on the arguments presented above, withdrawal of the 35 U.S.C. §103 rejection of claims 4, 5, 10, 11, 16, 17, 22 and 23 is respectfully requested.

Claims 2-6, 8-12, 14-18, and 20-24 are dependent upon claims 1, 7, 13, and 19, and the Applicant believes that these claims are allowable over the cited references of record for the same reasons provided above.

Based on the arguments presented above, withdrawal of the 35 U.S.C. §103 rejections of claims 1-24 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, including claim 1-24, is in condition for allowance and a notice to that effect is respectfully requested.

Respectfully submitted,

Intellectual Ventures II LLC

By /John D. Wilt/

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JDW/cb

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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 user equipment (UE) comprising:

a receiver and a processor are configured to receive resource allocation information associated with an uplink physical signal, wherein the uplink physical signal and a physical uplink shared channel have different resources;

a transmitter and the processor are configured to send, over the physical uplink shared channel, data in assigned time intervals;

the transmitter and the processor are further configured, in a time interval that it is not sending information over the physical uplink shared channel, to send the uplink physical signal based on the received resource allocation information, wherein the uplink physical signal is used to determine channel conditions by a base station and in the same time interval that the uplink physical signal is sent, a plurality of UEs transmit uplink physical signals in the same time interval; and

the receiver and the processor are further configured to receive, on a physical control channel, control information, wherein the control information is based on the determined channel conditions, wherein physical control channels are transmitted in a same time slot with other physical channels in a plurality of predetermined time slots in a downlink frame, wherein other time slots of the downlink frame do not include a physical control channel, wherein a number of bits sent over the physical

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control channel is based on a number of fields of control information to be sent to the UE.

2. (Original) The UE of claim 1, wherein the receiver and the processor are further configured to receive data on a physical downlink shared channel.

3. (Previously Presented) The UE of claim 2, wherein the physical control channel and the physical downlink shared channel are time multiplexed.

4. (Previously Presented) The UE of claim 1, wherein the receiver and the processor are further configured to receive, on the physical control channel, power control information.

5. (Previously Presented) The UE of claim 4, wherein the physical control channel includes power control information for a plurality of UEs using different bits.

6. (Original) The UE of claim 1, wherein in the time interval that the uplink physical signal is sent by the UE, a plurality of UEs each transmit on respective uplink physical control channels in the time interval.

7. (Currently Amended) A network device comprising:

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a transmitter and a processor are configured to transmit resource allocation information associated with an uplink physical signal, wherein the uplink physical signal and a physical uplink shared channel have different resources;

a receiver and the processor are further configured to receive, over the physical uplink shared channel, data in assigned time intervals;

the receiver and the processor are further configured, in a time interval that it is not receiving information over the physical uplink shared channel, to receive the uplink physical signal based on the transmitted resource allocation information, wherein the uplink physical signal is used to determine channel conditions by the network device and in the same time interval that the uplink physical signal is sent, a plurality of UEs transmit uplink physical signals in the same time interval; and

the transmitter and the processor are further configured to transmit, on a physical control channel, control information, wherein the control information is based on the determined channel conditions, wherein physical control channels are transmitted in a same time slot with other physical channels in a plurality of predetermined time slots in a downlink frame, wherein other time slots of the downlink frame do not include a physical control channel, wherein a number of bits sent over the physical control channel is based on a number of fields of control information to be sent to the UE.

8. (Original) The network device of claim 7, wherein the transmitter and the

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processor are further configured to transmit data on a physical downlink shared channel.

9. (Previously Presented) The network device of claim 8, wherein the physical control channel and the physical downlink shared channel are time multiplexed.

10. (Previously Presented) The network device of claim 7, wherein the transmitter and the processor are further configured to transmit, on the physical control channel, power control information.

11. (Previously Presented) The network device of claim 10, wherein the physical control channel includes power control information for a plurality of UEs using different bits.

12. (Original) The network device of claim 7, wherein in the time interval that the uplink physical signal is received by the network device, signals are received on other uplink physical control channels in the time interval from a plurality of UEs.

13. (Currently Amended) A method performed by user equipment (UE), the method comprising:

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receiving resource allocation information associated with an uplink physical signal, wherein the uplink physical signal and a physical uplink shared channel have different resources;

sending, over the physical uplink shared channel, data in assigned time intervals;

sending, in a time interval that it is not sending information over the physical uplink shared channel, the uplink physical signal based on the received resource allocation information, wherein the uplink physical signal is used to determine channel conditions by a base station and in the same time interval that the uplink physical signal is sent, a plurality of UEs transmit uplink physical signals in the same time interval; and

receiving, on a physical control channel, control information, wherein the control information is based on the determined channel conditions, wherein physical control channels are transmitted in a same time slot with other physical channels in a plurality of predetermined time slots in a downlink frame, wherein other time slots of the downlink frame do not include a physical control channel, wherein a number of bits sent over the physical control channel is based on a number of fields of control information to be sent to the UE.

14. (Original) The method of claim 13 further comprising receiving data on a physical downlink shared channel.

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15. (Previously Presented) The method of claim 14, wherein the physical control channel and the physical downlink shared channel are time multiplexed.

16. (Previously Presented) The method of claim 13 further comprising receiving, on the physical control channel, power control information.

17. (Previously Presented) The method of claim 16, wherein the physical control channel includes power control information for a plurality of UEs using different bits.

18. (Original) The method of claim 13, wherein in the time interval that the uplink physical signal is sent by the UE, a plurality of UEs each transmit on respective uplink physical control channels in the time interval.

19. (Currently Amended) A method performed by a network device, the method comprising:

transmitting resource allocation information associated with an uplink physical signal, wherein the uplink physical signal and a physical uplink shared channel have different resources;

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receiving, over the physical uplink shared channel, data in assigned time intervals;

receiving, in a time interval that it is not receiving information over the physical uplink shared channel, the uplink physical signal based on the transmitted resource allocation information, wherein the uplink physical signal is used to determine channel conditions by the network device in the same time interval that the uplink physical signal is sent, a plurality of UEs transmit uplink physical signals in the same time interval; and

transmitting, on a physical control channel, control information, wherein the control information is based on the determined channel conditions, wherein physical control channels are transmitted in a same time slot with other physical channels in a plurality of predetermined time slots in a downlink frame, wherein other time slots of the downlink frame do not include a physical control channel, wherein a number of bits sent over the physical control channel is based on a number of fields of control information to be sent to the UE.

20. (Original) The method of claim 19 further comprising transmitting data on a physical downlink shared channel.

21. (Previously Presented) The method of claim 20, wherein the physical control channel and the physical downlink shared channel are time multiplexed.

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22. (Previously Presented) The method of claim 19 further comprising transmitting, on the physical control channel, power control information.

23. (Previously Presented) The method of claim 22, wherein the physical control channel includes power control information for a plurality of UEs using different bits.

24. (Original) The method of claim 19, wherein in the time interval that the uplink physical signal is received by the network device, signals are received on other uplink physical control channels in the time interval from a plurality of UEs.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875				Application or Docket Number 16/682,854		Filing Date 11/13/2019		☐ To be Mailed			
ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO											
APPLICATION AS FILED - PART I											
		(Column 1)		(Column 2)							
FOR		NUMBER FILED		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	01/20/2021	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR		PRESENT EXTRA		RATE (\$)		ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(j))	* 24	Minus	** 24	= 0	x \$100 =		0			
	Independent (37 CFR 1.16(h))	* 4	Minus	*** 4	= 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(j))	*	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".								/LAMONT N MCLAUCHLIN/			
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".											
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.											

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/682,854	11/13/2019	Paul Howard	IPW2-USCN213316	1678
3624	7590	10/21/2020		
Volpe Koenig 30 SOUTH 17TH STREET, 18TH FLOOR PHILADELPHIA, PA 19103			EXAMINER ABELSON, RONALD B	
			ART UNIT	PAPER NUMBER
			2476	
			NOTIFICATION DATE	DELIVERY MODE
			10/21/2020	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):

eooffice@volpe-koenig.com

Notice of Pre-AIA or AIA Status

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

Claim Rejections - 35 USC § 103

2. 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 negated by the manner in which the invention was made.

3. Claims 1, 2, 6-8, 12-14, 18-20, and 24 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Ishii JP 2005-346319 (for translation see US 20070265017) in view of Matthews US 20020077151, Choi US 20040022213, and Shin US 20040170132, and Jeong US 20050058103.

Regarding claims 1, 7, 13, and 19, Ishii teaches a user equipment (UE) comprising:

a receiver and processor are configured to receive resource allocation information associated with an uplink physical control channel (uplink control channel, [0207]), wherein the

uplink physical control channel and a physical uplink shared channel / PUSCH have different resources;

a transmitter and the processor are configured to send, over the physical uplink shared channel, data in assigned time intervals (uplink control channel can be one of two types, a channel to be time-multiplexed with physical uplink shared channel PUSCH and a channel to be frequency-multiplexed with it, [0207])).

Although Ishii teaches time multiplexing the uplink physical control channel and a physical uplink shared channel / PUSCH, the reference is silent on the transmitter and processor are further configured, in a time interval that it is not sending information over the physical uplink shared channel, to send the uplink physical signal based on the received resource allocation information. The Examiner interprets this limitation to be dynamically allocating the time slots for transmitting the uplink physical control channel and a physical uplink shared channel based on received resource allocation information transmitted from the network.

Matthews teaches dynamically allocating control channels on uplink time slots (control channels dynamically allocated on uplink and downlink frequencies, time slots and code

channels, [0074]) based on received resource allocation information transmitted from the network (primary base station subsystem provides principle interface between base station controller and radio network, commands from base station controller interface used to configure primary base station, frequency, time slot and code channel allocation are based on commands received through the base station controller interface, [0084])).

Therefore it would have been obvious to one of ordinary skill in the art, to modify the system of Ishii by the transmitter and processor are further configured, in a time interval that it is not sending information over the physical uplink shared channel, to send the uplink physical signal based on the received resource allocation information, as suggested by Matthews. This modification would benefit the system by efficiently using bandwidth.

The combination is silent on wherein the uplink physical signal is used to determine channel conditions by a base station; and

the receiver and the processor are further configured to receive, on a downlink control channel, control information,

wherein the control information is based on the determined channel conditions.

Choi teaches wherein the uplink physical signal is used to determine channel conditions by a base station; and

the receiver and the processor are further configured to receive, on a downlink control channel, control information, wherein the control information is based on the determined channel conditions (It is possible to estimate a variation rate of a [REDACTED] by determining a Doppler frequency using a pilot signal of an [REDACTED] (UL DPCCH) or an HS-DPCCH signal received from a UE, [0126], Upon receiving a [REDACTED] channel signal, a UE must measure channel quality (CQ) of the received [REDACTED] channel signal, and report the measured channel quality to a Node B. The Node B then receives the channel quality information from the UE, determines an MCS level of an HS-DSCH over which data is actually transmitted to the UE according to the received channel quality information, and creates transport format and resource related information (TFRI), i.e., HS-DSCH [REDACTED] information, [0010]).

Therefore it would have been obvious to one of ordinary skill in the art, to modify the system of the combination by the uplink physical signal is used to determine channel conditions by a base station; and the receiver and the processor are

further configured to receive, on a downlink control channel, control information, wherein the control information is based on the determined channel conditions, as shown by Choi. This modification would benefit the system by providing a means for the UEs to receive control information based on the current channel conditions.

Although Ishii teaches a downlink physical control channel (HS-PDSCH, [0079], PDSCH, [0207], the reference is silent on wherein physical control channels are transmitted with other physical channels in a plurality of predetermined time slots in a downlink frame, wherein other time slots of the downlink frame do not include a physical control channel.

Shin teaches wherein physical control channels are transmitted with other physical channels in a plurality of predetermined time slots in a downlink frame, wherein other time slots of the downlink frame do not include a physical control channel (fig. 1, [0019, 0022]).

Therefore it would have been obvious to one of ordinary skill in the art, to modify the system of the combination by wherein physical control channels are transmitted with other physical channels in a plurality of predetermined time slots in a downlink frame, wherein other time slots of the downlink frame do not include a physical control channel, as shown by Shin.

This modification would benefit the system by simultaneously transmit the PDSCH and beacon.

The combination is silent on the physical control channels are transmitted in a same time slot with other physical channels in a plurality of predetermined time slots in a downlink frame.

Jeong teaches the physical control channels are transmitted in a same time slot with other physical channels in a plurality of predetermined time slots in a downlink frame (When one UE occupies all physical channels in one downlink ~~time slot~~, ~~the physical control channels are transmitted in a same time slot with other physical channels in a plurality of predetermined time slots in a downlink frame~~ all physical channels in one downlink time slot, [0035]).

Therefore it would have been obvious to one of ordinary skill in the art, to modify the system of the combination by the physical control channels are transmitted in a same time slot with other physical channels in a plurality of predetermined time slots in a downlink frame, as shown by Jeong. This modification would benefit the system since using a single time slot to transmit information for a plurality of physical channels is an efficient use of the time slots.

Regarding claims 2, 8, 14, and 20, the processor is further configured to receive data on a physical downlink shared channel (Ishii: PDSCH, [0207]).

Regarding claims 6, 12, 18, and 24, in the time interval that the uplink physical signal is sent by the UE, a plurality of UEs each transmit on respective uplink physical control channels in the time interval (Ishii: (uplink control channel can be one of two types, a channel to be time-multiplexed with physical uplink shared channel PUSCH and a channel to be frequency-multiplexed with it, [0207])).

4. Claims 3, 9, 15, and 21 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over the combination as applied to claim 1 above, and further in view of Malkamaki US 20020172208.

The combination is silent on the downlink control channel and the physical downlink shared channel are time multiplexed.

Malkamaki teaches the downlink control channel and the physical downlink shared channel are time multiplexed (The shared control channel could be sent as a separate code

channel (i.e. it could be code multiplexed) or could be sent using the same code channels as the HS-PDSCH (i.e. it could be time multiplexed with the HS-PDSCH, [0008])).

Therefore it would have been obvious to one of ordinary skill in the art, to modify the system of the combination by the downlink control channel and the physical downlink shared channel are time multiplexed, as shown by Malkamaki. This modification would benefit the system by since time multiplexing allows for an efficient use of system resources.

5. Claims 4, 5, 10, 11, 16, 17, 22, and 23 rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over the combination as applied to claim 1 above, and further in view of Anderson US 20080144600.

Regarding claims 4, 10, 16, and 22, although Ishii teaches PLCCH, the reference is silent on the receiver and processor is further configured to receive, on the physical control channel, power control information.

Anderson teaches the receiver and processor is further configured to receive, on the physical control channel, power control information (PLCCH implemented for communication of TPC and SS data, transmission comprising TPC and SS data bits for plurality of UEs, [0131])).

Therefore it would have been obvious to one of ordinary skill in the art, to modify the system of the combination by the receiver and processor is further configured to receive, on the physical control channel, power control information, as shown by Anderson. This modification would benefit the system by providing an proven, reliable method for sending power control information.

Regarding claims 5, 11, 17, and 23, the physical control channel includes power control information for a plurality of UEs using different bits (Anderson: PLCCH implemented for communication of TPC and SS data, transmission comprising TPC and SS data bits for plurality of UEs, [0131]).

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to RONALD B ABELSON whose telephone number is (571)272-3165. The examiner can normally be reached on M-F 8:00-4:30.

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, Ayaz Sheikh can be reached on 571-272-3795. 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.

/RONALD B ABELSON/
Primary Examiner, Art Unit 2476

Application/Control Number: 16/682,854
Art Unit: 2476

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<i>Notice of References Cited</i>	Application/Control No. 16/682,854	Applicant(s)/Patent Under Reexamination Howard, Paul	
	Examiner RONALD B ABELSON	Art Unit 2476	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
	A	20050058103	03-2005	Jeong	H04H 7/216	
	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.

U.S. Patent and Trademark Office
PTO-892 (Rev. 01-2001)

Notice of References Cited

Part of Paper No. 20201015

<i>Search Notes</i> 	Application/Control No. 16/682,854	Applicant(s)/Patent Under Reexamination Howard, Paul
	Examiner RONALD B ABELSON	Art Unit 2476

CPC - Searched*		
Symbol	Date	Examiner
h04b7/2643	10/16/2020	RA
h04j3/1694	10/16/2020	RA
h04l5/0053	10/16/2020	RA
h04w52/146 h04w72/0406 h04w72/042 h04w72/0446	10/16/2020	RA

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
CPC combined with limited text search in EAST	10/16/2020	RA

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

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<i>Index of Claims</i> 	Application/Control No. 16/682,854	Applicant(s)/Patent Under Reexamination Howard, Paul
	Examiner RONALD B ABELSON	Art Unit 2476

✓	Rejected
=	Allowed

-	Cancelled
÷	Restricted

N	Non-Elected
I	Interference

A	Appeal
O	Objected

CLAIMS										
☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47										
CLAIM		DATE								
Final	Original	01/25/2020	06/25/2020	10/16/2020						
	1	✓	✓	✓						
	2	✓	✓	✓						
	3	✓	✓	✓						
	4	✓	✓	✓						
	5	✓	✓	✓						
	6	✓	✓	✓						
	7	✓	✓	✓						
	8	✓	✓	✓						
	9	✓	✓	✓						
	10	✓	✓	✓						
	11	✓	✓	✓						
	12	✓	✓	✓						
	13	✓	✓	✓						
	14	✓	✓	✓						
	15	✓	✓	✓						
	16	✓	✓	✓						
	17	✓	✓	✓						
	18	✓	✓	✓						
	19	✓	✓	✓						
	20	✓	✓	✓						
	21	✓	✓	✓						
	22	✓	✓	✓						
	23	✓	✓	✓						
	24	✓	✓	✓						

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	16/682,854	Filing Date	2019-11-13	Docket Number (if applicable)	IPW2-USCN213316	Art Unit	2476
First Named Inventor	Paul Howard			Examiner Name	Ronald B. Abelson		
This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application. Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV							
SUBMISSION REQUIRED UNDER 37 CFR 1.114							
Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).							
☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.							
☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____							
☐ Other _____							
☒ Enclosed							
☒ Amendment/Reply							
☐ Information Disclosure Statement (IDS)							
☐ Affidavit(s)/ Declaration(s)							
☐ Other _____							
MISCELLANEOUS							
☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____ (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)							
☐ Other _____							
FEES							
The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.							
☒ The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No <u>220493</u>							
SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED							
☒ Patent Practitioner Signature							
☐ Applicant Signature							

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.

Signature of Registered U.S. Patent Practitioner			
Signature	/John D. Wilt/	Date (YYYY-MM-DD)	2020-10-01
Name	John D. Wilt	Registration Number	76110

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

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

Privacy Act Statement

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

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

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

Electronic Patent Application Fee Transmittal				
Application Number:		16682854		
Filing Date:		13-Nov-2019		
Title of Invention:		COMMUNICATIONS IN A WIRELESS NETWORK		
First Named Inventor/Applicant Name:		Paul Howard		
Filer:		John D. Wilt/Caren Burgoon		
Attorney Docket Number:		IPW2-USCN213316		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

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

Electronic Acknowledgement Receipt	
EFS ID:	40735146
Application Number:	16682854
International Application Number:	
Confirmation Number:	1678
Title of Invention:	COMMUNICATIONS IN A WIRELESS NETWORK
First Named Inventor/Applicant Name:	Paul Howard
Customer Number:	3624
Filer:	John D. Wilt/Caren Burgoon
Filer Authorized By:	John D. Wilt
Attorney Docket Number:	IPW2-USCN213316
Receipt Date:	01-OCT-2020
Filing Date:	13-NOV-2019
Time Stamp:	14:41:23
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$1300
RAM confirmation Number	E202001E42520680
Deposit Account	220493
Authorized User	Caren Burgoon
<p>The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:</p> <p>37 CFR 1.16 (National application filing, search, and examination fees)</p> <p>37 CFR 1.17 (Patent application and reexamination processing fees)</p>	

37 CFR 1.19 (Document supply fees) 37 CFR 1.20 (Post Issuance fees) 37 CFR 1.21 (Miscellaneous fees and charges)					
File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		IPW2_USCN213316_FOAReply_20201001.pdf	141063 b31e10ba9ae475236a5dca5a6821a0fd718b231b	yes	14
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Response After Final Action		1	1	
	Claims		2	8	
	Applicant Arguments/Remarks Made in an Amendment		9	14	
Warnings:					
Information:					
2	Request for Continued Examination (RCE)	IPW2_USCN213316_RCE_20201001.pdf	45964 8622a930a5fe06eb8697b24a02c79d7275cd60	no	3
Warnings:					
This is not a USPTO supplied RCE SB30 form.					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30461 7694e26635282a5de0ed4b4d3f9290b87428619e	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			217488		

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:

Intellectual Ventures II LLC

Application No.: 16/682,854

Confirmation No.: 1678

Filed: November 13, 2019

For: COMMUNICATIONS IN A WIRELESS
NETWORK

Group: 2476

Examiner: Ronald B. Abelson

Our File: IPW2-USCN213316

Date: October 1, 2020

RESPONSE PURSUANT TO 37 C.F.R. § 1.114

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

This Response is being timely filed in response to the Final Office Action (hereinafter "FOA") dated July 1, 2020. A Request for Continued Examination (RCE) is filed concurrently herewith.

Please amend the application without prejudice or disclaimer as follows:

Amendments to the Claims:

This listing of the claims will replace all prior versions of the claims in the application:

1. (Currently Amended) A user equipment (UE) comprising:

a receiver and a processor are configured to receive resource allocation information associated with an uplink physical signal, wherein the uplink physical signal and a physical uplink shared channel have different resources;

a transmitter and the processor are configured to send, over the physical uplink shared channel, data in assigned time intervals;

the transmitter and the processor are further configured, in a time interval that it is not sending information over the physical uplink shared channel, to send the uplink physical signal based on the received resource allocation information, wherein the uplink physical signal is used to determine channel conditions by a base station; and

the receiver and the processor are further configured to receive, on a physical control channel, control information, wherein the control information is based on the determined channel conditions, wherein physical control channels are transmitted in a same time slot with other physical channels in a plurality of predetermined time slots in a downlink frame, wherein other time slots of the downlink frame do not include a physical control channel.

2. (Original) The UE of claim 1, wherein the receiver and the processor are further configured to receive data on a physical downlink shared channel.

3. (Previously Presented) The UE of claim 2, wherein the physical control channel and the physical downlink shared channel are time multiplexed.

4. (Previously Presented) The UE of claim 1, wherein the receiver and the processor are further configured to receive, on the physical control channel, power control information.

5. (Previously Presented) The UE of claim 4, wherein the physical control channel includes power control information for a plurality of UEs using different bits.

6. (Original) The UE of claim 1, wherein in the time interval that the uplink physical signal is sent by the UE, a plurality of UEs each transmit on respective uplink physical control channels in the time interval.

7. (Currently Amended) A network device comprising:

a transmitter and a processor are configured to transmit resource allocation information associated with an uplink physical signal, wherein the uplink physical signal and a physical uplink shared channel have different resources;

a receiver and the processor are further configured to receive, over the physical uplink shared channel, data in assigned time intervals;

the receiver and the processor are further configured, in a time interval that it is not receiving information over the physical uplink shared channel, to receive the uplink physical signal based on the transmitted resource allocation information, wherein the uplink physical signal is used to determine channel conditions by the network device; and

the transmitter and the processor are further configured to transmit, on a physical control channel, control information, wherein the control information is based on the determined channel conditions, wherein physical control channels are transmitted in a same time slot with other physical channels in a plurality of predetermined time slots in a downlink frame, wherein other time slots of the downlink frame do not include a physical control channel.

8. (Original) The network device of claim 7, wherein the transmitter and the processor are further configured to transmit data on a physical downlink shared channel.

9. (Previously Presented) The network device of claim 8, wherein the physical control channel and the physical downlink shared channel are time multiplexed.

10. (Previously Presented) The network device of claim 7, wherein the transmitter and the processor are further configured to transmit, on the physical control channel, power control information.

11. (Previously Presented) The network device of claim 10, wherein the physical control channel includes power control information for a plurality of UEs using different bits.

12. (Original) The network device of claim 7, wherein in the time interval that the uplink physical signal is received by the network device, signals are received on other uplink physical control channels in the time interval from a plurality of UEs.

13. (Currently Amended) A method performed by user equipment (UE), the method comprising:

receiving resource allocation information associated with an uplink physical signal, wherein the uplink physical signal and a physical uplink shared channel have different resources;

sending, over the physical uplink shared channel, data in assigned time intervals;

sending, in a time interval that it is not sending information over the physical uplink shared channel, the uplink physical signal based on the received resource allocation information, wherein the uplink physical signal is used to determine channel conditions by a base station; and

receiving, on a physical control channel, control information, wherein the control information is based on the determined channel conditions, wherein physical control channels are transmitted in a same time slot with other physical channels in a plurality of predetermined time slots in a downlink frame, wherein other time slots of the downlink frame do not include a physical control channel.

14. (Original) The method of claim 13 further comprising receiving data on a physical downlink shared channel.

15. (Previously Presented) The method of claim 14, wherein the physical control channel and the physical downlink shared channel are time multiplexed.

16. (Previously Presented) The method of claim 13 further comprising receiving, on the physical control channel, power control information.

17. (Previously Presented) The method of claim 16, wherein the physical control channel includes power control information for a plurality of UEs using different bits.

18. (Original) The method of claim 13, wherein in the time interval that the uplink physical signal is sent by the UE, a plurality of UEs each transmit on respective uplink physical control channels in the time interval.

19. (Currently Amended) A method performed by a network device, the method comprising:

transmitting resource allocation information associated with an uplink physical signal, wherein the uplink physical signal and a physical uplink shared channel have different resources;

receiving, over the physical uplink shared channel, data in assigned time intervals;

receiving, in a time interval that it is not receiving information over the physical uplink shared channel, the uplink physical signal based on the transmitted resource allocation information, wherein the uplink physical signal is used to determine channel conditions by the network device; and

transmitting, on a physical control channel, control information, wherein the control information is based on the determined channel conditions, wherein physical

control channels are transmitted in a same time slot with other physical channels in a plurality of predetermined time slots in a downlink frame, wherein other time slots of the downlink frame do not include a physical control channel.

20. (Original) The method of claim 19 further comprising transmitting data on a physical downlink shared channel.

21. (Previously Presented) The method of claim 20, wherein the physical control channel and the physical downlink shared channel are time multiplexed.

22. (Previously Presented) The method of claim 19 further comprising transmitting, on the physical control channel, power control information.

23. (Previously Presented) The method of claim 22, wherein the physical control channel includes power control information for a plurality of UEs using different bits.

24. (Original) The method of claim 19, wherein in the time interval that the uplink physical signal is received by the network device, signals are received on other uplink physical control channels in the time interval from a plurality of UEs.

REMARKS/ARGUMENTS

After the foregoing Amendment, claims 1-24 are currently pending in this application. Claims 1, 7, 13, and 19 are amended.

Support for the amendments can be found in at least paragraph [0034] and FIG 2 shown below of the U.S. Patent Publication 2020/0083952 A1. No new matter has been added.

Applicant respectfully requests the entry of the amendments and reconsideration of the application in view of the amendments and the remarks below.

Claim Rejections - 35 U.S.C. § 103

Claims 1, 2, 6, 7, 8, 12, 13, 14, 18, 19, 20, and 24 are rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over JP Publication No. 2005-346319 (for translation US 2007-0265017) to Ishii et al. (hereinafter “Ishii”) in view of U.S. Publication No. 2002-0077151 to Matthews (hereinafter “Matthews”), U.S. Publication No. 2004-0022213 to Choi (hereinafter “Choi”) and U.S. Publication No. 2004-0170132 to Shin (hereinafter “Shin”).

Applicant respectfully traverses the §103 rejections and submits that independent claim 1 recites features not taught, suggested, or otherwise yielded by any proper combination of the cited references. Accordingly, the Applicant submits that the amended claims are patentable for at least the following reasons:

For example, claim 1, as amended, herein recites, in part:

...wherein the control information is based on the determined channel conditions, wherein physical control channels are transmitted in a same time slot with other physical channels in a plurality of predetermined time slots in a downlink frame, wherein other time slots of the downlink frame do not include a physical control channel.

None of the cited references teach or suggest wherein physical control channels are transmitted in a same time slot with other physical channels in a plurality of predetermined time slots in a downlink frame, wherein other time slots of the downlink frame do not include a physical control channel.

Ishii discloses a call admission control device in a communication system for transmitting a packet to a plurality of mobile stations. Further, the call admission of a new mobile station is controlled based on at least one of a number and a ratio of mobile stations that cannot satisfy a predetermined minimum transmission data rate in the plurality of mobile stations. However, Ishii fails to disclose, teach, or suggest, wherein physical control channels are transmitted in a same time slot with other physical channels in a plurality of predetermined time slots in a downlink frame, wherein other time slots of the downlink frame do not include a physical control channel. Ishii discloses only transmission time intervals (TTIs).

Matthew discloses a plurality of nanoCell base stations that provide radio connectivity among mobile stations. Further, the plurality of nanoCell base stations includes a plurality of transceivers that provides base station functionality via a controller for managing the transceivers, and determining the communications

connectivity paths between base station and mobile station functions. However, Matthew fails to disclose, teach, or suggest, wherein physical control channels are transmitted in a same time slot with other physical channels in a plurality of predetermined time slots in a downlink frame, wherein other time slots of the downlink frame do not include a physical control channel.

Choi discloses an apparatus for determining channel quality indicator (CQI) report cycles for user equipments (UEs). The Node B receives CQI information from the UEs receiving a high-speed downlink packet access (HSDPA) service. The Node B determines recommended CQI report cycles based on the number of UEs and the CQI information, and transmits the determined recommended CQI report cycles to the SRNC via the CRNC. The SRNC then determines CQI report cycles for the UEs referring to the recommended CQI report cycles, and transmits the determined CQI report cycles to the UEs and the Node B. However, Choi fails to disclose, teach, or suggest, wherein physical control channels are transmitted in a same time slot with other physical channels in a plurality of predetermined time slots in a downlink frame, wherein other time slots of the downlink frame do not include a physical control channel.

Shin discloses a method of determining uplink power requirements for a transceiver in a wireless communication system that includes obtaining measurements from a beacon signal occupying a first timeslot in a frame; obtaining measurements from at least one additional channel having a known transmitted

signal strength and occupying a second timeslot in the frame; and utilizing the measurements to determine a path loss estimate. However, Shin fails to disclose, teach, or suggest, wherein physical control channels are transmitted in a same time slot with other physical channels in a plurality of predetermined time slots in a downlink frame, wherein other time slots of the downlink frame do not include a physical control channel. Shins discloses a dedicated timeslot. However, Shin does not disclose that it is used by other channels.

Accordingly, Applicant's amended independent claim 1 is patentable over the Ishii, Matthew, Choi and Shins references, whether taken alone or in combination with one another. Although not identical, Applicant's amended and independent claims 7, 13, and 19 recite features similar to Applicant's amended independent claim 1, and are therefore patentable over the cited art of record for at least the same reasons provided above.

Claims 3, 9, 15 and 21 are rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over the combination as applied to claim 1 above, and further in view of U.S. Publication No. 2002-0172208 to Malkamaki (hereinafter "Malkamaki").

Malkamaki discloses a HARQ process with a modification that allows in-sequence delivery of protocol data units (PDUs) to the radio link control layer (RLC) of the receiving wireless terminal. However, Malkamaki fails to disclose, teach, or suggest, wherein physical control channels are transmitted in a same time slot with other physical channels in a plurality of predetermined time slots in a downlink

frame, wherein other time slots of the downlink frame do not include a physical control channel. Therefore, Malkamaki does not cure the deficiencies of Ishii, Matthew, Choi, and Shins. Based on the arguments presented above, withdrawal of the 35 U.S.C. §103 rejection of claims 3, 9, 15 and 21 is respectfully requested.

Claims 4, 5, 10, 11, 16, 17, 22 and 23 are rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over the combination as applied to claim 1 above, and further in view of U.S. Publication No. 2008-0144600 to Anderson (hereinafter “Anderson”).

Anderson discloses a method of sending user equipment specific information to a plurality of user equipment to maximize channel efficiency. However, Anderson fails to disclose, teach, or suggest, wherein physical control channels are transmitted in a same time slot with other physical channels in a plurality of predetermined time slots in a downlink frame, wherein other time slots of the downlink frame do not include a physical control channel. Therefore, Anderson does not cure the deficiencies of Ishii, Matthew, Choi, and Shins. Based on the arguments presented above, withdrawal of the 35 U.S.C. §103 rejection of claims 4, 5, 10, 11, 16, 17, 22 and 23 is respectfully requested.

Claims 2-6, 8-12, 14-18, and 20-24 are dependent upon claims 1, 7, 13, and 19, and the Applicant believes that these claims are allowable over the cited references of record for the same reasons provided above.

Applicant: Intellectual Ventures II LLC
Application No.: 16/682,854

Based on the arguments presented above, withdrawal of the 35 U.S.C. §103 rejections of claims 1-24 is respectfully requested.

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, including claims 1-24, is in condition for allowance and a notice to that effect is respectfully requested.

Respectfully submitted,

Intellectual Ventures II LLC

By /John D. Wilt/
John D. Wilt
Registration No. 76,110
(215) 568-6400

Volpe and Koenig, P.C.
United Plaza
30 South 17th Street
Philadelphia, PA 19103

JDW/JMG/cmb
Enc: Request for Continued Examination (RCE)

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875				Application or Docket Number 16/682,854		Filing Date 11/13/2019		☐ To be Mailed			
ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO											
APPLICATION AS FILED - PART I											
		(Column 1)		(Column 2)							
FOR		NUMBER FILED		NUMBER EXTRA		RATE (\$)		FEE (\$)			
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))		N/A		N/A		N/A					
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))		N/A		N/A		N/A					
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))		N/A		N/A		N/A					
TOTAL CLAIMS (37 CFR 1.16(i))		minus 20 =		*		x \$100 =					
INDEPENDENT CLAIMS (37 CFR 1.16(h))		minus 3 =		*		x \$460 =					
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))		If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).									
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))											
* If the difference in column 1 is less than zero, enter "0" in column 2.						TOTAL					
APPLICATION AS AMENDED - PART II											
		(Column 1)		(Column 2)		(Column 3)					
AMENDMENT	10/01/2020	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR		PRESENT EXTRA		RATE (\$)		ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(j))	* 24	Minus	** 24	= 0	x \$100 =		0			
	Independent (37 CFR 1.16(h))	* 4	Minus	*** 4	= 0	x \$460 =		0			
	☐ Application Size Fee (37 CFR 1.16(s))										
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))										
								TOTAL ADD'L FEE		0	
		(Column 1)		(Column 2)		(Column 3)					
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR		PRESENT EXTRA		RATE (\$)		ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(j))	*	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".								/DORIS M KING/			
*** 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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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/682,854	11/13/2019	Paul Howard	IPW2-USCN213316	1678
3624	7590	07/01/2020	EXAMINER	
VOLPE AND KOENIG, P.C. 30 SOUTH 17TH STREET, 18TH FLOOR PHILADELPHIA, PA 19103			ABELSON, RONALD B	
			ART UNIT	PAPER NUMBER
			2476	
			NOTIFICATION DATE	DELIVERY MODE
			07/01/2020	ELECTRONIC

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

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

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

eooffice@volpe-koenig.com

Notice of Pre-AIA or AIA Status

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

Claim Rejections - 35 USC § 103

2. 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 negated by the manner in which the invention was made.

3. Claims 1, 2, 6-8, 12-14, 18-20, and 24 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Ishii JP 2005-346319 (for translation see US 20070265017) in view of Matthews US 20020077151, Choi US 20040022213, and Shin US 20040170132.

Regarding claims 1, 7, 13, and 19, Ishii teaches a user equipment (UE) comprising:

a receiver and processor are configured to receive resource allocation information associated with an uplink physical control channel (uplink control channel, [0207]), wherein the

uplink physical control channel and a physical uplink shared channel / PUSCH have different resources;

a transmitter and the processor are configured to send, over the physical uplink shared channel, data in assigned time intervals (uplink control channel can be one of two types, a channel to be time-multiplexed with physical uplink shared channel PUSCH and a channel to be frequency-multiplexed with it, [0207])).

Although Ishii teaches time multiplexing the uplink physical control channel and a physical uplink shared channel / PUSCH, the reference is silent on the transmitter and processor are further configured, in a time interval that it is not sending information over the physical uplink shared channel, to send the uplink physical signal based on the received resource allocation information. The Examiner interprets this limitation to be dynamically allocating the time slots for transmitting the uplink physical control channel and a physical uplink shared channel based on received resource allocation information transmitted from the network.

Matthews teaches dynamically allocating control channels on uplink time slots (control channels dynamically allocated on uplink and downlink frequencies, time slots and code

channels, [0074]) based on received resource allocation information transmitted from the network (primary base station subsystem provides principle interface between base station controller and radio network, commands from base station controller interface used to configure primary base station, frequency, time slot and code channel allocation are based on commands received through the base station controller interface, [0084])).

Therefore it would have been obvious to one of ordinary skill in the art, to modify the system of Ishii by the transmitter and processor are further configured, in a time interval that it is not sending information over the physical uplink shared channel, to send the uplink physical signal based on the received resource allocation information, as suggested by Matthews. This modification would benefit the system by efficiently using bandwidth.

The combination is silent on wherein the uplink physical signal is used to determine channel conditions by a base station; and

the receiver and the processor are further configured to receive, on a downlink control channel, control information,

wherein the control information is based on the determined channel conditions.

Choi teaches wherein the uplink physical signal is used to determine channel conditions by a base station; and

the receiver and the processor are further configured to receive, on a downlink control channel, control information, wherein the control information is based on the determined channel conditions (It is possible to estimate a variation rate of a [REDACTED] by determining a Doppler frequency using a pilot signal of an [REDACTED] (UL DPCCH) or an HS-DPCCH signal received from a UE, [0126], Upon receiving a [REDACTED] channel signal, a UE must measure channel quality (CQ) of the received [REDACTED] channel signal, and report the measured channel quality to a Node B. The Node B then receives the channel quality information from the UE, determines an MCS level of an HS-DSCH over which data is actually transmitted to the UE according to the received channel quality information, and creates transport format and resource related information (TFRI), i.e., HS-DSCH [REDACTED] information, [0010]).

Therefore it would have been obvious to one of ordinary skill in the art, to modify the system of the combination by the uplink physical signal is used to determine channel conditions by a base station; and the receiver and the processor are

further configured to receive, on a downlink control channel, control information, wherein the control information is based on the determined channel conditions, as shown by Choi. This modification would benefit the system by providing a means for the UEs to receive control information based on the current channel conditions.

Although Ishii teaches a downlink physical control channel (HS-PDSCH, [0079], PDSCH, [0207], the reference is silent on wherein physical control channels are transmitted with other physical channels in a plurality of predetermined time slots in a downlink frame, wherein other time slots of the downlink frame do not include a physical control channel.

Shin teaches wherein physical control channels are transmitted with other physical channels in a plurality of predetermined time slots in a downlink frame, wherein other time slots of the downlink frame do not include a physical control channel (fig. 1, [0019, 0022]).

Therefore it would have been obvious to one of ordinary skill in the art, to modify the system of the combination by wherein physical control channels are transmitted with other physical channels in a plurality of predetermined time slots in a downlink frame, wherein other time slots of the downlink frame do not include a physical control channel, as shown by Shin.

This modification would benefit the system by simultaneously transmit the PDSCH and beacon.

Regarding claims 2, 8, 14, and 20, the processor is further configured to receive data on a physical downlink shared channel (Ishii: PDSCH, [0207]).

Regarding claims 6, 12, 18, and 24, in the time interval that the uplink physical signal is sent by the UE, a plurality of UEs each transmit on respective uplink physical control channels in the time interval (Ishii: (uplink control channel can be one of two types, a channel to be time-multiplexed with physical uplink shared channel PUSCH and a channel to be frequency-multiplexed with it, [0207])).

4. Claims 3, 9, 15, and 21 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over the combination as applied to claim 1 above, and further in view of Malkamaki US 20020172208.

The combination is silent on the downlink control channel and the physical downlink shared channel are time multiplexed.

Malkamaki teaches the downlink control channel and the physical downlink shared channel are time multiplexed (The shared control channel could be sent as a separate code channel (i.e. it could be code multiplexed) or could be sent using the same code channels as the HS-PDSCH (i.e. it could be time multiplexed with the HS-PDSCH, [0008])).

Therefore it would have been obvious to one of ordinary skill in the art, to modify the system of the combination by the downlink control channel and the physical downlink shared channel are time multiplexed, as shown by Malkamaki. This modification would benefit the system by since time multiplexing allows for an efficient use of system resources.

5. Claims 4, 5, 10, 11, 16, 17, 22, and 23 rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over the combination as applied to claim 1 above, and further in view of Anderson US 20080144600.

Regarding claims 4, 10, 16, and 22, although Ishii teaches PLCCH, the reference is silent on the receiver and processor is further configured to receive, on the physical control channel, power control information.

Anderson teaches the receiver and processor is further configured to receive, on the physical control channel, power

control information (PLCCH implemented for communication of TPC and SS data, transmission comprising TPC and SS data bits for plurality of UEs, [0131]).

Therefore it would have been obvious to one of ordinary skill in the art, to modify the system of the combination by the receiver and processor is further configured to receive, on the physical control channel, power control information, as shown by Anderson. This modification would benefit the system by providing an proven, reliable method for sending power control information.

Regarding claims 5, 11, 17, and 23, the physical control channel includes power control information for a plurality of UEs using different bits (Anderson: PLCCH implemented for communication of TPC and SS data, transmission comprising TPC and SS data bits for plurality of UEs, [0131]).

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). 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 date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RONALD B ABELSON whose telephone number is (571)272-3165. The examiner can normally be reached on M-F 8:00-4:30.

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, Ayaz Sheikh can be reached on 571-272-3795. 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.

/RONALD B ABELSON/
Primary Examiner, Art Unit 2476

<i>Notice of References Cited</i>	Application/Control No. 16/682,854	Applicant(s)/Patent Under Reexamination Howard, Paul	
	Examiner RONALD B ABELSON	Art Unit 2476	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
	A	20040170132	09-2004	Shin	H04L 5/14	
	B					
	C					
	D					
	E					
	F					
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	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.

U.S. Patent and Trademark Office
PTO-892 (Rev. 01-2001)

Notice of References Cited

Part of Paper No. 20200620

<i>Index of Claims</i> 	Application/Control No. 16/682,854	Applicant(s)/Patent Under Reexamination Howard, Paul
	Examiner RONALD B ABELSON	Art Unit 2476

✓	Rejected
=	Allowed

-	Cancelled
÷	Restricted

N	Non-Elected
I	Interference

A	Appeal
O	Objected

CLAIMS										
☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47										
CLAIM		DATE								
Final	Original	01/25/2020	06/25/2020							
	1	✓	✓							
	2	✓	✓							
	3	✓	✓							
	4	✓	✓							
	5	✓	✓							
	6	✓	✓							
	7	✓	✓							
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	16	✓	✓							
	17	✓	✓							
	18	✓	✓							
	19	✓	✓							
	20	✓	✓							
	21	✓	✓							
	22	✓	✓							
	23	✓	✓							
	24	✓	✓							

<i>Search Notes</i> 	Application/Control No. 16/682,854	Applicant(s)/Patent Under Reexamination Howard, Paul
	Examiner RONALD B ABELSON	Art Unit 2476

CPC - Searched*		
Symbol	Date	Examiner
h04b7/2643	06/25/2020	RA
h04j3/1694	06/25/2020	RA
h04l5/0053	06/25/2020	RA
h04w52/146 h04w72/0406 h04w72/042 h04w72/0446	06/25/2020	RA

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
CPC combined with limited text search in EAST	06/25/2020	RA

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

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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the **PATENT APPLICATION** of:

Paul Howard

Application No.: 16/682,854

Confirmation No.: 1678

Filed: November 13, 2019

For: COMMUNICATIONS IN A WIRELESS
NETWORK

Group: 2476

Examiner: Ronald B. Abelson

Our File: IPW2-USCN213316

Date: June 19, 2020

RESPONSE PURSUANT TO 37 C.F.R. § 1.111

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

This Response is being timely filed in response to the Non-Final Office Action (hereinafter "NFOA") dated February 7, 2020 and is submitted in conjunction with a Petition for a Two (2) Month Extension of Time.

Please amend the application without prejudice or disclaimer as follows:

PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)		Docket Number (Optional) IPW2-USCN213316																														
Application Number 16/682,854	Filed 2019-11-13																															
For COMMUNICATIONS IN A WIRELESS NETWORK																																
Art Unit 2476	Examiner Ronald B. Abelson																															
<p>This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above-identified application.</p> <p>The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):</p> <table style="width: 100%; border-collapse: collapse;"><thead><tr><th></th><th style="text-align: center;"><u>Fee</u></th><th style="text-align: center;"><u>Small Entity Fee</u></th><th style="text-align: center;"><u>Micro Entity Fee</u></th><th></th></tr></thead><tbody><tr><td>☐ One month (37 CFR 1.17(a)(1))</td><td style="text-align: center;">\$200</td><td style="text-align: center;">\$100</td><td style="text-align: center;">\$50</td><td>\$ _____</td></tr><tr><td>☒ Two months (37 CFR 1.17(a)(2))</td><td style="text-align: center;">\$600</td><td style="text-align: center;">\$300</td><td style="text-align: center;">\$150</td><td>\$ <u>600</u></td></tr><tr><td>☐ Three months (37 CFR 1.17(a)(3))</td><td style="text-align: center;">\$1,400</td><td style="text-align: center;">\$700</td><td style="text-align: center;">\$350</td><td>\$ _____</td></tr><tr><td>☐ Four months (37 CFR 1.17(a)(4))</td><td style="text-align: center;">\$2,200</td><td style="text-align: center;">\$1,100</td><td style="text-align: center;">\$550</td><td>\$ _____</td></tr><tr><td>☐ Five months (37 CFR 1.17(a)(5))</td><td style="text-align: center;">\$3,000</td><td style="text-align: center;">\$1,500</td><td style="text-align: center;">\$750</td><td>\$ _____</td></tr></tbody></table> <p>☐ Applicant asserts small entity status. See 37 CFR 1.27.</p> <p>☐ Applicant certifies micro entity status. See 37 CFR 1.29. Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.</p> <p>☐ A check in the amount of the fee is enclosed.</p> <p>☒ Payment by credit card. Form PTO-2038 is attached.</p> <p>☐ The Director has already been authorized to charge fees in this application to a Deposit Account.</p> <p>☒ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number <u>220493</u>.</p> <p>☒ Payment made via EFS-Web.</p> <p>WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.</p> <p>I am the</p> <p>☐ applicant.</p> <p>☒ attorney or agent of record. Registration number <u>76110</u></p> <p>☐ attorney or agent acting under 37 CFR 1.34. Registration number _____</p> <p><u>/John D. Wilt/</u> <u>2020-06-19</u></p> <p style="text-align: center;">Signature Date</p> <p><u>John D. Wilt</u> <u>215.255.9187</u></p> <p style="text-align: center;">Typed or printed name Telephone Number</p> <p>NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.</p>				<u>Fee</u>	<u>Small Entity Fee</u>	<u>Micro Entity Fee</u>		☐ One month (37 CFR 1.17(a)(1))	\$200	\$100	\$50	\$ _____	☒ Two months (37 CFR 1.17(a)(2))	\$600	\$300	\$150	\$ <u>600</u>	☐ Three months (37 CFR 1.17(a)(3))	\$1,400	\$700	\$350	\$ _____	☐ Four months (37 CFR 1.17(a)(4))	\$2,200	\$1,100	\$550	\$ _____	☐ Five months (37 CFR 1.17(a)(5))	\$3,000	\$1,500	\$750	\$ _____
	<u>Fee</u>	<u>Small Entity Fee</u>	<u>Micro Entity Fee</u>																													
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☐ Five months (37 CFR 1.17(a)(5))	\$3,000	\$1,500	\$750	\$ _____																												

☐ * Total of _____ forms are submitted.
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This collection of information is required by 37 CFR 1.136(a). 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 6 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: Mail Stop PCT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Privacy Act Statement

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

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

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether 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 Patent Application Fee Transmittal				
Application Number:		16682854		
Filing Date:		13-Nov-2019		
Title of Invention:		COMMUNICATIONS IN A WIRELESS NETWORK		
First Named Inventor/Applicant Name:		Paul Howard		
Filer:		John D. Wilt/Caren Burgoon		
Attorney Docket Number:		IPW2-USCN213316		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension - 2 months with \$0 paid	1252	1	600	600
Miscellaneous:				
Total in USD (\$)				600

Electronic Acknowledgement Receipt	
EFS ID:	39775142
Application Number:	16682854
International Application Number:	
Confirmation Number:	1678
Title of Invention:	COMMUNICATIONS IN A WIRELESS NETWORK
First Named Inventor/Applicant Name:	Paul Howard
Customer Number:	3624
Filer:	John D. Wilt/Caren Burgoon
Filer Authorized By:	John D. Wilt
Attorney Docket Number:	IPW2-USCN213316
Receipt Date:	19-JUN-2020
Filing Date:	13-NOV-2019
Time Stamp:	16:10:49
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$ 600
RAM confirmation Number	E20206IG12234638
Deposit Account	220493
Authorized User	Caren Burgoon
<p>The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:</p> <p>37 CFR 1.16 (National application filing, search, and examination fees)</p> <p>37 CFR 1.17 (Patent application and reexamination processing fees)</p>	

37 CFR 1.19 (Document supply fees)					
37 CFR 1.20 (Post Issuance fees)					
37 CFR 1.21 (Miscellaneous fees and charges)					
File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		IPW2_USCN213316_NFOAReply_20200619.PDF	110226	yes	13
			ac064a229c200f18dca282bce442df4105b7bec8		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Applicant Arguments/Remarks Made in an Amendment		10	13	
	Claims		2	9	
	Amendment/Req. Reconsideration-After Non-Final Reject		1	1	
Warnings:					
Information:					
2	Extension of Time	IPW2_USCN213316_2MONEOT_20200619.PDF	127008	no	2
			4565926abab98c8bef87d26e2a7feca7b4fa524f		
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30961	no	2
			a25a6852ebcfe34f94fa97a61f410e074dd48e		
Warnings:					
Information:					
Total Files Size (in bytes):			268195		

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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.

REMARKS/ARGUMENTS

After the foregoing Amendment, claims 1-24 are currently pending in this application. Claims 1, 3, 4, 5, 7, 9, 10, 11, 13, 15, 16, 17, 19, 21, 22, and 23 are amended.

Support for the amendments can be found in at least paragraph [0032], [0034], [0037] and FIG 2 shown below of the U.S. Patent Publication 2020/0083952 A1. No new matter has been added.

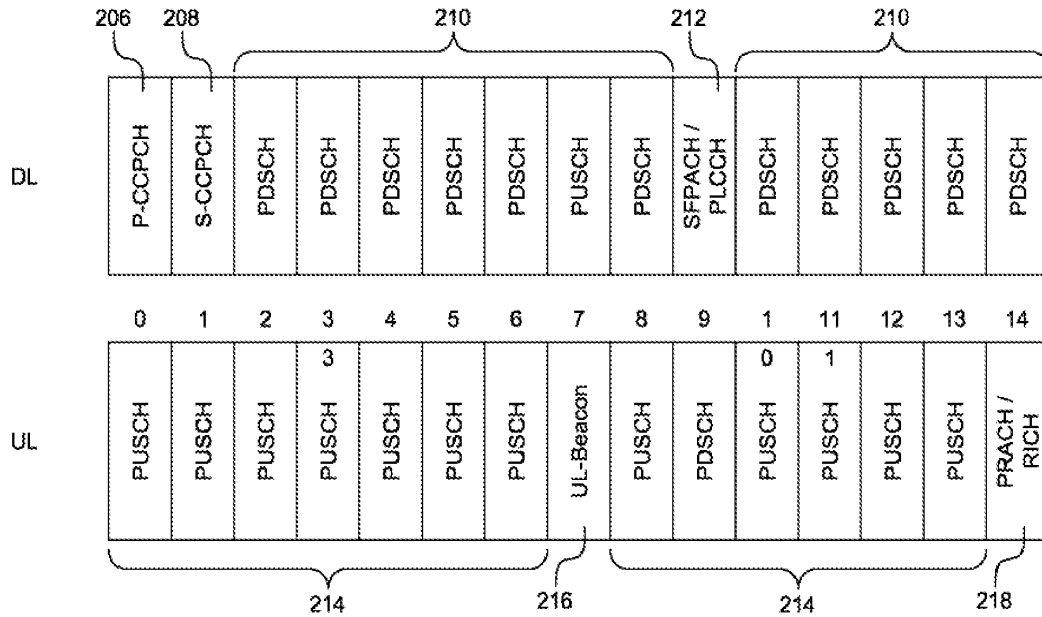


FIG. 2

Applicant respectfully requests the entry of the amendments and reconsideration of the application in view of the amendments and the remarks below.

Examiner Interview

Applicant thanks the Examiner for the telephonic interview with the Applicant's representative, Harry Vartanian, on 29 January 2020. During the telephonic interview, Ishii, Classon and Choi references were discussed.

Claim Rejections - 35 U.S.C. § 103

Claims 1, 2, 6, 7, 8, 12, 13, 14, 18, 19, 20, and 24 are rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over JP Publication No. 2005-346319 (for translation US 2007-0265017) to Ishii et al. (hereinafter "Ishii") in view of U.S. Publication No. 2002-0077151 to Matthews (hereinafter "Matthews") and U.S. Publication No. 2004-0022213 to Choi (hereinafter "Choi").

Claims 3, 9, 15 and 21 are rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over the combination as applied to claim 1 above, and further in view of U.S. Publication No. 2002-0172208 to Malkamaki (hereinafter "Malkamaki").

Claims 4, 5, 10, 11, 16, 17, 22 and 23 are rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over the combination as applied to claim 1 above, and further in view of U.S. Publication No. 2008-0144600 to Anderson (hereinafter "Anderson").

Claims 1, 2, 6, 7, 8, 12, 13, 14, 18, 19, 20 and 24 are rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over U.S. Publication No. 2007-0058595 to Classon (hereinafter "Classon") in view of Matthews and Choi.

Claims 3, 9, 15 and 21 are rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over the combination as applied to claim 1 above, and further in view of Malkamaki.

Claims 4, 5, 10, 11, 16, 17, 22, and 23 are rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over the combination as applied to claim 1 above, and further in view of Anderson.

Although applicant respectfully disagrees with the §103 rejections, the claims have been amended to advance prosecution. The current claims recite “wherein physical control channels are transmitted with other physical channels in a plurality of predetermined time slots in a downlink frame, wherein other time slots of the downlink frame do not include a physical control channel” None of the cited references alone or in combination disclose at least this feature of the claims.

Based on the arguments presented above, withdrawal of the 35 U.S.C. §103 rejections of claims 1-24 is respectfully requested.

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, including claims 1-24, is in condition for allowance and a notice to that effect is respectfully requested.

Respectfully submitted,

Intellectual Ventures II LLC

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United Plaza
30 South 17th Street
Philadelphia, PA 19103

JDW/JMG/cmb

Amendments to the Claims:

This listing of the claims will replace all prior versions of the claims in the application:

1. (Currently Amended) A user equipment (UE) comprising:

a receiver and a processor are configured to receive resource allocation information associated with an uplink physical signal, wherein the uplink physical signal and a physical uplink shared channel have different resources;

a transmitter and the processor are configured to send, over the physical uplink shared channel, data in assigned time intervals;

the transmitter and the processor are further configured, in a time interval that it is not sending information over the physical uplink shared channel, to send the uplink physical signal based on the received resource allocation information, wherein the uplink physical signal is used to determine channel conditions by a base station; and

the receiver and the processor are further configured to receive, on a ~~downlink~~ physical control channel, control information, wherein the control information is based on the determined channel conditions, wherein physical control channels are transmitted with other physical channels in a plurality of predetermined time slots in a downlink frame, wherein other time slots of the downlink frame do not include a physical control channel.

2. (Original) The UE of claim 1, wherein the receiver and the processor are further configured to receive data on a physical downlink shared channel.

3. (Currently Amended) The UE of claim 2, wherein the ~~downlink~~ physical control channel and the physical downlink shared channel are time multiplexed.

4. (Currently Amended) The UE of claim 1, wherein the receiver and the processor are further configured to receive, on the ~~downlink~~ physical control channel, power control information.

5. (Currently Amended) The UE of claim 4, wherein the ~~downlink~~ physical control channel includes power control information for a plurality of UEs using different bits.

6. (Original) The UE of claim 1, wherein in the time interval that the uplink physical signal is sent by the UE, a plurality of UEs each transmit on respective uplink physical control channels in the time interval.

7. (Currently Amended) A network device comprising:

a transmitter and a processor are configured to transmit resource allocation information associated with an uplink physical signal, wherein the uplink physical signal and a physical uplink shared channel have different resources;

a receiver and the processor are further configured to receive, over the physical uplink shared channel, data in assigned time intervals;

the receiver and the processor are further configured, in a time interval that it is not receiving information over the physical uplink shared channel, to receive the uplink physical signal based on the transmitted resource allocation information, wherein the uplink physical signal is used to determine channel conditions by the network device; and

the transmitter and the processor are further configured to transmit, on a ~~downlink~~ physical control channel, control information, wherein the control information is based on the determined channel conditions, wherein physical control channels are transmitted with other physical channels in a plurality of predetermined time slots in a downlink frame, wherein other time slots of the downlink frame do not include a physical control channel.

8. (Original) The network device of claim 7, wherein the transmitter and the processor are further configured to transmit data on a physical downlink shared channel.

9. (Currently Amended) The network device of claim 8, wherein the ~~downlink~~ physical control channel and the physical downlink shared channel are time multiplexed.

10. (Currently Amended) The network device of claim 7, wherein the transmitter and the processor are further configured to transmit, on the ~~downlink~~ physical control channel, power control information.

11. (Currently Amended) The network device of claim 10, wherein the ~~downlink~~ physical control channel includes power control information for a plurality of UEs using different bits.

12. (Original) The network device of claim 7, wherein in the time interval that the uplink physical signal is received by the network device, signals are received on other uplink physical control channels in the time interval from a plurality of UEs.

13. (Currently Amended) A method performed by user equipment (UE), the method comprising:

receiving resource allocation information associated with an uplink physical signal, wherein the uplink physical signal and a physical uplink shared channel have different resources;

sending, over the physical uplink shared channel, data in assigned time intervals;

sending, in a time interval that it is not sending information over the physical uplink shared channel, the uplink physical signal based on the received resource allocation information, wherein the uplink physical signal is used to determine channel conditions by a base station; and

receiving, on a ~~downlink~~ physical control channel, control information, wherein the control information is based on the determined channel conditions, wherein physical control channels are transmitted with other physical channels in a plurality of predetermined time slots in a downlink frame, wherein other time slots of the downlink frame do not include a physical control channel.

14. (Original) The method of claim 13 further comprising receiving data on a physical downlink shared channel.

15. (Currently Amended) The method of claim 14, wherein the ~~downlink~~ physical control channel and the physical downlink shared channel are time multiplexed.

16. (Currently Amended) The method of claim 13 further comprising receiving, on the ~~downlink~~ physical control channel, power control information.

17. (Currently Amended) The method of claim 16, wherein the ~~downlink~~ physical control channel includes power control information for a plurality of UEs using different bits.

18. (Original) The method of claim 13, wherein in the time interval that the uplink physical signal is sent by the UE, a plurality of UEs each transmit on respective uplink physical control channels in the time interval.

19. (Currently Amended) A method performed by a network device, the method comprising:

transmitting resource allocation information associated with an uplink physical signal, wherein the uplink physical signal and a physical uplink shared channel have different resources;

receiving, over the physical uplink shared channel, data in assigned time intervals;

receiving, in a time interval that it is not receiving information over the physical uplink shared channel, the uplink physical signal based on the transmitted

resource allocation information, wherein the uplink physical signal is used to determine channel conditions by the network device; and

transmitting, on a ~~downlink~~ physical control channel, control information, wherein the control information is based on the determined channel conditions, wherein physical control channels are transmitted with other physical channels in a plurality of predetermined time slots in a downlink frame, wherein other time slots of the downlink frame do not include a physical control channel.

20. (Original) The method of claim 19 further comprising transmitting data on a physical downlink shared channel.

21. (Currently Amended) The method of claim 20, wherein the ~~downlink~~ physical control channel and the physical downlink shared channel are time multiplexed.

22. (Currently Amended) The method of claim 19 further comprising transmitting, on the ~~downlink~~ physical control channel, power control information.

23. (Currently Amended) The method of claim 22, wherein the ~~downlink~~ physical control channel includes power control information for a plurality of UEs using different bits.

24. (Original) The method of claim 19, wherein in the time interval that the uplink physical signal is received by the network device, signals are received on other uplink physical control channels in the time interval from a plurality of UEs.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875				Application or Docket Number 16/682,854		Filing Date 11/13/2019		☐ To be Mailed					
ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO													
APPLICATION AS FILED - PART I													
		(Column 1)		(Column 2)									
FOR		NUMBER FILED		NUMBER EXTRA		RATE (\$)		FEE (\$)					
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))		N/A		N/A		N/A							
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))		N/A		N/A		N/A							
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))		N/A		N/A		N/A							
TOTAL CLAIMS (37 CFR 1.16(i))		minus 20 = *				x \$100 =							
INDEPENDENT CLAIMS (37 CFR 1.16(h))		minus 3 = *				x \$460 =							
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))		If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).											
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))													
* If the difference in column 1 is less than zero, enter "0" in column 2.						TOTAL							
APPLICATION AS AMENDED - PART II													
		(Column 1)		(Column 2)		(Column 3)							
AMENDMENT	06/19/2020	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR		PRESENT EXTRA		RATE (\$)		ADDITIONAL FEE (\$)			
	Total (37 CFR 1.16(j))	* 24	Minus	** 24	= 0			x \$100 =		0			
	Independent (37 CFR 1.16(h))	* 4	Minus	*** 4	= 0			x \$460 =		0			
	☐ Application Size Fee (37 CFR 1.16(s))												
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))												
										TOTAL ADD'L FEE		0	
		(Column 1)		(Column 2)		(Column 3)							
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR		PRESENT EXTRA		RATE (\$)		ADDITIONAL FEE (\$)			
	Total (37 CFR 1.16(j))	*	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".										/KIM P DOZIER/			
*** 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.													

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/682,854	11/13/2019	Paul Howard	IPW2-USCN213316

CONFIRMATION NO. 1678

PUBLICATION NOTICE

3624
VOLPE AND KOENIG, P.C.
30 SOUTH 17TH STREET, 18th Floor
PHILADELPHIA, PA 19103



Title:COMMUNICATIONS IN A WIRELESS NETWORK

Publication No.US-2020-0083952-A1

Publication Date:03/12/2020

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/682,854	11/13/2019	Paul Howard	IPW2-USCN213316	1678
3624	7590	02/07/2020	EXAMINER	
VOLPE AND KOENIG, P.C. 30 SOUTH 17TH STREET, 18th Floor PHILADELPHIA, PA 19103			ABELSON, RONALD B	
			ART UNIT	PAPER NUMBER
			2476	
			NOTIFICATION DATE	DELIVERY MODE
			02/07/2020	ELECTRONIC

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

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Notice of Pre-AIA or AIA Status

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

Claim Rejections - 35 USC § 103

2. 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 negated by the manner in which the invention was made.

3. Claims 1, 2, 6, 7, 8, 12, 13, 14, 18, 19, 20, and 24 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Ishii JP 2005-346319 (for translation see US 20070265017) in view of Matthews US 20020077151 and Choi US 20040022213.

Regarding claims 1, 7, 13, and 19, Ishii teaches a user equipment (UE) comprising:

a receiver and processor are configured to receive resource allocation information associated with an uplink physical

control channel (uplink control channel, [0207]), wherein the uplink physical control channel and a physical uplink shared channel / PUSCH have different resources;

a transmitter and the processor are configured to send, over the physical uplink shared channel, data in assigned time intervals (uplink control channel can be one of two types, a channel to be time-multiplexed with physical uplink shared channel PUSCH and a channel to be frequency-multiplexed with it, [0207]).

Although Ishii teaches time multiplexing the uplink physical control channel and a physical uplink shared channel / PUSCH, the reference is silent on the transmitter and processor are further configured, in a time interval that it is not sending information over the physical uplink shared channel, to send the uplink physical signal based on the received resource allocation information. The Examiner interprets this limitation to be dynamically allocating the time slots for transmitting the uplink physical control channel and a physical uplink shared channel based on received resource allocation information transmitted from the network.

Matthews teaches dynamically allocating control channels on uplink time slots (control channels dynamically allocated

on uplink and downlink frequencies, time slots and code channels, [0074]) based on received resource allocation information transmitted from the network (primary base station subsystem provides principle interface between base station controller and radio network, commands from base station controller interface used to configure primary base station, frequency, time slot and code channel allocation are based on commands received through the base station controller interface, [0084])).

Therefore it would have been obvious to one of ordinary skill in the art, to modify the system of Ishii by the transmitter and processor are further configured, in a time interval that it is not sending information over the physical uplink shared channel, to send the uplink physical signal based on the received resource allocation information, as suggested by Matthews. This modification would benefit the system by efficiently using bandwidth.

The combination is silent on wherein the uplink physical signal is used to determine channel conditions by a base station; and

the receiver and the processor are further configured to receive, on a downlink control channel, control information,

wherein the control information is based on the determined channel conditions.

Choi teaches wherein the uplink physical signal is used to determine channel conditions by a base station; and

the receiver and the processor are further configured to receive, on a downlink control channel, control information, wherein the control information is based on the determined channel conditions (It is possible to estimate a variation rate of a [REDACTED] by determining a Doppler frequency using a pilot signal of an [REDACTED] (UL DPCCH) or an HS-DPCCH signal received from a UE, [0126]).

Therefore it would have been obvious to one of ordinary skill in the art, to modify the system of xxx by the uplink physical signal is used to determine channel conditions by a base station; and the receiver and the processor are further configured to receive, on a downlink control channel, control information, wherein the control information is based on the determined channel conditions, as shown by Choi. This modification would benefit the system by providing a means for the UEs to receive control information based on the current channel conditions.

Regarding claims 2, 8, 14, and 20, the processor is further configured to receive data on a physical downlink shared channel (Ishii: PDSCH, [0207]).

Regarding claims 6, 12, 18, and 24, in the time interval that the uplink physical signal is sent by the UE, a plurality of UEs each transmit on respective uplink physical control channels in the time interval (Ishii: (uplink control channel can be one of two types, a channel to be time-multiplexed with physical uplink shared channel PUSCH and a channel to be frequency-multiplexed with it, [0207])).

4. Claims 3, 9, 15, and 21 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over the combination as applied to claim 1 above, and further in view of Malkamaki US 20020172208.

The combination is silent on the downlink control channel and the physical downlink shared channel are time multiplexed.

Malkamaki teaches the downlink control channel and the physical downlink shared channel are time multiplexed (The shared control channel could be sent as a separate code

channel (i.e. it could be code multiplexed) or could be sent using the same code channels as the HS-PDSCH (i.e. it could be time multiplexed with the HS-PDSCH, [0008])).

Therefore it would have been obvious to one of ordinary skill in the art, to modify the system of the combination by the downlink control channel and the physical downlink shared channel are time multiplexed, as shown by Malkamaki. This modification would benefit the system by since time multiplexing allows for an efficient use of system resources.

5. Claims 4, 5, 10, 11, 16, 17, 22, and 23 rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over the combination as applied to claim 1 above, and further in view of Anderson US 20080144600.

Regarding claims 4, 10, 16, and 22, although Ishii teaches PLCCH, the reference is silent on the receiver and processor is further configured to receive, on the downlink control channel, power control information.

Anderson teaches the receiver and processor is further configured to receive, on the downlink control channel, power control information (PLCCH implemented for communication of TPC and SS data, transmission comprising TPC and SS data bits for plurality of UEs, [0131])).

Therefore it would have been obvious to one of ordinary skill in the art, to modify the system of the combination by the receiver and processor is further configured to receive, on the downlink control channel, power control information, as shown by Anderson. This modification would benefit the system by providing an proven, reliable method for sending power control information.

Regarding claims 5, 11, 17, and 23, Anderson (PLCCH implemented for communication of TPC and SS data, transmission comprising TPC and SS data bits for plurality of UEs, [0131]).

6. Claims 1, 2, 6, 7, 8, 12, 13, 14, 18, 19, 20, and 24 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Classon US 20070058595 in view of Matthews US 20020077151 and Choi US 20040022213.

Regarding claims 1, 7, 13, and 19, Classon teaches a user equipment (UE) comprising:

a receiver and processor are configured to receive resource allocation information associated with an uplink physical

control channel, wherein the uplink physical control channel and a physical uplink shared channel;

a transmitter and the processor are configured to send, over the physical uplink shared channel, data in assigned time intervals (uplink transmissions, control channels time multiplexed with shared data channel, [0040]).

Although Classon teaches time multiplexing the uplink physical control channel and a physical uplink shared channel, the reference is silent on the transmitter and processor are further configured, in a time interval that it is not sending information over the physical uplink shared channel, to send the uplink physical signal based on the received resource allocation information. The Examiner interprets this limitation to be dynamically allocating the time slots for transmitting the uplink physical control channel and a physical uplink shared channel based on received resource allocation information transmitted from the network.

Matthews teaches dynamically allocating control channels on uplink time slots (control channels dynamically allocated on uplink and downlink frequencies, time slots and code channels, [0074]) based on received resource allocation information transmitted from the network (primary base station

subsystem provides principle interface between base station controller and radio network, commands from base station controller interface used to configure primary base station, frequency, time slot and code channel allocation are based on commands received through the base station controller interface, [0084])).

Therefore it would have been obvious to one of ordinary skill in the art, to modify the system of Ishii by the transmitter and processor are further configured, in a time interval that it is not sending information over the physical uplink shared channel, to send the uplink physical signal based on the received resource allocation information, as suggested by Matthews. This modification would benefit the system by efficiently using bandwidth.

The combination is silent on wherein the uplink physical signal is used to determine channel conditions by a base station; and

the receiver and the processor are further configured to receive, on a downlink control channel, control information, wherein the control information is based on the determined channel conditions.

Choi teaches wherein the uplink physical signal is used to determine channel conditions by a base station; and

the receiver and the processor are further configured to receive, on a downlink control channel, control information, wherein the control information is based on the determined channel conditions (It is possible to estimate a variation rate of a [REDACTED] by determining a Doppler frequency using a pilot signal of an [REDACTED] (UL DPCCH) or an HS-DPCCH signal received from a UE, [0126]).

Therefore it would have been obvious to one of ordinary skill in the art, to modify the system of xxx by the uplink physical signal is used to determine channel conditions by a base station; and the receiver and the processor are further configured to receive, on a downlink control channel, control information, wherein the control information is based on the determined channel conditions, as shown by Choi. This modification would benefit the system by providing a means for the UEs to receive control information based on the current channel conditions.

Regarding claims 2, 8, 14, and 20, the processor is further configured to receive data on a physical downlink shared channel (Classon: [0040]).

Regarding claims 6, 12, 18, and 24, the time interval that the uplink physical signal is sent by the UE, a plurality of UEs each transmit on respective uplink physical control channels in the time interval (Classon: [0040]).

7. Claims 3, 9, 15, and 21 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over the combination as applied to claim 1 above, and further in view of Malkamaki US 20020172208.

The combination is silent on the downlink control channel and the physical downlink shared channel are time multiplexed.

Malkamaki teaches the downlink control channel and the physical downlink shared channel are time multiplexed (The shared control channel could be sent as a separate code channel (i.e. it could be code multiplexed) or could be sent using the same code channels as the HS-PDSCH (i.e. it could be time multiplexed with the HS-PDSCH, [0008])).

Therefore it would have been obvious to one of ordinary skill in the art, to modify the system of the combination by the downlink control channel and the physical downlink shared channel are time multiplexed, as shown by Malkamaki. This modification would benefit the system by since time multiplexing allows for an efficient use of system resources.

8. Claims 4, 5, 10, 11, 16, 17, 22, and 23 rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over the combination as applied to claim 1 above, and further in view of Anderson US 20080144600.

Regarding claims 4, 10, 16, and 22, although Ishii teaches PLCCH, the reference is silent on the receiver and processor is further configured to receive, on the downlink control channel, power control information.

Anderson teaches the receiver and processor is further configured to receive, on the downlink control channel, power control information (PLCCH implemented for communication of TPC and SS data, transmission comprising TPC and SS data bits for plurality of UEs, [0131]).

Therefore it would have been obvious to one of ordinary skill in the art, to modify the system of the combination by the receiver and processor is further configured to receive, on the downlink control channel, power control information, as shown by Anderson. This modification would benefit the system by providing an proven, reliable method for sending power control information.

Regarding claims 5, 11, 17, and 23, Anderson (PLCCH implemented for communication of TPC and SS data, transmission comprising TPC and SS data bits for plurality of UEs, [0131]).

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to RONALD B ABELSON whose telephone number is (571)272-3165. The examiner can normally be reached on M-F 8:00-4:30.

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, Ayaz Sheikh can be reached on 571-272-3795. 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.

/RONALD B ABELSON/
Primary Examiner, Art Unit 2476

<i>Notice of References Cited</i>	Application/Control No. 16/682,854	Applicant(s)/Patent Under Reexamination Howard, Paul	
	Examiner RONALD B ABELSON	Art Unit 2476	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
	A	20080144600	06-2008	Anderson	H04J 3/06	
	B	20040022213	02-2004	Choi	H04Q 7/00	
	C	20020172208	11-2002	Malkamaki	H04L 12/28	
	D	20020077151	06-2002	Matthews	H04Q 7/20	
	E	20070058595	03-2007	Classon	H04B 7/212	
	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	JP 2005-346319	09-2006	Japan	Ishii	H04L 12/56
	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.

U.S. Patent and Trademark Office
PTO-892 (Rev. 01-2001)

Notice of References Cited

Part of Paper No. 20200124

<i>Search Notes</i> 	Application/Control No. 16/682,854	Applicant(s)/Patent Under Reexamination Howard, Paul
	Examiner RONALD B ABELSON	Art Unit 2476

CPC - Searched*		
Symbol	Date	Examiner
h04b7/2643		
h04j3/1694		
h04l5/0053		
h04w52/146 h04w72/0406 h04w72/042 h04w72/0446		

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
CPC combined with limited text search in EAST		

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

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<i>Index of Claims</i> 	Application/Control No. 16/682,854	Applicant(s)/Patent Under Reexamination Howard, Paul
	Examiner RONALD B ABELSON	Art Unit 2476

✓	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	01/25/2020								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
	6	✓								
	7	✓								
	8	✓								
	9	✓								
	10	✓								
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	17	✓								
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	19	✓								
	20	✓								
	21	✓								
	22	✓								
	23	✓								
	24	✓								

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

Verified and Acknowledged: /RONALD B ABELSON/

Examiner's Signature

Initials

Title: COMMUNICATIONS IN A WIRELESS NETWORK

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
11/13/2019	370	2476	IPW2-USCN213316
RULE			

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Paul Howard Bristol, UNITED KINGDOM

CONTINUING DATA

This application is a CON of 14458693 08/13/2014

14458693 is a CON of 13176298 07/05/2011 PAT 8811356

13176298 is a CON of 11646692 12/27/2006 PAT 8009639

FOREIGN APPLICATIONS

IF REQUIRED, FOREIGN LICENSE GRANTED**

12/03/2019

STATE OR COUNTRY

UNITED KINGDOM

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FILING FEE RECEIVED

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	: Not yet assigned	Confirmation No.	Not yet assigned
First Named Inventor	: Hiroyuki ISHII		
Filed	: November 29, 2006		
TC/A.U.	: Not yet assigned		
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Docket No.	: 010755.58429US		
Customer No.	: 23911		
Title	: Call Admission Control Device and Call Admission Control Method		

CLAIM OF PRIORITY UNDER 35 U.S.C. § 119

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

Sir:

The benefit of the filing date of prior foreign application No. 2005-346319, filed in Japan on November 30, 2005, is hereby requested and the right of priority under 35 U.S.C. § 119 is hereby claimed.

In support of this claim, filed herewith is a certified copy of the original foreign application.

Respectfully submitted,

November 29, 2006

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日 本 国 特 許 庁
JAPAN PATENT OFFICE

別紙添付の書類に記載されている事項は下記の出願書類に記載されている事項と同一であることを証明する。

This is to certify that the annexed is a true copy of the following application as filed with this Office.

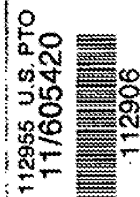
出 願 年 月 日
Date of Application: 2005年11月30日

出 願 番 号
Application Number: 特願2005-346319

パリ条約による外国への出願
に用いる優先権の主張の基礎
となる出願の国コードと出願
番号
the country code and number
of your priority application,
as used for filing abroad
under the Paris Convention, is

JP2005-346319

願 人
Applicant(s): 株式会社エヌ・ティ・ティ・ドコモ



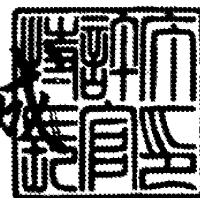
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2006年 9月27日

特許庁長官
Commissioner,
Japan Patent Office

中 嶋 誠



出証番号 出証特2006-3073445

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 【包括委任状番号】 0016816

【書類名】 特許請求の範囲**【請求項1】**

複数の無線端末に対してパケットの送信を行う通信システムにおける呼受付制御装置であって、

前記複数の無線端末の内、所定の最低伝送速度を満たすことができない無線端末の数とその割合との少なくとも一方に基づいて、新規の無線端末の受付を制御することを特徴とする呼受付制御装置。

【請求項2】

複数の無線端末に対してパケットの送信を行う通信システムにおける呼受付制御装置であって、

前記無線端末の平均伝送速度を測定する伝送速度把握手段と、

最低伝送速度の値を設定する最低伝送速度設定手段と、

前記無線端末の平均伝送速度の値が、前記最低伝送速度の値よりも小さいか否かを判定する判定手段と、

前記平均伝送速度の値が前記最低伝送速度の値よりも小さいと判定された無線端末の数とその割合との少なくとも一方に基づいて、新規の無線端末の受付を制御する新規無線端末受付手段と、

を有することを特徴とする呼受付制御装置。

【請求項3】

複数の無線端末に対してパケットの送信を行う通信システムにおける呼受付制御装置であって、

前記無線端末の平均伝送速度を測定する伝送速度把握手段と、

最低伝送速度の値を設定する最低伝送速度設定手段と、

前記無線端末の平均伝送速度の値が、前記最低伝送速度の値よりも小さい場合に、前記無線端末の平均伝送速度の値を初期化する平均伝送速度初期化手段と、

前記平均伝送速度の値を初期化された無線端末の数とその割合との少なくとも一方に基づいて、新規の無線端末の受付を制御する新規無線端末受付手段と、

を有することを特徴とする呼受付制御装置。

【請求項4】

複数の無線端末 n (n は無線端末の添え字) に対してパケットの送信を行う通信システムにおける呼受付制御装置であって、

前記無線端末 n の無線状態 R_n と、前記無線端末 n の伝送速度 $avgR_n$ と、を把握する状態把握手段と、

最低伝送速度 $targetR_n$ 及び伝送速度閾値 $R_{threshold}$ を設定する最低伝送速度設定手段と、

前記伝送速度 $avgR_n$ から前記最低伝送速度 $targetR_n$ を引いたものが、前記伝送速度閾値 $R_{threshold}$ よりも小さい場合に、前記伝送速度 $avgR_n$ の値を初期化する伝送速度初期化手段と、

前記無線状態 R_n をべき乗する指数 α と、前記伝送速度 $avgR_n$ から前記最低伝送速度 $targetR_n$ を引いたものをべき乗する指数 β と、を設定する設定手段と、

各無線端末 n に対する評価関数 C_n を、

$C_n = R_n^\alpha / (avgR_n - targetR_n)^\beta$

に従って算出する評価関数算出手段と、

前記評価関数 C_n が最大となる無線端末を送信相手の無線端末として選択する無線端末選択手段と、

前記伝送速度 $avgR_n$ を初期化された無線端末 n の数とその割合との少なくとも一方に基づいて、新規の無線端末の受付を制御する新規無線端末受付手段と、

を有することを特徴とする呼受付制御装置。

【請求項5】

請求項4記載の呼受付制御装置であって、前記伝送速度初期化手段は、連続する所定の

出証特2006-3073445

時間間隔において、前記伝送速度 $\text{avgR}_n - \text{targetR}_n$ が、前記伝送速度閾値 $R_{\text{threshold}}$ よりも小さい場合に、前記伝送速度 avgR_n の値を初期化することを特徴とする呼受付制御装置。

【請求項 6】

請求項 2 から請求項 4 までのいずれか 1 項に記載の呼受付制御装置であって、

前記新規無線端末受付手段は、前記平均伝送速度が前記最低伝送速度よりも小さいと判定された無線端末の数と、その無線端末の数の割合と、前記平均伝送速度を初期化された無線端末の数と、その無線端末の数の割合とのうちの少なくとも 1 つが、所定の閾値よりも大きい場合に、新規の無線端末を受け付けないことを特徴とする呼受付制御装置。

【請求項 7】

請求項 2 から請求項 4 までのいずれか 1 項に呼受付制御装置であって、

前記新規無線端末受付手段は、前記平均伝送速度が前記最低伝送速度よりも小さいと判定された無線端末の数と、その無線端末の数の割合と、前記平均伝送速度を初期化された無線端末の数と、その無線端末の数の割合とのうちの少なくとも 1 つに加えて、

通信を行っている無線端末の数に基づいて、新規の無線端末の受付を制御することを特徴とする呼受付制御装置。

【請求項 8】

請求項 7 に記載の呼受付制御装置であって、

前記新規無線端末受付手段は、

前記平均伝送速度が前記最低伝送速度よりも小さいと判定された無線端末の数と、その無線端末の数の割合と、前記平均伝送速度を初期化された無線端末の数と、その無線端末の数の割合とのうちの少なくとも 1 つが、所定の閾値より大きく、かつ、前記通信を行っている無線端末の数とその割合との少なくとも一方が、別の所定の閾値よりも大きい場合に、新規の無線端末を受け付けないことを特徴とする呼受付制御装置。

【請求項 9】

請求項 2 から請求項 4 までのいずれか 1 項に呼受付制御装置であって、

前記新規無線端末受付手段は、前記平均伝送速度が前記最低伝送速度よりも小さいと判定された無線端末の数と、その無線端末の数の割合と、前記平均伝送速度を初期化された無線端末の数と、その無線端末の数の割合とのうちの少なくとも 1 つを計算する際、サービス種別、契約種別、端末種別、ユーザ識別子、及び、Priority Class の少なくとも 1 つに応じて計算することを特徴とする呼受付制御装置。

【書類名】明細書

【発明の名称】呼受付制御装置

【技術分野】

【0001】

本発明は呼受付制御装置に関し、特に移動体通信におけるパケット通信システムにおいて呼受付制御を行う呼受付制御装置に関する。

【背景技術】

【0002】

移動通信システムは有限のリソース（周波数や電力）を用いて通信を行うシステムであり、その通信容量には上限が存在する。よって、上記通信容量に応じて、セル内の移動局の数を制限する必要がある。具体的には、新規の無線端末が当該セルにおいて通信を開始しようとした場合に、上記新規の無線端末が当該セルにおいて通信を開始してよいか否かを判定する必要がある、このような制御を呼受付制御という。また、新規の無線端末が当該セルにおいて通信を開始してはいけないと判定するような状況、すなわち、上記通信容量をほぼ100%使用している状況を容量限界と呼ぶ。

【0003】

従来の呼受付制御としては、例えば、当該セル内で通信中の移動局の総数が所定の閾値を超えていない場合に、新規の無線端末が通信を開始することを許可し、当該セル内で通信中の移動局の総数が所定の閾値を超えている場合に、新規の無線端末が通信を開始することを許可しないといった制御方法がある。

ところで、第3世代移動通信システム、いわゆるIMT (International Mobile Telecommunications) - 2000の標準化については、地域標準化機関等により組織された3GPP/3GPP2 (Third-Generation Partnership Project/Third-Generation Partnership Project2) において、前者ではW-CDMA方式、後者ではcdma2000方式に係る標準仕様が規定されている。

【0004】

3GPPでは、近年のインターネットの急速な普及に伴い、特に下りリンクにおいてデータベースやWebサイトからのダウンロード等による高速・大容量のトラフィックが増加するとの予測に基づき下り方向の高速パケット伝送方式である「HSDPA (High Speed Downlink Packet Access)」の仕様が規定されている（例えば、非特許文献1参照）。また、3GPP2でも、上記同様の観点から下り方向の高速データ専用の伝送方式「1xEV-DO」の仕様が規定されている（例えば、非特許文献2参照）。なお、cdma2000 1xEV-DOにおいて、DOはData onlyの意味である。

【0005】

以下では、HSDPAに関して、さらに説明を行う。

HSDPAは、複数の移動局が1つの共有チャネルを共有して通信を行うシステムであり、無線基地局は、TTI (Time Transmission Interval、HSDPAでは2ms) 毎に上記複数の移動局の中から上記共有チャネルを使用する移動局を選択し、パケットの送信を行う。この場合、そのデータトラフィックの発生仕方によって、容量限界に達した場合のセル内の移動局の数に差が生じることになる。例えば、全ての移動局がFTP (File Transfer Protocol) によるダウンロードを行った場合と、全ての移動局がWeb browsingを行った場合とでは、前者よりも後者の方が、容量限界に達した場合のセル内の移動局数が大きくなる。その理由は、FTPによるダウンロードでは、移動局に対して常に送信すべきパケットが存在するが、Web browsingの場合には、ユーザがWeb ページを閲覧するリーディングタイムが存在するため、移動局に対して送信すべきパケットが存在しない時間帯が存在するからである。すなわち、Web browsingの場合には、1台の移動局が共有チャネルを使用する頻度が小さいため、より多くの移動局が1つの共有チャネルを共有することができる。以上より、HSDPAにおいては、データトラフィックの発生仕方によって、容量限界において収容可能な移動局の数は変動してしまう。

【0006】

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また、HSDPAでは、移動局と無線基地局との間の無線状態に応じて無線チャネルの変調方式や符号化率を制御する方式（HSDPAでは、適応変調・符号化AMCS (Adaptive Modulation and Coding Scheme) と呼ばれている）を採用しており、移動局と無線基地局との間の無線状態（SIR）に応じて、伝送速度が変動する。一方、上記無線状態（SIR）は屋外環境や屋外環境、市街地や郊外といったセルの形態によって、大きく異なる。すなわち、HSDPAにおいては、セルの形態によっても、容量限界において収容可能な移動局の数は変動してしまう。

【0007】

このようなHSDPAにおいては、上述した従来方法の呼受付制御、すなわち、セル内において通信を行っている移動局の数に基づいた呼受付制御を行った場合、容量限界におけるセル内において通信を行っている移動局の数は一定であるため、各移動局の位置やセル内の形態に依存して、容量限界における各移動局の伝送速度が異なることになる。例えば、屋内環境では他セルからの干渉が少なく、無線品質が良好であるため、容量限界における各移動局の伝送速度が高いが、屋外環境では他セルからの干渉が多く、無線品質が良好ではないため、容量限界における各移動局の伝送速度が低いということが考えられる。

しかしながら、容量限界における各移動局の伝送速度は、HSDPAを用いて提供する通信のサービス性によって決定されるべきものであり、セル形態や各移動局の位置に関係なく、一定であることが望ましい。

【0008】

以下では、HSDPAにおけるスケジューリングに関して説明を行う。上述したように、HSDPAは、複数の移動局が1つの共有チャネルを共有して通信を行うシステムであり、無線基地局は、TTI (Time Transmission Interval、HSDPAでは2ms) 毎に上記複数の移動局の中から上記共有チャネルを使用する移動局を選択し、パケットの送信を行う。この基地局がTTI毎に上記共有チャネルを使用する移動局を選択することをスケジューリングと呼ぶ。

【0009】

このスケジューリングのアルゴリズムとしては、無線基地局装置に属する移動局に順（例えば、移動局#1→#2→#3→…）に下り共有チャネルの送信割り当てパケットの送信順序を制御するラウンドロビンスケジューラが良く知られている。また、各移動局の無線状態や各移動局の平均伝送速度に基づいて送信待ちパケットの送信順序を制御するProportional FairnessスケジューラやMAX C/I (Maximum C/I) スケジューラが知られている。

例えば、Proportional Fairnessスケジューラは、評価関数

$$C_n = R_n / \text{avg}R_n$$

を各移動局に関して算出し、上記評価関数 C_n が最も大きい移動局に対してパケットを割り当てるというスケジューリングを行う。但し、 R_n は各移動局の瞬時の無線状態、 $\text{avg}R_n$ は各移動局の平均伝送速度である。

【0010】

Proportional Fairnessスケジューラは、各々の移動局において、下り品質が比較的良好な状況での送信割り当てが行われるため、ラウンドロビンスケジューラと比較して、高いスループットを得ることが期待できる。その上で、各移動局の平均伝送速度で除算することで、平均伝送速度が高い移動局の評価関数式の値を下げ、時間的な公平性の高い割り当てを実現することができる。

【0011】

また、サービス性の観点から、最低伝送速度を考慮したProportional Fairnessスケジューリングを提供する方法が例えば特許文献1において提案されている。特許文献1では、評価関数 C_n として、

$$C_n = R_n / \text{avg}R_n$$

の代わりに、

$$C_n = R_n / (\text{avg}R_n - \text{target}R)$$

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を用いることが提案されている。ここで、target Rは、上記最低伝送速度である。

【0012】

その他、特許文献2では、呼を受け付けた場合における上り干渉量、下り総送信電力を推定し、その推定した上り干渉量が干渉量閾値以上であるか否か、下り総送信電力が送信電力閾値以上であるか否か、及び、使用されていない残りの拡散コード資源が拡散コード閾値以下であるか否かを判定し、その判定結果に応じて呼受付要求を認めるかどうか制御している。

【0013】

また、特許文献3では、サービスの種別または優先度に応じて、新規の呼受付の規制を行っている。

さらに、特許文献4では、リソース使用状況やパケットユーザ数に応じて、新規の呼受付を規制している。

【特許文献1】特開2005-130053号公報

【特許文献2】特開2002-232941号公報

【特許文献3】特開2002-223239号公報

【特許文献4】特開2002-217956号公報

【非特許文献1】3GPP TR25.848 v4.0.0

【非特許文献2】3GPP2 C.S0024 Rev.1.0.0

【発明の開示】

【発明が解決しようとする課題】

【0014】

上述したように、複数の移動局に対してパケットを送信する通信システムにおける呼受付制御方法として、当該セル内で通信を行っている移動局の総数が所定の閾値を超えた場合に新規の無線端末の受付を行わないという方法がある。

しかしながら、上記従来の呼受付制御方法では、パケットデータの生起の仕方やセルの形態に応じて適切に呼受付制御を行うことができない、という欠点がある、すなわち、従来の呼受付制御方法を行った場合、容量限界における移動局の伝送速度は、パケットデータの生起の仕方やセルの形態に応じて異なってしまう、という問題点が存在する。

本発明は上述した従来技術の問題点を解決するためになされたものであり、その目的はパケットデータの生起の仕方やセルの形態に対して適応的に呼受付制御を行い、新規呼の受け付けを効率良く制御することができる呼受付制御装置を提供することである。

【課題を解決するための手段】

【0015】

本発明の請求項1による呼受付制御装置は、複数の無線端末に対してパケットの送信を行う通信システムにおける呼受付制御装置であって、

前記複数の無線端末の内、所定の最低伝送速度を満たすことができない無線端末の数とその割合との少なくとも一方に基づいて、新規の無線端末の受付を制御することを特徴とする。所定の最低伝送速度を満たすことができない無線端末の数とその割合とのいずれか一方に基づいてセル内の輻輳状態を推定し、呼受付制御を行うことにより、トラヒックの発生の仕方やセルの形態に関係無く適切に呼受付制御を行うことができる。

【0016】

本発明の請求項2による呼受付制御装置は、複数の無線端末に対してパケットの送信を行う通信システムにおける呼受付制御装置であって、

前記無線端末の平均伝送速度を測定する伝送速度把握手段と、

最低伝送速度の値を設定する最低伝送速度設定手段と、

前記無線端末の平均伝送速度の値が、前記最低伝送速度の値よりも小さいか否かを判定する判定手段と、

前記平均伝送速度の値が前記最低伝送速度の値よりも小さいと判定された無線端末の数とその割合との少なくとも一方に基づいて、新規の無線端末の受付を制御する新規無線端末受付手段と、

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を有することを特徴とする。平均伝送速度の値が最低伝送速度の値よりも小さいと判定された無線端末の数とその割合とのいずれか一方に基づいて、セル内の輻輳状態を推定し、呼受付制御を行うことにより、トラヒックの発生の仕方やセルの形態に関係無く適切に呼受付制御を行うことができる。

【0017】

本発明の請求項3による呼受付制御装置は、複数の無線端末に対してパケットの送信を行う通信システムにおける呼受付制御装置であって、

前記無線端末の平均伝送速度を測定する伝送速度把握手段と、

最低伝送速度の値を設定する最低伝送速度設定手段と、

前記無線端末の平均伝送速度の値が、前記最低伝送速度の値よりも小さい場合に、前記無線端末の平均伝送速度の値を初期化する平均伝送速度初期化手段と、

前記平均伝送速度の値を初期化された無線端末の数とその割合との少なくとも一方に基づいて、新規の無線端末の受付を制御する新規無線端末受付手段と、

を有することを特徴とする。スケジューリングにおいて、平均伝送速度の値が初期化された無線端末の数及びその割合のいずれか一方に基づいてセル内の輻輳状態を推定し、呼受付制御を行うことにより、トラヒックの発生の仕方やセルの形態に関係無く適切に呼受付制御を行うことができる。

【0018】

本発明の請求項4による呼受付制御装置は、複数の無線端末 n (n は無線端末の添え字)に対してパケットの送信を行う通信システムにおける呼受付制御装置であって、

前記無線端末 n の無線状態 R_n と、前記無線端末 n の伝送速度 $avrgR_n$ と、を把握する状態把握手段と、

最低伝送速度 $targetR_n$ 及び伝送速度閾値 $R_{threshold}$ を設定する最低伝送速度設定手段と、

前記伝送速度 $avrgR_n$ から前記最低伝送速度 $targetR_n$ を引いたものが、前記伝送速度閾値 $R_{threshold}$ よりも小さい場合に、前記伝送速度 $avrgR_n$ の値を初期化する伝送速度初期化手段と、

前記無線状態 R_n をべき乗する指数 α と、前記伝送速度 $avrgR_n$ から前記最低伝送速度 $targetR_n$ を引いたものをべき乗する指数 β と、を設定する設定手段と、

各無線端末 n に対する評価関数 C_n を、

$$C_n = R_n^\alpha / (avrgR_n - targetR_n)^\beta$$

に従って算出する評価関数算出手段と、

前記評価関数 C_n が最大となる無線端末を送信相手の無線端末として選択する無線端末選択手段と、

前記伝送速度 $avrgR_n$ を初期化された無線端末 n の数とその割合との少なくとも一方に基づいて、新規の無線端末の受付を制御する新規無線端末受付手段と、

を有することを特徴とする。このように呼受付制御を行うことにより、トラヒックの発生の仕方やセルの形態に関係無く適切に呼受付制御を行うことができる。

【0019】

本発明の請求項5による呼受付制御装置は、請求項4記載の呼受付制御装置であって、前記伝送速度初期化手段は、連続する所定の時間間隔において、前記伝送速度 $avrgR_n - targetR_n$ が、前記伝送速度閾値 $R_{threshold}$ よりも小さい場合に、前記伝送速度 $avrgR_n$ の値を初期化することを特徴とする。所定の時間間隔においてこのように呼受付制御を行うことにより、トラヒックの発生の仕方やセルの形態に関係無く適切に呼受付制御を行うことができる。

【0020】

本発明の請求項6による呼受付制御装置は、請求項2から請求項4までのいずれか1項に記載の呼受付制御装置であって、

前記新規無線端末受付手段は、前記平均伝送速度が前記最低伝送速度よりも小さいと判定された無線端末の数と、その無線端末の数の割合と、前記平均伝送速度を初期化された

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無線端末の数と、その無線端末の数の割合とのうちの少なくとも1つが、所定の閾値よりも大きい場合に、新規の無線端末を受け付けないことを特徴とする。このように呼受付制御を行うことにより、トラヒックの発生の仕方やセルの形態に関係無く適切に呼受付制御を行うことができる。

【0021】

本発明の請求項7による呼受付制御装置は、請求項2から請求項4までのいずれか1項に呼受付制御装置であって、

前記新規無線端末受付手段は、前記平均伝送速度が前記最低伝送速度よりも小さいと判定された無線端末の数と、その無線端末の数の割合と、前記平均伝送速度を初期化された無線端末の数と、その無線端末の数の割合とのうちの少なくとも1つに加えて、

通信を行っている無線端末の数に基づいて、新規の無線端末の受付を制御することを特徴とする。通信を行っている無線端末の数をも考慮した呼受付制御を行うことにより、より適切に呼受付制御を行うことができる。

【0022】

本発明の請求項8による呼受付制御装置は、請求項7に記載の呼受付制御装置であって、

前記新規無線端末受付手段は、

前記平均伝送速度が前記最低伝送速度よりも小さいと判定された無線端末の数と、その無線端末の数の割合と、前記平均伝送速度を初期化された無線端末の数と、その無線端末の数の割合とのうちの少なくとも1つが、所定の閾値より大きく、かつ、前記通信を行っている無線端末の数とその割合との少なくとも一方が、別の所定の閾値よりも大きい場合に、新規の無線端末を受け付けないことを特徴とする。このように呼受付制御を行うことにより、より適切に呼受付制御を行うことができる。

【0023】

本発明の請求項9による呼受付制御装置は、請求項2から請求項4までのいずれか1項に呼受付制御装置であって、

前記新規無線端末受付手段は、前記平均伝送速度が前記最低伝送速度よりも小さいと判定された無線端末の数と、その無線端末の数の割合と、前記平均伝送速度を初期化された無線端末の数と、その無線端末の数の割合とのうちの少なくとも1つを計算する際、サービス種別、契約種別、端末種別、ユーザ識別子、及び、Priority Classの少なくとも1つに応じて計算することを特徴とする。サービス種別、契約種別、端末種別、ユーザ識別子、Priority Classを考慮した呼受付制御を行うことにより、より適切に呼受付制御を行うことができる。

【発明の効果】

【0024】

以上説明したように本発明は、平均伝送速度の値が初期化された移動局の数又はその割合に基づいて、当該セルの輻輳状態を推定し、呼受付制御を行うことにより、当該セルのセル形態、トラヒック状況に関係なく適切な呼受付制御を実現できるという効果がある。

【発明を実施するための最良の形態】

【0025】

以下、本発明の実施の形態を、図面を参照して説明する。なお、以下の説明において参照する各図では、他の図と同等部分は同一符号によって示されている。

(実施形態1)

以下、本発明の実施形態1について、図面を参照して説明する。

(システム全体の構成例)

図1は、本発明の実施形態1に係る呼受付制御装置を用いた移动通信システムの構成例を示す図である。

【0026】

同図において、この移动通信システムは、複数の移動局10～12及び21と、呼受付制御装置である無線基地局100と、それらを制御する無線制御装置300とから構成さ

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れ、前述したHSDPAを適用した場合を示している。セル1000は、基地局100が通信を提供することのできるエリアを示す。ここで、移動局10～12はすでにセル1000において基地局100とHSDPAを用いて通信を行っている状態にあり、移動局21は、セル1000において基地局100とHSDPAを用いた通信を新規に開始しようとしている状態にある。

以下、HSDPAを用いて通信を行っている移動局10～12に関しては、同一の構成、機能、状態を持つので、以下では特段の断りがない限り移動局n（nは1以上の整数）として説明を進める。また、HSDPAを用いた通信を新規に開始しようとしている状態にある移動局の一例として、移動局21を用いる。

【0027】

HSDPAにおける通信チャネルに関する説明を行う。HSDPAにおける下りリンクにおいては、各移動局10～12で共有して使用される下り共有物理チャネルHS-DSCH（High Speed-Physical Downlink Shared Channel、トランスポートチャネルで言えば、HS-DSCH: High Speed Downlink Shared Channel）と、各移動局で共有して使用される下り共有制御チャネルHS-SCCH（High Speed-Shared Control Channel）と、各移動局に個別に割り当てられる、上記共有物理チャネルに付随する下りリンク付随個別チャネル（A-DPCH: associated-Dedicated Physical Channel）とが用いられる。また、上りリンクにおいては、各移動局に個別に割り当てられる上りリンク付随個別チャネルA-DPCHに加えて、各移動局に個別に割り当てられるHSDPA用の制御チャネルHS-DPCCCH（High Speed-Dedicated Physical Control Channel）が用いられる。そして、下りリンクでは、上記下りリンク付随個別チャネルにより、上記上りリンク付随個別チャネルのための送信電力制御コマンド等が伝送され、上記共有物理チャネルによりユーザデータが伝送される。一方、上りリンクでは、上記上りリンク付随個別チャネルにより、ユーザデータ以外に、パイロットシンボル、下りリンク付随個別チャネル送信のための電力制御コマンド（TPC コマンド）が伝送され、上記HSDPA用の個別制御チャネルにより、共有チャネルのスケジューリングや、AMCS（適応変調・符号化）に用いるための下り品質情報、及び、下りリンクの共有チャネルHS-DSCHの送達確認情報が伝送される。

【0028】

（無線基地局の構成例）

図2は、図1に示す無線基地局100の構成例を示す機能ブロック図である。

同図において、この無線基地局100は、送受信アンテナ101と、アンプ部102と、送受信部103と、ベースバンド信号処理部104と、呼処理部105と、伝送路インターフェース106から構成される。下りリンクのパケットデータについては、無線基地局100の上位に位置する無線制御装置300から伝送路インターフェース106を介してベースバンド信号処理部104に入力される。ベースバンド信号処理部104では、再送制御（HARQ（Hybrid Automatic Repeat reQuest）の処理や、スケジューリング、伝送フォーマット選択、チャネル符号化、拡散処理が行われて送受信部103に転送される。送受信部103では、ベースバンド信号処理部104から出力されたベースバンド信号を無線周波数帯に変換する周波数変換処理が施され、その後、アンプ部102で増幅されて送受信アンテナ101より送信される。

【0029】

一方、上りリンクのデータについては、送受信アンテナ101で受信された無線周波数信号がアンプ部102で増幅され、送受信部103で周波数変換されてベースバンド信号に変換される。このベースバンド信号は、ベースバンド信号処理部104で逆拡散やRAKE合成、誤り訂正復号がなされた後、伝送路インターフェース106を介して無線制御装置に転送される。

また、呼処理部105では、無線制御装置と呼処理制御信号の送受信を行い、無線基地局100の状態管理やリソース割り当てが行われる。

【0030】

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(ベースバンド信号処理部の構成例)

図3は、上記ベースバンド信号処理部104の機能構成を示す機能ブロック図である。同図において、ベースバンド信号処理部104は、レイヤー1処理部111と、MAC-hs (Medium Access Control-HSDPAの略称) 処理部112から構成される。ベースバンド信号処理部104におけるレイヤー1処理部111とMAC-hs処理部112はそれぞれ呼処理部105と接続される。レイヤー1処理部111では、下りデータのチャネル符号化や上りデータのチャネル復号化、上下の個別チャネルの送信電力制御や、RAKE合成、拡散・逆拡散処理が行われる。

また、レイヤー1処理部111では、各移動局からの上りHSDPA用個別物理チャネルに載せられて報告される下り無線状態を示す情報を受け取り、MAC-hs処理部112に通知する。MAC-hs処理部112では、HSDPAにおける下り共有チャネルのHARQや送信待ちパケットに対するスケジューリングが行われる。また、MAC-hs処理部112では、後述するように、移動局21が当該セル1000において新規にHSDPAを用いた通信を開始することができるか否かを判定する呼受付判定も行われる。

【0031】

(MAC-hs処理部の構成例)

図4は、図3に示すMAC-hs処理部112の機能構成例を示す図である。同図において、MAC-hs処理部112は、例えば、以下の機能ブロックを備えて構成される。

- (1) フローコントロール部120
- (2) MAC-hsリソース計算部130
- (3) スケジューラ部140
- (4) TFR (Transport Format and Resource) 選択部150
- (5) 移動局伝送速度初期化部160
- (6) 移動局伝送速度計算部170
- (7) 評価関数計算部180
- (8) 最低伝送速度設定部190
- (9) HS呼受付判定部200

【0032】

(フローコントロール部)

上記(1)のフローコントロール部120は、無線制御装置から伝送路インターフェース106を介して受信される信号の伝送速度を、実装されているバッファの容量等に基づいて調整する機能を備える。各フローコントロール(#1~#N) 121₁~121_Nは、パケットの流通量を監視し、パケット流通量が増大し、キューバッファのメモリの空きが減少してくると送信パケット送出量を抑制する処理を行う。

(MAC-hsリソース計算部)

上記(2)のMAC-hsリソース計算部130は、HS-DSCHに割り当てる無線リソース(電力リソースや符号リソース、ハードウェアリソースなど)を計算するHS-DSCHパワーリソース計算部131とHS-DSCHコードリソース計算部132を備える。

【0033】

(スケジューラ部)

上記(3)のスケジューラ部140は、N個のプライオリティキュー(#1~#N) 141₁~141_Nと、N個のリオーダーリング部(#1~#N) 142₁~142_Nと、N個のHARQ部(#1~#N) 143₁~143_Nとを有する。プライオリティキュー(#1~#N) 141₁~141_Nとは、コネクション毎のキューであり、通常は、1ユーザで1プライオリティキューを持つが、1ユーザが複数のコネクションを持つ場合には、1ユーザで複数のプライオリティキューを持つ。プライオリティキュー(#1~#N) 141₁~141_Nには、下りリンクのデータが入れられスケジューリングで選択されるまで蓄積される。リオーダーリング部(#1~#N) 142₁~142_Nでは、HARQにおける再送制御において、下りの受信順序制御を移動局nが行えるように、データに対してシーケンス

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番号を付与し、移動局 n の受信バッファがあふれないようにウィンドウ制御を行う。HARQ部 (#1~#N) 1431~143Nでは、Mプロセスのストップアンドウェイトプロトコルによって、上りAck/Nack (Acknowledgment/Negative Acknowledgment) フィードバックに基づいたHARQの再送制御を行う。ここでは、Mはプロセスの数を示す。

【0034】

(TFR選択部)

上記(4)のTFR選択部150には、N個のTFRSelect機能(#1~#N) 1511~151Nが備えられている。これらN個のTFRSelect機能(#1~#N) 1511~151Nは、スケジューラ部140で選択されたユーザのデータについて、上りチャネルで受信する下り品質インジケータであるCQI (Channel Quality Indicator) や、MAC-RLSリソース計算部で計算されたHS-DSCHに割り当てる無線リソース(電力リソース、符号リソース、ハードウェアリソース)などに基づいて、下り伝送チャネルの伝送フォーマット(コード変調、変調多値数、符号化率)及び送信電力を決定する。このTFRSelect機能で決定された下り伝送チャネルの伝送フォーマット及び送信電力はレイヤー1処理部へと通知される。

【0035】

(移動局伝送速度初期化部)

上記(5)の移動局伝送速度初期化部160では、後述する移動局伝送速度計算部170から、移動局 n の平均伝送速度(プライオリティキュー1411~141N毎に計算される平均伝送速度) $avrgR_n$ を受け取り、また、後述する最低伝送速度設定部190から、移動局 n の最低伝送速度 $targetR_n$ を受け取る。そして、上記平均伝送速度 $avrgR_n$ を初期化するか否かを判定し、上記平均伝送速度 $avrgR_n$ を初期化すべきだと判定した場合には、上記判定結果を、移動局伝送速度計算部170に通知する。さらに、移動局伝送速度初期化部160は上記平均伝送速度を初期化するか否かの判定結果を、後述する呼受付判定部200にも通知する。

【0036】

ここで、以下に、上記平均伝送速度 $avrgR_n$ を初期化するか否かの判定方法の例を記載する。

例えば、上記平均伝送速度 $avrgR_n$ から上記最低伝送速度 $targetR_n$ を引いたもの、すなわち、 $avrgR_n - targetR_n$ が所定の伝送速度閾値 $R_{threshold}$ よりも小さい場合には、上記平均伝送速度 $avrgR_n$ を初期化すべきだと判定する。

また、例えば、上記平均伝送速度 $avrgR_n$ から上記最低伝送速度 $targetR_n$ を引いたもの、すなわち、 $avrgR_n - targetR_n$ が、連続する所定の時間間隔 $T_{imethreshold}$ において、所定伝送速度閾値 $R_{threshold}$ よりも小さい場合には、上記平均伝送速度 $avrgR_n$ を初期化すべきだと判定する。

【0037】

具体的な例をあげるならば、 $avrgR_n - targetR_n$ が、連続する50TTI (1TTI = 2[m s])であるため、100[m s])において、常に所定の伝送速度閾値 $R_{threshold}$ よりも小さい場合に、上記平均伝送速度 $avrgR_n$ を初期化すべきだと判定してもよい。また、あるいは、 $avrgR_n - targetR_n$ が、連続する50TTI (1TTI = 2[m s])であるため、100[m s])において、所定の伝送速度閾値 $R_{threshold}$ よりも小さいTTIが20回以上存在した場合に、上記平均伝送速度 $avrgR_n$ を初期化すべきだと判定してもよい。

【0038】

なお、上記所定の伝送速度閾値 $R_{threshold}$ 及び所定の時間間隔 $T_{imethreshold}$ は、上記例においては、全ての移動局に共通の値としているが、移動局毎に設定してもよい。また、上記所定の伝送速度閾値 $R_{threshold}$ 及び所定の時間間隔 $T_{imethreshold}$ を、サービス種別毎、あるいは、契約種別毎、あるいは、端末種別毎、あるいは、ユーザ毎、あるいは、セル毎、あるいは、Priority Class毎に、設定してもよい。

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【0039】

(移動局伝送速度計算部)

上記(6)の移動局伝送速度計算部170では、移動局n(平均伝送速度)が計算される。例えば、次式に基づき移動局nの伝送速度(平均伝送速度)が計算される。

$$\text{avgRn}(t) = \delta \cdot \text{avgRn}(t-1) + (1-\delta) \cdot r_n \quad \dots (1)$$

ここで、式(1)において、 δ は、平均化区間を指定するパラメータ、言い換えれば、平均化のための忘却係数($0 \leq \delta \leq 1$)である。本パラメータ δ は、前記プライオリティキュー141₁~141_N内のデータに係るサービス種別や契約種別、受信器種別(RAKE受信器、等化器や受信ダイバーシチ、干渉キャンセラや、その他のUE(User Equipment)のCapability(受信可能な変調方式や受信可能なコード数、ビット数等によってクラス分けされた指標)等)、セル種別、プライオリティクラス種別に基づいて設定されることができる。

【0040】

また、式(1)において、 r_n は瞬時伝送速度を示すものであり、MAC-hs処理部112において

<1>送信されたデータの送達確認ができたデータのサイズ(データ量)、又は

<2>送信されたデータのサイズ(データ量)、又は

<3>移動局nから報告される下り瞬時の無線状態、あるいは、前記無線状態から推定される送信可能なデータのサイズ(データ量)

のいずれかを移動局nにおけるデータ伝送速度(瞬時のデータ伝送速度)とする。

【0041】

上記式(1)に基づいて求められた移動局nの平均伝送速度の更新機会の組み合わせは、例えば、以下の式(2)に示すようなものが考えられる。

タイプ#	avgRnの更新機会	r _n の計算方法
1	接続時間中の全てのTTI毎	上記<1>
2	接続時間中の全てのTTI毎	上記<2>
3	接続時間中の全てのTTI毎	上記<3>
4	スケジューリングの計算を行ったTTI毎	上記<1>
5	スケジューリングの計算を行ったTTI毎	上記<2>

…(2)

【0042】

移動局伝送速度計算部170は、移動局伝送速度初期化部160から、平均伝送速度avgRnを初期化するべきである、と通知された場合、上記平均伝送速度avgRnを初期化する。具体的な初期化方法としては、例えば、平均伝送速度avgRnを瞬時の無線状態Rnと同一とする、といった方法が考えられる。ここで、瞬時の無線状態Rnは、例えば、レイヤー1処理部111から出力される移動局nの下りリンクの瞬時の無線状態、あるいは、上記無線状態から推定される送信可能なデータのサイズ(データ量)である。

【0043】

なお、移動局nの平均伝送速度avgRnを求めるには、上記方法の他に、例えば、データリンク層でのデータの伝送速度を測定する機能がMAC-hs処理部112に備えられ、移動局nがデータ通信状態に入った後、MAC-hs処理部112に流入したデータ量を一定時間毎に測定する。そして、その測定された一定時間毎のデータ量を移動局nにおける平均伝送速度avgRnとする場合もある。

【0044】

(評価関数計算部)

上記(7)の評価関数計算部180では、スケジューラ部140でのスケジューリングの際に用いられる移動局毎の評価関数が計算される。スケジューラ部140では、上記の評価関数計算部180で計算された移動局毎の評価関数のうち最大の評価関数を持つ移動局nを選択し、その移動局nに対し送信キューを割り当てる。すなわち、下りリンクの送信割り当てを行う。

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【0045】

(最低伝送速度設定部)

上記(8)の最低伝送速度設定部190は、プライオリティキュー141₁乃至141_N内の下りパケットについて考慮すべき最低伝送速度 $target R_n$ を設定し、上記最低伝送速度 $target R_n$ を、移動局伝送速度初期化部160及び評価関数計算部180に通知する。ここで、最低伝送速度設定部190は、呼処理部105を介して遠隔からの指定に応じて、最低伝送速度 $target R_n$ を設定するように構成されてもよい。

【0046】

また、最低伝送速度設定部190は、サービス種別毎に、契約種別毎に、端末種別毎に、セル種別毎に、又は優先度クラス毎に、最低伝送速度 $target R_n$ を設定するように構成されてもよい。例えば、サービス種別は、下りパケットを送信するサービスの種別を示すものであり、例えば、VoIP (Voice over Internet Protocol) サービスや音声サービスやストリーミングサービスやFTPサービス等を含む。また、契約種別は、下りパケットの宛先移動局のユーザが加入している契約の種別を示すものであり、例えば、Low Class契約やHigh Class契約等を含む。また、端末種別は、下りパケットの宛先移動局の性能をクラス分けするものであり、移動局の識別情報に基づくクラスや、RAKE受信機能や等化器や受信ダイバーシチや干渉キャンセラ等の有無又は種別や、受信可能な変調方式やコード数やビット数等の端末能力等を含む。また、セル種別は、下りパケットの宛先移動局が在圏するセルの形態の種別を示すものであり、例えば、セルの識別情報に基づくクラスや、屋内又は屋外や、郊外又は市街地や、高トラフィック地帯又は低トラフィック地帯等を含む。さらには、優先度クラスは、下りパケットの送信に関わる優先度を示すものであり、例えば、第1の優先度の下りパケットは、第2の優先度の下りパケットよりも優先的に送信される。

【0047】

また、最低伝送速度設定部190は、

$$avgR_n - target R_n \leq minus R_n \quad \dots (3)$$

の場合、評価関数 C_n の分母に設定すべき値 $minus R_n$ を、プライオリティキュー141₁乃至141_N毎に設定するように構成されている。なお、式(3)において、 $avgR_n$ は平均伝送速度、 $target R_n$ は最低伝送速度である。

ここで、最低伝送速度設定部190は、 $target R_n = 0$ と設定してもよい。この場合、評価関数計算部180において用いられる評価関数 C_n は一般的なPF (Proportional Fairness) スケジューリングを提供することになる。

【0048】

(HS呼受付判定部)

上記(9)のHS呼受付判定部200は、移動局伝送速度初期化部160から、移動局 n に関してその平均伝送速度 $avgR_n$ が初期化されたか否かの判定結果を受け取る。そして、上記平均伝送速度 $avgR_n$ が初期化された移動局の数あるいは割合に基づいて、移動局21がセル1000においてHSDPAを用いた通信を新規に開始することができるか否かの判定を行い、上記判定結果を、伝送路インターフェース106を介して、無線制御装置300に通知する。

【0049】

ここで、以下に、HS呼受付判定部200が、その平均伝送速度 $avgR_n$ が初期化された移動局の数あるいは割合に基づいて、移動局21がセル1000においてHSDPAを用いた通信を新規に開始することができるか否かを判定する方法を記載する。

例えば、HS呼受付判定部200は、平均伝送速度 $avgR_n$ が初期化された移動局の数を算出し、上記平均伝送速度 $avgR_n$ が初期化された移動局の数が10よりも小さい場合には、移動局21はセル1000においてHSDPAを用いた通信を新規に開始することができると判定し、平均伝送速度 $avgR_n$ が初期化された移動局の数が10以上である場合には、移動局21はセル1000においてHSDPAを用いた通信を新規に開始することができないと判定してもよい。

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【0050】

さらに例えば、HS呼受付判定部200は、平均伝送速度avgRnが初期化された移動局の割合を算出し、上記平均伝送速度avgRnが初期化された移動局の割合が、セル1000においてHSDPAを用いた通信を行っている全移動局の20%よりも小さい場合に、移動局21はセル1000においてHSDPAを用いた通信を新規に開始することができると判定し、平均伝送速度avgRnが初期化された移動局の割合が、セル1000においてHSDPAを用いた通信を行っている全移動局の20%以上である場合に、移動局21はセル1000においてHSDPAを用いた通信を新規に開始することができないと判定してもよい。ここで、上記セル1000においてHSDPAを用いた通信を行っている全移動局とは、プライオリティキューにデータが滞留している状態にある全ての移動局であってもよいし、あるいは、基地局100との間でA-DPCHが設定されている状態にある全ての移動局であってもよい。

【0051】

また、上述した2つの例では、その平均伝送速度avgRnが初期化された移動局の数に基づいて、移動局21がセル1000においてHSDPAを用いた通信を新規に開始することができるか否かを判定する方法と、その平均伝送速度avgRnが初期化された移動局の割合に基づいて、移動局21がセル1000においてHSDPAを用いた通信を新規に開始することができるか否かを判定する方法と、を記載したが、その平均伝送速度avgRnが初期化された移動局の数とその割合との両方に基づいて、移動局21がセル1000においてHSDPAを用いた通信を新規に開始することができるか否かを判定してもよい。

【0052】

ここで、上記における平均伝送速度avgRnが初期化された移動局の数または割合とは、例えば、所定の測定時間の間に平均伝送速度avgRnが初期化された移動局の数または割合のことである。例えば、HS呼受付判定部200が上記判定を行う時点から見た、過去の3分間に少なくとも1回、平均伝送速度avgRnが初期化された移動局の数または割合のことである。あるいは、所定の測定時間の間に平均伝送速度avgRnが初期化された回数が所定の閾値以上の移動局を、平均伝送速度avgRnが初期化された移動局としてもよい。例えば、HS呼受付判定部200が上記判定を行う時点から見た、過去の3分間に少なくとも3回以上、平均伝送速度avgRnが初期化された移動局の数または割合のことである。

【0053】

なお、上述した移動局21がセル1000においてHSDPAを用いた通信を新規に開始することができるか否かの判定を、Priority Class毎に行ってもよい。この場合、Priority Class毎に平均伝送速度avgRnが初期化された移動局の数あるいは割合を算出して、上述したような判定を行う。

【0054】

あるいは、複数のPriority Classに関する平均伝送速度avgRnが初期化された移動局の数あるいは割合の合計を用いて、上述したような判定を行ってもよい。この場合、平均伝送速度avgRnが初期化された移動局の数あるいは割合を、Priority Classに応じた重み付けを行って合計してもよい。例えば、優先度の高いPriority Classと、優先度の低いPriority Classとが存在する場合に、優先度の高いPriority Classの移動局に関しては、平均伝送速度avgRnが初期化された移動局の数あるいは割合に1.0を掛け算し、優先度の低いPriority Classの移動局に関しては、平均伝送速度avgRnが初期化された移動局の数あるいは割合に0.5を掛け算して、合計を行ってもよい。また、あるいは、優先度の低いPriority Classの移動局に関しては、平均伝送速度avgRnが初期化された移動局の数あるいは割合に0.0を掛け算して、合計を行ってもよい。

【0055】

あるいは、上記した移動局21がセル1000においてHSDPAを用いた通信を新規に開始することができるか否かの判定を、サービス種別毎、あるいは、契約種別毎、ある

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いは、端末種別毎、あるいは、ユーザ毎、あるいは、セル毎に行ってもよい。この場合、サービス種別毎、あるいは、契約種別毎、あるいは、端末種別毎、あるいは、ユーザ毎、あるいは、セル毎に、平均伝送速度 avrgR_n が初期化された移動局の数あるいはその割合を算出して、上述したような判定を行う。

【0056】

なお、上述した例では、初期化された移動局の数あるいは割合を用いて判定を行ったが、移動局が複数のプライオリティキューを持つ場合には、初期化された移動局のプライオリティキューの数あるいはその割合を用いて判定を行ってもよい。この場合、スケジューリングに関連する処理も移動局が持つプライオリティキュー毎に行われる。

【0057】

なお、上述した例では、HS呼受付判定部200は、平均伝送速度 avrgR_n が初期化された移動局の数あるいは割合に基づいて、移動局21がセル1000においてHSDPAを用いた通信を新規に開始することができるか否かの判定を行ったが、より簡単に、各移動局 n の伝送速度に基づいて、移動局21がセル1000においてHSDPAを用いた通信を新規に開始することができるか否かの判定を行ってもよい。例えば、移動局伝送速度計算部170より各移動局 n の伝送速度 avrgR_n を受け取り、上記各移動局 n の伝送速度 avrgR_n に基づいて、移動局21がセル1000においてHSDPAを用いた通信を新規に開始することができるか否かの判定を行ってもよい。具体的には、伝送速度 avrgR_n が所定の閾値よりも小さい移動局の数、あるいは、割合に基づいて、移動局21がセル1000においてHSDPAを用いた通信を新規に開始することができるか否かの判定を行ってもよい。

【0058】

(無線制御装置の構成例)

図5は、無線制御装置300の機能構成を示す機能ブロック図である。但し、本図においては、無線制御装置300の機能のうち、新規の呼を設定する部分のみを記載しており、その他の機能に関しては省略している。無線制御装置300は、新規呼設定部310を備えている。

【0059】

新規呼設定部310は、無線基地局100内のHS呼受付判定部200より、移動局21がセル1000においてHSDPAを用いた通信を新規に開始することができるか否かの判定結果を受け取る。そして、新規呼設定部310は、移動局21がセル1000においてHSDPAを用いた通信を新規に開始することができるという判定結果の場合には、移動局21がセル1000においてHSDPAを用いた通信を開始するための処理を実行する。すなわち、通信を開始するための制御信号を無線基地局100及び移動局21に通知し、通信の設定を行う。一方、新規呼設定部310は、移動局21がセル1000においてHSDPAを用いた通信を新規に開始することができないという判定結果の場合には、移動局21がセル1000においてHSDPAを用いた通信を開始するための処理を実行しない。この場合、例えば、新規呼設定部310は、HSDPAを用いた通信を開始するための処理を実行する代わりに、個別チャネルを用いた通信を開始するための処理を実行してもよい。この場合、移動局21は、セル1000において個別チャネルを用いた通信を行うことになる。あるいは、新規呼設定部310は、HSDPAを用いた通信を開始するための処理を実行する代わりに、移動局21に、HSDPAの通信を行うことができないという情報を通知してもよい。この場合、移動局21が開始しようとした通信は呼損となる。

【0060】

なお、ここで、無線基地局100内のHS呼受付判定部200においてHSDPAの通信を開始することが可能か否かの判定を行い、無線制御装置300内の新規呼設定部310において実際にHSDPAの通信を設定するかしないかの呼受付制御を行ったが、本発明はこの一実施形態に限定されるものではない。すなわち、無線基地局100においてHSDPAの通信を開始することが可能か否かの判定とHSDPAの通信の設定を行っても

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よく、あるいは、無線制御装置 300 において HSDPA の通信を開始することが可能か否かの判定と、HSDPA の通信の設定を行ってもよい。

【0061】

次に、本発明に係る呼受付制御の動作について、図 6 に示すフローチャートを用いて説明する。なお、本発明に係る呼受付制御は、スケジューリング動作と関連しているため、図 7 を用いてスケジューリングの動作についても説明を行う。

(呼受付制御)

図 6 において、まずステップ S1 において、HS 呼受付判定部 200 は、移動局 21 がセル 1000 において新規に HSDPA を用いた通信を開始しようとしているという情報を取得する。ステップ S2 において、HS 呼受付判定部 200 は、移動局伝送速度初期化部 160 より、平均伝送速度 $avgR_n$ が初期化された移動局の数取得する。

【0062】

ステップ S3 において、平均伝送速度 $avgR_n$ が初期化された移動局の数が所定の閾値、例えば「10」よりも小さいか否かを判定する。そして、平均伝送速度 $avgR_n$ が初期化された移動局の数が所定の閾値よりも小さいと判定した場合にはステップ S4 に進み、平均伝送速度 $avgR_n$ が初期化された移動局の数が所定の閾値よりも小さくない場合にはステップ S6 に進む。

【0063】

ステップ S4 において、HS 呼受付判定部 200 は、移動局 21 がセル 1000 において新規に HSDPA を用いた通信を開始することができると判定する。

ステップ S5 において、新規呼設定部 310 は、移動局 21 がセル 1000 において新規に HSDPA を用いた通信を行うための通信の設定を行う。

ステップ S6 において、HS 呼受付判定部 200 は、移動局 21 がセル 1000 において新規に HSDPA を用いた通信を開始することができないと判定する。

【0064】

ステップ S7 において、新規呼設定部 310 は、移動局 21 がセル 1000 において新規に個別チャネルを用いた通信を行うための通信の設定を行う。ここで、新規呼設定部 310 は、移動局 21 がセル 1000 において新規に個別チャネルを用いた通信を行うための通信の設定を行う代わりに、移動局 21 はセル 1000 において新規に通信を行うことができないと判断し、どのような通信の設定も行わないという処理を行ってもよい。この場合、移動局 21 が行おうとした通信は呼損となる。

ところで、上記のステップ S2、S3 において、指標として平均伝送速度 $avgR_n$ が初期化された移動局の数を用いたが、代わりに、セル 1000 において通信を行っている全ての移動局の数に対する、平均伝送速度 $avgR_n$ が初期化された移動局の数の割合を用いてもよい。

【0065】

さらに、上記においては、ステップ S2～S7 の処理が、移動局 21 がセル 1000 において新規に HSDPA を用いた通信を開始したタイミングで行われる場合を記載したが、予め決められた時間間隔でステップ S2～S7 の処理を行ってもよい。例えば、3 秒を判定周期とし、3 秒毎にステップ S2～S7 の処理を行ってもよい。この場合、セル 1000 において新規に通信を行うことができると判定した場合には、新規呼設定部 310 は、その次の 3 秒間において、セル 1000 において HSDPA を用いた通信を開始しようとした全ての移動局に対して、HSDPA を用いた通信を行うための通信の設定を行う。また、セル 1000 において新規に通信を行うことができないと判定した場合には、新規呼設定部 310 は、その次の 3 秒間において、セル 1000 において HSDPA を用いた通信を開始しようとした全ての移動局に対して、個別チャネルを用いた通信を行うための通信の設定を行う。

【0066】

(スケジューリング動作)

次に、図 7 を用いて、本発明に係る呼受付制御と関連するスケジューリング動作につい

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て説明を行う。

図7において、MAC-hs処理部112の評価関数計算部180は、まず、ステップS101において、移動局nの評価関数を計算するための初期値設定を行う。

(初期値設定)

$n = 1$

$C_{\max} = 0$

$n_{\max} = 0$

ここで、nは移動局の添え字を表し、 $C_{\max}$ は、評価関数の最大値を表し、 $n_{\max}$ は、評価関数が最大となる移動局の添え字を表す。

【0067】

ステップS102～S104では、評価関数C_nの計算に用いる下記の(1)～(3)の情報の取得が行われる。

(1) ステップS102: レイヤー1処理部111から出力される移動局nの下りリンクの瞬時の無線状態、あるいは、上記無線状態から推定される送信可能なデータのサイズ(データ量)の取得(但し、「無線状態から推定される送信可能なデータのサイズ」とは、下りの品質を示すCQI、或いは、下り伝送チャネルの瞬時SIRと、MAC-hsリソース計算部で計算されたHS-DSCHに割り当てる無線リソースとから、所定の誤り率で送信可能と推定されるデータのサイズのことを表す)

(2) ステップS103: 移動局伝送速度計算部170から出力される移動局nの平均伝送速度 $avrgR_n$ の取得

(3) ステップS104: 最低伝送速度設定部190から出力される移動局nの最低伝送速度 $targetR_n$ の取得

【0068】

ステップS105では、上記(1)～(3)の情報が全て取得されたかどうか判定され、上記(1)～(3)の情報が全て取得されたとき(ステップS105でYES)は、次ステップに移行し、そうでなければ(ステップS105でNO)、上記(1)～(3)の情報のうち未取得情報の取得が行われる。

ステップS106では、平均伝送速度 $avrgR_n$ を初期化するか否かの判定を行う。例えば、連続する所定の時間間隔 $Time_{threshold}$ において、 $avrgR_n - targetR_n$ が、所定の伝送速度閾値 $R_{threshold}$ よりも小さい場合には(ステップS106でYES)ステップS107に進み、そうでない場合には(ステップS106でNO)、ステップS108に進む。

【0069】

ステップS107では、ステップS106において、平均伝送速度 $avrgR_n$ を初期化すると判定されたため、平均伝送速度 $avrgR_n$ を初期化する。

ステップS108では、呼処理部105を介して遠隔から指定される指数パラメータ(α 、 β)を受け取り、ステップS109で次の式(4)に従って、評価関数(C_n)が計算される。

$$\begin{aligned} & (avrgR_n - targetR_n) >_{\min} R_n \quad \text{の時} \\ & C_n = R_n^{\alpha} / (avrgR_n - targetR_n)^{\beta} \\ & (avrgR_n - targetR_n) \leq_{\min} R_n \quad \text{の時} \\ & C_n = R_n^{\alpha} /_{\min} R_n^{\beta} \end{aligned}$$

… (4)

【0070】

以下に、ステップS106、S107において、平均伝送速度 $avrgR_n$ を初期化することの作用効果を説明する。 $avrgR_n - targetR_n$ が、「0」に近づいた場合、当該移動局nに関する評価関数 C_n の値は増大する。この動作は、その平均伝送速度が考慮すべき最低伝送速度よりも小さくなった移動局nに対してパケット(HS-DSCH)を優先的に割り当てることとなり、本来であれば正しい動作であるが、逆に、そのような平均伝送速度が考慮すべき最低伝送速度よりも小さい移動局が多数存在した場合には、上記移動局に

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必要以上にパケットを割り当てることとなり、他の移動局にパケットが割り当てられず、システム全体のスループットは劣化する。そこで、ある所定の時間間隔 $T_{imethreshold}$ において、上記移動局 n の $avrgR_n - targetR_n$ が、所定の伝送速度閾値 $R_{threshold}$ よりも小さい場合に、上記平均伝送速度 $avrgR_n$ を初期化することにより、上記システム全体のスループットの劣化を回避することが可能となる。

【0071】

また、上記のような平均伝送速度 $avrgR_n$ が初期化される移動局の数または割合は、当該セルの輻輳状態を示す指標として用いることができる。すなわち、考慮すべき最低伝送速度を満たすことができない移動局が多数存在する場合には、当該セルは輻輳状態にあると判断することができる。一方で、考慮すべき最低伝送速度を満たすことができない移動局が多数存在しない場合には、当該セルは輻輳状態にないと判断することができる。

【0072】

ここで、上記所定の時間間隔 $T_{imethreshold}$ や、所定の伝送速度閾値 $R_{threshold}$ は、遠隔、例えば、無線基地局 100 の上位ノード（例：無線制御装置やコアネットワーク上のサーバ等）から指定する。例えば、呼処理制御信号に含められて上位ノードから無線基地局 100 へと通知される。無線基地局 100 は、上記呼処理制御信号に含まれる所定の時間間隔 $T_{imethreshold}$ や、所定の伝送速度閾値 $R_{threshold}$ を、呼処理部 105 で受け取り、ベースバンド信号処理部 104 内の $MAC-hs$ 処理部 112 の評価関数計算部 180 に転送する。また、あるいは、上記所定の時間間隔 $T_{imethreshold}$ や、所定の伝送速度閾値 $R_{threshold}$ は、無線基地局 100 の局データとして保持され、ベースバンド信号処理部 104 内の $MAC-hs$ 処理部 112 の評価関数計算部 180 は、上記局データ内の上記所定の時間間隔 $T_{imethreshold}$ や、所定の伝送速度閾値 $R_{threshold}$ を参照してもよい。

【0073】

なお、上記例において、 α 及び β の値を適切に設定することにより、いわゆる典型的な Proportional Fairness スケジューラ ($\alpha=1$ 、 $\beta=1$) と、MAX/Cn スケジューラ ($\alpha=1$ 、 $\beta \sim 0$ (但し、 $\beta \neq 0$)) の中間のスケジューラを提供することが可能となる。

また、本発明は、上記発明に限定されることはなく、評価関数 C_n の式の一部分が " $R_n \alpha / (avrgR_n - targetR_n) \beta$ " であるスケジューラの場合に適用することが可能である。例えば、評価関数の式が、

$$C_n = R_n \alpha / (avrgR_n - targetR_n) \beta \cdot W_n \gamma \cdots (5)$$

というスケジューラの場合にも、本発明により、平均伝送速度 $avrgR_n$ が、連続する所定の時間間隔 $T_{imethreshold}$ において、所定の伝送速度閾値 $R_{threshold}$ よりも小さい場合には、上記平均伝送速度 $avrgR_n$ を初期化する、という処理を加えてもよい。但し、式 (5) において、 α 、 β 、 γ はパラメータ係数であり、0 から 1 までのいずれかの値をとる。また、式 (5) において、 W_n は移動局 n に関する、無線基地局におけるパケットの滞留時間を表す。

【0074】

上記のようにしてステップ S109 で評価関数 C_n が計算されると、その計算された評価関数 C_n が最大値であるかどうかの判定（ステップ S110）が行われる。ここでは、 $C_{max}=0$ に設定（初期値）されているので、ステップ S109 で測定された評価関数 C_n が C_{max} に設定され、その C_{max} が与える移動局 n が移動局 n_{max} として設定される（ステップ S111）。

【0075】

ステップ S112 では、次の移動局の評価関数を計算するために移動局 n を +1 インクリメントする。そして、移動局 n が無線基地局と通信中の移動局数 (m) を超えると判断されなければ（ステップ S113 で NO）、上記のステップ S102 以降のループ処理が移動局数 (m) を超えると判断されるまで繰り返し行われる。すなわち、無線基地局と通信中の移動局全ての評価関数 C_n が計算される。一方、ステップ S113 で移動局 n が無

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線基地局と通信中の移動局数(m)を超えると判断されたときは(ステップS113でYES)、ステップS111で設定された移動局nmaxに対して送信キューの割り当てを行うようにスケジューラ部140に指示する(ステップS114)。

【0076】

以上説明したような本実施形態によれば、平均伝送速度avrgRnの初期化を行うスケジューリングにおいて、上記平均伝送速度avrgRnの初期化が行われた移動局の数に基づいて輻輳状態を推定することにより、セルの形態、トラフィック状況に関係なく、呼受付制御を行うことが可能となる。

なお、MAC-hs処理部112の評価関数計算部180は、例えば、CPUやデジタルシグナルプロセッサ(DSP)、或いはFPGA(Field Programmable Gate Array)等のプログラムの書き換えが可能なプログラマブルデバイスで構成され、所定のメモリ領域に上述した評価関数のプログラムが記憶され、パラメータ(α 、 β 、 δ 、Time threshold、Rthreshold)をダウンロードして書き換える構成がとられる。この時、上記パラメータ(α 、 β 、 δ 、Time threshold、Rthreshold)を無線基地局の上位ノードからダウンロードしてもよいし、評価関数計算部180に端末I/F(外部インターフェース機能)を設け、端末から直接上記パラメータ(α 、 β 、 δ 、Time threshold、Rthreshold)を読み込ませるような形態であってもよい。

【0077】

また、上述したMAC-hs処理部112の各機能ブロックは、ハードウェアで分割される場合もあるし、プロセッサ上のプログラムでソフトウェアとして分割されている場合もありうる。

また、上述した本発明に係る呼受付制御の動作では、平均伝送速度avrgRnが初期化された移動局の数あるいは割合に基づいて、移動局21がセル1000においてHSDPAを用いた通信を新規に開始することができるか否かの判定を行ったが、より簡単に、各移動局nの伝送速度に基づいて、移動局21がセル1000においてHSDPAを用いた通信を新規に開始することができるか否かの判定を行ってもよい。各移動局nの伝送速度に基づいて、移動局21がセル1000においてHSDPAを用いた通信を新規に開始することができるか否かの判定を行った場合の呼受付制御の動作を、図8に示すフローチャートを用いて説明する。

【0078】

図8において、まずステップS21において、HS呼受付判定部200は、移動局21がセル1000において新規にHSDPAを用いた通信を開始しようとしているという情報を取得する。

ステップS22において、HS呼受付判定部200は、移動局伝送速度計算部170より、各移動局nの平均伝送速度avrgRnを取得し、上記平均伝送速度avrgRnが所定の閾値TH1よりも小さい移動局の数を取得する。ここで、例えば、上記所定の閾値TH1を64kbpsと設定することができる。また、例えば、上記平均伝送速度avrgRnが、連続する所定の時間間隔Time thresholdにおいて、所定の閾値TH1よりも小さい移動局の数を取得してもよい。

【0079】

ステップS23において、上記平均伝送速度avrgRnが所定の閾値TH1よりも小さい移動局の数が、所定の閾値TH2、例えば「10」よりも小さいか否かを判定する。そして、平均伝送速度avrgRnが所定の閾値TH1よりも小さい移動局の数が所定の閾値TH2よりも小さいと判定した場合にはステップS24に進み、平均伝送速度avrgRnが所定の閾値TH1よりも小さい移動局の数が所定の閾値TH2よりも小さくない場合にはステップS26に進む。

【0080】

ステップS24において、HS呼受付判定部200は、移動局21がセル1000において新規にHSDPAを用いた通信を開始できると判定する。

ステップS25において、新規呼設定部310は、移動局21がセル1000において

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新規にHSDPAを用いた通信を行うための通信の設定を行う。

ステップS26において、HS呼受付判定部200は、移動局21がセル1000において新規にHSDPAを用いた通信を開始することができないと判定する。

【0081】

ステップS27において、新規呼設定部310は、移動局21がセル1000において新規に個別チャネルを用いた通信を行うための通信の設定を行う。ここで、新規呼設定部310は、移動局21がセル1000において新規に個別チャネルを用いた通信を行うための通信の設定を行う代わりに、移動局21はセル1000において新規に通信を行うことができないと判断し、どのような通信の設定も行わないという処理を行ってもよい。この場合、移動局21が行おうとした通信は呼損となる。

ところで、上記のステップS22、S23において、指標として平均伝送速度avgRnが所定の閾値TH1よりも小さい移動局の数を用いたが、代わりに、セル1000において通信を行っている全ての移動局の数に対する、平均伝送速度avgRnが所定の閾値TH1よりも小さい移動局の数の割合を用いてもよい。

【0082】

さらに、上記においては、ステップS22～S27の処理が、移動局21がセル1000において新規にHSDPAを用いた通信を開始したタイミングで行われる場合を記載したが、予め決められた時間間隔でステップS22～S27の処理を行ってもよい。例えば、3秒を判定周期とし、3秒毎にステップS22～S27の処理を行ってもよい。この場合、セル1000において新規に通信を行うことができると判定した場合には、新規呼設定部310は、その次の3秒間において、セル1000においてHSDPAを用いた通信を開始しようとした全ての移動局に対して、HSDPAを用いた通信を行うための通信の設定を行う。また、セル1000において新規に通信を行うことができないと判定した場合には、新規呼設定部310は、その次の3秒間において、セル1000においてHSDPAを用いた通信を開始しようとした全ての移動局に対して、個別チャネルを用いた通信を行うための通信の設定を行う。

【0083】

また、上記実施例は、3GPPにおける高速パケット伝送方式HSDPAに関して記述したが、本発明は上記HSDPAに限定されるものではなく、その他の、移動通信システムにおける下りパケットの送信制御（スケジューリング）を行う高速パケット伝送方式に適用することが可能である。例えば、3GPPのLTE(Long Term Evolution)により提供される高速パケット伝送方式や、3GPP2におけるcdma2000 1xEV-DOやTDD方式における高速パケット伝送方式など、がその他の高速パケット伝送方式としてあげられる。また、上記実施例では、本発明を下りリンクにおける高速パケット伝送方式に適用する場合を記載したが、本発明を上りリンクにおける高速パケット伝送方式に適用してもよい。ここで、上りリンクにおける高速パケット伝送方式とは、例えば、3GPPや3GPP2、LTEにおける上りリンクの高速パケット伝送方式のことを指す。

【0084】

上記実施例において、移動局伝送速度計算部170の機能が伝送速度把握手段、最低伝送速度設定部190の機能が最低伝送速度設定手段、HS呼受付判定部200の機能が判定手段、新規呼設定部310が新規無線端末受付手段に対応する。

また、上記実施例において、無線基地局100及び無線制御装置は、呼受付制御装置に対応し、移動局（#1～#3）10～12は無線端末に対応する。

【0085】

（実施形態2）

以下、本発明の実施形態2について、図面を参照して説明する。

上述した実施形態1において、HS呼受付判定部200は、平均伝送速度avgRnが初期化された数あるいは割合に基づいて、移動局21がセル1000においてHSDPAを用いた通信を新規に開始することができるか否かの判定を行った。しかしながら、上記のような呼受付判定は、以下のような問題を抱えている。例えば、当該セルに2台の移動局

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が通信を行っており、その内の1台が極めて無線品質の悪い環境に存在し、その平均伝送速度avgR_nが初期化されたとする。この場合、平均伝送速度avgR_nが初期化された割合は50%となり、閾値を30%に設定したとすると、セル内に2台の移動局しか存在しないにも関わらず、当該セルは輻輳状態にあると判断されてしまう。

【0086】

以下に説明する実施の形態2においては、上記問題を克服するために、平均伝送速度avgR_nが初期化された数あるいは割合だけでなく、当該セルにおいて通信を行っている全移動局の数をも用いて呼受付判定を行う。

本実施の形態2に係る呼受付制御装置を用いた移動通信システムの構成は、上記実施の形態1とほぼ同様であり、異なる点は、HS呼受付判定部200の機能のみである。よって、以下では、HS呼受付判定部200の機能に関してのみ記載を行い、それ以外に関しては省略する。

【0087】

HS呼受付判定部200は、移動局伝送速度初期化部160から、移動局nに関してその平均伝送速度avgR_nが初期化されたか否かの判定結果を受け取る。そして、上記平均伝送速度avgR_nが初期化された移動局の数あるいは割合と、当該セル1000において通信を行っている移動局の数とに基づいて、移動局21がセル1000においてHSDPAを用いた通信を新規に開始することができるか否かの判定を行い、上記判定結果を、伝送路インターフェース106を介して、無線制御装置300に通知する。

ここで、以下に、HS呼受付判定部200が、その平均伝送速度avgR_nが初期化された移動局の数とその割合とのいずれか一方と、当該セル1000において通信を行っている移動局の数とに基づいて、移動局21がセル1000においてHSDPAを用いた通信を新規に開始することができるか否かを判定する方法を記載する。

【0088】

例えば、HS呼受付判定部200は、平均伝送速度avgR_nが初期化された移動局の数と、当該セル1000において通信を行っている移動局の数と、に基づいて、移動局21がセル1000においてHSDPAを用いた通信を新規に開始することができるか否かを判定してもよい。例えば、平均伝送速度avgR_nが初期化された移動局の数が「10」よりも小さい場合、あるいは、当該セル1000において通信を行っている移動局の数が「20」よりも小さい場合に、移動局21はセル1000においてHSDPAを用いた通信を新規に開始できると判定し、平均伝送速度avgR_nが初期化された移動局の数が「10」以上であり、かつ、当該セル1000において通信を行っている移動局の数が「20」よりも以上である場合に、移動局21はセル1000においてHSDPAを用いた通信を新規に開始することができないと判定してもよい。

【0089】

また、例えば、HS呼受付判定部200は、平均伝送速度avgR_nが初期化された移動局の割合と、当該セル1000において通信を行っている移動局の数と、に基づいて、移動局21がセル1000においてHSDPAを用いた通信を新規に開始することができるか否かを判定してもよい。例えば、平均伝送速度avgR_nが初期化された移動局の割合が20%よりも小さい場合、あるいは、当該セル1000において通信を行っている移動局の数が「20」よりも小さい場合に、移動局21はセル1000においてHSDPAを用いた通信を新規に開始できると判定し、平均伝送速度avgR_nが初期化された移動局の割合が20%以上であり、かつ、当該セル1000において通信を行っている移動局の数が「20」よりも以上である場合に、移動局21はセル1000においてHSDPAを用いた通信を新規に開始することができないと判定してもよい。

ここで、上記当該セル1000において通信を行っている移動局の数とは、プライオリティキューにデータが滞留している状態の移動局の数であってもよいし、あるいは、基地局100との間でA-DPCHが設定されている状態の移動局の数であってもよい。

【0090】

また、上記の例において、当該セル1000において通信を行っている移動局の数が、

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固定の閾値である「20」よりも以上であるかそうでないかで、移動局 21 がセル 1000 において HSDPA を用いた通信を新規に開始することができるか否かを判定したが、固定の閾値を用いる代わりに、適応的に変動する閾値を用いてもよい。例えば、セル内で通信を行うことのできる移動局の数は、HS-PDSCH に割り当てられるパワーリソース量に依存するため、HS-PDSCH に割り当てられるパワーリソース量に応じて上記閾値を適応的に変動させてもよい。すなわち、HS-PDSCH に割り当てられるパワーリソース量が全体のパワーリソース量の 50% である場合には、上記閾値を「20」とし、HS-PDSCH に割り当てられるパワーリソース量が全体のパワーリソース量の 25% である場合には、上記閾値を「10」としてもよい。あるいは、パワーリソースではなく、コードリソースを用いて同様の制御を行ってもよい。

【0091】

次に、本実施の形態 2 に係る呼受付制御の動作について、図 9 に示すフローチャートを用いて説明する。なお、本発明に係る呼受付制御と関連するスケジューリング動作は、実施の形態におけるスケジューリング動作と同様であるため省略する。

図 9 において、まずステップ S11 において、HS 呼受付判定部 200 は、移動局 21 がセル 1000 において新規に HSDPA を用いた通信を開始しようとしているという情報を取得する。

【0092】

ステップ S12 において、HS 呼受付判定部 200 は、移動局伝送速度初期化部 160 より、平均伝送速度 $avgR_n$ が初期化された移動局の数を取得する。

ステップ S13 において、平均伝送速度部が初期化された移動局の数が所定の閾値 TH_1 、例えば「10」よりも小さいか否かを判定し、平均伝送速度 $avgR_n$ が初期化された移動局の数が所定の閾値 TH_1 よりも小さいと判定した場合にはステップ S14 に進み、平均伝送速度 $avgR_n$ が初期化された移動局の数が所定の閾値 TH_1 よりも小さくないと判定した場合にはステップ S16 に進む。

ステップ S14 において、HS 呼受付判定部 200 は、移動局 21 がセル 1000 において新規に HSDPA を用いた通信を開始できると判定する。

【0093】

ステップ S15 において、新規呼設定部 310 は、移動局 21 がセル 1000 において新規に HSDPA を用いた通信を行うための通信の設定を行う。

ステップ S16 において、セル 1000 において通信を行っている移動局の数が所定の閾値 TH_2 、例えば「20」よりも小さいか否かを判定し、セル 1000 において通信を行っている移動局の数が所定の閾値 TH_2 よりも小さいと判定した場合はステップ S14 に進み、セル 1000 において通信を行っている移動局の数が所定の閾値 TH_2 よりも小さくないと判定した場合にはステップ S17 に進む。

【0094】

ステップ S17 において、HS 呼受付判定部 200 は、移動局 21 がセル 1000 において新規に HSDPA を用いた通信を開始できないと判定する。

ステップ S18 において、新規呼設定部 310 は、移動局 21 がセル 1000 において新規に個別チャネルを用いた通信を行うための通信の設定を行う。ここで、新規呼設定部 310 は、移動局 21 はセル 1000 において新規に通信を行うことができないと判断し、どのような通信の設定も行わないという処理を行ってもよい。この場合、移動局 21 が行おうとした通信は呼損となる。

ここで、上記のステップ S12、S13 において、指標として平均伝送速度 $avgR_n$ が初期化された移動局の数をを用いたが、代わりに、セル 1000 において通信を行っている全ての移動局の数に対する、平均伝送速度 $avgR_n$ が初期化された移動局の数の割合を用いてもよい。

【0095】

さらに、上記においては、ステップ S12～S18 の処理が、移動局 21 がセル 1000 において新規に HSDPA を用いた通信を開始したタイミングで行われる場合を記載し

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たが、予め決められた時間間隔でステップ S12～S18 の処理を行ってもよい。例えば、3 秒を判定周期とし、3 秒毎に S12～S18 の処理を行ってもよい。この場合、セル 1000 において新規に通信を行うことができると判定した場合には、新規呼設定部 310 は、その次の 3 秒間において、セル 1000 において HSDPA を用いた通信を開始しようとした全ての移動局に対して、HSDPA を用いた通信を行うための通信の設定を行う。また、セル 1000 において新規に通信を行うことができないと判定した場合には、新規呼設定部 310 は、その次の 3 秒間において、セル 1000 において HSDPA を用いた通信を開始しようとした移動局全てに対して、個別チャネルを用いた通信を行うための通信の設定を行う。

【0096】

なお、上述した例では、HS 呼受付判定部 200 は、平均伝送速度 $avrgR_n$ が初期化された移動局の数あるいは割合と、当該セルにおいて通信を行っている全移動局の数あるいは割合とに基づいて、移動局 21 がセル 1000 において HSDPA を用いた通信を新規に開始することができるか否かの判定を行ったが、より簡単に、各移動局 n の伝送速度と、当該セルにおいて通信を行っている全移動局の数あるいは割合とに基づいて、移動局 21 がセル 1000 において HSDPA を用いた通信を新規に開始することができるか否かの判定を行ってもよい。例えば、移動局伝送速度計算部 170 より各移動局 n の伝送速度 $avrgR_n$ を受け取り、上記各移動局 n の伝送速度 $avrgR_n$ と、当該セルにおいて通信を行っている全移動局の数あるいは割合とに基づいて、移動局 21 がセル 1000 において HSDPA を用いた通信を新規に開始することができるか否かの判定を行ってもよい。具体的には、伝送速度 $avrgR_n$ が所定の閾値よりも小さい移動局の数あるいは割合と、当該セルにおいて通信を行っている全移動局の数あるいは割合とに基づいて、移動局 21 がセル 1000 において HSDPA を用いた通信を新規に開始することができるか否かの判定を行ってもよい。

【産業上の利用可能性】

【0097】

本発明は、移動体通信におけるパケット通信の呼受付制御に利用することができる。

【図面の簡単な説明】

【0098】

【図 1】本発明の実施形態に係る呼受付制御装置である無線基地局を用いた移動通信システムの構成例を示す図である。

【図 2】図 1 中の無線基地局の構成例を示す機能ブロック図である。

【図 3】図 1 中の無線基地局のベースバンド信号処理部の機能構成を示す機能ブロック図である。

【図 4】図 1 中の無線基地局の MAC-hs 処理部の機能構成を示す機能ブロック図である。

【図 5】図 1 中の無線制御装置の機能構成を示す機能ブロック図である。

【図 6】MAC-hs 処理部での呼受付判定動作を示すフローチャートである。

【図 7】MAC-hs 処理部でのスケジューリング動作の一例を示すフローチャートである。

【図 8】MAC-hs 処理部での呼受付判定動作の他の例を示すフローチャートである。

【図 9】MAC-hs 処理部での呼受付判定動作を示すフローチャートである。

【符号の説明】

【0099】

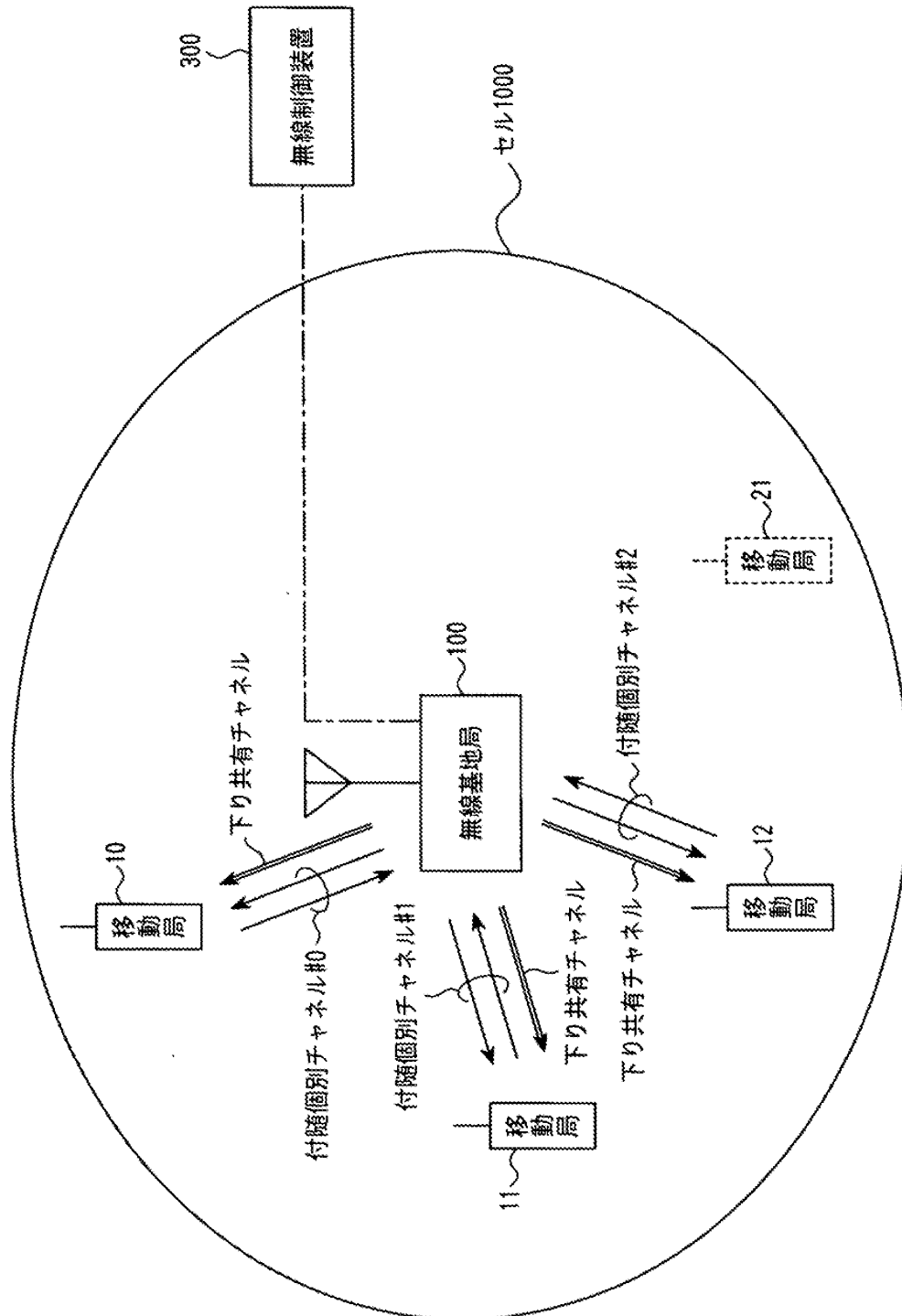
- 10～12、21 移動局
- 100 無線基地局
- 101 送受信アンテナ
- 102 アンプ部
- 103 送受信部

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104 ベースバンド信号処理部
105 呼処理部
106 伝送路インターフェース
111 レイヤー1処理部
112 MAC-hs処理部
120 フローコントロール部
121₁ ~ 121_N フローコントロール
130 MAC-hsリソース計算部
131 HS-DSCHパワーリソース計算部
132 HS-DSCHコードリソース計算部
140 スケジューラ部
141₁ ~ 141_N プライオリティキュー
142₁ ~ 142_N リオーダーリング部
143₁ ~ 143_N HARQ部
150 TFR選択部
151₁ ~ 151_N TFRselect機能
160 移動局伝送速度初期化部
170 移動局伝送速度計算部
180 評価関数計算部
190 最低伝送速度設定部
200 呼受付判定部
300 無線制御装置
310 新規呼設定部
1000 セル

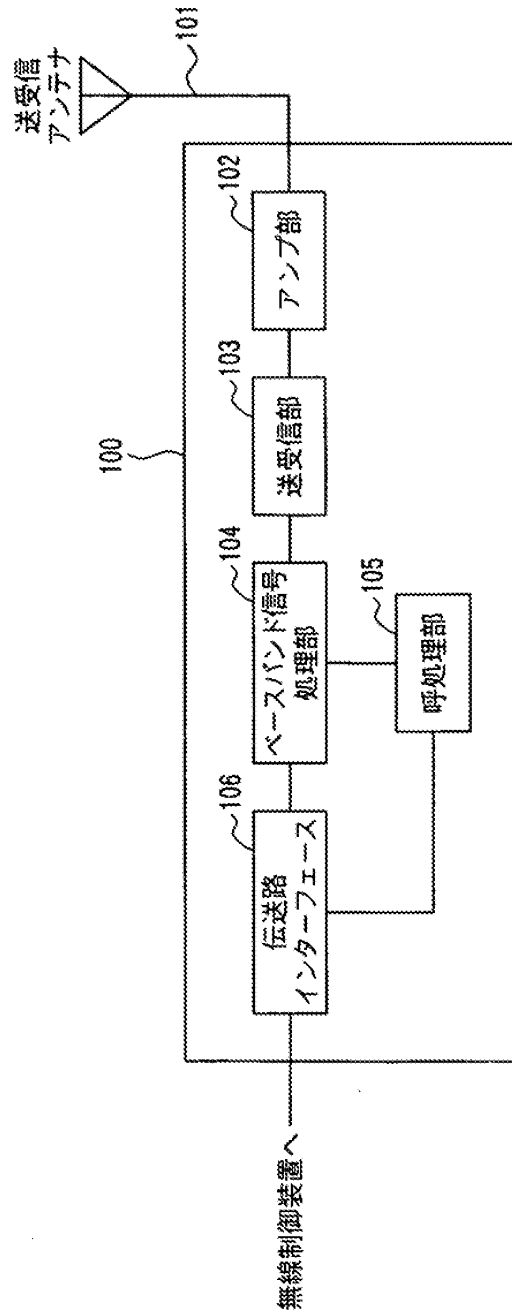
出証特 2006-3073445

【書類名】 図面
【図 1】



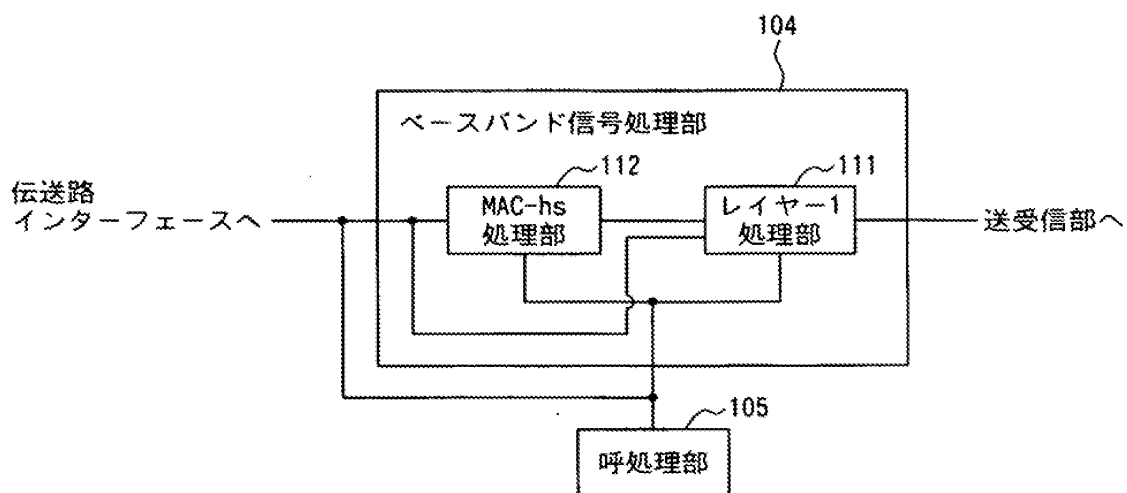
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【図 2】



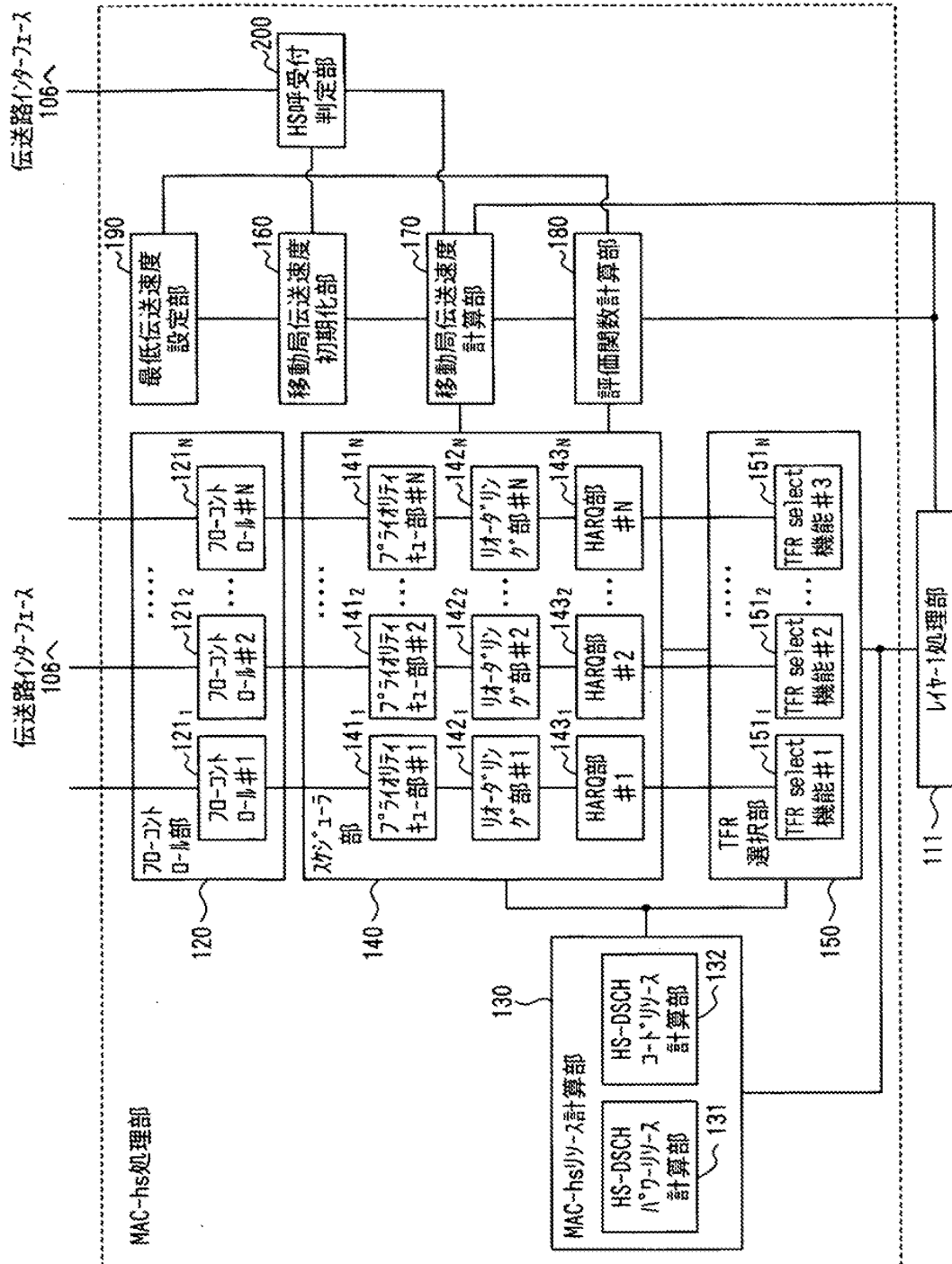
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【図 3】



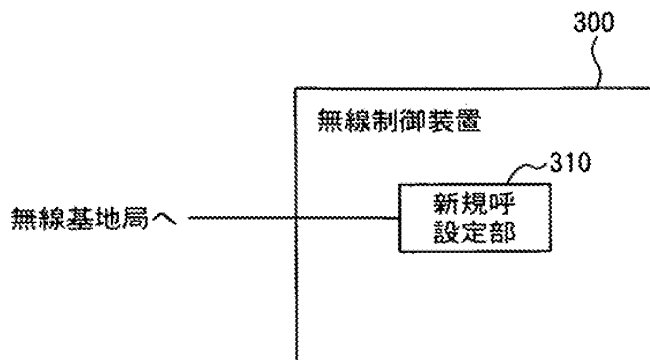
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【図4】

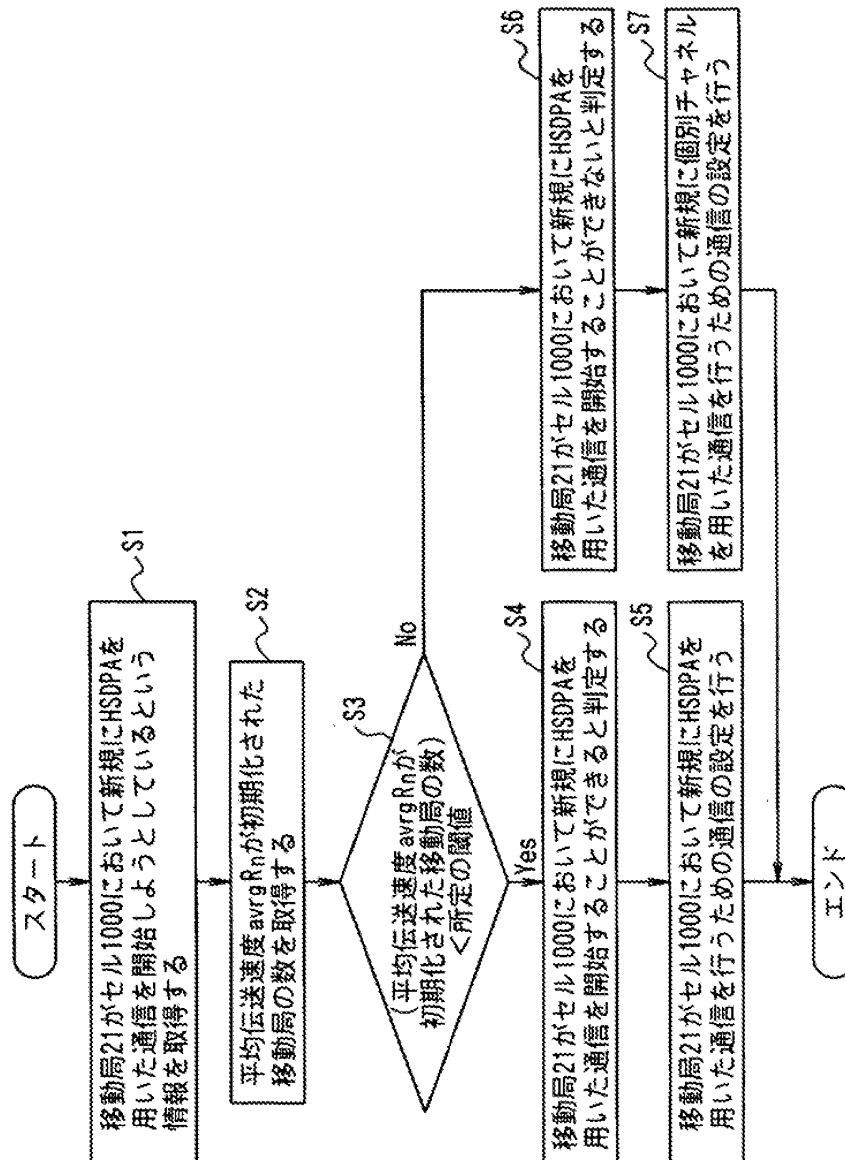


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【図 5】

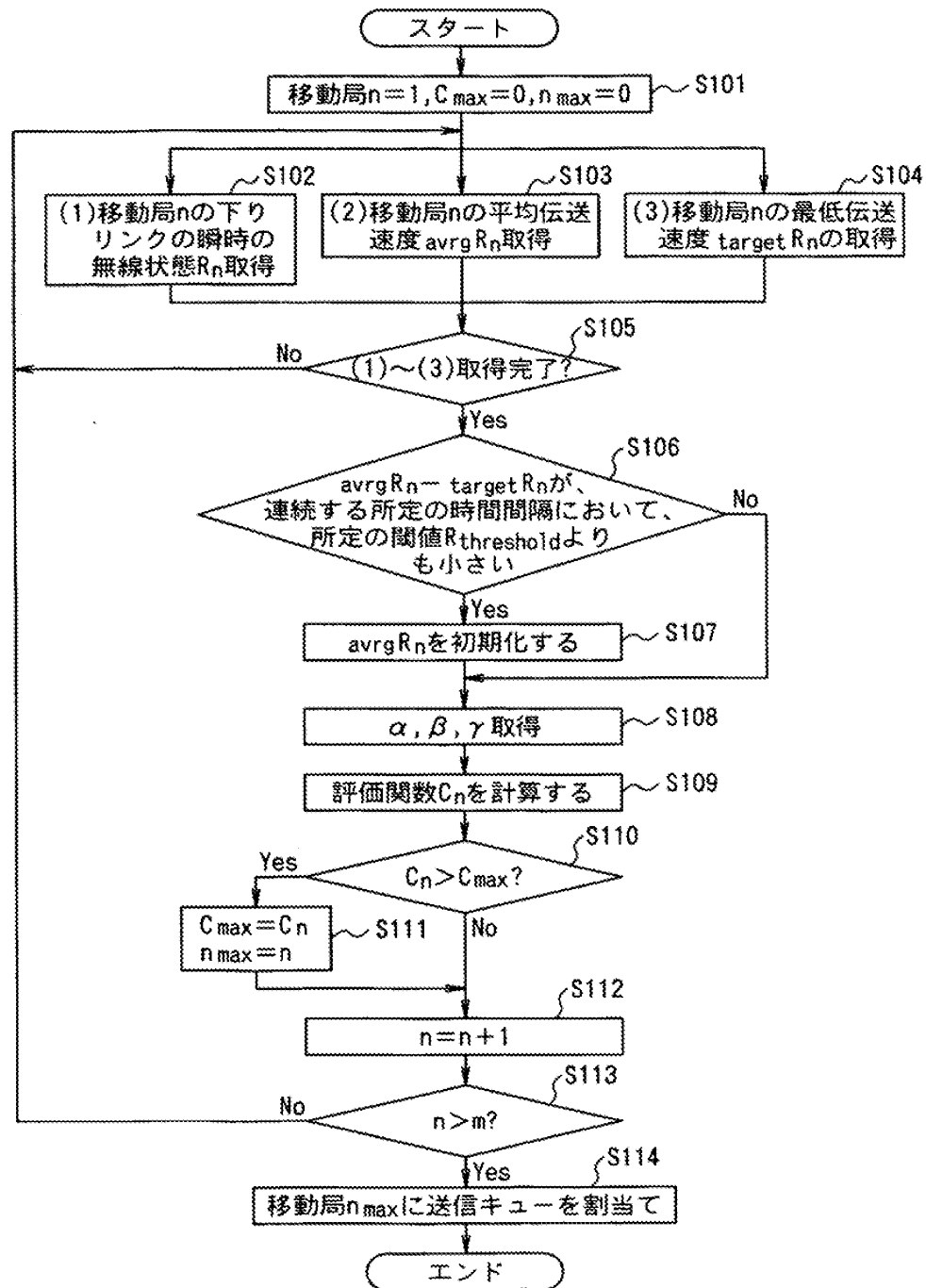


【図6】

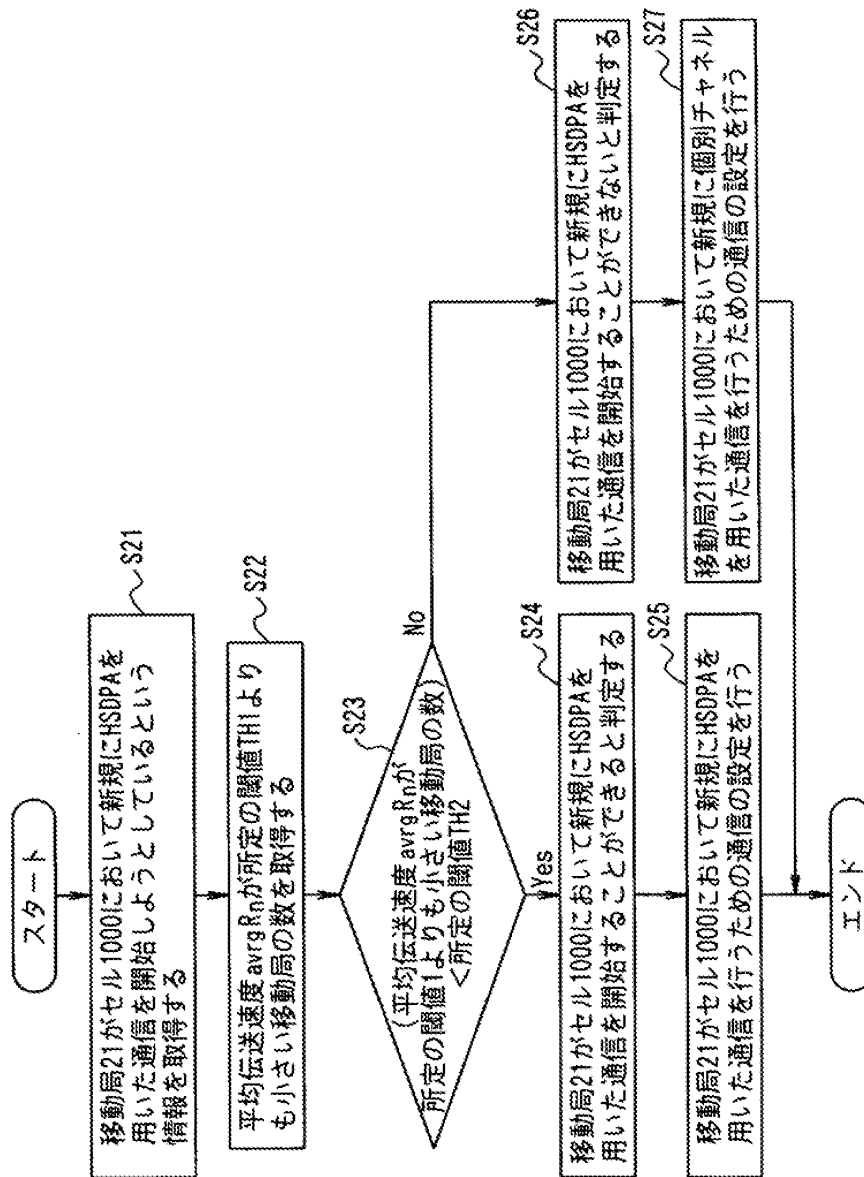


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【図7】

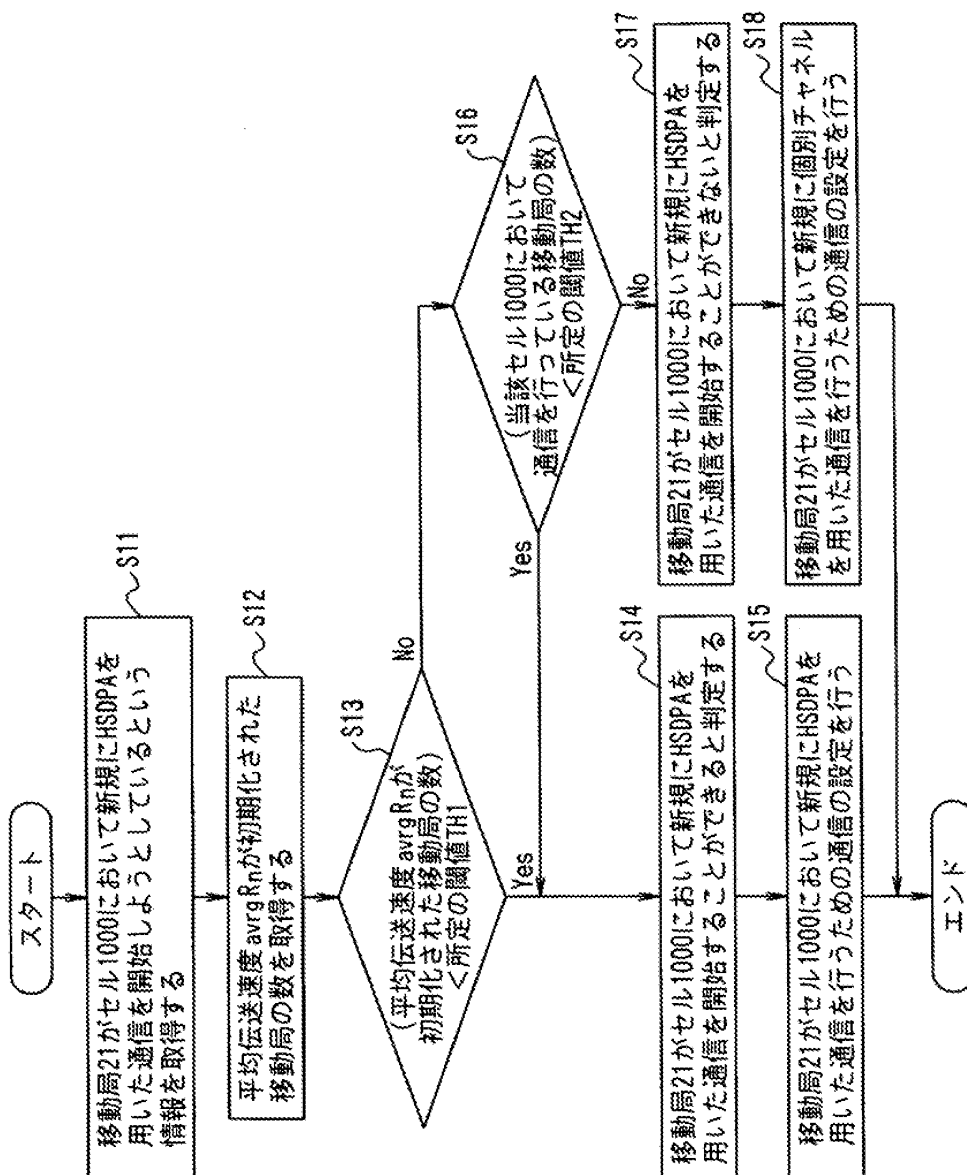


【図8】



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【図9】



出願特2006-3073445

【書類名】 要約書

【要約】

【課題】 新規呼の受け付けを効率良く制御する。

【解決手段】 スケジューリングにおいて、平均伝送速度が初期化された無線端末の数やその割合に基づいてセル内の輻輳状態を推定し、呼受付制御を行うことにより、トラヒックの発生仕方やセルの形態に関係無く、適切に呼受付制御を行うことができる。

【選択図】 図 6

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特願 2 0 0 5 - 3 4 6 3 1 9

出 願 人 履 歴 情 報

識別番号 [3 9 2 0 2 6 6 9 3]

1. 変更年月日 2 0 0 0 年 5 月 1 9 日

[変更理由] 名称変更

住所変更

住 所 東京都千代田区永田町二丁目 1 1 番 1 号
氏 名 株式会社エヌ・ティ・ティ・ドコモ

出証番号 出証特 2 0 0 6 - 3 0 7 3 4 4 5

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	Filing Date	2019-11-13
	First Named Inventor	Paul Howard
	Art Unit	2476
	Examiner Name	Ayaz R. Sheikh
	Attorney Docket Number	IPW2-USCN213316

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	1	5056109	B1	1991-10-08	Gilhousen et al.	
	2	5265119	B1	1993-11-23	Gilhousen et al.	
	3	5485486	B1	1996-01-16	Gilhousen et al.	
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	Examiner Name	Ayaz R. Sheikh	
Attorney Docket Number		IPW2-USCN213316	

	9	7215657	B2	2007-05-08	Toshimitsu et al.	
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	11	8072916	B2	2011-12-06	Dateki	
	12	6754505	B1	2004-06-22	Baker et al.	
	13	7180902	B1	2007-02-20	Raaf et al.	

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17	20080144600	A1	2008-06-19	Anderson	
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	Attorney Docket Number	IPW2-USCN213316

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	Examiner Name	Ayaz R. Sheikh	
	Attorney Docket Number	IPW2-USCN213316	

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EXAMINER SIGNATURE			
Examiner Signature	/RONALD B ABELSON/		Date Considered 02/04/2020
*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.			
<small> 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. </small>			

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	Examiner Name	Ayaz R. Sheikh	
	Attorney Docket Number	IPW2-USCN213316	

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	/Harry Vartanian/	Date (YYYY-MM-DD)	2020-01-08
Name/Print	Harry Vartanian	Registration Number	56,787

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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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. /R.B.A/

Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		16682854
	Filing Date		2019-11-13
	First Named Inventor	Paul Howard	
	Art Unit	2476	
	Examiner Name	Ayaz R. Sheikh	
	Attorney Docket Number	IPW2-USC213316	

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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	5056109	B1	1991-10-08	Gilhousen et al.	
	2	5265119	B1	1993-11-23	Gilhousen et al.	
	3	5485486	B1	1996-01-16	Gilhousen et al.	
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Attorney Docket Number		IPW2-USCN213316	

	9	7215657	B2	2007-05-08	Toshimitsu et al.	
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	12	6754505	B1	2004-06-22	Baker et al.	
	13	7180902	B1	2007-02-20	Raaf et al.	

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	1	20020061005	A1	2002-05-23	Lee et al.	
	2	20020075891	A1	2002-06-20	Souissi	
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5	20020150058	A1	2002-10-17	Kim et al.	
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	1	10201270	DE	A1	2002-08-08	CHOI SUNG HO		

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9	2006015984	WO	A1	2006-02-16	ANDERSON		
10	2005083897	WO	A1	2005-09-09	YAMAKAWA MASAKI		

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1	"3 UMTS Interfaces," UMTS Protocols and Protocol Testing, pp. 9-14, located at < http://www.tek.com/Measurement/App.sub.-Notes/2F.sub.-14251/eng/intl-erfaces.pdf >.
2	"3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Feasibility Study for Evolved UTRA and UTRAN (Release 7)," (Mar. 2006). 3GPP:Valbonne, France, TS 25.912 v0.0.4:1-13.
3	"3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; 3GPP System Architecture Evolution: Report on Technical Options and Conclusions (Release 7)," (Jul. 2005). 3GPP:Valbonne, France, TS 23.882 v0.3.0:1-13.
4	"3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; General UMTS Architecture (3G TS23.101 version 3.0.1)," (Apr. 1999). 3GPP:Valbonne, France, TS 23.101 v3.0.1 :1-13.
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8	Final Rejection issued by USPTO, dated November 19, 2009 for 11/646,692.
9	FINAL REJECTION, U.S. Patent Application No. 13/176,298, dated November 6, 2013.
10	Ghadiyaly, Z. "Tutorial: Medium Access Control (MAC) in 3G/UMTS Protocol Stack," located at < http://www.3g4g.co.uk/Tutorial/ZG/zg.sub.-mac.html > visited on Jun. 20, 2007. (9 pages).
11	International Engineering Consortium. "Universal Mobile Telecommunications System (UMTS) Protocols and Protocol Testing," located at < http://www.iec.org/online/tutorials/umts/topic02.html > visited on Jun. 20, 2007. (7 pages).

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12	International Preliminary Report on Patentability issued on Jun. 30, 2009 from PCT Application No. PCT/EP20071064483.
13	Non-Final Rejection issued by USPTO, dated May 14, 2009 for 11/646,692.
14	Non-Final Rejection issued by USPTO, dated May 28, 2010 for 11/646,692.
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21	FINAL REJECTION, U.S. Patent Application No. 14/458,693, dated May 10, 2016.
22	FINAL REJECTION, U.S. Patent Application No. 14/458,693, dated March 21, 2017

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23	FINAL REJECTION, U.S. Patent Application No. 14/458,693, dated May 17, 2018.
24	NON-FINAL REJECTION, U.S. Patent Application No. 14/458,693, dated December 30, 2015.
25	NON-FINAL REJECTION, U.S. Patent Application No. 14/458,693, dated December 2, 2016.
26	NON-FINAL REJECTION, U.S. Patent Application No. 14/458,693, dated October 23, 2017.
27	NOTICE OF ALLOWANCE, U.S. Patent Application No. 14/458,693, dated November 16, 2015.
28	ADVISORY ACTION, U.S. Patent Application No. 14/458,693, dated August 25, 2016.
29	MISCELLANEOUS COMMUNICATION TO APPLICANT, U.S. Patent Application No. 14/458,693, dated May 20, 2016
30	EXAMINER'S ANSWER TO APPEAL BRIEF, U.S. Patent Application No. 14/458,693, dated November 23, 2018.
31	THIRD GENERATION PARTNERSHIP PROJECT, "Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Overall description; Stage 2 (Release 8)," 3GPP TS 36.300 V0.3.1 (November 2006).
32	THIRD GENERATION PARTNERSHIP PROJECT, "Technical Specification Group Radio Access Network; Physical Channels and Modulation (Release 8)," 3GPP TS 36.211 V0.2.1 (November 2006).
33	THIRD GENERATION PARTNERSHIP PROJECT, "Technical Specification Group Radio Access Network; Physical layer procedures (Release 8)," 3GPP TS 36.213 V0.1.0 (October 2006).

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34	THIRD GENERATION PARTNERSHIP PROJECT, "Technical Specification Group Radio Access Network; Multiplexing and channel coding (Release 8)," 3GPP TS 36.212 V0.2.1 (November 2006).		
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	First Named Inventor	Paul Howard	
	Art Unit	2476	
	Examiner Name	Ayaz R. Sheikh	
	Attorney Docket Number	IPW2-USCN213316	

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).

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☐ 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	/Harry Vartanian/	Date (YYYY-MM-DD)	2020-01-08
Name/Print	Harry Vartanian	Registration Number	56,787

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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the **PATENT APPLICATION** of:

Paul Howard

Application No.: 16/682,854

Confirmation No.: 1678

Filed: November 13, 2019

For: COMMUNICATIONS IN A WIRELESS
NETWORK

Group: 2476

Examiner: Ayaz R. Sheikh

Our File: IPW2-USCN213316

Date: January 8, 2020

INFORMATION DISCLOSURE STATEMENT

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P.O. Box 1450
Alexandria, VA 22313-1450

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.

This Application is a continuation of U.S. Patent Application No. 14/458,693, filed August 13, 2014, which is a continuation of U.S. Patent Application No. 13/176,298, filed July 5, 2011, which issued August 19, 2014 as U.S. Patent No. 8,811,356, which is a continuation of U.S. Patent Application No. 11/646,692, filed December 27, 2006, which issued August 30, 2011 as U.S. Patent No. 8,009,639.

6070242-1

Applicant: Intellectual Ventures II LLC
Application No.: 16/682,854

Pursuant to 37 C.F.R. §1.98(d) copies of documents cited in the parent application are not enclosed, but copies will be provided upon request. Documents that were not cited in the parent application are enclosed.

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,

Intellectual Ventures II LLC

By /Harry Vartanian/
Harry Vartanian
Registration No. 56,787
(215) 568-6400

Volpe and Koenig, P.C.
United Plaza
30 South 17th Street
Philadelphia, PA 19103

HV/PCK
Enclosures

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EFS ID:	38235577
Application Number:	16682854
International Application Number:	
Confirmation Number:	1678
Title of Invention:	COMMUNICATIONS IN A WIRELESS NETWORK
First Named Inventor/Applicant Name:	Paul Howard
Customer Number:	3624
Filer:	Harry Vartanian/Carey Kulp
Filer Authorized By:	Harry Vartanian
Attorney Docket Number:	IPW2-USCN213316
Receipt Date:	08-JAN-2020
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Warnings:					

Information:					
2	Non Patent Literature	36_211_V0_2_1.pdf	369795	no	24
			62d84c0c4129c7ec69ab2e42f9e212472bc690c9		
Warnings:					
Information:					
3	Non Patent Literature	36_212_V0_2_1.pdf	318138	no	10
			4f010d55db77ac325f950c3e9f38a88163d73ed5		
Warnings:					
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4	Non Patent Literature	36_213_V0_1_0.pdf	250571	no	11
			26d7eb3d22bf2e1c72a03ce016e71f11780250eb		
Warnings:					
Information:					
5	Non Patent Literature	36_300_V0_3_1.pdf	736268	no	64
			7505809b7a05ecf976791c7742a5c27974b5595f		
Warnings:					
Information:					
6	Other Reference-Patent/App/Search documents	Advisory_Action_20160825.pdf	263061	no	9
			8cbacb891fec70827498aa8615f88aa91e782f0b		
Warnings:					
Information:					
7	Other Reference-Patent/App/Search documents	Examiners_answer_to_Appeal_Brief_20181123.pdf	362125	no	14
			99663a9e813e6fbd7b4453d432cc45eaf19c86a		
Warnings:					
Information:					
8	Other Reference-Patent/App/Search documents	FR_20160510.pdf	313663	no	11
			8409544609d7b4b324bedc1275cb845b1f3e3a56		
Warnings:					
Information:					

9	Other Reference-Patent/App/Search documents	FR_20170321.pdf	338204	no	12
			480ccf2044d2e0dbf3b61d897f959dd3d13fe0c5		
Warnings:					
Information:					
10	Other Reference-Patent/App/Search documents	FR_20180517.pdf	344517	no	13
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Warnings:					
Information:					
11	Other Reference-Patent/App/Search documents	MiscellaneousCommunication_20160520.pdf	66258	no	3
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Information:					
12	Other Reference-Patent/App/Search documents	NFR_20151230.pdf	319880	no	12
			c1c0051019c40cd4da5ab10ec3dc936f0c1a86e3		
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Information:					
13	Other Reference-Patent/App/Search documents	NFR_20161202.pdf	290091	no	11
			7e5af0e0fb1b853f85e4ab72bb2a1b2ff2313763		
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Information:					
14	Other Reference-Patent/App/Search documents	NFR_20171023.pdf	327966	no	12
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15	Other Reference-Patent/App/Search documents	NOA_20151116.pdf	470162	no	10
			c97865ce075b6073f4a7fb1f67e4d376a41c72e1		
Warnings:					
Information:					

16	Transmittal Letter	IPW2-USCN213316-IDS_transmittal-EFS.pdf	59620	no	2
			5e888878581654e5bdef0a9c798090487b76ba6f		
Warnings:					
Information:					
Total Files Size (in bytes):			5508848		
<p>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.</p> <p><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.</p> <p><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.</p> <p><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.</p>					



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/682,854	11/13/2019	Paul Howard	IPW2-USCN213316	1678
3624	7590	12/11/2019	EXAMINER	
VOLPE AND KOENIG, P.C.			NGO, RICKY QUOC	
30 SOUTH 17TH STREET, 18th Floor				
PHILADELPHIA, PA 19103				
			ART UNIT	PAPER NUMBER
			2464	
			NOTIFICATION DATE	DELIVERY MODE
			12/11/2019	ELECTRONIC

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

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

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

eooffice@volpe-koenig.com

<i>Decision Granting Request for Prioritized Examination (Track I)</i>	Application No. 16/682,854	Applicant(s) Howard, Paul	
	Examiner BRIAN W BROWN	Art Unit OPET	AIA (FITF) Status No
<p>1. THE REQUEST FILED <u>13 November 2019</u> IS GRANTED .</p> <p>The above-identified application has met the requirements for prioritized examination</p> <p>A. ☒ for an original nonprovisional application (Track I).</p> <p>B. ☐ for an application undergoing continued examination (RCE).</p> <p>2. The above-identified application will undergo prioritized examination. The application will be accorded special status throughout its entire course of prosecution until one of the following occurs:</p> <p>A. filing a <u>petition for extension of time</u> to extend the time period for filing a reply;</p> <p>B. filing an <u>amendment to amend the application to contain more than four independent claims, more than thirty total claims</u>, or a multiple dependent claim;</p> <p>C. filing a <u>request for continued examination</u> ;</p> <p>D. filing a notice of appeal;</p> <p>E. filing a request for suspension of action;</p> <p>F. mailing of a notice of allowance;</p> <p>G. mailing of a final Office action;</p> <p>H. completion of examination as defined in 37 CFR 41.102; or</p> <p>I. abandonment of the application.</p> <p>Telephone inquiries with regard to this decision should be directed to BRIAN BROWN at (571)272-5338. In his/her absence, calls may be directed to Petition Help Desk at (571) 272-3282.</p>			
/BRIAN W BROWN/ Petitions Examiner, OPET			

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 16/682,854		
APPLICATION AS FILED - PART I								
(Column 1)		(Column 2)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY		
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)	
BASIC FEE <small>(37 CFR 1.16(a), (b), or (c))</small>	N/A	N/A	N/A			N/A	300	
SEARCH FEE <small>(37 CFR 1.16(k), (l), or (m))</small>	N/A	N/A	N/A			N/A	660	
EXAMINATION FEE <small>(37 CFR 1.16(o), (p), or (q))</small>	N/A	N/A	N/A			N/A	760	
TOTAL CLAIMS <small>(37 CFR 1.16(j))</small>	24	minus 20 = *	4			x 100 =	400	
INDEPENDENT CLAIMS <small>(37 CFR 1.16(h))</small>	4	minus 3 = *	1			x 460 =	460	
APPLICATION SIZE FEE <small>(37 CFR 1.16(s))</small>	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00	
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00	
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL		TOTAL	2580	
APPLICATION AS AMENDED - PART II								
AMENDMENT A	(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY	OR OTHER THAN SMALL ENTITY
		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE(\$)	ADDITIONAL FEE(\$)
	Total <small>(37 CFR 1.16(i))</small>	*	Minus	**	=	x	=	=
	Independent <small>(37 CFR 1.16(h))</small>	*	Minus	***	=	x	=	=
	Application Size Fee (37 CFR 1.16(s))							
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
						TOTAL ADD'L FEE		TOTAL ADD'L FEE
AMENDMENT B	(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY	OR OTHER THAN SMALL ENTITY
		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE(\$)	ADDITIONAL FEE(\$)
	Total <small>(37 CFR 1.16(i))</small>	*	Minus	**	=	x	=	=
	Independent <small>(37 CFR 1.16(h))</small>	*	Minus	***	=	x	=	=
	Application Size Fee (37 CFR 1.16(s))							
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
						TOTAL ADD'L FEE		TOTAL ADD'L FEE
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.								



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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO.	TOT CLAIMS	IND CLAIMS
16/682,854	11/13/2019	2414	2580	IPW2-USC213316	24	4

CONFIRMATION NO. 1678

FILING RECEIPT



CC000000113059962

3624
VOLPE AND KOENIG, P.C.
30 SOUTH 17TH STREET, 18th Floor
PHILADELPHIA, PA 19103

Date Mailed: 12/04/2019

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)

Paul Howard, Bristol, UNITED KINGDOM;

Applicant(s)

Intellectual Ventures II LLC, Wilmington, DE;

Assignment For Published Patent Application

Intellectual Ventures II LLC, Wilmington, DE

Power of Attorney: The patent practitioners associated with Customer Number 3624

Domestic Priority data as claimed by applicant

This application is a CON of 14/458,693 08/13/2014
which is a CON of 13/176,298 07/05/2011 PAT 8811356
which is a CON of 11/646,692 12/27/2006 PAT 8009639

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: 12/03/2019

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/682,854**

Projected Publication Date: 03/12/2020

Non-Publication Request: No

Early Publication Request: No
Title

COMMUNICATIONS IN A WIRELESS NETWORK

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 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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page 2 of 4

countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

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Title 35, United States Code, Section 184
Title 37, Code of Federal Regulations, 5.11 & 5.15

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16682854

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Document Number	Fee Code	Fee Code Description	Amount Paid	Payment Method
I2019B3924248996	1202	CLAIMS IN EXCESS OF 20	\$400.00	Deposit Account

TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

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

Application Number	Not Yet Known
Filing Date	November 13, 2019
First Named Inventor	Paul Howard
Title	COMMUNICATIONS IN A WIRELESS NETWORK
Art Unit	Not Yet Known
Examiner Name	Not Yet Known
Attorney Docket Number	IPW2-USCN213316

SIGNATURE of Applicant or Patent Practitioner			
Signature	/Harry Vartanian/	Date (Optional)	2019-11-13
Name	Harry Vartanian	Registration Number	56,787
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)	INTELLECTUAL VENTURES II LLC		
<p>NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.</p>			
☐ *Total of _____ forms are submitted.			

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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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:



Practitioners associated with Customer Number:

3624

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 assignments 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:



The address associated with Customer Number:

3624

OR

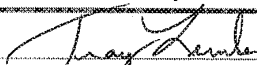
☐	Firm or Individual Name			
	Address			
	City	State	Zip	
	Country			
	Telephone	Email		

Assignee Name and Address: Intellectual Ventures II LLC
2711 Centerville Road, Suite 400
Wilmington, DE 19808

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

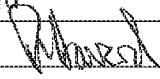
The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature		Date	9/18/16
Name	Tracy Lemke	Telephone	
Title	Authorized Person for Intellectual Ventures II 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 file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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

Title of Invention	COMMUNICATIONS IN A WIRELESS NETWORK
<p>As the below named inventor, I hereby declare that:</p> <p>This declaration is directed to: ☐ The attached application, or ☒ United States application or PCT international application number <u>14/458,693</u> filed on <u>August 13, 2014</u></p> <p>The above-identified application was made or authorized to be made by me.</p> <p>I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.</p> <p>I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.</p> <p style="text-align: center;">WARNING:</p> <p>Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.</p> <p>LEGAL NAME OF INVENTOR</p> <p>Inventor: <u>Paul Howard</u> Date (Optional): <u>22 October 2014</u></p> <p>Signature: <u></u></p> <p>Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.</p>	

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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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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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 Patent Application Fee Transmittal				
Application Number:		14458693		
Filing Date:				
Title of Invention:		COMMUNICATIONS IN A WIRELESS NETWORK		
First Named Inventor/Applicant Name:		Paul Howard		
Filer:		Harry Vartanian/Amanda Lopez		
Attorney Docket Number:		IPW2-USCN213316		
Filed as Large Entity				
Filing Fees for Track I Prioritized Examination - Nonprovisional Application under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
UTILITY APPLICATION FILING	1011	1	300	300
UTILITY SEARCH FEE	1111	1	660	660
UTILITY EXAMINATION FEE	1311	1	760	760
REQUEST FOR PRIORITIZED EXAMINATION	1817	1	4000	4000
Pages:				
Claims:				
INDEPENDENT CLAIMS IN EXCESS OF 3	1201	1	460	460
Miscellaneous-Filing:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
PUBL. FEE- EARLY, VOLUNTARY, OR NORMAL	1504	1	0	0
PROCESSING FEE, EXCEPT PROV. APPLS.	1830	1	140	140
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				6320

Electronic Acknowledgement Receipt	
EFS ID:	37743445
Application Number:	16682854
International Application Number:	
Confirmation Number:	1678
Title of Invention:	COMMUNICATIONS IN A WIRELESS NETWORK
First Named Inventor/Applicant Name:	Paul Howard
Customer Number:	3624
Filer:	Harry Vartanian/Amanda Lopez
Filer Authorized By:	Harry Vartanian
Attorney Docket Number:	IPW2-USCN213316
Receipt Date:	13-NOV-2019
Filing Date:	
Time Stamp:	17:07:47
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$6320
RAM confirmation Number	E2019ACH09196504
Deposit Account	220493
Authorized User	Amanda Lopez
<p>The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:</p> <p>37 CFR 1.16 (National application filing, search, and examination fees)</p> <p>37 CFR 1.17 (Patent application and reexamination processing fees)</p>	

37 CFR 1.19 (Document supply fees)					
37 CFR 1.20 (Post Issuance fees)					
37 CFR 1.21 (Miscellaneous fees and charges)					
File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	TrackOne Request	IPW2-USCN213316_Track_1_Request_20191113.PDF	136327	no	2
			e0db7e13b017f52f690a03ef212ec2370cebe30e		
Warnings:					
Information:					
2		IPW2-USCN213316-Application-20191113.PDF	82060	yes	22
			6a420d8c677c47d336a48489dee2c1ebd5e46d6f		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Specification		1	16	
	Claims		17	21	
	Abstract		22	22	
Warnings:					
Information:					
3	Drawings-only black and white line drawings	IPW2-USCN213316_Drawings_20191113.PDF	563956	no	5
			861d43262142019dc17769989c2093edec681d56		
Warnings:					
Information:					
4	Application Data Sheet	IPW2-USCN213316_ADS_20191113.PDF	104156	no	8
			6969d1cb21c828522a6f6318f3000e1f01bee945		
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					

5	Power of Attorney	IPW2- USCN213316_POA_20191113. PDF	336075	no	2
			fd26e1016959c273d28b5a07c0ddb5908f8eaf0d		
Warnings:					
Information:					
6	Oath or Declaration filed	IPW2- USCN213316_Signed_Declaration_20191113.PDF	2818700	no	2
			484f5438bb56a659a5606bb504f639813cbf4ee95		
Warnings:					
Information:					
7	Miscellaneous Incoming Letter	IPW2- USCN213316_373_Statement_20191113.PDF	83063	no	3
			377c77eff0e13f9de322e052e90875f16c0ac95b		
Warnings:					
Information:					
8	Miscellaneous Incoming Letter	IPW2- USCN213316_373_Statement_continued_20191113.PDF	56830	no	1
			9c317c1080972b235089eeb7b45f6c4b8074fabcb		
Warnings:					
Information:					
9	Fee Worksheet (SB06)	fee-info.pdf	42126	no	2
			51f097dc52aa68d7eb396bfe3dbe7af0ada55038		
Warnings:					
Information:					
Total Files Size (in bytes):			4223293		

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.

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Intellectual Ventures II LLC
Application No./Patent No.: _____ Filed/Issue Date: November 13, 2019
Titled: COMMUNICATIONS IN A WIRELESS NETWORK
Intellectual Ventures II LLC, a limited liability company
(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: Paul Howard To: IPWireless, Inc.
The document was recorded in the United States Patent and Trademark Office at
Reel 027937, Frame 0788, or for which a copy thereof is attached.
2. From: IPWireless, Inc. To: Northrop Grumman Information Technology, Inc.
The document was recorded in the United States Patent and Trademark Office at
Reel 027938, Frame 0301, or for which a copy thereof is attached.

[Page 1 of 2]

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.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: Northrop Grumman Information Technology, Inc. To: IPWireless, Inc.

The document was recorded in the United States Patent and Trademark Office at
Reel 027938, Frame 0464, or for which a copy thereof is attached.

4. From: IPWireless, Inc. To: Wireless Technology Solutions LLC

The document was recorded in the United States Patent and Trademark Office at
Reel 027938, Frame 0566, or for which a copy thereof is attached.

5. From: Wireless Technology Solutions LLC To: IPWireless, Inc.

The document was recorded in the United States Patent and Trademark Office at
Reel 027910, Frame 0649, or for which a copy thereof is attached.

6. From: IPWireless, Inc. To: Intellectual Ventures Holding 81 LLC

The document was recorded in the United States Patent and Trademark Office at
Reel 033824, Frame 0851, 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.

/Harry Vartanian/

Signature

Harry Vartanian

Printed or Typed Name

2019-11-13

Date

56,787

Title or Registration Number

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**CERTIFICATION AND REQUEST FOR PRIORITIZED EXAMINATION
UNDER 37 CFR 1.102(e) (Page 1 of 1)**

First Named Inventor:	Paul Howard	Nonprovisional Application Number (if known):	IPW2-USCN213316
Title of Invention:	COMMUNICATIONS IN A WIRELESS NETWORK		

APPLICANT HEREBY CERTIFIES THE FOLLOWING AND REQUESTS PRIORITIZED EXAMINATION FOR THE ABOVE-IDENTIFIED APPLICATION.

1. The processing fee set forth in 37 CFR 1.17(i)(1) and the prioritized examination fee set forth in 37 CFR 1.17(c) have been filed with the request. The publication fee requirement is met because that fee, set forth in 37 CFR 1.18(d), is currently \$0. The basic filing fee, search fee, and examination fee are filed with the request or have been already been paid. I understand that any required excess claims fees or application size fee must be paid for the application.
2. I understand that the application may not contain, or be amended to contain, more than four independent claims, more than thirty total claims, or any multiple dependent claims, and that any request for an extension of time will cause an outstanding Track I request to be dismissed.
3. The applicable box is checked below:
 - I. ☒ **Original Application (Track One) - Prioritized Examination under § 1.102(e)(1)**
 - i. (a) The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a). This certification and request is being filed with the utility application via EFS-Web.
---OR---
 - (b) The application is an original nonprovisional plant application filed under 35 U.S.C. 111(a). This certification and request is being filed with the plant application in paper.
 - ii. An executed inventor's oath or declaration under 37 CFR 1.63 or 37 CFR 1.64 for each inventor, or the application data sheet meeting the conditions specified in 37 CFR 1.53(f)(3)(i) is filed with the application.
- II. ☐ **Request for Continued Examination - Prioritized Examination under § 1.102(e)(2)**
 - i. A request for continued examination has been filed with, or prior to, this form.
 - ii. If the application is a utility application, this certification and request is being filed via EFS-Web.
 - iii. The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a), or is a national stage entry under 35 U.S.C. 371.
 - iv. This certification and request is being filed prior to the mailing of a first Office action responsive to the request for continued examination.
 - v. No prior request for continued examination has been granted prioritized examination status under 37 CFR 1.102(e)(2).

Signature /Harry Vartanian/	Date 2019-11-13
Name (Print/Typed) Harry Vartanian	Practitioner Registration Number 56,787
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.*	
☐ *Total of _____ forms are submitted.	

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COMMUNICATIONS IN A WIRELESS NETWORK

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation of U.S. Patent Application Serial No. 14/458,693, filed August 13, 2014, which is a continuation of U.S. Patent Application Serial No. 13/176,298, filed July 5, 2011, which issued as 8,811,356 on August 19, 2014, which is a continuation of U.S. Patent Application Serial No. 11/646,692, filed December 27, 2006, which issued as 8,009,639 on August 30, 2011, which are all incorporated by reference as if fully set forth.

BACKGROUND OF THE INVENTION

[0002] Time division-code division multiple access (TD-CDMA) is an air interface technology that combines the benefits of the three elemental concepts in a universal mobile telecommunication system (UMTS): time division multiple access (TDMA); code division multiple access (CDMA); and time division duplex (TDD). TDD, in particular, uses the same radio channel for both uplink and downlink communications, and discriminates between signals by separating the transmissions in time. One of the benefits obtained by operating both links on the same frequency is the ability to exploit channel reciprocity.

[0003] Channel reciprocity gives equipment the ability to derive information about uplink channel conditions from downlink channel conditions based upon signals received by the user equipment (UE). Pathloss is one example of channel information that can be obtained from channel reciprocity. Knowledge of the uplink pathloss enables open-loop power control to be employed for uplink transmissions. For example, uplink power control is important for the operation of the CDMA element of TD-CDMA as it counteracts the near-far effect that would otherwise be encountered if all UEs transmitted at a fixed power regardless of the uplink pathloss.

[0004] The open-loop uplink power control feature provides a significant advantage when coupled with a multiple access data transmission system that is used for packet-based communication and/or shared channels. When access to a limited number of uplink channels is shared between a large population of terminals it is imperative that access to the channels can be switched between terminals with minimal latency. A data terminal that can derive information needed to access uplink channels from the downlink transmissions (beacon signals) has a significant advantage over a terminal that relies on the (lengthy) configuration of a dedicated channel in order to establish a feedback channel.

[0005] However, channel reciprocity cannot always be guaranteed. For example TDD transmissions may not be permitted in certain frequency spectrum allocations; this is a regulatory issue and may be used to protect other wireless equipment in the same or adjacent frequency bands. In these situations the correlation between uplink and downlink channels is lost because the channels are transported on carrier frequencies that are separated in frequency by an amount that is greater than the coherence bandwidth of the channel (usually, only a few MHz separation is sufficient to cause the uplink and downlink fading profiles to be independent).

[0006] In high speed mobile applications, the time delay between downlink and uplink transmissions may exceed the coherence time of the channel. The maximum time delay that can be tolerated is a function of the mobile speed and the RF carrier frequency used, with the coherence time reducing with increasing speed and RF carrier frequency. Also, the use of multiple transmit and/or receive antennas at the network and/or the mobile terminal can introduce unintentional decorrelation between the uplink and downlink channels.

[0007] If the TD-CDMA air interface is to be used in applications where the correlation between the uplink and downlink path loss is not guaranteed, then it would be advantageous to find a substitute for channel reciprocity.

BRIEF SUMMARY OF THE INVENTION

[0008] Although it is desirable to support air interfaces where the pathloss is not reciprocal, known conventional methods do not deal directly with the evolution or adaptation of an air interface that uses channel reciprocity to deliver key features and advantages where channel reciprocity is not guaranteed. The adaptation provided in embodiments of the invention introduces a new technique for uplink channel control that uses a feedback scheme as a substitute for the absence of channel reciprocity, with minimal impact on the ability of the air interface to support uplink shared channels.

[0009] Embodiments of the present invention enable active feedback control between a base station and user equipment (UE). In particular, the operation of a system designed for TDD, or unpaired operation, is expanded to operate in FDD, or paired, mode. For example, an uplink beacon function (for power control) and a modified random access process substitute for the information lost due to the lack of channel reciprocity in paired operation. Embodiments of the invention allow a terminal to transmit the uplink physical channel control signal (UL_Beacon) independently from the uplink physical channel. Therefore, the implementation of closed loop feedback may operate in the absence of an uplink physical channel. In one embodiment, a UE allocates a time slot for a beacon signal separated from the time slots for data in a frame. A second time slot is allocated within the frame for the base station to transmit a control signal in response to the beacon signal. The control signal instructs the UE to adjust a transmission parameter.

[0010] A UL_Beacon signal may be combined with a physical layer common control channel (PLCCH) to form a feedback system. A dedicated timeslot groups all of the UL_Beacon signals from multiple UEs in a specific uplink timeslot. By grouping the UL_Beacon signals together, embodiments obtain separation between the UL_Beacon signals and the standard uplink physical channels. Additionally, in a synchronous system embodiments of the invention detect and cancel the UL_Beacon signals from other cell sites (inter-cell interference). The PLCCH

carries feedback information to the UEs that are transmitting UL_Beacon signals. The PLCCH can share a timeslot with other physical channels by exploiting the CDMA aspect of the system.

[0011] In other embodiments, the number of supported UEs can be increased by fractionating the use of the UL_Beacon and PLCCH across a multiframe period. Fractionation may also prevent timeslot blocking where half duplex UEs have a long UL/DL switching time. Additionally, support for half duplex terminals is implicit due to the nature of the TDMA frame structure. The system may manage the allocation of resource across the population of terminals such that the full capacity of the base station can be utilized even when only half-duplex terminals are deployed. In embodiments of the invention, full-duplex terminals can be still be supported along with half duplex UEs.

[0012] Moreover, in other embodiments, a radio resource control (RRC) connected state covers the subset of terminals that are in cell forward access channel (Cell_FACH), which are also transmitting UL_Beacon and receiving PLCCH, thus creating an active control feedback channel. Management of the UEs that are in Cell_Active state may remove users that are less active, and may add users that are newly active while retaining users that may have on-going data transfer requirements.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] Figure 1 illustrates a cellular communication system according to embodiments of the invention;

[0014] Figure 2 illustrates a timeslot arrangement for uplink and downlink messages supporting the UL_Beacon and its corresponding PLCCH within a TD-CDMA frame structure modified to support FDD according to embodiments of the invention;

[0015] Figure 3 illustrates fractionation in different frames at the base station according to embodiments of the invention;

[0016] Figure 4 illustrates UTRA RRC connected modes according to embodiments of the invention;

[0017] FIG. 5 illustrates a computer system that may be employed to implement embodiments of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0018] Figure 1 illustrates an example of a cellular communication system according to embodiments of the invention. The network includes a user equipment (UE) domain, a radio access network (RAN) domain, and a core network domain. The UE domain includes user equipment 110 that communicate with at least one base station 112 in the RAN domain via a wireless interface. The RAN domain may also include a network controller (RNC) 118 (e.g., radio network controller), such as that used in UMTS systems. Alternatively, such functionality may be distributed between the Node Bs and an access gateway (AGW) (not shown) or other controller in the core network. FIG. 1 also illustrates an optional radio resource manager (RRM) 114. The RRM may perform functions otherwise performed by the Node Bs or an AGW in some embodiments.

[0019] The core network (CN) 116 includes, in this example, a serving GPRS support node (SGSN) 120, and a gateway GPRS support node (GGSN) 122. The core network is coupled to an external network 124. The SGSN 120 is responsible for session control, including keeping track of the location of the UEs. The GGSN 122 concentrates and tunnels user data within the core network 116 to the ultimate destination (e.g., an Internet service provider) in the external network 124. Further details may be found in the 3GPP UMTS technical specifications, such as TS23.246 v6.4.0 "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Multimedia Broadcast/Multicast Service (MBMS); Architecture and Functional Description (Release 6)," published by the 3GPP Support Office, 650 Route des Lucioles--Sophia Antipolis, Valbonne--FRANCE, which are incorporated by reference herein.

[0020] Further details regarding exemplary communications systems that may implement embodiments of the invention may be found in 3GPP UMTS technical specifications, such as TR 23.882, "3GPP System Architecture Evolution: Report on Technical Options and Conclusions"; TR 25.912, "Feasibility Study for Evolved UTRA and UTRAN"; TS 23.101, "General Universal Mobile Telecommunications System (UMTS) Architecture," all of which are incorporated by reference herein.

TDD to FDD Evolution

[0021] A system designed for operation in Time Division Duplex (TDD) mode has base stations and terminals that transmit and receive at orthogonal points in time. In normal operation terminals are in receive mode when the base station is transmitting, and base stations are in receive mode when terminals are transmitting. In conventional TDD implementations, neither base stations nor the terminals are able to transmit and receive at the same points in time because the same frequency is used for uplink and downlink communication.

[0022] Such a system can be adjusted to operate in Frequency Division Duplex (FDD) mode, where the uplink and downlink communications occur on different frequencies. According to embodiments of the invention, to make full and efficient use of the frequency spectrum resources, the base stations are adapted to transmit and receive at the same time. This is possible since the uplink and downlink communications now occur on different frequencies. The terminals, however, retain the restriction of transmitting and receiving at orthogonal points in time to retain the simplicity of not having to transmit and receive at the same time (e.g., no duplexer required). The full use of the frequency spectrum is then obtained by allocating the resource across a plurality of terminals.

[0023] Additional measures may be needed if there are aspects of the air interface that rely on the channel reciprocity that can be assumed for TDD systems.

In the case of TD-CDMA, modifications may be made for the correct operation of uplink power control and rate adaptation. This can be achieved by defining an uplink physical control channel used for estimating the uplink channel conditions and a downlink channel used to feed back control information to the terminal. These channels may not need an associated data physical channel to be operational.

[0024] Modifications may be made to the random access channel. This may be achieved by introducing an additional indicator step at the start of any physical random access. A new uplink physical channel carries the random access indicators. A new downlink physical channel carries the response to received uplink indicators.

Uplink Physical Channel Control Signal

[0025] When pathloss reciprocity is not available, the combination of an uplink physical channel control signal with a downlink feedback channel may be used to keep the terminal informed of the condition of the uplink channel. The uplink physical control signal is referred to herein as an "Uplink Beacon" (UL_Beacon).

[0026] In general, a system that supports shared channels may also support shared access to a large number of terminals. To extract the maximum benefit from the resulting trunking gain, shared channels can be quickly and efficiently re-allocated between the population of UEs. To obtain rapid access to the uplink shared channels, terminals can transmit at the correct power with their first transmission so that latency can be kept to a minimum.

[0027] According to embodiments of the invention, the RNC or other controller (e.g., other controller having its functionality in the core network) allocates resources so that the physical channel control signal is separate from the uplink (shared) physical channel. Thus, terminals are able to transmit an UL_Beacon independently of their access to the uplink shared channel. The system

may implement a closed loop control system, in which the base station detects the received power and/or other channel information from the UL_Beacon, and sends controlling commands back to each terminal to keep the terminal informed of the channel conditions observed at the base station.

[0028] In certain embodiments, the closed loop control system is simply based on the UL_Beacon power received at the base station. The base station may send power control commands on a shared downlink channel to each terminal based on the power received from the UL_Beacon signal. Each power control command may, for example, indicate whether terminal power should be increased or decreased by a predetermined amount. This downlink channel is referred to as the "Physical Layer Control Channel" (PLCCH). The capacity of the PLCCH may be matched to the number of bits required in the feedback field and the number of UL_Beacon signals that can be simultaneously supported. That is, each UL_Beacon may correspond to one bit of the PLCCH. All terminals transmitting UL_Beacon signals may receive this channel and extract the relevant feedback field.

[0029] It is possible to extend the complexity of the control loop by sending control commands based on other aspects of the UL_Beacon signal as received by the base station, such as time-of-arrival, and channel impulse response. The amount of resource that is required for the feedback channel increases with the size (in bits) of the feedback information to each UE.

[0030] For example, for air interface technologies with a TDMA element, it is possible to adapt the TDMA frame structure to provide separation between the UL_Beacon and the normal physical channels by dedicating at least one uplink time slot per frame (or at least one time slot per multi-frame) to carrying UL_Beacon signals.

[0031] By placing UL_Beacon signals in a dedicated timeslot, a dedicated detection scheme can be applied which may include performance enhancing features such as intra-cell cancelling (for alleviating the effects of cross-correlation interference between UL_Beacon signals transmitted by multiple terminals in the

same cell), or inter-cell cancelling (for reducing the interference from neighboring cells in the case where the UL_Beacon timeslots are time synchronized). Cross-interference between UL_Beacon and normal uplink bursts is avoided by the separation obtained from the use of separate time slots.

[0032] Those skilled in the art will recognize that there are a large number of possibilities for the arrangement of a UL_Beacon and its associated PLCCH within the frame structure according to embodiments of the invention. More than one UL_Beacon and PLCCH per frame could be supported if the feedback update rate is required to be faster than the frame rate (at the expense of system capacity). For system applications that can tolerate a slower feedback rate, embodiments may fractionate the use of the UL_Beacon timeslot (and the associated PLCCH).

[0033] When fractionation is employed, the RNC or other controller may allocate the UL_Beacon timeslot in a given frame to a group of terminals depending on the current fractionation phase, thus increasing the number of terminals that can be supported with active physical channel feedback control. The maximum fractionation cycle length may be determined by the feedback update rate that the system requires in order to meet its performance targets.

[0034] Figure 2 illustrates an example of a timeslot arrangement supporting the UL_Beacon and its corresponding PLCCH within a TD-CDMA frame structure modified to support FDD. In this example, the PLCCH 212 shares a timeslot with another downlink shared channel. This is possible since normal downlink physical channels are used to transmit the PLCCH. The downlink frame also comprises a downlink beacon timeslot 206, an access control timeslot 208, and normal traffic carrying timeslots 210. The uplink frame comprises a UL_Beacon control timeslot 216, an access control timeslot 218, and normal traffic carrying timeslots 214.

[0035] Figure 3 illustrates an example where fractionation is employed. The UL_Beacon and PLCCH timeslots are active in every frame at the base station 302. However, terminal 304, terminal 306, and terminal 308 have been assigned a different fractionation phase. Figure 3 illustrates the case where the fractionation

phase is 3. For example, the fractionation phase of terminal 304 occurs in frame #0 310, the fractionation phase of terminal 306 occurs in frame #1 312, and the fractionation phase of terminal 308 occurs in frame #2 314. Since the fractionation phase is 3, the phase for terminal 304 occurs again in frame #3 316.

Half Duplex Terminals

[0036] Embodiments of the invention enable terminals to operate in half duplex or full duplex mode. In a half duplex system, base stations and terminals do not transmit and receive simultaneously. When such a system is evolved to operate in paired spectrum, it becomes inefficient if base stations retain their half duplex operation. It is not necessarily inefficient for the terminals to do so, however, since half duplex operation may have some advantages in the design and implementation of the terminal.

[0037] Nonetheless, there are some points that should be considered. For example, a single terminal may not be able to access all transmit and all receive slots. Therefore, the system may have to manage resources across the population of terminals to ensure all the available resources at the base station are efficiently utilized. To prevent blocking of timeslots, half duplex terminals may be operated with a fractionation cycle of greater than one. In particular, this may also apply for the case where there are more than one UL_Beacon timeslot per, frame. There is a time delay for half duplex terminals to switch between transmit and receive functions. In some cases this delay exceeds the guard period inserted between consecutive timeslots. In the half duplex terminal case, the terminal is unable to transmit and receive on adjacent timeslots. This will affect the locations of the UL_Beacon, PLCCH, and other common channels. Accordingly, the timeslot arrangement may be adjusted when the system is configured.

Terminal Management

[0038] Embodiments of this invention separate uplink control from the uplink physical traffic. This allows the control feedback to operate even when the terminal does not have data to send, with the consequence that uplink shared channels can be used with maximum efficiency.

[0039] To use shared channels efficiently, a relatively large user base may be needed. At the same time, the network resources required to support the control feedback channels for these terminals need to be minimized. In general, the number of users that can be supported with active control feedback channels is smaller than the typical number of users per cell. Therefore, the terminals in this active state may be managed.

[0040] In UMTS terminology, embodiments of the invention provide a new Universal Terrestrial Radio Access-Radio Resource Control-Connected (UTRA RRC-Control) sub-state into the system. UTRA systems already support the idea of different RRC-Connected states (see, TS25.331 Radio Resource Control (RRC) Protocol Specification, which is incorporated herein by reference), e.g., CELL_DCH, CELL_FACH etc. This sub-state is referred to as the CELL_ACTIVE state. Figure 4 illustrates this sub-state in context with other UTRA RRC-connected states. A UE in a Cell_Active sub-state transmits the physical channel control part of the uplink physical channel only, and nothing else (i.e., no data).

[0041] As shown in Figure 4, CELL_ACTIVE sub-state is a sub-state of CELL_FACH state 404. In general, UEs in CELL_FACH state have an RRC connection, but they may not be actively transferring data. Out of the population of UEs in CELL_FACH state 404, a smaller number of UEs, determined by the network to be the most-active UEs, are supported in a CELL_ACTIVE state 406. In this state, the UEs transmit the physical channel control signal and listen to the associated feedback channel from the network. Because the UE is aware of the uplink pathloss conditions from the feedback channel, it can have instant access to

the uplink shared channels, and the resource allocator (controller) in the network can treat the UE accordingly.

[0042] The rules governing which UEs are maintained in CELL_ACTIVE state are decided by the network (e.g., through the RNC) and may be based on factors such as the volume of data transfer required by the UE, the data transfer rate required by a UE, the frequency of short bursts of data transfer, the total number of UEs in CELL_FACH state, the time since the last data transfer, the UE power saving requirements, etc.

[0043] Note that UEs in CELL_ACTIVE state have their transmitters active, therefore it is necessary for these UEs to monitor the status of the downlink and automatically come out of CELL_ACTIVE state if the downlink is deemed to be out-of-synchronization (for example, very high downlink errors or low received signal strength). This feature prevents UEs continuing to transmit in a state where the feedback channel may be unreliable and thus causing interference.

[0044] While the invention has been described in terms of particular embodiments and illustrative figures, those of ordinary skill in the art will recognize that the invention is not limited to the embodiments or figures described. Although embodiments of the present invention are described, in some instances, using UMTS terminology, those skilled in the art will recognize that such terms are also used in a generic sense herein, and that the present invention is not limited to such systems.

[0045] Those skilled in the art will recognize that the operations of the various embodiments may be implemented using hardware, software, firmware, or combinations thereof, as appropriate. For example, some processes can be carried out using processors or other digital circuitry under the control of software, firmware, or hard-wired logic. (The term "logic" herein refers to fixed hardware, programmable logic and/or an appropriate combination thereof, as would be recognized by one skilled in the art to carry out the recited functions.) Software and firmware can be stored on computer-readable media. Some other processes can be

implemented using analog circuitry, as is well known to one of ordinary skill in the art. Additionally, memory or other storage, as well as communication components, may be employed in embodiments of the invention.

[0046] Figure 5 illustrates a typical computing system 500 that may be employed to implement processing functionality in embodiments of the invention. Computing systems of this type may be used in the radio controllers, the base stations, and the UEs, for example. Those skilled in the relevant art will also recognize how to implement the invention using other computer systems or architectures. Computing system 500 may represent, for example, a desktop, laptop, or notebook computer, hand-held computing device (PDA, cell phone, palmtop, etc.), mainframe, server, client, or any other type of special or general purpose computing device as may be desirable or appropriate for a given application or environment. Computing system 500 can include one or more processors, such as a processor 504. Processor 504 can be implemented using a general or special purpose processing engine such as, for example, a microprocessor, microcontroller or other control logic. In this example, processor 504 is connected to a bus 502 or other communications medium.

[0047] Computing system 500 can also include a main memory 508, such as random access memory (RAM) or other dynamic memory, for storing information and instructions to be executed by processor 504. Main memory 508 also may be used for storing temporary variables or other intermediate information during execution of instructions to be executed by processor 504. Computing system 500 may likewise include a read only memory ("ROM") or other static storage device coupled to bus 502 for storing static information and instructions for processor 504.

[0048] The computing system 500 may also include information storage system 510, which may include, for example, a media drive 512 and a removable storage interface 520. The media drive 512 may include a drive or other mechanism to support fixed or removable storage media, such as a hard disk drive, a floppy disk drive, a magnetic tape drive, an optical disk drive, a CD or DVD drive (R or RW), or

other removable or fixed media drive. Storage media 518, may include, for example, a hard disk, floppy disk, magnetic tape, optical disk, CD or DVD, or other fixed or removable medium that is read by and written to by media drive 512. As these examples illustrate, the storage media 518 may include a computer-readable storage medium having stored therein particular computer software or data.

[0049] In alternative embodiments, information storage system 510 may include other similar components for allowing computer programs or other instructions or data to be loaded into computing system 500. Such components may include, for example, a removable storage unit 522 and an interface 520, such as a program cartridge and cartridge interface, a removable memory (for example, a flash memory or other removable memory module) and memory slot, and other removable storage units 522 and interfaces 520 that allow software and data to be transferred from the removable storage unit 522 to computing system 500.

[0050] Computing system 500 can also include a communications interface 524. Communications interface 524 can be used to allow software and data to be transferred between computing system 500 and external devices. Examples of communications interface 524 can include a modem, a network interface (such as an Ethernet or other NIC card), a communications port (such as for example, a USB port), a PCMCIA slot and card, etc. Software and data transferred via communications interface 524 are in the form of signals which can be electronic, electromagnetic, optical or other signals capable of being received by communications interface 524. These signals are provided to communications interface 524 via a channel 528. This channel 528 may carry signals and may be implemented using a wireless medium, wire or cable, fiber optics, or other communications medium. Some examples of a channel include a phone line, a cellular phone link, an RF link, a network interface, a local or wide area network, and other communications channels.

[0051] In this document, the terms "computer program product," "computer-readable medium" and the like may be used generally to refer to media such as, for

example, memory 508, storage device 518, or storage unit 522. These and other forms of computer-readable media may store one or more instructions for use by processor 504, to cause the processor to perform specified operations. Such instructions, generally referred to as "computer program code" (which may be grouped in the form of computer programs or other groupings), when executed, enable the computing system 500 to perform functions of embodiments of the present invention. Note that the code may directly cause the processor to perform specified operations, be compiled to do so, and/or be combined with other software, hardware, and/or firmware elements (e.g., libraries for performing standard functions) to do so.

[0052] In an embodiment where the elements are implemented using software, the software may be stored in a computer-readable medium and loaded into computing system 500 using, for example, removable storage drive 522, drive 512 or communications interface 524. The control logic (in this example, software instructions or computer program code), when executed by the processor 504, causes the processor 504 to perform the functions of the invention as described herein.

[0053] It will be appreciated that, for clarity purposes, the above description has described embodiments of the invention with reference to different functional units and processors. However, it will be apparent that any suitable distribution of functionality between different functional units, processors or domains may be used without detracting from the invention. For example, functionality illustrated to be performed by separate processors or controllers may be performed by the same processor or controller. Hence, references to specific functional units are only to be seen as references to suitable means for providing the described functionality, rather than indicative of a strict logical or physical structure or organization.

[0054] Although the present invention has been described in connection with some embodiments, it is not intended to be limited to the specific form set forth herein. Rather, the scope of the present invention is limited only by the claims. Additionally, although a feature may appear to be described in connection with

particular embodiments, one skilled in the art would recognize that various features of the described embodiments may be combined in accordance with the invention.

[0055] Furthermore, although individually listed, a plurality of means, elements or method steps may be implemented by, for example, a single unit or processor. Additionally, although individual features may be included in different claims, these may possibly be advantageously combined, and the inclusion in different claims does not imply that a combination of features is not feasible and/or advantageous. Also, the inclusion of a feature in one category of claims does not imply a limitation to this category, but rather the feature may be equally applicable to other claim categories, as appropriate.

* * *

CLAIMS

What is claimed is:

1. A user equipment (UE) comprising:
 - a receiver and a processor are configured to receive resource allocation information associated with an uplink physical signal, wherein the uplink physical signal and a physical uplink shared channel have different resources;
 - a transmitter and the processor are configured to send, over the physical uplink shared channel, data in assigned time intervals;
 - the transmitter and the processor are further configured, in a time interval that it is not sending information over the physical uplink shared channel, to send the uplink physical signal based on the received resource allocation information, wherein the uplink physical signal is used to determine channel conditions by a base station; and
 - the receiver and the processor are further configured to receive, on a downlink control channel, control information, wherein the control information is based on the determined channel conditions.
2. The UE of claim 1, wherein the receiver and the processor are further configured to receive data on a physical downlink shared channel.
3. The UE of claim 2, wherein the downlink control channel and the physical downlink shared channel are time multiplexed.
4. The UE of claim 1, wherein the receiver and the processor are further configured to receive, on the downlink control channel, power control information.
5. The UE of claim 4, wherein the downlink control channel includes power control information for a plurality of UEs using different bits.

6. The UE of claim 1, wherein in the time interval that the uplink physical signal is sent by the UE, a plurality of UEs each transmit on respective uplink physical control channels in the time interval.

7. A network device comprising:

a transmitter and a processor are configured to transmit resource allocation information associated with an uplink physical signal, wherein the uplink physical signal and a physical uplink shared channel have different resources;

a receiver and the processor are further configured to receive, over the physical uplink shared channel, data in assigned time intervals;

the receiver and the processor are further configured, in a time interval that it is not receiving information over the physical uplink shared channel, to receive the uplink physical signal based on the transmitted resource allocation information, wherein the uplink physical signal is used to determine channel conditions by the network device; and

the transmitter and the processor are further configured to transmit, on a downlink control channel, control information, wherein the control information is based on the determined channel conditions.

8. The network device of claim 7, wherein the transmitter and the processor are further configured to transmit data on a physical downlink shared channel.

9. The network device of claim 8, wherein the downlink control channel and the physical downlink shared channel are time multiplexed.

10. The network device of claim 7, wherein the transmitter and the processor are further configured to transmit, on the downlink control channel, power control information.

11. The network device of claim 10, wherein the downlink control channel includes power control information for a plurality of UEs using different bits.

12. The network device of claim 7, wherein in the time interval that the uplink physical signal is received by the network device, signals are received on other uplink physical control channels in the time interval from a plurality of UEs.

13. A method performed by user equipment (UE), the method comprising:
receiving resource allocation information associated with an uplink physical signal, wherein the uplink physical signal and a physical uplink shared channel have different resources;

sending, over the physical uplink shared channel, data in assigned time intervals;

sending, in a time interval that it is not sending information over the physical uplink shared channel, the uplink physical signal based on the received resource allocation information, wherein the uplink physical signal is used to determine channel conditions by a base station; and

receiving, on a downlink control channel, control information, wherein the control information is based on the determined channel conditions.

14. The method of claim 13 further comprising receiving data on a physical downlink shared channel.

15. The method of claim 14, wherein the downlink control channel and the physical downlink shared channel are time multiplexed.

16. The method of claim 13 further comprising receiving, on the downlink control channel, power control information.

17. The method of claim 16, wherein the downlink control channel includes power control information for a plurality of UEs using different bits.

18. The method of claim 13, wherein in the time interval that the uplink physical signal is sent by the UE, a plurality of UEs each transmit on respective uplink physical control channels in the time interval.

19. A method performed by a network device, the method comprising:

transmitting resource allocation information associated with an uplink physical signal, wherein the uplink physical signal and a physical uplink shared channel have different resources;

receiving, over the physical uplink shared channel, data in assigned time intervals;

receiving, in a time interval that it is not receiving information over the physical uplink shared channel, the uplink physical signal based on the transmitted resource allocation information, wherein the uplink physical signal is used to determine channel conditions by the network device; and

transmitting, on a downlink control channel, control information, wherein the control information is based on the determined channel conditions.

20. The method of claim 19 further comprising transmitting data on a physical downlink shared channel.

21. The method of claim 20, wherein the downlink control channel and the physical downlink shared channel are time multiplexed.

22. The method of claim 19 further comprising transmitting, on the downlink control channel, power control information.

23. The method of claim 22, wherein the downlink control channel includes power control information for a plurality of UEs using different bits.

24. The method of claim 19, wherein in the time interval that the uplink physical signal is received by the network device, signals are received on other uplink physical control channels in the time interval from a plurality of UEs.

ABSTRACT

A user equipment (UE) may, in a time interval that it is not sending information over a physical uplink shared channel, send an uplink physical signal based on received resource allocation information. The uplink physical signal may be used to determine channel conditions by a base station. The UE may receive, on a downlink control channel, control information. The control information may be based on the determined channel conditions.

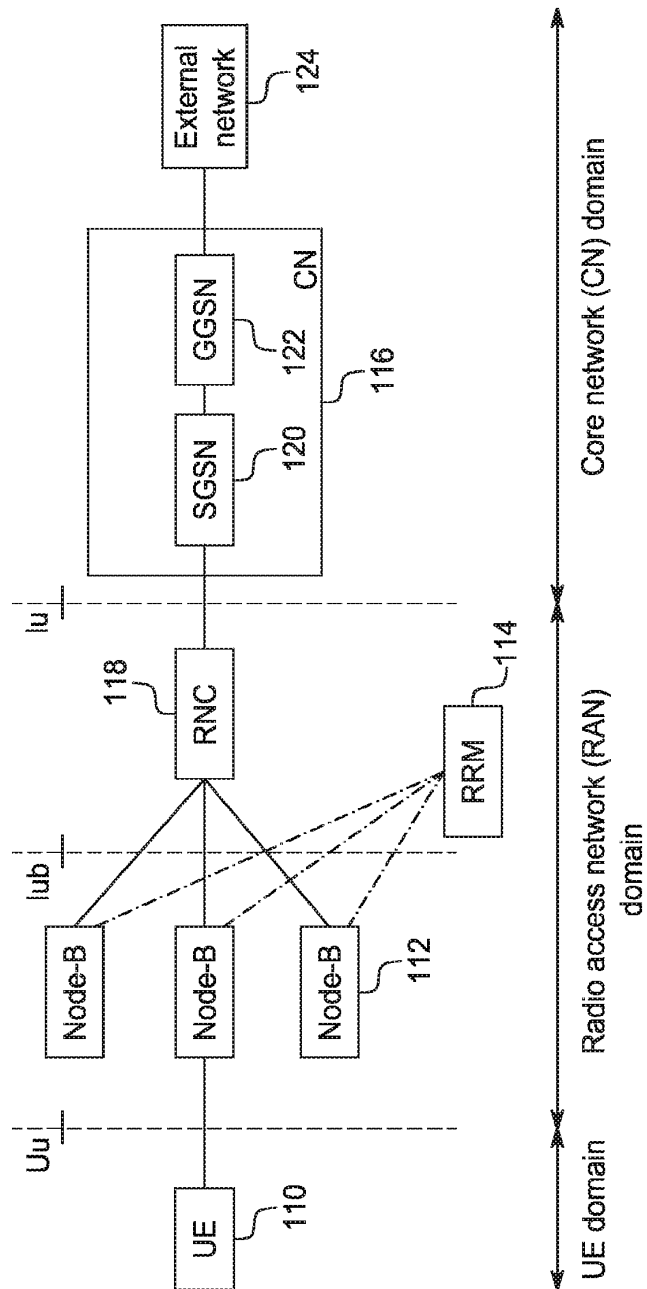


FIG. 1

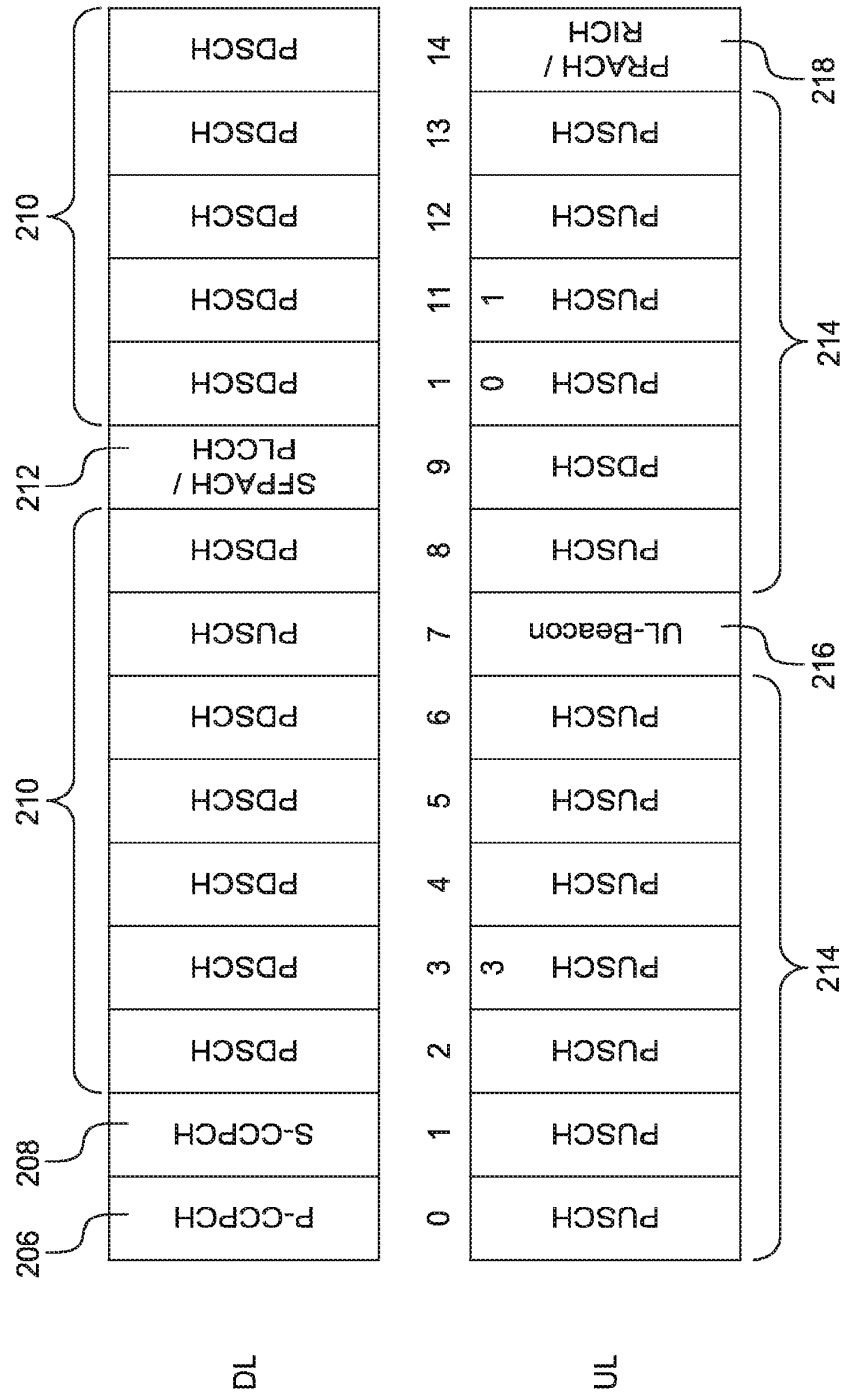


FIG. 2

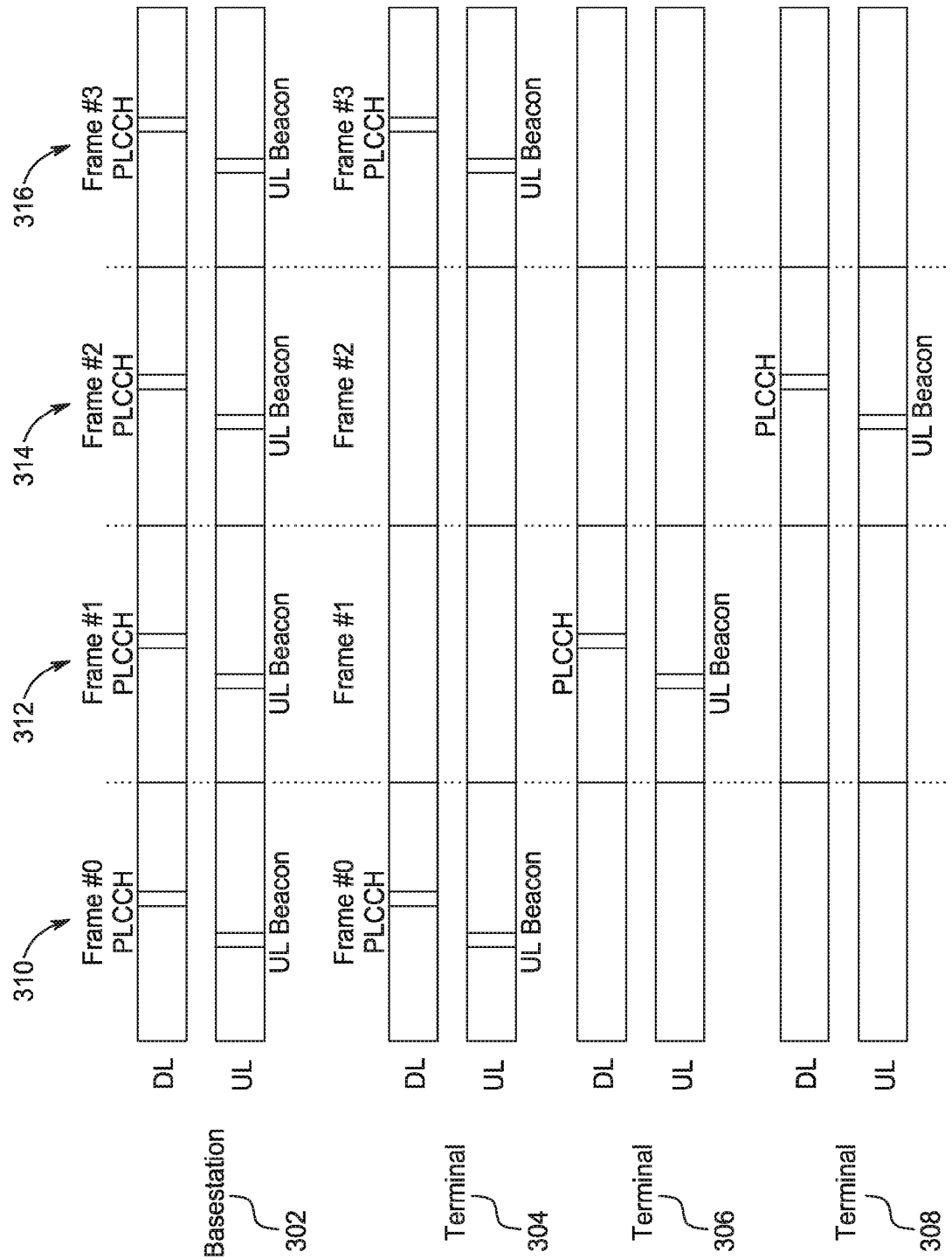


FIG. 3

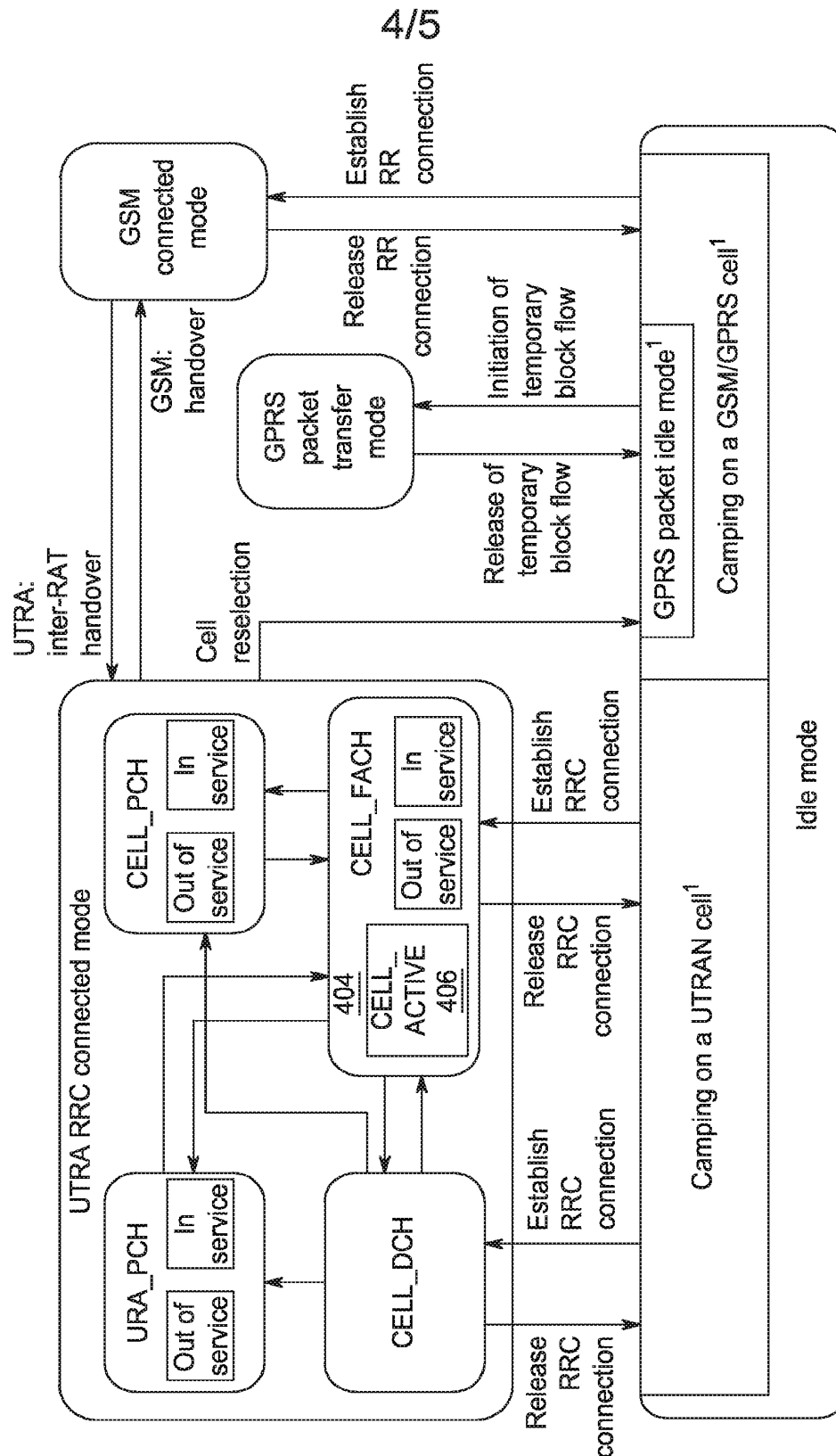


FIG. 4

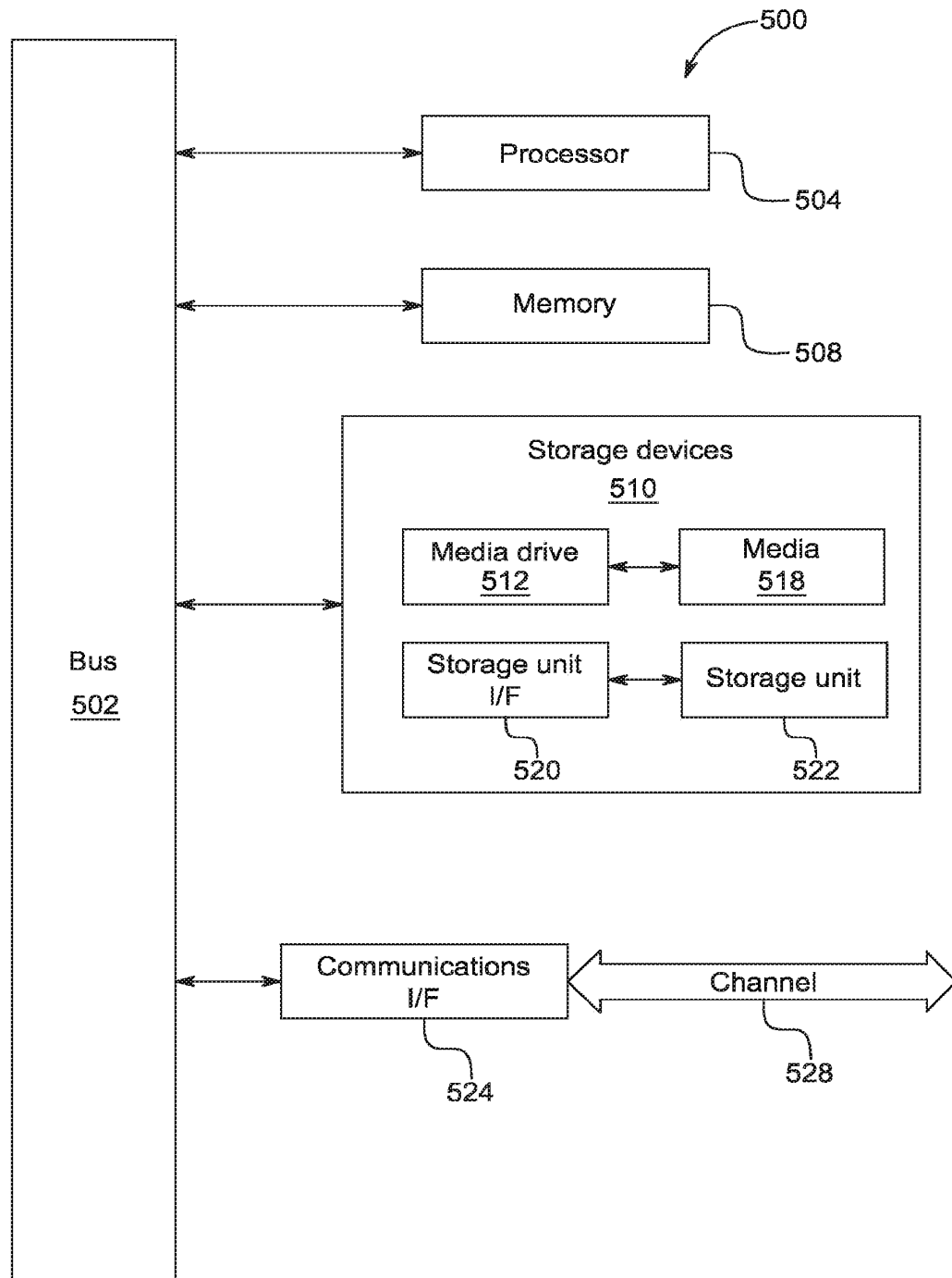


FIG. 5

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	IPW2-USCN213316
		Application Number	
Title of Invention	COMMUNICATIONS IN A WIRELESS NETWORK		
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.			

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)
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Title of the Invention	COMMUNICATIONS IN A WIRELESS NETWORK		
Attorney Docket Number	IPW2-USCN213316	Small Entity Status Claimed	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	5	Suggested Figure for Publication (if any)	

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	IPW2-USCN213316
		Application Number	
Title of Invention	COMMUNICATIONS IN A WIRELESS NETWORK		

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

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

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

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

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

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative information during processing.

Please Select One:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	3624		

Domestic Benefit/National Stage Information:

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

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

Prior Application Status	Pending	Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Continuation of	14458693	2014-08-13

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

Application Data Sheet 37 CFR 1.76		Attorney Docket Number		IPW2-USCN213316	
		Application Number			
Title of Invention	COMMUNICATIONS IN A WIRELESS NETWORK				
Prior Application Status		Patented		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14458693	Continuation of	13176298	2011-07-05	8811356	2014-08-19
Prior Application Status		Patented		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13176298	Continuation of	11646692	2006-12-27	8009639	2011-08-30
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.					

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)¹ 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).

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

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

This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

☐ NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	IPW2-USCN213316
		Application Number	
Title of Invention	COMMUNICATIONS IN A WIRELESS NETWORK		

Authorization or Opt-Out of Authorization to Permit Access:

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

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

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

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

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

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

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

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

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

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

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

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

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	IPW2-USCN213316
		Application Number	
Title of Invention	COMMUNICATIONS IN A WIRELESS NETWORK		

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.			
Applicant 1			
If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.			
Clear			
☒ Assignee	☐ Legal Representative under 35 U.S.C. 117	☐ Joint Inventor	
☐ Person to whom the inventor is obligated to assign.		☐ Person who shows sufficient proprietary interest	
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:			
Name of the Deceased or Legally Incapacitated Inventor: <input type="text"/>			
If the Applicant is an Organization check here. ☒			
Organization Name	Intellectual Ventures II LLC		
Mailing Address Information For Applicant:			
Address 1	2711 Centerville Road		
Address 2	Suite 400		
City	Wilmington	State/Province	DE
Country	US	Postal Code	19808
Phone Number		Fax Number	
Email Address			
Additional Applicant Data may be generated within this form by selecting the Add button.			

Assignee Information including Non-Applicant Assignee Information:

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

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

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	IPW2-USCN213316
		Application Number	
Title of Invention	COMMUNICATIONS IN A WIRELESS NETWORK		

Assignee 1			
Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.			
If the Assignee or Non-Applicant Assignee is an Organization check here. ☒			
Organization Name	Intellectual Ventures II LLC		
Mailing Address Information For Assignee including Non-Applicant Assignee:			
Address 1	2711 Centerville Road II LLC		
Address 2	Suite 400		
City	Wilmington	State/Province	DE
Country ⁱ	US	Postal Code	19808
Phone Number		Fax Number	
Email Address			
Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.			

Signature:

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

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

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

Signature	/Harry Vartanian/		Date (YYYY-MM-DD)	2019-11-13	
First Name	Harry	Last Name	Vartanian	Registration Number	56,787
Additional Signature may be generated within this form by selecting the Add button.					

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

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	IPW2-USCN213316
		Application Number	
Title of Invention	COMMUNICATIONS IN A WIRELESS NETWORK		

This collection of information is required by 37 CFR 1.76. 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 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

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

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

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