The United States Patent and Trademark Office
PATENT TRIAL AND APPEAL BOARD

A petition has been filed in Patent Number 11,664,889, Application Number 17/870,425 on 11/25/24 (Date).

The Case Number is IPR2025-00221.
(IPR, CBM, PGR, DER #)

To view the documents filed in this petition, go to https://ptab.uspto.gov.

Use the Search PTAB tab and enter the Patent Number or the Trial or Case Number and select the Search button.

Questions regarding this notice should be directed to the Patent Trial and Appeal Board at 571-272-7822.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address : COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.
17/870,425	30-MAY-23	11664889

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

EGRANT NOTIFICATION

Your electronic patent grant (eGrant) is now available, which can be accessed via Patent Center at https://patentcenter.uspto.gov

The electronic patent grant is the official patent grant under 35 U.S.C. 153. For more information, please visit https://www.uspto.gov/electronicgrants

TO: eoffice@vklaw.com
FROM: noreply@uspto.gov
CC: patentcenter_eofficeaction@uspto.gov
SUBJECT: USPTO: Patent Electronic System - Correspondence Notification for Customer Number 3624

Tue May 30 05:36:51 EDT 2023

Dear Patent Center Customer:

Correspondence Address:

VOLPE KOENIG
30 SOUTH 17TH STREET, 18TH FLOOR
PHILADELPHIA,PENNSYLVANIA,19103
UNITED STATES

This is a courtesy notification regarding the following USPTO patent application(s) associated with your Customer Number, 3624, that have new outgoing correspondence. This correspondence is now available for viewing in Patent Center.

The official date of notification of the outgoing correspondence will be indicated on the form (e.g., PTOL-90) accompanying the correspondence.

Disclaimer:
The list of documents shown below are provided as a courtesy and is not part of the official file wrapper. The content of the images shown in the Image File Wrapper is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
17870425	EGRANT.NTF	05/30/2023	IPW2-USCN213571

To view your correspondence online, please sign in to Patent Center and then select Workbench/View correspondence. To update your email address(es), select Manage/Manage customer numbers.

If you have any questions, please contact the Patent Electronic Business Center (EBC) at ebc@uspto.gov or 866-217-9197 Monday – Friday, 6 a.m. to midnight ET.

Please do not reply to this email as it was sent from an unmonitored mailbox.

Sincerely,

The Patent Center Team

TO: eoffice@vklaw.com
FROM: noreply@uspto.gov
CC: patentcenter_eofficeaction@uspto.gov
SUBJECT: USPTO: Patent Electronic System - Correspondence Notification for Customer Number 3624

Thu May 11 09:06:17 EDT 2023

Dear Patent Center Customer:

Correspondence Address:

VOLPE KOENIG
30 SOUTH 17TH STREET, 18TH FLOOR
PHILADELPHIA,PENNSYLVANIA,19103
UNITED STATES

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Application	Document	Mailroom Date	Attorney Docket No.
17870425	ISSUE.NTF	05/10/2023	IPW2-USCN213571

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Sincerely,

The Patent Center Team

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/870,425	05/30/2023	11664889	IPW2-USCN213571	9362

3624 7590 05/10/2023

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

ISSUE NOTIFICATION

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

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

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

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

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

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

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

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

Paul Howard, Bristol, UNITED KINGDOM;

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

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.

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 01/26/2023

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)
April 18, 2023	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/870,425	07/21/2022	Paul Howard	IPW2-USCN213571	9362

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	04/26/2023

EXAMINER	ART UNIT	CLASS-SUBCLASS
ABELSON, RONALD B	2476	455-522000

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

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

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

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 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: Intellectual Ventures II LLC

(B) RESIDENCE: (CITY and STATE OR COUNTRY): 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 April 18, 2023

Typed or printed name John D. Wilt Registration No. 76,110

Electronic Patent Application Fee Transmittal

Application Number:	17870425
Filing Date:	21-Jul-2022
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-USCN213571

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:	47859824
Application Number:	17870425
International Application Number:	
Confirmation Number:	9362
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-USCN213571
Receipt Date:	18-APR-2023
Filing Date:	21-JUL-2022
Time Stamp:	16:07:25
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	E20234HG12416014
Deposit Account	220493
Authorized User	Caren Burgoon

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

37 CFR 1.16 (National application filing, search, and examination fees)

37 CFR 1.17 (Patent application and reexamination processing fees)

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_USCN213571_IssueFeeTransmittalPayment_20230418.pdf	120784 7192286f79daeae32d38ef3e6e4a0235af07847c	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	37811 8956e7666ce16cb1f7163b891e41f5b2c07c5c2c	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	158595		

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.

To: eoffice@vklaw.com,,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 3624

Jan 26, 2023 03:25:35 AM

Dear PAIR Customer:

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

The following USPTO patent application(s) associated with your Customer Number, 3624 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

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Application	Document	Mailroom Date	Attorney Docket No.
17870425	NOA	01/26/2023	IPW2-USCN213571
	1449	01/26/2023	IPW2-USCN213571

To view your correspondence online or update your email addresses, please visit us anytime at https://sportal.uspto.gov/secure/myportal/privatepair.

If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

Monday - Friday 6:00 a.m. to 12:00 a.m.

Thank you for prompt attention to this notice,

UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

3624 7590 01/26/2023

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

EXAMINER
ABELSON, RONALD B

ART UNIT	PAPER NUMBER
2476	

DATE MAILED: 01/26/2023

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/870,425	07/21/2022	Paul Howard	IPW2-USCN213571	9362

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	04/26/2023

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

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

HOW TO REPLY TO THIS NOTICE:

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

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

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

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

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

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

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

PART B - FEE(S) TRANSMITTAL

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

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 01/26/2023

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

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

Certificate of Mailing or Transmission

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

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/870,425	07/21/2022	Paul Howard	IPW2-USCN213571	9362

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	04/26/2023

EXAMINER	ART UNIT	CLASS-SUBCLASS
ABELSON, RONALD B	2476	455-522000

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

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

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

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 _____
3 _____

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

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

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

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

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

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

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

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

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

❑ Applicant certifying micro entity status. See 37 CFR 1.29

❑ Applicant asserting small entity status. See 37 CFR 1.27

❑ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

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

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/870,425	07/21/2022	Paul Howard	IPW2-USCN213571	9362

3624 7590 01/26/2023

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

EXAMINER	
ABELSON, RONALD B	
ART UNIT	PAPER NUMBER
2476	

DATE MAILED: 01/26/2023

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

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

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

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

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

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

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

Privacy Act Statement

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

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

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

Notice of Allowability	Application No. 17/870,425	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 1/2/22, 10/18/22.
   ☐ 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 1,3-6,8-11,13-16 and 18-20 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some* c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

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

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

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

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

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☑ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 10/18/22.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/RONALD B ABELSON/
Primary Examiner, Art Unit 2476

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/870,425	Howard, Paul
	Examiner	Art Unit
	RONALD B ABELSON	2476

CPC - Searched*		
Symbol	Date	Examiner
h04j3/1694	12/07/2022	RA
h04l5/0053	12/07/2022	RA
h04w52/146 h04w72/0406 h04w72/042 h04w72/0446 h04w72/121 h04w72/1289	12/07/2022	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 PE2E	12/07/2022	RA

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
h04j	3/1694	12/07/2022	RA
h04l	5/0053	12/07/2022	RA
h04w	52/146, 72/0406, 72/042, 72/0446, 72/121, 72/1289	12/07/2022	RA

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/870,425	Howard, Paul
	Examiner	**Art Unit**
	RONALD B ABELSON	2476

CPC						
Symbol					**Type**	**Version**
H04B	/	7	/	2643	F	2013-01-01
H04W	/	72	/	0406	I	2013-01-01
H04W	/	72	/	121	I	2013-01-01
H04W	/	72	/	1289	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)	16	
/RONALD B ABELSON/ Primary Examiner, Art Unit 2476	07 December 2022	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office — Part of Paper No.: 20221206

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/870,425	Howard, Paul
	Examiner	**Art Unit**
	RONALD B ABELSON	2476

INTERNATIONAL CLASSIFICATION				
CLAIMED				
H04B	/	7	/	26
H04W	/	72	/	04
H04W	/	72	/	12
H04W	/	52	/	14
H04W	/	72	/	04
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)	16	
/RONALD B ABELSON/ Primary Examiner, Art Unit 2476	07 December 2022	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office

Part of Paper No.: 20221206

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/870,425	Howard, Paul
	Examiner	**Art Unit**
	RONALD B ABELSON	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	8	10	15	19										
	2	9	11	16	20										
2	3		12												
3	4	10	13												
4	5	11	14												
5	6	12	15												
	7	13	16												
6	8		17												
7	9	14	18												

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	16	
/RONALD B ABELSON/ Primary Examiner, Art Unit 2476	07 December 2022	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office

Part of Paper No.: 20221206

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/870,425	Howard, Paul
	Examiner	Art Unit
	RONALD B ABELSON	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	09/08/2022	12/07/2022							
1	1	✓	=							
	2	O	-							
2	3	✓	=							
3	4	O	=							
4	5	O	=							
5	6	✓	=							
	7	O	-							
6	8	✓	=							
7	9	O	=							
8	10	O	=							
9	11	✓	=							
	12	O	-							
10	13	O	=							
11	14	O	=							
12	15	O	=							
13	16	✓	=							
	17	O	-							
14	18	✓	=							
15	19	O	=							
16	20	O	=							

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	12	"11646692"	(US-PGPUB; USPAT)	OR	ON	ON	2022/08/31 09:42 AM
L2	12	1 AND (control physical slot power).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2022/08/31 09:43 AM
L3	12	1 AND (control physical slot power extract$3).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2022/08/31 09:45 AM
L4	0	1 AND (extract$3).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2022/08/31 09:46 AM
L5	0	1 AND (control adj1 message WITH physical adj1 channel).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2022/08/31 09:48 AM
L6	0	1 AND (message WITH physical adj1 channel).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2022/08/31 09:48 AM
L7	5	1 AND (physical adj1 channel).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2022/08/31 09:48 AM
L8	12	1 AND (power WITH control).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2022/08/31 09:50 AM
L9	3	1 AND (power WITH control WITH slot).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2022/08/31 09:50 AM
L10	2	"20020061005"	(US-PGPUB; USPAT)	OR	ON	ON	2022/08/31 10:18 AM
L11	7	1 AND (power adj1 control WITH bit).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2022/08/31 10:26 AM
L12	1	"20080144600" AND plcch	(US-PGPUB; USPAT)	OR	ON	ON	2022/08/31 08:32 PM
L13	1	"20080144600"	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/01 02:14 PM
L14	0	1 AND (second adj1 slot).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/01 02:23 PM
L15	9	1 AND (slot).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/01 02:24 PM
L16	5	1 AND (second adj2 slot).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/01 02:25 PM
L17	9	1 AND (slot).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/01 02:27 PM
L18	10	1 AND (physical).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/01 02:32 PM
L19	8	1 AND (physical SAME different).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/01 02:33 PM
L20	3	1 AND (physical SAME slot near4 different).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/01 02:33 PM
L21	1965	(uplink WITH downlink WITH slot near4	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/01 02:36 PM

		different)					
L22	1050	(uplink WITH downlink WITH different adj1 time adj1 slot)	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/01 02:36 PM
L23	974	(uplink near3 downlink WITH different adj1 time adj1 slot)	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/01 02:36 PM
L24	0	(uplink near3 downlink WITH different adj1 time adj1 slot) SAME physical near3 control	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/01 02:38 PM
L25	1	"20080144600"	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/01 02:42 PM
L26	1	25 AND shared	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/08 11:50 AM
L27	0	25 AND shared WITH slot	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/08 11:51 AM
L28	0	25 AND channel WITH slot	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/08 11:51 AM
L29	1	25 AND channel SAME slot	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/08 11:52 AM
L30	0	25 AND first adj1 slot	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/08 11:52 AM
L31	0	25 AND first adj2 slot	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/08 11:52 AM
L32	1	25 AND first	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/08 11:53 AM
L33	1	25 AND code	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/08 02:12 PM
L34	1	25 AND code SAME physical	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/08 02:13 PM
L35	1	25 AND plcch	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/08 02:23 PM
L36	0	25 AND plcch WITH synchroniz$5	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/08 02:23 PM
L37	85784	h04j3/1694 h04l5/0053 h04w52/146 h04w72/0406 h04w72/042 h04w72/0446 h04w72/121 h04w72/1289	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/08 03:01 PM
L38	255	37 AND 23	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/08 03:02 PM
L39	10	"20020061768"	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/08 03:07 PM
L40	2	"20100272032"	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/12 09:28 AM
L41	1	"17267091"	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/12 10:04 AM
L42	1180	37 AND first adj1	(US-PGPUB; USPAT)	OR	ON	ON	2022/12/06

		(timeslot slot) WITH downlink adj1 shared adj1 channel					04:29 PM
L43	6	37 AND first adj1 (timeslot slot) WITH downlink adj1 shared adj1 channel SAME control near2 message WITH physical	(US-PGPUB; USPAT)	OR	ON	ON	2022/12/06 04:30 PM
L44	1	"17870425"	(US-PGPUB; USPAT)	OR	ON	ON	2022/12/07 07:47 AM

PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	17/870,425
Filing Date	2022-07-21
First Named Inventor	Howard
Art Unit	2476
Examiner Name	Ronald B. Abelson
Attorney Docket Number	IPW2-USCN213571

U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
		5056109	10/1991	Gilhousen et al.			
		5265119	11/1993	Gilhousen et al.			
		5485486	01/1996	Gilhousen et al.			
		6061784	05/2000	Tarsky et al.			
		6567459	05/2003	Hakkinen et al.			
		6611509	08/2003	Hayashi et al.			
		6754505	06/2004	Baker et al.			
		6978151	12/2005	Choi et al.			
		7120134	10/2006	Tiedemann, Jr. et al.			
		7180902	02/2007	Raaf et al.			
		7215657	05/2007	Toshimitsu et al.			
		8009639	08/2011	Howard			
		8072916	12/2011	Dateki			
		20010012276	08/2001	Tsunehara et al.			
		20010026543	10/2001	Hwang et al.			
		20010048711	12/2001	Sun et al.			
		20020061005	05/2002	Lee et al.			
		20020075891	06/2002	Souissi			
		20020077151	06/2002	Matthews et al.			
		20020085522	07/2002	Huber			
		20020094834	07/2002	Baker et al.			
		20020105929	08/2002	Chen et al.			
		20020114311	08/2002	Mazur et al.			
		20020119798	08/2002	Hamabe			
		20020136193	09/2002	Chang et al.			
		20020150058	10/2002	Kim et al.			
		20020168993	11/2002	Choi et al.			
		20020172208	11/2002	Malkamaki			

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EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
		20020196766	12/2002	Hwang et al.			
		20030022683	01/2003	Beckmann et al.			
		20030054850	03/2003	Masseroni et al.			
		20030069020	04/2003	Speight			
		20040022213	02/2004	Choi et al.			
		20040152473	08/2004	Kuwano et al.			
		20040170132	09/2004	Shin et al.			
		20040203419	10/2004	Crocker et al.			
		20050002360	01/2005	Lamontagne et al.			
		20050013287	01/2005	Wallentin et al.			
		20050022098	01/2005	Vayanos et al.			
		20050058103	03/2005	Jeong et al.			
		20050222948	10/2005	Sato et al.			
		20060093026	05/2006	Montojo et al.			
		20060211417	09/2006	Pedlar			
		20060221809	10/2006	Malladi et al.			
		20070058595	03/2007	Classon et al.			
		20070173256	07/2007	Laroia et al.			
		20070177656	08/2007	Maruta et al.			
		20070265017	11/2007	Ishii et al.			
		20080090528	04/2008	Malladi			
		20080144600	06/2008	Anderson			
		20090262711	10/2009	Ahn et al.			

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	TRANSLATION NO
		10201270	08/2002	DE				
		1467582	10/2004	EP				
		1615384	01/2006	EP				

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

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Filing Date	2022-07-21
First Named Inventor	Howard
Art Unit	2476
Examiner Name	Ronald B. Abelson
Attorney Docket Number	IPW2-USCN213571

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	TRANSLATION NO
		1681780	07/2006	EP				
		11261544	09/1999	JP				
		2006197318	07/2006	JP				
		2006019263	02/2006	WO				
		2006063138	06/2006	WO				
		2006015984	02/2006	WO				
		2005083897	09/2005	WO				

OTHER DOCUMENTS

EXAMINER INITIAL		DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
		"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/in!- erfaces.pdf>.
		"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.
		"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.
		"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.
		"3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Multimedia Broadcast/Multicast Service (MBMS); Architecture and Functional Description (Release 6); 3GPP: Valbonne, France; 3GPP TS 23.246 v.6.4.0 (2004-09).
		"UMTS Protocols and Protocol Testing," Tektronix, The International Engineering Consortium, pp. 1-45, located at <http://www.rfpeople.com/docs/umts.pdf>.
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	17/870,425
Filing Date	2022-07-21
First Named Inventor	Howard
Art Unit	2476
Examiner Name	Ronald B. Abelson
Attorney Docket Number	IPW2-USCN213571

EXAMINER INITIAL		DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
		EXAMINER'S ANSWER TO APPEAL BRIEF, U.S. Patent Application No. 14/458,693, dated November 23, 2018.
		Final Rejection issued by USPTO, dated November 19, 2009 for 11/646,692.
		FINAL REJECTION, U.S. Patent Application No. 13/176,298, dated November 6, 2013.
		FINAL REJECTION, U.S. Patent Application No. 14/458,693, dated May 10, 2016.
		FINAL REJECTION, U.S. Patent Application No. 14/458,693, dated March 21, 2017.
		FINAL REJECTION, U.S. Patent Application No. 14/458,693, dated May 17, 2018.
		FINAL REJECTION, U.S. Patent Application No. 16/682,854, dated July 1, 2020.
		Ghadialy, Z. "Tutorial: Medium Access Control (MAC) in 3G/UMTS Protocol Stack," located at <http://www.3g4g.co.ukl Tutoriai/ZG/zg.sub.--mac.html> visited on Jun. 20, 2007. (9 pages).
		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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7664724 All References Considered Except Where Lined Through. /R.B.A/

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /R.B.A/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	17/870,425
Filing Date	2022-07-21
First Named Inventor	Howard
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Attorney Docket Number	IPW2-USCN213571

EXAMINER INITIAL		DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
		NON-FINAL REJECTION, U.S. Patent Application No. 13/176,298, dated April 10, 2013.
		NON-FINAL REJECTION, U.S. Patent Application No. 14/458,693, dated December 30, 2015.
		NON-FINAL REJECTION, U.S. Patent Application No. 14/458,693, dated December 2, 2016.
		NON-FINAL REJECTION, U.S. Patent Application No. 14/458,693, dated October 23, 2017.
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		NOTICE OF ALLOWANCE, U.S. Patent Application No. 13/176,298, dated April 15, 2014.
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7664724 All References Considered Except Where Lined Through. /R.B.A/

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /R.B.A/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	17/870,425
Filing Date	2022-07-21
First Named Inventor	Howard
Art Unit	2476
Examiner Name	Ronald B. Abelson
Attorney Docket Number	IPW2-USCN213571

EXAMINER INITIAL		DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
		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).
		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).
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/RONALD B ABELSON/ 12/06/2022

All References Considered Except Where Lined Through. /R.B.A/

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /R.B.A/

Bibliographic Data

Application No: 17/870,425

Foreign Priority claimed: ○ Yes ◉ No

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.
07/21/2022	455	2476	IPW2-USCN213571
RULE			

APPLICANTS

Intellectual Ventures II LLC, Wilmington, DE, UNITED STATES

INVENTORS

Paul Howard, Bristol,

CONTINUING DATA

This application is a CON of 17583369 01/25/2022 PAT 11411642

17583369 is a CON of 17339550 06/04/2021 PAT 11239908

17339550 is a CON of 16682854 11/13/2019 PAT 11032000

16682854 is a CON of 14458693 08/13/2014 PAT 11044010

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**

08/01/2022

STATE OR COUNTRY

ADDRESS

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UNITED STATES

FILING FEE RECEIVED

$6,640

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the **PATENT APPLICATION** of: Intellectual Ventures II LLC **Application No.:** 17/870,425 **Confirmation No.: 9362** **Filed:** July 21, 2022 For: COMMUNICATIONS IN A WIRELESS NETWORK Group: 2476 Examiner: Ronald B. Abelson	Our File: IPW2-USCN213571 Date: December 2, 2022

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 September 16, 2022.

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 first user equipment (UE) comprising:

a transmitter;

a receiver; and

a processor, operatively coupled to the transmitter and the receiver,

wherein:

the receiver and the processor are configured to receive a control message over a physical control channel in a first time slot, wherein the first time slot also includes a downlink shared channel, wherein the control message has power control bits for a plurality of UEs, wherein the plurality of UEs include the first UE,

the processor is further configured to extract power control information for the first UE from the control message, and

the transmitter and the processor are configured to transmit a signal over a physical control channel to a base station in a second time slot at a transmission power level based on the extracted power control information.

2. (Canceled)

3. (Original) The first UE of claim 1 wherein the signal transmitted over the physical control channel is produced using a code sequence, wherein a plurality of UEs transmit in the second time slot using different code sequences.

4. (Original) The first UE of claim 1 wherein the transmitter and the processor are further configured to transmit data over a physical shared channel in a third time slot and the transmitter and the processor are further configured to not transmit the signal over the physical control channel at a same time that data over a physical shared channel is transmitted.

5. (Original) The first UE of claim 1 wherein the transmitter and the processor are further configured to transmit the signal over the physical control channel when time synchronized and to transmit a signal over a random access channel when not time synchronized.

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

receiving, by the first UE, a control message over a physical control channel in a first time slot, wherein the first time slot also includes a downlink shared channel, wherein the control message has power control bits for a plurality of UEs including the first UE;

extracting, by the UE, power control information for the first UE from the control message; and

transmitting, by the UE, a signal over a physical control channel to a base station in a second time slot at a transmission power level based on the extracted power control information.

7. (Canceled)

8. (Original) The method of claim 6 wherein the signal transmitted over the physical control channel is produced using a code sequence, wherein a plurality of UEs transmit in the second time slot using different code sequences.

9. (Original) The method of claim 6 further comprising:

transmitting, by the first UE, data over a physical shared channel in a third time slot, wherein the UE does not transmit the signal over the physical control channel at a same time that data over a physical shared channel is transmitted.

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

transmitting, by the first UE, the signal over the physical control channel when time synchronized; and

transmitting a signal over a random access channel when not time synchronized.

11. (Currently Amended) A base station comprising:

a transmitter;

a receiver; and

a processor, operatively coupled to the transmitter and the receiver,

wherein:

the transmitter and the processor are configured to transmit a control message over a physical control channel in a first time slot, wherein the control message has power control bits for a plurality of user equipments (UEs), wherein the plurality of UEs include a first UE, ~~and~~

the transmitter and the processor are also configured to transmit data over a downlink shared channel in the first time slot, and

the transmitter and the processor are further configured to receive a signal over a physical control channel from the first UE in a second time slot, wherein a power level of the received signal from the first UE is based on the transmitted message.

12. (Cancelled)

13. (Original) The base station of claim 11 wherein the processor is further configured to process the signal received over the physical control channel from the first UE based on a code sequence, wherein signals from a plurality of UEs are received in the second time slot using different code sequences.

14. (Original) The base station of claim 11 wherein the receiver and the processor are further configured to receive data over a physical shared channel in a third time slot.

15. (Original) The base station of claim 11 wherein the receiver and the processor are further configured to receive the signal over the physical control channel when the first UE is time synchronized and to receive a signal over a random access channel when the first UE is not time synchronized.

16. (Currently Amended) A method performed by a base station, the method comprising:

transmitting, by the base station, a control message over a physical control channel in a first time slot, wherein the control message has power control bits for a plurality of user equipments (UEs), wherein the plurality of UEs include a first UE;

transmitting, by the base station, data over a downlink shared channel in the first time slot; and

receiving, by the base station, a signal over a physical control channel from the first UE in a second time slot, wherein a power level of the received signal from the first UE is based on the transmitted message.

17. (Cancelled)

18. (Original) The method of claim 16 further comprising processing, by the base station, the signal received over the physical control channel from the first UE based on a code sequence, wherein signals from a plurality of UEs are received and processed in the second time slot using different code sequences.

19. (Original) The method of claim 16 further comprising receiving, by the base station, data over a physical shared channel in a third time slot.

20. (Original) The method of claim 16 further comprising:

receiving, by the base station, the signal over the physical control channel when the first UE is time synchronized; and

receiving, by the base station, a signal over a random access channel when the first UE is not time synchronized.

REMARKS/ARGUMENTS

After the foregoing Amendment, claims 1, 3-6, 8-11, 13-16, and 18-20 are currently pending in this application. Claims 2, 7, 12, and 17 are canceled. Claims 1, 6, 11, and 16 are amended.

Allowable Subject Matter

Applicant thanks the Examiner for indicating that claims 2, 4, 5, 7, 9, 10, 12, 14, 15, 17, 19, and 20 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim Objections

The Examiner objected to claims 2, 4, 5, 7, 9, 10, 12, 14, 15, 17, 19, and 20 because they depend upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Limitations from the dependent claims 2, 7, 12, and 17 have been added to independent claims 1, 6, 11, and 16, respectfully. Withdrawal of the objection to the claims 4, 5, 9, 10, 14, 15, 19, and 20 is therefore respectfully requested.

Claim Rejections - 35 U.S.C. §103

Claims 1, 3, 6, 8, 11, 13, 16, and 18 are rejected under pre-AIA 35 U.S.C. §103(a) as being unpatentable over Great Britain Patent No. 2,417,167 to Anderson (hereinafter "Anderson") (U.S. Patent Publication No. 2008/0144600 to Anderson) in view of U.S. Patent Publication No. 2002/0061768 to Liang (hereinafter "Liang").

Since the Examiner has indicated that dependent claims 2, 7, 12, and 17 as allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims, withdrawal of the §103 rejection of claims 1, 3, 6, 8, 11, 13, 16, and 18 is respectfully requested in view of the current amendments.

Claims 3-5, 8-10, 13-15, and 18-20 are dependent upon claims 1, 6, 11, and 16, and the Applicant submits that these claims are allowable over the cited references of record for the same reasons provided above.

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, 3-6, 8-11, 13-16, and 18-20, 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
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JDW/cb

Electronic Acknowledgement Receipt

EFS ID:	47134234
Application Number:	17870425
International Application Number:	
Confirmation Number:	9362
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-USCN213571
Receipt Date:	02-DEC-2022
Filing Date:	21-JUL-2022
Time Stamp:	16:07:54
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_USCN213571_NFOAReply_20221202.pdf	129949 643a8814a724a3ca504e9cf0069670de32e3a6bb	yes	10

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Request for Reconsideration-After Non-Final Rejection	1	1
	Claims	2	7
	Applicant Arguments/Remarks Made in an Amendment	8	10
Warnings:			
Information:			
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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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

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

New International Application Filed with the USPTO as a Receiving Office

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

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
17/870,425	07/21/2022	Paul Howard	IPW2-USCN213571

CONFIRMATION NO. 9362

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PUBLICATION NOTICE

OC000000136814046

Title:COMMUNICATIONS IN A WIRELESS NETWORK

Publication No.US-2022-0360325-A1
Publication Date:11/10/2022

NOTICE OF PUBLICATION OF APPLICATION

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

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

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

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

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	17/870,425
Filing Date	2022-07-21
First Named Inventor	Howard
Art Unit	2476
Examiner Name	Ronald B. Abelson
Attorney Docket Number	IPW2-USCN213571

U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
		5056109	10/1991	Gilhousen et al.			
		5265119	11/1993	Gilhousen et al.			
		5485486	01/1996	Gilhousen et al.			
		6061784	05/2000	Tarsky et al.			
		6567459	05/2003	Hakkinen et al.			
		6611509	08/2003	Hayashi et al.			
		6754505	06/2004	Baker et al.			
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		7180902	02/2007	Raaf et al.			
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	17/870,425
	Filing Date	2022-07-21
	First Named Inventor	Howard
	Art Unit	2476
	Examiner Name	Ronald B. Abelson
	Attorney Docket Number	IPW2-USCN213571

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
		20020196766	12/2002	Hwang et al.			
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EXAMINER INITIAL		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
		10201270	08/2002	DE				
		1467582	10/2004	EP				
		1615384	01/2006	EP				

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	Examiner Name	Ronald B. Abelson
	Attorney Docket Number	IPW2-USCN213571

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	TRANSLATION NO
		1681780	07/2006	EP				
		11261544	09/1999	JP				
		2006197318	07/2006	JP				
		2006019263	02/2006	WO				
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EXAMINER INITIAL		DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
		"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/in!- erfaces.pdf>.
		"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.
		"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.
		"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.
		"3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Multimedia Broadcast/Multicast Service (MBMS); Architecture and Functional Description (Release 6); 3GPP: Valbonne, France; 3GPP TS 23.246 v.6.4.0 (2004-09).
		"UMTS Protocols and Protocol Testing," Tektronix, The International Engineering Consortium, pp. 1-45, located at <http://www.rfpeople.com/docs/umts.pdf>.
		3RD GENERATION PARTNERSHIP PROJECT. "Technical Specification Group Radio Access Network; Radio Resource Control (RRC); Protocol Specification (Release 7)," 3GPP TS 25.331 V7.3.0, December 2006.
		ADVISORY ACTION, U.S. Patent Application No. 14/458,693, dated August 25, 2016.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	17/870,425
	Filing Date	2022-07-21
	First Named Inventor	Howard
	Art Unit	2476
	Examiner Name	Ronald B. Abelson
	Attorney Docket Number	IPW2-USCN213571

EXAMINER INITIAL		DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
		EXAMINER'S ANSWER TO APPEAL BRIEF, U.S. Patent Application No. 14/458,693, dated November 23, 2018.
		Final Rejection issued by USPTO, dated November 19, 2009 for 11/646,692.
		FINAL REJECTION, U.S. Patent Application No. 13/176,298, dated November 6, 2013.
		FINAL REJECTION, U.S. Patent Application No. 14/458,693, dated May 10, 2016.
		FINAL REJECTION, U.S. Patent Application No. 14/458,693, dated March 21, 2017.
		FINAL REJECTION, U.S. Patent Application No. 14/458,693, dated May 17, 2018.
		FINAL REJECTION, U.S. Patent Application No. 16/682,854, dated July 1, 2020.
		Ghadialy, Z. "Tutorial: Medium Access Control (MAC) in 3G/UMTS Protocol Stack," located at <http://www.3g4g.co.ukl Tutoriai/ZG/zg.sub.--mac.html> visited on Jun. 20, 2007. (9 pages).
		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).
		International Preliminary Report on Patentability issued on Jun. 30, 2009 from PCT Application No. PCT/ EP20071064483.
		MISCELLANEOUS COMMUNICATION TO APPLICANT, U.S. Patent Application No. 14/458,693, dated May 20, 2016.
		Non-Final Rejection issued by USPTO, dated May 14, 2009 for 11/646,692.
		Non-Final Rejection issued by USPTO, dated May 28, 2010 for 11/646,692.
		NON-FINAL REJECTION, U.S. Patent Application No. 13/176,298, dated July 24, 2013.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	17/870,425
	Filing Date	2022-07-21
	First Named Inventor	Howard
	Art Unit	2476
	Examiner Name	Ronald B. Abelson
	Attorney Docket Number	IPW2-USCN213571

EXAMINER INITIAL		DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
		NON-FINAL REJECTION, U.S. Patent Application No. 13/176,298, dated April 10, 2013.
		NON-FINAL REJECTION, U.S. Patent Application No. 14/458,693, dated December 30, 2015.
		NON-FINAL REJECTION, U.S. Patent Application No. 14/458,693, dated December 2, 2016.
		NON-FINAL REJECTION, U.S. Patent Application No. 14/458,693, dated October 23, 2017.
		NON-FINAL REJECTION, U.S. Patent Application No. 16/682,854, dated February 7, 2020.
		NON-FINAL REJECTION, U.S. Patent Application No. 16/682,854, dated October 21, 2020.
		Notice of Allowance issued by USPTO, dated February 2, 2011 for 11/646,692.
		Notice of Allowance issued by USPTO, dated May 17, 2011 for 11/646,692.
		NOTICE OF ALLOWANCE, U.S. Patent Application No. 13/176,298, dated April 15, 2014.
		NOTICE OF ALLOWANCE, U.S. Patent Application No. 14/458,693, dated November 16, 2015.
		NOTICE OF ALLOWANCE, U.S. Patent Application No. 16/682,854, dated February 4, 2021.
		NOTICE OF ALLOWANCE, U.S. Patent Application No. 17/339,550, dated September 30, 2021.
	*	NOTICE OF ALLOWANCE, U.S. Patent Application No. 17/583,369, dated April 12, 2022.
		OFFICE ACTION, Japanese Patent Application No. 2009-543459, dated December 18, 2012.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	17/870,425
	Filing Date	2022-07-21
	First Named Inventor	Howard
	Art Unit	2476
	Examiner Name	Ronald B. Abelson
	Attorney Docket Number	IPW2-USCN213571

EXAMINER INITIAL		DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
		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).
		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).
		THIRD GENERATION PARTNERSHIP PROJECT, "Technical Specification Group Radio Access Network; Physical layer procedures (Release 8)," 3GPP TS 36.213 V0.1.0 (October 2006).
		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).

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

3624 7590 04/12/2022

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

EXAMINER
ABELSON, RONALD B

ART UNIT	PAPER NUMBER
2476	

DATE MAILED: 04/12/2022

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/583,369	01/25/2022	Paul Howard	IPW2-USCN213536	3554

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	07/12/2022

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

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

HOW TO REPLY TO THIS NOTICE:

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

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

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

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

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

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

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

PART B - FEE(S) TRANSMITTAL

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

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

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

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

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

3624 7590 04/12/2022

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

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

Certificate of Mailing or Transmission

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

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/583,369	01/25/2022	Paul Howard	IPW2-USCN213536	3554

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	07/12/2022

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/AIA/122 or PTO/SB/122) attached.

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

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 _____
3 _____

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

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

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

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

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

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

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

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

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

❑ Applicant certifying micro entity status. See 37 CFR 1.29

❑ Applicant asserting small entity status. See 37 CFR 1.27

❑ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

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

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/583,369	01/25/2022	Paul Howard	IPW2-USCN213536	3554

3624 7590 04/12/2022

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PHILADELPHIA, PA 19103

EXAMINER	
ABELSON, RONALD B	
ART UNIT	PAPER NUMBER
2476	

DATE MAILED: 04/12/2022

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

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

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

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

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

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

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

Privacy Act Statement

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

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

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

Notice of Allowability	Application No. 17/583,369	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 4/7/22, 01/25/2002.
   ☐ 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 1-20 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some* c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

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

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

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

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

Attachment(s)

1. ☑ Notice of References Cited (PTO-892)
2. ☑ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 4/7/22.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☑ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/RONALD B ABELSON/
Primary Examiner, Art Unit 2476

Notice of Pre-AIA or AIA Status

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

Reasons for Allowance

Regarding claims 1, 7, 13, and 17, Lee (US 2002/0061005) teaches allocating, by a controller, a first time slot within a frame for a base station to transmit a beacon signal / midamble to the base station, wherein the beacon signal is separate from data signals in the frame, and includes downlink physical channel information (each of the sub-frames has uplink time slots and downlink time slots, data parts, and midamble between data parts, measuring power level depending on midamble signal, [0037]);

allocating, by the controller, a second time slot within the frame that is different to the first time slot for the UE to transmit a control signal in response to the beacon signal, the control signal for providing a basis upon which the base station adjusts a transmission parameter (creating power control command to be transmitted to Node B over an uplink time slot, [0037]); and

allocating, by the controller, other timeslots for the base station to operate in full duplex frequency division duplex (FDD) mode (FDD, [0048]).

However, none of the prior art of record teaches or fairly suggests all the limitations of the independent claims.

Conclusion

Any comments considered necessary by the applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments of Statement of Reasons for Allowance."

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 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 published or unpublished applications may be obtained from Patent Center. Unpublished application information in Patent Center is available to registered users. To file and manage patent submissions in Patent Center, visit: https://patentcenter.uspto.gov. Visit https://www.uspto.gov/patents/apply/patent-center for more information about Patent Center and https://www.uspto.gov/patents/docx for information about filing in DOCX format. For additional questions, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/RONALD B ABELSON/
Primary Examiner, Art Unit 2476

Notice of References Cited	Application/Control No. 17/583,369	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	2002/0061005	05-2002	Lee	H 04 B 7/0619	
	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.

Electronic Acknowledgement Receipt

EFS ID:	46838736
Application Number:	17870425
International Application Number:	
Confirmation Number:	9362
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-USCN213571
Receipt Date:	18-OCT-2022
Filing Date:	21-JUL-2022
Time Stamp:	17:18:01
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	IPW2_USCN213571_IDStransmittal_20221018.pdf	91226 c8fa7f153a4b6a0fcfe3c72d8ded27d2431962e7	no	3

Warnings:

Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	IPW2_USCN213571_IDS_20221018.pdf	144240 b0917f632b1466dcf673a601730b0f0d2bbc7acc	no	6
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Non Patent Literature	NPL01_IPW2-USCN213536-NOA-20220412.pdf	447660 09e6b28c719ae755d5f0e9a99c8eed0c13866f02	no	9
Warnings:					
Information:					
		Total Files Size (in bytes):	683126		

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: Paul Howard **Application No.:** 17/870,425 **Confirmation No.: 9362** **Filed:** July 21, 2022 For: COMMUNICATIONS IN A WIRELESS NETWORK Group: 2476 Examiner: Ronald B. Abelson	Our File: IPW2-USCN213571 Date: October 18, 2022

INFORMATION DISCLOSURE STATEMENT

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

Dear Commissioner:

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 Information Disclosure Statement Form.

This Application is a continuation of U.S. Patent Application No. 17/583,369, filed January 25, 2022, which issued August 9, 2022 as U.S. Patent No. 11,411,642, which is a continuation of U.S. Patent Application No. 17/339,550, filed June 4, 2021, which issued February 1, 2022 as U.S. Patent No. 11,239,908, which is a continuation of U.S. Patent Application No. 16/682,854, filed November 13, 2019, which issued

June 8, 2021 as U.S. Patent No. 11,032,000, which is a continuation of U.S. Patent Application No. 14/458,693, filed August 13, 2014, which issued June 22, 2021 as U.S. Patent No. 11,044,010, 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.

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. Office actions issued in the parent application are indicated by an asterisk (*) on the enclosed Information Disclosure Statement Form. Copies are enclosed.

It is respectfully requested that the Examiner consider these documents and return an initialed copy of the Information Disclosure Statement Form indicating consideration of the cited materials.

Respectfully submitted,

Intellectual Ventures II LLC

By /John D. Wilt/
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JDW/PCK

7604723.1

Enclosures

To: eoffice@volpe-koenig.com,,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 3624

Sep 16, 2022 03:22:58 AM

Dear PAIR Customer:

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

The following USPTO patent application(s) associated with your Customer Number, 3624 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

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The list of documents shown below is provided as a courtesy and is not part of the official file wrapper. The content of the images shown in PAIR is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
17870425	CTNF	09/16/2022	IPW2-USCN213571
	892	09/16/2022	IPW2-USCN213571

To view your correspondence online or update your email addresses, please visit us anytime at https://sportal.uspto.gov/secure/myportal/privatepair.

If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

Monday - Friday 6:00 a.m. to 12:00 a.m.

Thank you for prompt attention to this notice,

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/870,425	07/21/2022	Paul Howard	IPW2-USCN213571	9362

3624 7590 09/16/2022

VOLPE KOENIG
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EXAMINER	
ABELSON, RONALD B	

ART UNIT	PAPER NUMBER
2476	

NOTIFICATION DATE	DELIVERY MODE
09/16/2022	ELECTRONIC

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

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

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

eoffice@volpe-koenig.com

Office Action Summary	Application No. 17/870,425	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 --

Period for Reply

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

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

Status

1)☑ Responsive to communication(s) filed on 7/21/22.

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

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

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

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

Disposition of Claims*

5) ☑ Claim(s) 1-20 is/are pending in the application.

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

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1,3,6,8,11,13,16 and 18 is/are rejected.

8) ☑ Claim(s) 2,4-5,7,9-10,12,14-15,17 and 19-20 is/are objected to.

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

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

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

11)☑ The drawing(s) filed on 7/21/22 is/are: a)☑ accepted or b)☐ objected to by the Examiner.

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

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

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

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

Attachment(s)

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

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

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

4) ☐ Other: _____.

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 negatived by the manner in which the invention was made.

3. Claims 1, 3, 6, 8, 11, 13, 16, and 18 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Anderson GB 2,417,167 (note: this office action will refer to US 20080144600 instead) in view of Liang US 20020061768.

Regarding claims 1, 6, 11, and 16, Anderson teaches a first user equipment (UE) comprising:

a transmitter;

a receiver; and

a processor, operatively coupled to the transmitter and the receiver,

wherein:

the receiver and the processor are configured to receive a control message over a physical control channel in a first time slot, wherein the control message has power control bits for a plurality of UEs, wherein the plurality of UEs include the first UE,

the processor is further configured to extract power control information for the first UE from the control message (The PLCCH may be implemented by transmission of messages on a single channelisation code of single time slots with each transmission comprising TPC and SS data bits for a plurality of UEs, [0131, For example, if the TPC and SS data for one user has 6 possible values, the TPC and SS data for five UEs has 6.sup.5=7776 possible data values. Thus, by generating a combined parameter value comprising information of the TPC and SS data for five UEs, a 7776 state value must be encoded, [0135], [0139]).

Anderson is silent on the transmitter and the processor are configured to transmit a signal over a physical control channel to a base station in a second time slot at a transmission power level based on the extracted power control information.

Liang teaches a mobile transmitting to a base station in a second time slot different from the downlink time slot ([0006]).

Therefore it would have been obvious to one of ordinary skill in the art before the effective filing date of the claimed

invention, to modify the system of Anderson by transmitting a signal over a physical control channel to a base station in a second time slot at a transmission power level based on the extracted power control information, as suggested by Liang. This modification would benefit the system by efficiently using transmission resources by transmitting over the same channel for uplink and downlink.

Regarding claims 3, 8, 13, and 18, Anderson teaches the signal transmitted over the physical code channel is produced using a code sequence ([0131]). Liang, as shown above, makes obvious the limitation a plurality of UEs transmit in the second time slot using different code sequences.

Allowable Subject Matter

4. Claims 2, 4, 5, 7, 9, 10, 12, 14, 15, 17, 19, and 20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

5. 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 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 published or unpublished applications may be obtained from Patent Center. Unpublished application information in Patent Center is available to registered users. To file and manage patent submissions in Patent Center, visit: https://patentcenter.uspto.gov. Visit https://www.uspto.gov/patents/apply/patent-center for more information about Patent Center and https://www.uspto.gov/patents/docx for information about filing in DOCX format. For additional questions, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/RONALD B ABELSON/
Primary Examiner, Art Unit 2476

Notice of References Cited	Application/Control No. 17/870,425	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	20020061768	05-2002	Liang	h04M 1/00	
	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	GB2417167	02-2006	Great Britian	Anderson	h04q 7/32
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

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

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

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/870,425	Howard, Paul
	Examiner	Art Unit
	RONALD B ABELSON	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	09/08/2022								
	1	✓								
	2	O								
	3	✓								
	4	O								
	5	O								
	6	✓								
	7	O								
	8	✓								
	9	O								
	10	O								
	11	✓								
	12	O								
	13	O								
	14	O								
	15	O								
	16	✓								
	17	O								
	18	✓								
	19	O								
	20	O								

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/870,425	Howard, Paul
	Examiner	Art Unit
	RONALD B ABELSON	2476

CPC - Searched*		
Symbol	Date	Examiner
h04j3/1694	09/08/2022	RA
h04l5/0053	09/08/2022	RA
h04w52/146 h04w72/0406 h04w72/042 h04w72/0446 h04w72/121 h04w72/1289	09/08/2022	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 PE2E	09/08/2022	RA

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

(12) UK Patent Application (19) GB (11) 2 417 167 (13) A

(43) Date of A Publication 15.02.2006

(21) Application No: 0418107.9

(22) Date of Filing: 13.08.2004

(51) INT CL:
H04Q 7/32 (2006.01) H04Q 7/38 (2006.01)

(52) UK CL (Edition X):
H4L LDXX

(56) Documents Cited:
EP 0975185 A

(58) Field of Search:
UK CL (Edition X) H4L
INT CL[7] H04Q
Other: Online: WPI, EPODOC

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(54) Abstract Title: **Combining user equipment specific information for multiple users and transmitting in a single communications channel**

(57) A cellular communication system comprises a base station (101) and a plurality of user equipment (103). The base station (101) comprises a combine processor (111) which combines user equipment specific information, such as power control commands or synchronisation information, for a plurality of user equipment (103). An encode processor 113 encodes the combined user equipment specific information and a transceiver 109 transmits the combined user equipment specific information in a minimum transmission resource unit of the cellular communication system. The minimum transmission resource unit may be a single channelisation code in a single time slot. The UE (103) comprises a receiver (115) for receiving the minimum transmission resource unit and a UE data processor (117) which decodes the minimum transmission resource unit and extracts the user equipment specific information for that UE (103). The invention may provide a more efficient communication of small data blocks.

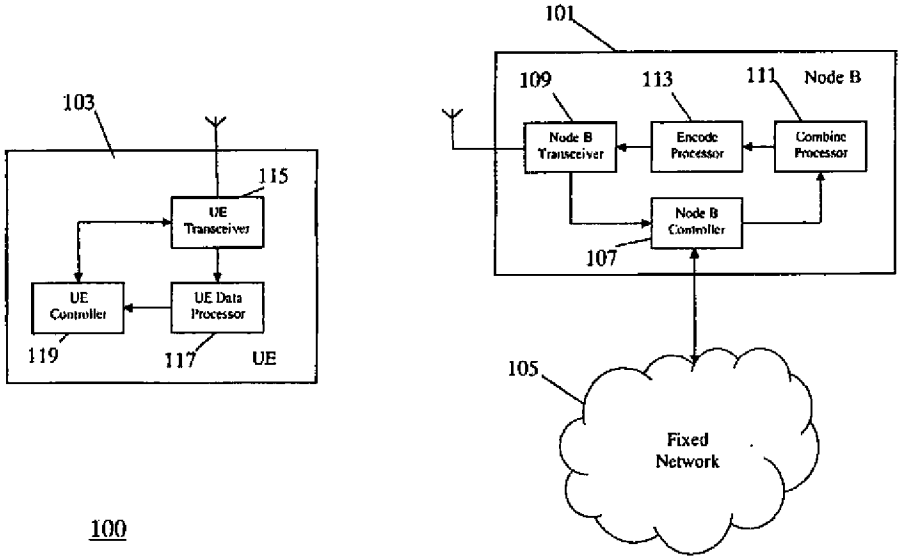
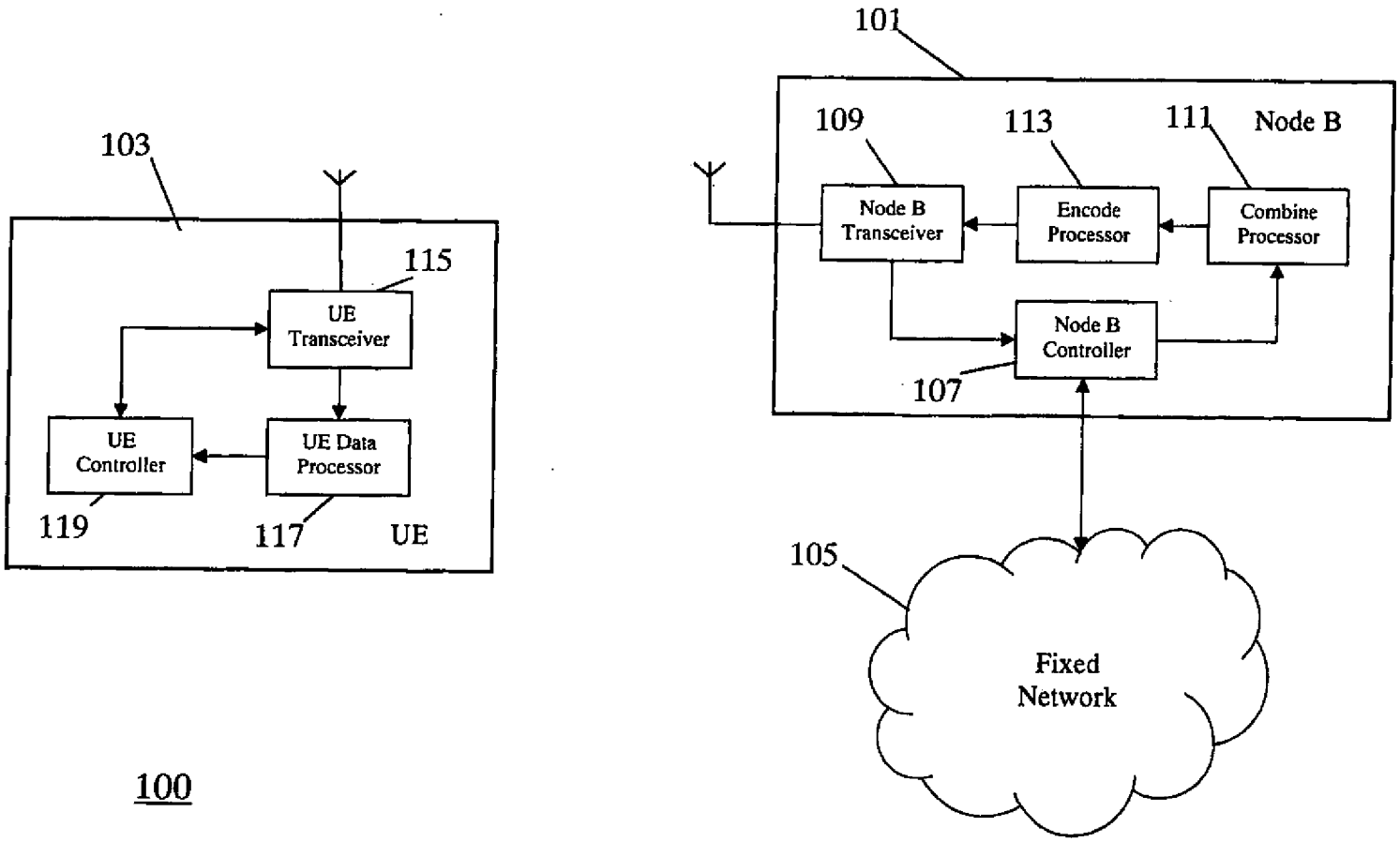


FIG. 1

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1995

GB 2 417 167 A



100

FIG. 1

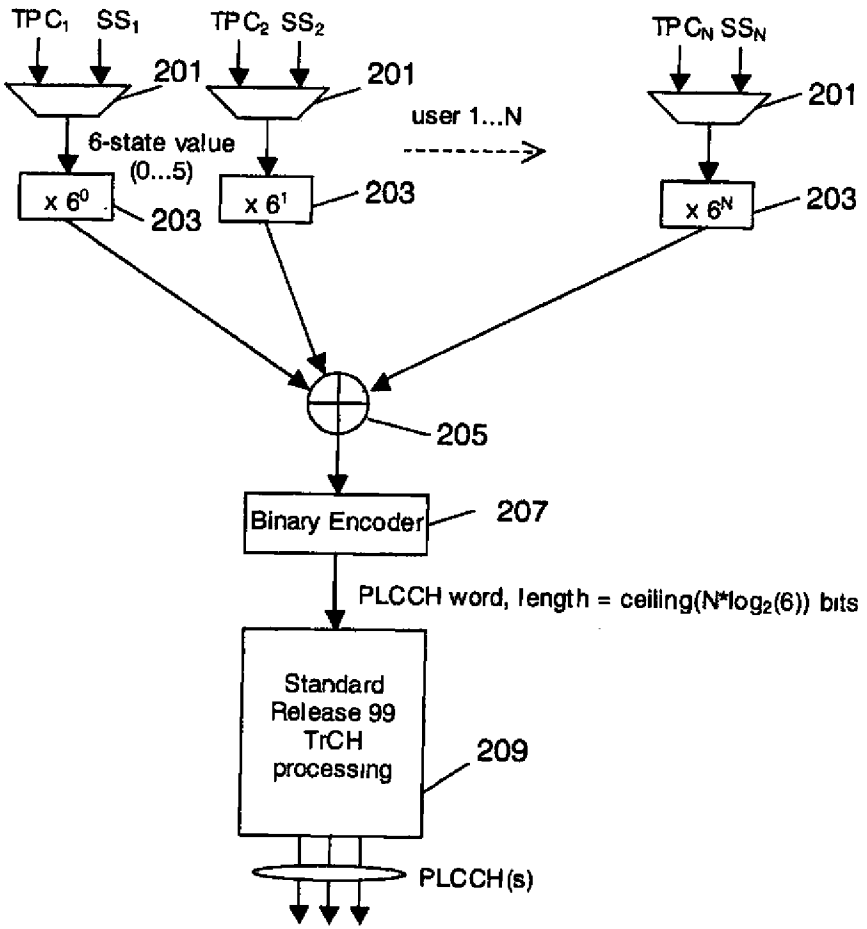


FIG. 2

APPARATUS AND METHOD FOR COMMUNICATING USER EQUIPMENT SPECIFIC INFORMATION IN CELLULAR COMMUNICATION SYSTEM

Field of the invention

The invention relates to an apparatus and method for communicating user equipment specific information in cellular communication system and in particular, but not exclusively, to communication of transmit power control and synchronisation data.

Background of the Invention

In the last decades, cellular communication systems for mobile communication have become commonplace. Originally cellular communication systems provided only voice services but over time an increasing number of services have been provided either through enhancements to existing cellular communication systems or through the development of new cellular communication systems.

For example, 3rd generation cellular communication systems have been, and are being, standardized by the 3rd Generation Partnership Project (3GPP). These 3rd generation cellular communication systems have been standardised to provide a large number of different services aimed at different applications.

In particular data packet services suitable for data communication are supported by most cellular communication systems. For example, downlink packet data services are supported within the 3GPP release 5 specifications in the form of the High Speed Downlink Packet Access (HSDPA) service. In this system, transmission code resources are shared amongst users according to their traffic needs. The base station or "Node-B" is responsible for allocating and distributing the resources to the users, within a so-called scheduling task.

The allocation information itself is transmitted to the users via a High Speed - Shared Common Control CHannel (HS-SCCH). This furnishes the user equipment (UE) with knowledge of the forthcoming transmission on the HSDPA shared resources (the High Speed - Downlink Shared CHannel - HS-DSCH). The UE can thus prepare itself and configure its receiver appropriately for the transmission.

In addition to these shared resources used for data and signalling purposes, the current release 5 specifications mandate the existence of associated uplink and downlink Dedicated Physical CHannels (DPCH's).

In accordance with the 3GPP specifications, the HSDPA service may be used in both Frequency Division Duplex (FDD) mode and Time Division Duplex (TDD) mode.

For the FDD mode, the purpose of these channels is:
Downlink DPCH:

- to potentially carry data from the layers above the physical layer (provided that any data is mapped to the Dedicated CHannel (DCH))
- to carry Transmit Power Control (TPC) commands to the UE to control the uplink DPCH
- to carry downlink pilot symbols to the UE (these symbols are used to derive channel quality feedback for transmission to the base station and to facilitate demodulation of downlink signals)

Uplink DPCH:

- to carry data from the layers above the physical layer
- to carry TPC feedback for the downlink DPCH

For the TDD mode, the purpose of these channels is:

1.28Mcps TDD service

- to carry data from the layers above the physical layer (provided that any data is mapped to the DCH)
- to carry TPC data for the uplink DPCH power control
- to carry SS for uplink DPCH synchronisation

3.84Mcps TDD Service

- to carry data from the layers above the physical layer (provided that any data is mapped to the DCH)

A disadvantage of the current approach for HSDPA is that the assignment of a dedicated channelisation code to each active user equipment consumes a large fraction of the available code resources. The channelisation code is used by the Code

Division Multiple Access (CDMA) system to separate between data for different user equipment. In a 3rd Generation cellular communication system, the number of available channelisation codes that can be used by a base station is significantly limited on the downlink for FDD and TDD, and on the uplink for TDD. In addition, the transmit power associated with transmission of the control information to the individual user equipment causes interference to other communications. Accordingly the current approach may significantly reduce the code and power resources available for use by other channels, such as for the HS-DSCH.

The HS-DSCH is especially efficient at handling bursty user traffic profiles, such as are common in packet-data communication systems. Dedicated channels on the other hand are generally more suited to constant bit rate applications, such as voice, and some types of video conferencing technologies. These services are generally termed "conversational class" services. When using HSDPA packet data services without the existence of parallel conversational class services, it is possible to map all higher layer data for downlink onto other downlink transport channels than the DCH. In such situations, only very little information is communicated on the DPCH physical channel.

Specifically, only the following information may in some cases be carried by the DPCH:

FDD

- TPC commands for uplink DPCH power control
- Dedicated pilot symbols for downlink

1.28 Mcps TDD

- TPC commands for uplink DPCH power control
- SS commands for uplink DPCH synchronisation

3.84Mcps TDD

- <no uses>

As the data rate for this information is extremely low, the use of a dedicated DPCH results in a highly inefficient communication. Therefore, it would be advantageous if a more efficient means of communicating dedicated UE specific information to individual UEs could be found. In particular, it would be advantageous to more efficiently carry the TPC/pilot/SS information to the user equipment such that the requirement for an associated downlink DPCH to exist with each HSDPA service could be removed or relaxed.

One solution which has been proposed is known as the "fractionated DPCH" (F-DPCH) concept. This approach is only applicable to FDD and seeks to improve the channelisation code efficiency of HSDPA. In this concept, for HSDPA "data-only" users (ie: those with no conversational-class traffic), downlink signalling (DCCH) and traffic (DTCH) are not mapped to a DCH transport channel but are instead mapped to either the HS-DSCH or FACH transport channels. Furthermore, in the F-DPCH concept, the downlink code resources used for transmission of TPC and (possibly) pilot symbols are time multiplexed onto the same channelisation code which may be continuously transmitted.

However, although the proposed time multiplexing of data onto a transmitted channelisation code may be suited for

some applications, it may be disadvantageous in other circumstances.

For example, the FDD F-DPCH concept is unsuitable for TDD communication.

Specifically, the TDD data is transmitted in timeslots with a data portion either side of a midamble portion and a guard-period at the end of the burst. The midamble portion must be received in order to detect, demodulate and receive the data payload portions. Thus a whole timeslot must be received to transfer any data.

Furthermore for TDD, the maximum channelisation code spreading factor is 16, whereas for FDD it is 256. Thus, whereas the minimum unit of transmission for TDD is one timeslot with one channelisation code at spreading factor 16, the minimum transmission unit for FDD may be much smaller and it is therefore much better suited for transmission of small amounts of UE specific data. For example, the minimum transmission unit for 1.28Mcps TDD (1 timeslot, 1 code at SF16, QPSK modulation) communication comprises 88 bits. It is clear that the minimum transmission unit for TDD is therefore too large to efficiently carry the TPC and SS information which is typically only 3 bits.

Some of the above disadvantages may be alleviated through the use of a duty-cycle wherein data is transmitted to users using a single minimum transmission unit only one frame in every "N" frames. However, this has the disadvantage that the update rate of the signalling is substantially reduced

and this will greatly impair the performance of the power control and synchronisation loops.

Thus, the current approach for transmitting small amounts of UE specific information to individual UEs is inefficient, cumbersome and may result in low update rates.

Hence, an improved system for communicating user equipment specific information in a cellular communication system would be advantageous.

Summary of the Invention

Accordingly, the Invention seeks to preferably mitigate, alleviate or eliminate one or more of the above mentioned disadvantages singly or in any combination.

According to a first aspect of the invention there is provided an apparatus for transmitting user equipment specific information from a base station to a user equipment in a cellular communication system; the apparatus comprising: means for combining user equipment specific information for a plurality of user equipment to generate combined user equipment specific information; means for encoding the combined user equipment specific information; and means for transmitting the combined user equipment specific information in a minimum transmission resource unit.

The UE specific information may be control information.

The invention may allow a more efficient communication of user equipment (UE) specific information. In particular, low amounts of UE specific information may efficiently be communicated with high update rates. For example, in situations where the UE specific information is significantly less than the capacity of a minimum transmission resource unit, the overhead associated with communicating the information may be substantially reduced

Embodiments of the invention may provide reduced interference, increased update rates, reduced transmit resource usage and/or improved performance of the cellular communication system as a whole. In particular, the cellular communication system's usage of code and power resources could be significantly improved and system capacity could be correspondingly increased.

According to an optional feature of the invention, the minimum transmission resource unit is a time slot. The invention may allow an efficient communication of UE specific information for a plurality of UEs in a single time slot. In embodiments, such as for the 3GPP TDD system, the minimum transmission resource unit may be a channelisation code on a time slot.

According to an optional feature of the invention, the minimum transmission resource unit is a single time code frequency resource allocation unit.

The invention may allow an efficient communication of UE specific information for a plurality of UEs in a single time code frequency resource allocation unit. The time code

frequency resource allocation unit uses a single code in a time interval on a single frequency carrier. In embodiments wherein code division is not used, the time code frequency resource allocation unit will inherently be associated with a single code (corresponding to no spreading or channelisation or code division). In embodiments wherein time division is not used, the time code frequency resource allocation unit will inherently be associated with a single time interval.

According to an optional feature of the invention, the means for encoding is operable to jointly encode user equipment specific information for at least two of the plurality of user equipment.

The joint encoding may be such that encoded data relating to a first user equipment is determined in response to user equipment specific information associated with at least a second user equipment. The joint encoding may be such that at least one data bit of the encoded data comprises information relating to UE specific information for more than one user equipment.

The feature may allow a more efficient communication of the UE specific information. For example, if three parameters of the UE specific information may take on five potential values, each individual parameter requires three data bits to represent the actual value. However, the total number of possible values for the three parameters is $(5^3)=125$ potential values. Hence a combined parameter value may be represented by seven bits rather than the nine bits required for individual coding. The optional feature may in some embodiments allow a binary signalling efficiency which is increased by combining the data streams for more than one UE.

According to an optional feature of the invention, the means for encoding is operable to jointly encode user equipment specific information associated with all user equipment of the plurality of user equipment. This may improve the encoding efficiency.

According to an optional feature of the invention, the encoding comprises forward error correcting coding. This may improve performance of the communication of the UE specific information. A joint forward error correcting coding may be applied to UE specific information for a plurality of UEs. This may provide enhanced error correcting performance compared to only applying the error correction to individual data for a single UE. In particular improved time diversity may be achieved. Interleaving may be performed as part of the forward error correction coding.

According to an optional feature of the invention, the user equipment specific information comprises a plurality of parameters each having a number of possible values, and the

means for encoding is operable to encode the plurality of parameters by encoding a combined parameter having a combined number of possible values equal to the product of the number of possible values of the plurality of parameters. This provides for improved efficiency and/or facilitated implementation. For example, a first parameter having five possible values, a second parameter having six possible values and a third parameter having seven possible values may be encoded by encoding of a combined parameter having 5*6*7=210 possible values, i.e. by eight bits rather than 3*3=9 bits.

According to an optional feature of the invention, the user equipment specific information comprises power control information. The invention may provide an efficient means for communicating power control information. In particular, a low overhead and/or high update rate may be achieved. Power control information typically comprises small amounts of information to be communicated at a sufficiently high data rate and the invention may therefore provide a particularly advantageous means of operating a power control loop over the air interface.

According to an optional feature of the invention, the user equipment specific information comprises synchronisation information.

The synchronisation information may e.g. be code synchronisation and/or timing synchronisation including data symbol timing synchronisation.

The invention may provide an efficient means for communicating synchronisation information. In particular, a low overhead and/or high update rate may be achieved. Synchronisation information typically comprises small amounts of information to be communicated at a sufficiently high data rate and the invention may therefore provide a particularly advantageous means of operating a power control loop over the air interface.

The UE specific information may in some embodiments consist in power control information and synchronisation.

According to an optional feature of the invention, the user equipment specific information comprises only synchronisation information. This may improve the efficiency of communication of control information in some systems as the data rate may be reduced. For example, power control may be achieved through other means such as open loop power control loop methods.

According to an optional feature of the invention, the user equipment specific information is associated with an uplink channel from each of the plurality of user equipment.

The uplink channel may for example be a dedicated physical channel of the cellular communication system and the user equipment specific information may be control information associated with the uplink channel. The invention may thus provide an efficient means of e.g. controlling or managing an uplink channel by transmission of downlink data using little communication resource and having a high update rate.

According to an optional feature of the invention, the apparatus further comprises means for setting a transmit power for the minimum transmission resource unit in response to a transmit power requirement of the plurality of user equipment.

Specifically, a required or desired transmit power may be determined for each user equipment of the plurality of user equipment and the transmit power of the minimum transmission resource unit may be set to the highest determined transmit power. This may ensure an efficient communication with low transmit power resource use while ensuring that all user equipment of the plurality of user equipment receive a signal of adequate quality.

According to an optional feature of the invention, the apparatus further comprises means for transmitting position information indicative of a position of user equipment specific information for a first user equipment.

The position information may indicate the position of data for the first user equipment within the minimum transmission resource unit. The position information may enable or assist an individual user equipment in determining the user specific data for that individual user equipment within the combined information stream. The position information may be an explicit and/or direct indication or may for example be an associative and/or indirect indication.

According to an optional feature of the invention, the user equipment specific information is control information

associated with a High Speed Downlink Packet Access (HSDPA) service.

The High Speed Downlink Packet Access (HSDPA) may specifically be the HSDPA service specified by the 3rd Generation Partnership Project (3GPP). The invention may thus provide for an efficient communication of control information for an HSDPA service and may in particular provide for an efficient control or feedback for uplink communication.

According to an optional feature of the invention, the user equipment specific information is associated with an uplink dedicated physical channel (DPCH) of the HSDPA downlink packet data service.

In particular, the DPCH may be an uplink dedicated physical channel (DPCH) as standardized by 3GPP. The invention may provide an extremely efficient control of uplink DPCH channels with a low resource use and a high performance due to a high update rate.

According to an optional feature of the invention, the means for encoding is operable to encode the combined user equipment specific information by using processing algorithms of a group of algorithms used by a plurality of services.

The plurality of services may be dedicated or shared channels and may correspond to data communication using other physical or logical channels than used for the minimum transmission resource unit. Specifically for a 3GPP

embodiment, the encoding of the UE specific information may use standardised 3GPP transport channel processing methods. Thus a toolbox of standardised algorithms and processes may be used to map the multiplexed, concatenated, or otherwise combined user data from the plurality of users to common physical resources. This may facilitate encoding and may allow for reduced complexity of the apparatus as functionality may be shared.

According to an optional feature of the invention, the cellular communication system is a Time Division Duplex (TDD) cellular communication system.

The cellular communication system may specifically implement the 1.28 Mcps mode variant of the 3GPP TDD system. The user equipment specific information may be user equipment specific information associated with a TDD uplink communication.

According to an optional feature of the invention, the cellular communication system is a UTRA (UMTS (Universal Mobile Telecommunication System) Terrestrial Radio Access) TDD cellular communication system specified by the 3rd Generation Partnership Project. The invention may provide a particularly advantageous and efficient means of communicating UE specific information specifically suitable for and compliant with the UTRA TDD system.

According to an optional feature of the invention, the user equipment specific information consists of Transmit Power Control (TPC) and Synchronisation Shift (SS) data. The invention may provide a particularly advantageous and

efficient means of communicating TPC and SS data in a UTRA TDD system. The invention may allow a reduced resource use, improved performance and/or increased update rate. For example, an efficient and frequent communication of TPC and SS data may be accomplished resulting in improved performance of an associated uplink DPCH.

According to an optional feature of the invention, the apparatus further comprises means for determining a transmit power of the minimum transmission resource unit in response to a number of user equipment for which the minimum transmission resource unit comprises user equipment specific information.

This may improve the reliability of the communication and/or may reduce the resource use and/or caused interference. For example, if UE specific information is communicated only to a few users, increased redundancy may be introduced and the transmit power may be reduced.

According to an optional feature of the invention, the apparatus further comprises means for determining an encoding process for the minimum transmission resource unit in response to a number of user equipment for which the minimum transmission resource unit comprises user equipment specific information.

This may improve the reliability of the communication and/or may reduce the resource use and/or caused interference. The encoding process may for example include a forward error correcting coding process. For example, if UE specific information is communicated only to a few users, a high

performance forward error correcting code (with high redundancy and thus low data rate) may be used with a reduced transmit power.

According to an optional feature of the invention, the minimum transmission resource unit does not comprise verification data.

This may provide a reduced overhead and may exploit that general reliability of the minimum transmission resource unit is typically not important to the individual UE as only errors in the UE specific information for the UE will have an impact. Errors experienced by a UE in the UE specific information may not directly affect the reliability of the information for other UEs.

According to an optional feature of the invention, the means for transmitting is operable to transmit user equipment specific information for a first user in intermittent minimum transmission resource units.

For example, UE specific information for a specific UE may only be transmitted in every other minimum transmission resource unit. This may improve the communication efficiency and may provide an increased flexibility of the resource allocation for communication of UE specific information.

According to an optional feature of the invention, the minimum transmission resource unit corresponds to a minimum size transmission block of user equipment specific information which can be transmitted by the means for transmitting.

In some embodiments, the minimum transmission resource unit may be the smallest data block which can be allocated by a resource scheduler for transmission by the means for transmitting. Specifically, in some embodiments, the minimum transmission resource unit may be the smallest data block or unit which can be transmitted individually in accordance with the specifications of the cellular communication system. For example, for a 3GPP TDD communication system, the minimum transmission resource unit may be a single channelisation code in a single time slot on a single carrier.

The apparatus may be a base station also known as a Node B in some cellular communication systems.

According to a second aspect of the invention, there is provided a user equipment for receiving user equipment specific information from a base station in a cellular communication system; the apparatus comprising: means for receiving a minimum transmission resource unit comprising combined user equipment specific information for a plurality of user equipment; and means for determining user specific information for the user equipment from the minimum transmission resource unit.

According to an optional feature of the invention the combined user equipment specific information is jointly encoded; and the means for determining comprises means for decoding the combined user equipment specific information and for selecting the user equipment specific information for the user equipment.

According to a third aspect of the invention, there is provided a cellular communication system comprising: a first apparatus for transmitting user equipment specific information from a base station to a user equipment, the first apparatus comprising: means for combining user equipment specific information for a plurality of user equipment to generate combined user equipment specific information, means for encoding the combined user equipment specific information, and means for transmitting the combined user equipment specific information in a minimum transmission resource unit; and the user equipment comprising: means for receiving a minimum transmission resource unit comprising combined user equipment specific information for a plurality of user equipment; and means for determining user specific information for the user equipment from the minimum transmission resource unit.

According to a fourth aspect of the invention, there is provided a method of transmitting user equipment specific information from a base station to a user equipment in a cellular communication system; the method comprising the steps of: combining user equipment specific information for a plurality of user equipment to generate combined user equipment specific information; encoding the combined user equipment specific information; and transmitting the combined user equipment specific information in a minimum transmission resource unit.

According to a fifth aspect of the invention, there is provided method of receiving user equipment specific information from a base station in a cellular communication

system; the method comprising the steps of: receiving a minimum transmission resource unit comprising combined user equipment specific information for a plurality of user equipment; and determining user specific information for the user equipment from the minimum transmission resource unit.

These and other aspects, features and advantages of the invention will be apparent from and elucidated with reference to the embodiment(s) described hereinafter.

Brief Description of the Drawings

An embodiment of the invention will be described, by way of example only, with reference to the drawings, in which

FIG. 1 illustrates a cellular communication system in accordance with an embodiment of the invention; and

FIG. 2 illustrates an example of an encode processor for a base station in accordance with an embodiment of the invention.

Detailed Description of an Embodiment of the Invention

FIG. 1 illustrates a cellular communication system 100 in accordance with an embodiment of the invention.

The cellular communication system 100 comprises a base station, henceforth referred to as a Node B 101 in accordance with the terminology used for 3rd generation

cellular communication systems. The Node B 101 communicates with a plurality of User Equipment (UE)(of which only one 103 is shown) as is well known by the person skilled in the art.

The UE 103 may be a subscriber unit, a wireless user equipment, a mobile station, a communication terminal, a personal digital assistant, a laptop computer, an embedded communication processor or any communication element capable of communicating over the air interface of the cellular communication system.

The Node B 101 is further coupled to a fixed network which interconnects base stations and is operable to route data between any two base stations, thereby enabling a UE in a cell to communicate with a UE in any other cell. In addition, the fixed network comprises gateway functions for interconnecting to external networks such as the Public Switched Telephone Network (PSTN), thereby allowing UEs to communicate with landline telephones and other communication terminals connected by a landline. Furthermore, the fixed network comprises much of the functionality required for managing a conventional cellular communication network including functionality for routing data, admission control, resource allocation, subscriber billing, mobile station authentication etc. The fixed network may specifically include Radio Network Controllers (RNCs) and a core network as well known to the person skilled in the art.

In the embodiment of FIG. 1, the Node B 101 supports one or more services of the UE 103. In the example, the Node B 101 frequently communicates very small amounts of data to the UE

103. The data is UE specific information that is not applicable or relevant to other UEs. The UE specific information may be data which is part of a communication service provided to the UE 103 or may be data which is communicated in support of the services provided to the UE 103.

As a specific example, the Node B 101 may in the embodiment of FIG. 1 transmit 3 bits of data to the UE 103 every five msec.

In addition, to the transmission to the UE 103, the node B 101 may also support similar services for a number of other UEs. Hence, the Node B 101 must communicate a potentially large number of very small data blocks to individual UEs. Conventionally, this is very inefficient in cellular communication systems and results in a large overhead and very high resource consumption per transmitted data bit.

In accordance with the embodiment of FIG. 1, the Node B 101 comprises a Node B controller 107. The Node B controller 107 is operable to implement the functionality desired or required by a Node B 101 as is well known to a person skilled in the art.

In the example of FIG. 1, the Node B controller 107 is coupled to a Node B transceiver 109 which is operable to transmit and receive data over the air interface of the cellular communication system. In the specific embodiment, the Node B controller 107 is operable to generate control information for the individual UEs in response to signals received from the UEs. For example, the Node B controller

107 may generate uplink power control or synchronisation (e.g. code timing synchronisation) data for each individual UE.

The Node B controller 107 is coupled to a combine processor 111. In accordance with the embodiment of FIG. 1, the combine processor 111 is operable to combine user equipment specific information for a plurality of user equipment to generate combined UE specific information. For example, the combine processor 111 may receive power control and synchronisation data from the Node B controller 107 and combine these into a single block of control data comprising information for a group of UEs.

The combine processor 111 is coupled to an encode processor 113 which receives the combined UE specific information from the combine processor 111. For example, the encode processor 113 receives the data block of power control and synchronisation information from the combine processor 111.

The encode processor 113 is operable to encode the combined UE specific information to generate data suitable for transmission. In the embodiment of FIG. 1, the encode processor 113 performs error correcting coding, interleaving and symbol mapping for transmission.

In some embodiments, the encode processor 113 encodes data for each UE individually and independently of the data for other UEs. However, as described later, the encode processor 113 may in other embodiments perform a joint encoding wherein the data for different UEs is encoded together

resulting in encoded data which depends on UE specific information associated with more than one UE.

The encode processor 113 thus encodes the combined UE specific information and feeds it to the Node B transceiver 109 which transmits it over the air interface in a minimum transmission resource unit.

Hence, in accordance with the embodiment, a minimum transmission resource unit is generated which comprises UE specific information for a plurality of UEs. Hence, the embodiment may allow for UE specific information to be transmitted efficiently in granularities significantly lower than the resource granularity corresponding to the minimum transmission resource unit.

The minimum transmission resource unit typically depends on the specific embodiment.

The minimum transmission resource unit may be a single time code frequency resource allocation unit. For example in cellular communication systems, a resource allocation may generally allocate resource in the form of a resource unit corresponding to a specified carrier frequency, a specified time interval and a specified code division code. Thus, the minimum transmission resource unit may be the smallest time interval which can be allocated for one carrier and one code. Specifically, the minimum transmission resource unit may be a time slot of a Time Division Multiple Access (TDMA) or Time Division Duplex (TDD) cellular communication system. In some communication systems, code division is not applied and the minimum transmission resource unit may be determined

by the remaining parameters used for separation between UEs - e.g. by time slots and carrier frequencies.

In some embodiments, other constraints may limit the minimum size of resource units. Hence, the minimum size of a resource unit used in a cellular communication system may be determined by limitations in technical specifications which have been standardised or by implementation constraints.

The minimum transmission resource unit may be the smallest resource unit which can be transmitted continuously by the Node B transceiver 109.

Hence, in accordance with the embodiment, the Node B 101 is capable of transmitting UE specific data of a size much smaller than the minimum transmission resource unit without incurring an overhead determined by the size of the minimum transmission resource unit. Hence, a much more efficient communication of small amounts of UE specific information is achieved.

The UE specific information for a plurality of UEs may for example be transmitted in a single time slot using the same channelisation code. The individual UEs may then receive the time slot, decode the time slot and retrieve the UE specific information for the individual UE.

Accordingly, the UE 103 comprises a UE transceiver 115 which receives and transmits data over the air interface. Specifically, the UE transceiver 115 receives the minimum transmission resource unit and feeds this to a UE data processor 117. The UE data processor 117 is operable to

decode the minimum transmission resource unit and to extract the UE specific information for the specific UE 103.

In the embodiment of FIG. 1, the UE 103 further comprises a UE controller 119 which implements all other functionality required by the UE 103 as is well known to the person skilled in the art.

In the embodiment of FIG. 1, the UE data processor 117 is coupled to the UE controller 119. Hence, as an example, the Node B 101 may transmit power control and synchronisation data for a plurality of UEs in a single time slot on a single channelisation code. The UE 103 may receive this transmission, decode it and extract the power control and synchronisation data for the UE 103. This data may then be fed to the UE controller 119 which may adjust the transmit power and timing of the uplink transmissions accordingly. Hence, an efficient system for transmitting low data rate control information is provided.

In order for the individual UE to select the relevant data, it is necessary for it to have knowledge of which data of the received minimum transmission resource unit is for that UE.

This may be achieved in many ways. In the embodiment of FIG. 1, the Node B 101 is operable to transmit data position information which is indicative of the position of UE specific information for the different user equipment. The position information may be transmitted in the minimum transmission resource unit or by another transmission. The position information may be direct and explicit. For

example, a message may be transmitted by the Node B 101 to all UEs specifically associating a UE identity with each data of the minimum transmission resource unit. As the same association may be used for a large number of minimum transmission resource units, the resource usage associated with transmitting the position information may be kept acceptably low.

The position information may in some embodiments be provided indirectly by e.g. associative information. For example, the position information may be related to other system or UE parameters, and from knowledge of these system or UE parameters, the position of data from a specific UE may be determined.

In the following, a more detailed description of an embodiment of the invention applicable to a 3GPP UTRA TDD mobile radio communications system is described. In particular, the description will focus on communication of control information for a 1.28 Mcps TDD HSDPA service. However, it will be appreciated that the invention is not limited to this application but may be applied to many other cellular communication systems. The embodiment is compatible with the embodiment of FIG. 1 and will be described with reference to this.

In the specific embodiment, downlink packet data services are offered by means of HSDPA and using the HS-DSCH transport channel. Within the system, a fair proportion of HSDPA-active users do not have conversational-class traffic (ie: they are so-called data-only users). Accordingly a

significant number of UEs tend to exhibit a bursty traffic profile.

In the system, an uplink dedicated physical channel (DPCH) is associated with the HSDPA operation. A downlink dedicated physical channel is not configured. The uplink DPCH is controlled by information provided from the Node B 101. In particular, the code timing and transmit power levels are controlled by Transmit Power Commands (TPC) data and Synchronisation Shift(SS) commands transmitted from the Node B 101.

In the embodiment, the TPC command is binary, representing either "power-up" or "power-down". The SS command is tri-state representing either "up", "down" or "do nothing". Hence, in the example, the Node B 101 communicates six levels of control information at a rate sufficiently high for the dynamic requirements of the power control and the synchronisation.

In accordance with the exemplary embodiment, the TPC and SS bits for each UE are not transmitted on an individual channelisation code of a time slot. Rather a TDD minimum transmission resource unit is used to convey information destined for a plurality of users within a cell. A single minimum transmission resource unit (in this case one timeslot and one channelisation code) is used to communicate TPC and SS bits to a plurality of UEs.

Hence, in accordance with the embodiment, the combine processor 111 of the Node B 101 may combine the TPC and SS data bits generated for a plurality of UEs into a single data block which can be transmitted in one time slot and with one channelisation code. Accordingly, one channelisation code is shared between a plurality of UEs thereby significantly reducing the number of channelisation codes used for communicating TPC and SS data and thus freeing up channelisation codes for other uses.

In some such embodiments, a new physical channel, henceforth denoted a Physical Layer Common Control Channel (PLCCH), may be implemented for efficient communication of TPC and SS data. The PLCCH may be implemented by transmission of messages on a single channelisation code of single time slots with each transmission comprising TPC and SS data bits for a plurality of UEs. As the PLCCH is shared between different UEs, the resource use is significantly reduced compared to the conventional approach for communication of TCP and SS data for HSDPA services.

In some embodiments, the PLCCH is implemented by the combine processor 111 generating a combined data block by including one TPC data bit and two SS data bits for each UE of the PLCCH message. Furthermore, the PLCCH message may simply be generated and transmitted by the encode processor 113 encoding the individual data bits of the data block in a suitable fashion.

However, in other embodiments the encode processor 113 is operable to jointly encode the TPC and SS information which relates to a plurality of UEs.

For example, in order to send TPC and SS data to a single user, a six-state value must be signalled (two possible values for the TPC and three possible values for the SS data). Rather than using 3 bits to achieve this per user (1 bit for TPC and 2 bits for SS) as per the current 3GPP specifications, the TPC and SS data for a plurality of UEs may be jointly encoded.

For example, if the TPC and SS data for one user has 6 possible values, the TPC and SS data for five UEs has 6^5 = 7776 possible data values. Thus, by generating a combined parameter value comprising information of the TPC and SS data for five UEs, a 7776 state value must be encoded. This can be achieved by thirteen bits (2^{13}=8192). In contrast, the individual encoding of the TPC and SS data will result in a requirement of 5*3=15 data bits. Hence a reduction in the number of data bits which must be transmitted is achieved.

As another example, in the prior art, 10 users using 1 bit for TPC and 2 bits for SS would require a total of 10*3=30 bits, and these would be distributed across multiple DPCHs (one to each user). However, by jointly encoding the commands across users onto a common PLCCH, this could be achieved using $10*\log_2(6)$ = 25.85 (round up to 26) bits; a 13% saving. Furthermore as this can be transmitted on a single PLCCH message a very substantial reduction in the resource use is achieved.

It will be appreciated that the efficiency improvement may increase for increasing numbers of TPC and SS data being jointly encoded and that in some embodiments all TPC and SS data of a given PLCCH message may be jointly encoded.

In these examples, to decode the TPC and SS information, the UE would convert the received word into a base 6 number and select the digit position assigned to that user. The resulting six-state value maps directly to both a binary TPC command and a tri-state SS command.

It will be appreciated that any suitable way of jointly encoding the information may be used in accordance with the embodiment. For example, a simple one to one mapping between a block of TPC and SS bits for a plurality of UEs and an encoded PLCCH symbol representing the combined state may be implemented. The mapping may for example be implemented by a simple look-up table. The UE 103 may simply perform the joint decoding by implementing the reverse one to one mapping and selecting the appropriate TPC and SS data bits of the result.

An example of an encode processor 113 using joint encoding is shown in FIG. 2. The encode processor 113 of FIG. 2 comprises N input circuits 201 which receive the TCP and SS data bits from the Node B controller 107. The TCP and SS data bits for each UE are converted into a value in the range from 0 to 5 (inclusive) in state converters 203. The output values of the state converters 203 are added in a summer 205. The sum is then encoded into a binary PLCCH word by a binary encoder 207. The resulting PLCCH word is then fed to a physical layer encoder 209 which generates the PLCCH message that is fed to the Node B transceiver 109 for transmission.

In the example, the physical layer encoder may encode the PLCCH using ½ rate or 1/3 rate convolutional or 1/3 rate turbo coding, or using no coding (as per the standard 3GPP release 99 transport channel processing). However, it should be understood that e.g. any generic forward error correcting entity could be used in its place, such as block codes, repetition codes, concatenated coding schemes etc.

In some embodiments, the encode processor 113 is operable to encode the PLCCH word by using processing algorithms of a group of algorithms used by a plurality of services.

Specifically, once constructed, traditional 3GPP transport channel processing could be employed to map the PLCCH word onto the physical channel(s). This means that the coding retains the full flexibility of the Layer 1 transport channel processing toolbox, and the PLCCH may be adapted to varying numbers of users (affecting the information bit rate) and to various system deployments and configurations.

As such, a transmit power or an encoding process for the PLCCH message may be determined in response to a number of UEs for which the minimum transmission resource unit comprises UE specific information. For example, for a small number of users, a low forward error correction code rate could be employed (this has more redundancy and requires less transmission power), whereas for a larger number of users a progressively higher code rate could be used (having less redundancy and higher transmit power requirements).

Additionally, if one physical channel transmission unit is not sufficient to carry the data for all of the intended

users, a further physical channel may be used. The data destined for each physical channel may be handled by an encoder separately for each, or it may be encoded together by a single encoding unit and separated only at the output of the encoder. The formation of the PLCCH would thus resemble that of FIG. 2 for n=1…N UE's using the PLCCH. In this example, the data destined for multiple physical channels is encoded using a single encoder.

Thus, the use of a common TPC/SS physical channel (the PLCCH) may provide advantages in many embodiments. Specifically, for a given TPC/SS update rate, overall transmission power resources are reduced when compared to multiple DPCH or special burst transmissions. Furthermore, the code resources used for the transmission of TPC and SS information to the multiple users are greatly reduced (many downlink DPCH's are potentially replaced by a single PLCCH).

A further and substantial benefit is that the uplink power control and synchronisation update rates may be maintained if desired, whereas when using special bursts or multi-frame DPCH's (transmitted only every m^{th} frame), the update rate is correspondingly slower. (As will be known to the person skilled in the art special bursts are transmitted as a "keep-alive" signal at certain regular periods when no higher layer data is available to map to a physical channel. In the time between special burst, discontinuous transmission (DTX) is used).

However, in some embodiments the Node B may be operable to transmit TCP and SS information for a given UE in intermittent PLCCH messages.

For example, the framing structure of 1.28Mcps TDD is repeated every subframe (5ms) and in some examples the PLCCH may not need to be transmitted in every subframe. This would allow flexible use of system resources as the number of UEs actively using the PLCCH is increased or decreased. However, there is of course some degree of trade-off in that the TPC and SS update rates are also a function of how often the PLCCH is transmitted.

Additionally, the information for a given user need not be present in each PLCCH instance. This would enable the system to handle higher loads without consuming more resources, at the expense of a slower TPC and SS update rate. Conversely, more resources could be used to handle higher loads without compromising TPC and SS update rates.

As a specific example, assuming a ½ rate convolutional code is used, the minimum transmission unit of 88 channel bits (1 code at SF16, QPSK) would be able to convey 36 information bits. At $\log_2(6)$ bits per user, this could carry TPC and SS streams for approximately 14 users.

If the PLCCH were transmitted once per 5ms subframe, and the TPC and SS update rate for the uplink DPCH was once every (say) 10 or 20ms, it is clear that a single PLCCH could serve all active data-only HSDPA users in the cell (28 users at 10ms update rate, or 56 users at 20ms update rate). Here, a total of 13 SF16 downlink channelisation codes (previously used for downlink DPCH) are freed-up for use by other channels such as HS-DSCH by means of the invention. By being able to more efficiently use these codes, the

system is able to serve higher data throughputs in each cell.

In some embodiments, the Node B 101 may comprise means for setting a transmit power for the PLCCH in response to a transmit power requirement of the plurality of user equipment. Specifically, the Node B controller 107 may calculate a suitable power level for each UE addressed by the PLCCH message, and the transmit power may be set to the highest of these values as this should ensure that the PLCCH message can be received by all UEs.

In general, the PLCCH must be received by multiple UE's and for this reason it is impractical to minimise the transmission power separately for each individual user. Although this may result in some power efficiency loss for the TPC and SS symbols, a far greater power saving is generally made due to the fact that the redundant data payload portions (ie: the non-TPC/SS symbols) of the downlink DPCH (or so-called 'special bursts) no longer need to be transmitted.

Simplistically, if e.g. 4 users had DL the DPCH powers P_1, P_2, P_3, P_4, and these could be replaced by a single channel of power $P_0 = \max(P_1, P_2, P_3, P_4)$, then it follows that $P_0 < (P_1+P_2+P_3+P_4)$.

In some embodiments the PLCCH message may only comprise synchronisation commands with the uplink power control being achieved by other means (eg: using open-loop power control methods).

In some embodiments, the PLCCH does not comprise verification data.

Since the PLCCH message contains information for a plurality of users, it is not of importance that all of the data is received correctly by each UE. The block or frame error rate (BLER or FER respectively) is thus not of particular relevance in determining TPC or SS error performance. Rather the post-decoded bit error rate (BER) has the most direct relevance to TPC and SS performance. Because of this, there is typically no explicit need to protect the integrity of the data block with a cyclic redundancy check (CRC) or other checksum technique.

The invention can be implemented in any suitable form including hardware, software, firmware or any combination of these. However, preferably, the invention is implemented at least partly as computer software running on one or more data processors and/or digital signal processors. The elements and components of an embodiment of the invention may be physically, functionally and logically implemented in any suitable way. Indeed the functionality may be implemented in a single unit, in a plurality of units or as part of other functional units. As such, the invention may be implemented in a single unit or may be physically and functionally distributed between different units and processors.

Although the present invention has been described in connection with the preferred embodiment, 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

accompanying claims. In the claims, the term comprising does not exclude the presence of other elements or steps. Furthermore, although individually listed, a plurality of means, elements or method steps may be implemented by e.g. 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. In addition, singular references do not exclude a plurality. Thus references to "a", "an", "first", "second" etc do not preclude a plurality.

CLAIMS

1. An apparatus for transmitting user equipment specific information from a base station to a user equipment in a cellular communication system; the apparatus comprising:

means for combining user equipment specific information for a plurality of user equipment to generate combined user equipment specific information;

means for encoding the combined user equipment specific information; and

means for transmitting the combined user equipment specific information in a minimum transmission resource unit.

2. An apparatus as claimed in claim 1 wherein the minimum transmission resource unit is a time slot.

3. An apparatus as claimed in claim 1 wherein the minimum transmission resource unit is a single time code frequency resource allocation unit.

4. An apparatus as claimed in any of the previous claims wherein the means for encoding is operable to jointly encode user equipment specific information for at least two of the plurality of user equipment.

5. An apparatus as claimed in claim 4 wherein the means for encoding is operable to jointly encode user equipment specific information associated with all user equipment of the plurality of user equipment.

6. An apparatus as claimed in claim 4 or 5 wherein the encoding comprises forward error correcting coding

7. An apparatus as claimed in any of the claims 4 to 6 wherein the user equipment specific information comprises a plurality of parameters each having a number of possible values, and wherein the means for encoding is operable to encode the plurality of parameters by encoding a combined parameter having a combined number of possible values equal to the product of the number of possible values of the plurality of parameters.

8. An apparatus as claimed in any of the previous claims wherein the user equipment specific information comprises power control information.

9. An apparatus as claimed in any of the previous claims wherein the user equipment specific information comprises synchronisation information.

10. An apparatus as claimed in any of the previous claims wherein the user equipment specific information comprises only synchronisation information.

11. An apparatus as claimed in any of the previous claims wherein the user equipment specific information is associated with an uplink channel from each of the plurality of user equipment.

12. An apparatus as claimed in any of the previous claims further comprising means for setting a transmit power for the minimum transmission resource unit in response to a

transmit power requirement of the plurality of user equipment.

13. An apparatus as claimed in any of the previous claims further comprising means for transmitting position information indicative of a position of user equipment specific information for a first user equipment.

14. An apparatus as claimed in any of the previous claims wherein the user equipment specific information is control information associated with High Speed Downlink Packet Access (HSDPA) service.

15. An apparatus as claimed in claim 14 wherein the user equipment specific information is associated with an uplink dedicated physical channel (DPCH) of the HSDPA downlink packet data service.

16. An apparatus as claimed in any of the previous claim wherein the means for encoding is operable to encode the combined user equipment specific information by using processing algorithms of a group of algorithms used by a plurality of services.

17. An apparatus as claimed in any of the previous claims wherein the cellular communication system is a Time Division Duplex (TDD) cellular communication system.

18. An apparatus as claimed in claim 16 wherein the cellular communication system is the UTRA (UMTS (Universal Mobile Telecommunication System) Terrestrial Radio Access)

TDD cellular communication system specified by the 3rd Generation Partnership Project.

19. An apparatus as claimed in claim 18 wherein the user equipment specific information consists of Transmit Power Control (TPC) and Synchronisation Shift (SS) data.

20. An apparatus as claimed in any of the previous claims further comprising means for determining a transmit power of the minimum transmission resource unit in response to a number of user equipment for which the minimum transmission resource unit comprises user equipment specific information.

21. An apparatus as claimed in any of the previous claims further comprising means for determining an encoding process for the minimum transmission resource unit in response to a number of user equipment for which the minimum transmission resource unit comprises user equipment specific information.

22. An apparatus as claimed in any of the previous claims wherein the minimum transmission resource unit does not comprise verification data.

23. An apparatus as claimed in any of the previous claims wherein the means for transmitting is operable to transmit user equipment specific information for a first user in intermittent minimum transmission resource units.

24. An apparatus as claimed in any of the previous claims wherein the minimum transmission resource unit corresponds to a minimum size transmission block of user equipment

specific information which can be transmitted by the means for transmitting.

25. An apparatus as claimed in any of the previous claims wherein the apparatus is a base station

26. A user equipment for receiving user equipment specific information from a base station in a cellular communication system; the apparatus comprising:

means for receiving a minimum transmission resource unit comprising combined user equipment specific information for a plurality of user equipment; and

means for determining user specific information for the user equipment from the minimum transmission resource unit.

27. A user equipment as claimed in claim 26 wherein the combined user equipment specific information is jointly encoded; and wherein the means for determining comprises means for decoding the combined user equipment specific information and for selecting the user equipment specific information for the user equipment.

28. A cellular communication system comprising

a first apparatus for transmitting user equipment specific information from a base station to a user equipment, the first apparatus comprising:

means for combining user equipment specific information for a plurality of user equipment to generate combined user equipment specific information,

means for encoding the combined user equipment specific information, and

means for transmitting the combined user equipment specific information in a minimum transmission resource unit; and

the user equipment comprising:

means for receiving a minimum transmission resource unit comprising combined user equipment specific information for a plurality of user equipment; and

means for determining user specific information for the user equipment from the minimum transmission resource unit.

29. A method of transmitting user equipment specific information from a base station to a user equipment in a cellular communication system; the method comprising the steps of:

combining user equipment specific information for a plurality of user equipment to generate combined user equipment specific information;

encoding the combined user equipment specific information; and

transmitting the combined user equipment specific information in a minimum transmission resource unit.

30. A method of receiving user equipment specific information from a base station in a cellular communication system; the method comprising the steps of:

receiving a minimum transmission resource unit comprising combined user equipment specific information for a plurality of user equipment; and

determining user specific information for the user equipment from the minimum transmission resource unit.

Application No:	GB0418107.9	**Examiner:**	Steve Evans
Claims searched:	All	**Date of search:**	21 February 2005

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
A	-	EP 0975185 A (NIPPON) - Whole document

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC[X] :

H4L

Worldwide search of patent documents classified in the following areas of the IPC[07]

H04Q

The following online and other databases have been used in the preparation of this search report

Online: WPI, EPODOC

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Aug 20, 2022 12:19:27 PM

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Application	Document	Mailroom Date	Attorney Docket No.
17870425	TRACK1.GRANT	08/19/2022	IPW2-USCN213571

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/870,425	07/21/2022	Paul Howard	IPW2-USCN213571	9362

3624 7590 08/19/2022

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

EXAMINER
CENTRAL, DOCKET

ART UNIT	PAPER NUMBER
OPAP	

NOTIFICATION DATE	DELIVERY MODE
08/19/2022	ELECTRONIC

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

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

eoffice@volpe-koenig.com

Decision Granting Request for Prioritized Examination (Track I)	**Application No.** 17/870,425	**Applicant(s)** Howard, Paul	
	Examiner FIKIRTE A GEREMEW	**Art Unit** OMBL	**AIA (FITF) Status** No

1. THE REQUEST FILED 21 July 2022 IS **GRANTED** .

   The above-identified application has met the requirements for prioritized examination
   - A. ☑ for an original nonprovisional application (Track I).
   - B. ☐ for an application undergoing continued examination (RCE).

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:
   - A. filing a **petition for extension of time** to extend the time period for filing a reply;
   - B. filing an **amendment to amend the application to contain more than four independent claims, more than thirty total claims** , or a multiple dependent claim;
   - C. filing a **request for continued examination** ;
   - D. filing a notice of appeal;
   - E. filing a request for suspension of action;
   - F. mailing of a notice of allowance;
   - G. mailing of a final Office action;
   - H. completion of examination as defined in 37 CFR 41.102; or
   - I. abandonment of the application.

Telephone inquiries with regard to this decision should be directed to FIKIRTE GEREMEW at (703) 756-1930. In his/her absence, calls may be directed to Petition Help Desk at (571) 272-3282.

/FIKIRTE A GEREMEW/ PROGRAM SUPPORT ASSISTANT, OMBL	

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Application	Document	Mailroom Date	Attorney Docket No.
17870425	APP.FILE.REC	08/03/2022	IPW2-USCN213571

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Application or Docket Number: 17/870,425

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	320
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	700
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	800
TOTAL CLAIMS (37 CFR 1.16(i))	20 minus 20 =	*			OR	x 100 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	4 minus 3 =	* 1				x 480 =	480
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	2300

APPLICATION AS AMENDED - PART II

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

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

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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
17/870,425	07/21/2022	2414	2300	IPW2-USCN213571	20	4

CONFIRMATION NO. 9362

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

FILING RECEIPT

OC000000135537277

Date Mailed: 08/03/2022

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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 17/583,369 01/25/2022 PAT 11411642
which is a CON of 17/339,550 06/04/2021 PAT 11239908
which is a CON of 16/682,854 11/13/2019 PAT 11032000
which is a CON of 14/458,693 08/13/2014 PAT 11044010
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

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The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 17/870,425**
Projected Publication Date: 11/10/2022
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

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Application Number	Not Yet Known
Filing Date	July 21, 2022
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-USCN213571

SIGNATURE of Applicant or Patent Practitioner

Signature	/John D. Wilt/	Date (Optional)	2022-07-21
Name	John D. Wilt	Registration Number	76,110
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)	Intellectual Ventures II LLC		

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

PTO/AIA/80 (07-12)
Approved for use through 11/30/2014 OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

[x] Practitioners associated with the 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 assignment documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

[x] The address associated with Customer Number: **3624**

OR

[ ] Firm or Individual Name					
Address					
City		State		Zip	
Country		Telephone		Email	

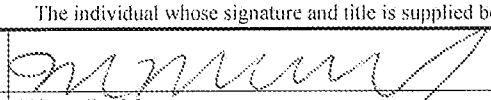
Assignee Name and Address:

Intellectual Ventures II LLC
251 Little Falls Drive
Wilmington, DE 19808

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/SB/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	1/9/2020
Name	Michelle Macartney	Telephone	
Title	Assistant Company Secretary for Intellectual Ventures II LLC		

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):	Not Known
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 /John D. Wilt/	Date 2022-07-21
Name (Print/Typed) John D. Wilt	Practitioner Registration Number 76,110

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.

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.

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

PTO/AIA/01 (06-12)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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

As the below named inventor, I hereby declare that:

This declaration is directed to:

☐ The attached application, or

☒ United States application or PCT international application number 14/458,693

filed on August 13, 2014.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

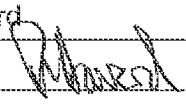
I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Paul Howard Date (Optional): 22 October 2014

Signature: 

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.

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.

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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.

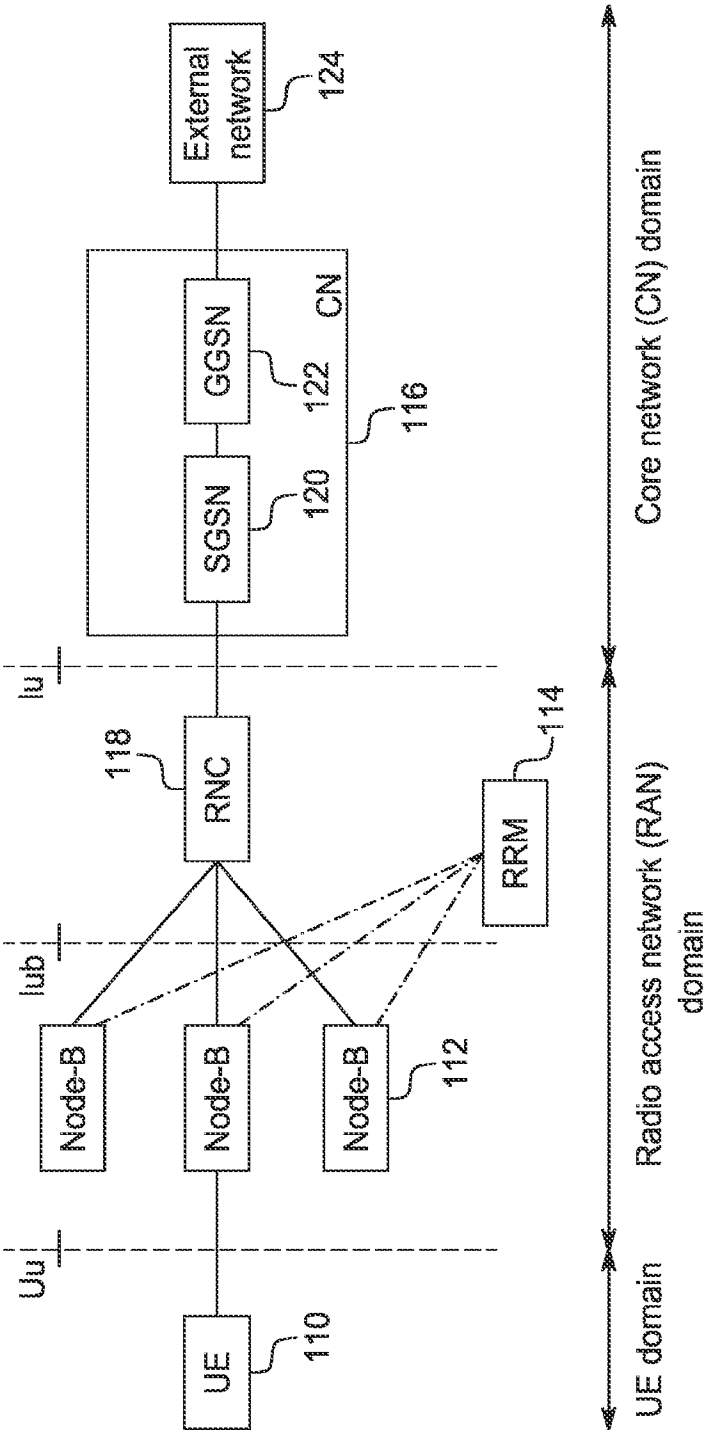
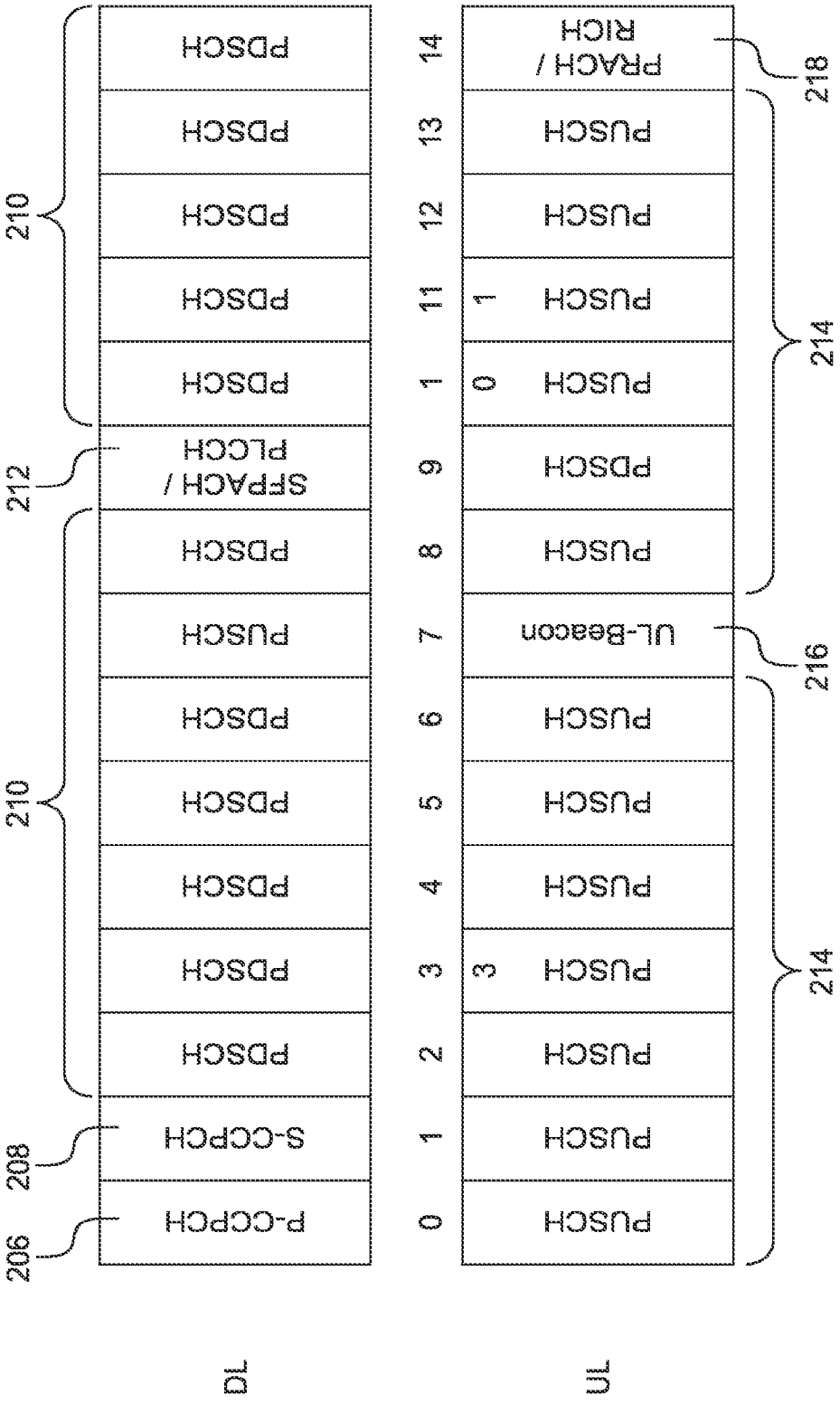

External network
124
GGSN
122
SGSN
120
CN
116
Core network (CN) domain
Iu
118
RNC
114
RRM
Iub
Node-B
Node-B
Node-B
112
Radio access network (RAN) domain
Uu
UE
110
UE domain

FIG. 1


DL
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S-CCPCH
PDSCH
SFPACH / PLCCH
PUSCH
PRACH / RICH
UL-Beacon
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FIG. 2

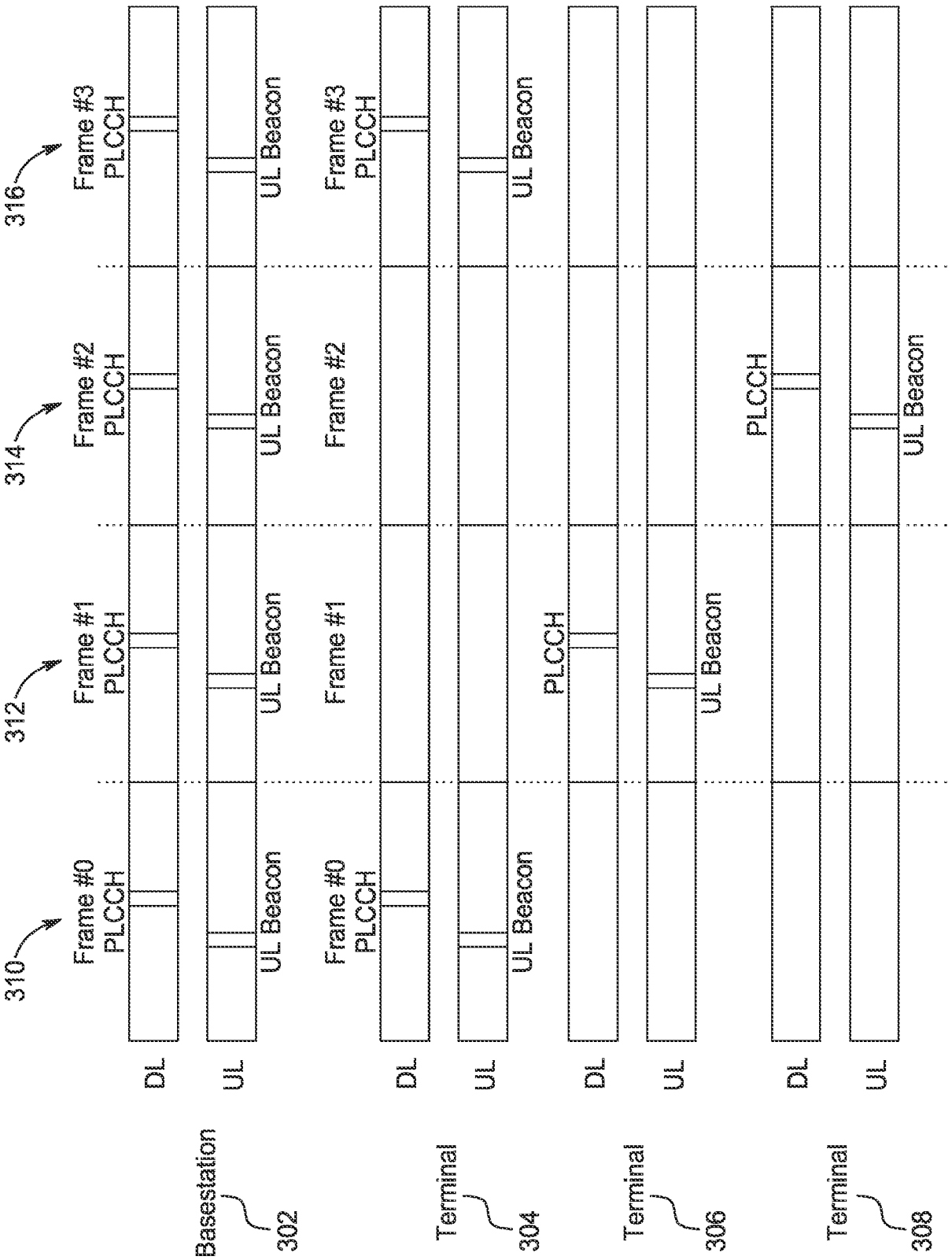

310
312
314
316
Frame #0
Frame #1
Frame #2
Frame #3
PLCCH
UL Beacon
DL
UL
Basestation
302
Terminal
304
Terminal
306
Terminal
308

FIG. 3

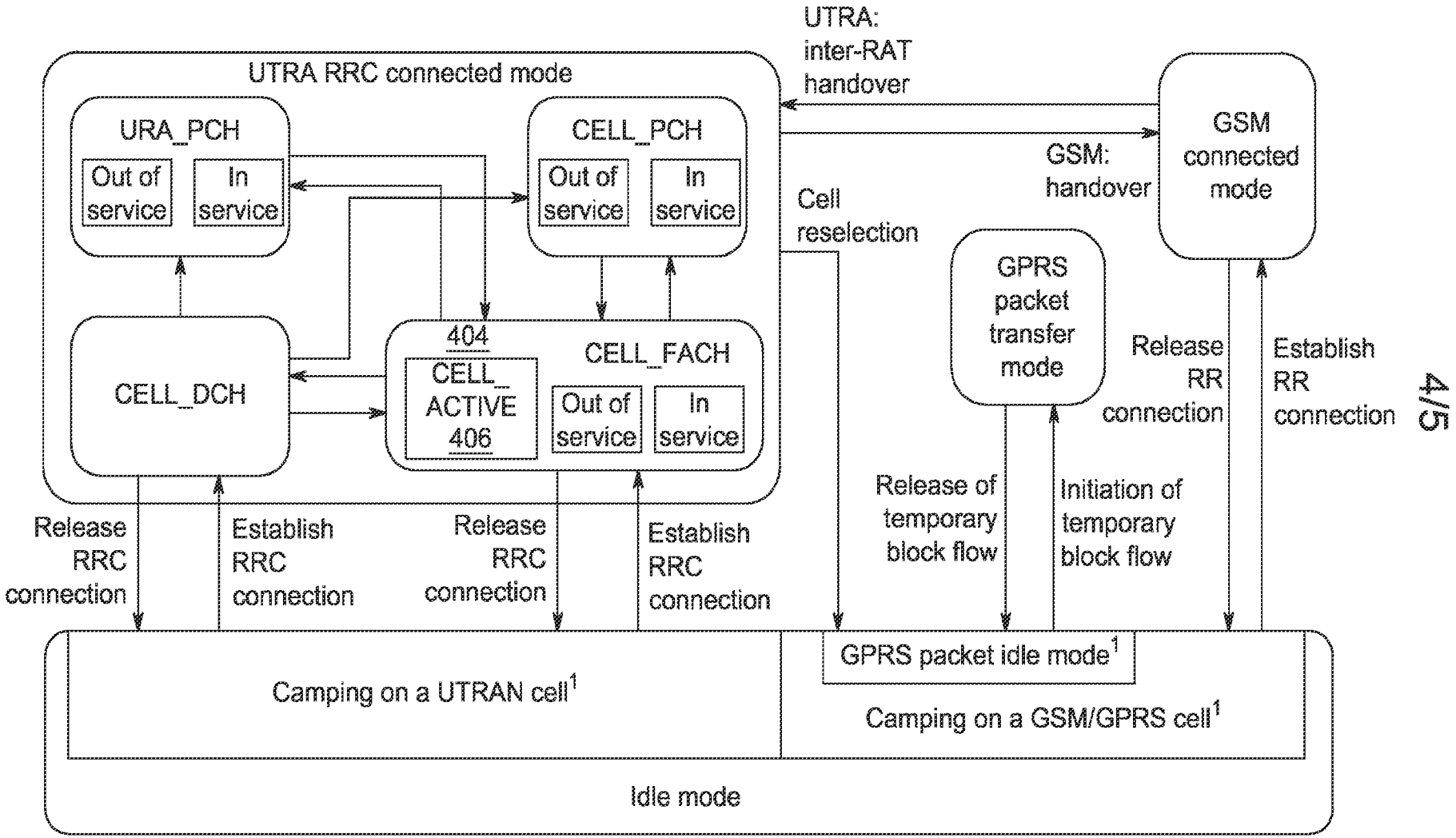
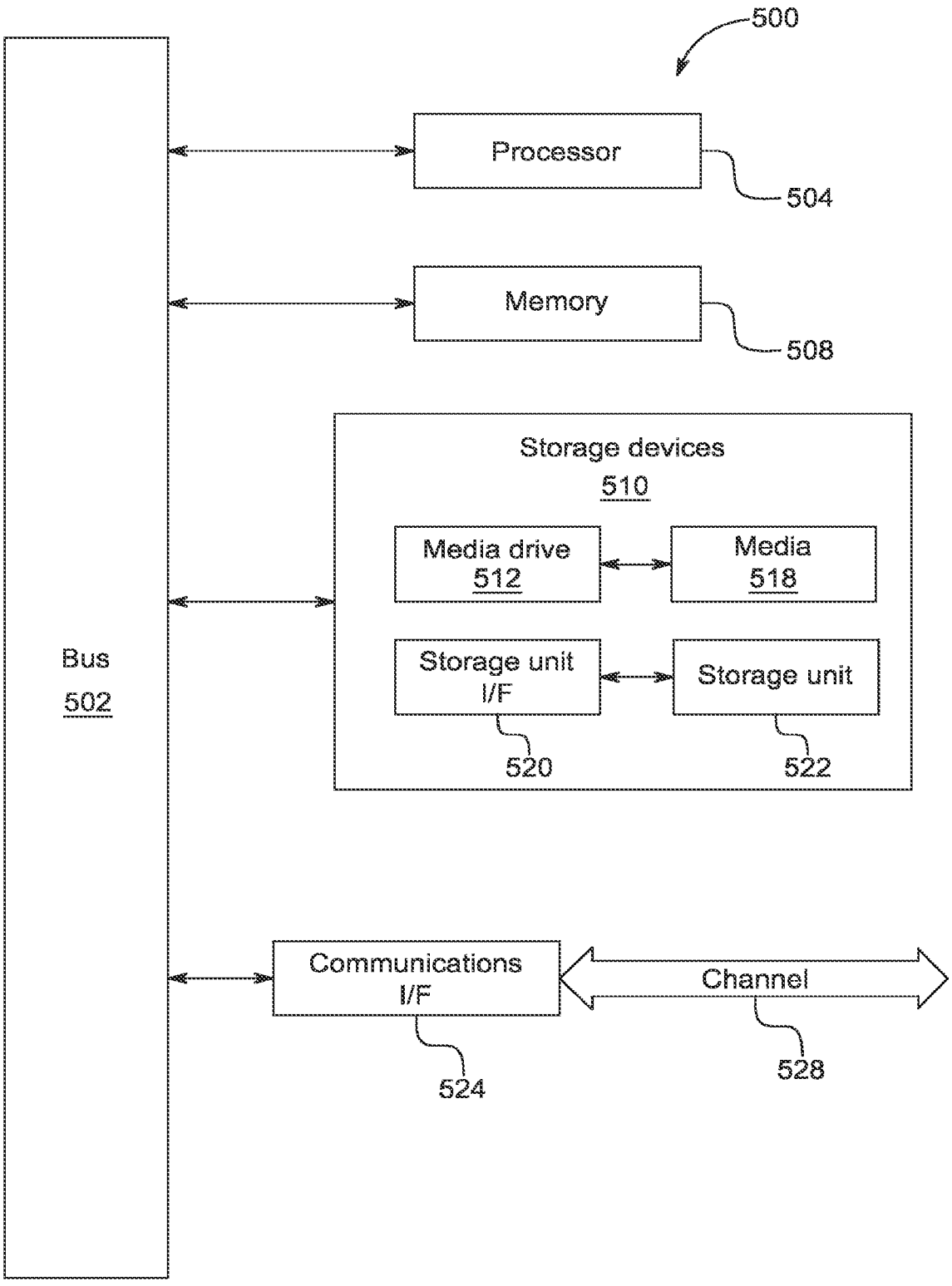

UTRA:
inter-RAT
handover
UTRA RRC connected mode
URA_PCH
Out of service
In service
CELL_PCH
Out of service
In service
GSM
connected
mode
GSM:
handover
Cell
reselection
GPRS
packet
transfer
mode
Release
RR
connection
Establish
RR
connection
CELL_DCH
404
CELL_
ACTIVE
406
CELL_FACH
Out of service
In service
Release of
temporary
block flow
Initiation of
temporary
block flow
Release
RRC
connection
Establish
RRC
connection
Release
RRC
connection
Establish
RRC
connection
GPRS packet idle mode[1]
Camping on a UTRAN cell[1]
Camping on a GSM/GPRS cell[1]
Idle mode

FIG. 4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Processor
504
Memory
508
Storage devices
510
Media drive
512
Media
518
Storage unit
I/F
520
Storage unit
522
Bus
502
Communications
I/F
524
Channel
528

FIG. 5

COMMUNICATIONS IN A WIRELESS NETWORK

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation of U.S. Patent Application Serial No. 17/583,369, filed January 25, 2022, which will issue as U.S. Patent No. 11,411,642 on August 9, 2022, which is a continuation of 17/339,550, filed June 4, 2021 which issued as U.S. Patent No. 11,239,908 on February 1, 2022, which is a continuation of U.S. Patent Application No. 16/682,854, filed November 13, 2019, which issued as U.S. Patent No. 11,032,000 on June 8, 2021, which is a continuation of U.S. Patent Application Serial No. 14/458,693, filed August 13, 2014, which issued as U.S. Patent No. 11,044,010 on June 22, 2021, which is a continuation of U.S. Patent Application Serial No. 13/176,298, filed July 5, 2011, which issued as U.S. Patent No. 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 U.S. Patent No. 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 PLLCH. 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 first user equipment (UE) comprising:

a transmitter;

a receiver; and

a processor, operatively coupled to the transmitter and the receiver,

wherein:

the receiver and the processor are configured to receive a control message over a physical control channel in a first time slot, wherein the control message has power control bits for a plurality of UEs, wherein the plurality of UEs include the first UE,

the processor is further configured to extract power control information for the first UE from the control message, and

the transmitter and the processor are configured to transmit a signal over a physical control channel to a base station in a second time slot at a transmission power level based on the extracted power control information.

2. The first UE of claim 1 wherein the first time slot also includes a downlink shared channel.

3. The first UE of claim 1 wherein the signal transmitted over the physical control channel is produced using a code sequence, wherein a plurality of UEs transmit in the second time slot using different code sequences.

4, The first UE of claim 1 wherein the transmitter and the processor are further configured to transmit data over a physical shared channel in a third time slot and the transmitter and the processor are further configured to not transmit the signal over the physical control channel at a same time that data over a physical shared channel is transmitted.

5. The first UE of claim 1 wherein the transmitter and the processor are further configured to transmit the signal over the physical control channel when time synchronized and to transmit a signal over a random access channel when not time synchronized.

6. A method performed by a first user equipment (UE), the method comprising:

receiving, by the first UE, a control message over a physical control channel in a first time slot, wherein the control message has power control bits for a plurality of UEs including the first UE;

extracting, by the UE, power control information for the first UE from the control message; and

transmitting, by the UE, a signal over a physical control channel to a base station in a second time slot at a transmission power level based on the extracted power control information.

7. The method of claim 6 wherein the first time slot also includes a downlink shared channel.

8. The method of claim 6 wherein the signal transmitted over the physical control channel is produced using a code sequence, wherein a plurality of UEs transmit in the second time slot using different code sequences.

9. The method of claim 6 further comprising:

transmitting, by the first UE, data over a physical shared channel in a third time slot, wherein the UE does not transmit the signal over the physical control channel at a same time that data over a physical shared channel is transmitted.

10. The method of claim 1 further comprising:

transmitting, by the first UE, the signal over the physical control channel when time synchronized; and

transmitting a signal over a random access channel when not time synchronized.

11. A base station comprising:

a transmitter;

a receiver; and

a processor, operatively coupled to the transmitter and the receiver,

wherein:

the transmitter and the processor are configured to transmit a control message over a physical control channel in a first time slot, wherein the control message has power control bits for a plurality of user equipments (UEs), wherein the plurality of UEs include a first UE, and

the transmitter and the processor are further configured to receive a signal over a physical control channel from the first UE in a second time slot, wherein a power level of the received signal from the first UE is based on the transmitted message.

12. The base station of claim 11 wherein the transmitter and the processor also transmit data over a downlink shared channel in the first time slot.

13. The base station of claim 11 wherein the processor is further configured to process the signal received over the physical control channel from the first UE based on a code sequence, wherein signals from a plurality of UEs are received in the second time slot using different code sequences.

14. The base station of claim 11 wherein the receiver and the processor are further configured to receive data over a physical shared channel in a third time slot.

15. The base station of claim 11 wherein the receiver and the processor are further configured to receive the signal over the physical control channel when the first UE is time synchronized and to receive a signal over a random access channel when the first UE is not time synchronized.

16. A method performed by a base station, the method comprising:

transmitting, by the base station, a control message over a physical control channel in a first time slot, wherein the control message has power control bits for a plurality of user equipments (UEs), wherein the plurality of UEs include a first UE;

receiving, by the base station, a signal over a physical control channel from the first UE in a second time slot, wherein a power level of the received signal from the first UE is based on the transmitted message.

17. The method of claim 16 further comprising transmitting, by the base station, data over a downlink shared channel in the first time slot.

18. The method of claim 16 further comprising processing, by the base station, the signal received over the physical control channel from the first UE based on a code sequence, wherein signals from a plurality of UEs are received and processed in the second time slot using different code sequences.

19. The method of claim 16 further comprising receiving, by the base station, data over a physical shared channel in a third time slot.

20. The method of claim 16 further comprising:

receiving, by the base station, the signal over the physical control channel when the first UE is time synchronized; and

receiving, by the base station, a signal over a random access channel when the first UE is not time synchronized.

ABSTRACT

A user equipment (UE) is configured to receive a control message over a physical control channel in a first time slot, wherein the control message has power control bits for a plurality of UEs, wherein the plurality of UEs include the first UE. The UE is further configured to extract power control information for the first UE from the control message, and to transmit a signal over a physical control channel to a base station in a second time slot at a transmission power level based on the extracted power control information.

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
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-USCN213571

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	320	320
UTILITY SEARCH FEE	1111	1	700	700
UTILITY EXAMINATION FEE	1311	1	800	800
REQUEST FOR PRIORITIZED EXAMINATION	1817	1	4200	4200
Pages:				
Claims:				
INDEPENDENT CLAIMS IN EXCESS OF 3	1201	1	480	480
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 ($)	**6640**

Electronic Acknowledgement Receipt

EFS ID:	46241062
Application Number:	17870425
International Application Number:	
Confirmation Number:	9362
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-USCN213571
Receipt Date:	21-JUL-2022
Filing Date:	
Time Stamp:	16:28:12
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$6640
RAM confirmation Number	E20227KG29122297
Deposit Account	220493
Authorized User	Caren Burgoon

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37 CFR 1.16 (National application filing, search, and examination fees)

37 CFR 1.17 (Patent application and reexamination processing fees)

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	Application Data Sheet	IPW2_USCN213571_ADS_20220721.pdf	2295950 cd28d305115cdee0a704c8a7cf83423b799fb807	no	9
Warnings:					
Information:					
2	Power of Attorney	IPW2_USCN213571_POA_20220721.pdf	839605 86e36865f4c54f2c01a7a7eb2be6b5411cbb3447	no	2
Warnings:					
Information:					
3	Track One Request	IPW2_USCN213571_Track1Request_20220721.pdf	146188 3f23e761b895ece4708a7d66abdd77d6a24c7d7e	no	2
Warnings:					
Information:					
4	Oath or Declaration filed	IPW2_USCN213571_ExecutedDeclaration_20220721.pdf	2818700 484f5438bb56a659a5606bb504f639813cbfee95	no	2
Warnings:					
Information:					
5	Drawings-only black and white line drawings	IPW2_USCN213571_Drawings_20220721.pdf	563956 861d43262142019dc17769989c2093edec681d56	no	5
Warnings:					
Information:					
6		IPW2_USCN213571_ContinuationApplication_20220721.pdf	137410 25870bd3a55bd6db247210bbf371ad443ab80c18	yes	23
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	

	Specification		1		16
	Claims		17		22
	Abstract		23		23
Warnings:					
Information:					
7	Fee Worksheet (SB06)	fee-info.pdf	53043 14bdf974c9d50dc7aeec884f5693b381d2562668	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	6854852		

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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.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	IPW2-USCN213571
	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.)

Inventor Information:

Inventor 1 — Remove

Legal Name

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

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	3624		
Email Address	eoffice@vklaw.com	Add Email	Remove Email

Application Information:

Title of the Invention	COMMUNICATIONS IN A WIRELESS NETWORK		
Attorney Docket Number	IPW2-USCN213571	**Small Entity Status Claimed**	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	5	**Suggested Figure for Publication (if any)**	

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	IPW2-USCN213571
	Application Number	
Title of Invention	COMMUNICATIONS IN A WIRELESS NETWORK	

Filing By Reference:

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

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

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

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

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

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	● Customer Number	US Patent Practitioner	◯ Limited Recognition (37 CFR 11.9)
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	17/583369	2022-01-25

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	IPW2-USCN213571
	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)
17/583369	Continuation of	17/339550	2021-06-04	11239908	2022-02-01
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
17/339550	Continuation of	16/682854	2019-11-13	11032000	2021-06-08
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16/682854	Continuation of	14/458693	2014-08-13	11044010	2021-06-22
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14/458693	Continuation of	13/176298	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)
13/176298	Continuation of	11/646692	2006-12-27	8009639	2011-08-30

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

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

Remove

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

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	IPW2-USCN213571
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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-USCN213571
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Authorization or Opt-Out of Authorization to Permit Access:

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

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

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

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

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

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

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

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

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

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

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

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	IPW2-USCN213571
	Application Number	
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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 — Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

● Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.	Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	Intellectual Ventures II LLC		
Mailing Address Information For Applicant:			
Address 1	251 Little Falls Drive		
Address 2			
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. Add

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.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	IPW2-USCN213571
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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.

Remove

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	251 Little Falls Drive		
Address 2			
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. Add

Signature:

Remove

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	/John D. Wilt/			Date (YYYY-MM-DD)	2022-07-21
First Name	John D	Last Name	Wilt	Registration Number	76110

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

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	IPW2-USCN213571
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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 CooperationTreaty.

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.