PTO/AIA/15 (03-13)
Approved for use through 01/31/2014. OMB 0651-0032
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UTILITY PATENT APPLICATION TRANSMITTAL

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

Attorney Docket No.	061240-8017.US05
First Named Inventor	Xiaodong Li
Title	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH H
Express Mail Label No.	Via EFS

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO: **Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450**

1. [✓] **Fee Transmittal Form** (PTO/SB/17 or equivalent)
2. [✓] **Applicant asserts small entity status.** See 37 CFR 1.27
3. [ ] **Applicant certifies micro entity status.** See 37 CFR 1.29. Applicant must attach form PTO/SB/15A or B or equivalent.
4. [✓] **Specification** [*Total Pages* 23] Both the claims and abstract must start on a new page. *(See MPEP § 608.01(a) for information on the preferred arrangement)*
5. [✓] **Drawing(s)** (35 U.S.C. 113) [*Total Sheets* 12]
6. **Inventor's Oath or Declaration** [*Total Pages* 4] *(including substitute statements under 37 CFR 1.64 and assignments serving as an oath or declaration under 37 CFR 1.63(e))*
   a. [ ] Newly executed (original or copy)
   b. [✓] A copy from a prior application (37 CFR 1.63(d))
7. [✓] **Application Data Sheet** ** See note below.* See 37 CFR 1.76 (PTO/AIA/14 or equivalent)
8. **CD-ROM or CD-R** in duplicate, large table, or Computer Program (*Appendix*)
   [ ] Landscape Table on CD
9. **Nucleotide and/or Amino Acid Sequence Submission** (*if applicable, items a. – c. are required*)
   a. [ ] Computer Readable Form (CRF)
   b. [ ] Specification Sequence Listing on:
      i. [ ] CD-ROM or CD-R (2 copies); or
      ii. [ ] Paper
   c. [ ] Statements verifying identity of above copies

ACCOMPANYING APPLICATION PAPERS

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

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

19. CORRESPONDENCE ADDRESS

[✓] The address associated with Customer Number: 25096 OR [ ] Correspondence address below

Name					
Address					
City		State		Zip Code	
Country		Telephone		Email	

Signature	/Stephen Bishop/	Date	22 May 2015
Name (Print/Type)	Stephen Bishop	Registration No. (Attorney/Agent)	38,829

This collection of information is required by 37 CFR 1.53(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

PTO/SB/17 (03-13)
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FEE TRANSMITTAL

Complete if known	
Application Number	Not Yet Assigned
Filing Date	Concurrently Herewith
First Named Inventor	Xiaodong Li
Examiner Name	Not Yet Assigned
Art Unit	Not Yet Assigned
Practitioner Docket No.	061240-8017.US05

[x] Applicant asserts small entity status. See 37 CFR 1.27

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

TOTAL AMOUNT OF PAYMENT ($) 730.00

METHOD OF PAYMENT (check all that apply)

[ ] Check [x] Credit Card [ ] Money Order [ ] None [ ] Other (please identify): _____

[x] Deposit Account Deposit Account Number: 50-0665 Deposit Account Name: Perkins Coie LLP

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

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

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

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

FEE CALCULATION

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

	FILING FEES			SEARCH FEES			EXAMINATION FEES			
Application Type	**U ($)**	**S ($)**	**M ($)**	**U ($)**	**S ($)**	**M ($)**	**U ($)**	**S ($)**	**M ($)**	**Fees Paid ($)**
Utility	280	140*	70	600	300	150	720	360	180	730.00
Design	180	90	45	120	60	30	460	230	115	
Plant	180	90	45	380	190	95	580	290	145	
Reissue	280	140	70	600	300	150	2,160	1,080	540	
Provisional	260	130	65	0	0	0	0	0	0	

* The $140 small entity status filing fee for a utility application is further reduced to $70 for a small entity status applicant who files the application via EFS-Web.

2. EXCESS CLAIM FEES

Fee Description	**Undiscounted Fee ($)**	**Small Entity Fee ($)**	**Micro Entity Fee ($)**
Each claim over 20 (including Reissues)	80	40	20
Each independent claim over 3 (including Reissues)	420	210	105
Multiple dependent claims	780	390	195

Total Claims		**Extra Claims**	**Fee ($)**		**Fee Paid ($)**
12	- 20 or HP =	0	x 0	=	0

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

Indep. Claims		**Extra Claims**	**Fee ($)**		**Fee Paid ($)**
3	- 3 or HP =	0	x 0	=	0

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

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

3. APPLICATION SIZE FEE

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

Total Sheets		**Extra Sheets**		**Number of each additional 50 or fraction thereof**	**Fee ($)**	**Fee Paid ($)**
35	- 100 =		/50 =	(round **up** to a whole number) x		=

4. OTHER FEE(S)

	Fees Paid ($)
Non-English specification, $130 fee (no small or micro entity discount)	
Non-electronic filing fee under 37 CFR 1.16(t) for a utility application, $400 fee ($200 small or micro entity)	
Other (e.g., late filing surcharge):	

SUBMITTED BY

Signature	/Stephen Bishop/	Registration No. (Attorney/Agent)	38,829	Telephone	(206) 359-8000
Name (Print/Type)	Stephen Bishop			Date	22 May 2015

Docket No.: 061240-8017.US05
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Li et al.

Application No.: Not Yet Assigned

Confirmation No.: Not Yet Assigned

Filed: Concurrently Herewith

Art Unit: Not Yet Assigned

For: METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD

Examiner: Not Yet Assigned

AUTHORIZATION FOR: EXTENSIONS OF TIME UNDER 37 C.F.R. § 1.136(A)(3) AND FEES UNDER 37 C.F.R. § 1.17

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

Madam:

With respect to the above-identified application, the Commissioner is authorized to treat any concurrent or future reply requiring a petition for an extension of time under 37 C.F.R. § 1.136(a)(3) for its timely submission as incorporating a petition therefor for the appropriate length of time.

The Commissioner is also authorized to charge any extension of time fees or other fees that may be required under 37 C.F.R. § 1.17 for any paper filed concurrently herewith or in the future, or credit any overpayment, to Deposit Account No. 50-0665.

Dated: 22 May 2015

Respectfully submitted,

By /Stephen Bishop/
Stephen Bishop
Registration No.: 38,829
PERKINS COIE LLP
P.O. Box 1247
Seattle, Washington 98111-1247
(206) 359-8000
(206) 359-7198 (Fax)
Attorney for Applicant

61240-8017.US05/LEGAL126162769.1

PTO/SB/80 (01-06)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

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

I hereby appoint:

[x] Practitioners associated with the Customer Number: 25096

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(b).

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

[x] The address associated with Customer Number: 25096

OR

[ ] Firm or Individual Name

Address					
City		State		Zip	
Country		Telephone		Email	

Assignee Name and Address:

Neocific, Inc.
13312 SE 43rd Street
Bellevue, Washington 98006

A copy of this form, together with a statement under 37 CFR 3.73(b) (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(b) may be completed by one of the practitioners appointed in this form if the appointed practitioner is authorized to act on behalf of the assignee, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

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

Signature	[signature]	Date	1/3/2007
Name	XIAODONG LI	Telephone	425-445-2270
Title	PRESIDENT		

61240-8000/LEGAL12936537.1

PTO/AIA/96 (08-12)
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STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Neocific, Inc.

Application No./Patent No.: Not Yet Assigned Filed/Issue Date: Concurrently Herewith

Titled: METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD

Neocific, Inc. (Name of Assignee) , a corporation (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. [X] The assignee of the entire right, title, and interest.

2. [ ] An assignee of less than the entire right, title, and interest (check applicable box):

   [ ] (The extent (by percentage) of its ownership interest is _____ %). Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   [ ] There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. [ ] The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. [ ] The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2, or 3 above (not option 4) is evidence by either (choose **one** of options A or B below):

A. [X] An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 023455 , Frame 0173 , or for which a copy thereof is attached.

B. [ ] A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

   1. From: _____ To: _____
      The document was recorded in the United States Patent and Trademark Office at
      Reel _____ , Frame _____ , or for which a copy thereof is attached.

   2. From: _____ To: _____
      The document was recorded in the United States Patent and Trademark Office at
      Reel _____ , Frame _____ , or for which a copy thereof is attached.

[Page 1 of 2]

PTO/AIA/96 (08-12)
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STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____
The document was recorded in the United States Patent and Trademark Office at
Reel _____ , Frame _____ , or for which a copy thereof is attached.

4. From: _____ To: _____
The document was recorded in the United States Patent and Trademark Office at
Reel _____ , Frame _____ , or for which a copy thereof is attached.

5. From: _____ To: _____
The document was recorded in the United States Patent and Trademark Office at
Reel _____ , Frame _____ , or for which a copy thereof is attached.

6. From: _____ To: _____
The document was recorded in the United States Patent and Trademark Office at
Reel _____ , Frame _____ , or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☒ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Stephen Bishop/	22 May 2015
Signature	Date
Stephen Bishop - Reg. No. 38,829	Attorney for Assignee
Printed or Typed Name	Title or Registration Number

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

Title of Invention	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD

As the below named inventor, I hereby declare that:

This declaration is directed to:
- [ ] The attached application, or
- [x] United States application or PCT international application number 14/248,243 filed on 04/08/2014

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.

I hereby state that I have reviewed and understand the contents of the above identified application, including the claims, as amended by any amendment.

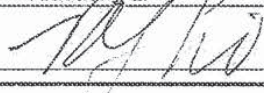
I acknowledge the duty to disclose information material to patentability as defined in 37 C.F.R. 1.56 including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

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: Xiaodong Li Date: 5/6/2014

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.

Used in lieu of AIA-01 (06-12)

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

Title of Invention	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD

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I acknowledge the duty to disclose information material to patentability as defined in 37 C.F.R. 1.56 including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

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LEGAL NAME OF INVENTOR

Inventor: Haiming Huang Date: 5/6/2014

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.

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

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LEGAL NAME OF INVENTOR

Inventor: Titus Lo Date: 4/12/2014

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.

Used in lieu of AIA-01 (06-12)

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

Title of Invention	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD

As the below named inventor, I hereby declare that:

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- [ ] The attached application, or
- [x] United States application or PCT international application number 14/248,243 filed on 04/08/2014.

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

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I hereby state that I have reviewed and understand the contents of the above identified application, including the claims, as amended by any amendment.

I acknowledge the duty to disclose information material to patentability as defined in 37 C.F.R. 1.56 including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

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LEGAL NAME OF INVENTOR

Inventor: Ruifeng Wang Date: 4/11/2014

Signature: Ruifeng Wang

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.

METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD

CROSS-REFERENCE TO RELATED APPLICATION(S)

[0001] This application is a continuation of, and incorporates by reference in its entirety, U.S. Patent Application No. 14/248,243, filed on April 8, 2014, which is a continuation of U.S. Patent Application No. 13/115,055, filed on May 24, 2011, now U.S. Patent No. 8,693,430, which is a continuation of U.S. Patent Application No. 11/908,257, filed on July 14, 2008, now U.S. Patent No. 7,948,944, which is a national stage application of PCT/US06/38149, filed September 28, 2006, which claims the benefit of U.S. Provisional Patent Application No. 60/721,451, filed on September 28, 2005.

[0002] This application is related to, and incorporates by reference in its entirety, U.S. Patent Application No. 13/631,735, filed on September 28, 2012, now U.S. Patent No. 8,634,376.

TECHNICAL FIELD

[0003] The disclosed technology relates, in general, to wireless communication and, in particular, to multi-carrier packet communication networks.

BACKGROUND

[0004] Bandwidth efficiency is one of the most important system performance factors for wireless communication systems. In packet based data communication, where the traffic has a bursty and irregular pattern, application payloads are typically of different sizes and with different quality of service (QoS) requirements. In order to accommodate different applications, a wireless communication system should be able to provide a high degree of flexibility. However, in order to support such flexibility, additional overhead is

usually required. For example, in a wireless system based on the IEEE 802.16 standard ("WiMAX"), multiple packet streams are established for each mobile station to support different applications. At the medium access control (MAC) layer, each packet stream is mapped into a wireless connection. The MAC scheduler allocates wireless airlink resources to these connections. Special scheduling messages, DL-MAP and UL-MAP, are utilized to broadcast the scheduling decisions to the mobile stations.

[0005] In the MAP scheduling message defined by IEEE802.16, there is significant control overhead. For example, each connection is identified by a 16 bits connection ID (CID). The CID is included in the MAP message to identify the mobile station. The maximum number of connections that a system can support is therefore 65,536. Each mobile station has at least two management connections for control and management messages and a various number of traffic connections for application data traffic. As another example, each connection includes the identification of an airlink resource that can correspond to any time/frequency region that is allocated for communication. The resource allocation is identified in the time domain scale with a start symbol offset (8 bits) and a symbol length (7 bits) and in the frequency domain scale with a start logical subchannel offset (6 bits) and a number of allocated subchannels (6 bits). Due to the fact that different applications have different resource requirements, the allocated resource region is irregular from connection to connection. As a still further example, the modulation and coding scheme for each connection is identified by a 4-bit MCS code, identified as either a downlink interval usage code (DIUC) or an uplink interval usage code (UIUC). Another 2 bits are used to indicate the coding repetition in addition to 3 bits for power control. Overall, the overhead of a MAP message is 52 bits. For applications such as voice-over-IP (VoIP), the payload of an 8Kbps voice codec is 20 bytes in every 20ms. The overhead of the MAP message alone can therefore account for as much as 32.5% of the overall data communication, thereby resulting in a relatively low spectral efficiency. It would therefore be beneficial to reduce the overhead in a multi-carrier packet communication system to improve the spectral efficiency of the system.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] Figure 1 illustrates the coverage of a wireless communication network that is comprised of a plurality of cells.

[0007] Figure 2 is a block diagram of a receiver and a transmitter, such as might be used in a multi-carrier wireless communication network.

[0008] Figure 3 is a block diagram depicting a division of communication capacity in a physical media resource.

[0009] Figure 4 is a graphical depiction of the relationship between a sampling frequency, a channel bandwidth, and usable subcarriers in a channel.

[0010] Figure 5 is a graphical depiction of the structure of a multi-carrier signal in the frequency domain.

[0011] Figure 6 is a block diagram of a time-frequency resource utilized by a wireless communication network.

[0012] Figure 7 is a block diagram of a classifier for classifying received packets by application, QoS, or other factor.

[0013] Figures 8A and 8B are block diagrams of representative control message formats.

[0014] Figure 9 is a block diagram of a special resource zone with unit sequence defined in time-first order.

[0015] Figures 10A-10C are block diagrams illustrating the reallocated of resources within a resource zone.

DETAILED DESCRIPTION

[0016] A system and method for minimizing the control overhead in a multi-carrier wireless communication network that utilizes a time-frequency resource is disclosed. In some embodiments, one or more zones in the time-frequency resource are designated for particular applications, such as a zone dedicated for voice-over-IP (VoIP) applications. By

grouping applications of a similar type together within a zone, a reduction in the number of bits necessary for mapping a packet stream to a portion of the time-frequency resource can be achieved. In some embodiments, modular coding schemes associated with the packet streams may be selected that further reduce the amount of necessary control information.

[0017] In some embodiments, packets may be classified for transmission in accordance with application type, QoS parameters, and other properties. An application connection-specific identifier (ACID) may also be assigned to a packet stream. Both measures reduce the overhead associated with managing multiple application streams in a communication network.

[0018] In some embodiments, improved control messages may be constructed to facilitate the control process and minimize associated overhead. The control messages may include information such as the packet destination, the modulation and coding method, and the airlink resource used. Control messages of the same application type or subtype, modulation and coding scheme, or other parameter may be grouped together for efficiency.

[0019] While the following discussion contemplates the application of the disclosed technology to an Orthogonal Frequency Division Multiple Access (OFDMA) system, those skilled in the art will appreciate that the technology can be applied to other system formats such as Code Division Multiple Access (CDMA), Multi-Carrier Code Division Multiple Access (MC-CDMA), or others. Without loss of generality, OFDMA is therefore only used as an example to illustrate the present technology. In addition, the following discussion uses voice-over-IP as a representative application to which the disclosed technology can be applied. The disclosed technology is equally applicable to other applications including, but not limited to, audio and video.

[0020] The following description provides specific details for a thorough understanding of, and enabling description for, various embodiments of the technology. One skilled in the art will understand that the technology may be practiced without these details. In some instances, well-known structures and functions have not been shown or described in detail to avoid unnecessarily obscuring the description of the embodiments of the technology. It is intended that the terminology used in the description presented below be interpreted in

its broadest reasonable manner, even though it is being used in conjunction with a detailed description of certain embodiments of the technology. Although certain terms may be emphasized below, any terminology intended to be interpreted in any restricted manner will be overtly and specifically defined as such in this Detailed Description section.

I. Wireless Communication Network

[0021] Figure 1 is a representative diagram of a wireless communication network 100 that services a geographic region. The geographic region is divided into a plurality of cells 105, and wireless coverage is provided in each cell by a base station (BS) 110. One or more mobile devices (not shown) may be fixed or may roam within the geographic region covered by the network. The mobile devices are used as an interface between users and the network. Each base station is connected to the backbone of the network, usually by a dedicated link. A base station serves as a focal point to transmit information to and receive information from the mobile devices within the cell that it serves by radio signals. Note that if a cell is divided into sectors, from a system engineering point of view each sector can be considered as a cell. In this context, the terms “cell” and “sector” are interchangeable.

[0022] In a wireless communication system with base stations and mobile devices, the transmission from a base station to a mobile device is called a downlink (DL) and the transmission from a mobile device to a base station is called an uplink (UL). Figure 2 is a block diagram of a representative transmitter 200 and receiver 205 that may be used in base stations and mobile devices to implement a wireless communication link. The transmitter comprises a channel encoding and modulation component 210, which applies data bit randomization, forward error correction (FEC) encoding, interleaving, and modulation of an input data signal. The channel encoding and modulation component is coupled to a subchannel and symbol construction component 215, an inverse fast Fourier transform (IFFT) component 220, and a radio transmitter component 225. Those skilled in the art will appreciate that these components construct and transmit a communication signal containing the data that is input to the transmitter 200. Other forms of transmitter may, of course, be used depending on the requirements of the communication network. :

[0023] The receiver 205 comprises a reception component 230, a frame and synchronization component 235, a fast Fourier transform component 240, a frequency, timing, and channel estimation component 245, a subchannel demodulation component 250, and a channel decoding component 255. The channel decoding component de-interleaves, decodes, and derandomizes a signal that is received by the receiver. The receiver recovers data from the signal and outputs the data for use by the mobile device or base station. Other forms of receiver may, of course, be used depending on the requirements of the communication network.

[0024] Figure 3 is a block diagram depicting the division of communication capacity in a physical media resource 300 (e.g., radio or cable) into frequency and time domains. The frequency is divided into two or more subchannels 305, represented in the diagram as subchannels 1, 2,…m. Time is divided into two or more time slots 310, represented in the diagram as time slots 1, 2,…n. The canonical division of the resource by both time and frequency provides a high degree of flexibility and fine granularity for resource sharing between multiple applications or multiple users of the resource.

[0025] Figure 4 is a block diagram representing the relationship between the bandwidth of a given channel and the number of usable subcarriers within that channel. A multi-carrier signal in the frequency domain is made up of subcarriers. In Figure 4, the sampling frequency is represented by the variable f_s, the bandwidth of the channel is represented by the variable B_{ch}, and the effective bandwidth by the variable B_{eff} (where the effective bandwidth is a percentage of the channel bandwidth). The number of usable subcarriers within the channel is defined by the following equation:

$$\#\_usable\_subcarriers = \frac{B_{eff}}{f_s} \times N_{fft}$$

Where N_{fft} is the length of the fast Fourier transform. Those skilled in the art will appreciate that for a given bandwidth of a spectral band or channel (B_{ch}), the number of usable subcarriers is finite and limited, and depends on the size of the FFT, the sampling frequency (f_s), and the effective bandwidth (B_{eff}) in accordance with equation 1.

[0026] Figure 5 is a signal diagram depicting the various subcarriers and subchannels that are contained within a given channel. There are three types of subcarriers: (1) data

subcarriers, which carry information data; (2) pilot subcarriers, whose phases and amplitudes are predetermined and made known to all receivers, and which are used for assisting system functions such as estimation of system parameters; and (3) silent subcarriers, which have no energy and are used for guard bands and as a DC carrier. The data subcarriers can be arranged into groups called subchannels to support scalability and multiple-access. The subcarriers forming one subchannel may or may not be adjacent to each other. Each mobile device may use some or all of the subchannels.

[0027] A multi-carrier signal in the time domain is generally made up of time frames, time slots, and OFDM symbols. A frame consists of a number of time slots, and each time slot is comprised of one or more OFDM symbols. The OFDM time domain waveform is generated by applying an inverse-fast-Fourier-transform (IFFT) to the OFDM symbols in the frequency domain. A copy of the last portion of the time domain waveform, known as the cyclic prefix (CP), is inserted in the beginning of the waveform itself to form an OFDM symbol.

[0028] In some embodiments, a mapper such as the subchannel and symbol construction component 215 in Figure 2 is designed to map the logical frequency/subcarrier and OFDM symbol indices seen by upper layer facilities, such as the MAC resource scheduler or the coding and modulation modules, to the actual physical subcarrier and OFDM symbol indices. A contiguous time-frequency area before the mapping may be actually discontinuous after the mapping, and vice versa. On the other hand, in a special case, the mapping may be a "null process", which maintains the same time and frequency indices before and after the mapping. The mapping process may change from time slot to time slot, from frame to frame, or from cell to cell. Without loss of generality, the terms "resource", "airlink resource", and "time-frequency resource" as used herein may refer to either the time-frequency resource before such mapping or after such mapping.

II. Airlink Resource Zones

[0029] Various technologies are now described that may be utilized in conjunction with the wireless communication network 100 in order to reduce the amount of control

overhead associated with the use of system resources. By reducing the control overhead, greater spectral efficiency is achieved allowing the system to, among other benefits, maximize the amount of simultaneously supported communications.

[0030] Figure 6 is a map of a time-frequency resource 600 that is allocated for use by the wireless communication network 100. As described above, in a typical wireless system based on the IEEE 802.16 standard ("WiMAX"), multiple packet streams are established for each mobile device to support different applications. At the medium access control (MAC) layer, each packet stream is mapped into a wireless connection. As a result, various applications carried in packet streams may be spread throughout the available time-frequency resource. To overcome the inefficiencies associated with maintaining this mapping, Figure 6 depicts an alternative way of managing multiple packet streams. The time-frequency resource 600 may be divided into one or more zones 605a, 605b,…605n. Each of the zones 605a, 605b,…605n is associated with a particular type of application. For example, zone 605a may be associated with voice applications (e.g., VoIP), zone 605b may be associated with video applications, and so on. As will be described in additional detail below, by grouping like applications together the amount of control overhead in MAC headers is reduced. Zones may be dynamically allocated, modified, or terminated by the system.

[0031] When applications of a similar type are grouped together within a zone, a reduction in the number of bits necessary for mapping a packet stream to a time-frequency segment can be achieved. In some embodiments, the identification of the time-frequency segment associated with a particular packet stream can be indicated by the starting time-frequency coordinate and the ending time-frequency coordinate relative to the starting point of the zone. The granularity in the time coordinates can be one or multiple OFDM symbols, and that in the frequency coordinates can be one or multiple subcarriers. If the time-frequency resource is divided into two or more zones, the amount of control information necessary to map to a location relative to the starting point of the zone may be significantly less than the amount of information necessary to map to an arbitrary starting and ending coordinate in the entire time-frequency resource.

[0032] Within each zone 605a, 605b,…605n, the time-frequency resource may be further divided in accordance with certain rules to accommodate multiple packet streams V_1, V_2,…V_m. For example, as depicted in Figure 6, zone 605a is divided into multiple columns and the packet streams are arranged from top down in each column and from left to right across the columns. The width of each column can be a certain number of subcarriers. Each packet stream V_1, V_2,…V_m may be associated with an application. For example, V_1 is the resource segment to be used for the first voice packet stream, V_2 is the resource segment to be used for the second voice packet stream, etc. While the zone 605a is divided and the packet streams numbered starting at an origin of the zone, it will be appreciated that the division of the time-frequency resource in accordance with certain rules may start at other origin locations within the zone as well. Segments within each zone may be dynamically allocated by the system as requested and released by the system when expressly or automatically terminated.

[0033] When the zones are further subdivided into time-frequency segments in accordance with certain rules, a mapping of packet streams to segment may be achieved using a one-dimensional offset with respect to the origin of the zone rather than the two-dimensional (i.e. starting time-frequency coordinate and ending time-frequency coordinate relative to the starting point of the zone) mapping method discussed above. Calculation of such an offset may require knowledge of a modulation and coding scheme that is associated with a particular packet stream. For example, Table 1 below sets forth representative modulation and forward-error correction (FEC) coding schemes (MCS) that may be used for voice packet streams under various channel conditions.

Table 1

MCSI	Modulation	Coding rate	Information bits	Raw symbols	Units
1	16QAM	1/2	160	80	1
2	QPSK	1/2	160	160	2

3	QPSK	1/4	160	320	4
4	QPSK	1/8	160	640	8

[0034] In some embodiments, the MCS may be selected to utilize modular resources. For example, as illustrated in Table 1, 80 raw modulation symbols are needed to transmit 160 information bits using 16QAM modulation and rate-½ coding, the highest available MCS in the table. The resource utilized by this highest MCS is called a basic resource unit ("Unit"), i.e., 80 raw symbols in this example. The resource utilized by other MCS is simply an integer multiple of the basic unit. For example, four units are required to transmit the same number of information bits using QPSK modulation with rate-¼ coding. The MCS index (MCSI) conveys the information about modulation and coding schemes. For a known vocoder, MCSI also implies the number of AMC resource units required for a voice packet. Those skilled in the art will appreciate that coding and signal repetition can be combined to provide lower coding rates. For example, rate-1/8 coding can be realized by a concatenation of rate-½ coding and 4-time repetition.

[0035] The decision process for selecting the proper MCS of a packet can vary by application. In some embodiments, the process for voice packets can be more conservative than that for general data packets due to the QoS requirements of the voice applications. For example, when the signal to interference noise ratio (SINR) is used as a threshold for selecting the MCS, the threshold value for voice packets is set higher than that for general data packets. For example, the SINR threshold of QPSK with rate-½ coding for voice packets is 12 dB, while that for general data packets is 10 dB.

[0036] If a MCS from Table 1 is selected for each packet stream contained in a particular zone, the offset to a segment representing a particular packet stream may be easily calculated. For example, an index VZI_1, VZI_2,…VZI_m is shown at the origin of each segment that is contained in the zone 605a. The index for any selected packet stream is defined as the sum of all basic resource units associated with each packet stream preceding the selected packet stream, with an optional adjustment depending on the location where the division of the time-frequency resource is started (typically no

adjustment is required since the division starts at the origin of the zone). For example, the location index for the first voice packet stream is VZI_1=0 since it starts at the origin of the zone 605a. The first packet stream has an MCS of 1, which implies that one basic resource unit is used. As a result, the index for the second voice packet stream is VZI_2 = 1. The second packet stream has an MCS of 4, which implies that eight basic resource units are used. As a result, the index for the third voice packet stream is VZI_3=9, arrived by summing the basic resource units used for the preceding first and second packet streams.

[0037] Using basic resource units as the granularity of a location offset to the packet stream reduces the number of bits required to represent its location with the zone 605a. For example, to support a maximum of 64 VoIP calls in a cell, a maximum of 64x8=512 units might be used, assuming that every voice packet is transmitted using the lowest MCS. Therefore, a 9-bit number is sufficient to represent a VZI. In practice, different voice packets may be transmitted using different MCSs, some with MCSI=1, some with MCSI=4, so on so forth. According to statistics, a shorter bit-length than the maximum needed, for example 8 bits, may be used for VZI for practical purpose.

[0038] In some embodiments, control information necessary to map a packet stream to a resource segment may be still further reduced. In the case where an MCS is used with packet streams that are located sequentially in the zone. the index of a packet can be inferred from the MCSI of the packets located before the subject packet. For example, if the first voice packet stream uses $MCSI_1$=1, 16QAM with ½ coding, and the second voice packet stream uses $MCSI_2$=4, QPSK with 1/8 coding, then the first two voice packet streams occupy 1+8=9 units, and the starting location of the third voice packet stream is the 9th unit. Rather than encode the index for each packet stream in the control information, the index can be omitted in the control message and the offset from the origin of the zone calculated as necessary.

[0039] Allocation of the time-frequency resource 600 can be carried out in a variety of ways. In some embodiments, an application zone may contain all subcarriers of one or multiple OFDM symbols or time slots. In some embodiments, the definition of an application zone, such as the location and size of the zone, may be different from cell-to-cell 105. In some embodiments, in order to avoid inter-cell interference the zones of

similar applications are allocated at different locations in neighboring cells. For example, voice applications may be located at a lower frequency range in the time-frequency resource in one cell, and at a higher frequency range in the time-frequency range in an adjacent cell. In some embodiments, the system allocates a fixed amount of resource to each voice connection. The system uses AMC and matches it with adaptive multi-rate (AMR) voice coding to improve the voice quality. Moreover, unused resources in one application zone may be allocated for other applications.

[0040] In a system with one or multiple application zones, the remaining resource unused by the application zones can be treated as a special resource zone. The special resource zone may be irregular in shape. For example, Figure 9 depicts a time-frequency resource 900 having three defined zones 905, 910, and 915. The remaining resource area that is shaded in the figure represents the special resource zone. The MAC scheduler may track the time-frequency resources in this special zone and broadcast the resource allocation in a special zone MAP message. In some embodiments, the special zone MAP message explicitly identifies the resource zone, for example using the time and frequency coordinates of a resource block. A mobile device can identify its own resource by decoding the MAP message.

[0041] In some embodiments, both the base station and the mobile device share the configuration information of the special resource zone, and view the special zone as a contiguous resource zone. The MAP message only includes the resource allocation information in the special resource zone, using connection ID (described below), resource identification parameters and MCS index.

[0042] In some embodiments, the MAP message can be further compressed if the special resource zone is further divided into a sequence of pre-defined resource units. For example, the shaded area in Figure 9 has been further divided into forty-two resource units 920, first numbered sequentially along the time axis and then continuing in columns along the frequency axis. If the size of each resource unit is pre-defined, the location within the special resource zone may be determined based on a mapping to a sequence number.

III. Application Connection IDs

[0043] When a mobile device enters a wireless network, it is first assigned a basic connection identification (BCID) for each direction of the wireless connection: downlink and uplink. A BCID can be used for control messages or generic (unclassified) application connections. The BCID for downlink may or may not be the same as that of the uplink.

[0044] In some embodiments, a classification of packet streams may be performed by the system. Figure 7 is a block diagram of a system component 700 for receiving IP packets and sorting the received packets into various streams. The system component 700 includes a classifier 705 having associated classification rules 710. The classifier receives incoming packets, each packet having various header information such as an Ethernet header 715, an IP header 720, a UDP header 725, an RTP header 730 and an RTP payload 735. The packets are classified by the classifier 705 and output into different application data queues 740 where they will subsequently be transmitted by an OFDMA transmitter 745.

[0045] The classifier 705 is able to classify the packets based on application type, quality of service (QoS) requirement, or other properties. For example, packets from a voice application stream are identified based on a special value in the type of service (ToS) field in the IP header 720 of the packets. A new combination of RTP/UDP/IP headers with the special IP ToS field value indicates a new voice application stream. Such a new stream is identified by peeking into voice session setup protocol messages, such as session initiation protocol (SIP). The classification performed by the classifier is based on one or more classification rules 710. The classification rules can be configured statically or dynamically by a control process. Each classification rule is defined using parameters, such as application type, QoS parameters, and other properties that may be determined from the received packets.

[0046] In some embodiments, the incoming packets may also be assigned an application connection-specific identifier (ACID) in addition to or in lieu of a BCID. Each ACID can be assigned to a corresponding packet stream. For example, an ACID can be assigned to voice packets that together make up a voice application. When an ACID is assigned to a voice application, the ACID may also be referred to as a voice connection ID

(VCID). As another example, an ACID can be assigned to a packet stream that requires a particular QoS. Furthermore, an application packet stream can be further classified into different sub-types, based on certain properties of that application. For example, voice applications can be further classified into different sub-types based on the voice source coding (vocoder) methods (e.g., G.711 and G.729A). When further classified in this matter, the sub-types may each be assigned their own ACID. For certain multi-casting applications, an ACID may also be shared by multiple base stations or mobile devices.

[0047] Once established, the connection IDs, including BCIDs and ACIDs, are disseminated, through broadcasting messages for example, to the corresponding base station(s) and mobile device(s) for proper packet transmission and reception. As was previously discussed, the medium access control (MAC) scheduler may allocate specific zones of airlink resources for certain types of packet streams.

[0048] A connection ID is released once the wireless system determines that there is no need to continue the connection. For example, a voice connection and its VCID are released once the system detects deactivation of the voice stream. In some embodiments, the voice connection is deactivated if the voice session disconnect is detected through snooping SIP signaling. In some embodiments, the voice connection is released if there is no voice packet activity on the connection for a certain period of time.

[0049] In some embodiments, the same bit length is used in different types of connections IDs, including BCIDs and ACIDs. In some embodiments, different types of connection IDs may have different bit lengths. For example, in a typical implementation for voice applications, a BCID may be 16-bits to accommodate a large number of mobile devices and unclassified applications, while a VCID is 6-bits to accommodate up to 64 simultaneous voice connections in a cell. A shorter ACID length is beneficial for reducing control overhead, especially when an application utilizes many small data packets, such as VoIP packets.

[0050] In some embodiments, an ACID is further augmented by other properties of the utilized airlink resources, such as time or frequency indices, to identify an application connection. This can be used to further reduce ACID bit length or to increase the maximum number of accommodated application connections given a certain ACID bit

length. For example, a voice codec generates voice application data periodically. The allocation period is usually a multiple of the airlink frame duration. In this case, the airlink frame number can be combined with a VCID to identify a voice connection. For example, the voice codec of G.723.1 generates a voice frame once every 30 milliseconds. The MAC scheduler allocates airlink resource to such a voice connection once every 30ms. In a wireless cellular system using 5ms frame duration, a single VCID can be shared by 6 voice streams, each associated with a different frame number to uniquely identify a voice connection.

IV. Control Messages

[0051] When airlink resource zones or application-specific IDs are utilized by the system, various improved control messages, often called Information Elements (IEs), may be constructed to facilitate the control process and minimize the control overhead. Various control message improvements are described herein.

[0052] In some embodiments, the IE is sent prior to transmitting an application packet to indicate information associated with the packet, such as the packet destination, the modulation and coding method, and the airlink resource used. For example, the IE for a voice packet may include the VCID (indicative of the packet destination), the MCSI (encoding scheme), and the VZI (index to location fo the packet stream within the airlink resource). In some embodiments, the VCID is 6 bits, the MCSI is 2 bits, and the VZI is 8 bits, thereby resulting in a 2-byte IE overhead for each voice packet. Alternatively, the IE for a voice packet may include only the VCID and the MCSI, with the VZI inferred from the MCSIs of previous packet streams in the airlink resource as described above. When using only the VCID and MCSI, the IE overhead for each voice packet is reduced to only 1 byte. Additional control information, such as power control information, can be added to the IE with additional bit fields. The reduction in control bits improves the overall bandwidth efficiency of the wireless communication network.

[0053] In some embodiments, a base station sends the IE before a downlink packet to inform the mobile device for proper reception of the packet, and the base station sends the IE before an uplink packet to inform the mobile device for proper transmission of the

packet. The downlink and uplink packet IEs may be separately grouped together. The IEs may be broadcasted or multi-casted to corresponding destinations.

[0054] In some embodiments, the IEs of the same application type or subtype may be grouped together. A special field, called an Application MAP (AMAP) subheader, for a specific application type, may be added to the IE. The subheader may indicate the application type and the length of the IE group. Figure 8A is a block diagram of a representative IE 800 with an AMAP subheader 805, in this case used for voice applications. The AMAP subheader 805 includes a type variable and a length variable. As depicted in Figure 8A, type = 01 indicates that the application type is voice. Length = 3 indicates that the subheader is followed by three voice IEs. The remainder of the IE contains the three voice IEs 810a, 810b, and 810c. For example, if the AMAP subheader was associated with streams in the zone 605a depicted in Figure 6, then voice IE 810a would pertain to packet stream V_1, voice IE 810b would pertain to packet stream V_2, and voice IE 810c would pertain to packet stream V_3. Those skilled in the art will appreciate that the although text is used to indicate the contents of the IE in Figure 8A, in an actual implementation the text would be replaced by appropriately coded information.

[0055] In some embodiments, the IEs for all packets that are transmitted with the same modulation and coding schemes (MCS) are grouped together for efficiency. Figure 8B is a block diagram of a block 850 of IEs that are grouped by MCS. A frame control header (FCH) 855 or other control message is transmitted prior to the block to indicate the length and the MCS used for each segment of the block. In some embodiments, adaptive modulation and coding (AMC) is used for the transmission of the IE's. A special rule, which is known to both base stations and mobile devices, can be used to determine the IE MCS, based on the MCS of its corresponding packet for proper reception of the IE. In some embodiments, the MCS for an IE is maintained the same as that of its corresponding application packet. In some embodiments, the MCS for an IE is one level more conservative than that of its corresponding packet. For example, if the MCSI for a packet is 2 (QPSK with rate-½ coding), then the MCSI for its IE is 3 (QPSK with rate-¼ coding).

V. Voice Activity Detection

[0056] Typical voice conversations contain approximately 50 percent silence. In order to take advantage of the fact that about half of the time data does not need to be transmitted at the same rate as when a user is speaking, the system may rely upon detecting the period of silence and reducing the effective data transfer rate during that period. The silence period in conversation is detected by a vocoder using technologies such as Voice Activity Detection (VAD). Voice packets are only generated when voice activity is detected. During the silence period, the voice packet data rate is greatly reduced.

[0057] In addition to reducing the voice packet data rate during periods of silence, the bandwidth allocation for the voice connection may also be reduced. The MAC scheduler at the base station may use the indication of voice activity to adjust the bandwidth allocation for the voice connection. In the uplink direction, the mobile device sends a special MAC message once a VAD indication is received from its vocoder. The MAC message indicates to the base station that the voice data rate is being temporarily reduced. When such an indication is received, the MAC scheduler can reduce the airlink resource allocated to the voice connection. Similarly, if the VAD indicates new voice activity, the mobile device notifies the base station using a MAC message and the original resource allocation is re-applied to the voice connection.

[0058] In the downlink direction, if there is no voice packet to be transmitted over a voice connection, the MAC scheduler allocates the resource to other voice connections. As a consequence, a resource block previous allocated for the connection in a particular zone may become vacant. Several methods can be used to deal with such fragmentation in the zone.

[0059] In some embodiments, the MAC scheduler at the base station reallocates the resource with the objective of minimizing the impact to other voice connections, such as their adaptive modulation and coding processes.

[0060] In some embodiments, the MAC scheduler maintains the resource allocation of the other voice connections, and allocates the resource vacated by the silent voice connection to new voice connections or other application packets.

[0061] In some embodiments, the MAC scheduler moves all the subsequent allocations up to fill the resource gap. As shown in Figure 10A, once a voice connection, identified by VCID 2 enters a silent period, the other voice connections are moved by the MAC scheduler to occupy the resource vacated by VCID 2.

[0062] In some embodiments, the MAC scheduler uses the last voice time-frequency resource in the same zone to fill the resource gap of a silent voice connection. Figure 10B illustrates such a case, when the MAC scheduler moves the last voice connection VCID 12 to occupy the resource allocation gap that is vacated by the voice connection VCID 2.

[0063] In some embodiments, the MAC scheduler uses the last voice time-frequency resource that has the same coding and modulation scheme, and is contained in the same zone, to fill the resource gap. The resource gap that is introduced by such a replacement is then filled by the voice time-frequency resource that is subsequent to the voice time-frequency resource that was moved. As shown in Figure 10C, voice connection VCID 6 uses the same coding and modulation scheme as voice connection VCID 2, and is the last connection having that scheme in the zone. When voice connection VCID 2 goes into a silent period, the MAC scheduler allocates the voice connection VCID 2 resource to voice connection VCID 6.. The MAC scheduler then moves resources after voice connection VCID 6, specifically VCID 7 in Figure 10C, to occupy the resource allocation gap that is caused by moving voice connection VCID 6.

[0064] The above detailed description of embodiments of the system is not intended to be exhaustive or to limit the system to the precise form disclosed above. While specific embodiments of, and examples for, the system are described above for illustrative purposes, various equivalent modifications are possible within the scope of the system, as those skilled in the relevant art will recognize. For example, while processes are presented in a given order, alternative embodiments may perform routines having steps in a different order, and some processes may be deleted, moved, added, subdivided, combined, and/or modified to provide alternative or subcombinations. Each of these

processes may be implemented in a variety of different ways. Further any specific numbers noted herein are only examples: alternative implementations may employ differing values or ranges.

[0065] These and other changes can be made to the invention in light of the above Detailed Description. While the above description describes certain embodiments of the technology, and describes the best mode contemplated, no matter how detailed the above appears in text, the invention can be practiced in many ways. Details of the system may vary considerably in its implementation details, while still being encompassed by the technology disclosed herein. As noted above, particular terminology used when describing certain features or aspects of the technology should not be taken to imply that the terminology is being redefined herein to be restricted to any specific characteristics, features, or aspects of the technology with which that terminology is associated. In general, the terms used in the following claims should not be construed to limit the invention to the specific embodiments disclosed in the specification, unless the above Detailed Description section explicitly defines such terms. Accordingly, the actual scope of the invention encompasses not only the disclosed embodiments, but also all equivalent ways of practicing or implementing the invention under the claims.

CLAIMS

We claim:

1. A method for a base station in a multi-cell wireless packet system using a frame structure, each frame comprising a plurality of time slots, each time slot comprising a plurality of orthogonal frequency division multiplexing (OFDM) symbols, the method comprising:

designating a first zone of time-frequency resource in a cell for transmisson of packets associated with a voice application, the first zone selected to be different from a second zone of time-frequency resource designated in a neighboring cell for transmission of packets associated with the voice application;

allocating N basic time-frequency resource units in the first zone for transmission of a packet associated with the voice application to a mobile device, wherein a basic time-frequency resource unit contains a number of subcarriers in a number of OFDM symbols and N is an integer number; and

transmitting a signal carrying the packet to a mobile device over the N basic time-frequency units in the first zone.

2. The method of claim 1, wherein the packet contains data associated with a real time protocol (RTP).

3. The method of claim 2, wherein the data is identified for transmission in the first zone based on a RTP header associated with the data.

4. The method of claim 1, wherein the packet contains data associated with a user datagram protocol (UDP).

5. The method of claim 1, wherein the packet contains data associated with a session initiation protocol (SIP).

6. The method of claim 1, wherein data contained in the packet is identified for transmission in the first zone based on a quality of service requirement.

7. The method of claim 1, further comprising sending information to the mobile device to indicate the allocation of the N basic time-frequency resource units used for the transmission of the packet.

8. A method for a mobile device in a multi-cell wireless packet system using a frame structure, each frame comprising a plurality of time slots, each time slot comprising a plurality of orthogonal frequency division multiplexing (OFDM) symbols, the method comprising:

receiving at the mobile device, from a base station, information indicating an allocation of N basic time-frequency resource units in a first zone of time-frequency resource designated for transmisson from a current cell, to the base station, of packets associated with a voice application, wherein:

the first zone is selected by the base station to be different from a second zone of time-frequency resource designated in a neighboring cell for transmission of packets associated with the voice application;

a basic time-frequency resource unit contains a number of subcarriers in a number of OFDM symbols; and

N is an integer number; and

transmitting, to the base station, a signal carrying a packet over the N basic time-frequency units in the first zone.

9. The method of claim 8, wherein the packet contains data generated from a voice source coder (vocoder).

10. The method of claim 8, further comprising receiving, from the base station, information indicating a modulation and coding scheme for the transmission of the packets associated with the voice application.

11. The method of claim 8, further comprising receiving, from the base station, information indicating transmission power control information for the transmission of the packets assocaited with the voice application.

12. A base station in a multi-cell wireless packet system using a frame structure, each frame comprising a plurality of time slots, each time slot comprising a plurality of orthogonal frequency division multiplexing (OFDM) symbols, the base station comprising:

a controller configured to designate a first zone of time-frequency resource in a cell for transmisson of packets associated with a voice application, the first zone selected to be different from a second zone of time-frequency resource designated in a neighboring cell for transmission of packets associated with the voice application;

a scheduler configured to allocate N basic time-frequency resource units in the first zone for transmission of a packet associated with the voice application to a mobile device, wherein a basic time-frequency resource unit contains a number of subcarriers in a number of OFDM symbols and N is an integer number; and

a transmitter configured to transmit a signal carrying the packet to a mobile device over the N basic time-frequency units in the first zone.

METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD

ABSTRACT

A method and system for minimizing the control overhead in a multi-carrier wireless communication network that utilizes a time-frequency resource is disclosed. In some embodiments, one or more zones in the time-frequency resource are designated for particular applications, such as a zone dedicated for voice-over-IP (VoIP) applications. By grouping applications of a similar type together within a zone, a reduction in the number of bits necessary for mapping a packet stream to a portion of the time-frequency resource can be achieved. In some embodiments, modular coding schemes associated with the packet streams may be selected that further reduce the amount of necessary control information. In some embodiments, packets may be classified for transmission in accordance with application type, QoS parameters, and other properties. In some embodiments, improved control messages may be constructed to facilitate the control process and minimize associated overhead.

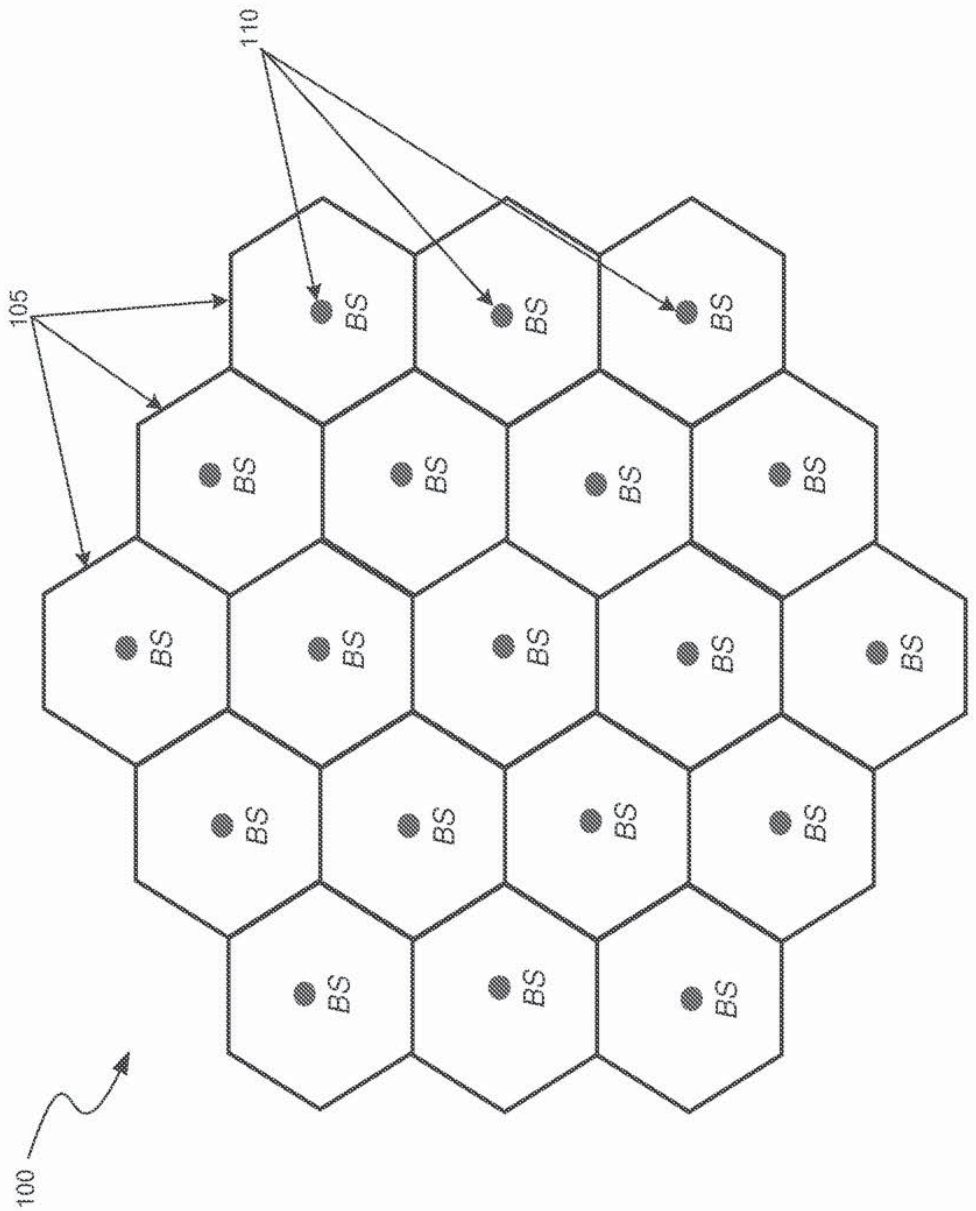


FIG. 1

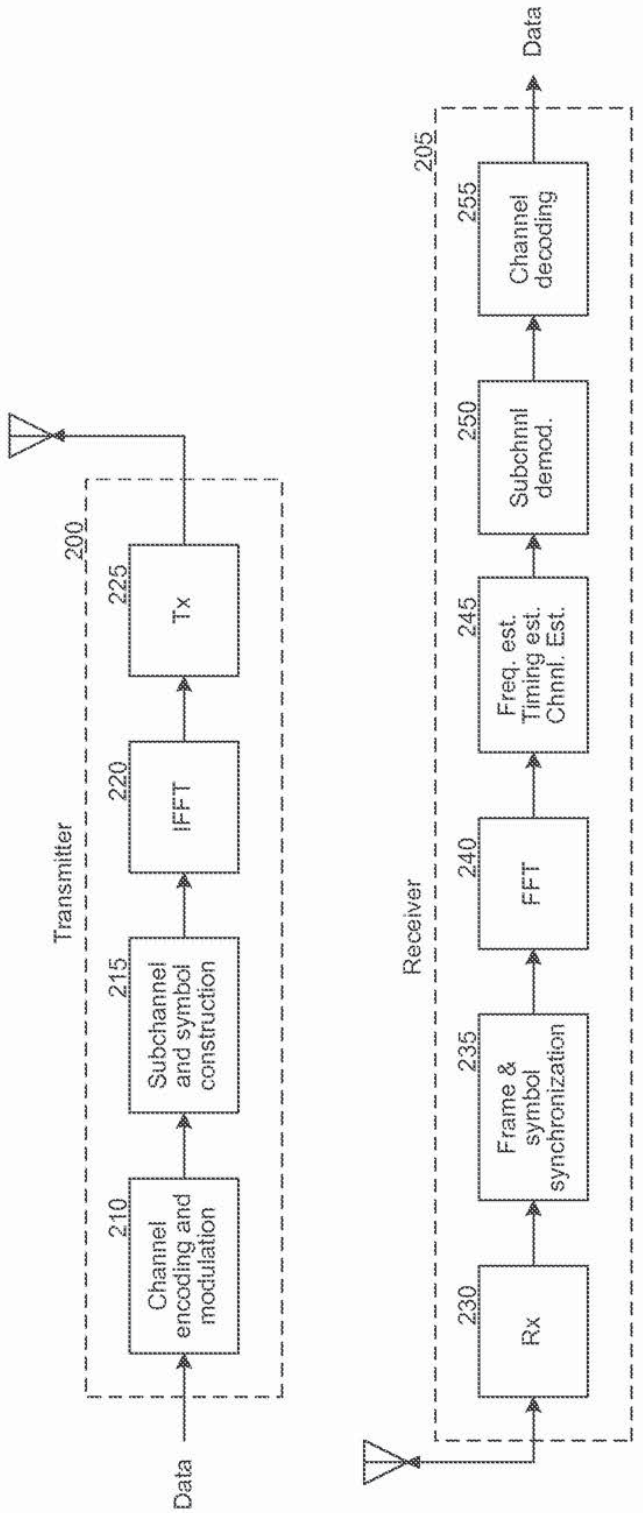

Data
Transmitter
200
210
Channel encoding and modulation
215
Subchannel and symbol construction
220
IFFT
225
Tx
Receiver
205
230
Rx
235
Frame & symbol synchronization
240
FFT
245
Freq. est. Timing est. Chnnl. Est.
250
Subchnnl demod.
255
Channel decoding
Data

FIG. 2

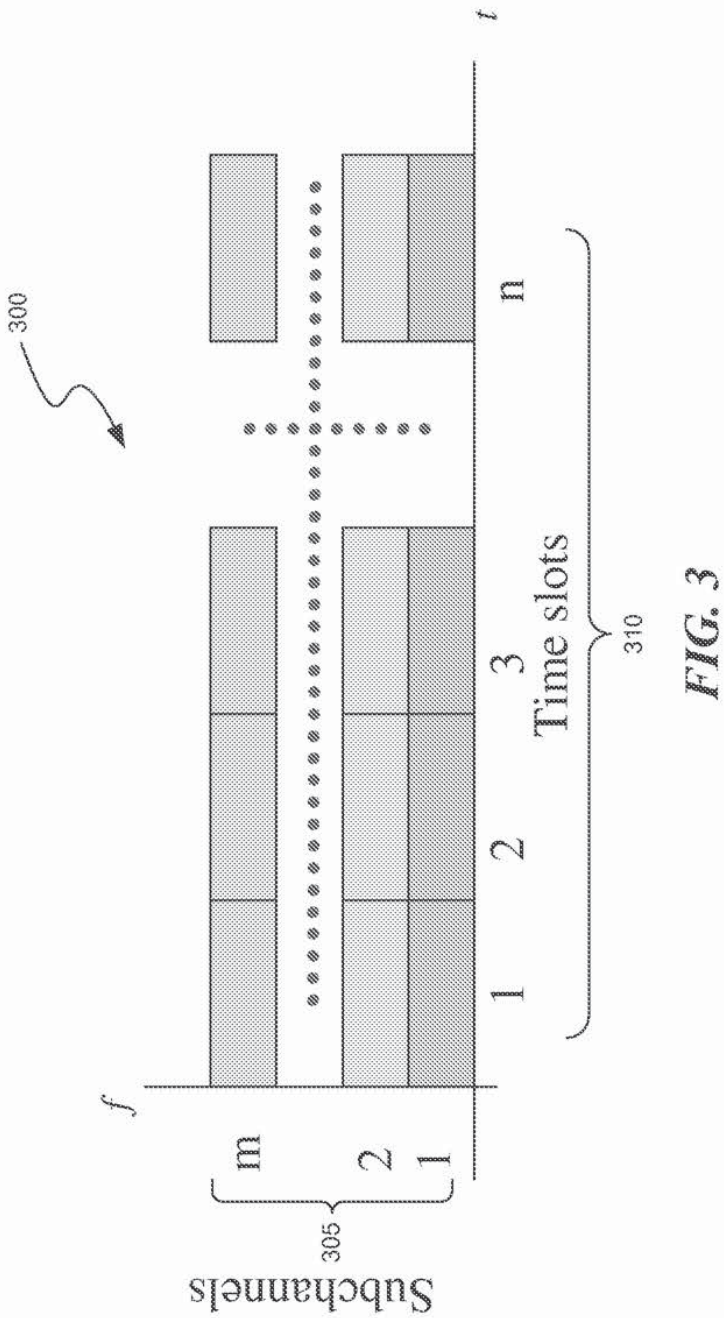


FIG. 3

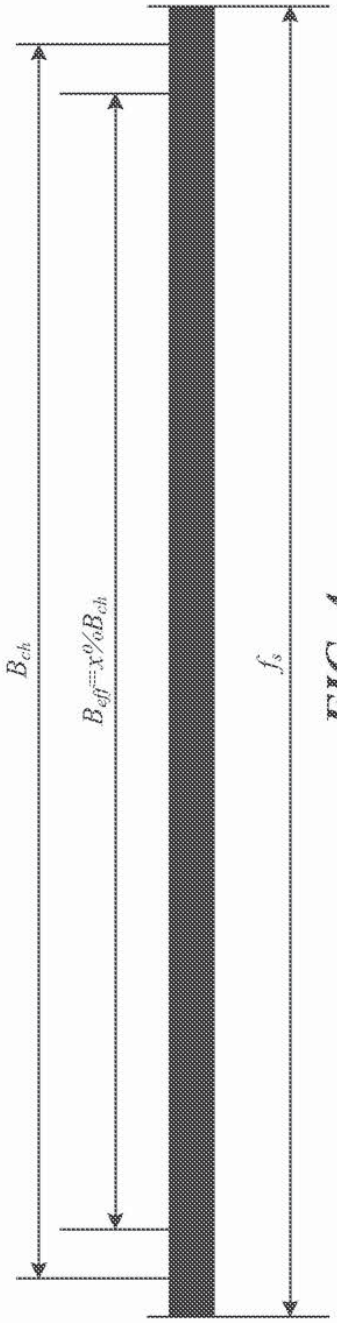


FIG. 4

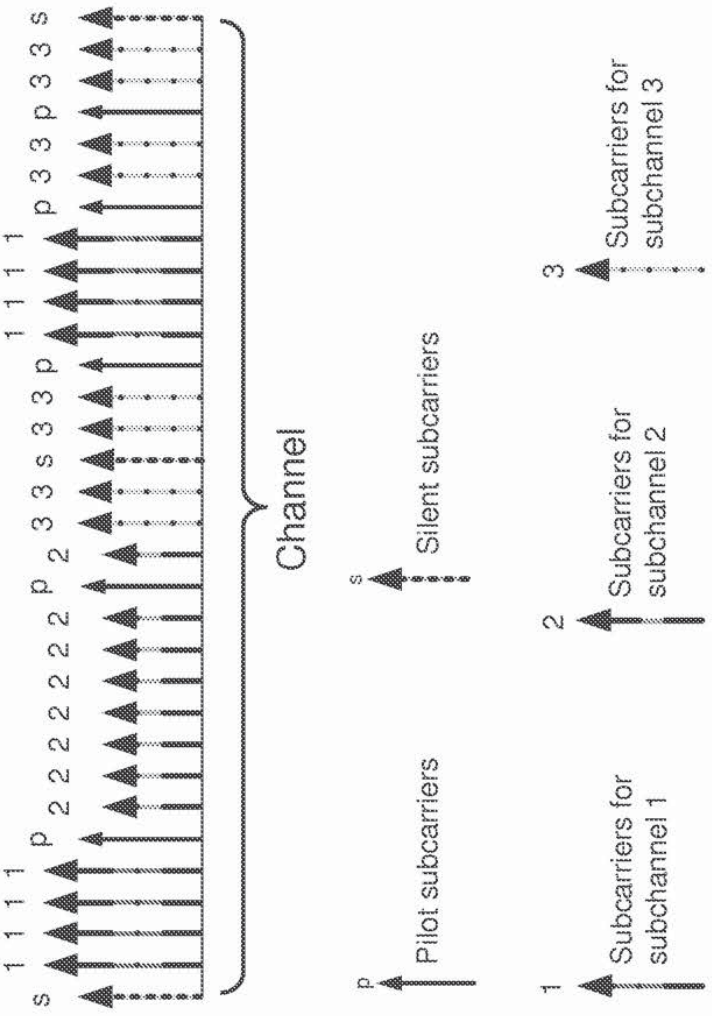

s 1 1 1 1 p 2 2 2 2 2 2 2 2 p 2 3 3 s 3 3 p 1 1 1 1 p 3 3 p 3 3 s
Channel
p
Pilot subcarriers
s
Silent subcarriers
1
Subcarriers for subchannel 1
2
Subcarriers for subchannel 2
3
Subcarriers for subchannel 3

FIG. 5

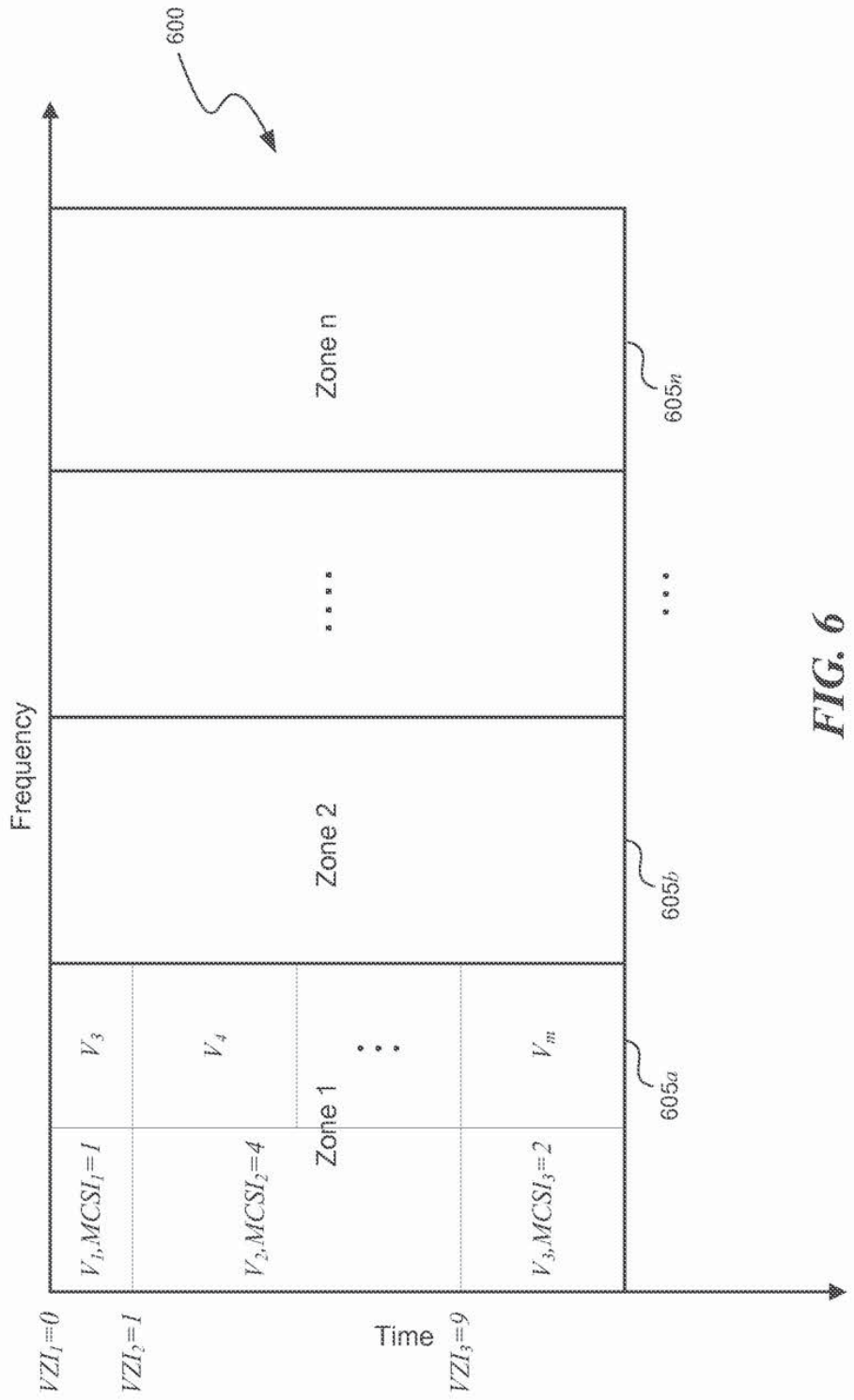

600
Frequency
Time
Zone 1
Zone 2
Zone n
605a
605b
605n
V_1,$MCSI_1$=1
V_2,$MCSI_2$=4
V_3,$MCSI_3$=2
V_3
V_4
V_m
VZI_1=0
VZI_2=1
VZI_3=9

FIG. 6

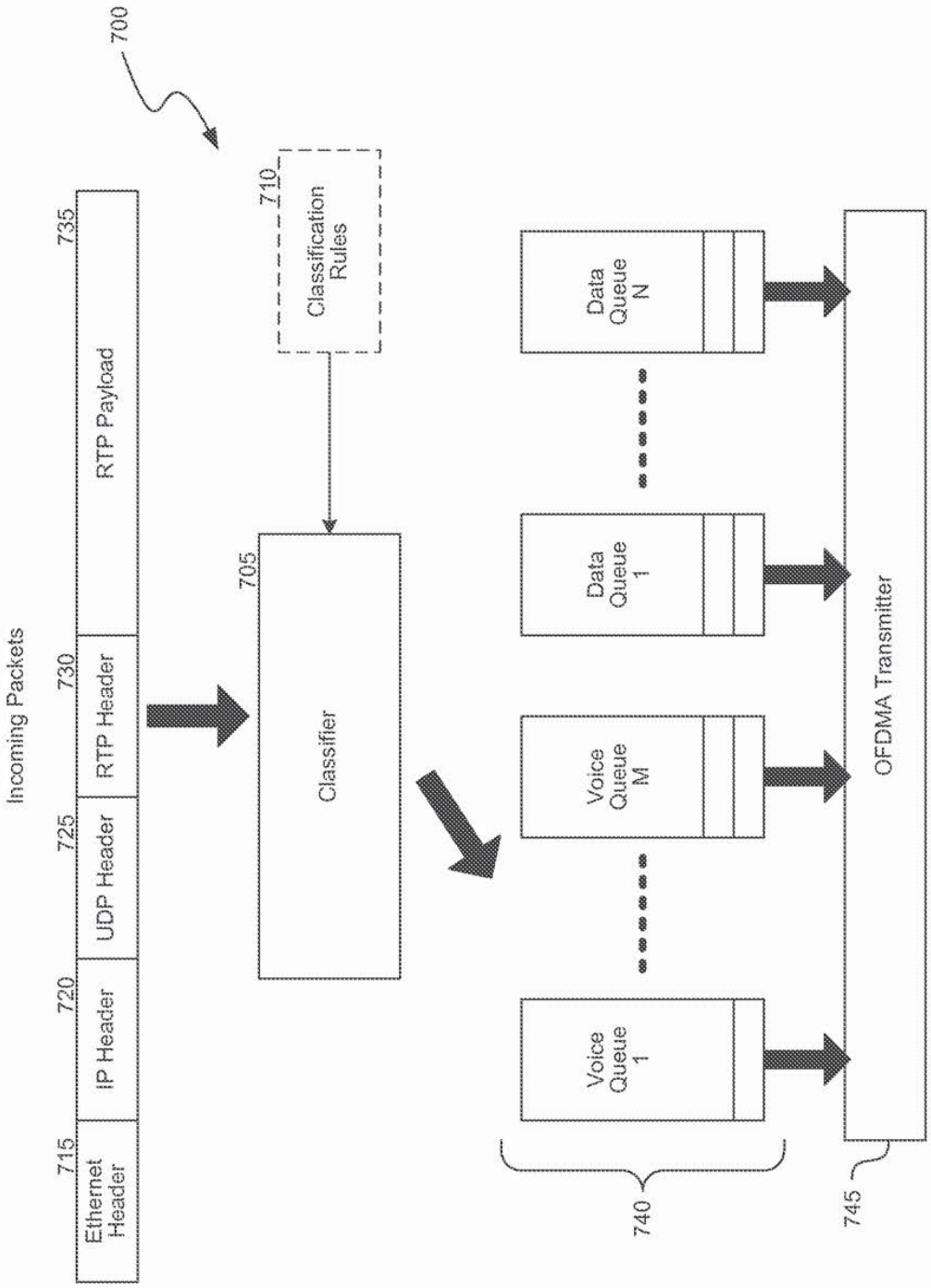

700
710
Classification Rules
735
RTP Payload
730
RTP Header
725
UDP Header
720
IP Header
715
Ethernet Header
Incoming Packets
705
Classifier
Data Queue N
Data Queue 1
Voice Queue M
Voice Queue 1
740
OFDMA Transmitter
745

FIG. 7

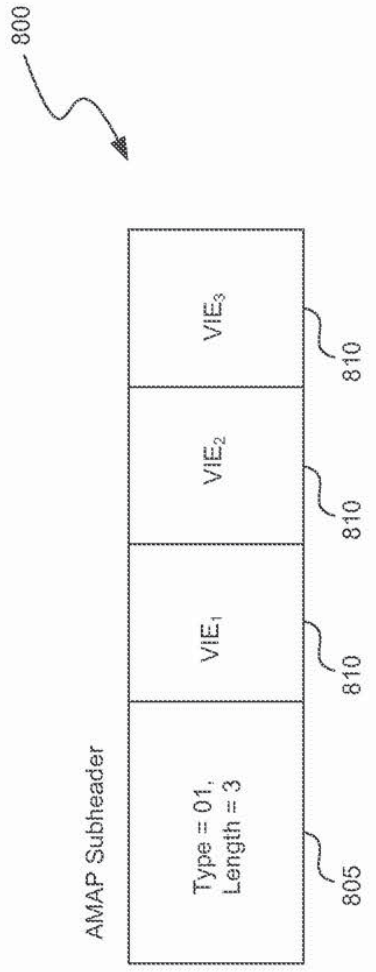

800
AMAP Subheader
Type = 01,
Length = 3
VIE1
VIE2
VIE3
805
810
810
810

FIG. 8A

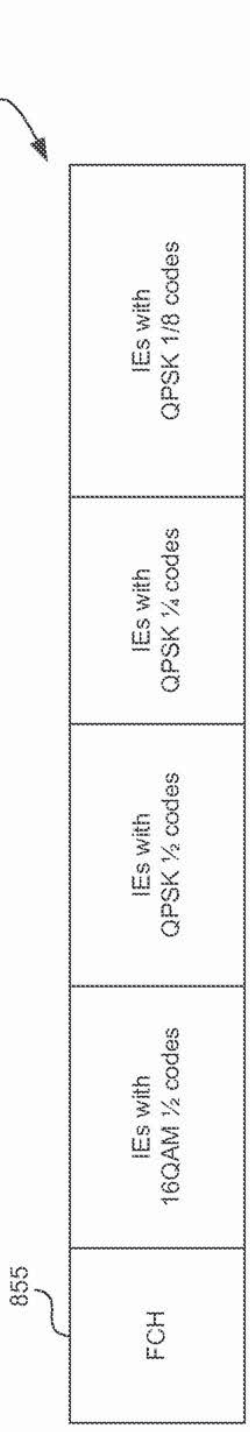

850
855
FCH
IEs with
16QAM ½ codes
IEs with
QPSK ½ codes
IEs with
QPSK ¼ codes
IEs with
QPSK 1/8 codes

FIG. 8B

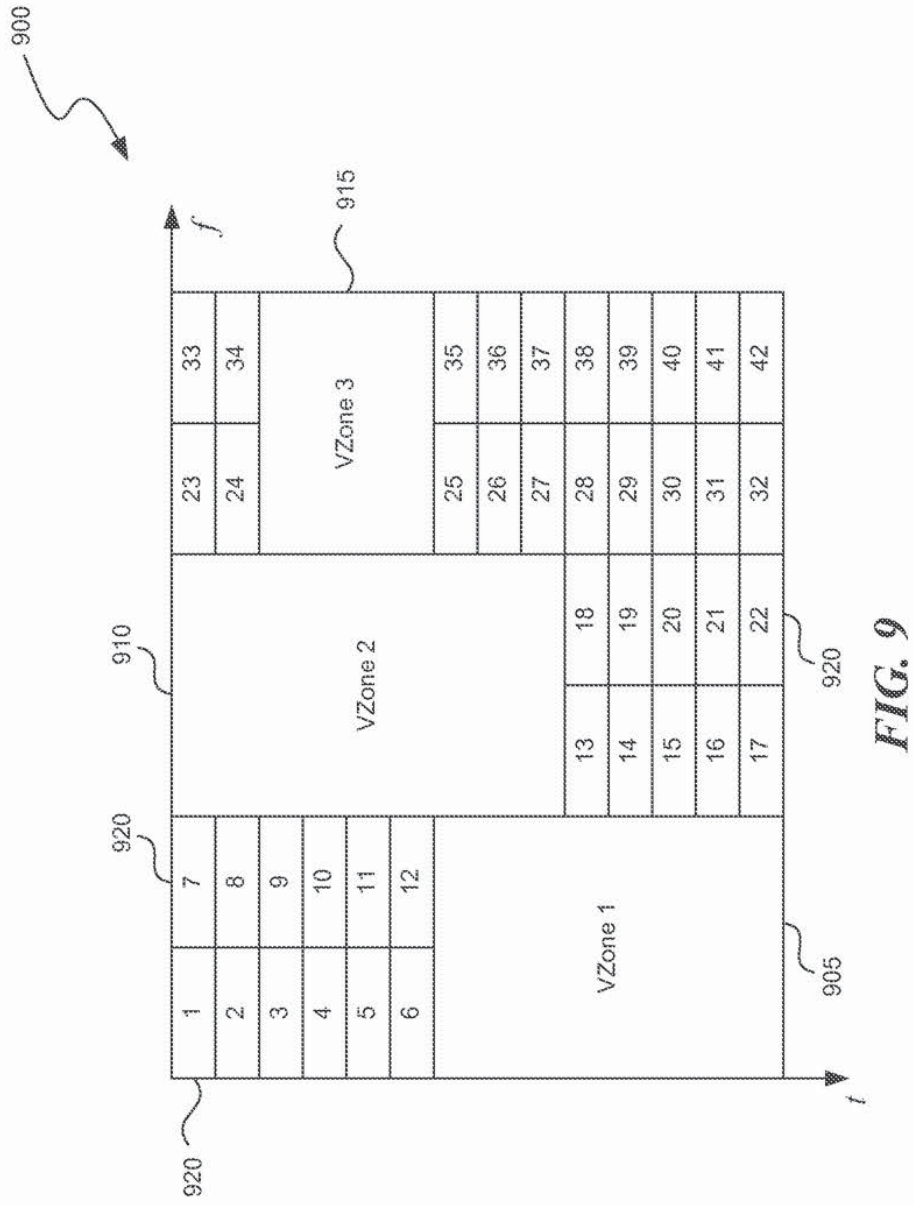

900
915
f
VZone 3
VZone 2
VZone 1
910
920
905
t
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
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FIG. 9

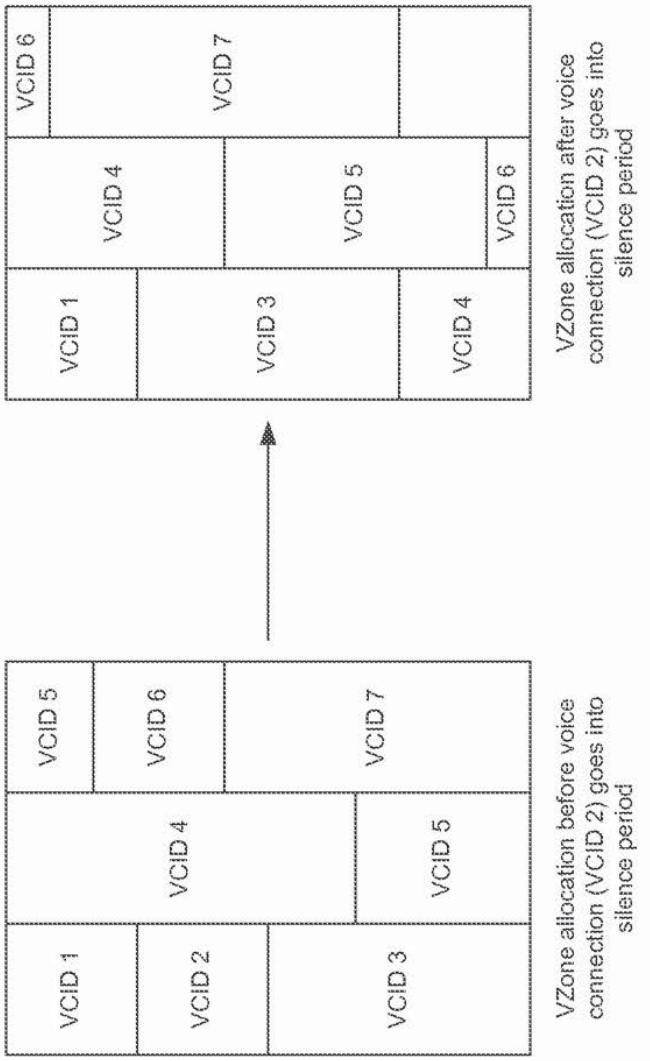

VCID 1
VCID 2
VCID 3
VCID 4
VCID 5
VCID 6
VCID 7
VZone allocation before voice connection (VCID 2) goes into silence period
VCID 1
VCID 3
VCID 4
VCID 5
VCID 6
VCID 7
VZone allocation after voice connection (VCID 2) goes into silence period

FIG. 10A

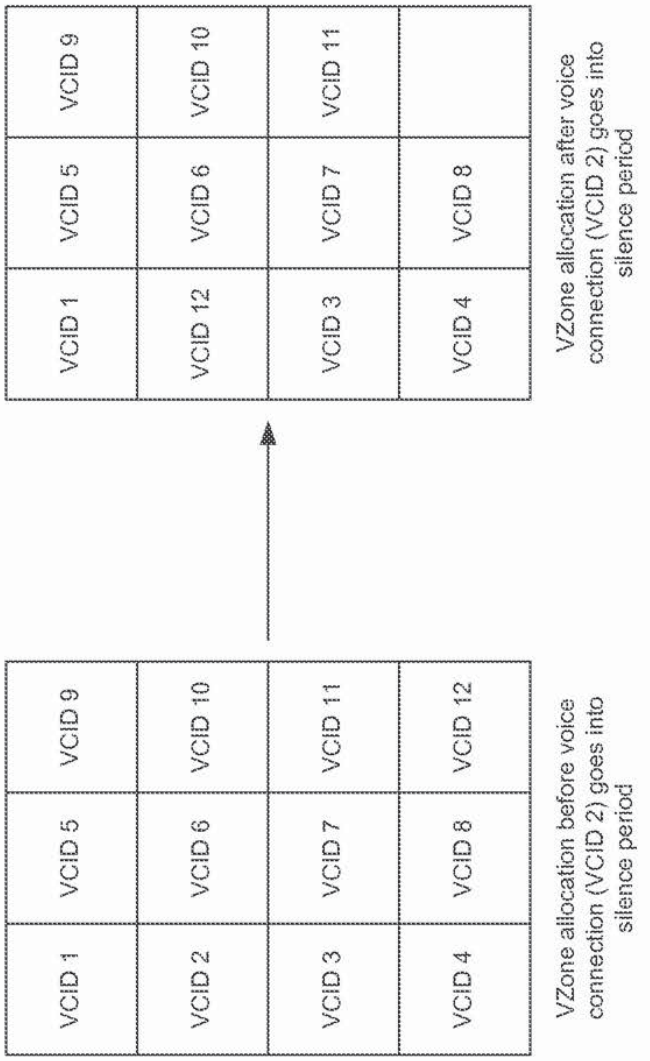

VCID 1
VCID 5
VCID 9
VCID 2
VCID 6
VCID 10
VCID 3
VCID 7
VCID 11
VCID 4
VCID 8
VCID 12
VZone allocation before voice connection (VCID 2) goes into silence period
VCID 1
VCID 5
VCID 9
VCID 12
VCID 6
VCID 10
VCID 3
VCID 7
VCID 11
VCID 4
VCID 8
VZone allocation after voice connection (VCID 2) goes into silence period

FIG. 10B

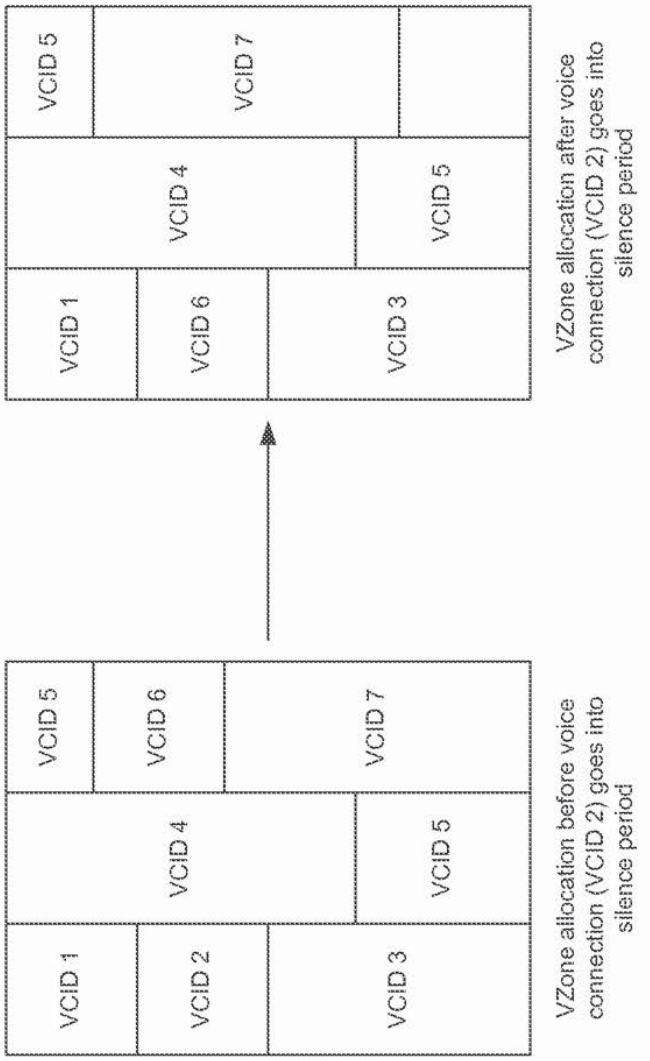

VCID 1
VCID 2
VCID 4
VCID 3
VCID 5
VCID 6
VCID 7
VCID 5
VZone allocation before voice connection (VCID 2) goes into silence period
VCID 1
VCID 6
VCID 4
VCID 3
VCID 5
VCID 5
VCID 7
VZone allocation after voice connection (VCID 2) goes into silence period

FIG. 10C

Electronic Patent Application Fee Transmittal					
Application Number:					
Filing Date:					
Title of Invention:	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD				
First Named Inventor/Applicant Name:	Xiaodong Li				
Filer:	Stephen C Bishop/Todd Nielsen				
Attorney Docket Number:	061240-8017.US05				
Filed as Small Entity					
Filing Fees for	**Utility under 35 USC 111(a)**				
Description		**Fee Code**	**Quantity**	**Amount**	**Sub-Total in USD($)**
Basic Filing:					
Utility filing Fee (Electronic filing)		4011	1	70	70
Utility Search Fee		2111	1	300	300
Utility Examination Fee		2311	1	360	360
Pages:					
Claims:					
Miscellaneous-Filing:					
Petition:					
Patent-Appeals-and-Interference:					

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**730**

Electronic Acknowledgement Receipt	
EFS ID:	22432440
Application Number:	14720554
International Application Number:	
Confirmation Number:	3128
Title of Invention:	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD
First Named Inventor/Applicant Name:	Xiaodong Li
Customer Number:	25096
Filer:	Stephen C Bishop/Todd Nielsen
Filer Authorized By:	Stephen C Bishop
Attorney Docket Number:	061240-8017.US05
Receipt Date:	22-MAY-2015
Filing Date:	
Time Stamp:	18:56:01
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$730
RAM confirmation Number	5945
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	0612408017US05_ADS_05_22_15.PDF	1819746 da8482e66e995909a666932d6087943b31c6e528	no	8
Warnings:					
Information:					
2		0612408017US05_Application_05_22_15.pdf	2129245 0906f28a44c6e87056e8aa5849286ca19c0cf0ef	yes	45

Multipart Description/PDF files in .zip description

Document Description	Start	End
Transmittal of New Application	1	1
Transmittal Letter	2	2
Authorization for Extension of Time all replies	3	3
Power of Attorney	4	4
Assignee showing of ownership per 37 CFR 3.73	5	6
Oath or Declaration filed	7	10
Specification	11	29
Claims	30	32
Abstract	33	33
Drawings-only black and white line drawings	34	45

Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	35365 04a24037982258e9bb051a7517e0d300bbb1e994	no	2
Warnings:					

Information:	
Total Files Size (in bytes):	3984356

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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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

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

PTO/AIA/14 (07-14)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	061240-8017.US05
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD	

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

Prefix	Given Name	Middle Name	Family Name	Suffix
	Xiaodong		Li	

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

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Address 2	Suite D159

City	Bellevue	State/Province	WA
Postal Code	98004	Country i	US

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Haiming		Huang	

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

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Mailing Address of Inventor:

Address 1	1750 112th Ave. NE
Address 2	Suite D159

City	Bellevue	State/Province	WA
Postal Code	98004	Country i	US

Inventor 3 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Titus		Lo	

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

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	061240-8017.US05
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD	

City	Bellevue	State/Province	WA	Country of Residence i	US

Mailing Address of Inventor:

Address 1	1750 112th Ave. NE		
Address 2	Suite D159		
City	Bellevue	State/Province	WA
Postal Code	98004	Country i	US

Inventor 4 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Ruifeng		Wang	

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

City	Sammamish	State/Province	WA	Country of Residence i	US

Mailing Address of Inventor:

Address 1	1750 112th Ave. NE		
Address 2	Suite D159		
City	Bellevue	State/Province	WA
Postal Code	98004	Country i	US

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	25096		
Email Address	patentprocurement@perkinscoie.com	Add Email	Remove Email

Application Information:

Title of the Invention	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD		
Attorney Docket Number	061240-8017.US05	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	12	Suggested Figure for Publication (if any)	

Filing By Reference :

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	061240-8017.US05
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD	

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	25096		

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 this 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 blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Continuation of	14248243	2014-04-08
Prior Application Status	Patented		Remove

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14248243	Continuation of	13115055	2011-05-24	8693430	2014-04-08
Prior Application Status	Patented				Remove

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	061240-8017.US05
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD	

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13115055	Continuation of	11908257	2008-07-14	7948944	2011-05-24

Prior Application Status			Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
11908257	a 371 of international	PCTUS0638149	2006-09-28
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
US0638149	Claims benefit of provisional	60721451	2005-09-28

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

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

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

PTO/AIA/14 (07-14)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	061240-8017.US05
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD	

Authorization to Permit Access:

☐ Authorization to Permit Access to the Instant Application by the Participating Offices

If 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 World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date o f filing this Authorization.

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	Neocific, Inc.

PTO/AIA/14 (07-14)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	061240-8017.US05
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD	

Mailing Address Information For Applicant:			
Address 1	1750 112th Ave. NE		
Address 2	Suite D159		
City	Bellevue	**State/Province**	US
Country i	US	Postal Code	98004
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 subsitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Assignee 1

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

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

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

Mailing Address Information For Assignee including Non-Applicant Assignee:			
Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

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

PTO/AIA/14 (07-14)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	061240-8017.US05
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD	

Signature:

Remove

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

Signature	/Stephen Bishop/			Date (YYYY-MM-DD)	2015-05-22
First Name	Stephen	Last Name	Bishop	Registration Number	38829

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

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 C o o p eration Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

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

DocCode - SCORE

SCORE Placeholder Sheet for IFW Content

Application Number: 14720554 Document Date: 05/22/2015

The presence of this form in the IFW record indicates that the following document type was received in electronic format on the date identified above. This content is stored in the SCORE database.

- Drawings – Other than Black and White Line Drawings

Since this was an electronic submission, there is no physical artifact folder, no artifact folder is recorded in PALM, and no paper documents or physical media exist. The TIFF images in the IFW record were created from the original documents that are stored in SCORE.

To access the documents in the SCORE database, refer to instructions below.

At the time of document entry (noted above):

- Examiners may access SCORE content via the eDAN interface.
- Other USPTO employees can bookmark the current SCORE URL (http://Score.uspto.gov/ScoreAccessWeb/).
- External customers may access SCORE content via the Public and Private PAIR interfaces.

Form Revision Date: September 30, 2013

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 14/720,554

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	70		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	300		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	360		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	12 minus 20 =	*	x 40 =	0.00	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x 210 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	730		TOTAL	

APPLICATION AS AMENDED - PART II

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

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

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

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/720,554	05/22/2015	2414	730	061240-8017.US05	12	3

CONFIRMATION NO. 3128

FILING RECEIPT

25096
PERKINS COIE LLP - SEA General
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247

OC000000075308894

Date Mailed: 06/04/2015

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

Inventor(s)

Xiaodong Li, Kirkland, WA;
Haiming Huang, Bellevue, WA;
Titus Lo, Bellevue, WA;
Ruifeng Wang, Sammamish, WA;

Applicant(s)

Neocific, Inc., Residence Not Provided;

Power of Attorney: The patent practitioners associated with Customer Number 25096

Domestic Priority data as claimed by applicant

This application is a CON of 14/248,243 04/08/2014 PAT 9042337
which is a CON of 13/115,055 05/24/2011 PAT 8693430
which is a CON of 11/908,257 07/14/2008 PAT 7948944
which is a 371 of PCT/US06/38149 09/28/2006

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.

If Required, Foreign Filing License Granted: 06/02/2015
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/720,554**
Projected Publication Date: 09/10/2015
Non-Publication Request: No

Early Publication Request: No
** **SMALL ENTITY** **
Title

METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD

Preliminary Class

370

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

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

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

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

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

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

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

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

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

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

Docket No.: 061240-8017.US05
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of: Li et al.	Confirmation No.: 3128
Application No.: 14/720,554	Art Unit: 2414
Filed: May 22, 2015	Examiner: Not Yet Assigned
For: METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD	

REQUEST FOR CORRECTED FILING RECEIPT

Office of Initial Patent Examination's Filing Receipt Corrections
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Madam:

Applicant hereby requests that a corrected Filing Receipt be issued in the above-identified patent application. The official Filing Receipt received by Applicant, a copy of which is attached hereto, is missing the Applicant's city and state of residence.

The Filing Receipt indicates the residence of the applicant was not provided, however the Application Data Sheet filed on May 22, 2015 indicates the applicant resides in Bellevue, Washington. Please correct the official Filing Receipt as shown:

"Residence Not Provided" should read - Bellevue, WA - .

Applicant additionally requests that all pertinent U.S. Patent and Trademark Office records relating to the subject application be changed to reflect this correction.

Applicant believes no fee is due with this request. However, if a fee is due, please charge our Deposit Account No. 50-0665, under Order No. 061240-8017.US05 from which the undersigned is authorized to draw.

Dated: 18 June 2015

Respectfully submitted,

Electronic signature: /Stephen Bishop/
Stephen C. Bishop
Registration No.: 38,829
PERKINS COIE LLP
P.O. Box 1247
Seattle, Washington 98111-1247
(206) 359-8000
(206) 359-9000 (Fax)
Attorney for Applicant

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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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
14/720,554	05/22/2015	2414	730	061240-8017.US05	12	3

CONFIRMATION NO. 3128

FILING RECEIPT

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PERKINS COIE LLP - SEA General
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247

Date Mailed: 06/04/2015

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Inventor(s)

Xiaodong Li, Kirkland, WA;
Haiming Huang, Bellevue, WA;
Titus Lo, Bellevue, WA;
Ruifeng Wang, Sammamish, WA;

Applicant(s)

Neocific, Inc., ~~Residence Not Provided;~~ Bellevue, WA

Power of Attorney: The patent practitioners associated with Customer Number 25096

Domestic Priority data as claimed by applicant

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which is a CON of 13/115,055 05/24/2011 PAT 8693430
which is a CON of 11/908,257 07/14/2008 PAT 7948944
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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.

If Required, Foreign Filing License Granted: 06/02/2015
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/720,554**
Projected Publication Date: 09/10/2015
Non-Publication Request: No

Early Publication Request: No
** **SMALL ENTITY** **
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Preliminary Class

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PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

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

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

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

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

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Title 35, United States Code, Section 184

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Electronic Acknowledgement Receipt	
EFS ID:	22684389
Application Number:	14720554
International Application Number:	
Confirmation Number:	3128
Title of Invention:	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD
First Named Inventor/Applicant Name:	Xiaodong Li
Customer Number:	25096
Filer:	Stephen C Bishop/Todd Nielsen
Filer Authorized By:	Stephen C Bishop
Attorney Docket Number:	061240-8017.US05
Receipt Date:	19-JUN-2015
Filing Date:	22-MAY-2015
Time Stamp:	14:01:44
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	Request for Corrected Filing Receipt	0612408017US05_Request_Corrected_FR_06_19_15.pdf	4065707 3863805817a61d09f53c903234cf5b71401c7888	no	5
Warnings:					
Information:					

Total Files Size (in bytes):	4065707

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

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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

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

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P.O. Box 1450
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www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/720,554	05/22/2015	Xiaodong Li	061240-8017.US05

CONFIRMATION NO. 3128

IMPROPER CFR REQUEST

25096
PERKINS COIE LLP - SEA General
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247



Date Mailed: 06/24/2015

RESPONSE TO REQUEST FOR CORRECTED FILING RECEIPT

Power of Attorney, Claims, Fees, System Limitations, and Miscellaneous

In response to your request for a corrected Filing Receipt, the Office is unable to comply with your request because:

- The ADS submitted on JUNE 19, 2015 was not properly marked up to show the desired changes. For information being changed relative to the information already of record, additions must be shown with underlining, and deletions must be shown with strike-through or brackets. See 37 CFR 1.76(c)(2)

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/lqchau/

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Xiaodong Li et al.	
Application No.: 14/720,554	Confirmation No.: 3128
Filed: May 22, 2015	Art Unit: 2414
For: METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD	Examiner: Not Yet Assigned

PRELIMINARY AMENDMENT UNDER 37 CFR 1.115

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

Madam:

Prior to examination on the merits, please amend the above-identified U.S. patent application as follows:

INTRODUCTORY COMMENTS

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks/Arguments begin on page 6 of this paper.

AMENDMENTS TO THE CLAIMS

Please amend the claims as follows:

1 -12. (Cancelled)

13. (New) A method for a mobile device in a wireless packet system using a frame structure of multiple frames for transmission, each frame comprising a plurality of time intervals, each time interval comprising a plurality of orthogonal frequency division multiplexing (OFDM) symbols, and each OFDM symbol containing a plurality of frequency subcarriers, the method comprising:

receiving an identifier from a base station in a cell in which the mobile device is operating;

receiving a quadrature phase-shift keying (QPSK) modulated signal from the base station over a zone of time-frequency resource that is allocated for an application type, the zone having a starting time-frequency coordinate origin and the zone comprising N time-frequency resource units within a time interval, each unit containing a set of frequency subcarriers in a group of OFDM symbols, where N = 2, 4, or 8; and

recovering a packet of data from the received QPSK signal using the starting origin and N in conjunction with the received identifier.

14. (New) The method of claim 13, wherein the zone of time-frequency resource is at a different resource location than a resource location of a zone of time-frequency resource for the same application type in an adjacent cell within the time interval.

15. (New) The method of claim 13, wherein the starting origin indicates a starting OFDM symbol of the zone of time-frequency resource.

16. (New) The method of claim 13, wherein the starting origin indicates a starting subcarrier of the zone of time-frequency resource.

17. (New) The method of claim 13, wherein the starting origin indicates a starting group of subcarriers of the zone of time-frequency resource.

18. (New) The method of claim 13, wherein modular coding is applied to the time-frequency resource units in the zone of time-frequency resource.

19. (New) The method of claim 18, wherein a repetition coding is further applied to the time-frequence resource units.

20. (New) A mobile device in a wireless packet system using a frame structure of multiple frames for transmission, each frame comprising a plurality of time intervals, each time interval comprising a plurality of orthogonal frequency division multiplexing (OFDM) symbols, and each OFDM symbol containing a plurality of frequency subcarriers, the mobile device comprising:

a receiver configured to:

receive an identifier from a base station in a cell in which the mobile device is operating; and

receive a quadrature phase-shift keying (QPSK) modulated signal from the base station over a zone of time-frequency resource that is allocated for an application type, the zone having a starting time-frequency coordinate origin and the zone comprising N time-frequency resource units within a time interval, each unit containing a set of frequency subcarriers in a group of OFDM symbols, where N = 2, 4, or 8; and

a processor configured to recover a packet of data from the received QPSK

signal using the starting origin and N in conjunction with the received identifier.

21. (New) A method for a base station of a cell in a wireless packet system using a frame structure of multiple frames for transmission, each frame comprising a plurality of time intervals, each time interval comprising a plurality of orthogonal frequency division multiplexing (OFDM) symbols, and each OFDM symbol containing a plurality of frequency subcarriers, the method comprising:

providing an identifier to a mobile device in the cell;

allocating a zone of time-frequency resource for carrying a packet of data of an application type to the mobile device, the zone having a starting time-frequency coordinate origin and the zone comprising N time-frequency resource units within a time interval, each unit containing a set of frequency subcarriers in a group of OFDM symbols, where N = 2, 4, or 8; and

transmitting a quadrature phase-shift keying (QPSK) modulated signal containing the packet of data to the mobile device in a manner that allows the mobile device to recover the packet of data using the starting origin and N in conjunction with the provided identifier.

22. (New) The method of claim 21, wherein the zone of time-frequency resource is allocated at a different resource location than a resource location of a zone of time-frequency resource for the same application type in an adjacent cell within the time interval.

23. (New) The method of claim 21, wherein the starting origin indicates a starting OFDM symbol of the zone of time-frequency resource.

24. (New) The method of claim 21, wherein the starting origin indicates a starting subcarrier of the zone of time-frequency resource.

25. (New) The method of claim 21, wherein the starting origin indicates a starting group of subcarriers of the zone of time-frequency resource.

26. (New) The method of claim 21, wherein modular coding is applied to the time-frequency resource units in the zone of time-frequency resource.

27. (New) The method of claim 26, wherein a repetition coding is further applied to the time-frequence resource units.

28. (New) A base station in a wireless packet system using a frame structure of multiple frames for transmission, each frame comprising a plurality of time intervals, each time interval comprising a plurality of orthogonal frequency division multiplexing (OFDM) symbols, and each OFDM symbol containing a plurality of frequency subcarriers, the base station comprising:

an apparatus configured to provide an identifier to a mobile device in the cell;

a scheduler configured to allocate a zone of time-frequency resource for carrying a packet of data of an application type to the mobile device, the zone having a time-frequency coordinate origin and the zone comprising N time-frequency resource units within a time interval, each unit containing a set of frequency subcarriers in a group of OFDM symbols, where N = 2, 4, or 8; and

a transmitter configured to transmit a quadrature phase-shift keying (QPSK) modulated signal containing the packet of data to the mobile device in a manner that allows the mobile device to recover the packet of data using the starting origin and N in conjunction with the provided identifier.

REMARKS

Claims 1-12 have been cancelled and new claims 13-28 have been added. Support for the new claims may be found, for example, in paragraphs [0029]-[0039], [0046], and [0051-0052], including Table 1 and accompanying figures. Applicant respectfully requests examination of the newly-added claims.

Please charge any underpayment or credit any overpayment to our Deposit Account No. 50-0665, under Order No. 061240-8017.US05 from which the undersigned is authorized to draw.

Dated: 15 July 2015

Respectfully submitted,

By /Stephen Bishop/
Stephen C. Bishop
Registration No.: 38,829

Perkins Coie LLP
P.O. Box 1247
Seattle, WA 98111-1247
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Fax: (206) 359-7198

Attorneys for Applicant

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Corrected Application Data Sheet 37 CFR 1.76(c)(2)	Attorney Docket Number	061240-8017.US05
	Application Number	14720554
Title of Invention	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

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

Inventor Information

Inventor 1

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Xiaodong		Li	

Residence Information (Select One)	[x] US Residency	[ ] Non US Residency	[ ] Active US military Service

City	Kirkland	State/Province	WA	Country of Residence	US

Mailing Address of Inventor:

Address 1	1750 112th Ave. NE		
Address 2	Suite D159		
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Postal Code	98004	Country	US

Inventor 2

Legal Name

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Supplemental Application Data Sheet 37 CFR 1.76	Attorney Docket Number	061240-8017.US05
	Application Number	14720554
Title of Invention	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD	

Prefix	Given Name	Middle Name	Family Name	Suffix
	Haiming		Huang	

Residence Information (Select One)	[x] US Residency	[ ] Non US Residency	[ ] Active US military Service

City	Bellevue	State/Province	WA	Country of Residence	US

Mailing Address of Inventor:

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Address 2	Suite D159		
City	Bellevue	State/Province	WA
Postal Code	98004	Country	US

Inventor 3
Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Titus		Lo	

Residence Information (Select One)	[x] US Residency	[ ] Non US Residency	[ ] Active US military Service

City	Bellevue	State/Province	WA	Country of Residence	US

Mailing Address of Inventor:

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Address 2	Suite D159

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Supplemental Application Data Sheet 37 CFR 1.76	Attorney Docket Number	061240-8017.US05
	Application Number	14720554
Title of Invention	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD	

City	Bellevue	State/Province	WA
Postal Code	98004	Country	US

Inventor 4				
Legal Name				
Prefix	Given Name	Middle Name	Family Name	Suffix
	Ruifeng		Wang	

Residence Information (Select One)	[x] US Residency	[ ] Non US Residency	[ ] Active US military Service

City	Sammamish	State/Province	WA	Country of Residence	US

Mailing Address of Inventor:

Address 1	1750 112th Ave. NE		
Address 2	Suite D159		
City	Bellevue	State/Province	WA
Postal Code	98004	Country	US

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	25096

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Supplemental Application Data Sheet 37 CFR 1.76	Attorney Docket Number	061240-8017.US05
	Application Number	14720554
Title of Invention	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD	

Email Address	patentprocurement@perkinscoie.com

Application Information:

Title of Invention	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD		
Attorney Docket Number	061240-8017.US05	X	Small Entity Status Claimed
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	12	Selected Figure for Publication (if any)	

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). Enter either 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

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Supplemental Application Data Sheet 37 CFR 1.76	Attorney Docket Number	061240-8017.US05
	Application Number	14720554
Title of Invention	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD	

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 this 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 blank.

Prior Application Status	Pending	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
14720554	Continuation of	14248243	2014-04-08
Prior Application Status	Patented	Remove	

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14248243	Continuation of	13115055	2011-05-24	8693430	2014-04-08
Prior Application Status	Patented	Remove			

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13115055	Continuation of	11908257	2008-07-14	7948944	2011-05-24
Prior Application Status		Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)		
11908257	a 371 of international	PCTUS0638149	2006-09-28		
Prior Application Status	Expired	Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)		
US0638149	Claims benefit of provisional	60721451	2005-09-28		

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

Foreign Priority Information:

This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(a).

Application Number	Country	Parent Filing Date(YYYY-MM-DD)	Priority Claimed
			☐ Yes ☐ No

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Supplemental Application Data Sheet 37 CFR 1.76	Attorney Docket Number	061240-8017.US05
	Application Number	14720554
Title of Invention	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD	

Authorization to Permit Access:

☐ Authorization to Permit Access to the Instant Application by the Participating Offices

If 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 World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h) (3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

Applicant Information:

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

Applicant 1

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

☒ Assignee	☐ Legal Representative under 35 U.S.C. 117

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Supplemental Application Data Sheet 37 CFR 1.76	Attorney Docket Number	061240-8017.US05
	Application Number	14720554
Title of Invention	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD	

☐ 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 Assignee is an Organization check here. ☒	

Organization Name		Neocific, Inc.		
Mailing Address Information:				
Address 1		1750 112th Ave. NE		
Address 2		Suite D159		
City		Bellevue	**State/Province**	US WA
Country	US		**Postal Code**	98004
Phone Number			**Fax Number**	
Email Address				

Signature:

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications					
Signature	/Stephen Bishop/			**Date**	15 July 2015
First Name	Stephen	**Last Name**	Bishop	**Registration Number**	38,829

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

Supplemental Application Data Sheet 37 CFR 1.76	Attorney Docket Number	061240-8017.US05
	Application Number	14720554
Title of Invention	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD	

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**.

Electronic Patent Application Fee Transmittal

Application Number:	14720554
Filing Date:	22-May-2015
Title of Invention:	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD
First Named Inventor/Applicant Name:	Xiaodong Li
Filer:	Stephen C Bishop/Todd Nielsen
Attorney Docket Number:	061240-8017.US05

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Independent Claims in Excess of 3	2201	1	210	210
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**210**

Electronic Acknowledgement Receipt	
EFS ID:	22925493
Application Number:	14720554
International Application Number:	
Confirmation Number:	3128
Title of Invention:	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD
First Named Inventor/Applicant Name:	Xiaodong Li
Customer Number:	25096
Filer:	Stephen C Bishop/Todd Nielsen
Filer Authorized By:	Stephen C Bishop
Attorney Docket Number:	061240-8017.US05
Receipt Date:	15-JUL-2015
Filing Date:	22-MAY-2015
Time Stamp:	14:56:55
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$210
RAM confirmation Number	1218
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		0612408017US05_PA_07_15_15.pdf	86282 3c2fbd2c0b0919ff46a77753e1a8f5f62834b766	yes	6
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Preliminary Amendment		1	1	
	Claims		2	5	
	Applicant Arguments/Remarks Made in an Amendment		6	6	
Warnings:					
Information:					
2	Application Data Sheet	0612408017US05_Corrected_ADS_07_15_15_.pdf	196020 6d21b97acea529d140ff5460e34a299214ce802a	no	8
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					
3	Fee Worksheet (SB06)	fee-info.pdf	30670 53df4da080973d46c8f5b04cd1cc5fd87a264e3f	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	312972		

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

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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

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

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/720,554	05/22/2015	Xiaodong Li	061240-8017.US05

CONFIRMATION NO. 3128

25096
PERKINS COIE LLP - SEA General
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247

PUBLICATION NOTICE



Title:METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD

Publication No.US-2015-0256315-A1
Publication Date:09/10/2015

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 Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, 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 http://pair.uspto.gov/. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

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

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

PLUS Search Results for S/N 14720554, Searched Mon Sep 28 12:00:56 EDT 2015

The Patent Linguistics Utility System (PLUS) is a USPTO automated search system for U.S. Patents from 1971 to the present PLUS is a query-by-example search system which produces a list of patents that are most closely related linguistically to the application searched. This search was prepared by the staff of the Scientific and Technical Information Center, SIRA.

7308268 69
7613461 69
7822849 69
7948944 69
7952999 69
7948944 69
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8233430 69
8693430 69
9042337 69
4224990 65
5065312 52

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NOTICE OF ALLOWANCE AND FEE(S) DUE

25096 7590 04/12/2017

PERKINS COIE LLP - SEA General
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247

EXAMINER	
PATEL, CHANDRAHAS B	
ART UNIT	PAPER NUMBER
2464	

DATE MAILED: 04/12/2017

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/720,554	05/22/2015	Xiaodong Li	061240-8017.US05	3128

TITLE OF INVENTION: METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$0	$480	07/12/2017

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

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

HOW TO REPLY TO THIS NOTICE:

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

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

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

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

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

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

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (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)

25096 7590 04/12/2017
PERKINS COIE LLP - SEA General
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247

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 facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/720,554	05/22/2015	Xiaodong Li	061240-8017.US05	3128

TITLE OF INVENTION: METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$0	$480	07/12/2017

EXAMINER	ART UNIT	CLASS-SUBCLASS
PATEL, CHANDRAHAS B	2464	370-330000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 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 has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(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. The following fee(s) are submitted:
- ❑ Issue Fee
- ❑ Publication Fee (No small entity discount permitted)
- ❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ❑ A check is enclosed.
- ❑ Payment by credit card. Form PTO-2038 is attached.
- ❑ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ❑ Applicant certifying micro entity status. See 37 CFR 1.29 — 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.
- ❑ Applicant asserting small entity status. See 37 CFR 1.27 — NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- ❑ Applicant changing to regular undiscounted fee status. — NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

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

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/720,554	05/22/2015	Xiaodong Li	061240-8017.US05	3128

25096 7590 04/12/2017

PERKINS COIE LLP - SEA General
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247

EXAMINER	
PATEL, CHANDRAHAS B	
ART UNIT	PAPER NUMBER
2464	

DATE MAILED: 04/12/2017

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 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, 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. 14/720,554	Applicant(s) LI ET AL.	
	Examiner CHANDRAHAS PATEL	Art Unit 2464	AIA (First Inventor to File) Status No

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

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

1. ☒ This communication is responsive to *7/15/2015*.
   ☐ 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 *13-28*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:
   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

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

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

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

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

/CHANDRAHAS PATEL/
Primary Examiner, Art Unit 2464

DETAILED ACTION

Allowable Subject Matter

1. Claims 13-28 are allowed.

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

Regarding claims 13, 20, 21 and 28, Vijayan et al. (USPN 7,221,680) teaches a method for a mobile device in a wireless packet system using a frame structure of multiple frames for transmission, each frame comprising a plurality of time intervals, each time interval comprising a plurality of orthogonal frequency division multiplexing (OFDM) symbols, and each OFDM symbol containing a plurality of frequency subcarriers [Fig. 4], the method comprising: receiving an identifier from a base station in a cell in which the mobile device is operating [Col. 5, lines 35-66]; receiving a quadrature phase-shift keying (QPSK) modulated signal from the base station over a zone of time-frequency resource [Col. 13, lines 46-58].

However Vijayan and other prior art does not teach a zone of time-frequency resource that is allocated for an application type, the zone having a starting time-frequency coordinate origin and the zone comprising N time-frequency resource units within a time interval, each unit containing a set of frequency subcarriers in a group of OFDM symbols, where N = 2, 4, or 8; and recovering a packet of data from the received QPSK signal using the starting origin and N in conjunction with the received identifier.

Above taken with other limitations of the claims is considered novel and non-obvious.

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

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CHANDRAHAS PATEL whose telephone number is (571)270-1211. The examiner can normally be reached on Monday through Thursday 7:30 to 17:00 ET.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ricky Ngo can be reached on 571-272-3139. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public

PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/CHANDRAHAS PATEL/
Primary Examiner, Art Unit 2464

Notice of References Cited	Application/Control No. 14/720,554	Applicant(s)/Patent Under Reexamination LI ET AL.	
	Examiner CHANDRAHAS PATEL	Art Unit 2464	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-7,221,680 B2	05-2007	Vijayan; Rajiv	H04B7/12	370/335
	B	US-				
	C	US-				
	D	US-				
	E	US-				
	F	US-				
	G	US-				
	H	US-				
	I	US-				
	J	US-				
	K	US-				
	L	US-				
	M	US-				

FOREIGN PATENT DOCUMENTS

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

NON-PATENT DOCUMENTS

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

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

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14720554	LI ET AL.
	Examiner	Art Unit
	CHANDRAHAS PATEL	2464

CPC- SEARCHED		
Symbol	Date	Examiner
H04L 12/5695, 1/0009, 1/16, 1/1854, 1/1887	4/3/2017	CBP

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
Text search in EAST for prior art	4/3/2017	CBP
Inventor search/double patent search	4/3/2017	CBP

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
H04L	5/0053, 1/0003, 1/0009, 1/0029, 5/0007, 5/0044, 5/006, 27/2601, 5/0094	4/3/2017	CBP
H04J	11/005	4/3/2017	CBP
H04W	52/146, 72/04, 72/048	4/3/2017	CBP
US-PGPUB	Database Interference Search	4/3/2017	CBP

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

BIB DATA SHEET

CONFIRMATION NO. 3128

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
14/720,554	05/22/2015 RULE	370	2464	061240-8017.US05

APPLICANTS

Neocific, Inc., Residence Not Provided;

INVENTORS

Xiaodong Li, Kirkland, WA;
Haiming Huang, Bellevue, WA;
Titus Lo, Bellevue, WA;
Ruifeng Wang, Sammamish, WA;

**** CONTINUING DATA ***************************

This application is a CON of 14/248,243 04/08/2014 PAT 9042337
which is a CON of 13/115,055 05/24/2011 PAT 8693430
which is a CON of 11/908,257 07/14/2008 PAT 7948944
which is a 371 of PCT/US06/38149 09/28/2006

**** FOREIGN APPLICATIONS ***************************

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **** ** SMALL ENTITY **
06/02/2015

Foreign Priority claimed ☐ Yes ☑ No 35 USC 119(a-d) conditions met ☐ Yes ☐ No Verified and Acknowledged /CHANDRAHAS B PATEL/ Examiner's Signature	☐ Met after Allowance CBP Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		WA	12	12	3

ADDRESS

PERKINS COIE LLP - SEA General
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247
UNITED STATES

TITLE

METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD

FILING FEE RECEIVED		
940	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

BIB (Rev. 05/07).

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L3	32	(li and huang and lo and wang).in.	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/03 10:32
L5	15900	h04l12/5695.cpc.	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/03 10:52
L6	93	5 and qpsk	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/03 10:52
L8	20285	h04l1/0009.cpc.	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/03 11:08
L9	2458	8 and qpsk	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/03 11:08
L10	1382	8 and (qpsk and ofdm)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT;	OR	ON	2017/04/03 11:09

			IBM_TDB			
L11	61	8 and qpsk and ofdm and (identifier with ((Base adj station) (node adj B) bts enb))	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/03 11:10
L14	5553	h04l1/16.cpc.	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/03 11:38
L15	11	14 and qpsk and ofdm and (identifier with ((Base adj station) (node adj B) bts enb))	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/03 11:38
L16	10238	h04l1/1854.cpc.	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/03 11:47
L17	49	16 and qpsk and ofdm and (identifier with ((Base adj station) (node adj B) bts enb))	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/03 11:47
L18	13308	h04l1/1887.cpc.	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/03 11:50
L19	44	18 and qpsk and ofdm and (identifier with ((Base adj station) (node adj B) bts enb))	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/03 11:50

L20	2028	qpsk and ofdm and (identifier with ((Base adj station) (node adj B) bts enb))	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/03 13:04
L21	1286	qpsk and ofdm and (identifier with ((Base adj station) (node adj B) bts enb)) and ((time near frequency) time$1frequency)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/03 13:06
L22	682	(qpsk same ofdm) and (identifier with ((Base adj station) (node adj B) bts enb)) and ((time near frequency) time$1frequency)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/03 13:18

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L23	9652	h04l5/0053.cpc.	US-PGPUB; USPAT	OR	ON	2017/04/03 13:32
L24	169	23 and qpsk.clm.	US-PGPUB; USPAT	OR	ON	2017/04/03 13:32
L25	8	23 and (qpsk and time$1frequency).clm.	US-PGPUB; USPAT	OR	ON	2017/04/03 13:32
L26	930	h04j11/005.cpc.	US-PGPUB; USPAT	OR	ON	2017/04/03 13:35
L27	0	26 and (qpsk and time$1frequency).clm.	US-PGPUB; USPAT	OR	ON	2017/04/03 13:35
L29	5874	h04l1/0003.cpc.	US-PGPUB; USPAT	OR	ON	2017/04/03 13:35
L30	3	29 and (qpsk and time$1frequency).clm.	US-PGPUB; USPAT	OR	ON	2017/04/03 13:35
L31	5271	h04l1/0009.cpc.	US-PGPUB; USPAT	OR	ON	2017/04/03 13:36

L32	3	31 and (qpsk and time$1frequency).clm.	US-PGPUB; USPAT	OR	ON	2017/04/03 13:37
L33	944	h04l1/0029.cpc.	US-PGPUB; USPAT	OR	ON	2017/04/03 13:39
L34	2	33 and (qpsk and time$1frequency).clm.	US-PGPUB; USPAT	OR	ON	2017/04/03 13:39
L35	11070	h04l5/0007.cpc.	US-PGPUB; USPAT	OR	ON	2017/04/03 13:40
L36	8	35 and (qpsk and time$1frequency).clm.	US-PGPUB; USPAT	OR	ON	2017/04/03 13:40
L37	3920	h04l5/0044.cpc.	US-PGPUB; USPAT	OR	ON	2017/04/03 13:48
L38	5	37 and (qpsk and time$1frequency).clm.	US-PGPUB; USPAT	OR	ON	2017/04/03 13:48
L39	3208	h04l5/006.cpc.	US-PGPUB; USPAT	OR	ON	2017/04/03 13:49
L40	3	39 and (qpsk and time$1frequency).clm.	US-PGPUB; USPAT	OR	ON	2017/04/03 13:49
L41	3931	h04l27/2601.cpc.	US-PGPUB; USPAT	OR	ON	2017/04/03 13:51
L42	1	41 and (qpsk and time$1frequency).clm.	US-PGPUB; USPAT	OR	ON	2017/04/03 13:51
L43	3652	h04w52/146.cpc.	US-PGPUB; USPAT	OR	ON	2017/04/03 13:52
L44	0	43 and (qpsk and time$1frequency).clm.	US-PGPUB; USPAT	OR	ON	2017/04/03 13:52
L45	6659	h04w72/04.cpc.	US-PGPUB; USPAT	OR	ON	2017/04/03 13:52
L46	0	45 and (qpsk and time$1frequency).clm.	US-PGPUB; USPAT	OR	ON	2017/04/03 13:52
L47	2484	h04w72/048.cpc.	US-PGPUB; USPAT	OR	ON	2017/04/03 13:52
L48	0	47 and (qpsk and time$1frequency).clm.	US-PGPUB; USPAT	OR	ON	2017/04/03 13:52

L49	3234	h04l5/0094.cpc.	US-PGPUB; USPAT	OR	ON	2017/04/03 13:52
L50	1	49 and (qpsk and time$1frequency).clm.	US-PGPUB; USPAT	OR	ON	2017/04/03 13:53
L51	22	(qpsk and time$1frequency).clm.	US-PGPUB	OR	ON	2017/04/03 13:54

4/3/2017 2:09:37 PM

C:\Users\cpatel1\Documents\EAST\Workspaces\14\14720554.wsp

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14720554	LI ET AL.
	Examiner	Art Unit
	CHANDRAHAS PATEL	2464

CPC					
Symbol				Type	Version
H04L		5	/ 0053	F	2013-01-01
H04L		27	/ 2601	I	2013-01-01
H04L		5	/ 0007	I	2013-01-01
H04L		5	/ 0044	I	2013-01-01
H04L		5	/ 0094	A	2013-01-01
H04L		1	/ 0003	I	2013-01-01
H04L		1	/ 0009	I	2013-01-01
H04L		1	/ 0029	I	2013-01-01
H04W		72	/ 04	I	2013-01-01
H04J		11	/ 005	I	2013-01-01
H04L		5	/ 006	I	2013-01-01
H04W		52	/ 146	I	2013-01-01
H04W		72	/ 048	I	2013-01-01
			/		
			/		

CPC Combination Sets						
Symbol				Type	Set	Ranking	Version
			/				
			/				

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	16	
/CHANDRAHAS PATEL/ Primary Examiner.Art Unit 2464	04/03/2017	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	9	9

U.S. Patent and Trademark Office

Part of Paper No. 20170403

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14720554	LI ET AL.
	Examiner	Art Unit
	CHANDRAHAS PATEL	2464

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION	
CLASS	SUBCLASS	CLAIMED	NON-CLAIMED
		H 0 4 L 5 / 00 (2006.01.01)	

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

NONE (Assistant Examiner)	(Date)	Total Claims Allowed: 16	
/CHANDRAHAS PATEL/ Primary Examiner.Art Unit 2464 (Primary Examiner)	04/03/2017 (Date)	O.G. Print Claim(s) 9	O.G. Print Figure 9

U.S. Patent and Trademark Office

Part of Paper No. 20170403

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14720554	LI ET AL.
	Examiner	Art Unit
	CHANDRAHAS PATEL	2464

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
10	13														
14	14														
15	15														
16	16														
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12	18														
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6	25														
7	26														
8	27														
9	28														

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	16	
/CHANDRAHAS PATEL/ Primary Examiner.Art Unit 2464	04/03/2017	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	9	9

U.S. Patent and Trademark Office Part of Paper No. 20170403

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (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.

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25096 7590 04/12/2017
PERKINS COIE LLP - SEA General
PATENT-SEA
P.O. Box 1247
Seattle, Washington 98111-1247

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 facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

Todd Nielsen	(Depositor's name)
/Todd Nielsen/	(Signature)
10 July 2017	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/720,554	05/22/2015	Xiaodong Li	061240-8017.US05	3128

TITLE OF INVENTION: METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480.00	$0	$0	$480.00	07/12/2017

EXAMINER	ART UNIT	CLASS-SUBCLASS
PATEL, CHANDRAHAS B	2464	370-330000

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

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

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 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 Perkins Coie LLP
2
3

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

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

(A) NAME OF ASSIGNEE: Neocific, Inc.

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Bellevue, Washington

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

4a. The following fee(s) are submitted:

☒ Issue Fee
☐ Publication Fee (No small entity discount permitted)
☐ Advance Order - # of Copies _____

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

☐ A check is enclosed.
☒ Payment by credit card.
☒ The Director is hereby authorized to charge any deficiencies or credit any overpayment to Deposit Account Number 50-0665 .

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

☐ Applicant certifying micro entity status. See 37 CFR 1.29
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.

☐ Applicant asserting small entity status. See 37 CFR 1.27
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

☐ Applicant changing to regular undiscounted fee status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

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 /Stephen Bishop/ Date 10 July 2017

Typed or printed name Stephen Bishop Registration No. 38,829

Docket No.: 061240-8017.US05
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Li et al.

Application No.: 14/720,554 | Confirmation No.: 3128

Filed: May 22, 2015 | Art Unit: 2464

For: METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD | Examiner: Chandrahas B. Patel

COMMENTS ON STATEMENT OF REASONS FOR ALLOWANCE

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

Sir:

In the Notice of Allowability mailed April 12, 2017, the Examiner allowed claims 13-28. Although applicant agrees with the Examiner's conclusion that these claims are allowable, applicant notes that the claims may be allowable for reasons other than those identified by the Examiner and does not concede that the Examiner's characterizations of the terms of the claims and the prior art are correct.

Dated: 10 July 2017

Respectfully submitted,

By /Stephen Bishop/
Stephen Bishop
Registration No.: 38,829
PERKINS COIE LLP
P.O. Box 1247
Seattle, Washington 98111-1247
(206) 359-8000
(206) 359-7198 (Fax)
Attorney for Applicant

61240-8017.US05/135253860.1

Electronic Patent Application Fee Transmittal

Application Number:	14720554
Filing Date:	22-May-2015
Title of Invention:	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD
First Named Inventor/Applicant Name:	Xiaodong Li
Filer:	Stephen C Bishop/Todd Nielsen
Attorney Docket Number:	061240-8017.US05

Filed as Small 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	2501	1	480	480

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**480**

Electronic Acknowledgement Receipt	
EFS ID:	29731989
Application Number:	14720554
International Application Number:	
Confirmation Number:	3128
Title of Invention:	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD
First Named Inventor/Applicant Name:	Xiaodong Li
Customer Number:	25096
Filer:	Stephen C Bishop/Todd Nielsen
Filer Authorized By:	Stephen C Bishop
Attorney Docket Number:	061240-8017.US05
Receipt Date:	10-JUL-2017
Filing Date:	22-MAY-2015
Time Stamp:	14:30:26
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$480
RAM confirmation Number	071117INTEFSW14333700
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		0612408017US05_IF_Transmittal_07_10_17.pdf	204987 5c6303b09f1afbec0de1d23155f72e4c6b395302	yes	2
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Issue Fee Payment (PTO-85B)		1	1	
	Miscellaneous Incoming Letter		2	2	
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30496 2711697dbca17563699089dce02e512b6a330b19	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	235483		

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

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

UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office
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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/720,554	08/15/2017	9735944	061240-8017.US05	3128

25096 7590 07/26/2017

PERKINS COIE LLP - SEA General
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

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

The Patent Term Adjustment is 264 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

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

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

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

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

Xiaodong Li, Kirkland, WA;
Neocific, Inc., Residence Not Provided;
Haiming Huang, Bellevue, WA;
Titus Lo, Bellevue, WA;
Ruifeng Wang, Sammamish, WA;

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

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

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

Application Number	14/720,554
Filing Date	May 22, 2015
First Named Inventor	Li et al.
Title	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD
Art Unit	2464
Examiner Name	3128
Attorney Docket Number	NEO-PT020.5

SIGNATURE of Applicant or Patent Practitioner

Signature	/Christina R. Walsh/	Date (Optional)	
Name	Christina R. Walsh	Registration Number	61553
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)	Neo Wireless LLC		

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

☑ *Total of 1 forms are submitted.

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

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

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

PTO/AIA/82B (07-13)
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POWER OF ATTORNEY BY APPLICANT

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

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

☑ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 03624

OR

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

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

☑ The address associated with the above-mentioned Customer Number

OR

☐ The address associated with Customer Number:

OR

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

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

Neo Wireless LLC

☐ Inventor or Joint Inventor (title not required below)

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

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

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

SIGNATURE of Applicant for Patent

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

Signature	David Loo	Date (Optional)	
Name	David Loo		
Title	C.E.O., Neo Wireless LLC		

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

☑ Total of 1 forms are submitted.

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

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

PTO/AIA/96 (08-12)
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STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Neo Wireless LLC

Application No./Patent No.: 14/720,554 Filed/Issue Date: May 22, 2015

Titled: METHODS AND APPARATUS FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD

Neo Wireless LLC, a corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

B. ☑ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: INVENTORS To: NEOCIFIC, INC.

   The document was recorded in the United States Patent and Trademark Office at Reel 051256, Frame 0932, or for which a copy thereof is attached.

2. From: NEOCIFIC, INC. To: CFIP NCF LLC

   The document was recorded in the United States Patent and Trademark Office at Reel 051116, Frame 0396, or for which a copy thereof is attached.

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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PTO/AIA/96 (08-12)
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STATEMENT UNDER 37 CFR 3.73(c)

3. From: CFIP NCF LLC To: NEO WIRELESS LLC

The document was recorded in the United States Patent and Trademark Office at
Reel 051971, Frame 0226, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
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5. From: _____ To: _____

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

6. From: _____ To: _____

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

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☑ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Christina R. Walsh/	March 16, 2020
Signature	Date
Christina R. Walsh	61553
Printed or Typed Name	Title or Registration Number

[Page 2 of 2]

Privacy Act Statement

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

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

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

Electronic Acknowledgement Receipt	
EFS ID:	38868213
Application Number:	14720554
International Application Number:	
Confirmation Number:	3128
Title of Invention:	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD
First Named Inventor/Applicant Name:	Xiaodong Li
Customer Number:	25096
Filer:	Christina R. Walsh/Justin Slater
Filer Authorized By:	Christina R. Walsh
Attorney Docket Number:	061240-8017.US05
Receipt Date:	16-MAR-2020
Filing Date:	22-MAY-2015
Time Stamp:	14:21:01
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	Application Data Sheet	NEO-PT020_5-Supplemental_ADS-EFS-20200316.PDF	1129984 113fcb33e166b69a4a59f7d9c53de2eb59d859c4	no	8

Warnings:

Information:					
This is not an USPTO supplied ADS fillable form					
2	Power of Attorney	NEO-PT020_5-Executed_POA_ByApplicant_aia0082-20200316.PDF	360424 8112a84160911442526 3cf4fb337c0dd1abbbf99	no	2
Warnings:					
Information:					
3	Assignee showing of ownership per 37 CFR 3.73	NEO-PT020_5-373c_aia0096-20200316.PDF	165192 4370ee017a58214f38b2624ff45c56c50a89ddd	no	3
Warnings:					
Information:					
			Total Files Size (in bytes):	1655600	

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.

SUPPLEMENTAL APPLICATION DATA SHEET

PTO/AIA/14 (07-14)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	~~061240-8017.US05~~ NEO-PT020.5
	Application Number	14/720,554
Title of Invention	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD	

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

Prefix	Given Name	Middle Name	Family Name	Suffix
	Xiaodong		Li	

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

City	Kirkland	State/Province	WA	Country of Residence	US

Mailing Address of Inventor:

Address 1	1750 112th Ave. NE		
Address 2	Suite D159		
City	Bellevue	State/Province	WA
Postal Code	98004	Country	US

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Haiming		Huang	

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

City	Bellevue	State/Province	WA	Country of Residence	US

Mailing Address of Inventor:

Address 1	1750 112th Ave. NE		
Address 2	Suite D159		
City	Bellevue	State/Province	WA
Postal Code	98004	Country	US

Inventor 3 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Titus		Lo	

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

SUPPLEMENTAL APPLICATION DATA SHEET

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

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	~~061240-8017.US05~~ NEO-PT020.5
	Application Number	14/720,554
Title of Invention	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD	

City	Bellevue	State/Province	WA	Country of Residence	US

Mailing Address of Inventor:

Address 1	1750 112th Ave. NE		
Address 2	Suite D159		
City	Bellevue	State/Province	WA
Postal Code	98004	Country	US

Inventor 4 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Ruifeng		Wang	

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

City	Sammamish	State/Province	WA	Country of Residence	US

Mailing Address of Inventor:

Address 1	1750 112th Ave. NE		
Address 2	Suite D159		
City	Bellevue	State/Province	WA
Postal Code	98004	Country	US

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	~~25096~~ 03624		
Email Address	~~patentprocurement@perkinscoie.com~~ eoffice@vklaw.com	Add Email	Remove Email

Application Information:

Title of the Invention	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD		
Attorney Docket Number	~~061240-8017.US05~~ NEO-PT020.5	~~Small Entity Status Claimed~~	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	12	Suggested Figure for Publication (if any)	

Filing By Reference :

SUPPLEMENTAL APPLICATION DATA SHEET

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	~~061240-8017.US05~~ NEO-PT020.5
	Application Number	14/720,554
Title of Invention	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD	

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	~~25096~~ 03624		

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 this 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 blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
14/720,554	Continuation of	14248243	2014-04-08
Prior Application Status	Patented		Remove

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14248243	Continuation of	13115055	2011-05-24	8693430	2014-04-08
Prior Application Status	Patented				Remove

SUPPLEMENTAL APPLICATION DATA SHEET

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

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	~~061240-8017.US05~~ NEO-PT020.5
	Application Number	14/720,554
Title of Invention	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD	

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13115055	Continuation of	11908257	2008-07-14	7948944	2011-05-24

Prior Application Status			Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
11908257	a 371 of international	PCTUS0638149	2006-09-28
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
US0638149	Claims benefit of provisional	60721451	2005-09-28

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

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[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.

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.

SUPPLEMENTAL APPLICATION DATA SHEET

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

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	~~061240-8017.US05~~ NEO-PT020.5
	Application Number	14/720,554
Title of Invention	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD	

Authorization to Permit Access:

☐ Authorization to Permit Access to the Instant Application by the Participating Offices

If 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 World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date o f filing this Authorization.

Applicant Information:

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

Applicant 1

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

Clear

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

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

Name of the Deceased or Legally Incapacitated Inventor :	
If the Applicant is an Organization check here. ☒	
Organization Name	~~Neocific, Inc.~~ Neo Wireless LLC

PTO/AIA/14 (07-14)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

SUPPLEMENTAL APPLICATION DATA SHEET

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

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	~~061240-8017.US05~~ NEO-PT020.5
	Application Number	14/720,554
Title of Invention	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD	

Mailing Address Information For Applicant:			
Address 1	~~1750 112th Ave. NE~~ 123 West Wayne Avenue, Floor 1		
Address 2	~~Suite D159~~		
City	~~Bellevue~~ Wayne	State/Province	~~WA~~ PA
Country	US	Postal Code	~~98004~~ 19087
Phone Number		Fax Number	
Email Address			

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

Assignee Information including Non-Applicant Assignee Information:

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

Assignee 1

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

If the Assignee or Non-Applicant Assignee is an Organization check here. Neo Wireless LLC [X]

Prefix	Given Name	Middle Name	Family Name	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:			
Address 1	123 West Wayne Avenue, Floor 1		
Address 2			
City	Wayne	State/Province	PA
Country	US	Postal Code	19087
Phone Number		Fax Number	
Email Address			

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

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

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Signature:

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

Signature	~~/Stephen Bishop/~~ /Christina R. Walsh			Date (YYYY-MM-DD)	~~2015-05-22~~ 2020-03-16
First Name	~~Stephen~~ Christina R.	Last Name	~~Bishop~~ Walsh	Registration Number	~~38829~~ 61553

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

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 C o o p eration Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

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

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/720,554	05/22/2015	Xiaodong Li	NEO-PT020.5

CONFIRMATION NO. 3128

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

POA ACCEPTANCE LETTER

OC000000115568123

Date Mailed: 03/20/2020

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 03/16/2020.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/cnguyen/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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Alexandria, Virginia 22313-1450
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/720,554	05/22/2015	Xiaodong Li	061240-8017.US05

CONFIRMATION NO. 3128

25096
PERKINS COIE LLP - SEA General
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247

POWER OF ATTORNEY NOTICE

OC000000115568076

Date Mailed: 03/20/2020

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 03/16/2020.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/cnguyen/

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.:	14/720,554	
Filed:	May 22, 2015	FILE: NEO-PT020.5
Patent No.:	9,735,944	DATE: March 23, 2020
Issued:	August 15, 2017	

DECLARATION OF LARGE ENTITY STATUS
PURSUANT TO 37 C.F.R. §1.27 (c)(1)

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

Sir:

The above-identified patent is no longer entitled to small entity status and should be considered a large entity for all further payments.

Respectfully submitted,

NEO WIRELESS LLC

By /John C. Donch Jr./
John C. Donch Jr., Esquire
Registration No. 43,593
(215) 568-6400

Volpe and Koenig, P.C.
United Plaza
30 South 17th Street
Philadelphia, PA 19103-4009

JCD/dt

5670574-1

Electronic Acknowledgement Receipt	
EFS ID:	38940244
Application Number:	14720554
International Application Number:	
Confirmation Number:	3128
Title of Invention:	METHOD AND SYSTEM FOR MULTI-CARRIER PACKET COMMUNICATION WITH REDUCED OVERHEAD
First Named Inventor/Applicant Name:	Xiaodong Li
Customer Number:	3624
Filer:	John C. Donch/Diane Thatcher
Filer Authorized By:	John C. Donch
Attorney Docket Number:	NEO-PT020.5
Receipt Date:	23-MAR-2020
Filing Date:	22-MAY-2015
Time Stamp:	14:54:57
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	Notification of loss of entitlement to small entity status	NEO_PT020.pdf	47093 fb4980374a1f97e418f7b9d04f3366707735e0c3	no	1

Warnings:

Information:	
Total Files Size (in bytes):	47093

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.