AO 120 (Rev. 08/10)

TO:	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court Eastern District of Texas - Marshall Division on the following

☐ Trademarks or ☑ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
2:23-cv-316	6/30/2023	Eastern District of Texas - Marshall Division

PLAINTIFF	DEFENDANT
CELERITY IP, LLC, and INNOVATIVE SONIC LTD.	LG ELECTRONICS, INC. and LG ELECTRONICS U.S.A., INC.

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	9,979,514 B2	5/22/2018	Innovative Sonic Limited
2	9,124,558 B2	9/1/2015	Innovative Sonic Limited
3	8,223,708 B2	7/17/2012	Innovative Sonic Limited
4	7,664,059 B2	2/16/2010	Innovative Sonic Limited
5	8,804,756 B2	8/12/2014	Innovative Sonic Limited

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading		
	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1			
2			
3			
4			
5			

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE

Copy 1—Upon initiation of action, mail this copy to Director **Copy 3—Upon termination of action, mail this copy to Director**
Copy 2—Upon filing document adding patent(s), mail this copy to Director **Copy 4—Case file copy**

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
11/278,546	04/04/2006	Sam Shiaw-Shiang Jiang	1291-268.101

CONFIRMATION NO. 6559

106622
Blue Capital Law Firm, P.C.
600 Anton Blvd., Suite 1000
Costa Mesa, CA 92626

POA ACCEPTANCE LETTER

OC000000066171598

Date Mailed: 01/21/2014

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 01/13/2014.

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.

/rmturner myles/

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

Petitioners' Exhibit 1007, p. 2
AT&T et al v. Innovative Sonic
IPR2024-01143

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
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/278,546	04/04/2006	Sam Shiaw-Shiang Jiang	ASTP0061USA

CONFIRMATION NO. 6559

POWER OF ATTORNEY NOTICE

27765
NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION
P.O. BOX 506
MERRIFIELD, VA 22116

OC00000066171512

Date Mailed: 01/21/2014

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 01/13/2014.

- 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).

/rmturner myles/

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

Petitioners' Exhibit 1007, p. 3
AT&T et al v. Innovative Sonic
IPR2024-01143

Substitution/Power of Attorney by Assignee
And Change of Correspondence Address
including Statement Under 37 CFR 3.73b

Innovative Sonic Limited, the assignee of the entire interest in and to the below listed United States patents, patent applications and provisional applications hereby revokes all previous powers of attorneys and appoints the practitioners associated with

CUSTOMER NUMBER 106622

To prosecute the below listed patent applications and any subsequent or prior applications based on the disclosure of these applications, and any reexaminations or reissues of any patents issuing from such applications or of any of the below listed patents, and to transact all business before or with the United States Patent and Trademark Office in connection with these patent applications and any subsequent or prior applications, patents and reexaminations or reissues.

Please direct all correspondence to the address associated with customer number **106622**.
Direct all phone calls to Sang N. Dang at 714-839-3800.

Patent No./Patent Application No./Provisional Application No.	Issued/ Filing Date	Assignment Recording Date	Reel/Frame		Attorney Docket No.
12/765,892	04/23/2010	04/23/2010	024276/0204	Inventor to Innovative Sonic Limited	1291-264.101
10/064,778	08/16/2002	08/16/2002 04/30/2007	012989/0829 019102/0485	Inventor to Asustek Computer Inc. Asustek Computer Inc. to Innovative Sonic Limited	1291-265.101

Patent No./Patent Application No./Provisional Application No.	Issued/ Filing Date	Assignment Recording Date	Reel/Frame		Attorney Docket No.
10/064,204	06/21/2002	06/21/2002 04/02/2007	012816/0443 019099/0127	Inventor to Asustek Computer Inc. Asustek Computer Inc. to Innovative Sonic Limited	1291-266.101
10/286,588	11/01/2002	02/16/2007 07/02/2007	018900/0686 019509/0115	Inventor to Asustek Computer Inc. Asustek Computer Inc. to Innovative Sonic Limited	1291-267.101
11/278,546	04/04/2006	04/07/2006 04/05/2007	017433/0257 019119/0535	Inventor to Asustek Computer Inc. Asustek Computer Inc. to Innovative Sonic Limited	1291-268.101
11/383,759	05/17/2006	05/17/2006 04/02/2007	017625/0669 019104/0090	Inventor to Asustek Computer Inc. Asustek Computer Inc. to Innovative Sonic Limited	1291-269.101
10/249,177	03/20/2003	03/20/2003 04/05/2007	013490/0909 019123/0756	Inventor to Asustek Computer Inc. Asustek Computer Inc. to Innovative Sonic Limited	1291-270.101
10/358,295	02/05/2003	02/05/2003 04/05/2007	013743/0420 019119/0387	Inventor to Asustek Computer Inc. Asustek Computer Inc. to Innovative Sonic Limited	1291-271.101

Patent No./Patent Application No./Provisional Application No.	Issued/ Filing Date	Assignment Recording Date	Reel/Frame		Attorney Docket No.
10/330,879	12/27/2002	12/27/2002 05/04/2007	013620/0675 019252/0179	Inventor to Asustek Computer Inc. Asustek Computer Inc. to Innovative Sonic Limited	1291-272.101
12/004,000	01/04/2008	01/04/2008 01/04/2008	020376/0634 020380/0274	From Inventor to Innovative Sonic Limited	1291-273.101
11/905,310	09/28/2007	09/28/2007	019951/0752	From Inventor to Innovative Sonic Limited	1291-274.101
10/374,235	02/25/2003	02/25/2003 07/16/2007	013815/0823 019561/0700	Inventor to Asustek Computer Inc. Asustek Computer Inc. to Innovative Sonic Limited	1291-275.101
09/682,006	07/09/2001	07/06/2006 04/03/2007	017882/0615 019102/0472	Inventor to Asustek Computer Inc. Asustek Computer Inc. to Innovative Sonic Limited	1291-276.101
10/428,549	05/02/2003	05/02/2003 04/02/2007	014035/0805 019099/0207	Inventor to Asustek Computer Inc. Asustek Computer Inc. to Innovative Sonic Limited	1291-277.101

Patent No./Patent Application No./Provisional Application No.	Issued/ Filing Date	Assignment Recording Date	Reel/Frame		Attorney Docket No.
11/160,684	07/05/2005	07/05/2005 04/02/2007	016223/0316 019100/0689	Inventor to Asustek Computer Inc. Asustek Computer Inc. to Innovative Sonic Limited	1291-278.101
09/756,723	01/10/2001	01/10/2001 04/02/2007	011434/0214 019102/0236	Inventor to Asustek Computer Inc. Asustek Computer Inc. to Innovative Sonic Limited	1291-279.101
09/681,991	07/04/2001	07/04/2001 04/03/2007	011750/0313 019102/0475	Inventor to Asustek Computer Inc. Asustek Computer Inc. to Innovative Sonic Limited	1291-280.101
09/682,317	08/20/2001	08/20/2001 04/03/2007	011876/0608 019102/0478	Inventor to Asustek Computer Inc. Asustek Computer Inc. to Innovative Sonic Limited	1291-281.101
10/355,481	01/31/2003	01/31/2003 07/16/2007	013728/0533 019561/0660	Inventor to Asustek Computer Inc. Asustek Computer Inc. to Innovative Sonic Limited	1291-282.101
11/564,305	11/29/2006	11/29/2006 05/01/2007	018559/0062 019233/0616	Inventor to Asustek Computer Inc. Asustek Computer Inc. to Innovative Sonic Limited	1291-283.101

Patent No./Patent Application No./Provisional Application No.	Issued/ Filing Date	Assignment Recording Date	Reel/Frame		Attorney Docket No.
10/709,789	05/28/2004	05/28/2004 04/03/2007	014666/0356 019106/0877	Inventor to Asustek Computer Inc. Asustek Computer Inc. to Innovative Sonic Limited	1291-284.101
11/564,306	11/29/2006	11/29/2006 05/01/2007	018559/0060 019233/0624	Inventor to Asustek Computer Inc. Asustek Computer Inc. to Innovative Sonic Limited	1291-285.101
09/683,085	11/16/2001	11/16/2001 04/02/2007	012181/0191 019102/0273	Inventor to Asustek Computer Inc. Asustek Computer Inc. to Innovative Sonic Limited	1291-286.101
11/564,304	11/29/2006	11/29/2006 05/01/2007	018559/0064 019233/0604	Inventor to Asustek Computer Inc. Asustek Computer Inc. to Innovative Sonic Limited	1291-287.101
11/561,900	11/21/2006	11/21/2006 05/01/2007	018540/0191 019233/0679	Inventor to Asustek Computer Inc. Asustek Computer Inc. to Innovative Sonic Limited	1291-288.101
09/756,738	01/10/2001	01/10/2001 04/03/2007	011434/0378 019102/0436	Inventor to Asustek Computer Inc. Asustek Computer Inc. to Innovative Sonic Limited	1291-289.101

Patent No./Patent Application No./Provisional Application No.	Issued/ Filing Date	Assignment Recording Date	Reel/Frame		Attorney Docket No.
10/064,463	07/17/2002	07/17/2002 04/03/2007	012893/0492 019102/0496	Inventors to Asustek Computer Inc. Asustek Computer Inc. to Innovative Sonic Limited	1291-290.101
10/122,436	04/12/2002	04/12/2002 04/02/2007	012804/0553 019102/0267	Inventor to Asustek Computer Inc. Asustek Computer Inc. to Innovative Sonic Limited	1291-291.101
09/683,084	11/16/2001	11/16/2001 04/03/2007	012181/0082 019102/0427	Inventor to Asustek Computer Inc. Asustek Computer Inc. to Innovative Sonic Limited	1291-292.101
10/064,865	08/26/2002	08/26/2002 04/02/2007	013022/0286 019102/0270	Inventor to Asustek Computer Inc. Asustek Computer Inc. to Innovative Sonic Limited	1291-293.101
10/428,550	05/02/2003	05/02/2003 04/05/2007	014035/0808 019123/0780	Inventor to Asustek Computer Inc. Asustek Computer Inc. to Innovative Sonic Limited	1291-294.101
11/717,705	03/14/2007	03/14/2007	019097/0612	From Inventor to Innovative Sonic Limited	1291-295.101

The undersigned is authorized to act on behalf of the assignee with respect to the above listed patents and patent applications

INNOVATIVE SONIC LIMITED

By: Yao-Ching Hsu 2013. Oct. 24

Name: Yao Ching Hsu Date

Title: General Manager as Representative of
Innovative Sonic Limited

Electronic Acknowledgement Receipt

EFS ID:	17893089
Application Number:	11278546
International Application Number:	
Confirmation Number:	6559
Title of Invention:	ERROR HANDLING IN A WIRELESS COMMUNICATIONS SYSTEM
First Named Inventor/Applicant Name:	Sam Shiaw-Shiang Jiang
Customer Number:	27765
Filer:	Sang N. Dang/Sandy Kim
Filer Authorized By:	Sang N. Dang
Attorney Docket Number:	ASTP0061USA
Receipt Date:	13-JAN-2014
Filing Date:	04-APR-2006
Time Stamp:	13:36:32
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	1291-268-101--POAasFiled.pdf	178168 a437570e2141424a66fa5ce992f242aa616c03eb	no	7

Warnings:	
Information:	

Total Files Size (in bytes):	178168

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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NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION
P.O. BOX 506
MERRIFIELD VA 22116

MAILED

MAR 29 2011

OFFICE OF PETITIONS

In re Application of :
Sam Shiaw-Shiang JIANG :
Application No. 11/278,546 : NOTICE UNDER 37 CFR. 1.28(c)
Patent No. 7,664,059 :
Filed: April 04, 2006 :
Attorney Docket No. ASTP0061USA

This is a notice regarding your request for acceptance of a fee deficiency submission under 37 CFR 1.28.

The Office no longer investigates or rejects original or reissue patent under 37 CFR 1.56. **1098 Off. Gaz. Pat. Office 502 (January 3, 1989)**. Therefore, nothing in this Notice is intended to imply that an investigation was done.

Your fee deficiency submission under 37 CFR 1.28 is hereby **ACCEPTED**.

This patent is no longer entitled to small entity status. Accordingly, all future fees paid in this patent must be paid at the large entity rate.

Inquiries related to this communication should be directed to Michelle R. Eason at (571) 272-4231.

Thurman K. Page
Petitions Examiner
Office of Petitions

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FEB 09 2011
OFFICE OF PETITIONS
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CENTRAL FAX CENTER
FEB 04 2011

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

2011 FEB -7 PM 4:41

Applicant(s): Jiang, Sam Shiaw-Shiang
Assignee: Innovative Sonic Limited
Title: ERROR HANDLING IN A WIRELESS COMMUNICATIONS SYSTEM
Serial No.: 11/278,546 Filed: April 4, 2006
Attorney Docket No.: 1291-001.801 (0940100-US)

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

PAYMENT OF DEFICIENCY UNDER 37 C.F.R. § 1.28(c) BASED ON PREVIOUS ERRONEOUS PAYMENT OF A SMALL ENTITY FEE

Dear Sir:

Innovative Sonic hereby submits a payment under 37 C.F.R. § 1.28(c) for the total amount of the deficiency of fees based on the previous erroneous payment of small entity fees.

In compliance with the requirements of 37 C.F.R. § 1.28(c)(2), Innovative Sonic submits the following itemization of the deficiency payments and calculation of the deficiency owed:

Type of Fee Erroneously Paid as a Small Entity	Date Small Entity Fee Actually Paid	Small Entity Fee Actually Paid ($)	Current Non-Small Entity Fee ($)	Deficiency Amount Owed ($)
Extension for Response Within First Month	September 15, 2008	60	130	70
Request for Continued Examination	March 18, 2009	405	810	405
Utility Issue Fee	December 28, 2009	755	1510	755

Total Deficiency Payment Owed ($)	1,230

Pursuant to 37 C.F.R. §§ 1.27(g)(2) and 1.28(d), this submission and payment of deficiency operates as a notification of the loss of small entity status.

02/08/2011 DALLEN 00000017 11278546
01 FC:1599 1230.00 OP

Petitioners' Exhibit 1007, p. 14
AT&T et al v. Innovative Sonic
IPR2024-01143

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FEB 04 2011

REMARKS

Innovative Sonic Ltd. has recently discovered that the small entity status for the above-identified patent was established in good faith, but erroneously.

Pursuant to 37 C.F.R. § 1.28(c)(2), the total deficiency for all of the fees erroneously paid as a small entity as of today's date is determined to be $1,230. The total deficiency payment is submitted herewith.

Favorable action on the present request to excuse the errors in small entity status is respectfully requested.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment, or credit any overpayment, to Deposit Account No. 11-1159 for any additional fees required under 37 C.F.R. § 1.17 or 37 C.F.R. § 1.28(c)(3), particularly, extension of time fees.

Respectfully submitted,

Date: February 4, 2011



Sang N. Dang
Registration No: 51,186

Klein, O'Neill & Singh, LLP
18200 Von Karman Avenue, Suite 725
Irvine, California 92612
Tel: (949) 955-1920
Fax: (949) 955 1921

Petitioners' Exhibit 1007, p. 15
AT&T et al v. Innovative Sonic
IPR2024-01143

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Doc Code: TRAN.LET
Document Description: Transmittal Letter

PTO/SB/21 (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Total Number of Pages in This Submission

Application Number	11/278,546
Filing Date	April 4, 2006
First Named Inventor	Jiang, Sam Shiaw-Shiang
Art Unit	2617
Examiner Name	Batista, Marcos
Attorney Docket Number	1291-001.801

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FEB 09 2011
OFFICE OF PETITIONS

ENCLOSURES *(Check all that apply)*

- [ ] Fee Transmittal Form
  - [ ] Fee Attached
- [ ] Amendment/Reply
  - [ ] After Final
  - [ ] Affidavits/declaration(s)
- [ ] Extension of Time Request
- [ ] Express Abandonment Request
- [ ] Information Disclosure Statement
- [ ] Certified Copy of Priority Document(s)
- [ ] Reply to Missing Parts/ Incomplete Application
  - [ ] Reply to Missing Parts under 37 CFR 1.52 or 1.53
- [ ] Drawing(s)
- [ ] Licensing-related Papers
- [ ] Petition
- [ ] Petition to Convert to a Provisional Application
- [ ] Power of Attorney, Revocation Change of Correspondence Address
- [ ] Terminal Disclaimer
- [ ] Request for Refund
- [ ] CD, Number of CD(s) _____
  - [ ] Landscape Table on CD
- [ ] After Allowance Communication to TC
- [ ] Appeal Communication to Board of Appeals and Interferences
- [ ] Appeal Communication to TC (Appeal Notice, Brief, Reply Brief)
- [ ] Proprietary Information
- [ ] Status Letter
- [x] Other Enclosure(s) (please identify below):

Payment of Deficiency under 37 CFR 1.28(c) based on Previous Erroneous Payment of a Small Entity Fee (2 pages)

Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	KLEIN, O'NEILL & SINGH, LLP		
Signature			
Printed name	Sang N. Dang		
Date	February 4, 2011	Reg. No.	51186

CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below:

Signature			
Typed or printed name	Carrie Anne Cheung	Date	February 4, 2011

This collection of information is required by 37 CFR 1.5. 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 and1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/278,546	02/16/2010	7664059	ASTP0061USA	6559

27765 7590 01/27/2010

NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION
P.O. BOX 506
MERRIFIELD, VA 22116

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 227 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):

Sam Shiaw-Shiang Jiang, Taipei City, TAIWAN;

Petitioners' Exhibit 1007, p. 17
AT&T et al v. Innovative Sonic
IPR2024-01143

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)

27765 7590 12/15/2009

NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION
P.O.BOX 506
MERRIFIELD, VA 22116

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.

Krystal Pan	(Depositor's name)
/Krystal Pan/	(Signature)
12/28/2009	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/278,546	04/04/2006	Sam Shiaw-Shiang Jiang	ASTP0061USA	6559

TITLE OF INVENTION: Error Handling In A Wireless Communications System

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	Yes	$755	$300	$1055	03/15/2010

EXAMINER	ART UNIT	CLASS-SUBCLASS
BATISTA, MARCOS	2617	370-333000

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 Winston Hsu
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: INNOVATIVE SONIC LIMITED

(B) RESIDENCE: (CITY and STATE OR COUNTRY): P.O. Box 957, offshore incorporations centre, Road Town, Tortola, British Virgin Islands

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

4b. Payment of Fee(s):
☐ A check in the amount of the fee(s) is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☑ The Director is hereby authorized by charge the required fee(s), or credit any overpayment, to Deposit Account Number 50-3105 .

5. **Change in Entity Status** (from status indicated above)
☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.
☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

The Director of the USPTO is requested to apply the Issue Fee and Publication Fee (if any) or to re-apply any previously paid issue fee to the application identified above.
NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature /WINSTON HSU/ Date 12/28/2009

Typed or printed name Winston Hsu Registration No. 41,526

This collection of information 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.

Petitioners' Exhibit 1007, p. 18
AT&T et al v. Innovative Sonic
IPR2024-01143

Electronic Patent Application Fee Transmittal

Application Number:	11278546
Filing Date:	04-Apr-2006
Title of Invention:	ERROR HANDLING IN A WIRELESS COMMUNICATIONS SYSTEM
First Named Inventor/Applicant Name:	Sam Shiaw-Shiang Jiang
Filer:	Winston Hsu/Krystal Pan
Attorney Docket Number:	ASTP0061USA

Filed as Small Entity

Utility under 35 USC 111(a) Filing Fees

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	755	755
Publ. Fee- early, voluntary, or normal	1504	1	300	300

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**1055**

Electronic Acknowledgement Receipt

EFS ID:	6709455
Application Number:	11278546
International Application Number:	
Confirmation Number:	6559
Title of Invention:	ERROR HANDLING IN A WIRELESS COMMUNICATIONS SYSTEM
First Named Inventor/Applicant Name:	Sam Shiaw-Shiang Jiang
Customer Number:	27765
Filer:	Winston Hsu/Krystal Pan
Filer Authorized By:	Winston Hsu
Attorney Docket Number:	ASTP0061USA
Receipt Date:	28-DEC-2009
Filing Date:	04-APR-2006
Time Stamp:	01:18:16
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$1055
RAM confirmation Number	5735
Deposit Account	503105
Authorized User	

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

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	ASTP0061USA_E2_1_NP072.pdf	40779 b5f9d875eb95d7e5e89f516ad881def433bf8b2a	no	1
Warnings:					
Information:					
2	Fee Worksheet (PTO-875)	fee-info.pdf	31955 14ff901ee1d1c28129903de0801b6218db5106d0	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	72734		

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

NOTICE OF ALLOWANCE AND FEE(S) DUE

27765 7590 12/15/2009

NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION
P.O. BOX 506
MERRIFIELD, VA 22116

EXAMINER	
BATISTA, MARCOS	
ART UNIT	PAPER NUMBER
2617	

DATE MAILED: 12/15/2009

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/278,546	04/04/2006	Sam Shiaw-Shiang Jiang	ASTP0061USA	6559

TITLE OF INVENTION: ERROR HANDLING IN A WIRELESS COMMUNICATIONS SYSTEM

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	$755	$300	$0	$1055	03/15/2010

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 SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

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.

PTOL-85 (Rev. 08/07) Approved for use through 08/31/2010.

Petitioners' Exhibit 1007, p. 23
AT&T et al v. Innovative Sonic
IPR2024-01143

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)

27765 7590 12/15/2009

NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION
P.O. BOX 506
MERRIFIELD, VA 22116

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.
11/278,546	04/04/2006	Sam Shiaw-Shiang Jiang	ASTP0061USA	6559

TITLE OF INVENTION: ERROR HANDLING IN A WIRELESS COMMUNICATIONS SYSTEM

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	$755	$300	$0	$1055	03/15/2010

EXAMINER	ART UNIT	CLASS-SUBCLASS
BATISTA, MARCOS	2617	370-333000

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 credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

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

❑ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.

❑ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

This collection of information 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.

Petitioners' Exhibit 1007, p. 24
AT&T et al v. Innovative Sonic
IPR2024-01143

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/278,546	04/04/2006	Sam Shiaw-Shiang Jiang	ASTP0061USA	6559

27765 7590 12/15/2009

NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION
P.O. BOX 506
MERRIFIELD, VA 22116

EXAMINER	
BATISTA, MARCOS	
ART UNIT	PAPER NUMBER
2617	

DATE MAILED: 12/15/2009

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)

(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 227 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 227 day(s).

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 Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

PTOL-85 (Rev. 08/07) Approved for use through 08/31/2010.

Petitioners' Exhibit 1007, p. 25
AT&T et al v. Innovative Sonic
IPR2024-01143

Notice of Allowability	Application No.	Applicant(s)	
	11/278,546	JIANG, SAM SHIAW-SHIANG	
	Examiner	Art Unit	
	MARCOS BATISTA	2617	

-- 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 *09/03/2009*.

2. ☒ The allowed claim(s) is/are *1-8*.

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

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ 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. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

Petitioners' Exhibit 1007, p. 26
AT&T et al v. Innovative Sonic
IPR2024-01143

DETAILED ACTION

1. This Action is in response to Applicant's amendment filed on 09/03/2009. Claims 1-8 are now still pending in the present application.

Allowable Subject Matter

2. Claims 1-8 are allowed.

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

Consider claims 1-8, Applicant's remarks filed on 09/03/2009 in response to a non-final action have been considered and found to be persuasive. In agreement with the Applicant's remarks, claims 1-8 are allowed.

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

4. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Marcos Batista, whose telephone number is (571) 270-5209. The Examiner can normally be reached on Monday-Thursday from 8:00am to 5:00pm.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Rafael Pérez-Gutiérrez can be reached at (571) 272-7915. The fax phone

number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free) or 703-305-3028.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist/customer service whose telephone number is (571) 272-2600.

/Marcos Batista/
Examiner

/Rafael Pérez-Gutiérrez/
Supervisory Patent Examiner, Art Unit 2617

11/25/2009

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11278546	JIANG, SAM SHIAW-SHIANG
	Examiner	Art Unit
	MARCOS BATISTA	2617

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

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

CLAIM		DATE								
Final	Original	01/16/2008	06/09/2008	12/17/2008	05/27/2009	11/25/2009				
	1	✓	✓	✓	✓	=				
	2	✓	✓	✓	✓	=				
	3	✓	✓	✓	✓	=				
	4	✓	✓	✓	✓	=				
	5	✓	✓	✓	✓	=				
	6	✓	✓	✓	✓	=				
	7	✓	✓	✓	✓	=				
	8				✓	=				

Petitioners' Exhibit 1007, p. 29
AT&T et al v. Innovative Sonic
IPR2024-01143

Issue Classification

Application/Control No.	Applicant(s)/Patent Under Reexamination
11278546	JIANG, SAM SHIAW-SHIANG
Examiner	**Art Unit**
MARCOS BATISTA	2617

ORIGINAL		INTERNATIONAL CLASSIFICATION						
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED	
370	282	H	0	4	B	1 / 44 (2006.01)		

CROSS REFERENCE(S)					
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
714	798				

☒ 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
	1														
	2														
	3														
	4														
	5														
	6														
	7														
	8														

/MARCOS BATISTA/ Examiner, Art Unit 2617	11/25/09	**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	8	
/Rafael Pérez-Gutiérrez/ Supervisory Patent Examiner, Art Unit 2617	12/02/2009	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

Petitioners' Exhibit 1007, p. 30
AT&T et al v. Innovative Sonic
IPR2024-01143

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11278546	JIANG, SAM SHIAW-SHIANG
	Examiner	Art Unit
	MARCOS BATISTA	2617

SEARCHED			
Class	Subclass	Date	Examiner
455	115.1	1/16/2008	mb
709	230	1/16/2008	mb
714	776	5/8/2008	mb

SEARCH NOTES		
Search Notes	Date	Examiner
Consulted with D'Agosta	1/15/2008	mb
PLUS Search	01/9/08	mb
EAST Search	12/27/2007	mb
Inventor's Name Search	12/27/2007	mb
Consulted with Rafael Perez Gutierrez	5/27/2009	mb

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner
455	all	11/25/2009	mb
709	all	11/25/2009	mb

Petitioners Exhibit 1007, p. 31
AT&T et al v. Innovative Sonic
IPR2024-01143

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	0	((interval or range) with "VT (A)" with "VT(S)").clm.	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2009/11/25 21:03
L2	132354	("455").CLAS.	US-PGPUB; USPAT; USOCR	OR	OFF	2009/11/25 21:04
L3	0	(detect$3 same negatively same ackknowledged same sequence number same ranage).clm.	US-PGPUB; USPAT; USOCR	ADJ	ON	2009/11/25 21:08
L4	0	(detect$3 same negatively same acknowledged same sequence number same ranage).clm.	US-PGPUB; USPAT; USOCR	ADJ	ON	2009/11/25 21:09
L5	0	(detecting same negatively same acknowledge same sequence same ranage).clm.	US-PGPUB; USPAT; USOCR	ADJ	ON	2009/11/25 21:09
L6	0	(detecting same negatively same acknowledge same sequence same range).clm.	US-PGPUB; USPAT; USOCR	ADJ	ON	2009/11/25 21:09
L7	0	2 and 6	US-PGPUB; USPAT; USOCR	ADJ	ON	2009/11/25 21:10
L8	1107	("709"/$).ccls. and status report	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2009/11/25 21:11
L9	23	2 and L8	US-PGPUB; USPAT; USOCR	ADJ	ON	2009/11/25 21:11
L10	0	8 and 6	US-PGPUB; USPAT; USOCR	ADJ	ON	2009/11/25 21:11
L11	122249	("370").CLAS.	US-PGPUB; USPAT	OR	OFF	2009/11/25 21:13
L12	0	6 and 11	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2009/11/25 21:14

S1	1	11/278,546	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2007/12/27 10:15
S2	2	"6804804".pn.	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2007/12/27 11:19
S3	12	("4410989" | "5007055" | "5280488" | "5357525" | "5465261" | "5701316" | "5815516" | "6173333" | "6412092" | "6625241").PN. OR ("6804804").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2007/12/27 11:22
S4	11	S3 and (SN or sequence)	US-PGPUB; USPAT; USOCR	ADJ	ON	2007/12/27 11:24
S5	6789	(detect$3 or find$3) near4 erro$6 with (SN or sequence)	US-PGPUB; USPAT; USOCR	ADJ	ON	2007/12/27 11:36
S6	244	(detect$3 or find$3) near4 erro$6 with (SN or sequence) with protocol	US-PGPUB; USPAT; USOCR	ADJ	ON	2007/12/27 11:36
S7	216	S6 and (@rlad<"20050404" or @ad<"20050404")	US-PGPUB; USPAT; USOCR	ADJ	ON	2007/12/27 11:38
S8	8	(detect$3 or find$3) near4 erro$6 with (SN or sequence) with protocol with reset	US-PGPUB; USPAT; USOCR	ADJ	ON	2007/12/27 11:38
S9	7	S8 and (@rlad<"20050404" or @ad<"20050404")	US-PGPUB; USPAT; USOCR	ADJ	ON	2007/12/27 11:38
S10	2182	(detect$3 or find$3) with protocol near5 erro$6	US-PGPUB; USPAT; USOCR	ADJ	ON	2007/12/27 11:42
S11	39	(detect$3 or find$3) with protocol near5 erro$6 with (SN or Sequence Number)	US-PGPUB; USPAT; USOCR	ADJ	ON	2007/12/27 11:43
S12	35	S11 and (@rlad<"20050404" or @ad<"20050404")	US-PGPUB; USPAT; USOCR	ADJ	ON	2007/12/27 11:43
S14	40	(detect$3 or find$3) with protocol near5 erro$6 with (SN or Sequence Number)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2007/12/27 13:32
S15	36	S14 and (@rlad<"20050404" or @ad<"20050404")	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2007/12/27 13:33

S16	1	11/278,546	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2007/12/27 13:59
S17	54203	"vt(s)"	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2007/12/27 14:38
S19	207	"vt(s)" and pdu	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2007/12/27 14:39
S20	42	"vt(s)" and pdu same sn	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2007/12/27 14:39
S21	91	"vt(s)" and pdu same (sn or sequence number)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2007/12/27 14:39
S23	41	"vt(s)" and pdu same (sn or sequence number) same erro$6	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2007/12/27 14:40
S24	36	S23 and (@rlad<"20050404" or @ad<"20050404")	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2007/12/27 14:40
S25	41	"vt(s)" and pdu same (sn or sequence number) same erro$6	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/02 07:35
S26	36	S25 and (@rlad<"20050404" or @ad<"20050404")	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/02 07:35
S27	8	S26 and expect	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/02 07:35

S28	41	"vt(s)" and pdu same (sn or sequence number) same erro$6	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/02 11:49
S29	36	S28 and (@rlad<"20050404" or @ad<"20050404")	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/02 11:49
S30	1	("5959995").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2008/01/02 12:04
S31	1	("6141784").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2008/01/02 12:06
S32	161	protocol erro$5 detection	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/02 12:09
S33	8	protocol erro$5 detection with (SN or sequence number)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/02 12:10
S34	46	"vt(s)" and protocol error	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/02 13:20
S35	30	"vt(s)" and protocol error and range	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/02 13:25
S37	10	(US-20040085932-$ or US-20060221853-$ or US-20040062222-$ or US-20060067238-$ or US-20050039101-$ or US-20040208160-$ or US-20040047331-$ or US-20030157927-$).did. or (US-6629147-$ or US-6483855-$).did.	US-PGPUB; USPAT	ADJ	ON	2008/01/02 14:20
S41	4	(US-20060067238-$ or US-20050039101-$ or US-20040047331-$ or US-20040208160-$).did.	US-PGPUB	ADJ	ON	2008/01/02 14:22
S44	3	(protocol erro$5 detection) and piggy	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/02 14:23

S45	7	S37 and report	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/02 14:25
S46	4	"2003016698".pn.	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/15 16:31
S48	75	"0016698"	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/15 16:32
S49	1	S48 AND PROTOCOL	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/15 16:33
S51	1	"200316698"	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/15 16:34
S52	1	"200316698".pn.	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/15 16:34
S53	2	"20030016698".pn.	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/15 16:39
S54	2	"6473399".pn.	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/15 17:24
S55	11	(US-20040085932-$ or US-20060221853-$ or US-20040062222-$ or US-20060067238-$ or US-20050039101-$ or US-20040208160-$ or US-20040047331-$ or US-20030157927-$ or US-20030016698-$).did. or (US-6629147-$ or US-6483855-$).did.	US-PGPUB; USPAT	ADJ	ON	2008/01/15 18:00

S56	11	(US-20040085932-$ or US-20060221853-$ or US-20040062222-$ or US-20060067238-$ or US-20050039101-$ or US-20040208160-$ or US-20040047331-$ or US-20030157927-$ or US-20030016698-$).did. or (US-6629147-$ or US-6483855-$).did.	US-PGPUB; USPAT	ADJ	ON	2008/01/15 18:00
S57	36011	mod	US-PGPUB; USPAT	ADJ	ON	2008/01/15 18:01
S58	2	S56 and mod	US-PGPUB; USPAT	ADJ	ON	2008/01/15 18:01
S59	461	("455"/$).ccls. and status report	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/16 13:15
S60	69	S59 and (SN or sequence number)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/16 13:17
S61	57	S60 and (@rlad<"20050404" or @ad<"20050404")	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/16 13:19
S62	93	(("SAM SHIAW-SHIANG") near2 (JIANG)).INV.	US-PGPUB; USPAT	ADJ	ON	2008/01/16 14:20
S63	56	S62 and (@rlad<"20050404" or @ad<"20050404")	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/16 14:23
S64	867	("709"/$).ccls. and status report	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/16 14:39
S66	697	(455/115.1).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2008/01/17 15:23
S67	112	S66 and protocol	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/17 15:24

S68	69	S67 and error	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/17 15:24
S69	2584	(709/230).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2008/01/17 15:26
S70	1291	S69 and error	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/17 15:26
S71	391	S70 and report	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/17 15:26
S72	77	S71 and sequence number	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/17 15:26
S73	2	(interval or range) with "VT (A)" with "VT(S)"	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/05/07 11:17
S74	34	"VT(A)" with "VT(S)"	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/05/07 11:19
S75	34	"VT(A)" with "VT(S)"	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/05/07 11:19
S78	57501	("714").CLAS.	US-PGPUB; USPAT; USOCR	OR	OFF	2008/05/07 17:02
S79	254	(detect$3 or find$3) near4 erro$6 with (SN or sequence) with protocol	US-PGPUB; USPAT; USOCR	ADJ	ON	2008/05/07 17:03
S80	42	S78 and S79	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/05/07 17:03
S82	1128	S78 and state near2 variable	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/05/07 17:06

S83	60	S78 and state near2 variable same (range or interval)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/05/07 17:07
S84	1	("4841526").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2008/05/07 17:24
S85	67	(state near2 variable) same (range or interval) same protocol	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2009/05/23 14:13
S86	56	S85 and (@rlad<"20050404" or @ad<"20050404")	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2009/05/23 14:13
S87	13	"vr(mr)"	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2009/05/23 14:39
S88	675	"vr(r)"	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2009/05/23 14:40
S89	115	state same "vr(r)"	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2009/05/23 14:40
S90	75	state with "vr(r)"	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2009/05/23 14:40
S91	1	state with "vr(r)" and PDU	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2009/05/23 14:41
S92	46	(state near2 variable) same vt same protocol	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2009/05/23 15:26
S93	88	(state near2 variable) same pdu same protocol	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2009/05/23 15:26

S94	175	(state near2 variable) same pdu	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2009/05/23 15:27
S95	136	S94 and (@rlad<"20050404" or @ad<"20050404")	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2009/05/23 15:27
S96	40	(state near2 variable) same pdu same (error or nack or negative$3)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2009/05/23 15:28
S97	30	S96 and (@rlad<"20050404" or @ad<"20050404")	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2009/05/23 15:28
S98	12	("20030147396" | "20040187068" | "20040208160" | "20040206160" | "20040208160" | "20060067238" | "6483855").PN.	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2009/05/27 17:24

EAST Search History (Interference)

< This search history is empty>

11/25/2009 9:32:13 PM
C:\Documents and Settings\mbatista\My Documents\EAST\Workspaces\11278546 ERROR HANDLING IN A WIRELESS COMMUNICATIONS SYSTEM.wsp

Error Handling In A Wireless Communications System

Appl. No.	: 11/278,546	Confirmation No.	6559
Applicant	: Sam Shiaw-Shiang Jiang		
Filed	: April 4, 2006		
TC/A.U.	: 2617		
Examiner	: BATISTA, MARCOS		
Docket No.	: ASTP0061USA		
Customer No.	: 27765		

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

RESPONSE TO OFFICE ACTION

Sir:

In response to the Office action of June 05, 2009, please consider the following remarks:

Listing of the Claims begins on page 2 of this paper.

Remarks/Arguments begin on page 4 of this paper.

Petitioners' Exhibit 1007, p. 41
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IPR2024-01143

Listing of the Claims:

1 (original): A method of detecting an erroneous sequence number of a status report unit in a wireless communications system, the method comprising:

receiving a status report unit output from a receiver of the wireless communications system;

detecting whether a negatively acknowledged sequence number lies in a range of greater than or equal to a sequence number following a sequence number of a last in-sequence acknowledged packet of a transmitter and less than a sequence number of a next packet to be transmitted for the first time by the transmitter when the negatively acknowledged sequence number is detected in the status report unit; and

detecting that the status report unit comprises an erroneous sequence number when the negatively acknowledged sequence number is not in the range.

2 (original): The method of claim 1 further comprising initiating a reset procedure when the status report unit comprises the erroneous sequence number.

3 (original): The method of claim 1 wherein detecting whether the negatively acknowledged sequence number lies in the range of greater than or equal to the sequence number following the sequence number of the last in-sequence acknowledged packet of the transmitter and less than the sequence number of the next packet to be transmitted for the first time by the transmitter when the negatively acknowledged sequence number is detected in the status report unit is performed by modulus operation with the sequence number following the sequence number of the last in-sequence acknowledged packet of the transmitter as a modulus base.

4 (original): The method of claim 1 wherein the status report unit is a piggybacked status report unit.

5 (original): The method of claim 1 wherein the wireless communications system is a

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third generation mobile communications system.

6 (original): The method of claim 5 wherein the third generation mobile communications system is operating in an acknowledged mode.

7 (original): A wireless device comprising a central processing unit in electrical communications with a memory, the memory comprising program code for implementing the method of claim 1.

8 (previously presented): The method of claim 1 wherein it is determined that the status report unit comprises an erroneous sequence number when the negatively acknowledged sequence number is not in the range of greater than or equal to the sequence number following the sequence number of the last in-sequence acknowledged packet of the transmitter and less than and not equal to the sequence number of the next packet to be transmitted for the first time by the transmitter when the negatively acknowledged sequence number is detected in the status report unit.

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REMARKS/ARGUMENTS

1. Rejection of claims 1, 2, and 4-8 under 35 U.S.C. 103(a):

Claims 1, 2, and 4-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Petrovic et al. (US 2004/0208160) in view of Chintada et al. (US 2004/0187068).

Response:

Claim 1 recites the steps of "detecting whether a negatively acknowledged sequence number lies in a range of greater than or equal to a sequence number following a sequence number of a last in-sequence acknowledged packet of a transmitter and less than a sequence number of a next packet to be transmitted for the first time by the transmitter when the negatively acknowledged sequence number is detected in the status report unit" and "detecting that the status report unit comprises an erroneous sequence number when the negatively acknowledged sequence number is not in the range."

The Examiner has stated that Petrovic does not refer to "detecting whether a negatively acknowledged sequence number lies in a range of greater than or equal to a sequence number following a sequence number of a last in-sequence acknowledged packet of a transmitter and less than a sequence number of a next packet to be transmitted for the first time by the transmitter when the negatively acknowledged sequence number is detected in the status report unit". Petrovic also does not refer to "detecting that the status report unit comprises an erroneous sequence number when the negatively acknowledged sequence number is not in the range."

Instead, the Examiner has alleged that Chintada teaches these features in Fig. 6, paragraph [0024], and paragraph [0028] lines 1-5. However, Chintada does not teach the feature of "detecting whether a **negatively acknowledged sequence number** lies in a range of greater than or equal to a sequence number following a

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sequence number of a last in-sequence acknowledged packet of a transmitter and less than a sequence number of a next packet to be transmitted for the first time by the transmitter when the negatively acknowledged sequence number is detected in the status report unit" (emphasis added).

The Examiner has summarized the ranges of the claimed invention and Chintada as follows, "*the range of the claimed invention can be written as VT(A) < NS <VT(S) and the range in Chintada is Va <= Nr <= Vs, where the variables VT(A), NS and VT(S) of the claimed invention are represented as Va, Nr and Vs respectively*".

In the specification of the instant application, the abbreviation "SN" is used to represent sequence number, however for sake of argument, we will use the same abbreviation "NS" that the Examiner has used. In any event, it is important to note that the NS is the **negatively acknowledged sequence number**. We agree that Va and Vs in Chintada have the same meaning as VT(A) and VT(S) in claim 1. However, **Nr in Chintada is not the same as NS in claim 1**. We explain the difference in the following.

First, notice that Chintada uses Va interchangeably with V(A), uses Vs interchangeably with V(S), and uses Nr interchangeably with N(R). We can now check the meaning of Nr or N(R) in Chintada. In paragraph [0037] lines 4-5, Chintada states, "N(R) is the expected send sequence number of the next I-frame to be received". In paragraph [0038] lines 2-4, Chintada states, "acknowledge a previously received I-frame numbered up to and including N(R) – 1" . In paragraph [0040] lines 4-6, Chintada states, "…, the I frames numbered up to N(R) – 1 inclusive, are considered as acknowledged. " Finally, paragraph [0028] of Chintada describes how to use Nr (i.e., N(R)) information, "The Va is updated upon receiving … Nr value is one that is in the range of Va <= Nr <= Vs."

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The whole picture of Chintada is described in the following scenario as an example. Suppose the transmitter has send frames with Ns = 0, 1, 2, …, 20, so that Vs = 21, and Va = 0 before receiving any response from the receiver. Suppose the receiver receives Ns = 0, 1, 2, …14, **15, 17**, 18, 20. In other words, the receiver receives all the transmitted packets or frames except Ns = 16 and 19. By Chintada, the receiver can only send I or S frame with Nr = 16 to indicate that all frames with Ns = 0 up to Nr – 1 = 15 have been successfully received. Chintada does not disclose a way to feedback the missing frames (e.g. Ns = 16 and 19 in the above scenario). In other words, there is no negative acknowledgement in Chintada. (Note that, for a normal example, suppose that the receiver receives all the frames from Ns = 0 up to 20. The receiver will feedback with Nr = 21. The transmitter checks that Va = 0 <= Nr <= Vs = 21. Therefore, the transmitter can update Va to 21 now. Note that Nr does not imply that Ns = Nr is negatively acknowledged. The normal example shows this clearly because Ns = 21 is not negatively acknowledged in this normal example.)

Conversely, claim 1 clearly recites that the sequence number is a negatively acknowledged sequence number. Therefore, the claimed method supports **negative acknowledgement**. Note that NS in the feature of claim 1, VT(A) <= NS < VT(S) is a **negatively acknowledged sequence number**. Therefore, NS in claim 1 is different from Nr in Chintada, which does not support negative acknowledgement.

Therefore, due to the above differences between the cited prior art references and the features recited in claim 1, claim 1 is patentable over Petrovic and Chintada. Thus, the corresponding device claim and dependent claims are also patentable over Petrovic and Chintada. Reconsideration of claims 1, 2, and 4-8 is therefore respectfully requested.

2. Rejection of claim 3 under 35 U.S.C. 103(a):

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Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Petrovic et al. (US 2004/0208160) in view of Chintada et al. (US 2004/0187068), and further in view of Minagawa (US 6,483,855).

Response:

Claim 3 is dependent on claim 1, and should be allowed if claim 1 is allowed. Reconsideration of claim 3 is therefore respectfully requested.

Conclusion

Thus, all pending claims are submitted to be in condition for allowance with respect to the cited art for at least the reasons presented above. The Examiner is encouraged to telephone the undersigned if there are informalities that can be resolved in a phone conversation, or if the Examiner has any ideas or suggestions for further advancing the prosecution of this case.

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Sincerely yours,

/Winston Hsu/ Date: 09/03/2009

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e-mail : winstonhsu@naipo.com

Note: Please leave a message in my voice mail if you need to talk to me. (The time in D.C. is 12 hours behind the Taiwan time, i.e. 9 AM in D.C. = 9 PM in Taiwan.)

Petitioners' Exhibit 1007, p. 47
AT&T et al v. Innovative Sonic
IPR2024-01143

Electronic Acknowledgement Receipt

EFS ID:	6006358
Application Number:	11278546
International Application Number:	
Confirmation Number:	6559
Title of Invention:	Error Handling In A Wireless Communications System
First Named Inventor/Applicant Name:	Sam Shiaw-Shiang Jiang
Customer Number:	27765
Filer:	Winston Hsu
Filer Authorized By:	
Attorney Docket Number:	ASTP0061USA
Receipt Date:	03-SEP-2009
Filing Date:	04-APR-2006
Time Stamp:	04:16:44
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	Amendment/Req. Reconsideration-After Non-Final Reject	690779.PDF	59788 1b67693da2e0eb3cbdc71bc55476339544ebdace	no	1

Warnings:	
Information:	

2	Claims	690778.PDF	53646 7156a502878e81cbe6fdc3f073e5dbdb637c101e	no	2
Warnings:					
Information:					
3	Applicant Arguments/Remarks Made in an Amendment	690780.PDF	94044 6ce247ed92503cb8ddb1c4a3ba03fc82f1be01c6	no	4
Warnings:					
Information:					
			Total Files Size (in bytes):	207478	

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

PTO/SB/06 (07-06)
Approved for use through 1/31/2007. OMB 0651-0032
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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
11/278,546	04/04/2006	

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY ☒ RATE ($)	SMALL ENTITY ☒ FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT 09/03/2009	(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 ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 8	Minus	** 20	= 0	X $26 =	0	OR	X $ =	
Independent (37 CFR 1.16(h))	* 1	Minus	***3	= 0	X $110 =	0	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	0	OR	TOTAL ADD'L FEE	

AMENDMENT	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)	OR	RATE ($)	ADDITIONAL FEE ($)
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 number found in the appropriate box in column 1.

Legal Instrument Examiner:
/SHARONE R. MOORE/

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

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/278,546	04/04/2006	Sam Shiaw-Shiang Jiang	ASTP0061USA	6559

27765 7590 06/05/2009

NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION
P.O. BOX 506
MERRIFIELD, VA 22116

EXAMINER	
BATISTA, MARCOS	

ART UNIT	PAPER NUMBER
2617	

NOTIFICATION DATE	DELIVERY MODE
06/05/2009	ELECTRONIC

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

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

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

winstonhsu.uspto@gmail.com
Patent.admin.uspto.Rcv@naipo.com
mis.ap.uspto@naipo.com.tw

Petitioners' Exhibit 1007, p. 51
AT&T et al v. Innovative Sonic
IPR2024-01143

Office Action Summary	Application No.	Applicant(s)	
	11/278,546	JIANG, SAM SHIAW-SHIANG	
	Examiner	Art Unit	
	MARCOS BATISTA	2617	

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

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

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

Status

1)☒ Responsive to communication(s) filed on *18 March 2009*.

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

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

Disposition of Claims

4)☒ Claim(s) *1-8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8* is/are rejected.

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

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

Application Papers

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

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

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

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

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

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

a)☐ All b)☐ Some * c)☐ None of:

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

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

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

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

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *See Continuation Sheet*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Petitioners' Exhibit 1007, p. 52
AT&T et al v. Innovative Sonic
IPR2024-01143

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date : 02/18/2009, 02/24/2009, and 05/11/2009.

Petitioners' Exhibit 1007, p. 53
AT&T et al v. Innovative Sonic
IPR2024-01143

DETAILED ACTION

1. This Action is in response to Applicant's amendment filed on 03/18/2009. Claims 1-8 are still pending in the present application. This Action is made **Non-FINAL.**

Continued Examination Under 37 CFR 1.114

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 03/18/2009 has been entered.

Response to Arguments

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

Claim Rejections - 35 USC § 103

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

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claims 1, 2, and 4-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Petrovic et al. (US 20040208160 A1), hereafter "Petrovic," in view of Chintada et al. (US 20040187068 A1), hereafter "Chintada."

Consider claim 1, Petrovic discloses a method of detecting an erroneous sequence number of a status report unit in a wireless communications system, the method comprising (**see [0002] and [0128]**): Petrovic discloses receiving a status report unit output from a receiver of the wireless communications system (**see [0128]**).

Petrovic discloses the invention as claim in above, but does not particular refer to detecting whether a negatively acknowledged sequence number lies in a range of greater than or equal to a sequence number following a sequence number of a last in sequence acknowledged packet of a transmitter and less than a sequence number of a next packet to be transmitted for the first time by the transmitter when the negatively acknowledged sequence number is detected in the status report unit. Petrovic neither particular refer to detecting a status report unit comprises an erroneous sequence number when the negatively acknowledged sequence number is not in the range

Chintada, in analogous art, teaches detecting whether a negatively acknowledged sequence number lies in a range of greater than or equal to a sequence number following a sequence number of a last in sequence acknowledged packet of a transmitter and less than a sequence number of a next packet to be transmitted for the

first time by the transmitter when the negatively acknowledged sequence number is detected in the status report unit (**see fig. 6, [0024] and [0028] lines 1-5** - the rage of the claimed invention can be written as VT(A) <= NS < VT(S) and the range in Chintada is Va <= Nr <= Vs, where the variables VT(A), NS and VT(S) of the claimed invention are represented as Va, Nr and Vs respectively). However, based on the Obvious To Try rationale, "Obvious To Try – Choosing From a Finite Number of Identified, Predictable Solutions, With a Reasonable Expectation of Success. The Supreme Court in KSR International Co. v. Teleflex Inc., 550 U.S. ___,___,82 USPQ2d 1385, 1395-97 (2007) identified a number of rationales to support a conclusion of obviousness which are consistent with the proper "functional approach" to the determination of obviousness as laid down in Graham. The key to supporting any rejection under 35 U.S.C. 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious. The Supreme Court in KSR noted that the analysis supporting a rejection under 35 U.S.C. 103 should be made explicit, " a person of ordinary skill in the art at the time the invention was made would have modified the range in Chintada to arrive at the range of the claimed invention. See Pfizer, Inc. v. Apotex, Inc ., 480 F.3d 1348, 82 USPQ2d 1321 (Fed. Cir. 2007)). Chintada also teaches detecting a status report unit comprises an erroneous sequence number when the negatively acknowledged sequence number is not in the range (**see [0028] lines 1-5 – The variable V(A) is only updated after receiving a error-free I-frame, which implies that the system needs to check if that condition is met**).

It would have been obvious to a person of ordinary skill in the art at the time the

invention was made to modify the invention of Petrovic and have it include detecting whether a negatively acknowledged sequence number lies in a range of greater than or equal to a sequence number following a sequence number of a last in sequence acknowledged packet of a transmitter and less than a sequence number of a next packet to be transmitted for the first time by the transmitter when the negatively acknowledged sequence number is detected in the status report unit and detecting a status report unit comprises an erroneous sequence number when the negatively acknowledged sequence number is not in the range, as taught by Chintada. The motivation would have been in order to provide an error detection mechanism while communication with another device (**see fig. 6, pars. 0024 and 0028**).

Consider claim 2, Petrovic as modified by Chintada teaches claim 1 above. Petrovic also teaches initiating a reset procedure when the status report unit comprises the erroneous sequence number (see abstract, [0104] – [0109].

Consider claim 4, Petrovic as modified by Chintada teaches claim 1 above. Chintada also teaches piggybacked status report unit (see [0042] lines 12-15).

It would have been obvious to have modified Petrovic's invention with the teaching of Chintada. The motivation would have been in order to provide an error detection mechanism while communication with another device (see fig. 6, pars. 0024 and 0028).

Consider claim 5, Petrovic as modified Chintada teaches claim 1 above. Petrovic also teaches third generation mobile communication systems (see [0011] – [0014].

Consider claim 6, Petrovic as modified Chintada teaches claim 1 above. Petrovic also teaches third generation mobile communication systems operating in an acknowledged mode (see [0043] and [0104]).

Consider claim 7, Petrovic as modified Chintada teaches claim 1 above. Petrovic also teaches a reset procedure to be performed as per claim 1(see [0104] – [0111] - A reset procedure is known in the art to include processing unit, memory and program code).

Consider claim 8, Petrovic as modified by Chintada teaches claim 1 above. Chintada also teaches wherein it is determined that the status report unit comprises an erroneous sequence number when the negatively acknowledged sequence number is not in the range of greater than or equal to the sequence number following the sequence number of the last in-sequence acknowledged packet of the transmitter and less than and not equal to the sequence number of the next packet to be transmitted for the first time by the transmitter when the negatively acknowledged sequence number is detected in the status report unit (see fig. 6, [0024] and [0028] lines 1-5 – also see claim Obvious To Try rationale).

7. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Petrovic et al. (US 20040208160 A1), hereafter "Petrovic," in view of Chintada et al. (US 20040187068 A1), hereafter "Chintada," and in further view of Minagawa (US 6483855 B1), hereafter "Minagawa."

Consider claim 3, Petrovic as modified by Chintada teaches claim 1 above. But neither Petrovic nor Chintada particularly refer to modulus operation with the sequence number following the sequence number of the last in-sequence acknowledged packet of the transmitter as a modulus base.

Minagawa teaches transmission and reception sequence numbers based on modulo (see col 2, lines 43-49 and col 22, lines 29-34).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the invention of Petrovic as modified by Chintada and have it include modulus operation with the sequence number following the sequence number of the last in-sequence acknowledged packet of the transmitter as a modulus base, as taught by Minagawa. The motivation would have been in order to provide a consistent error checking mechanism (see col 2, lines 43-49).

Conclusion

8. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Marcos Batista, whose telephone number is (571) 270-5209. The Examiner can normally be reached on Monday-Thursday from 8:00am to 5:00pm.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Rafael Pérez-Gutiérrez can be reached at (571) 272-7915. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free) or 703-305-3028.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist/customer service whose telephone number is (571) 272-2600.

/Marcos Batista/
Examiner

/Rafael Pérez-Gutiérrez/
Supervisory Patent Examiner, Art Unit 2617

05/27/2009

PTO/SB/08a (03-08)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	11278546
Filing Date	2006-04-04
First Named Inventor	Sam Shiaw-Shiang Jiang
Art Unit	2617
Examiner Name	BATISTA, MARCOS
Attorney Docket Number	ASTP0061USA

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/M.B./	1	2002-516527	JP		2002-06-04			☒
/M.B./	2	99/60761	WO		1999-11-25	REZAIIFAR, Ramin		☐

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	11278546 11278546 - GAU: 2617
	Filing Date	2006-04-04
	First Named Inventor	Sam Shiaw-Shiang Jiang
	Art Unit	2617
	Examiner Name	BATISTA, MARCOS
	Attorney Docket Number	ASTP0061USA

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1		☐

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EXAMINER SIGNATURE

Examiner Signature	/Marcos Batista/	Date Considered	05/27/2009

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

Petitioners' Exhibit 1007, p. 62
AT&T et al v. Innovative Sonic
IPR2024-01143

PTO/SB/08a (03-08)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	11278546
Filing Date	2006-04-04
First Named Inventor	Sam Shiaw-Shiang Jiang
Art Unit	2617
Examiner Name	BATISTA, MARCOS
Attorney Docket Number	ASTP0061USA

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/M.B./	1	20040206160	A1	2004-10-21	Gupta	
/M.B./	2	20030147396	A1	2003-08-07	Jiang	

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FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	11278546 11278546 - GAU: 2617
	Filing Date	2006-04-04
	First Named Inventor	Sam Shiaw-Shiang Jiang
	Art Unit	2617
	Examiner Name	BATISTA, MARCOS
	Attorney Docket Number	ASTP0061USA

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1		☐

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EXAMINER SIGNATURE

Examiner Signature	/Marcos Batista/	Date Considered	05/27/2009

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

Petitioners' Exhibit 1007, p. 64
AT&T et al v. Innovative Sonic
IPR2024-01143

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11278546	JIANG, SAM SHIAW-SHIANG
	Examiner	Art Unit
	MARCOS BATISTA	2617

SEARCHED

Class	Subclass	Date	Examiner
455	115.1	1/16/2008	mb
709	230	1/16/2008	mb
714	776	5/8/2008	mb

SEARCH NOTES

Search Notes	Date	Examiner
Consulted with D'Agosta	1/15/2008	mb
PLUS Search	01/9/08	mb
EAST Search	12/27/2007	mb
Inventor's Name Search	12/27/2007	mb
Consulted with Rafael Perez Gutierrez	5/27/2009	mb

INTERFERENCE SEARCH

Class	Subclass	Date	Examiner

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11278546	JIANG, SAM SHIAW-SHIANG
	Examiner	Art Unit
	MARCOS BATISTA	2617

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

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

CLAIM		DATE								
Final	Original	01/16/2008	06/09/2008	12/17/2008	05/27/2009					
	1	✓	✓	✓	✓					
	2	✓	✓	✓	✓					
	3	✓	✓	✓	✓					
	4	✓	✓	✓	✓					
	5	✓	✓	✓	✓					
	6	✓	✓	✓	✓					
	7	✓	✓	✓	✓					
	8				✓					

Petitioners' Exhibit 1007, p. 66
AT&T et al v. Innovative Sonic
IPR2024-01143

PTO/SB/08a (08-08)
Approved for use through 07/31/2008. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	11278546
Filing Date	2006-04-04
First Named Inventor	Sam Shiaw-Shiang Jiang
Art Unit	2617
Examiner Name	BATISTA, MARCOS
Attorney Docket Number	ASTP0061USA

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					

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

U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
/M.B./	1	20040208160	A1	2004-10-21	Petrovic	

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

FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							☐

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NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	11278546 11278546 - GAU: 2617
	Filing Date	2006-04-04
	First Named Inventor	Sam Shiaw-Shiang Jiang
	Art Unit	2617
	Examiner Name	BATISTA, MARCOS
	Attorney Docket Number	ASTP0061USA

	1		☐

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature	/Marcos Batista/	Date Considered	05/27/2009

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

Petitioners' Exhibit 1007, p. 68
AT&T et al v. Innovative Sonic
IPR2024-01143

PTO/SB/08a (03-08)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	11278546
Filing Date	2006-04-04
First Named Inventor	Sam Shiaw-Shiang Jiang
Art Unit	2617
Examiner Name	BATISTA, MARCOS
Attorney Docket Number	ASTP0061USA

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					

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

U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20040208160	A1	2004-10-21	Petrovic	

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

FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							☐

If you wish to add additional Foreign Patent Document citation information please click the Add button Add

NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	11278546
	Filing Date	2006-04-04
	First Named Inventor	Sam Shiaw-Shiang Jiang
	Art Unit	2617
	Examiner Name	BATISTA, MARCOS
	Attorney Docket Number	ASTP0061USA

	1		☐

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	11278546
	Filing Date	2006-04-04
	First Named Inventor	Sam Shiaw-Shiang Jiang
	Art Unit	2617
	Examiner Name	BATISTA, MARCOS
	Attorney Docket Number	ASTP0061USA

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/WINSTON HSU/	Date (YYYY-MM-DD)	2009-05-11
Name/Print	WINSTON HSU	Registration Number	41526

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

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

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

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

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

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

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

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

Error Handling In A Wireless Communications System

Appl. No.	: 11/278,546	Confirmation No.	: 6559
Applicant	: Sam Shiaw-Shiang Jiang		
Filed	: April 4, 2006		
TC/A.U.	: 2617		
Examiner	: BATISTA, MARCOS		
Docket No.	: ASTP0061USA		
Customer No.	: 27765		

Commissioner for Patents

P.O. Box 1450

Alexandria VA 22313-1450

Subject: Information disclosure statement Under 37 C.F.R. §1.56.

Dear Sir:

This is an Information Disclosure Statement in accordance with the duty to disclose information material to patentability under 37 C.F.R. §1.56. The applicants wish to make of record the document listed on the accompanying form

Petitioners' Exhibit 1007, p. 73
AT&T et al v. Innovative Sonic
IPR2024-01143

PTO/SB/08. It is respectfully requested that the Examiner initials the cited reference on the form and that it be made of record in the application and that a copy of the initialed form be sent to the applicants with the next communication from the Examiner.

Since the IDS is filed before the mailing of a first Office action after the filing of a request for continued examination under § 1.114, consideration of the information disclosure statement is hereby requested according to 37C.F.R.§1.97(b). The prior art patent contained in the information disclosure statement was cited in communications from the Taiwan Intellectual Property Office on Feb. 16, 2009. Applicants sincerely hope that the Examiner can consider each of the items contained in the information disclosure statement.

In an IDS filed on 2/24/2009, the applicant mistakenly wrote the wrong publication number when disclosing US Publication Number 2004/020**6**160. In fact, the reference is actually US Publication Number 2004/020**8**160. The applicant regrets the error, and requests consideration of the disclosed US Publication Number 2004/0208160, applied by Petrovic et al.

Petitioners' Exhibit 1007, p. 74
AT&T et al v. Innovative Sonic
IPR2024-01143

Sincerely yours,

/Winston Hsu/ Date: 05/11/2009

Winston Hsu, Patent Agent No. 41,526

P.O. BOX 506, Merrifield, VA 22116, U.S.A.

Voice Mail: 302-729-1562

Facsimile: 806-498-6673

e-mail : winstonhsu@naipo.com

Note: Please leave a message in my voice mail if you need to talk to me. (The time in D.C. is 12 hours behind the Taiwan time, i.e. 9 AM in D.C. = 9 PM in Taiwan.)

Petitioners' Exhibit 1007, p. 75
AT&T et al v. Innovative Sonic
IPR2024-01143

Electronic Acknowledgement Receipt

EFS ID:	5298691
Application Number:	11278546
International Application Number:	
Confirmation Number:	6559
Title of Invention:	Error Handling In A Wireless Communications System
First Named Inventor/Applicant Name:	Sam Shiaw-Shiang Jiang
Customer Number:	27765
Filer:	Winston Hsu
Filer Authorized By:	
Attorney Docket Number:	ASTP0061USA
Receipt Date:	11-MAY-2009
Filing Date:	04-APR-2006
Time Stamp:	02:03:34
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Filed (SB/08)	618994.PDF	726499 4cd0cbb0bdef07a099b427aea20e96223738200b	no	4

Warnings:	
Information:	

2	Transmittal Letter	618997.PDF	69671 588af0df0b4d44be3c3b79ae0462a5102cd3ad55	no	3

Warnings:	
Information:	
Total Files Size (in bytes):	796170

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

Doc code: RCEX
Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (09-08)
Approved for use through 10/31/2008. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

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

Application Number	11/278,546	Filing Date	2006-04-04	Docket Number (if applicable)	ASTP0061USA	Art Unit	2617
First Named Inventor	Sam Shiaw-Shiang Jiang			Examiner Name	BATISTA, MARCOS		

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

SUBMISSION REQUIRED UNDER 37 CFR 1.114

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

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

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

☒ Enclosed

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

MISCELLANEOUS

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

☐ Other _____

FEES

☒ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 503105

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

☐ Applicant Signature

Petitioners' Exhibit 1007, p. 78
AT&T et al v. Innovative Sonic
IPR2024-01143

PTO/SB/30EFS (09-08)
Approved for use through 10/31/2008. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Signature of Registered U.S. Patent Practitioner			
Signature	/WINSTON HSU/	Date (YYYY-MM-DD)	2009-03-18
Name	Winston Hsu	Registration Number	41526

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

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

Privacy Act Statement

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

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

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

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

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

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

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

Petitioners' Exhibit 1007, p. 80
AT&T et al v. Innovative Sonic
IPR2024-01143

Electronic Patent Application Fee Transmittal

Application Number:	11278546
Filing Date:	04-Apr-2006
Title of Invention:	Error Handling In A Wireless Communications System
First Named Inventor/Applicant Name:	Sam Shiaw-Shiang Jiang
Filer:	Winston Hsu
Attorney Docket Number:	ASTP0061USA

Filed as Small Entity

Utility under 35 USC 111(a) Filing Fees

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

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Request for continued examination	2801	1	405	405
		Total in USD ($)		**405**

Electronic Acknowledgement Receipt

EFS ID:	4978447
Application Number:	11278546
International Application Number:	
Confirmation Number:	6559
Title of Invention:	Error Handling In A Wireless Communications System
First Named Inventor/Applicant Name:	Sam Shiaw-Shiang Jiang
Customer Number:	27765
Filer:	Winston Hsu
Filer Authorized By:	
Attorney Docket Number:	ASTP0061USA
Receipt Date:	18-MAR-2009
Filing Date:	04-APR-2006
Time Stamp:	03:49:19
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$405
RAM confirmation Number	14706
Deposit Account	503105
Authorized User	

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

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Applicant Arguments/Remarks Made in an Amendment	586809.PDF	94307 7d8156f34b19cdbbf4a53914b45e802d94bf9ce1	no	5
Warnings:					
Information:					
2	Amendment Submitted/Entered with Filing of CPA/RCE	586808.PDF	61813 268129f98f7a6a5272e7de8c340f78a0fa3b1502	no	1
Warnings:					
Information:					
3	Claims	586806.PDF	53864 3c818b150af335801a6d613ae3960d21b62127b9	no	2
Warnings:					
Information:					
4	Request for Continued Examination (RCE)	586892.PDF	767366 e0cbcfab421ee7ee7b935adc9485a1d1756fe606	no	3
Warnings:					
Information:					
5	Fee Worksheet (PTO-06)	fee-info.pdf	29858 920ee5c63afcac597fbc684bf56c489dfab4dce3	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	1007208		

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New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

REMARKS/ARGUMENTS

Request for Continued Examination:

The applicant respectfully requests continued examination of the above-indicated application as per 37 CFR 1.114.

1. Initial remarks concerning the Examiner's Response to Arguments:

In the Examiner's Response to Arguments, the Examiner writes:

"*1). The Applicant states that range set by the interval "Va <= Nr <= Vs" does not cover the range set by the interval "VT(A) <= SN < VT(S)," (refer to page 2 lines 24-27 and page 3 lines 1-14 of the Applicant's Remarks).*

Regarding point 1), The interval set by the range "Va <= Nr <= Vs" is inclusive of the interval set by the range "VT(A) <= SN < VT(S)," therefore "Va <= Nr <= Vs" anticipates VT(A) <= SN < VT(S)," (see Chintada: par. 0028 lines 1-5). Therefore, the argued features are written such that they read upon the cited reference(s)."

Response:

The applicant does not agree with the conclusion that "Nr in the range of Va <= Nr <= Vs" (Chintada, par. 0028 lines 1-5) anticipates that "SN in the range of VT(A) <= SN < VT(S)" (claim 1). An example will be given below to illustrate the difference.

For example, let VT(A) = Va = 10, and VT(S) = Vs = 20 (In other words, the transmitter transmitted SN = 0 to 19, and SN = 0-9 were positively acknowledged) and SN = Nr = 20 (In other words, the transmitter receives a NACK of SN = 20, which the transmitter has not sent yet).

Using Chintada's teachings, Nr is within the testing range because 10 <= 20 <= 20 is true. On the other hand, in claim 1, SN is not within the testing range because 10 <= 20 < 20 is not true. The behaviors of Chintada and Claim 1 are

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different in this scenario. Therefore, Chintada does not anticipate this feature of Claim 1.

In short, when testing a condition, the test range must be the same to get the same testing result. It is NOT appropriate to say that "testing a condition with a wider test range" anticipates "testing a condition with a narrower test range" even if a wider test range is inclusive of a narrower test range.

2. Rejection of claims 1, 2, and 4-7 under 35 U.S.C. 103(a):

Claims 1, 2, and 4-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Petrovic et al. (US 2004/0208160) in view of Chintada et al. (US 2004/0187068).

Response:

Claim 1 recites the steps of "detecting whether a negatively acknowledged sequence number lies in a range of greater than or equal to a sequence number following a sequence number of a last in-sequence acknowledged packet of a transmitter and less than a sequence number of a next packet to be transmitted for the first time by the transmitter when the negatively acknowledged sequence number is detected in the status report unit" and "detecting that the status report unit comprises an erroneous sequence number when the negatively acknowledged sequence number is not in the range."

The Examiner has stated that Petrovic does not refer to "detecting whether a negatively acknowledged sequence number lies in a range of greater than or equal to a sequence number following a sequence number of a last in-sequence acknowledged packet of a transmitter and less than a sequence number of a next packet to be transmitted for the first time by the transmitter when the negatively acknowledged sequence number is detected in the status report unit". Petrovic also does not refer to "detecting that the status report unit comprises an erroneous

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sequence number when the negatively acknowledged sequence number is not in the range."

Instead, the Examiner has alleged that Chintada teaches these features in Fig. 6, paragraph [0024], and paragraph [0028] lines 1-5. However, Chintada does not teach the feature of "detecting whether a negatively acknowledged sequence number lies in a range of greater than or equal to a sequence number following a sequence number of a last in-sequence acknowledged packet of a transmitter and **less than** a sequence number of a next packet to be transmitted for the first time by the transmitter when the negatively acknowledged sequence number is detected in the status report unit" (emphasis added).

Chintada teaches in [0028] line 5 that the range of the sequence number Nr is clearly specified to be Va <= Nr <= Vs. In other words, the range used by Chintada is greater than or equal to a sequence number following a sequence number of a last in sequence acknowledged packet of a transmitter and less than **or equal to** a sequence number of a next packet to be transmitted for the first time by the transmitter.

In contrast, the range in the present Claim 1 is VT(A) <= SN < VT(S), i.e. greater than or equal to a sequence number following a sequence number of a last in sequence acknowledged packet of a transmitter and **less than** a sequence number of a next packet to be transmitted for the first time by the transmitter.

In fact, Chintada's checking range is worse than Petrovic's checking range, i.e. VT(A) <= SN <= VT(S)-1. This is because Petrovic's checking range works in most cases except when VT(A) = VT(S), as was indicated in the applicant's remarks filed on 04/23/2008. With Chintada's checking range, even when VT(A) is not equal to VT(S), a NACK sequence number = VT(S) will not be checked as an erroneous sequence number. Note that VT(S) had not been sent out by the

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transmitter yet so that it should not be positively or negative acknowledged by the peer receiver. If it happens, there must be an error.

In summary, neither Petrovic nor Chintada teach the above feature of "detecting whether a negatively acknowledged sequence number lies in a range of greater than or equal to a sequence number following a sequence number of a last in-sequence acknowledged packet of a transmitter and **less than** a sequence number of a next packet to be transmitted for the first time by the transmitter when the negatively acknowledged sequence number is detected in the status report unit". Therefore, claim 1 is patentable over the combination of Petrovic and Chintada.

Furthermore, claims 2 and 4-7 are dependent on claim 1, and should be allowed if their respective base claims are allowed. Reconsideration of claims 1, 2, and 4-7 is therefore respectfully requested.

3. Rejection of claim 3 under 35 U.S.C. 103(a):

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Petrovic et al. (US 2004/0208160) in view of Chintada et al. (US 2004/0187068), and further in view of Minagawa (US 6,483,855).

Response:

Claim 3 is dependent on claim 1, and should be allowed if claim 1 is allowed. Reconsideration of claim 3 is therefore respectfully requested.

4. Introduction to new claim 8:

New claim 8 further modifies claim 1 by specifying the negatively acknowledged sequence number is in the range of greater than or equal to the sequence number following the sequence number of the last in-sequence acknowledged packet of the transmitter and **less than and not equal to** the

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sequence number of the next packet to be transmitted for the first time by the transmitter when the negatively acknowledged sequence number is detected in the status report unit.

In short, new claim 8 explicitly states the claimed range as being "VT(A) <= SN < VT(S)", whereas Chintada teaches the claimed range of "Va <= Nr <= Vs". Since the upper bounds of the range are not the same, and the upper bound is clearly defined in claim 8, claim 8 is patentable over the combination of Petrovic and Chintada. Consideration of claim 8 is respectfully requested.

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Sincerely yours,

/Winston Hsu/ Date: 03/18/2009

Winston Hsu, Patent Agent No. 41,526
P.O. BOX 506, Merrifield, VA 22116, U.S.A.
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Note: Please leave a message in my voice mail if you need to talk to me. (The time in D.C. is 12 hours behind the Taiwan time, i.e. 9 AM in D.C. = 9 PM in Taiwan.)

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AT&T et al v. Innovative Sonic
IPR2024-01143

Error Handling In A Wireless Communications System

Appl. No.	:	11/278,546	Confirmation No.	: 6559
Applicant	:	Sam Shiaw-Shiang Jiang		
Filed	:	April 4, 2006		
TC/A.U.	:	2617		
Examiner	:	BATISTA, MARCOS		
Docket No.	:	ASTP0061USA		
Customer No.	:	27765		

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

AMENDMENT AND REQUEST FOR CONTINUED EXAMINATION

Sir:

In response to the Office action of December 19, 2008, please amend the above-identified application as follows:

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

Remarks/Arguments begin on page 4 of this paper.

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Amendments to the Claims:

The listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

1 (original): A method of detecting an erroneous sequence number of a status report unit in a wireless communications system, the method comprising:

receiving a status report unit output from a receiver of the wireless communications system;

detecting whether a negatively acknowledged sequence number lies in a range of greater than or equal to a sequence number following a sequence number of a last in-sequence acknowledged packet of a transmitter and less than a sequence number of a next packet to be transmitted for the first time by the transmitter when the negatively acknowledged sequence number is detected in the status report unit; and

detecting that the status report unit comprises an erroneous sequence number when the negatively acknowledged sequence number is not in the range.

2 (original): The method of claim 1 further comprising initiating a reset procedure when the status report unit comprises the erroneous sequence number.

3 (original): The method of claim 1 wherein detecting whether the negatively acknowledged sequence number lies in the range of greater than or equal to the sequence number following the sequence number of the last in-sequence acknowledged packet of the transmitter and less than the sequence number of the next packet to be transmitted for the first time by the transmitter when the negatively acknowledged sequence number is detected in the status report unit is performed by modulus operation with the sequence number following the sequence number of the last in-sequence acknowledged packet of the transmitter as a modulus base.

4 (original): The method of claim 1 wherein the status report unit is a piggybacked

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status report unit.

5 (original): The method of claim 1 wherein the wireless communications system is a third generation mobile communications system.

6 (original): The method of claim 5 wherein the third generation mobile communications system is operating in an acknowledged mode.

7 (original): A wireless device comprising a central processing unit in electrical communications with a memory, the memory comprising program code for implementing the method of claim 1.

8 (new): The method of claim 1 wherein it is determined that the status report unit comprises an erroneous sequence number when the negatively acknowledged sequence number is not in the range of greater than or equal to the sequence number following the sequence number of the last in-sequence acknowledged packet of the transmitter and less than and not equal to the sequence number of the next packet to be transmitted for the first time by the transmitter when the negatively acknowledged sequence number is detected in the status report unit.

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PTO/SB/06 (07-06)
Approved for use through 1/31/2007. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
11/278,546	04/04/2006	

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY ☒ RATE ($)	SMALL ENTITY ☒ FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	03/17/2009	(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 ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 8	Minus	** 20	= 0	X $26 =	0	OR	X $ =	
	Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	X $110 =	0	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	0	OR	TOTAL ADD'L FEE	

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)	OR	RATE ($)	ADDITIONAL FEE ($)
	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 number found in the appropriate box in column 1.

Legal Instrument Examiner:
/MINNIE JACKSON/

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

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	11278546
Filing Date	2006-04-04
First Named Inventor	Sam Shiaw-Shiang Jiang
Art Unit	2617
Examiner Name	BATISTA, MARCOS
Attorney Docket Number	ASTP0061USA

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20040206160	A1	2004-10-21	Gupta	
	2	20030147396	A1	2003-08-07	Jiang	

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FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							☐

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	11278546
	Filing Date	2006-04-04
	First Named Inventor	Sam Shiaw-Shiang Jiang
	Art Unit	2617
	Examiner Name	BATISTA, MARCOS
	Attorney Docket Number	ASTP0061USA

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1		☐

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

Petitioners' Exhibit 1007, p. 96
AT&T et al v. Innovative Sonic
IPR2024-01143

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	11278546
	Filing Date	2006-04-04
	First Named Inventor	Sam Shiaw-Shiang Jiang
	Art Unit	2617
	Examiner Name	BATISTA, MARCOS
	Attorney Docket Number	ASTP0061USA

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☒ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☐ None

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/WINSTON HSU/	Date (YYYY-MM-DD)	2009-02-24
Name/Print	WINSTON HSU	Registration Number	41526

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

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

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

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

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

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

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

Petitioners' Exhibit 1007, p. 98
AT&T et al v. Innovative Sonic
IPR2024-01143

Electronic Patent Application Fee Transmittal

Application Number:	11278546
Filing Date:	04-Apr-2006
Title of Invention:	Error Handling In A Wireless Communications System
First Named Inventor/Applicant Name:	Sam Shiaw-Shiang Jiang
Filer:	Winston Hsu
Attorney Docket Number:	ASTP0061USA

Filed as Small Entity

Utility under 35 USC 111(a) Filing Fees

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

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

Electronic Acknowledgement Receipt

EFS ID:	4843668
Application Number:	11278546
International Application Number:	
Confirmation Number:	6559
Title of Invention:	Error Handling In A Wireless Communications System
First Named Inventor/Applicant Name:	Sam Shiaw-Shiang Jiang
Customer Number:	27765
Filer:	Winston Hsu
Filer Authorized By:	
Attorney Docket Number:	ASTP0061USA
Receipt Date:	24-FEB-2009
Filing Date:	04-APR-2006
Time Stamp:	20:03:56
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$180
RAM confirmation Number	6012
Deposit Account	503105
Authorized User	

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First Named Inventor	Sam Shiaw-Shiang Jiang
Art Unit	2617
Examiner Name	BATISTA, MARCOS
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	Application Number	11278546
	Filing Date	2006-04-04
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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 :
H04L 29/06, 1/18

A1

(11) International Publication Number: WO 99/60761

(43) International Publication Date: 25 November 1999 (25.11.99)

(21) International Application Number: PCT/US99/11108

(22) International Filing Date: 19 May 1999 (19.05.99)

(30) Priority Data:
09/082,085 20 May 1998 (20.05.98) US

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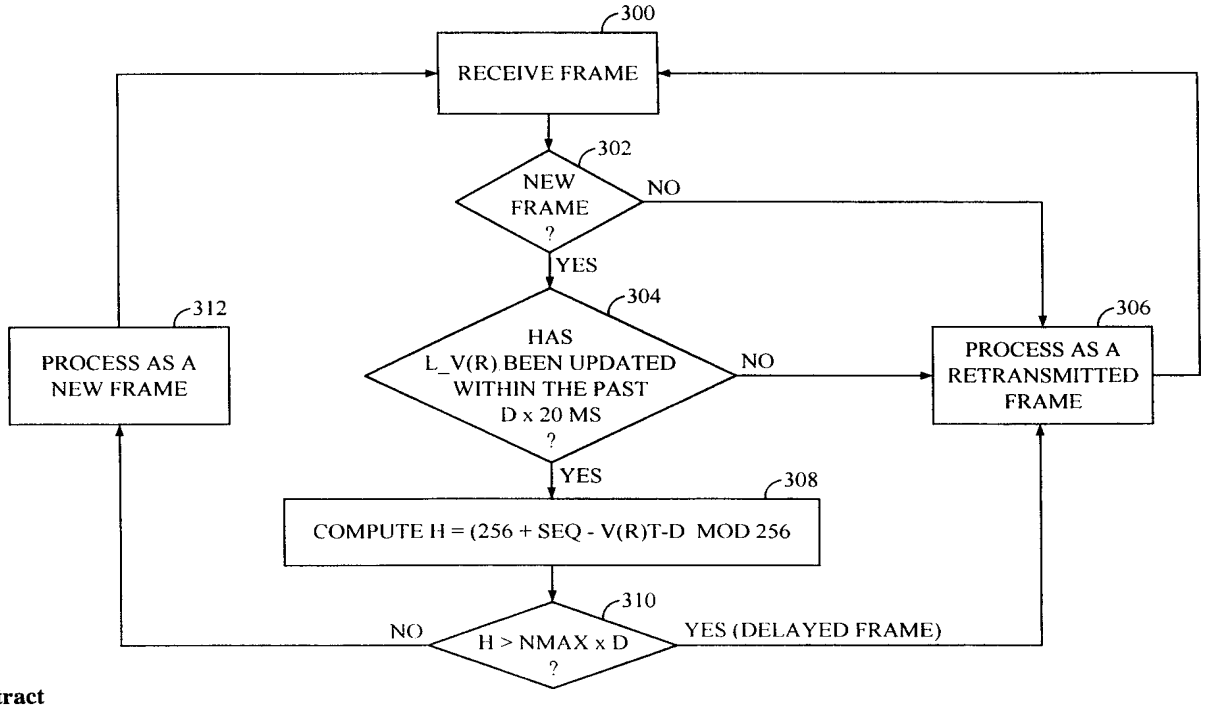
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(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: METHOD FOR DETECTING DELAYED DATA FRAMES IN A TRANSPORT FUNCTION



(57) Abstract

A method for detecting delayed data frames in a transport function includes the steps of comparing a frame sequence counter with a predetermined threshold value (304), detecting a delayed frame if the sequence counter exceeds the threshold value, and processing the detected delayed frame accordingly (306). In an RLP data transport protocol, the delayed frame may be processed as a retransmitted frame. The threshold value may be proportional to the maximum number of frames sent in a given bundle times the maximum delay, in units of frame intervals, between frames sent simultaneously over the air in the same frame interval.

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METHOD FOR DETECTING DELAYED DATA FRAMES IN A TRANSPORT FUNCTION

BACKGROUND OF THE INVENTION

I. Field of the Invention

The present invention pertains generally to the field of wireless communications, and more specifically to detecting delayed data frames in a transport function.

II. Background

The field of wireless communications has many applications including, e.g., cordless telephones, paging, wireless local loops, and satellite communication systems. A particularly important application is cellular telephone systems for mobile subscribers. (As used herein, the term "cellular" systems encompasses both cellular and PCS frequencies.) Various over-the-air interfaces have been developed for such cellular telephone systems including, e.g., frequency division multiple access (FDMA), time division multiple access (TDMA), and code division multiple access (CDMA). In connection therewith, various domestic and international standards have been established including, e.g., Advanced Mobile Phone Service (AMPS), Global System for Mobile (GSM), and Interim Standard 95 (IS-95). In particular, IS-95 and its derivatives, such as IS-95A, IS-95B, ANSI J-STD-008, IS-99, IS-657, IS-707, etc. (often referred to collectively herein as IS-95), are promulgated by the Telecommunication Industry Association (TIA) and other well known standards bodies.

Cellular telephone systems configured in accordance with the use of the IS-95 standard employ CDMA signal processing techniques to provide highly efficient and robust cellular telephone service. An exemplary cellular telephone system configured substantially in accordance with the use of the IS-95 standard is described in U.S. Patent No. 5,103,459, which is assigned to the assignee of the present invention and fully incorporated herein by reference. The aforesaid patent illustrates transmit, or forward-link, signal processing in a CDMA base station. Exemplary receive, or reverse-link, signal processing in a CDMA base station is described in U.S. Application Serial No. 08/987,172, filed December 9, 1997, entitled MULTICHANNEL DEMODULATOR, which is assigned to the assignee of the present invention

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and fully incorporated herein by reference. In CDMA systems, over-the-air power control is a vital issue. An exemplary method of power control in a CDMA system is described in U.S. Patent No. 5,056,109, which is assigned to the assignee of the present invention and fully incorporated herein by reference.

A primary benefit of using a CDMA over-the-air interface is that communications are conducted over the same RF band. For example, each mobile subscriber unit (typically a cellular telephone) in a given cellular telephone system can communicate with the same base station by transmitting a reverse-link signal over the same 1.25 MHz of RF spectrum. Similarly, each base station in such a system can communicate with mobile units by transmitting a forward-link signal over another 1.25 MHz of RF spectrum.

Transmitting signals over the same RF spectrum provides various benefits including, e.g., an increase in the frequency reuse of a cellular telephone system and the ability to conduct soft handoff between two or more base stations. Increased frequency reuse allows a greater number of calls to be conducted over a given amount of spectrum. Soft handoff is a robust method of transitioning a mobile unit from the coverage area of two or more base stations that involves simultaneously interfacing with two base stations. (In contrast, hard handoff involves terminating the interface with a first base station before establishing the interface with a second base station.) An exemplary method of performing soft handoff is described in U.S. Patent No. 5,267,261, which is assigned to the assignee of the present invention and fully incorporated herein by reference.

Under the IS-99 and IS-707 standards (referred to hereinafter collectively as IS-707), an IS-95-compliant communications system can provide both voice and data communications services. Data communications services allow digital data to be exchanged using a receiver and an RF interface to one or more transmitters. Examples of the type of digital data typically transmitted using the IS-707 standard include computer files and electronic mail.

In accordance with both the IS-95 and IS-707 standards, the data exchanged between a wireless terminal and a base station is processed in frames. To increase the likelihood that a frame will be successfully transmitted during a data transmission, IS-707 employs a radio link protocol (RLP) to track the frames transmitted successfully, and to perform frame retransmission when a frame is not transmitted successfully. Retransmission is performed up to three times in IS-707, and it is the

responsibility of the higher layer protocols to take additional steps to ensure that the frame transmitted is successfully.

In order to track which frames have been transmitted successfully, IS-707 calls for an eight-bit sequence number to be included as a frame header in each frame transmitted. The sequence number is incremented for each frame from 0 to 256 and then reset back to zero. An unsuccessfully transmitted frame is detected when a frame with an out-of-order sequence number is received, or an error is detected using CRC checksum information or other error detection methods. Once an unsuccessfully transmitted frame is detected, the receiver transmits a negative-acknowledgment message (NAK) to the transmit system that includes the sequence number of the frame that was not received. The transmit system then retransmits the frame including the sequence number as originally transmitted. If the retransmitted frame is not received successfully, a second negative-acknowledgment message is sent to the transmit system. The transmit system typically responds by notifying the controlling application or network layer of the failed transmission.

Under IS-95A and IS-707, frames are transmitted once every twenty milliseconds (ms). Thus, an eight-bit sequence number can track 256 frames transmitted over a five-second interval. Five seconds is typically sufficient to allow a failed frame transmission to be detected, and a retransmission to be performed, and therefore an eight-bit sequence number provides sufficient time for frame retransmission. Thus, retransmitted frames can be uniquely identified without ambiguity caused by a sequence "wrap-around" whereby the eight-bit sequence number repeats.

Since the original development of IS-95A and IS-707, however, additional protocols and standards have been proposed and developed that allow data to be transmitted at greater rates. Typically, these new protocols and standards use the same frame structure as IS-95A and IS-707 in order to maintain as much compatibility as possible with pre-existing systems and standards. Nevertheless, while maintaining compatibility with pre-existing standards and systems is desirable, the use of the same type of frame within these higher rate protocols and standards substantially increases the number of frames that are transmitted during a given period of time. For example, if the transmission rate is increased by a factor of four, the time required to transmit 256 frames is reduced to 1.25 seconds, rather than the five seconds required previously. A time period of 1.25 seconds is typically insufficient to allow a failed frame transmission to be detected, and a retransmission attempted, before the eight-bit sequence number repeats. Thus, the use of an

eight-bit sequence number is insufficient to allow unique identification of frames for the time period necessary to perform the desired retransmission sequence.

A well-known protocol, the Radio Link Protocol (RLP), uses an eight-bit sequence counter included in frames sent over the air. The eight bits represent the least significant bits of a twelve-bit counter kept internally at both the receiver and the transmitter. The twelve-bit counter is updated based on the eight-bit numbers sent over the air. It stands to reason that delayed frames present a problem. If multiple frames are simultaneously sent from the transmitter but are delayed with respect to each other at the receiver, the twelve-bit counters will be incorrectly updated and the RLP will abort.

While the number of bits in the sequence number could be increased, such an increase would substantially alter the frame format and therefore violate the goal of maintaining substantial compatibility with previously existing systems and standards. Additionally, increasing the number of bits in the sequence number would waste available bandwidth. A conventional solution such as increasing the number of bits used to represent the sequence counter is therefore inadequate because it would introduce additional overhead per transmission and decrease of the net throughput of the transport service. Hence, it would be desirable to provide a method for extending the sequence number range without modifying the number of bits used for the sequence number. Such a method would advantageously be capable of interpreting an impossibly large number of missing data frames derived from the sequence number as a delayed frame, thereby increasing the throughput of the transport function. Thus, there is a need for an efficient method of detecting delayed frames in a transport function using a minimum number of bits.

SUMMARY OF THE INVENTION

The present invention is directed to an efficient method of detecting delayed frames in a transport function using a minimum number of bits. Accordingly, a method for detecting delayed data frames in a transport function in which frames are sent from a transmitter to a receiver includes the steps of comparing, for a received frame, a frame sequencing counter number with a predetermined threshold value, the frame sequencing counter number being derived from a header of the received frame, and detecting the received frame as a delayed frame if the frame sequencing

counter number exceeds the threshold value. In one aspect of the invention, a data transmission system advantageously includes a transmitter, a receiver coupled to the transmitter via an interface for receiving data frames from the transmitter, and a protocol processing component housed in the receiver for comparing a frame sequencing counter number with a predetermined threshold value, the frame sequencing counter number being derived from headers of the data frames, the protocol processing component detecting a delayed data frame if the frame sequencing counter number exceeds the threshold value.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram of a cellular telephone system.

FIG. 2 is a schematic diagram of a transmitter and receiver.

FIG. 3 is a diagram of a frame buffer and resequencing buffer.

FIG. 4 is a flow chart illustrating the operation of a transmitter and a receiver during a communication.

FIG. 5 is a flow chart illustrating the operation of the receiver during the reception of a newly transmitted frame.

FIG. 6 is a flow chart illustrating the operation of the receiver during the reception of a retransmitted frame.

FIG. 7 is a message diagram illustrating the operation of the transmitter and the receiver during an exemplary communication.

FIG. 8 is a message diagram illustrating the operation of the transmitter and the receiver during an exemplary communication.

FIG. 9 is a flow chart illustrating the operation of the receiver in recognizing and processing delayed frames.

FIG. 10 is a functional diagram of a shift register used in the receiver to update a bit value specifying the next frame to be received.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The embodiments described hereinbelow reside in a personal communication system operating in accordance with the use of CDMA signal processing techniques of the IS-707 and IS-95 standards. While the present invention is especially suited for use within such a communications system, it should be understood that the present invention may be employed in various other types of communications systems that transmit

data via frames or packets, including both wireless and wireline communication systems, and satellite-based communication systems. Additionally, throughout the description, various well-known systems are set forth in block form. This is done in order to avoid unnecessarily obscuring the disclosure.

Various cellular systems for wireless telephone communication employ fixed base stations that communicate with mobile units via an over-the-air interface. Such cellular systems include, e.g., AMPS (analog), IS-54 (North American TDMA), GSM (Global System for Mobile communications TDMA), and IS-95 (CDMA). In a preferred embodiment, the cellular system is a CDMA system.

As illustrated in FIG. 1, a CDMA wireless telephone system generally includes a plurality of mobile subscriber units **10**, a plurality of base stations **12**, a base station controller (BSC) **14**, and a mobile switching center (MSC) **16**. The MSC **16** is configured to interface with a conventional public switch telephone network (PSTN) **18**. The MSC **16** is also configured to interface with the BSC **14**. The BSC **14** is coupled to each base station **12** via backhaul lines. The backhaul lines may be configured in accordance with any of several known interfaces including, e.g., E1/T1, ATM, or IP. It is to be understood that there can be more than one BSC **14** in the system. Each base station **12** advantageously includes at least one sector (not shown), each sector comprising an antenna pointed in a particular direction radially away from the base station **12**. Alternatively, each sector may comprise two antennas for diversity reception. Each base station **12** may advantageously be designed to support a plurality of frequency assignments (each frequency assignment comprising 1.25 MHz of spectrum). The intersection of a sector and a frequency assignment may be referred to as a CDMA channel. The base stations **12** may also be known as base station transceiver subsystems (BTSs) **12**. Alternatively, "base station" may be used in the industry to refer collectively to a BSC **14** and one or more BTSs **12**, which BTSs **12** may also be denoted "cell sites" **12**. (Alternatively, individual sectors of a given BTS **12** may be referred to as cell sites.) The mobile subscriber units **10** are typically cellular telephones **10**, and the cellular telephone system is advantageously a CDMA system configured for use in accordance with the IS-95 standard.

During typical operation of the cellular telephone system, the base stations **12** receive sets of reverse-link signals from sets of mobile units **10**. The mobile units **10** are conducting telephone calls or other communications. Each reverse-link signal received by a given base station **12** is processed within that base station **12**. The resulting data is forwarded to

the BSC **14**. The BSC **14** provides call resource allocation and mobility management functionality including the orchestration of soft handoffs between base stations **12**. The BSC **14** also routes the received data to the MSC **16**, which provides additional routing services for interface with the PSTN **18**. Similarly, the PSTN **18** interfaces with the MSC **16**, and the MSC **16** interfaces with the BSC **14**, which in turn controls the base stations **12** to transmit sets of forward-link signals to sets of mobile units **10**.

In the embodiments described below, an algorithm serves to map an eight-bit sequencing number for counting frames sent over the air into a twelve-bit sequencing number in accordance with the Radio Link Protocol (RLP), a protocol that is known in the art. The algorithm is advantageously carried out with RLP software instructions and a microprocessor. In one embodiment, an RLP component may reside in a base station **12**. Alternatively, the RLP component may reside in a BSC **14**. Those of skill in the art would appreciate that the RLP algorithm may be used not only in a BSC **14** or a base station **12**, but could be used in any transport layer in which multiple data frames are received in a particular processing period.

In FIG. 2, two communication systems configured in accordance with an exemplary embodiment are illustrated in block form. The higher rate communication is being conducted from transmitter **50** to receiver **52**. In an exemplary configuration, transmitter **50** is located in a base station **12** and receiver **52** is in a wireless terminal **10**; however, the locations may be reversed. Within transmitter **50**, control system **54** receives data frames from input/output (I/O) **56** and provides that data to encoder **58**. Encoder **58** performs convolutional encoding, generating code symbols that are received by digital modulator **60**. Digital modulator **60** performs direct sequence modulation on the code symbols with one or more binary channel codes and one or more binary spreading codes, yielding chipped symbols that are received by radio frequency (RF) transmitter **62**. The chipped symbols are upconverted to the carrier frequency band by RF transmitter **62** and transmitted from antenna system **64** via diplexer **66**.

Various methods and apparatus for performing the digital modulation and RF upconversion can be employed. A set of particularly useful methods and apparatus are described in copending U.S. Applications Serial Nos. 08/431,180, entitled METHOD AND APPARATUS FOR PROVIDING VARIABLE RATE DATA IN A COMMUNICATIONS SYSTEM USING STATISTICAL MULTIPLEXING, filed April 28, 1995; 08/395,960, entitled METHOD AND APPARATUS FOR PROVIDING VARIABLE RATE DATA IN A COMMUNICATIONS SYSTEMS USING

NON-ORTHOGONAL OVERFLOW CHANNELS, filed February 28, 1995; and 08/784,281, entitled HIGH DATA RATE SUPPLEMENTAL CHANNEL FOR CDMA TELECOMMUNICATIONS SYSTEM, filed January 15, 1997; each of which is assigned to the assignee of the present invention and fully incorporated herein by reference. It should be understood that some of the above-referenced patent applications are directed to the forward link, and are therefore more suited for use with the transmitter **50**, while others are directed to the reverse link, and are therefore more suited for use with the receiver **52**.

In an exemplary embodiment, the data transmitted from antenna system **64** is formatted in accordance with frames **70** that include an eight-bit sequence field (SEQ number) **72**, a retransmit flag **74**, and a data field **76**. A frame **70** may include other fields that are not shown because they are not particularly relevant to the present invention. In a preferred embodiment, the frames are formatted substantially in accordance with the frame structures defined in the IS-707 standard, with the addition of retransmit flag **74**.

To provide data frames to encoder **58** in an orderly manner, control system **54** stores the frames within frame buffer **55** and updates an index value L_V(S). Frame buffer **55** and index value L_V(S) are preferably stored within a memory system. In a preferred embodiment, index value L_V(S) is a twelve-bit sequence number that is incremented after the transmission of each frame as described in greater detail below. The least significant eight bits of index value L_V(S) are placed in the sequence field of a frame **72**.

Within receiver **52**, RF receiver **80** downconverts and digitizes the RF signals on which frame **70** is transmitted using antenna system **82** and diplexer **84**. Digital demodulator **86** demodulates the downconverted, or "baseband," signals using the necessary binary codes, generating soft decision data that is received by decoder **88**. Decoder **88** performs maximum likelihood trellis, or Viterbi, decoding, yielding hard decision data **90** that is provided to controller **91**.

Controller **91** reforms frame **70** using hard decision data **90** and determines whether the frame has been received in sequence relative to the frames that have already been received using the SEQ number, index variable L_V(N), and L_V(R), as well as resequencing buffer **92** and NAK list **94** as described in further detail below.

If controller **91** determines that the frame has been received out of sequence relative to the frames that have already been received, or if the frame is received in error, it generates a negative-acknowledgment (NAK)

message that is received by encoder **95**. Encoder **95** performs convolutional encoding to generate code symbols that are direct sequence spread spectrum modulated by digital modulator **97**, preferably in accordance with the IS-95 reverse link, and the chipped symbols are upconverted by RF transmit system **98** and transmitted as NAK **83** from antenna system **82** via diplexer **84**. The L_SEQ for the NAKed frame is stored within NAK list **94**.

Referring again to transmitter **50**, RF receiver **67** receives the RF signal via antenna system **64** and diplexer **66**. RF receiver **67** downconverts and digitizes the RF signal, yielding samples that are demodulated using digital demodulator **68**. Decoder **69** decodes the soft decision data from digital demodulator **68**, and control system **54** receives the hard decision data from decoder **69**, thereby detecting the NAK **83** from receiver **52** contained in the hard decision data.

Control system **54** receives NAK **83** and retrieves the NAKed frame from transmit buffer **55**. The retrieved frames are retransmitted in accordance with the original transmission as described above (including the original sequence number).

The configuration of frame buffer **55**, resequencing buffer **92**, and indexes L_V(S), L_V(N), and L_V(R), when used in accordance with one embodiment, are illustrated in FIG. 3. Within the transmit frame buffer **55**, frames already transmitted once are shaded, and frames to be transmitted are clear. In a preferred embodiment, indexes L_V(S), L_V(N), and L_V(R) are twelve-bit numbers. Index L_V(S) is set to the sequence number of the next frame to be transmitted. When the frame is actually transmitted, the eight-bit SEQ number of the frame is set to the eight least significant bits of index L_V(S).

Within resequencing buffer **92**, index L_V(R) is set to the twelve-bit sequence of the next new frame expected. Index L_V(N) is set to the twelve-bit sequence of the next frame needed for sequential delivery, or for which processing is still pending. When a predetermined number of NAKs **83** have been sent without receipt of the corresponding frame, attempted processing of the frame is terminated and the data with the missing frame is passed to the higher layer protocols such as, e.g., the transport layer. As shown, NAKed frames **96a - c** can be received with sequence numbers between L_V(N) and (L_V(R)-1) MOD 4096, inclusively.

In FIG. 4, a flow diagram illustrates the operation of the transmitter **50** and receiver **52** during a communication performed in accordance with one embodiment. The transmission begins at the transmitter at step **100**, with reception at the receiver occurring at step **101**. At step **102**, initialization is

performed, during which index L_V(S) is set to zero within transmitter **50** and L_V(R) is set to zero within receiver **52**.

At step **108**, the transmitter **50** transmits a frame (indicated by the dashed line) when data is available for transmission, with the SEQ number of the frame being set to the eight least significant bits of index L_V(S), and being referred to as V(S). Additionally, the retransmit flag is set to zero to indicate that the frame is a newly transmitted frame. At step **112**, index L_V(S) is incremented MOD 4096, and at step **113** the transmitter performs receive processing for any NAK message transmitted from receiver **52**. In one embodiment, when no data is available, "idle" frames having the current SEQ number may be sent repeatedly until data becomes available (idle transmissions not shown).

At step **130** the transmitter **50** determines if a NAK **83** has been received or is pending, , and if so the NAKed frames are retrieved from the transmit buffer using the long sequence number contained in the NAK message and retransmitted at step **132** with the original SEQ number and the retransmit field set to one. Once the frame is retransmitted the pending or received NAK **83** is cleared and processing then continues at step **113**.

If a NAK message has not been received or is not pending, the transmitter returns to step **108** and the processing continues.

Within receiver **52**, the processing begins at step **101,** and at step **106** L_V(S) is received from transmitter **50**. At step **110**, receiver **52** receives any frames transmitted from transmitter **50** at either step **108** (new transmission), or at step **132** (retransmission), and at step **114** receiver **52** examines the status of the retransmit flag of the frame to determine if the received frame is a retransmitted frame or a new frame. If the frame is a retransmitted frame, retransmit processing is performed at step **116**, and then the receiver returns to step **110**. If the frame is not a retransmitted frame, first transmit processing of the frame is performed at step **120**, and then step **110** is performed again.

In FIG. 5, a flow chart illustrates the operation of receiver **52** when processing the first transmission of a frame during step **120** of FIG. 4 in accordance with one embodiment. The first transmission processing begins at step **150,** and at step **152** L_SEQ is set according to the following equation:

$$L\_SEQ = \{L\_V(R) + [256 + SEQ - V(R)] \text{ MOD } 256\} \text{ MOD } 4096, \quad (1)$$

where V(R) is the eight least significant bits of L_V(R) and SEQ is the sequence number contained in the SEQ field of the frame being processed.

At step **154** it is determined whether L_SEQ is less than L_V(N), or that the frame has been stored in the resequencing buffer **92**. If so, the frame is discarded at step **156** and the receive system returns from first transmission processing at step **157**. As noted above, L_V(N) is set to the next frame needed for sequential delivery of the data.

If L_SEQ is not less than L_V(N) and the frame has not been stored in the resequencing buffer **92**, it is further determined at step **158** whether L_SEQ is greater than or equal to L_V(N) and less than L_V(R), and whether the frame has been not stored in the resequencing buffer **92.** If so, the frame is discarded at step **156** and the receive system returns from first transmission processing at step **157**. Otherwise, it is further determined at step **160** whether L_SEQ equals L_V(R) and therefore is the next frame needed for sequential delivery L_V(R).

If L_SEQ does not equal L_V(R), an out-of-order frame has been received, and the frame is stored in the resequencing buffer **92** at step **162,** and L_V(R) is set to L_SEQ at step **164**. At step **166**, the receive system transmits one or more NAK messages requesting retransmission of all unreceived frames from L_V(N) to (L_V(R) - 1) MOD 4096, inclusive. The receive system then returns from the first transmission processing at step **176**.

If, at step **160**, it is determined that L_SEQ equals L_V(R), the frame has been received in order, causing it to further be determined at step **170** whether L_V(N) equals L_V(R), which indicates that no NAKed frames are outstanding. If L_V(N) equals L_V(R), L_N(N) and L_V(R) are incremented MOD 4096 at step **172**. The data frame is delivered to the higher layer protocol at step **174,** and the receiver **52** returns from first transmit processing at step **176**.

If it is determined at step **160** that L_V(N) does not equals L_V(R), and therefore that NAKed frames remain outstanding, L_V(R) is incremented MOD 4096 at step **178**, and at step **180** the frame is stored in the resequencing buffer **92**. The receiver **52** then returns from the first frame transmit processing at step **176**.

In FIG. 6, a flow diagram illustrates the operation of the receiver **52** during step **116** when a retransmitted frame is received in accordance with one embodiment. The processing of the retransmitted frame begins at step **200,** and at step **202** the SEQ field in the received frame is used as the key to look up an L_SEQ associated with the SEQ in the NAK list **94** (see FIG. 2). At step **204** it is determined whether the L_SEQ is less than L_V(N), or whether the frame has already been stored in the resequencing buffer **92.** If

so, the frame is discarded at step **206**, and the receiver **52** returns from retransmit processing at step **208**.

If L_SEQ is not less than L_V(N), and the frame has not been stored in the resequencing buffer **92**, it is further determined at step **210** whether L_SEQ is greater than or equal to L_V(N) and less than L_V(R), and if the frame has not been stored in the resequencing buffer **92**. If so, the frame is stored in the resequencing buffer **92** at step **212** before step **214** is performed. Otherwise, step **214** is performed.

At step **214**, it is determined whether L_SEQ is equal to L_V(N), and if not, the frame is discarded at step **216** because the retransmitted frame has a sequence number that is higher than the next new frame expected, and therefore an error has occurred. Once the frame has been discarded, receiver **52** returns from retransmitted frame processing at step **208**.

If L_SEQ equals L_V(N), the data in all the contiguous frames formed by the addition of the retransmitted frame being processed from L_V(N) upward are delivered to the next higher processing layer at step **218**, and the delivered frames are removed from the resequencing buffer **92** at step **220**. At step **222** L_V(N) is set to LAST+1, where LAST is the long sequence number (L_SEQ) of the last frame delivered to the higher layer at step **218**. At step **224** the frame is removed from the NAK list and the receiver **52** returns from processing the retransmitted frame at step **226**.

In FIG. 7, a message diagram illustrates the messages transmitted during an exemplary communication performed in accordance with one embodiment. Transmitter **50** is shown on the left, and receiver **52** is shown on the right. Transmitter **50** maintains index L_V(S), and frames are transmitted with value V(S) in the sequence field, where V(S) is the eight least significant bits of L_V(S). At the receiver **52** the NAK list after each transmission is shown. All numbers are shown in hexadecimal.

The first frame **230** is transmitted when index L_V(S) is equal to 0x2FE, and therefore with a SEQ number of OxFE. After the transmission of frame **230**, index L_V(S) is incremented to 0x2FF and frame **232** is transmitted with a SEQ number of 0xFF. Both frames **230** and **232** are received successfully by receiver **52**, causing index L_V(R) to increment twice from 0x2FE to 0x300.

Frame **234** is transmitted with a SEQ number of 0x00 and is not successfully received by receiver **52**. L_V(S) is then incremented to 0x301, and frame **236** is transmitted with a SEQ number of 0x01 and is received successfully by receiver **52**.

Upon receipt of frame **236**, receiver **52** detects the out-of-order sequence number because frame **234** was not received. In response, receiver **52** generates NAK message **240** containing the full twelve-bit index L_V(R) for the unreceived frame 0x300. Additionally, receiver **52** updates the NAK list **94** to indicate that a NAK **83** has been transmitted for a frame with SEQ number 0x00 and L_SEQ number 0x300. Also, receiver **52** starts a NAK timer, which tracks the time that has expired since the transmission of NAK message **240**.

During the transmission of NAK message **240**, transmitter **50** transmits another frame **238** with a SEQ number of 0x02, which is received successfully by receiver **52**. Upon receipt of NAK message **240**, transmitter **50** generates retransmitted frame **242** having SEQ number 0x00 and the retransmit flag **74** (see FIG. 2) is set to one. Upon receipt of retransmitted frame **242**, receiver **52** detects the retransmission bit and matches the SEQ number with the SEQ number in NAK list **94**. Once the match is made, retransmitted frame **242** is placed within the resequencing buffer **92** (see FIG. 2) and the entry within NAK list **94** is removed. Frames **244** and **246** are then transmitted and received in normal fashion.

In FIG. 8, a message diagram further illustrates the operation of transmitter **50** and receiver **52** during a transmission in which the sequence number "wraps-around," when performed in accordance with one embodiment. Frames **240a** and **240b** are transmitted with SEQ numbers 0xFE (all numbers are in hexadecimal) and 0xFF, respectively, which correspond to values of 0x2FE and 0x2FF for index L_V(S), and are successfully received by receiver **52,** causing L_V(R) to be incremented from 0x2FE to 0x300.

Frame **240c** includes SEQ number 0x00 but is not successfully received by receiver **52**. Frame **240d** includes SEQ number 0x01 and is received properly by receiver **52**. Upon receipt of frame **240d**, receiver **52** detects that the SEQ number is greater than the eight least significant bits of L_V(R), and therefore that a frame has been received out of order. In response, receiver **52** updates L_V(R) to 0x302, which corresponds to the next expected frame, and places the SEQ number of the unreceived frame into NAK list **94**. Additionally, receiver **52** transmits NAK **241** containing the complete L_SEQ number 0x300 of the frame that was not received, and initiates a timer that tracks the amount of time that has expired since the transmission of the NAK **241**. As shown in FIG. 8, however, NAK **241** is not received successfully by transmitter **50**.

Transmitter **50** continues to transmit frames as shown, including frames **240e** - **240j**, all of which are successfully received by receiver **52**.

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During the transmission of frames **240e** - **240j**, index L_V(S) changes from 0x302 to 0x400, causing a wrap-around in eight least significant bits, and therefore in the SEQ number contained in the frames.

Frame **240k** is transmitted with SEQ number 0x01 and is not received successfully by receiver **52**. Frame **240l** is transmitted with SEQ number 0x02 and is received successfully by receiver **52**. Upon receipt of frame **240l,** receiver **52** detects an out-of-order transmission, and responds by transmitting NAK **243** containing sequence value 0x401 and by adding sequence number 0x401 to NAK list **94**. Additionally, at this time the timer for NAK **241** expires, causing a second NAK **245** containing sequence value 0x300 to be transmitted to transmitter **50**. Thus, a second NAK is transmitted for frame **240c**. Additionally, receiver **52** sets L_V(R) to the next expected sequence number 0x403. It should be noted that the sequence numbers transmitted in NAKs **243** and **245** could be transmitted in a single NAK message.

Transmitter **50** responds to NAKs **243** and **245** by transmitting retransmitted frame **242a** containing the data from frame **240k**, and retransmitted frame **242b** containing the data from frame **240c**. Upon receipt of retransmission frame **242a,** receiver **52** identifies the frame as a retransmitted frame based on the status of retransmit flag **74** (see FIG. 2). Once the frame is identified as a retransmitted frame, receiver **52** performs a lookup within NAK list **94,** using the SEQ number, and determines which frame has been retransmitted. Retransmitted frame **242a** is then placed in the appropriate location within resequencing buffer **92** (see FIG. 2), and the corresponding entry is removed from NAK list **94**.

Upon receipt of retransmission frame **242b,** receiver **52** also identifies the type of frame and performs a lookup within NAK list **94**. When the identity of the frame is determined, it is placed within the resequencing buffer **92** (see FIG. 2), and the corresponding entry is removed from NAK list **94**. Transmitter **50** then transmits frame **240m** having sequence number 0x03, which is successfully received by receiver **52**. At this point, NAK list **94** is empty.

As should be evident from the transmission shown in FIG. 8, marking frames as either "new" or "retransmitted" allows the receiver **52** to properly process both new and retransmitted frames that have the same SEQ numbers even when wrap-around of the sequence number occurs during a retransmission. This is possible because a retransmitted frame with the same SEQ number as a newly transmitted frame can be distinguished by the retransmit flag. Thus, a greater number of frames may be processed using an

eight-bit sequence number, which supports significantly higher data rates while maintaining substantial computability with pre-existing standards.

In FIG. 9, a flow chart illustrates the operation of the receiver **52** in recognizing and processing delayed frames in accordance with one embodiment. A delayed frame may be defined as an RLP frame that is transmitted at the same time on the over-the-air interface with a group, or bundle, of other RLP frames, but has experienced a significantly different delay (e.g., due to a different path length) on its way to the receiver **52**. In accordance with the IS-707-A standard and RLP, a known protocol for retransmission of data frames, frames are sent over the air in twenty-millisecond (ms) intervals. If the difference in the delay is more than twenty ms, the delayed frame will be received in one of the following twenty-ms processing intervals identified in IS-707-A. If not detected as a delayed frame, a delayed RLP frame may cause an RLP reset.

Equation (1), described above in connection with FIGS. 4-6, presents a method for mapping the eight-bit SEQ number (which is transmitted as a frame header over the air) into a twelve-bit L_SEQ number at the receiver **52** to keep track of frame sequence. If, by way of example, frames 1, 2, and 4 of a four-frame bundle are received within the same twenty-ms time interval, but frame 3 is delayed and is received in the following twenty-ms time interval, equation (1) yields the following value for L_SEQ:

$$\begin{aligned} L\_SEQ &= \{L\_V(R) + [256 + SEQ - V(R)] \text{ MOD } 256\} \text{ MOD } 4096 \\ &= \{5 + [256 + 3 - 5] \text{ MOD } 256\} \text{ MOD } 4096 \\ &= 5 + 254, \end{aligned}$$

which indicates that 254 frames are missing. Clearly, this is not the correct interpretation because it is impossible to miss 254 frames within a twenty-ms time interval. In the embodiment depicted in FIG. 9, an RLP algorithm advantageously categorizes such a frame as a delayed frame at the receiver **52**.

In the embodiment of FIG. 9, the value D denotes the maximum difference in the arrival time for RLP frames that are transmitted in the same twenty-ms time interval on the over-the-air interface. D is expressed in units of twenty-ms time intervals and is typically zero, one, or two. The number $V(R)_{T-D}$ denotes the value of V(R) at a time of D x 20 ms ago. The value N_{max} denotes the maximum number of frames that can be sent in one twenty-ms time interval. N_{max} may be eight in a particular embodiment. In another embodiment, N_{max} may be four.

In step **300**, a frame is received at the receiver **52**. The algorithm then proceeds to step **302** and determines whether the frame is a new frame. If the frame is a new frame, the algorithm proceeds to step **304**. If the frame is not a new frame, the algorithm proceeds to step **306** to process the frame as a retransmitted frame. In step **306**, the algorithm processes the frame as a retransmitted frame via a table, as described above. The algorithm then returns to step **300** and receives the next frame.

In step **304**, the algorithm determines whether L_V(R) has been updated within the past D x 20 ms. L_V(R) is the twelve-bit value of V(R), which points to the next frame the RLP algorithm expects to receive in the receive buffer. If L_V(R) has not been updated in the past D x 20 ms, equation (1) will not yield an impossibly large number of missing frames, so the algorithm proceeds to step **306**, processing the frame as a retransmitted frame. If L_V(R) has been updated within the past D x 20 ms, there is a possibility that the new frame is a delayed frame, and the algorithm proceeds to step **308**.

In step **308**, the algorithm commences new frame processing by computing the value $H = (256 + SEQ - V(R)_{T-D}) \text{ MOD } 256$. The algorithm then proceeds to step **310**. In step **310**, the algorithm determines whether H is greater than N_{max} x D. If H is greater than N_{max} x D, the algorithm detects the frame as a delayed frame and proceeds to step **306**, advantageously processing the detected delayed frame as a retransmitted frame. Those of skill in the art would understand that because L_SEQ equals [L_V(R) + H] MOD 4096 (see equation (1)), checking if H is greater than the threshold value N_{max} x D (which represents the maximum number of frames that could be missing) simply amounts to comparing L_SEQ with a threshold value. If L_SEQ is found to exceed the threshold value, a delayed frame is detected and processed accordingly. Those of skill in the art would likewise appreciate that in an alternate embodiment not employing RLP frames, the delayed frame need not necessarily be processed as a retransmitted frame, but might instead be processed in some other manner. If H is not greater than N_{max} x D, the algorithm proceeds to step **312** and processes the frame as a new frame via equation (1), as described above. The algorithm then returns to step **300** and receives the next frame.

In one embodiment, illustrated in FIG. 10, a shift register **400** in the receiver **52** (see FIG. 2) may advantageously be used to keep track of the value of $V(R)_{T-D}$. The shift register **400** must have D+1 stages (i.e., the shift register **400** must have a number of bits equal to (D+1) multiplied by the bit length of V(R)). The bit value V(R) is put into the shift register **400** and, as

shown, the shift register **400** is shifted every twenty ms to update $V(R)_{T\text{-}D}$. If L_V(R) (or, equivalently, V(R)) was not updated within the past twenty-ms time interval, a special value predetermined to denote a "null" symbol is advantageously placed in the shift register **400** to represent that no change took place.

Preferred embodiments of the present invention have thus been shown and described. It would be apparent to one of ordinary skill in the art, however, that numerous alterations may be made to the embodiments herein disclosed without departing from the spirit or scope of the invention. Therefore, the present invention is not to be limited except in accordance with the following claims.

WE CLAIM:

CLAIMS

1. A method of detecting a delayed frame in a transport function wherein a plurality of frames are sent from a transmitter to a receiver, the method comprising the steps of:

comparing, for a received frame, a frame sequencing counter number with a predetermined threshold value, the frame sequencing counter number being derived from a header of the received frame; and

detecting the received frame as a delayed frame if the frame sequencing counter number exceeds the predetermined threshold value.

2. The method of claim 1, further comprising the step of processing a detected delayed frame as a retransmitted frame.

3. The method of claim 1, wherein the plurality of frames is sent in bundles of frames, each bundle including an equal number of frames, the frames within any bundle being sent simultaneously, and wherein the comparing step comprises:

comparing the frame sequencing counter number with a threshold value proportional to the product of the number of frames within a bundle and the maximum delay time in frame-length time increments between frames sent in a bundle.

4. The method of claim 1, wherein the transport function is a Radio Link Protocol interface.

5. An apparatus for detecting a delayed frame in a transport function wherein a plurality of frames are sent from a transmitter to a receiver, the apparatus comprising:

means for comparing, for a received frame, a frame sequencing counter number with a predetermined threshold value, the frame sequencing counter number being derived from a header of the received frame; and

means for detecting the received frame as a delayed frame if the frame sequencing counter number exceeds the predetermined threshold value.

6. The apparatus of claim 5, further comprising means for processing a detected delayed frame as a retransmitted frame.

7. The apparatus of claim 5, wherein the plurality of frames is sent in bundles of frames, each bundle including an equal number of frames, the frames within any bundle being sent simultaneously, and wherein the means for comparing comprises:

means for comparing the frame sequencing counter number with a threshold value proportional to the product of the number of frames within a bundle and the maximum delay time in frame-length time increments between frames sent in a bundle.

8. The apparatus of claim 5, wherein the transport function is a Radio Link Protocol interface.

9. A data transmission system, comprising:

a transmitter;

a receiver coupled to the transmitter via an interface for receiving data frames from the transmitter; and

a protocol processing component housed in the receiver for comparing a frame sequencing counter number with a predetermined threshold value, the frame sequencing counter number being derived from headers of the data frames,

wherein the protocol processing component detects a delayed data frame if the frame sequencing counter number for that frame exceeds the predetermined threshold value.

10. The data transmission system of claim 9, wherein the data frames are transmitted in groups having equal numbers of frames, the frames within any group being transmitted simultaneously, and wherein the predetermined threshold value comprises a value proportional to the product of the number of frames within a group and the maximum delay time in frame-length time increments between frames sent in a group.

11. The data transmission system of claim 9, wherein the protocol processing component serves to process delayed frames as retransmitted frames.

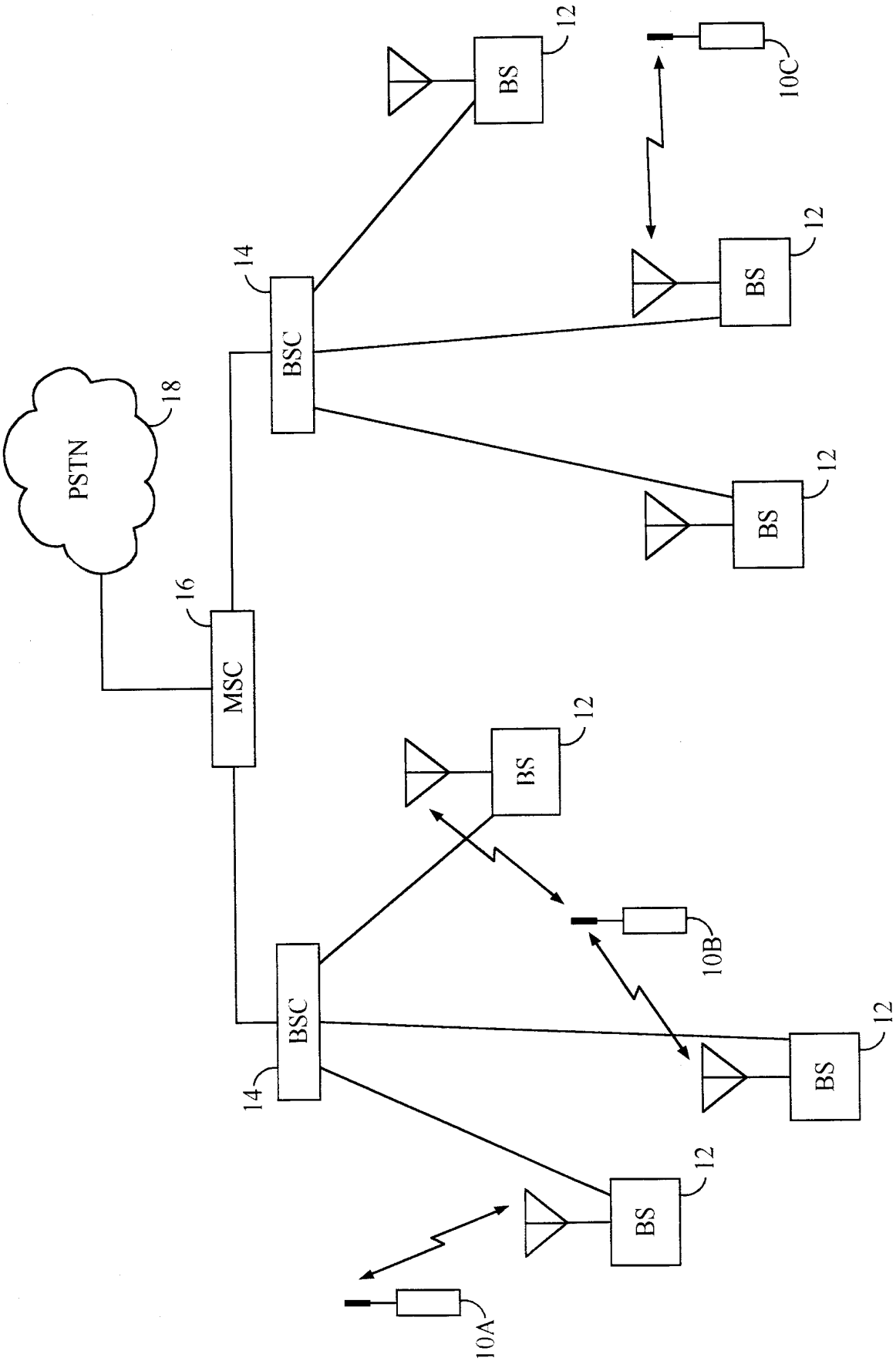


FIG. 1

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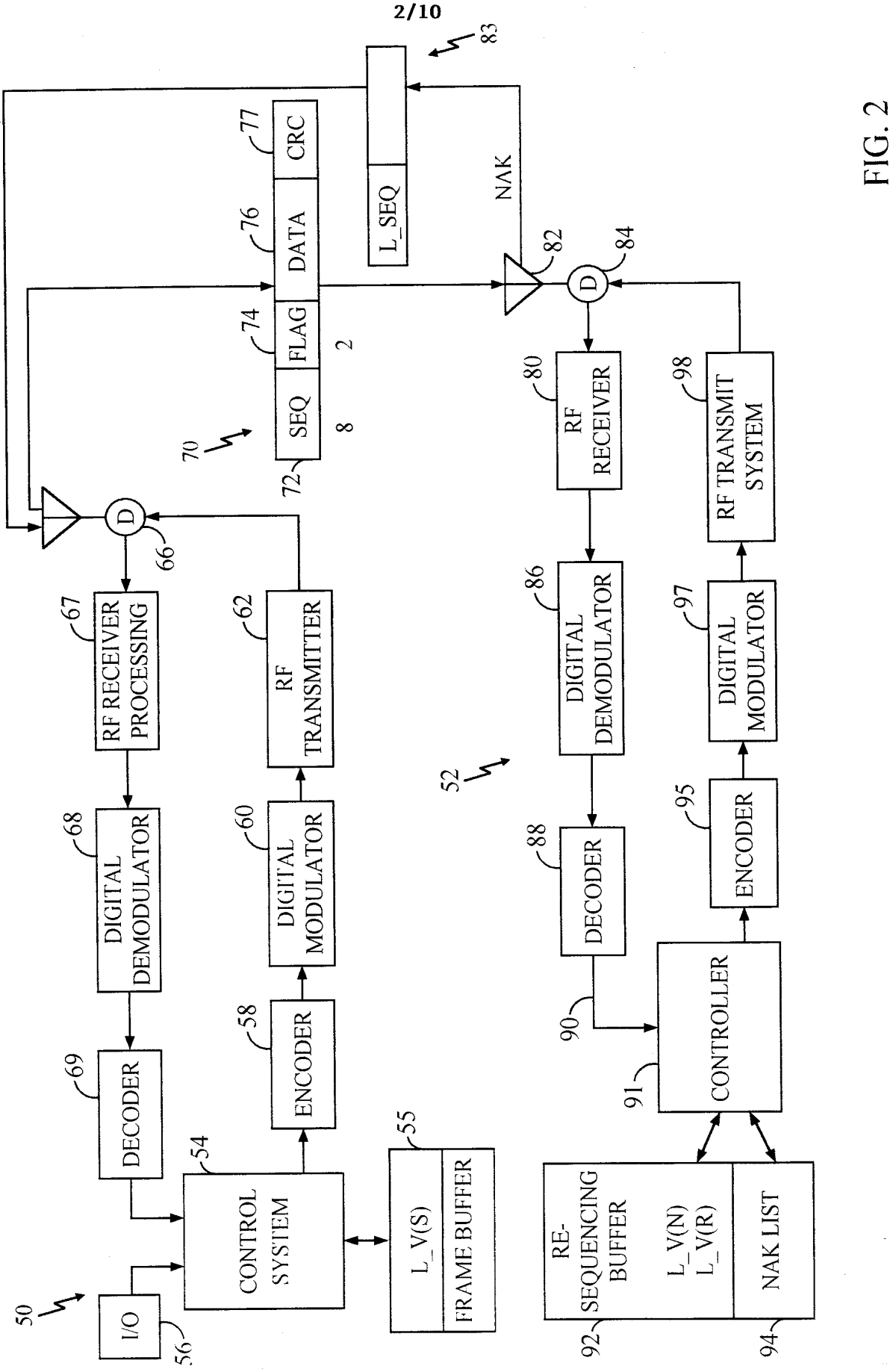


FIG. 2

Petitioners' Exhibit 1007, p. 129
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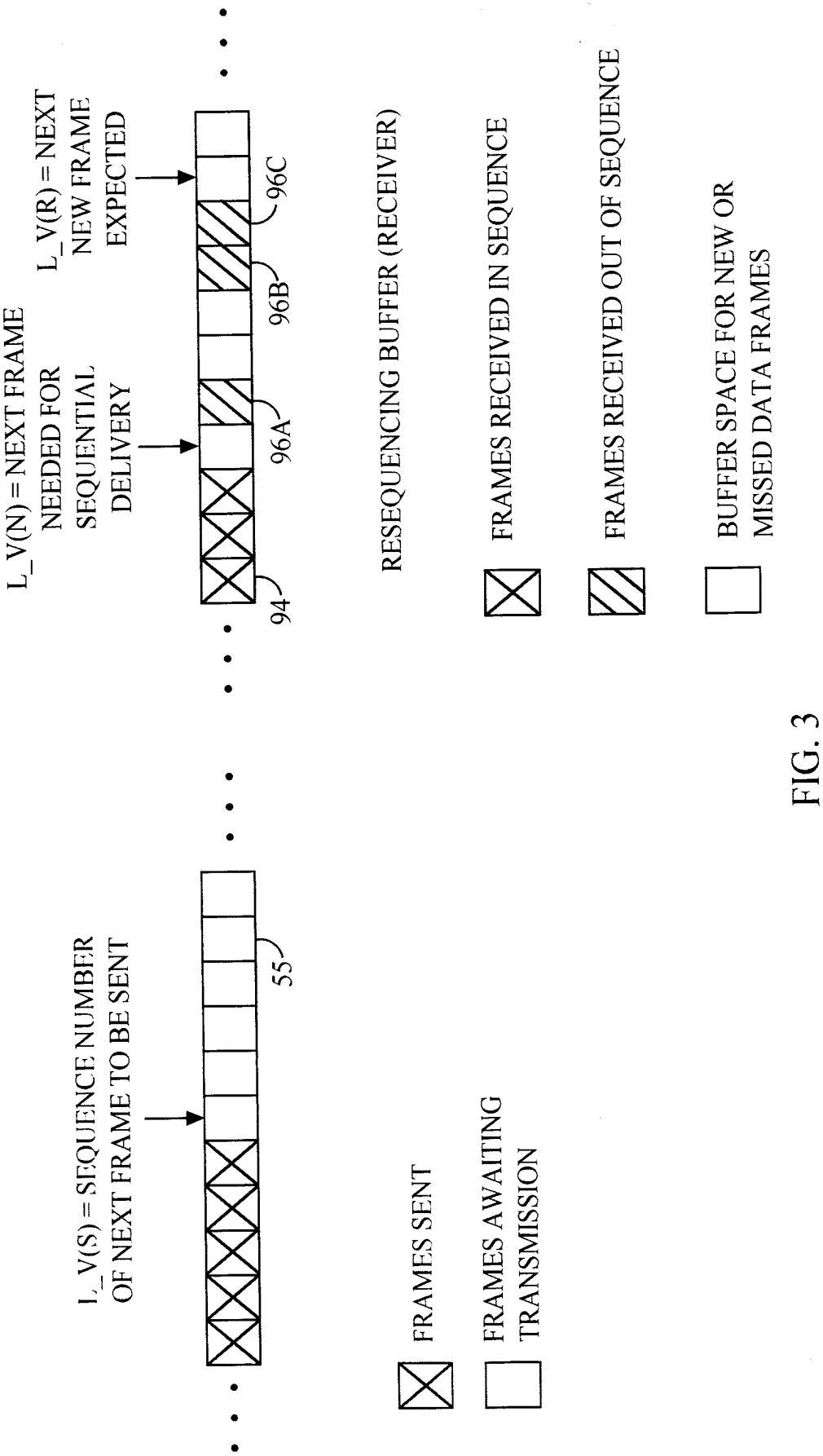


FIG. 3

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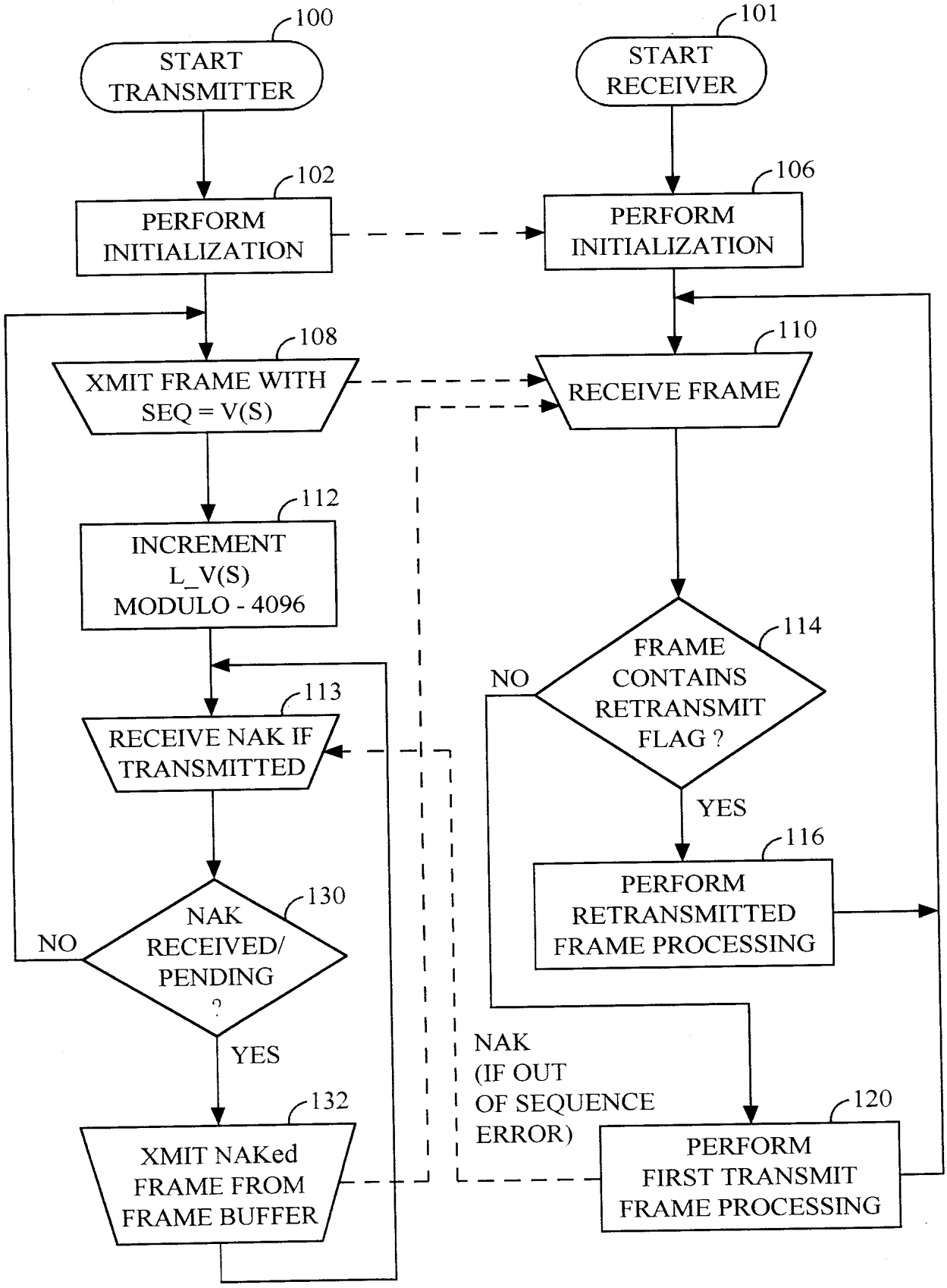


FIG. 4

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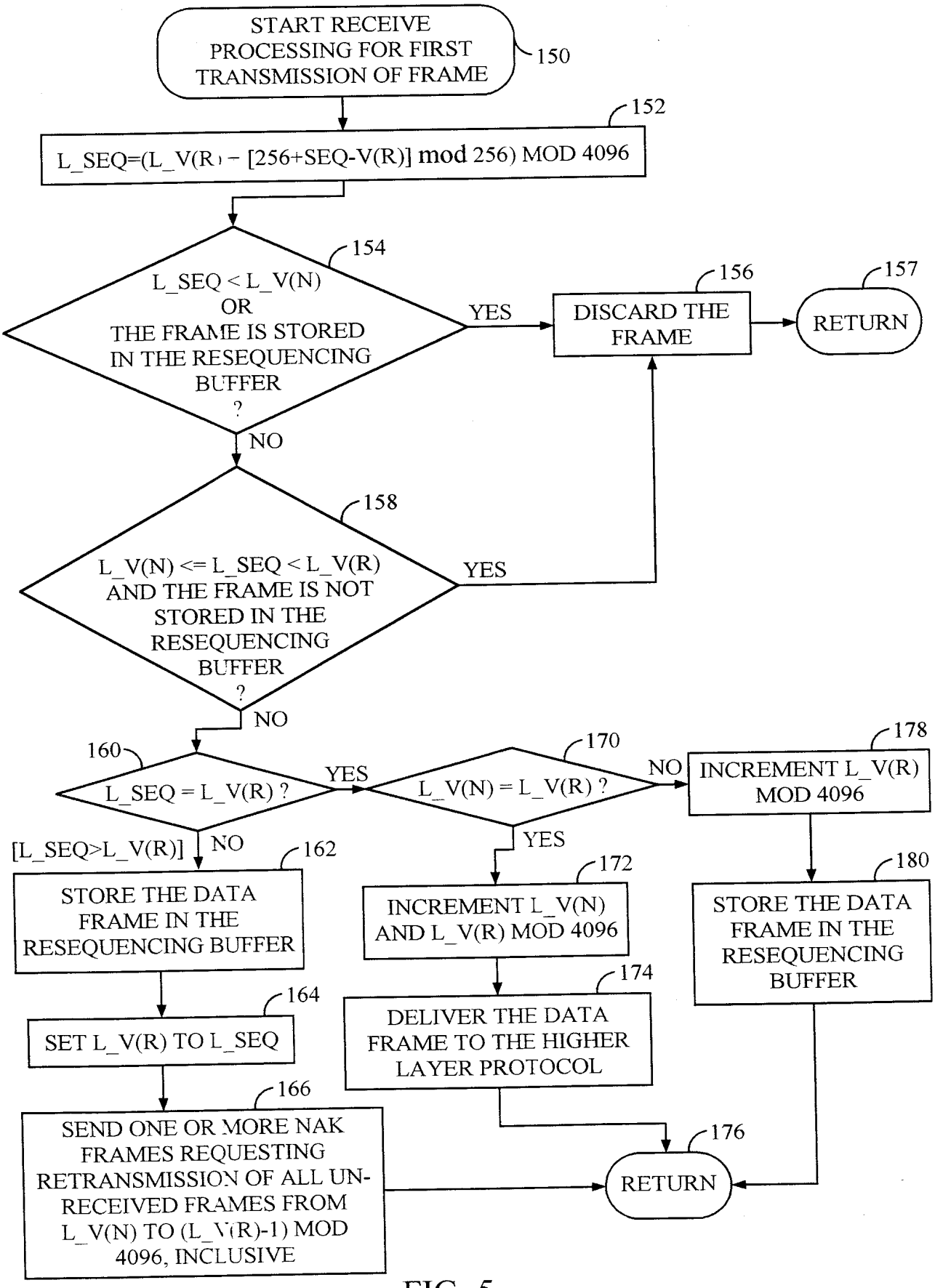


FIG. 5

Petitioners' Exhibit 1007, p. 132
AT&T et al v. Innovative Sonic
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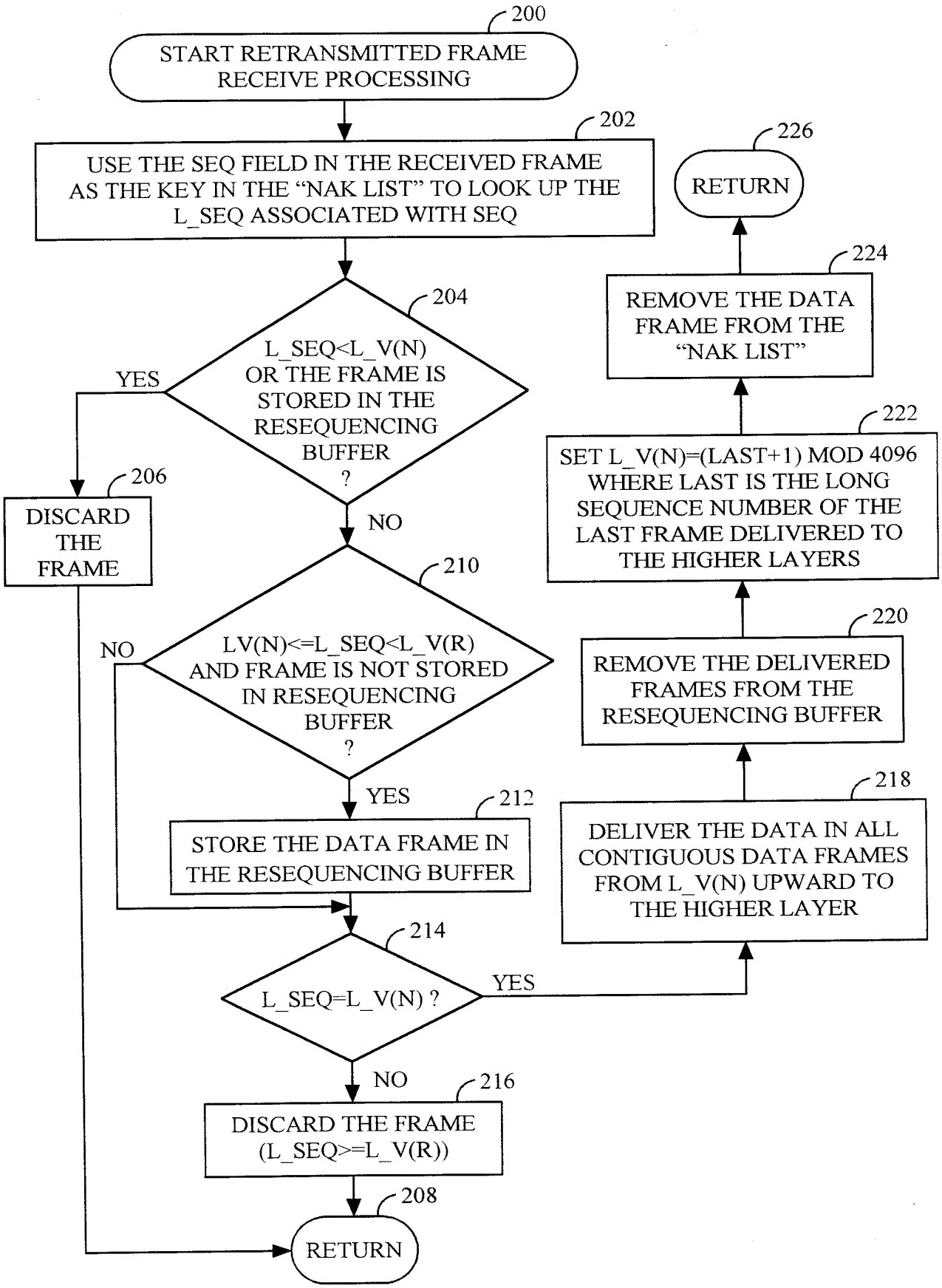


FIG. 6

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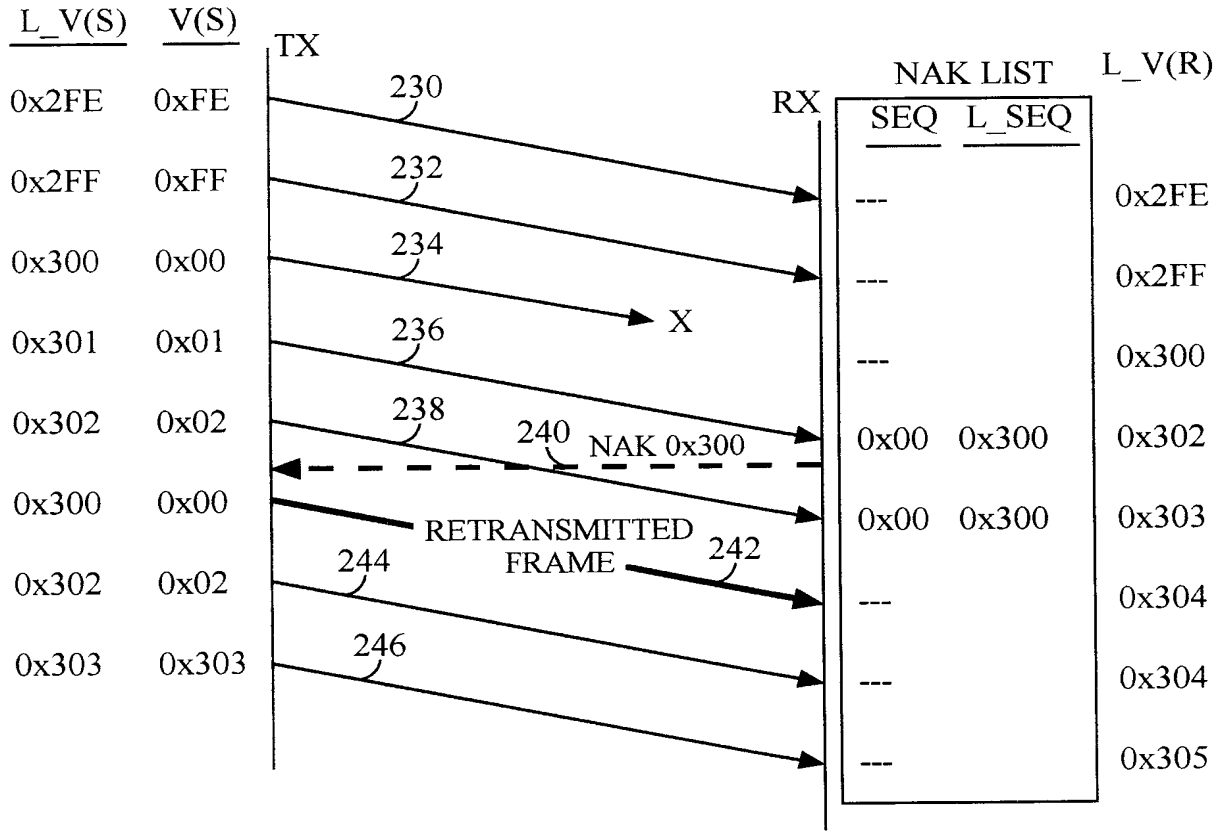


FIG. 7

Petitioners' Exhibit 1007, p. 134
AT&T et al v. Innovative Sonic
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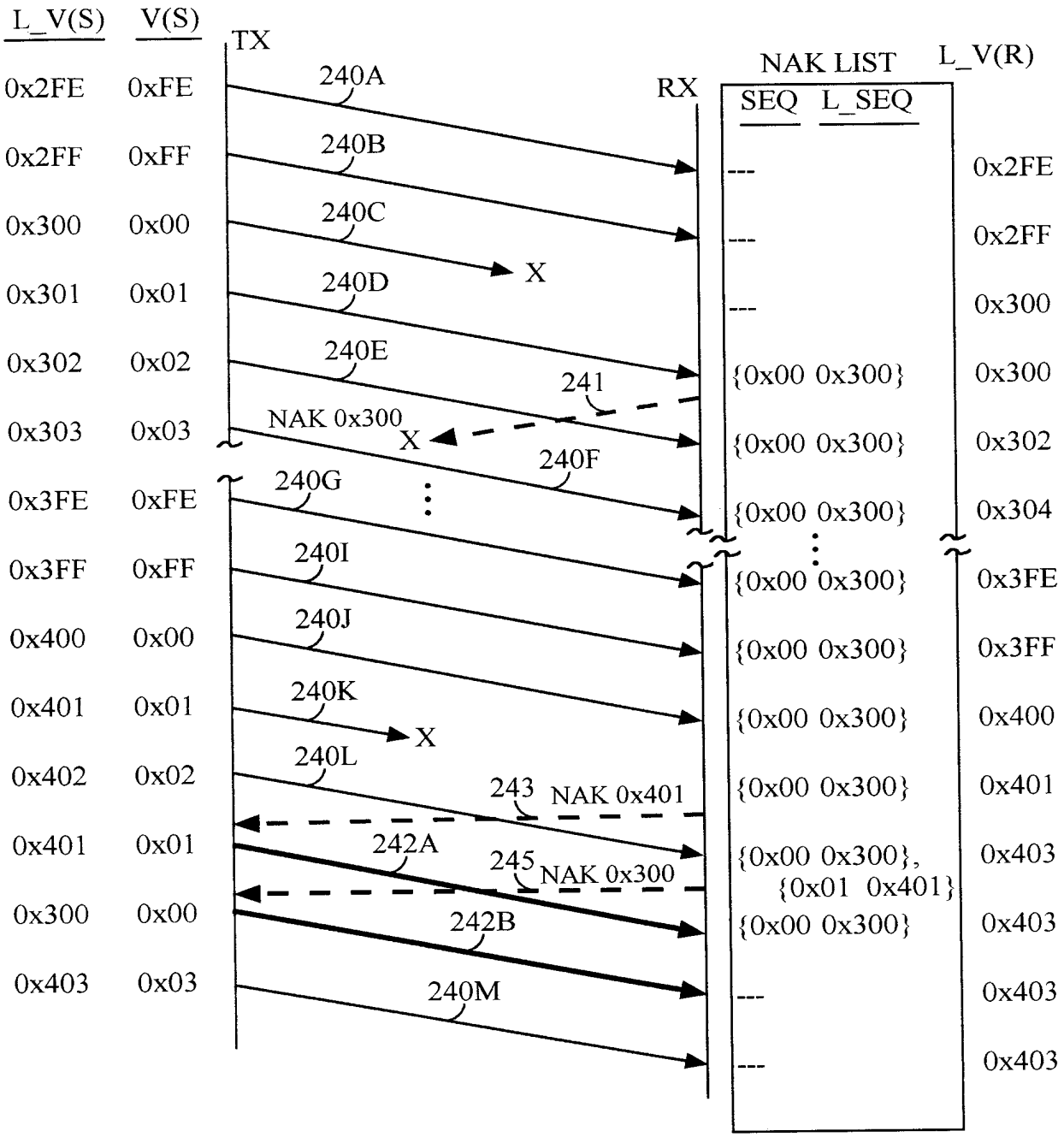


FIG. 8

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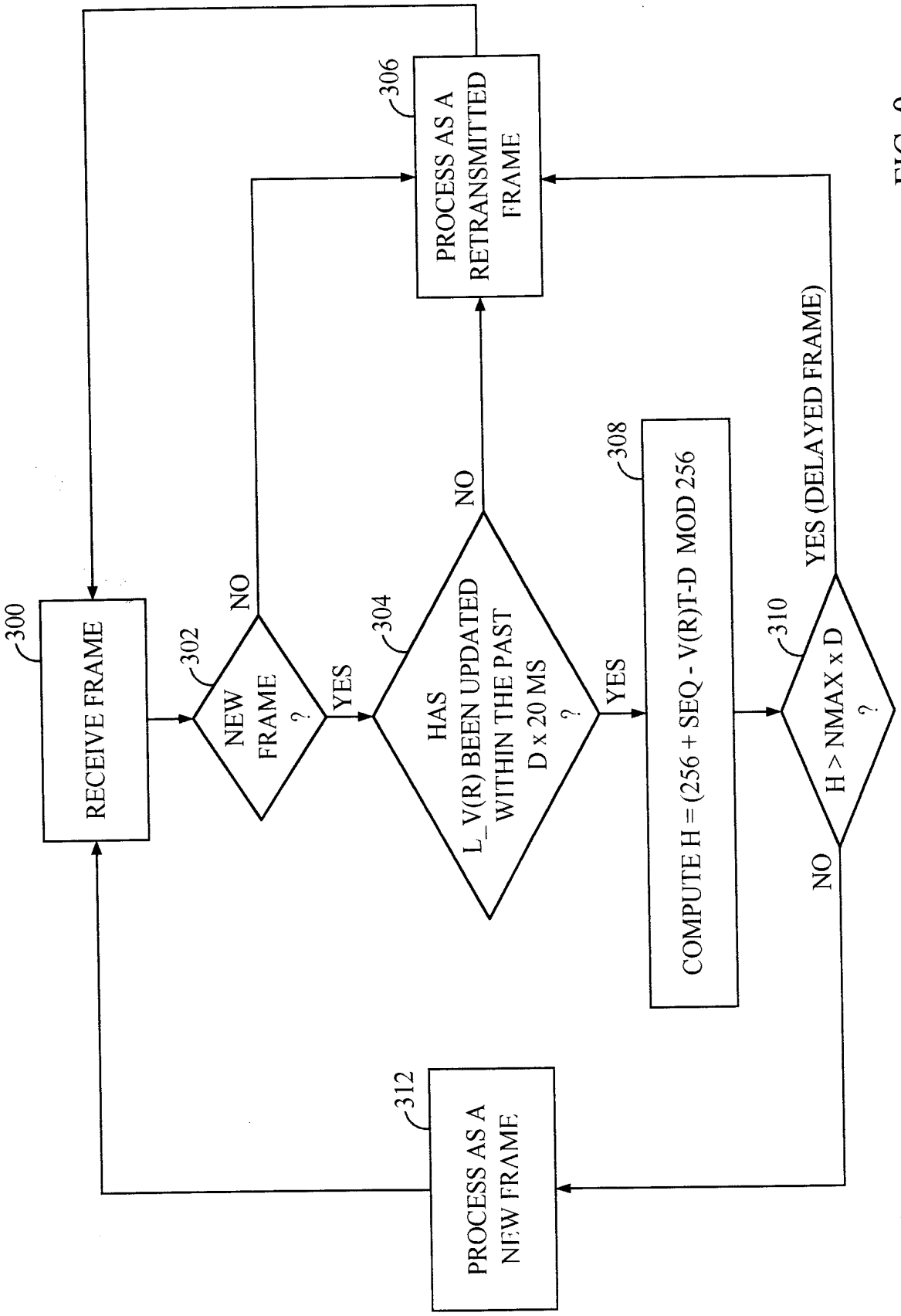


FIG. 9

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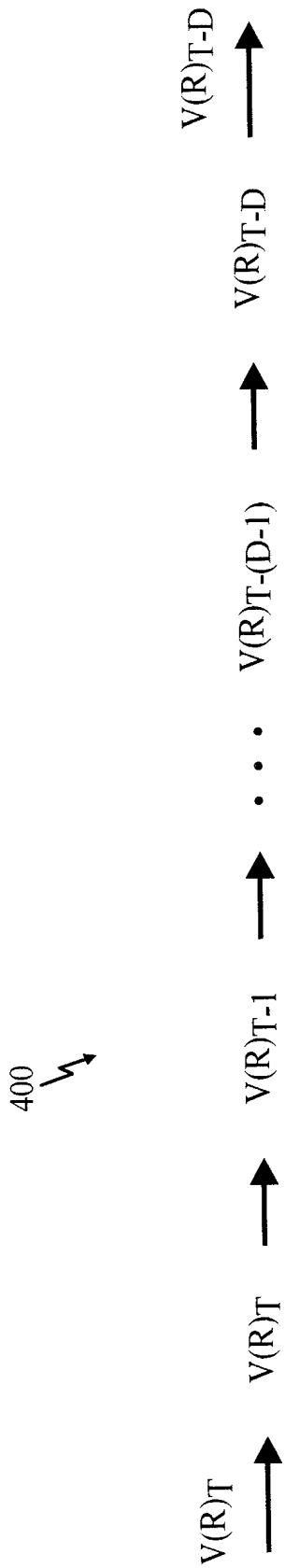


FIG. 10

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INTERNATIONAL SEARCH REPORT

Interr ɔnal Application No
PCT/US 99/11108

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04L29/06 H04L1/18

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 96 36154 A (NOKIA TELECOMMUNICATIONS OY ;KANERVA MIKKO (FI); KARI HANNU (FI);) 14 November 1996 (1996-11-14) abstract page 3, line 33 - line 35 page 4, line 30 - line 34 page 5, line 21 - line 27 page 13, line 19 - line 33 page 14, line 7 -page 15, line 8 claims 1,2,6-8 --- -/--	1-11

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
7 October 1999	14/10/1999

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

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Form PCT/ISA/210 (second sheet) (July 1992)

Petitioners' Exhibit 1007, p. 138
AT&T et al v. Innovative Sonic
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	EASTON M C: "DESIGN CHOICES FOR SELECTIVE-REPEAT RETRANSMISSION PROTOCOLS" IEEE TRANSACTIONS ON COMMUNICATIONS, vol. COM-29, no. 7, 1 July 1981 (1981-07-01), pages 944-953, XP002065807 ISSN: 0090-6778 abstract page 944, right-hand column, paragraph 5 -page 947, right-hand column, paragraph 1 ---	1-3,5-7, 9-11
A	TOMLINSON R S ET AL: "SELECTING SEQUENCE NUMBERS" COMPUTER COMMUNICATIONS REVIEW, vol. 25, no. 1, 1 January 1995 (1995-01-01), pages 45-53, XP000512241 ISSN: 0146-4833 paragraphs '002.!,'005.! ---	1-3,5-7, 9-11
A	SIMMONS J M: "PROOF OF CORRECTNESS OF ATM RETRANSMISSION SCHEME" COMPUTER NETWORKS AND ISDN SYSTEMS, vol. 29, no. 2, 1 January 1997 (1997-01-01), pages 187-194, XP000640505 ISSN: 0169-7552 paragraphs '02.1!,'02.2!,'02.3!,'03.5!,'3.5.1! -----	1-3,5-7, 9-11

2

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/US 99/11108

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9636154 A	14-11-1996	FI 952256 A	10-11-1996
		AU 708324 B	05-08-1999
		AU 5650696 A	29-11-1996
		CA 2193379 A	14-11-1996
		EP 0788702 A	13-08-1997
		JP 10503075 T	17-03-1998
		US 5930233 A	27-07-1999

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The English-language equivalent PCT patent application publication (No. WO 99/60761) of JP (No. 2002-516527) is hereby presented to fulfill the 37 CFR 1.98(a)(3) requirement.

(19)日本国特許庁（ＪＰ）　(12) **公表特許公報（Ａ）**　(11)特許出願公表番号
特表2002－516527
（P2002－516527A）
(43)公表日　平成14年６月４日(2002.6.4)

(51)Int.Cl.[7]	識別記号	ＦＩ		テーマコード（参考）
Ｈ０４Ｌ　29/02		Ｈ０４Ｌ	1/18	５Ｋ０１４
1/18			13/00	３０１Ａ　５Ｋ０３４

審査請求　未請求　　予備審査請求　有　　（全 40 頁）

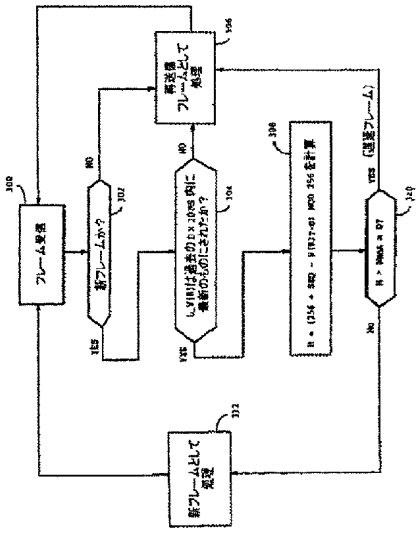
(21)出願番号　特願2000－550252(P2000－550252)
(86)（22)出願日　平成11年５月19日(1999.5.19)
(85)翻訳文提出日　平成12年11月20日(2000.11.20)
(86)国際出願番号　ＰＣＴ／ＵＳ９９／１１１０８
(87)国際公開番号　ＷＯ９９／６０７６１
(87)国際公開日　平成11年11月25日(1999.11.25)
(31)優先権主張番号　０９／０８２，０８５
(32)優先日　平成10年５月20日(1998.5.20)
(33)優先権主張国　米国（ＵＳ）

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(74)代理人　弁理士　鈴江　武彦　（外４名）

最終頁に続く

(54)【発明の名称】　トランスポートファクションにおける遅延データフレーム検出方法

(57)【要約】
【課題】トランスポートファクションにおける遅延データフレーム検出方法
【解決手段】トランスポートファンクションにおける遅延データフレームの検出方法は、フレームシーケンスカウンタを所定の閾値と比較する（３０４），もしシーケンスカウンタが閾値を超えていれば遅延フレームを検出する，およびそれに応じて検出された遅延フレームを処理する（３０６）工程を具備する。ＲＬＰデータトランスポートプロトコルでは、遅延フレームは再送信フレームとして処理されてもよい。閾値は、与えられた１束で送られたフレームの最大数に、比例しても良い。同じフレーム間隔で同時に大気中送られたフレーム間の、複数ユニットのフレーム間隔の単位での、最大の遅延を掛けたものに比例してもよい。



【特許請求の範囲】

【請求項１】　下記工程を含む、複数のフレームが送信器から受信器に送られるトランスポートファンクションにおいて遅延フレーム検出する方法：

受信フレームに関して、フレームシーケンシングカウンタ番号を所定の閾値と比較する，該フレームシーケンシングカウンタ番号は受信フレームのヘッダから引き出される、及び

フレームシーケンシングカウンタ番号が所定の閾値を超えれば、受信フレームを遅延フレームとして検出する。

【請求項２】　検出された遅延フレームを再送信フレームとして処理する工程をさらに具備する、請求項１の方法。

【請求項３】　複数のフレームは複数の束のフレーム中で送られる、

各束は同数のフレームを含み、いずれかの束の中の複数のフレームは同時に送られる、及び

該比較工程は、フレームシーケンシングカウンタ番号を、１束内のフレームの数と１束内で送られたフレーム間のフレーム長の時間増加量における最大遅延時間との積に比例する閾値と比較する

を具備する請求項１の方法。

【請求項４】　トランスポートファンクションが無線リンクプロトコルインターフェイスである、請求項１の方法。

【請求項５】　下記を具備する、複数フレームが送信器から受信器に送られるトランスポートファクションにおける遅延フレームを検出するための装置、

受信フレームに関して、フレームシーケンシングカウンタ番号を所定の閾値と比較するための手段，該フレームシーケンシングカウンタ番号は受信フレームのヘッダから引き出される、及び

フレームシーケンシングカウンタ番号が所定の閾値を超えれば受信フレームを遅延フレームとして検出する手段。

【請求項６】　検出された遅延フレームを再送信フレームとして処理する手段をさらに具備する、請求項５の装置。

【請求項７】　複数のフレームが複数の束のフレーム中で送られる、各束は

同数のフレームを含み、いずれかの束の中の複数のフレームは同時に送られる、及び

該比較手段は、フレームシーケンシングカウンタ番号を、１束内のフレーム数と１束内で送られたフレーム間のフレーム長時間増加量における最大遅延暗闇との積に比例する閾値と比較する、

請求項５の装置。

【請求項８】　トランスポートファンクションが無線リンクプロトコルインターフェイスである、請求項５の装置。

【請求項９】　下記を具備するデータ送信システム、

送信器、

送信器からのデータフレームを受信するためのインターフェイスを介して送信器と接続された受信器、及び

フレームシーケンシングカウンタ番号を所定の閾値と比較するための受信機内に収容されたプロトコル処理要素、該フレームシーケンシングカウンタ番号はデータフレームのヘッダーから引き出される、

ここで、プロトコル処理要素は、そのフレームに関するフレームシーケンシングカウンタ番号が所定の閾値を超える場合に遅延データフレームを検出する。

【請求項１０】　データフレームが同数のフレームを有する複数のグループで送信される、いずれかのグループ内の複数のフレームは同時に送信され、及び所定の閾値は１グループ内のフレームの数と１グループで送られた複数のフレーム間のフレーム長時間増加量における最大遅延時間との積に比例する値を具備する、

請求項９のデータ送信システム。

【請求項１１】　プロトコル処理要素は遅延フレームを再送信フレームとして処理することに寄与する、請求項９のデータ送信システム。

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【発明の詳細な説明】

【０００１】

【発明の属する技術分野】

本発明は、一般に無線通信分野に属し、特により明確にはトランスポートファンクション(transport function)における遅延データフレームの検出に関する。

【０００２】

【従来の技術】

無線通信分野は、例えばコードレス電話，ページング，無線ローカルループおよび衛星通信システムを含む多くの応用分野を有する。特に重要な応用分野は移動加入者用のセルラ電話システムである。（この中で使用しているように、専門語“セルラ”システムはセルラおよびＰＣＳ周波数の両方を包含している）。種々の放送インターフェイスが、例えば周波数分割多重アクセス（ＦＤＭＡ），時分割多重アクセス（ＴＤＭＡ）および符号分割多重アクセス（ＣＤＭＡ）を含むセルラ電話システム用に開発された。これに関連して、種々の国内および国際基準類は、例えば進歩した移動電話サービス（ＡＭＰＳ）、移動体用のグローバルシステム（ＧＳＭ）、および仮基準９５（ＩＳ－９５）を含んで制定された。特に、ＩＳ－９５とその派生物のＩＳ－９５Ａ，ＩＳ－９５Ｂ，ＡＮＳＩＪ－ＳＴＤ－００８，ＩＳ－９９，ＩＳ－６５７，ＩＳ－７０７等（この中ではしばしばＩＳ－９５として集合的に参照される）は、電気通信工業協会（ＴＩＡ）および他の周知の基準団体により公布される。

【０００３】

ＩＳ－９５基準の使用に従って構成されたセルラ電話システムは高度に能率的でたくましいセルラ電話サービスを提供すべくＣＤＭＡ信号処理技術を使用している。本質的にＩＳ－９５基準に従って構成された模範的セルラ電話システムは米国特許番号５，１０３，４５９に記述されており、この特許は本発明の譲受人に譲渡され、引用されて完全にこの中に組み込まれる。前述の特許は、送信、即ち順方向リンク，ＣＤＭＡ基地局での信号処理を説明している。典型的な受信、即ち逆方向リンク，ＣＤＭＡ基地局における信号処理は米国出願番号０８／９８７，１７２－１９９７年１２月９日に出願され、マルチチャネル・デモジュレー

タとタイトルを付けられている－この出願は、本発明の譲受人に譲渡され、引用されて完全にこの中に組み込まれる。ＣＤＭＡ方式では、放送のパワー制御はきわめて重要な論点である。ＣＤＭＡ方式の模範的なパワー制御は米国特許番号５，０５６，１０９に記述されており、これは本発明の譲受人に譲渡れ、引用されて完全にこの中に組み込まれる。

【０００４】

ＣＤＭＡ放送インターフェイスを使用した第１の利点は、通信が同じＲＦバンドで行われることである。例えば、与えられたセルラ電話システムにおける各移動加入者ユニット（代表的にセルラ電話機）はＲＦスペクトラムと同じ１．２５ＭＨｚによる逆方向リンク信号を送信することにより同じ基地局と通信することができる。同様に、そのようなシステムの各基地局はＲＦスペクトラムのもう１つの１・２５ＭＨｚによる順方向リンク信号を送信することにより移動体ユニットと通信することができる。

【０００５】

同じＲＦスペクトラムによる送信信号は、例えばセルラ電話システムの周波数再使用の増加および２つ以上の基地局間のソフトハンドオフを処理する能力を含む種種の利益を提供する。増加した周波数の再使用は、より多数の呼がスペクトラムの与えられた量を超えて導かれることを可能にする。ソフトハンドオフは１つの移動体ユニットが同時に２つの基地局とインターフェイスすることを意味する２つ以上の基地局の管轄領域から移行する際の強力な方法である。（対照的にハードハンドオフは第２の基地局とのインターフェイスを確立する前に第１の基地局とのインターフェイスを終結させることを意味する。）ソフトハンドオフを実行する典型的な方法は、米国特許番号５，２６７，２６１に記述されており、これは本発明の譲受人に譲渡にされ、引用されて完全にこの中に組み込まれる。

【０００６】

ＩＳ－９９およびＩＳ－７０７基準類（以後まとめてＩＳ－７０７と呼ぶ）の下では、ＩＳ－９５追従の通信システムは音声通信およびデータ通信の両サービスを提供することができる。データ通信サービスは１つの受信器および１つ以上の送信器とのＲＦインターフェイスを使用してディジタルデータを交換すること

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ができる。ＩＳ－７０７基準を使用して典型的に送信されるディジタルデータのタイプの例はコンピュータファイルおよび電子メールを含む。

【０００７】

ＩＳ－９５基準およびＩＳ－７０７基準の両方に従って、無線端末と基地局との間のデータ交換はフレーム内で処理される。データ伝送中にフレームが成功裡に送信される可能性を増大させるために、ＩＳ－７０７は成功裡に送信されたフレームを追跡するため、またフレームの送信が不成功のときフレーム再送信を行うため、無線リンクプロトコル（ＲＬＰ）を使用する。ＩＳ－７０７では再送信は３回まで行われ、フレーム送信が成功したことを確認するための追加ステップを取ることはより高位のレイヤ・プロトコル(layer protocols)の責任である。

【０００８】

フレームが成功裡に送信されたことを追跡するために、ＩＳ－７０７は送信された各フレームにおけるフレームヘッダとして含まれるべき８ビットのシーケンス番号を要求する。シーケンス番号は０から２５６まで各フレームごとに増大され、その後０にリセットされる。送信が不成功だったフレームは順番外のシーケンス番号を有するフレームが受信されるとき検出され、あるいはエラーはＣＲＣチェックサム情報または他のエラー検出法を使用して検出される。一度送信不成功フレームが検出されると、受信器は受信しなかったフレームのシーケンス番号を含む送信システムにネガティブアックノリッジ(negative-acknowledgment)メッセージ（ＮＡＫ）を送信する。その後送信システムは初めから送信されたようなシーケンス番号を含むフレームを再送信する。もし再送信されたフレームが成功裡に受信されないと、第２のネガティブアックノリッジメッセージが送信システムに送られる。送信システムは失敗送信のコントローリングアプリケーションまたはネットワーク・レイヤを通知することによって典型的に応答する。

【０００９】

ＩＳ－９５ＡおよびＩＳ－７０７の下では、２０ミリセカンド（ｍｓ）ごとに１回、フレームが送信される。従って、８ビットのシーケンス番号は５秒間隔で送信された２５６フレームを追跡することができる。５秒は、失敗送信フレームを検出し、再送信を行うのに全く十分であり、従って８ビットのシーケンス番号

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はフレーム再送信に十分な時間を供給する。このように、再送信フレームはそれによって８ビットのシーケンス番号が繰り返されるシーケンス“ラップアラウンド(wrap-around)”によって引き起こされるあいまいさ無しに独特に確認されることができる。

【００１０】

しかしながら、ＩＳ－９５ＡおよびＩＳ－７０７の最初の開発以来、追加のプロトコル類および基準類が提案され、データをより高速に送信できるものが開発された。典型的に、これらの新しいプロトコル類および基準類は、既存のシステムおよび基準類との互換性をできるだけ大きく保つためにＩＳ－９５ＡおよびＩＳ－７０７と同じフレーム構成を使用している。それでも既存の基準類およびシステムとの互換性を保つことが望ましいとは言え、これらの高速プロトコルおよび基準類内のフレームと同タイプのフレームを使用することは本質的に与えられた時間内に送信されるフレーム数を増加させる。例えば、もし送信レートが４倍に増加すれば、以前は５秒を要した２５６フレームの送信に必要な時間は１．２５秒に減少される。１．２５秒の時間は失敗したフレーム送信を検出し、８ビットのシーケンス番号を繰り返す前に再送信を試みるのに全く十分である。このように、８ビットのシーケンス番号の使用は、望ましい再送信シーケンスを行うのに必要な時間で独特なフレーム確認をさせるには不十分である。

【００１１】

周知のプロトコル，無線リンクプロトコル（ＲＬＰ）は大気中送られた(sent over the air）フレームに含まれた８ビットのシーケンスカウンタを使用する。８ビットは、受信器と送信器の両方で内部に保持された１２ビットカウンタの最も重要性の小さいビットを表す。１２ビットカウンタは大気中送られた８ビット番号に基づいて最新のものにされる。遅延フレームが問題を呈することは当然である。もし多重フレームが送信器から同時に送られ、受信器で互いに遅延するだけならば、１２ビットカウンタは間違って最新のものにされ、またＲＬＰは失敗するであろう。

【００１２】

シーケンス番号のビット数が増加される一方で、そのような増加はフレームフ

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ォーマットに実質上の警報を出し、したがって既存のシステムおよび基準類との実質的な互換性を保持するゴールを侵害する。さらにシーケンス番号におけるビット数の増加は、利用可能なバンド幅をむだにする。従って、シーケンスカウンタを表すために使用されるビットの数を増加するような従前の解決策は、送信当りの付加的費用を導入させ、トランスポートサービスの正味のスループットを減少させるので、不適当である。このゆえに、シーケンス番号として使用されるビット数を修正すること無しにシーケンス番号レンジを拡張する方法を提供することが望ましい。このような方法は、シーケンス番号から遅延フレームとして引き出された極端に大きい数の紛失データフレームを判断するのに好都合であり、それによってトランスポートファンクションのスループットを増加させる余地がある。このように最小数のビットを使用してトランスポートファンクションにおける遅延フレームを検出する効率的な方法が必要となる。

【００１３】

【課題を解決するための手段】

本発明は最小数のビットを使用してトランスポートファンクションにおける遅延フレームを検出する効率的な方法に関するある。それゆえにフレームが送信器から受信器に送られるトランスポートファンクションにおける遅延データフレームの検出方法は、受信フレームのための比較のステップ，あらかじめ定めちれた閾値を有するフレームシーケンシングカウンタ番号，受信フレームのヘッダから引き出されているフレームシーケンシングカウンタ番号，そしてもしフレームシーケンシングカウンタ番号が閾値を超えるならば受信フレームを遅延フレームとして検出する比較ステップを含んでいる。発明の１局面において、データ送信システムは１台の送信器，この送信器からデータフレームを受けるためのインターフェイスを経由して送信器と接続された１台の受信器，およびフレームシーケンシングカウンタ番号をあらかじめ定めた閾値と比較するため受信器に収容されたプロトコル処理要素，データフレームのヘッダから引き出されるフレームシーケンシングカウンタ番号，もしフレームシーケンシングカウンタ番号が閾値を超えると遅延データフレームを検出するプロトコル処理要素を含んでいる。

【００１４】

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【発明の実施の形態】

下記の実施例は、ＩＳ－７０７およびＩＳ－９５基準類のＣＤＭＡ信号処理技術を使用して動作する個人通信システムに属する。本発明は特にそのような通信システム内での使用に適していると同時に、本発明がフレームまたはパケットによってデータを送信し、無線通信システムと有線通信システムの両方および衛星－基地通信システムを含む種々の他のタイプの通信システムに使用されてもよいことが理解される。その上、説明の至る所に種々の周知のシステムがブロックの形で述べられている。これは開示を不必要にあいまいにするのを避けるためになされている。

【００１５】

無線電話通信用の各種セルラ方式は放送インターフェイスを経由して移動体ユニットと通信する固定基地局を使用する。このようなセルラ方式は、例えばＡＭＰＳ（アナログ），ＩＳ－５４（北米ＴＤＭＡ），ＧＳＭ（移動通信用グローバルシステムＴＤＭＡ），およびＩＳ－９５（ＣＤＭＡ）を含んでいる。好ましい実施例ではセルラ方式はＣＤＭＡシステムである。

【００１６】

図１に示すように、ＣＤＭＡ無線電話システムは一般に複数の加入者ユニット１０，複数の基地局１２，１つの基地局コントローラ（ＢＳＣ）１４，および１つの移動交換センタ（ＭＳＣ）１６を含んでいる。ＭＳＣ１６は旧来の公衆電話交換網（ＰＳＴＮ）１８とインターフェイスして構成される。ＭＳＣ１６はまたＢＳＣ１４とインターフェイスして構成される。ＢＳＣ１４はバックホール・ライン(backhaul line)で各基地局１２と接続される。バックホール・ラインは、例えばＥ１／Ｔ１，ＡＴＭ，またはＩＰを含むいくつかの周知のインターフェイスのどれかにより構成されてもよい。システムには１つ以上の基地局１４があり得ることは理解されるべきである。各基地局１２は好都合にも少なくとも１つのセクタ（図示せず）を含み、各セクタは基地局１２から放射状に遠ざかる特定の方向を指示する１つのアンテナを含んでいる。あるいはまた、各セクタはダイバーシティ受信用の２本のアンテナを含んでもよい。各基地局１２は好都合にも複数の周波数割当（各周波数割当は１．２５ＭＨｚスペクトラムから成る）をサポ

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ートするように設計されてもよい。１セクタの(intersection)および周波数割当はＣＤＭＡチャネルとして参照されてもよい。基地局１２はまた基地局トランシーバ・サブシステム（ＢＴＳｓ）１２として知られる。あるいは“基地局”は工業において１つのＢＳＣ１４および１つ以上のＢＴＳ１２に集約的に参照され、これらのＢＴＳ１２はまた“セルサイト”１２を表示してもよい。（あるいはまた、与えられたＢＴＳ１２の個々のセクタはセルサイトと呼ばれてもよい。）。移動加入者ユニット１０は代表的にセルラ電話機１０であり、そしてセルラ電話システムは好都合にもＩＳ－９５基準の使用に従って構成されたＣＤＭＡシステムである。

【００１７】

セルラ電話システムの代表的な動作中、基地局１２は移動体ユニット１０のセットから複数組の逆方向リンク信号を受信する。移動体ユニット１０は、電話通信または他の通信を処理している。与えられた基地局１２で受信された各逆方向リンク信号はその基地局１２内で処理される。結果として生じたデータは、ＢＳＣ１４に転送される。ＢＳＣ１４は呼の発信源の位置と基地局１２間のソフトハンドオフのオーケストレーション(orchestration)を含む移動性管理機能を供給する。ＢＳＣ１４はまた受信データをＭＳＣ１６に発送し、ＭＳＣ１６はＰＳＴＮ１８とインターフェイスするための付加的なルーティングサービスを供給する。同様に、ＰＳＴＮ１８はＭＳＣ１６とインターフェイスし、ＭＳＣ１６はＢＳＣ１４とインターフェイスし、ＢＳＣ１４は複数組の移動体ユニット１０に複数組の順方向リンク信号を送信するために基地局１２を順番に制御する。

【００１８】

下記の実施例において、アルゴリズムは大気中送られたフレームを数えるために８ビットのシーケンス番号を周知の技術の無線リンクプロトコル（ＲＬＰ）に従って１２ビットのシーケンス番号にマッピングする働きをする。アルゴリズムは好都合にもＲＬＰソフトウェア命令およびマイクロプロセッサとともに実行される。一実施例において、ＲＬＰ構成要素は１つの基地局１２に属してもよい。あるいはＲＬＰ構成要素は１つのＢＳＣ１４に属してもよい。これらの技術はＲＬＰアルゴリズムがＢＳＣ１４または基地局１２内で使用されるばかりでなく、

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多重データフレームが特殊な処理期間に受信されるどのトランスポートレイヤにおいても使用されるということの真価を認める。

【００１９】

図２には、模範的な実施例に従って構成された２つの通信システムがブロックの形で図示されている。高速通信は送信器５０から受信器５２に導かれる。典型的な構成では、送信器５０は１つの基地局１２に位置し、受信器５２は１つの無線端末１０内にあるが、この配置は逆であってもよい。送信器５０内では、制御システム５４は入出力装置（Ｉ／Ｏ）５６からデータフレームを受信して、このデータを符号器５８に供給する。符号器５８は通常の符号化を行い、ディジタル変調器６０で受信されるコードシンボルを発生する。ディジタル変調器６０は１つ以上のバイナリ・チャネルコードおよび１つ以上のバイナリ拡張コードを有するコードシンボルにダイレクトシーケンス変調を行い、無線通信周波数（ＲＦ）送信器６２によって受信されるチップドシンボル(chipped symbols)を産出する。チップドシンボルはＲＦ送信器６２によって搬送周波数帯にアップ変換され、ダイプレクサ６６経由でアンテナシステム６４から送信される。

【００２０】

ディジタル変調およびＲＦアップ変換を行う種々の方法および装置が使用され得る。持に有用な方法および装置のセットは、出願中の次の米国出願に記述されている。即ち出願番号０８／４３１１８０，表題「ＭＥＴＨＯＤＡＮＤＡＰＰＡＲＡＴＵＳＦＯＲＰＲＯＶＩＤＩＮＧＶＡＲＩＡＢＬＥＲＡＴＥＤＡＴＡＩＮＡＣＯＭＭＵＮＩＣＡＴＩＯＮＳＳＹＳＴＥＭＵＳＩＮＧＳＴＡＴＩＳＴＩＣＡＬＭＵＬＴＩＰＬＥＸＩＮＧ（統計的多重化を使用した通信システムにおける可変レートデータを供給する方法および装置）」１９９５年４月２８日提出、出願番号０８／３９５，９６０，表題「ＭＥＴＨＯＤＡＮＤＡＰＰＡＲＡＴＵＳＦＯＲＰＲＯＶＩＤＩＮＧＶＡＲＩＡＢＬＥＲＡＴＥＤＡＴＡＩＮＡＣＯＭＭＵＮＩＣＡＴＩＯＮＳＳＹＳＴＥＭＳＵＳＩＮＧＮＯＮ－ＯＲＴＨＯＧＯＮＡＬＯＶＥＲＦＬＯＷＣＨＡＮＮＥＬＳ（非直交オーバーフローチャネルを使用した通信システムにおける可変レートデータを供給する方法および装置）」１９９５年２月２８日提出；および出願番号０８／７８４，２８１，表題「ＨＩＧＨＤＡＴＡＲＡ

ＴＥＳＵＰＰＬＥＭＥＮＴＡＬＣＨＡＮＮＥＬＦＯＲＣＤＭＡＴＥＬＥＣＯＭＭＵＮＩＣＡＴＩＯＮＳＳＹＳＴＥＭ（ＣＤＭＡ電気通信システム用の高速データ付加チャネル）」１９９７年１月１５日提出；これら出願のそれぞれは、本発明の譲受人に譲渡され、引用されることより完全にこの中に組み込まれる。上記参照特許出願のあるものは、順方向リンクに導入され、したがって送信器５０との使用にさらに適しており、また他のものは逆方向リンクに導入され、したがって受信器５２との使用にさらに適していることが理解される。

【００２１】

例示的な実施例において、アンテナシステム６４から送信されたデータは８ビットのシーケンスフィールド（ＳＥＱ番号）７２，再送信フラグ７４，およびデータフィールド７６を含むフレーム７０に従ってフォーマットされている。フレーム７０は本発明には特に関係がないため図示されていない他のフィールドを含んでもよい。好ましい実施例では、フレームは本質的にＩＳ－７０７基準に定義されたフレーム構造に従って、また再送信フラグ７４を付加してフォーマットされる。

【００２２】

データフレームを通常の方法で符号器５８に供給するために、制御システム５４はフレームバッファ５５内にフレームを蓄積し、インデックス値Ｌ＿Ｖ（Ｓ）を最新のものにする。フレームバッファ５５およびインデックス値Ｌ＿Ｖ（Ｓ）は、メモリシステム内に蓄積されることが好ましい。好ましい実施例では、インデックス値Ｌ＿Ｖ（Ｓ）は１２ビットのシーケンス番号であり、それは後でさらに詳しく述べるように各フレームの送信後に増大される。インデックス値Ｌ＿Ｖ（Ｓ）の最も重要性の小さい８ビットはフレームのシーケンスフィールド７２内に配列される。

【００２３】

受信器５２内では、ＲＦ受信器８０はフレーム７０がアンテナシステム８２およびダイプレクサ８４を使用して送信されるＲＦ信号をダウン変換およびでディジタル化する。ディジタル復調器８６は必要なバイナリコードを使用してダウン変換された信号すなわち“ベースバンド”の信号を復調し、復号器８８によって

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受信されるソフトデシジョン(soft decision)データを発生する。復号器８８は、コントローラ９１に供給するハードデシジョンデータ９０を産出して、最大の可能性のあるトレリス(trellis)，またはビタビ、復号を実行する。

【００２４】

コントローラ９１は、ハードデシジョンデータ９０を使用してフレーム７０を作り変え、そして後でさらに詳しく述べるような再配列バッファ９２とＮＡＫリスト９４のようなＳＥＱ番号，インデックス値Ｌ＿Ｖ（Ｎ），およびＬ＿Ｖ（Ｒ）を使用して、該フレームが既に受信されていたフレームに対して順々に受信されていたかどうかを決定する。

【００２５】

もし、コントローラ９１が、フレームは既に受信されていたフレームに対して順々でなく受信されていたと決定すると、またはもしフレームが誤って受信されると決定すると、それは符号器９５によって受信されるネガティブ－アックノリッジメント（ＮＡＫ）メッセージを作成する。符号器９５はなるべくならＩＳ－９５リバースリンクに従って、ディジタル変調器９７によって変調されたダイレクトシーケンス拡張スペクトラムであるコードシンボルを生成するために畳み込み符号化を行い、またチップドシンボルはＲＦ送信システム９８によってアップ変換されそしてダイプレクサ８４を経由してアンテナシステム８２からＮＡＫ８３として送信される。ＮＡＫされたフレーム用のＬ＿ＳＥＱはＮＡＫリスト９４内に蓄積される。

【００２６】

再び送信器５０を参照すると、ＲＦ受信器６７はアンテナシステム６４およびダイプレクサ６６を経由してＲＦ信号を受信する。ＲＦ受信器６７はＲＦ信号をダウン変換およびディジタル化し、ディジタル復調器６８を使用して復調されるサンプルを産出する。復号器６９はディジタル復調器６８からのソフトデシジョンデータを復号化し、そして制御システム５４は復号器６９からハードデシジョンデータを受信し、それによってハードデシジョンデータに含まれている受信器５２からのＮＡＫ８３を検出する。

【００２７】

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制御システム５４はＮＡＫ８３を受信し、送信フレームバッファ５５からＮＡＫされたフレームを回収する。回収されたフレームは上述したように（最初のシーケンス番号を含んで）最初の送信に従って再送信される。

【００２８】

１実施例に従って使用されるときの、フレームバッファ５５，再配列バッファ９２およびインデックスＬ＿Ｖ（Ｓ），Ｌ＿Ｖ（Ｎ），およびＬ＿Ｖ（Ｒ）の構成は図３に示されている。送信フレームバッファ５５内では、既に送信されたフレームは一度隠され(shaded)、送信されるべきフレームはクリアされる。好ましい実施例では、インデックスＬ＿Ｖ（Ｓ），Ｌ＿Ｖ（Ｎ），およびＬ＿Ｖ（Ｒ）は１２ビット番号である。インデックスＬ＿Ｖ（Ｓ）は送信されるべき次フレームのシーケンス番号に設定される。フレームが実際に送信される時、フレームの８ビットＳＥＱ番号はインデックスＬ＿Ｖ（Ｓ）の最も重要性の小さい８ビットに設定される。

【００２９】

再配列バッファ９２内では、インデックスＬ＿Ｖ（Ｒ）は期待される新しい次のフレームの１２ビットシーケンスに設定される。インデックスＬ＿Ｖ（Ｎ）は順送りのためにまたは処理がなお未決定であるために必要な次フレームの１２ビットシーケンスに設定される。ＮＡＫ８３の予定された番号が対応するフレームを受信せずに送られた時には、試みられたフレームの処理は終結され、紛失フレームを持ったデータは例えばトランスポートレイヤのようなより高位のレイヤプロトコルに変化される。ＮＡＫされたフレーム９６ａ乃至９６ｃは、すべてをひっくるめてＬ＿Ｖ（Ｎ）と（Ｌ＿Ｖ（Ｒ）－１）ＭＯＤ４０９６との間のシーケンス番号を持って受信され得る。

【００３０】

図４において、フロー図は１実施例に従って実行された通信中の送信器５０および受信器５２の動作を説明している。送信はステップ１００で送信器で始まり、受信器での受信はステップ１０１で起こる。ステップ１０２では、初期化が行われ、その間インデックスＬ＿Ｖ（Ｓ）は送信器５０内でゼロに設定され、Ｌ＿Ｖ（Ｒ）は受信器５２内でゼロに設定される。

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【００３１】

ステップ１０８で、データが送信可能な時、フレームのＳＥＱ番号はインデックスＬ＿Ｖ（Ｓ）の重要性が最小の８ビットに設定されており、またフレームＶ（Ｓ）として参照されているフレームのＳＥＱ番号を有しており、送信器５０はこのフレームを送信する（点線で示す）。さらに、再送信フラグはフレームが新しく送信されたフレームであることを示すゼロに設定される。ステップ１１２で、インデックスＬ＿Ｖ（Ｓ）はＭＯＤ４０９６に増加され、そしてステップ１１３で送信器は受信器５２から送信されたいずれのＮＡＫメッセージに対しても受信処理を行う。１実施例において、どのデータも利用不能である時、最近のＳＥＱ番号を有している“無効”フレームはデータが利用可能になるまで繰り返し送られてもよい（無効送信は示されていない）。

【００３２】

ステップ１３０で送信器５０はＮＡＫ８３が受信されたかまたは未決定であるかを決定し、そしてもしそうならＮＡＫされたフレームはＮＡＫメッセージに含まれた長いシーケンス番号を使用して送信フレームバッファから回収され、ステップ１３２で最初のＳＥＱ番号とともに再送信され、そして再送信フィールドはゼロにセットされる。いったんフレームは未決定を再送信されるかまたは受信したＮＡＫ８３がクリアされると、その後ステップ１１３で処理が続く。

【００３３】

もしＮＡＫメッセージが受信されないかまたは未決定でないならば、送信器はステップ１０８に戻り、処理は続く。

【００３４】

受信器５２内では、ステップ１０１で処理が始まり、またステップ１０６でＬ＿Ｖ（Ｓ）が送信器５０から受信される。ステップ１１０で、受信器５２は送信器５０からステップ１０８（新しい送信）またはステップ１３２（再送信）のどちらかで送信されたフレームを受信し、そしてステップ１１４で受信器５２は受信したフレームが再送信されたフレームか新しいフレームかを決定するためにフレームの再送信フラグの状態を調べる。もしフレームが再送信フレームであれば、再送信処理がステップ１１６で行われ、そしてその後受信器はステップ１１０

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に戻る。もしフレームが再送信フレームでないならば、フレームの最初の送信処理がステップ１２０で行われ、そしてその後ステップ１１０が再び行われる。

【００３５】

図５において、フローチャートは１実施例に関する図４のステップ１２０の期間、フレームの最初の送信を処理する時の受信器５２の動作を示している。最初の送信処理はステップ１５０で始まり、そしてステップ１５２でＬ＿ＳＥＱは次式に従って設定される。

【００３６】

Ｌ＿ＳＥＱ＝｛Ｌ＿Ｖ（Ｒ）+[256+ＳＥＱ＿Ｖ（Ｒ）]MOD256｝MOD4096,(1)

ここでＶ（Ｒ）はＬ＿Ｖ（Ｒ）の最も重要性の小さい８ビットであり、またＳＥＱは処理されているフレームのＳＥＱフィールドに含まれるシーケンス番号である。ステップ１５４でＬ＿ＳＥＱがＬ＿Ｖ（Ｎ）以下かどうか、またフレームが再配列バッファ９２に蓄積されたかどうかが決定される。もしそうなら、ステップ１５６でフレームは捨てられ、そしてステップ１５７で受信システムは最初の送信処理から戻る。上述したように、Ｌ＿Ｖ（Ｎ）はデータの順送りに必要な次のフレームに設定される。

【００３７】

もしＬ＿ＳＥＱがＬ＿Ｖ（Ｎ）以下でなく、そしてフレームが再配列バッファ９２に蓄積されていなければ、さらに先のステップ１５８でＬ＿ＳＥＱがＬ＿Ｖ（Ｎ）以上かまたは等しいかおよびＬ＿Ｖ（Ｒ）以下か、そしてフレームが再配列バッファ９２に蓄積されていなかったかどうかが決定される。もしそうなら、ステップ１５６でフレームは捨てられ、またステップ１５７で受信システムは最初の送信処理から戻る。さもなければ、さらに先のステップ１６０でＬ＿ＳＥＱがＬ＿Ｖ（Ｒ）と等しいかどうかが決定され、したがって順送りのためにＬ＿Ｖ（Ｒ）が必要となる。

【００３８】

もしＬ＿ＳＥＱがＬ＿Ｖ（Ｒ）と等しくなければ、順番外のフレームが受信され、ステップ１６２でフレームは再配列バッファ９２に蓄積され、そしてステップ１６４でＬ＿Ｖ（Ｒ）はＬ＿ＳＥＱに設定される。ステップ１６６で、受信シ

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ステムはＬ＿Ｖ（Ｎ）から（Ｌ＿Ｖ（Ｒ）－１）ＭＯＤ４０９６までを含むすべての未受信フレームの再送信を要求するため１つ以上のＮＡＫメッセージを送信する。その後ステップ１７６で受信システムは最初の送信処理から戻る。

【００３９】

もしステップ１６０で、Ｌ＿ＳＥＱがＬ＿Ｖ（Ｒ）と等しいことが決定されると、フレームは順々に受信され、それはステップ１７０でＬ＿Ｖ（Ｎ）がＬ＿Ｖ（Ｒ）と等しいかどうかを決定させて、どのＮＡＫされたフレームも目立たない(outstanding)ことを示す。もしＬ＿Ｖ（Ｎ）がＬ＿Ｖ（Ｒ）と等しければ、ステップ１７２でＬ＿Ｖ（Ｎ）およびＬ＿Ｖ（Ｒ）はＭＯＤ４０９６に増加される。ステップ１７４でデータフレームはより高位のレイヤのプロトコルに送られ、そしてステップ１７６で受信器５２は最初の送信処理から戻る。

【００４０】

もしステップ１６０でＬ＿Ｖ（Ｎ）がＬ＿Ｖ（Ｒ）と等しくなく、したがってＮＡＫされたフレームが目立つままであると決定されると、ステップ１７８でＬ＿Ｖ（Ｒ）はＭＯＤ４０９６に増加され、そしてステップ１８０でフレームは再配列バッファ９２に蓄積される。受信器５２はその後ステップ１７６で最初のフレーム送信から戻る。

【００４１】

図６において、フロー図は１実施例に従って再送信フレームが受信されるステップ１１６の間の受信器５２の動作を示している。再送信フレームの処理はステップ２００で始まり、そしてステップ２０２で受信フレーム内のＳＥＱフィールドはＮＡＫリスト９４（図２参照）内のＳＥＱと提携するＬ＿ＳＥＱをルックアップする鍵として使用される。ステップ２０４でＬ＿ＳＥＱがＬ＿Ｖ（Ｎ）以下であるかどうか、またはフレームが既に再配列バッファ９２に蓄積されたかどうかが決定される。　もしそうなら、ステップ２０６でフレームは捨てられ、そしてステップ２０８で受信器５２は再送信処理から戻る。

【００４２】

もしＬ＿ＳＥＱがＬ＿Ｖ（Ｎ）以下でなく、そしてフレームが再配列バッファ９２に蓄積されていなかったならば、ステップ２１０でＬ＿ＳＥＱがＬ＿Ｖ（Ｎ

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）より大きいかまたは等しいかおよびＬ＿Ｖ（Ｒ）以下かどうかが、またフレームが再配列バッファ９２に蓄積されていなかったかどうかがさらに決定される。もしそうなら、ステップ２１４が実行される以前にステップ２１２でフレームは再配列バッファ９２に蓄積される。さもなければ、ステップ２１４が実行される。

【００４３】

ステップ２１４で、Ｌ＿ＳＥＱがＬ＿Ｖ（Ｎ）と等しいかどうかが決定され、もしも等しくなければ該フレームはステップ２１６で捨てられる。なぜならば、再送信フレームは期待される次の新しいフレームよりも高いシーケンス番号を有し、それ故にエラーが発生したからである。一度フレームが捨てられると、ステップ２０８で受信器５２は再送信フレーム処理から戻る。

【００４４】

もしＬ＿ＳＥＱがＬ＿Ｖ（Ｎ）と等しければ、Ｌ＿Ｖ（Ｎ）からアップワードに処理されている再送信フレームの追加により形成されたすべての隣接フレームにおけるデータはステップ２１８で次のより高位の処理レイヤに引き渡され、そして引き渡されたフレームはステップ２２０で再配列バッファ９２から除かれる。ステップ２２２でＬ＿Ｖ（Ｎ）はＬＡＳＴ＋１にセットされ、ここでＬＡＳＴはステップ２１８でより高位のレイヤに引き渡された最終フレームの長いシーケンス番号（Ｌ＿ＳＥＱ）である。ステップ２２４でフレームはＮＡＫリストから除かれ、そしてステップ２２６で受信器５２は再送信フレームを処理することから戻る。

【００４５】

図７において、メッセージ図は１実施例に従って実行された例示的な通信中に送信されたメッセージを示している。送信器５０は左側に示され、受信器５２は右側に示されている。送信器５０はインデックスＬ＿Ｖ（Ｓ）を保存し、そしてフレームはシーケンスフィールドにおける値Ｖ（Ｓ）とともに送信される。ここでＶ（Ｓ）はＬ＿Ｖ（Ｓ）の最も重要性の小さい８ビットである。受信器５２では各送信後のＮＡＫリストが示されている。すべての番号はヘクサデシマル（ｈｅｘａｄｅｃｉｍａｌ）で示されている。

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【００４６】

第１フレーム２３０はインデックスＬ＿Ｖ（Ｓ）が０×２ＦＥと等しいとき、したがってＳＥＱ番号０×ＦＥを有するとき送信される。フレーム２３０の送信後、インデックスＬ＿Ｖ（Ｓ）は０×２ＦＦに増加され、フレーム２３２はＳＥＱ番号０×ＦＦを有して送信される。フレーム２３０および２３２は共に受信器５２により成功裡に受信され、インデックスＬ＿Ｖ（Ｒ）を０×２ＦＥから０×３００に２倍に増加させる。

【００４７】

フレーム２３４はＳＥＱ番号０×００を有して送信され、受信器５２によって成功裡には受信されない。Ｌ＿Ｖ（Ｓ）はその後０×３０１に増加され、そしてフレーム２３６はＳＥＱ番号０×０１を有して送信され、受信器５２により成功裡に受信される。

【００４８】

フレーム２３６の受信において、受信器５２はフレーム２３４が受信されなかったので順番外のシーケンス番号を検出する。これに答えて、受信器５２は受信しなかったフレーム０×３００のための全１２ビットのインデックスＬ＿Ｖ（Ｒ）を含むＮＡＫメッセージ２４０を発生する。さらに受信器５２はＮＡＫ８３がＳＥＱ番号０×００およびＬ＿ＳＥＱ番号０×３００を有するフレームのために送信されたことを示すべくＮＡＫリスト９４を最新のものにする。また、受信器５２はＮＡＫメッセージ２４０の送信からその終了までの時間を追跡するためのＮＡＫタイマを起動する。

【００４９】

ＮＡＫメッセージ２４０の送信の間、送信器５０はＳＥＱ番号０×０２を有するもう１つのフレーム２３８を送信し、これは受信器５２により成功裡に受信される。ＮＡＫメッセージ２４０の受信において、送信器５０はＳＥＱ番号０×００を有している再送信フレーム２４２を発生し、そして再送信フラグ７４（図２参照）は１に設定される。再送信フレーム２４２の受信において、受信器５２は再送信ビットを検出し、そしてＳＥＱ番号をＮＡＫリスト９４内のＳＥＱ番号と調和させる。一度調和がとられると、再送信フレーム２４２は再配列バッファ９

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２（図２参照）内に配置され、そしてＮＡＫリスト９４内の記載事項は取り去られる。フレーム２４４および２４６はその後で送信されて正常な型で受信される。

【００５０】

図８において、メッセージ図は1実施例に従って実行されたときのシーケンス番号“ラップスアラウンドにおける送信中の送信器５０および受信器５２の動作をさらに進んで示している。フレーム２４０ａおよび２４０ｂはそれぞれインデックスＬ＿Ｖ（Ｓ）の値０×２ＦＥおよびＯ×２ＦＦに相当するＳＥＱ番号０×ＦＥ（すべての番号はヘクサデシマルである）およびＯ×ＦＦを有して送信され、受信器５２により成功裡に受信され、Ｌ＿Ｖ（Ｒ）を０×２ＦＥから０×３００に増加させる。

フレーム２４０ｃはＳＥＱ番号Ｏｘ００を含むが、受信器５２による受信は成功していない。フレーム２４０ｄはＳＥＱ番号Ｏ×０１を含むが、受信器５２により正しく受信される。フレーム２４０ｄの受信において、受信器５２はＳＥＱ番号がＬ＿Ｖ（Ｒ）の最も重要性の小さい８ビットよりも大きいことを、したがってフレームが順番外で受信されたことを検出する。これに答えて、受信器５２はＬ＿Ｖ（Ｒ）を期待される次フレームに対応する０×３０２に最新のものとし、未受信フレームのＳＥＱ番号をＮＡＫリスト９４内に配置する。さらに、受信器５２は受信されなかったフレームの完全なＬ＿ＳＥＱ番号０×３００を含むＮＡＫ２４１を送信し、そしてＮＡＫ２４１の送信からこれが終了した総時間を追跡するタイマを起動する。しかし、図８に示すように、ＮＡＫ２４１は送信器５０により成功裡には受信されない。

【００５１】

送信器５０は受信器５２により成功裡に受信されるすべてのフレーム２４０ｅ乃至２４０ｊを含む表示されるフレームを送信し続ける。フレーム２４０ｅ乃至２４０ｊの送信中には、インデックスＬ＿Ｖ（Ｓ）は０×３０２から０×４００に変化し、ラップアラウンド(wrap-around)を最も重要性の小さい８ビットにさせ、それによりフレームに含まれるＳＥＱ番号にさせる。

【００５２】

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フレーム２４０ｋはＳＥＱ番号０×０１と共に送信され、そして受信器５２による受信は成功しない。フレーム２４０１はＳＥＱ番号０×０２と共に送信され、受信器５２により成功裡に受信される。フレーム２４０１を受信して、受信器５２は順番外の送信を検出し、そしてシーケンス値０×４０１を含むＮＡＫ２４３を送信することにより、またＮＡＫリスト９４にシーケンス番号０×４０１を加えることにより応答する。その上、この時にＮＡＫ２４１用のタイマは終了し、シーケンス値０×３００を含む第２のＮＡＫ２４５を送信器５０に送信させる。このようにして、第２のＮＡＫはフレーム２４０ｃのために送信される。その上、受信器５２はＬ＿Ｖ（Ｒ）を期待される次シーケンス番号Ｏ×４０３に設定する。ＮＡＫ２４３および２４５に送信されるシーケンス番号がただ１つのＮＡＫメッセージであることは注意すべきである。

【００５３】

送信器５０はフレーム２４０ｋからのデータを含む再送信フレーム２４２ａおよびフレーム２４０ｃからのデータを含む再送信フレーム２４２ｂを送信することによりＮＡＫ２４３および２４５に応答する。再送信フレーム２４２ａの受信において、受信器５２はフレームを再送信フラグ７４（図２参照）の状態に基づいた再送信フレームと確認する。一度フレームが再送信フレームと確認されると、受信器５２はＳＥＱ番号を使用してＮＡＫリスト９４内でルックアップを行い、どのフレームが再送信されたかを決定する。再送信フレーム２４２ａはその後再配列バッファ９２（図２参照）内の適当な位置に配置され、そして対応する記入事項はＮＡＫリスト９４から除かれる。

【００５４】

再送信フレーム２４２ｂの受信において、受信器５２はまたフレームのタイプを確認し、ＮＡＫリスト９４内のルックアップを行う。フレームの本質が決定されたとき、それは再配列バッファ９２（図２参照）内に配置され、対応する記入事項はＮＡＫリスト９４から除かれる。その後送信器５０がシーケンス番号Ｏ×０３を有するフレーム２４０ｍを送信し、それは受信器５２により成功裡に受信される。この点で、ＮＡＫリスト９４は空きとなる。

【００５５】

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図８に示される送信から明らかなように、“新”または“再送信”のようなマーキングフレームは、シーケンス番号のラップアラウンドが再送信中に起こった時でも受信器５２に同じＳＥＱ番号を持つ新フレームおよび再送信フレームの両方を正しく処理させる。これは新しく送信されたフレームと同じＳＥＱ番号を有する再送信フレームは再送信フラグにより区別され得るので可能である。このように、大多数のフレームは８ビットのシーケンス番号を使用して処理され、このシーケンス番号は先在の基準類で本質的な算定を行っている間、意味のある高いデータレートを持続させる。

【００５６】

図９において、フローチャートは１実施例に従って遅延フレームを認識および処理する受信器５２の動作を示している。遅延フレームは他のＲＬＰフレームとグループまたは束(bundle)を組んで同時に大気中送信(over-the-air)インターフェイスに送信される１つのＲＬＰフレームとして定義されるが、しかし受信器５２までのその経路に（例えば、経路長が異なるために）異なる意味のある遅延があることを経験した。ＩＳ－７０７－Ａ基準およびデータフレームの再送信用のプロトコルとして周知のＲＬＰに従って、フレームは２０ミリ秒（ｍｓ）間隔で放送される。もし遅延における差異が２０ｍｓ以上であれば、遅延フレームはＩＳ－７０７－Ａにおいて確認された後続の２０ｍｓの処理間隔の１つにおいて受信されるであろう。もし遅延フレームとして検出されなければ、遅延ＲＬＰフレームは１つのＲＬＰをリセットさせる。

【００５７】

図４乃至６と関連して前記（１）式は８ビットのシーケンス番号（フレームヘッダとして大気中送信される）を受信器５２でフレームシーケンスの追跡を果すための１２ビットのＬ＿ＳＥＱ番号にマッピングする方法を与える。もし、例示した方法で、４フレーム束のフレーム１，２および４が同じ２０ｍｓ間隔以内に受信されるとすれば、フレーム３は遅延されて続く２０ｍｓの時間間隔において受信され、式（１）は次のＬ＿ＳＥＱ値を与える：

$$L\_SEQ = \{L\_V(R) + [256 + SEQ\_V(R)] \ MOD256\} \ MOD4096$$
$$= \{5 + [256 + 3 - 5] \ MOD256\} \ MOD4096$$

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＝５＋２５４，

この式は２５４フレームが紛失されていることを示している。明らかに、２０ｍｓの時間間隔内に２５４フレームを紛失すことは不可能なので、これは正しい解釈ではない。図９に描かれている具体例において、ＲＬＰアルゴリズムは受信器５２での遅延フレームと同じフレームを好都合に分類している。

【００５８】

図９の具体例では、値Ｄは同じ２０ｍｓの時間間隔に放送インターフェイスに送信されるＲＬＰフレームの到着時間における最大の差を示す。Ｄは２０ｍｓ時間間隔の単位において表現され、そして典型的には０，１または２である。番号Ｖ（Ｒ）Ｔ＿Ｄは時間Ｄｘ２０ｍｓ前のＶ（Ｒ）の値を示す。値ＮＭＡＸは１つの２０ｍｓの時間間隔中に送られ得るフレームの最大数を示している。特殊な具体例ではＮＭＡＸは８であってもよい。他の具体例では、ＮＭＡＸは４であってもよい。

【００５９】

ステップ３００において、フレームは受信器５２で受信される。それからアルゴリズムはステップ３０２に進み、フレームが新フレームかどうかを決定する。もしもフレームが新フレームであれば、アルゴリズムはステップ３０４に進む。もしもフレームが新フレームでなければ、アルゴリズムはフレームを再送信フレームとして処理するステップ３０６に進む。ステップ３０６では、前述したように、アルゴリズムはテーブルによってフレームを再送信フレームとして処理する。それからアルゴリズムはステップ３００に戻り、次のフレームを受信する。

【００６０】

ステップ３０４において、アルゴリズムはＬ＿Ｖ（Ｒ）が過去のＤ×２０ｍｓ以内に最新のものにされたかどうかを決定する。Ｌ＿Ｖ（Ｒ）は次フレームを示すＶ（Ｒ）の１２ビット値であり、ＲＬＰアルゴリズムは受信バッファにおいて受信すると予想する。もしもＬ＿Ｖ（Ｒ）が過去のＤＸ２０ｍｓ内に最新のものにされなければ、式（１）は極端に大きい数の紛失フレームを生じることはなく、アルゴリズムはフレームを再送信フレームとして処理するステップ３０６に進む。もしもＬ＿Ｖ（Ｒ）が過去のＤ×２０ｍｓ以内に最新のものにされたならば、

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新フレームが遅延フレームである可能性があり、そしてアルゴリズムはステップ３０８に進む。

【００６１】

ステップ３０８において、アルゴリズムは値Ｈ＝（２５６＋ＳＥＱ－Ｖ（Ｒ）Ｔ＿Ｄ）ＭＯＤ２５６を計算して新フレームの処理を始める。それからアルゴリズムはステップ３１０に進む。ステップ３１０において、アルゴリズムはＨがＮＭＡＸＤよりも大きいかどうかを決定する。もしもＨがＮＭＡＸＤよりも大きければ、アルゴリズムはフレームを遅延フレームとして検出してステップ３０６に進み、検出された遅延フレームを再送信フレームとして好都合に処理する。これらの技術は、Ｌ＿ＳＥＱが［Ｌ＿Ｖ（Ｒ）＋Ｈ］ＭＯＤ４０９６（式（１）参照）と等しいので、Ｈが閾値ＮＭＡＸＤ（これは紛失され得るフレームの最大数を表す）よりも大きいかどうかをチェックして単純にＬ＿ＳＥＱと閾値との比較に達することを理解する。もしもＬ＿ＳＥＱが閾値を超えることが分かると、遅延フレームが検出されて適宜処理される。これらの技術は同様に代理の具体例ではＲＬＰフレームを使用せず、遅延フレームは再送信フレームとして処理される必要がないことを認める。もしもＨがＮＭＡＸＤよりも大きくなければ、アルゴリズムはステップ３１２に進み、前述したように式（１）によってフレームを新フレームとして処理する。その後アルゴリズムはステップ３００に戻って次フレームを受信する。

【００６２】

１実施例において、図１０に示されるように、受信器５２（図２参照）内のシフトレジスタ４００はＶ（Ｒ）Ｔ＿Ｄの値の追跡を続けるために好都合に使用される。シフトレジスタ４００はＤ＋１ステージを持たねばならない（即ち、シフトレジスタ４００はＶ（Ｒ）のビット長により（Ｄ＋１）倍されたものと等しいビット数を持たねばならない）。ビット値Ｖ（Ｒ）はシフトレジスタ４００に入れられ、そして示されているように、シフトレジスタ４００はＶ（Ｒ）Ｔ＿Ｄを最新のものにすべく２０ｍｓごとにシフトされる。もしもＬ＿Ｖ（Ｒ）（または同等にＶ（Ｒ））が過去の２０ｍｓの時間間隔以内に最新のものにされなかったならば、“ナル(null)”シンボルを表示すべくあらかじめ決定された特殊な値が

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シフトレジスタ４００に好都合に配置され、いかなる変化も起こらなかったことを表わす。

【００６３】

本発明の好ましい実施例はこのように示されまた記述された。しかしながら、正規の技術の１つにとって本発明の精神および範囲を逸脱すること無しにここに開示された実施例に多くの変更がなされてもよいことは明白である。したがって、本発明は次の請求に従って例外は制限されることはない。

【図面の簡単な説明】

【図１】

セルラ電話システムのブロック図である。

【図２】

送信器および受信器の概略図である。

【図３】

フレームバッファおよび再配列バッファの図である。

【図４】

通信中の送信器および受信器の動作を示すフローチャートである。

【図５】

新しく送信されたフレームを受信中の受信器の動作を示すフローチャートである。

【図６】

再送信フレームを受信中の受信器の動作を示すフローチャートである。

【図７】

模範的な通信中の送信器および受信器の動作を示すメッセージ図である。

【図８】

模範的な通信中の送信器および受信器の動作を示すメッセージ図である。

【図９】

遅延フレームの認知および処理における受信器の動作を示すフローチャートである。

【図１０】

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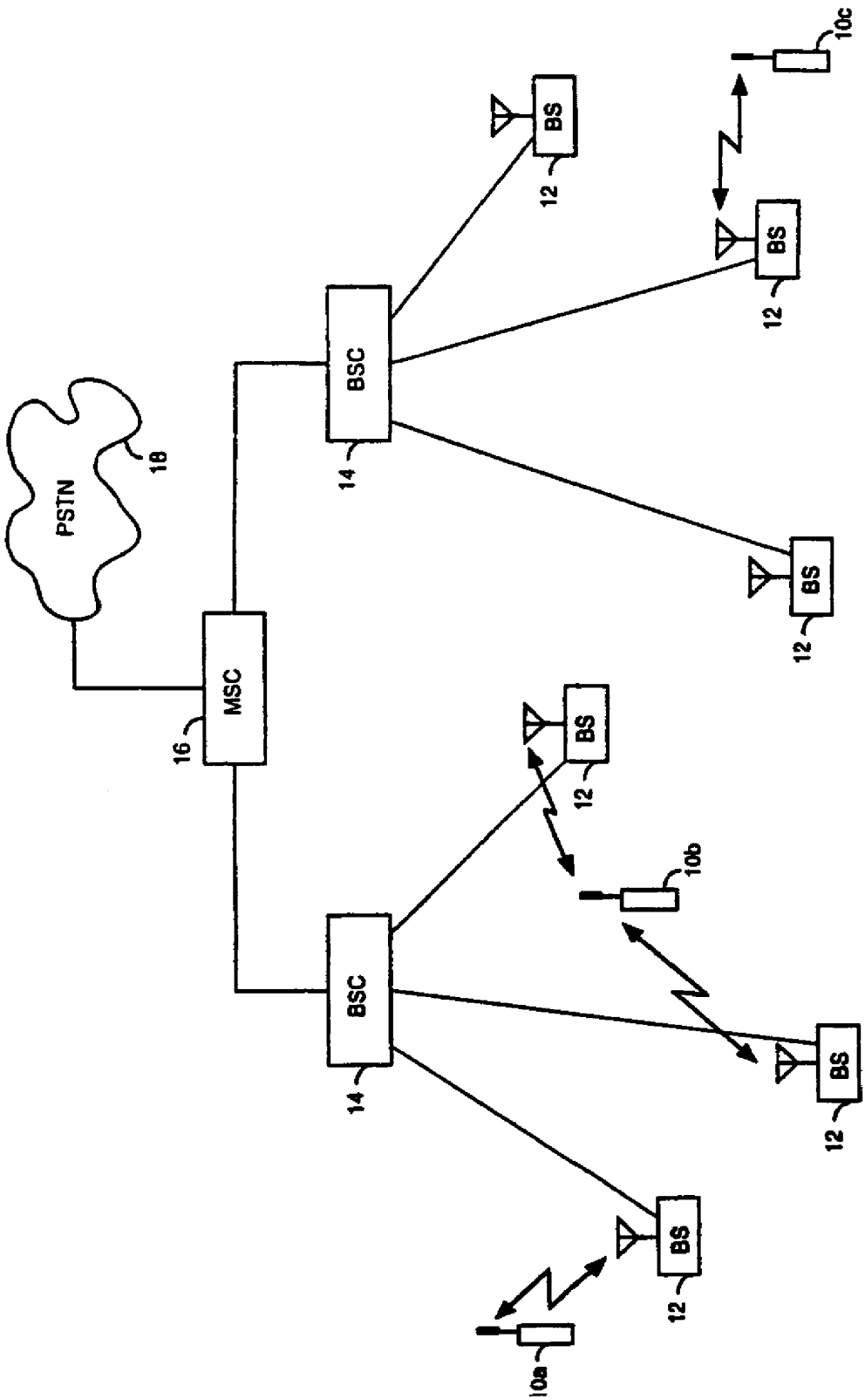
受信されるべき次のフレームを記入してビット値を最新のものにするために受信器内で使用されるシフトレジスタの機能図である。

【符号の説明】

１０ａ，１０ｂ，１０ｃ…加入者ユニット、５５…フレームバッファ，９６ａ，９６ｂ，９６ｃ…フレーム

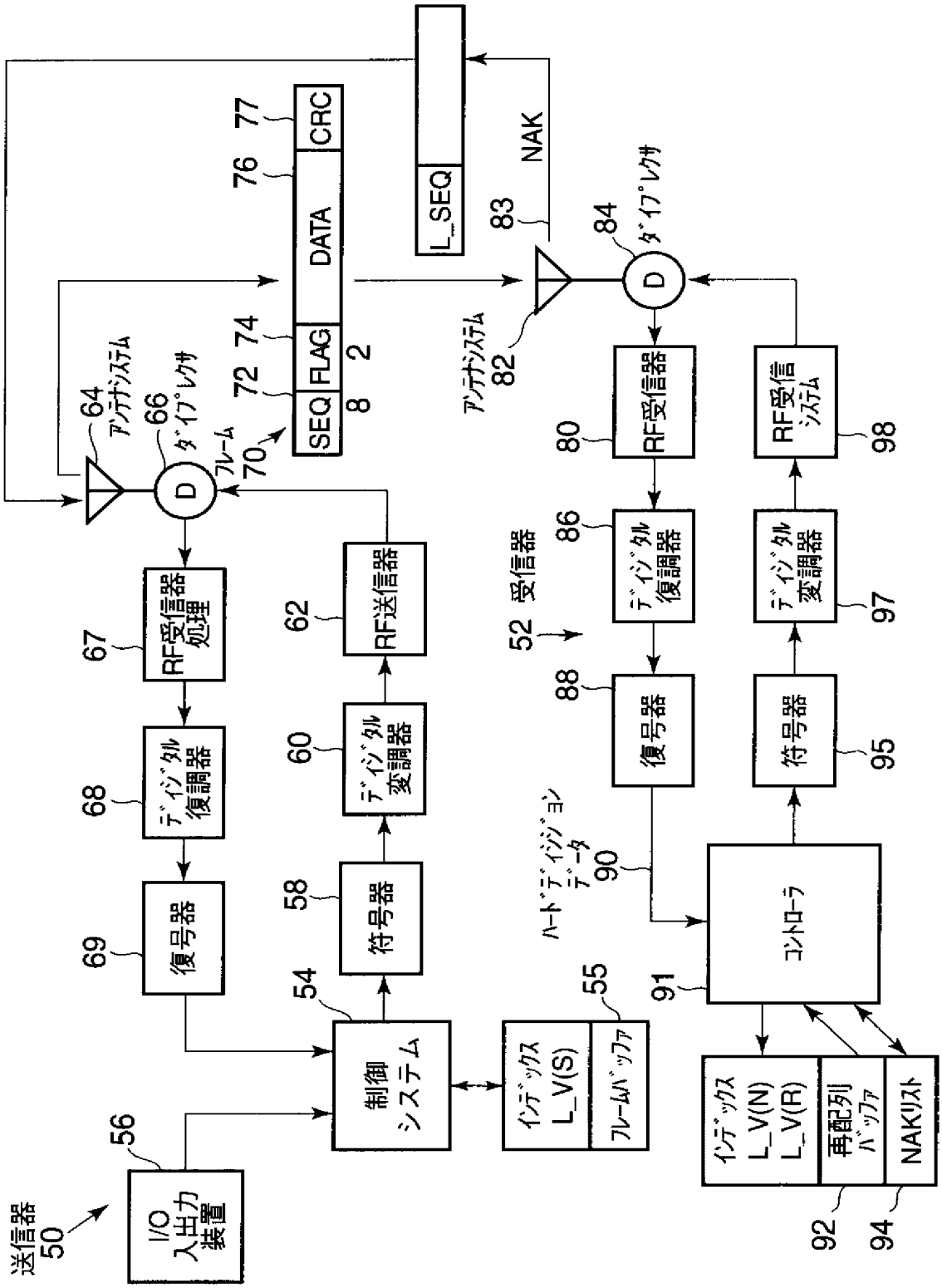
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【図１】

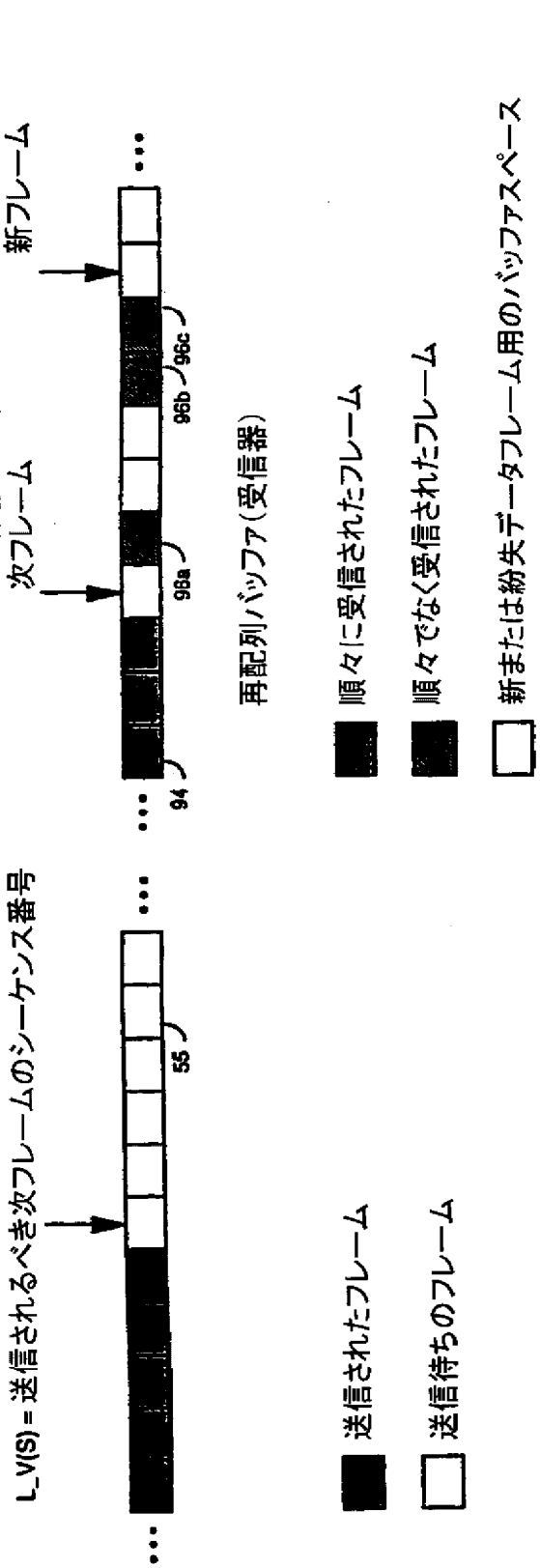


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【図２】

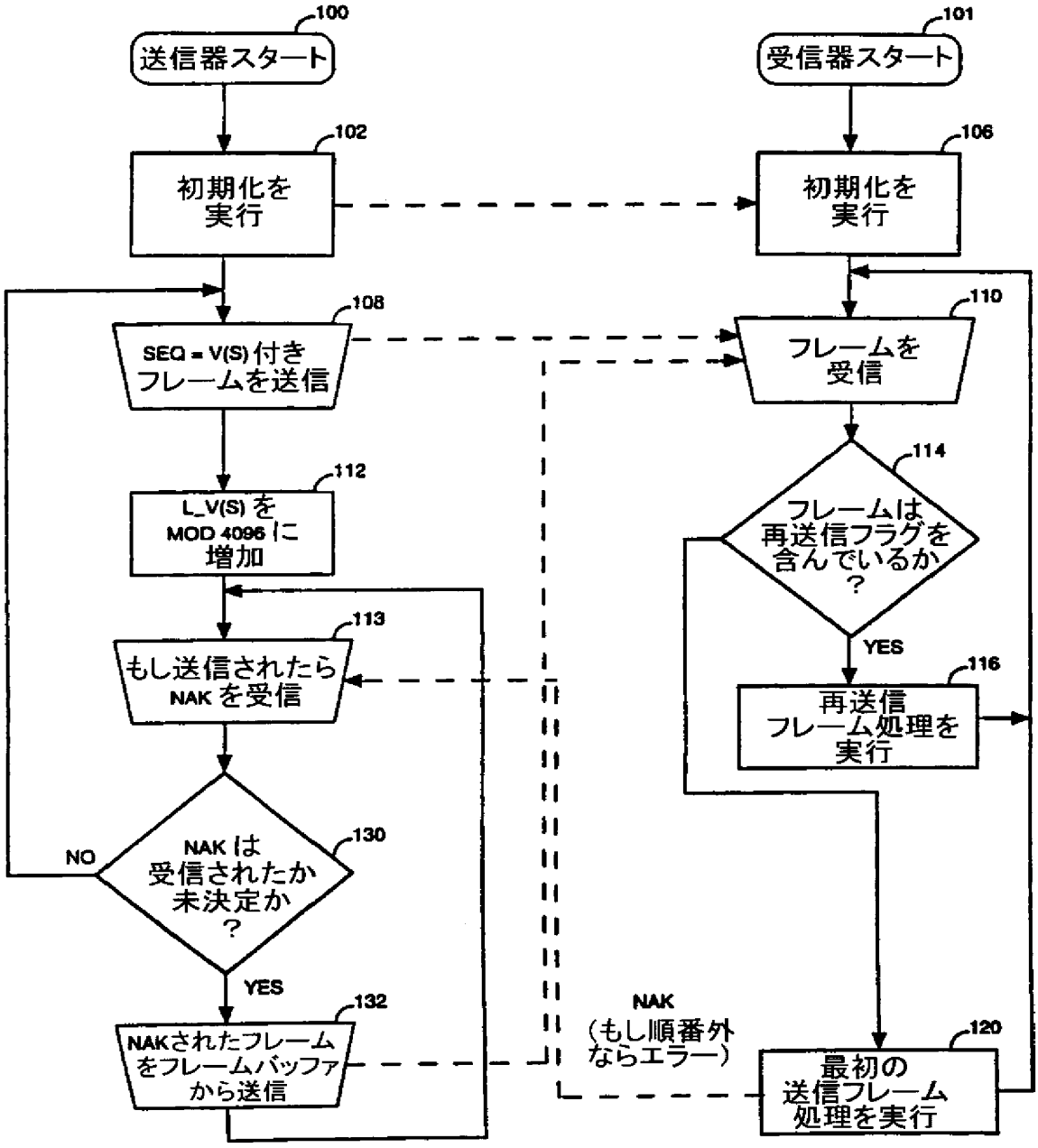

送信器
50
I/O
入出力
装置
56
制御
システム
54
インデックス
L_V(S)
フレームバッファ
55
符号器
58
デジタル
変調器
60
RF送信器
62
RF受信器
処理
67
デジタル
復調器
68
復号器
69
アンテナシステム
64
ダイプレクサ
66
D
フレーム
70
SEQ
FLAG
DATA
CRC
72
74
76
77
8
2
L_SEQ
NAK
83
アンテナシステム
82
ダイプレクサ
84
D
受信器
52
RF受信器
80
デジタル
復調器
86
復号器
88
ハードディシジョン
データ
90
コントローラ
91
インデックス
L_V(N)
L_V(R)
再配列
バッファ
NAKリスト
92
94
符号器
95
デジタル
変調器
97
RF受信
システム
98

【図３】

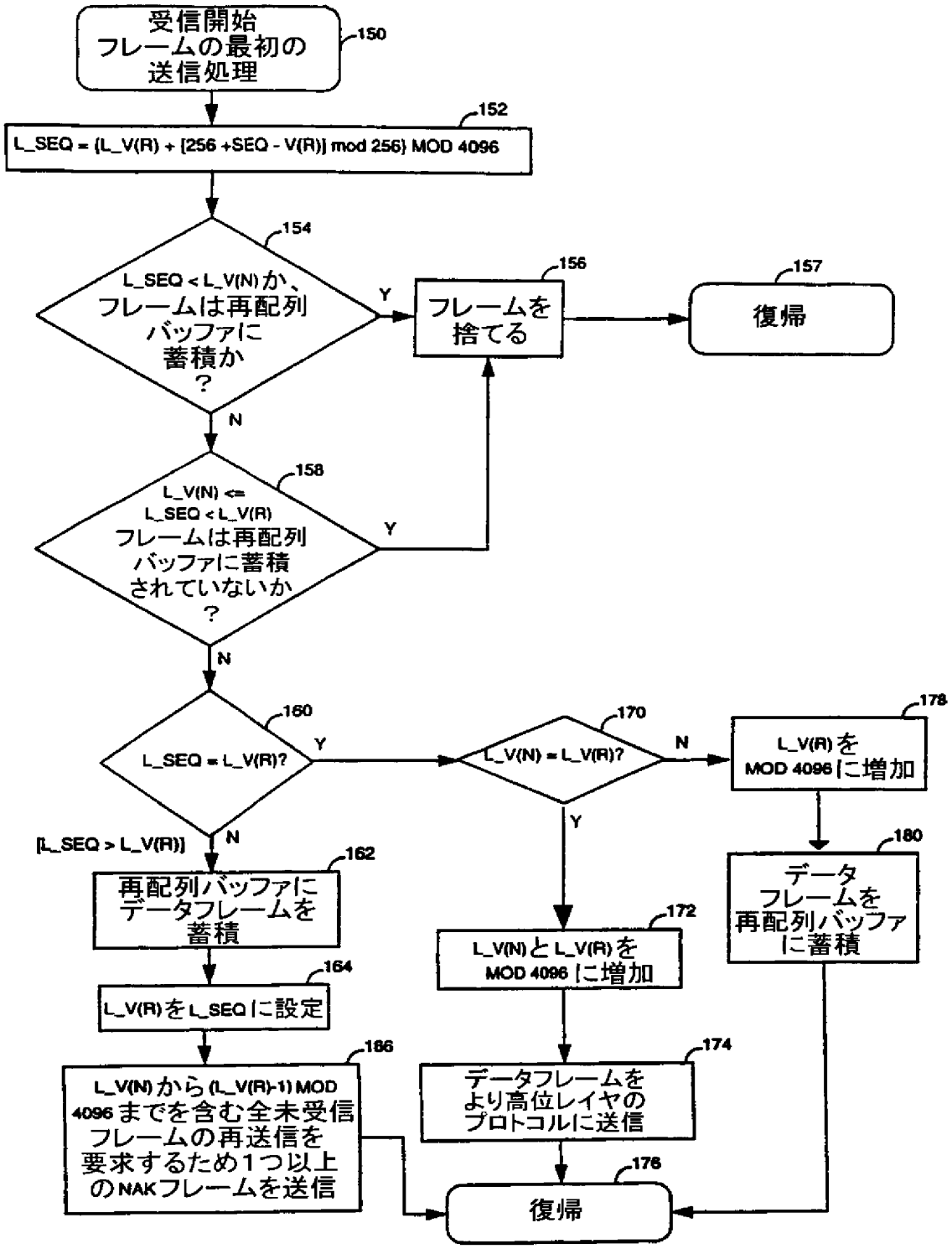


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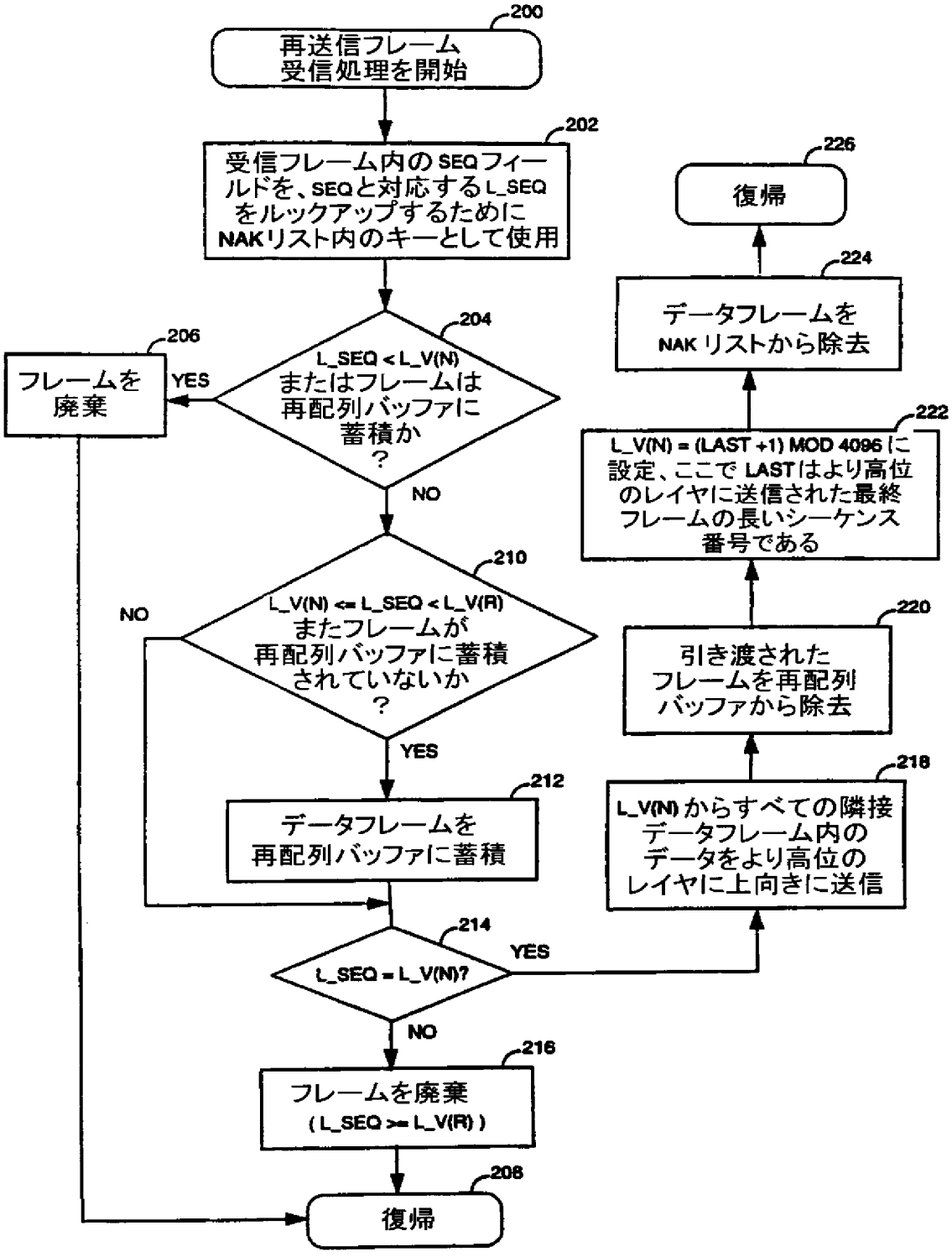
【図４】


100
送信器スタート
101
受信器スタート
102
初期化を実行
106
初期化を実行
108
SEQ = V(S) 付きフレームを送信
110
フレームを受信
112
L_V(S) を MOD 4096 に増加
114
フレームは再送信フラグを含んでいるか？
YES
113
もし送信されたら NAK を受信
116
再送信フレーム処理を実行
NO
130
NAK は受信されたか未決定か？
YES
132
NAKされたフレームをフレームバッファから送信
NAK
（もし順番外ならエラー）
120
最初の送信フレーム処理を実行

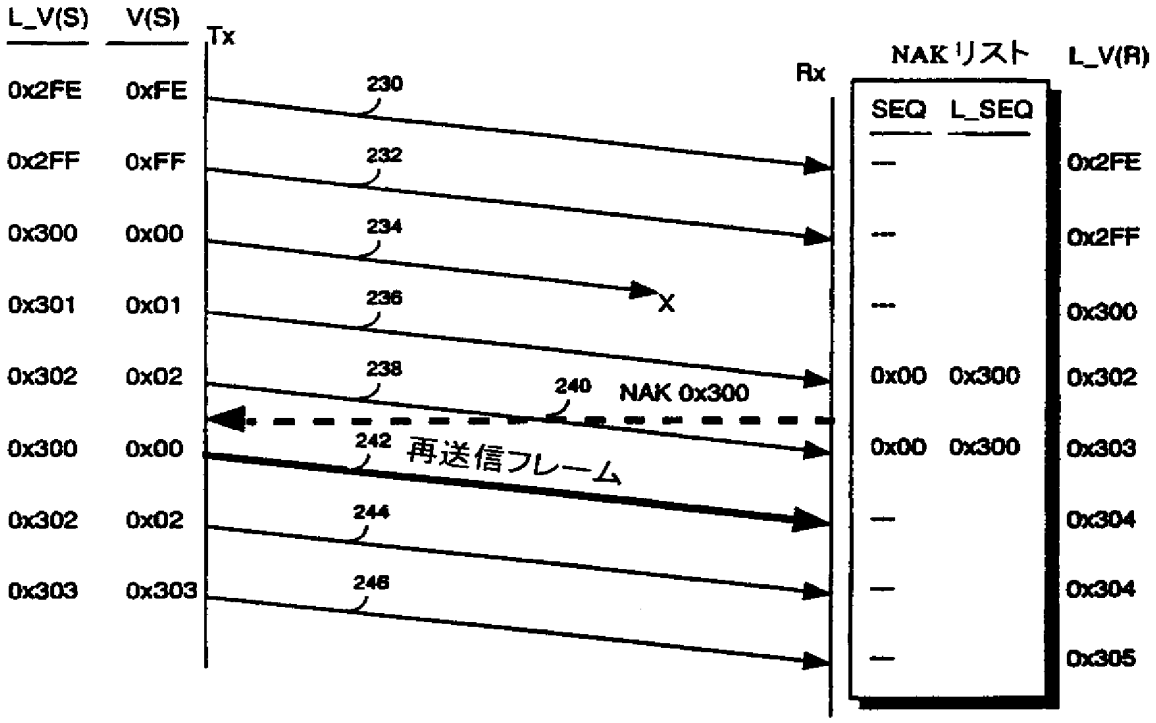
【図５】


受信開始
フレームの最初の
送信処理
150
L_SEQ = (L_V(R) + [256 +SEQ - V(R)] mod 256} MOD 4096
152
L_SEQ < L_V(N)か、
フレームは再配列
バッファに
蓄積か
？
154
Y
フレームを
捨てる
156
復帰
157
N
L_V(N) <=
L_SEQ < L_V(R)
フレームは再配列
バッファに蓄積
されていないか
？
158
Y
N
L_SEQ = L_V(R)?
160
Y
L_V(N) = L_V(R)?
170
N
L_V(R)を
MOD 4096に増加
178
[L_SEQ > L_V(R)]
N
Y
再配列バッファに
データフレームを
蓄積
162
L_V(N)とL_V(R)を
MOD 4096に増加
172
データ
フレームを
再配列バッファ
に蓄積
180
L_V(R)をL_SEQに設定
164
L_V(N)から(L_V(R)-1) MOD
4096までを含む全未受信
フレームの再送信を
要求するため1つ以上
のNAKフレームを送信
166
データフレームを
より高位レイヤの
プロトコルに送信
174
復帰
176

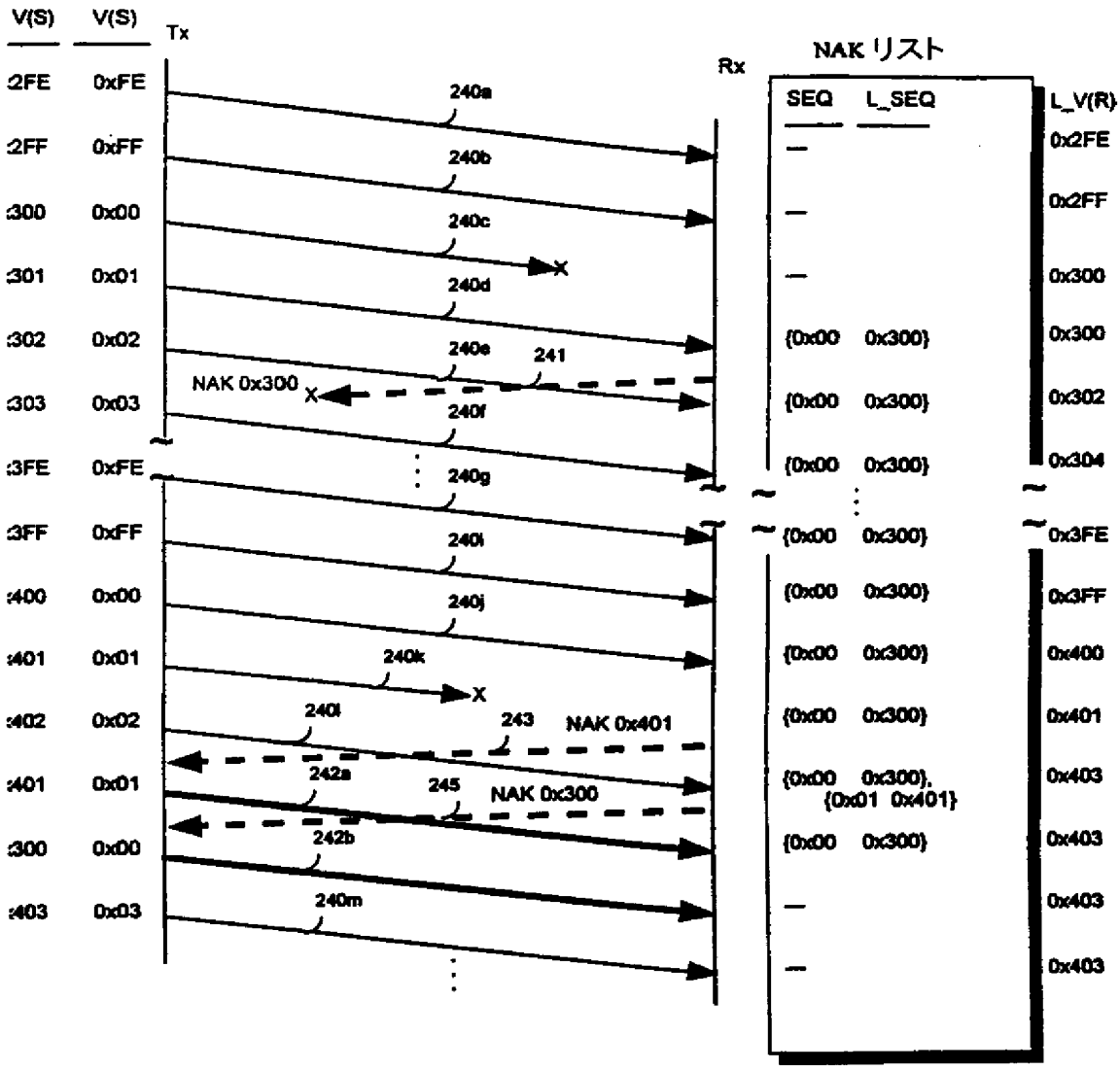
【図６】


200
再送信フレーム
受信処理を開始
202
受信フレーム内のSEQフィールドを、SEQと対応するL_SEQをルックアップするためにNAKリスト内のキーとして使用
204
L_SEQ < L_V(N)
またはフレームは
再配列バッファに
蓄積か
？
YES
206
フレームを
廃棄
NO
210
L_V(N) <= L_SEQ < L_V(R)
またフレームが
再配列バッファに蓄積
されていないか
？
NO
YES
212
データフレームを
再配列バッファに蓄積
214
L_SEQ = L_V(N)?
YES
NO
216
フレームを廃棄
(L_SEQ >= L_V(R))
208
復帰
218
L_V(N)からすべての隣接
データフレーム内の
データをより高位の
レイヤに上向きに送信
220
引き渡された
フレームを再配列
バッファから除去
222
L_V(N) = (LAST +1) MOD 4096に
設定、ここでLASTはより高位
のレイヤに送信された最終
フレームの長いシーケンス
番号である
224
データフレームを
NAKリストから除去
226
復帰

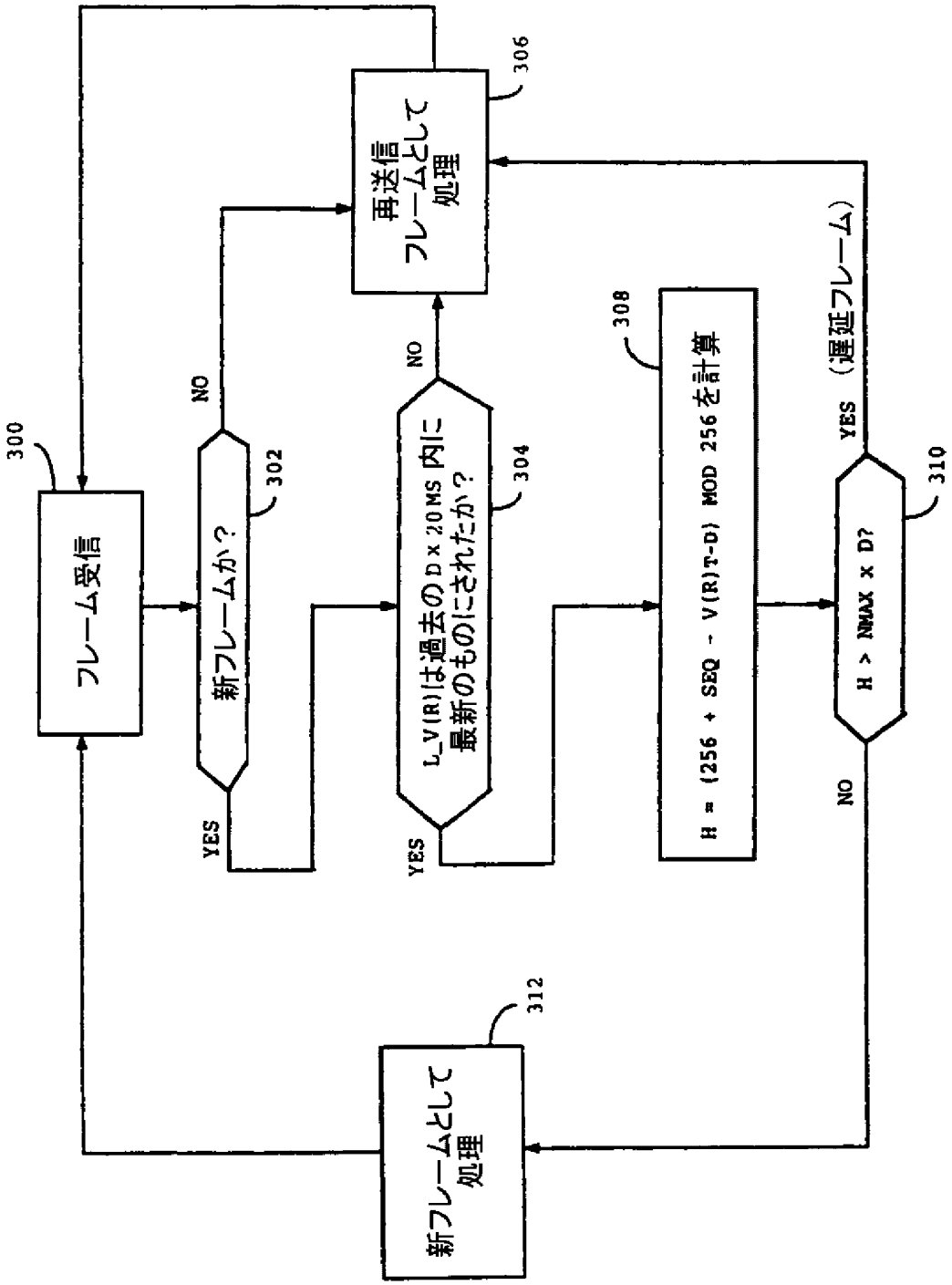
【図７】


L_V(S)
V(S)
Tx
Rx
NAKリスト
L_V(R)
SEQ
L_SEQ
0x2FE
0xFE
230
0x2FF
0xFF
232
0x300
0x00
234
X
0x301
0x01
236
0x302
0x02
238
240
NAK 0x300
0x300
0x00
242
再送信フレーム
0x302
0x02
244
0x303
0x303
246
0x2FE
0x2FF
0x300
0x00 0x300
0x302
0x00 0x300
0x303
0x304
0x304
0x305

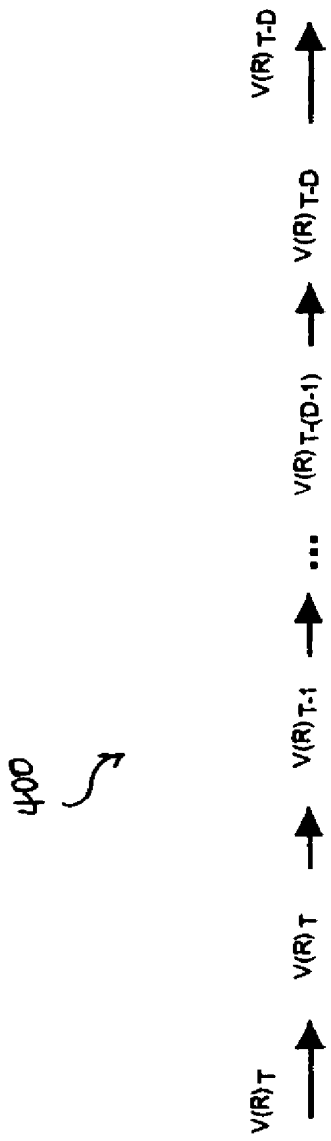
【図８】


V(S)
V(S)
Tx
Rx
NAKリスト
SEQ
L_SEQ
L_V(R)
240a
240b
240c
240d
240e
241
NAK 0x300
240f
240g
240i
240j
240k
240l
243
NAK 0x401
242a
245
NAK 0x300
242b
240m
0xFE
0xFF
0x00
0x01
0x02
0x03
0x2FE
0x2FF
0x300
0x302
0x304
0x3FE
0x3FF
0x400
0x401
0x403
{0x00 0x300}
{0x01 0x401}

【図９】


300
フレーム受信
302
新フレームか？
NO
YES
304
L_V(R)は過去のD x 20MS 内に最新のものにされたか？
NO
YES
306
再送信フレームとして処理
308
H = (256 + SEQ - V(R)T-D) MOD 256 を計算
310
H > NMAX x D?
YES （遅延フレーム）
NO
312
新フレームとして処理

【図１０】



Petitioners' Exhibit 1007, p. 176
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IPR2024-01143

【国際調査報告】

INTERNATIONAL SEARCH REPORT

Interr onal Application No
PCT/US 99/11108

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04L29/06 H04L1/18

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 96 36154 A (NOKIA TELECOMMUNICATIONS OY ;KANERVA MIKKO (FI); KARI HANNU (FI);) 14 November 1996 (1996-11-14) abstract page 3, line 33 - line 35 page 4, line 30 - line 34 page 5, line 21 - line 27 page 13, line 19 - line 33 page 14, line 7 -page 15, line 8 claims 1,2,6-8 --- -/--	1-11

[X] Further documents are listed in the continuation of box C. [X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
7 October 1999	14/10/1999

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

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Form PCT/ISA/210 (second sheet) (July 1992)

Petitioners' Exhibit 1007, p. 177
AT&T et al v. Innovative Sonic
IPR2024-01143

INTERNATIONAL SEARCH REPORT

Inter onal Application No
PCT/US 99/11108

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No:
A	EASTON M C: "DESIGN CHOICES FOR SELECTIVE-REPEAT RETRANSMISSION PROTOCOLS" IEEE TRANSACTIONS ON COMMUNICATIONS, vol. COM-29, no. 7, 1 July 1981 (1981-07-01), pages 944-953, XP002065807 ISSN: 0090-6778 abstract page 944, right-hand column, paragraph 5 -page 947, right-hand column, paragraph 1	1-3,5-7, 9-11
A	TOMLINSON R S ET AL: "SELECTING SEQUENCE NUMBERS" COMPUTER COMMUNICATIONS REVIEW, vol. 25, no. 1, 1 January 1995 (1995-01-01), pages 45-53, XP000512241 ISSN: 0146-4833 paragraphs '002.!,'005.!	1-3,5-7, 9-11
A	SIMMONS J M: "PROOF OF CORRECTNESS OF ATM RETRANSMISSION SCHEME" COMPUTER NETWORKS AND ISDN SYSTEMS, vol. 29, no. 2, 1 January 1997 (1997-01-01), pages 187-194, XP000640505 ISSN: 0169-7552 paragraphs '02.1!,'02.2!,'02.3!,'03.5!,'3.5.1!	1-3,5-7, 9-11

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Form PCT/ISA/210 (continuation of second sheet) (July 1992)

Petitioners' Exhibit 1007, p. 178
AT&T et al v. Innovative Sonic
IPR2024-01143

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/US 99/11108

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9636154 A	14-11-1996	FI 952256 A	10-11-1996
		AU 708324 B	05-08-1999
		AU 5650696 A	29-11-1996
		CA 2193379 A	14-11-1996
		EP 0788702 A	13-08-1997
		JP 10503075 T	17-03-1998
		US 5930233 A	27-07-1999

Form PCT/ISA/210 (patent family annex) (July 1992)

フロントページの続き

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

(72)発明者 リウング、ニコライ・ケー・エヌ
アメリカ合衆国 バージニア州 22207
アーリントン、ウェイクフィールド・ストリート 2542

Ｆターム(参考) 5K014 AA01 DA02 FA03
5K034 AA06 BB06 EE03 MM03 MM18

Petitioners' Exhibit 1007, p. 180
AT&T et al v. Innovative Sonic
IPR2024-01143

Electronic Patent Application Fee Transmittal

Application Number:	11278546
Filing Date:	04-Apr-2006
Title of Invention:	Error Handling In A Wireless Communications System
First Named Inventor/Applicant Name:	Sam Shiaw-Shiang Jiang
Filer:	Winston Hsu
Attorney Docket Number:	ASTP0061USA

Filed as Small Entity

Utility under 35 USC 111(a) Filing Fees

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

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

Electronic Acknowledgement Receipt

EFS ID:	4810597
Application Number:	11278546
International Application Number:	
Confirmation Number:	6559
Title of Invention:	Error Handling In A Wireless Communications System
First Named Inventor/Applicant Name:	Sam Shiaw-Shiang Jiang
Customer Number:	27765
Filer:	Winston Hsu
Filer Authorized By:	
Attorney Docket Number:	ASTP0061USA
Receipt Date:	18-FEB-2009
Filing Date:	04-APR-2006
Time Stamp:	23:03:47
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$180
RAM confirmation Number	7323
Deposit Account	503105
Authorized User	

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

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Filed (SB/08)	572604.PDF	736297 e0587ec8494f84f315591f6fc11ae2ec85926aba	no	4
Warnings:					
Information:					
A U.S. Patent Number Citation or a U.S. Publication Number Citation is required in the Information Disclosure Statement (IDS) form for autoloading of data into USPTO systems. You may remove the form to add the required data in order to correct the Informational Message if you are citing U.S. References. If you chose not to include U.S. References, the image of the form will be processed and be made available within the Image File Wrapper (IFW) system. However, no data will be extracted from this form. Any additional data such as Foreign Patent Documents or Non Patent Literature will be manually reviewed and keyed into USPTO systems.					
2	Foreign Reference	WO_9960761.pdf	1530565 d83bf367966089e8fac7c7b7b6c503767b0e347f	no	34
Warnings:					
Information:					
3	Foreign Reference	JP_2002516527.pdf	4121729 23d9b525ff417406712067d55714883bf59dabf2	no	40
Warnings:					
Information:					
4	Fee Worksheet (PTO-06)	fee-info.pdf	29847 ccb99d003336310b389b369801907637f4ba1877	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	6418438		

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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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/278,546	04/04/2006	Sam Shiaw-Shiang Jiang	ASTP0061USA	6559

27765 7590 12/19/2008

NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION
P.O. BOX 506
MERRIFIELD, VA 22116

EXAMINER	
BATISTA, MARCOS	
ART UNIT	PAPER NUMBER
2617	

NOTIFICATION DATE	DELIVERY MODE
12/19/2008	ELECTRONIC

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

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

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

winstonhsu.uspto@gmail.com
Patent.admin.uspto.Rcv@naipo.com
mis.ap.uspto@naipo.com.tw

Petitioners' Exhibit 1007, p. 186
AT&T et al v. Innovative Sonic
IPR2024-01143

Office Action Summary	Application No.	Applicant(s)	
	11/278,546	JIANG, SAM SHIAW-SHIANG	
	Examiner	Art Unit	
	MARCOS BATISTA	2617	

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

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

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

Status

1)☒ Responsive to communication(s) filed on *15 September 2008*.

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

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

Disposition of Claims

4)☒ Claim(s) *1-7* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7* is/are rejected.

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

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

Application Papers

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

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

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

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

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

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

a)☐ All b)☐ Some * c)☐ None of:

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

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

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

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

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

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IPR2024-01143

DETAILED ACTION

1. This Action is in response to Applicant's amendment filed on 09/15/2008. Claims 1-7 are still pending in the present application. This Action is made **FINAL.**

Response to Arguments

Applicant's arguments filed on 09/15/2008 have been fully considered but they are not persuasive.

After carefully revising the office action pertinent to the present response and remarks, 1 main point(s) have been identified:

1). The Applicant states that range set by the interval "Va <= Nr **<=** Vs" does not cover the range set by the interval "VT(A) <= SN **<** VT(S)," (refer to page 2 lines 24-27 and page 3 lines 1-14 of the Applicant's Remarks).

Regarding point **1)**, The interval set by the range "Va <= Nr <= Vs" is inclusive of the interval set by the range "VT(A) <= SN < VT(S)," therefore "Va <= Nr <= Vs" anticipates VT(A) <= SN < VT(S)," (see Chintada: par. 0028 lines 1-5). Therefore, the argued features are written such that they read upon the cited reference(s).

Claim Rejections - 35 USC § 103

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

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 2 and 4-7 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Petrovic et al. (US 20040208160 A1), hereafter "Petrovic," in view of Chintada et al. (US 20040187068 A1), hereafter "Chintada."

Consider claim 1, a method of detecting an erroneous sequence number of a status report unit in a wireless communications system, the method comprising (**see [0002] and [0128]**): Petrovic discloses receiving a status report unit output from a receiver of the wireless communications system (**see [0128]**).

Petrovic discloses the invention as claim in above, but does not particular refer to detecting whether a negatively acknowledged sequence number lies in a range of greater than or equal to a sequence number following a sequence number of a last in sequence acknowledged packet of a transmitter and less than a sequence number of a next packet to be transmitted for the first time by the transmitter when the negatively acknowledged sequence number is detected in the status report unit. Petrovic neither particular refer to detecting a status report unit comprises an erroneous sequence number when the negatively acknowledged sequence number is not in the range

Chintada, in analogous art, teaches detecting whether a negatively acknowledged sequence number lies in a range of greater than or equal to a sequence number following a sequence number of a last in sequence acknowledged packet of a transmitter and less than a sequence number of a next packet to be transmitted for the first time by the transmitter when the negatively acknowledged sequence number is detected in the status report unit (**see fig. 6, [0024] and [0028] lines 1-5**). Chintada also teaches detecting a status report unit comprises an erroneous sequence number when the negatively acknowledged sequence number is not in the range (**see [0028]**

lines 1-5 – The variable V(A) is only updated after receiving a error-free I-frame, which implies that the system needs to check if that condition is met).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the invention of Petrovic and have it include detecting whether a negatively acknowledged sequence number lies in a range of greater than or equal to a sequence number following a sequence number of a last in sequence acknowledged packet of a transmitter and less than a sequence number of a next packet to be transmitted for the first time by the transmitter when the negatively acknowledged sequence number is detected in the status report unit and detecting a status report unit comprises an erroneous sequence number when the negatively acknowledged sequence number is not in the range, as taught by Chintada. The motivation would have been in order to provide an error detection mechanism while communication with another device (**see fig. 6, pars. 0024 and 0028**).

Consider claim 2, Petrovic as modified by Chintada teaches claim 1 above. Petrovic also teaches initiating a reset procedure when the status report unit comprises the erroneous sequence number (see abstract, [0104] – [0109].

Consider claim 4, Petrovic as modified by Chintada teaches claim 1 above. Chintada also teaches piggybacked status report unit (see [0042] lines 12-15).

It would have been obvious to have modified Petrovic's invention with the teaching of Chintada. The motivation would have been in order to provide an error detection mechanism while communication with another device (see fig. 6, pars. 0024 and 0028).

Consider claim 5, Petrovic as modified Chintada teaches claim 1 above. Petrovic also teaches third generation mobile communication systems (see [0011] – [0014].

Consider claim 6, Petrovic as modified Chintada teaches claim 1 above. Petrovic also teaches third generation mobile communication systems operating in an acknowledged mode (see [0043] and [0104]).

Consider claim 7, Petrovic as modified Chintada teaches claim 1 above. Petrovic also teaches a reset procedure to be performed as per claim 1(see [0104] – [0111] - A reset procedure is known in the art to include processing unit, memory and program code).

4. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Petrovic et al. (US 20040208160 A1), hereafter "Petrovic," in view of Chintada et al. (US 20040187068 A1), hereafter "Chintada," and in further view of Minagawa (US 6483855 B1), hereafter "Minagawa."

Consider claim 3, Petrovic as modified by Chintada teaches claim 1 above. But neither Petrovic nor Chintada particularly refer to modulus operation with the sequence number following the sequence number of the last in-sequence acknowledged packet of the transmitter as a modulus base.

Minagawa teaches transmission and reception sequence numbers based on modulo (see col 2, lines 43-49 and col 22, lines 29-34).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the invention of Petrovic as modified by Chintada and

have it include modulus operation with the sequence number following the sequence number of the last in-sequence acknowledged packet of the transmitter as a modulus base, as taught by Minagawa. The motivation would have been in order to provide a consistent error checking mechanism (see col 2, lines 43-49).

Conclusion

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

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

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Marcos Batista, whose telephone number is (571) 270-5209. The Examiner can normally be reached on Monday-Thursday from 8:00am to 5:00pm.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Rafael Pérez-Gutiérrez can be reached at (571) 272-7915. The fax phone number for the organization where this application or proceeding is assigned is (571)

273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free) or 703-305-3028.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist/customer service whose telephone number is (571) 272-2600.

Marcos Batista
/M. B./

/Rafael Pérez-Gutiérrez/
Supervisory Patent Examiner, Art Unit 2617

12/10/2008

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11278546	JIANG, SAM SHIAW-SHIANG
	Examiner	Art Unit
	MARCOS BATISTA	2617

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

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

CLAIM		DATE								
Final	Original	01/16/2008	06/09/2008	12/17/2008						
	1	✓	✓	✓						
	2	✓	✓	✓						
	3	✓	✓	✓						
	4	✓	✓	✓						
	5	✓	✓	✓						
	6	✓	✓	✓						
	7	✓	✓	✓						

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IPR2024-01143

Error Handling In A Wireless Communications System

Appl. No.	:	11/278,546	Confirmation No. 6559
Applicant	:	Sam Shiaw-Shiang Jiang	
Filed	:	April 4, 2006	
TC/A.U.	:	4134	
Examiner	:	BATISTA, MARCOS	
Docket No.	:	ASTP0061USA	
Customer No.	:	27765	

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

AMENDMENT

Sir:

In response to the Office action of June 09, 2008, please amend the above-identified application as follows:

Remarks/Arguments begin on page 2 of this paper.

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REMARKS/ARGUMENTS

1. Rejection of claims 1, 2, and 4-7 under 35 U.S.C. 103(a):

Claims 1, 2, and 4-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Petrovic et al. (US 2004/0208160) in view of Chintada et al. (US 2004/0187068).

Response:

Claim 1 recites the steps of "detecting whether a negatively acknowledged sequence number lies in a range of greater than or equal to a sequence number following a sequence number of a last in-sequence acknowledged packet of a transmitter and less than a sequence number of a next packet to be transmitted for the first time by the transmitter when the negatively acknowledged sequence number is detected in the status report unit" and "detecting that the status report unit comprises an erroneous sequence number when the negatively acknowledged sequence number is not in the range."

The Examiner has stated that Petrovic does not refer to "detecting whether a negatively acknowledged sequence number lies in a range of greater than or equal to a sequence number following a sequence number of a last in-sequence acknowledged packet of a transmitter and less than a sequence number of a next packet to be transmitted for the first time by the transmitter when the negatively acknowledged sequence number is detected in the status report unit". Petrovic also does not refer to "detecting that the status report unit comprises an erroneous sequence number when the negatively acknowledged sequence number is not in the range."

Instead, the Examiner has alleged that Chintada teaches these features in Fig. 6, paragraph [0024], and paragraph [0028] lines 1-5. However, Chintada does not teach the feature of "detecting whether a negatively acknowledged sequence number lies in a range of greater than or equal to a sequence number following a

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sequence number of a last in-sequence acknowledged packet of a transmitter and **less than** a sequence number of a next packet to be transmitted for the first time by the transmitter when the negatively acknowledged sequence number is detected in the status report unit" (emphasis added).

Chintada teaches in [0028] line 5 that the range of the sequence number Nr is clearly specified to be Va <= Nr <= Vs. In other words, the range used by Chintada is greater than or equal to a sequence number following a sequence number of a last in sequence acknowledged packet of a transmitter and less than **or equal to** a sequence number of a next packet to be transmitted for the first time by the transmitter.

In contrast, the range in the present Claim 1 is VT(A) <= SN < VT(S), i.e. greater than or equal to a sequence number following a sequence number of a last in sequence acknowledged packet of a transmitter and **less than** a sequence number of a next packet to be transmitted for the first time by the transmitter.

In fact, Chintada's checking range is worse than Petrovic's checking range, i.e. VT(A) <= SN <= VT(S)-1. This is because Petrovic's checking range works in most cases except when VT(A) = VT(S), as was indicated in the applicant's remarks filed on 04/23/2008. With Chintada's checking range, even when VT(A) is not equal to VT(S), a NACK sequence number = VT(S) will not be checked as an erroneous sequence number. Note that VT(S) had not been sent out by the transmitter yet so that it should not be positively or negative acknowledged by the peer receiver. If it happens, there must be an error.

In summary, neither Petrovic nor Chintada teach the above feature of "detecting whether a negatively acknowledged sequence number lies in a range of greater than or equal to a sequence number following a sequence number of a last in-sequence acknowledged packet of a transmitter and **less than** a sequence

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number of a next packet to be transmitted for the first time by the transmitter when the negatively acknowledged sequence number is detected in the status report unit". Therefore, claim 1 is patentable over the combination of Petrovic and Chintada.

Furthermore, claims 2 and 4-7 are dependent on claim 1, and should be allowed if their respective base claims are allowed. Reconsideration of claims 1, 2, and 4-7 is therefore respectfully requested.

2. Rejection of claim 3 under 35 U.S.C. 103(a):

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Petrovic et al. (US 2004/0208160) in view of Chintada et al. (US 2004/0187068), and further in view of Minagawa (US 6,483,855).

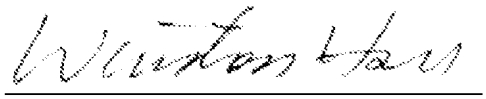
Response:

Claim 3 is dependent on claim 1, and should be allowed if claim 1 is allowed. Reconsideration of claim 3 is therefore respectfully requested.

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

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Sincerely yours,



Date: 09/15/2008

Winston Hsu, Patent Agent No. 41,526
P.O. BOX 506, Merrifield, VA 22116, U.S.A.
Voice Mail: 302-729-1562
Facsimile: 806-498-6673
e-mail : winstonhsu@naipo.com

Note: Please leave a message in my voice mail if you need to talk to me. (The time in D.C. is 12 hours behind the Taiwan time, i.e. 9 AM in D.C. = 9 PM in Taiwan.)

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Electronic Patent Application Fee Transmittal

Application Number:	11278546
Filing Date:	04-Apr-2006
Title of Invention:	Error Handling In A Wireless Communications System
First Named Inventor/Applicant Name:	Sam Shiaw-Shiang Jiang
Filer:	Winston Hsu
Attorney Docket Number:	ASTP0061USA

Filed as Small Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Extension - 1 month with $0 paid	2251	1	60	60

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
		Total in USD ($)		**60**

Electronic Acknowledgement Receipt

EFS ID:	3939073
Application Number:	11278546
International Application Number:	
Confirmation Number:	6559
Title of Invention:	Error Handling In A Wireless Communications System
First Named Inventor/Applicant Name:	Sam Shiaw-Shiang Jiang
Customer Number:	27765
Filer:	Winston Hsu
Filer Authorized By:	
Attorney Docket Number:	ASTP0061USA
Receipt Date:	15-SEP-2008
Filing Date:	04-APR-2006
Time Stamp:	20:57:51
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$60
RAM confirmation Number	4960
Deposit Account	503105
Authorized User	

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

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Extension of Time	ASTP0061_A2_2_SB22.pdf	82184 9199acde50f822ea8b9e57bb928e913070910e91	no	1
Warnings:					
Information:					
2	Amendment/Req. Reconsideration-After Non-Final Reject	ASTP0061USA0_A2_2_AMEND.pdf	195321 8f58e8fa3f1534dc6b6d5f934c18aeb3052d4909	no	1
Warnings:					
Information:					
3	Applicant Arguments/Remarks Made in an Amendment	ASTP0061USA0_A2_2_REMARKS.pdf	195260 70cb15502ec37f1eaf1d11079129a40af353010a	no	4
Warnings:					
Information:					
4	Fee Worksheet (PTO-06)	fee-info.pdf	29767 d30ef8a95768150c45e99205bf37d929ea595bf6	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	502532		

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

PTO/SB/22 (11-07)
Approved for use through 11/30/2007. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARMENT OF COMMERCE
Under the paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless if displays a valid OMB control number.

PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a) **FY 2008** (*Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).*)	Docket Number (Optional) ASTP0061USA
Application Number 11/278,546	Filed 04/04/2006
For Error Handling In A Wireless Communications System	
Art Unit 4134	Examiner BATISTA, MARCOS

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):

		Fee	Small Entity Fee	
☑	One month (37 CFR 1.17(a)(1))	$120	$60	$ 60.00
☐	Two months (37 CFR 1.17(a)(2))	$460	$230	$
☐	Three months (37 CFR 1.17(a)(3))	$1050	$525	$
☐	Four months (37 CFR 1.17(a)(4))	$1640	$820	$
☐	Five months (37 CFR 1.17(a)(5))	$2230	$1115	$

☑ Applicant claims small entity status. See 37 CFR 1.27.

☐ A check in the amount of the fee is enclosed.

☐ Payment by credit card. Form PTO-2038 is attached.

☑ The Director has already been authorized to charge fees in this application to a Deposit Account.

☑ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number 50-3105. I have enclosed a duplicate copy of this sheet.

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.

I am the

☐ applicant/inventor.

☐ assignee of record of the entire interest. See 37 CFR 3.71.
Statement under 37 CFR 3.73(b) is enclosed (Form PTO/SB/96).

☑ attorney or agent of record. Registration Number 41,526

☐ attorney or agent under 37 CFR 1.34.
Registration number if acting under 37 CFR 1.34 _____

Winston Hsu	09/15/2008
Signature	Date
Winston Hsu	3027291562
Typed or printed name	Telephone Number

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

☐ Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.136(a). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 6 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/278,546	04/04/2006	Sam Shiaw-Shiang Jiang	5413-0196PUS1

CONFIRMATION NO. 6559

POA ACCEPTANCE LETTER

27765
NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION
P.O. BOX 506
MERRIFIELD, VA 22116

OC000000031409639

Date Mailed: 08/07/2008

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 07/31/2008.

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.

/snguyen/

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

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AT&T et al v. Innovative Sonic
IPR2024-01143

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
11/278,546	04/04/2006	Sam Shiaw-Shiang Jiang	5413-0196PUS1

CONFIRMATION NO. 6559

POWER OF ATTORNEY NOTICE

64044
BIRCH, STEWART, KOLASCH & BIRCH, LLP
8110 GATEHOUSE ROAD
SUITE 100 EAST
FALLS CHURCH, VA 22315

OC00000031409613

Date Mailed: 08/07/2008

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 07/31/2008.

- 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).

/snguyen/

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

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AT&T et al v. Innovative Sonic
IPR2024-01143

PATENT

POWER OF ATTORNEY BY ASSIGNEE OF ENTIRE INTEREST

Revocation of Power of Attorney with New Power of Attorney

INNOVATIVE SONIC LIMITED, as assignee of record of the entire right, title and interest in each of the patent application(s) or patent(s) listed in the table of Attachment A, hereby revoke all powers of attorney previously given in each of the listed patent application(s) or patent(s) and appoint all practitioners associated with the Customer Number:

27765

as the attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all of the listed patent application(s) and patent(s).

Please recognize or change the correspondence address for the above-identified application to the address associated with the above-mentioned Customer Number.

Statement under 37 CFR 3.73(b)

I hereby state that, as required by 37 CFR 3.73(b)(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. The chain of title is indicated in the table of Attachment A.

Pursuant to 37 CFR 3.71, I hereby state the prosecution of the listed application(s) or reexamination of the listed patent(s) is to be conducted to the exclusion of both the inventor(s) and previous assignee(s).

The undersigned is authorized to act on behalf of the assignee.

Signature Liu Su-Huei Date JUL 17 2008

Name SU-HUEI LIU

Title Chairman

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AT&T et al v. Innovative Sonic
IPR2024-01143

Attachment A

Appl. No.	Filing Date	Title	Chain of Title			
			No.	from	to	Reel/Frame No.
09/756,723	2001/01/10	RETRANSMISSION RANGE FOR A COMMUNICATIONS PROTOCOL	1	JIANG, SAM SHIAW-SHIANG	ASUSTEK COMPUTER INC.	011434/0214
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019102/0236
09/756,738	2001/01/10	DATA DISCARDING REQUEST ACKNOWLEDGMENT IN A WIRELESS COMMUNICATIONS PROTOCOL	1	JIANG, SAM SHIAW-SHIANG JIAU, DAVID JIN-CHYANG	ASUSTEK COMPUTER INC.	011434/0378
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019102/0436
09/822,238	2001/04/02	WINDOW-BASED POLLING SCHEME FOR A WIRELESS COMMUNICATIONS PROTOCOL	1	JIANG, SAM SHIAW-SHIANG	ASUSTEK COMPUTER INC.	011665/0064
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019102/0430
			3	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019147/0648
09/683,722	2002/02/07	DETERMINATION OF ACCEPTABLE SEQUENCE NUMBER RANGES IN A COMMUNICATIONS PROTOCOL	1	JIANG, SAM SHIAW-SHIANG SUN, ALEX CHUNG-MING	ASUSTEK COMPUTER INC.	012369/0124
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019102/0424

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09/681,991	2001/07/04	WIRELESS COMMUNICATIONS DEVICE WITH A STATE MODEL	1	SAM SHIAW-SHIANG JIANG	ASUSTEK COMPUTER INC.	011750/0313
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019102/0475
09/682,310	2001/08/16	PREVENTING SHORTENED LIFETIMES OF SECURITY KEYS IN A WIRELESS COMMUNICATIONS SECURITY SYSTEM	1	SAM SHIAW-SHIANG JIANG RICHARD LEE-CHEE KUO CHI-FONG HO	ASUSTEK COMPUTER INC.	011867/0753
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019102/0504
09/682,006	2001/07/09	LOSSLESS SRNS RELOCATION PROCEDURE IN A WIRELESS COMMUNICATIONS SYSTEM	1	JIANG, SAM SHIAW-SHIANG	ASUSTEK COMPUTER INC.	017882/0615
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019102/0472
09/682,317	2001/08/20	PROCESSING CHANNEL RESETS WHILE PERFORMING A CIPHERING CONFIGURATION CHANGE IN A WIRELESS COMMUNICATIONS PROTOCOL	1	SAM SHIAW-SHIANG JIANG	ASUSTEK COMPUTER INC.	011876/0608
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019102/0478
09/683,084	2001/11/16	APPLICABLE PDU RANGE TEST AND CALCULATION FOR WINDOW-BASED POLLING	1	SAM SHIAW-SHIANG JIANG	ASUSTEK COMPUTER INC.	012181/0082
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019102/0427
09/683,085	2001/11/16	PROCESSING UNEXPECTED TRANSMISSION INTERRUPTIONS IN A WIRELESS COMMUNICATIONS SYSTEM	1	RICHARD LEE-CHEE KUO SAM SHIAW-SHIANG JIANG	ASUSTEK COMPUTER INC.	012181/0191
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019102/0273

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10/249,177	2003/03/20	METHOD FOR DETERMINING TRIGGERING OF A PDCP SEQUENCE NUMBER SYNCHRONIZATION PROCEDURE	1	WU, CHIH-HSIANG	ASUSTEK COMPUTER INC.	013490/0909
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019123/0756
10/064,204	2002/06/21	METHOD FOR SYNCHRONIZING A START VALUE FOR SECURITY IN A WIRELESS COMMUNICATIONS NETWORK	1	KUO, LEE-CHEE	ASUSTEK COMPUTER INC.	012816/0443
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019099/0127
10/064,463	2002/07/17	HANDLING OF A WIRELESS DEVICE RE-ENTERING A SERVICE AREA	1	KUO, LEE-CHEE CHEN, REX HUAN-YUEH	ASUSTEK COMPUTER INC.	012893/0492
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019102/0496
10/064,778	2002/08/16	METHOD FOR HANDLING CIPHERING STATUS IN A WIRELESS NETWORK	1	KUO, LEE-CHEE	ASUSTEK COMPUTER INC.	012989/0829
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019102/0485
10/064,865	2002/08/26	INITIALIZATION FOR HYPER FRAME NUMBER OF SIGNALING RADIO BEARERS	1	HO, CHI-FONG	ASUSTEK COMPUTER INC.	013022/0286
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019102/0270
10/064,866	2002/08/26	METHOD OF INITIALIZING HYPER-FRAME NUMBERS DURING AN ESTABLISHMENT OF A NEW RADIO BEARER IN A WIRELESS COMMUNICATION SYSTEM	1	KUO, LEE-CHEE	ASUSTEK COMPUTER INC.	013022/0348
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019102/0488
10/250,278	2003/06/19	CORRECTION TO HFN INITIALIZATION FOR RB2 DURING SRNS RELOCATION	1	KUO, LEE-CHEE	ASUSTEK COMPUTER INC.	014463/0358
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019119/0213

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10/064,747	2002/08/13	METHOD FOR HANDLING TIMERS AFTER AN RLC RESET OR RE-ESTABLISHMENT IN A WIRELESS COMMUNICATIONS SYSTEM	1	WU, CHIH-HSIANG	ASUSTEK COMPUTER INC.	012976/0978
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019156/0196
10/605,121	2003/09/10	HANDLING OF AN UNRECOVERABLE ERROR ON A DEDICATED CHANNEL	1	CHEN, REX HUAN-YUEH	ASUSTEK COMPUTER INC.	013952/0781
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019104/0036
10/248,731	2003/02/13	METHOD FOR STORING A SECURITY START VALUE IN A WIRELESS COMMUNICATIONS SYSTEM	1	WU, CHIH-HSIANG	ASUSTEK COMPUTER INC.	013424/0753
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019123/0777
10/248,730	2003/02/13	PENALTY OF CELL RESELECTION FOR A WIRELESS DEVICE	1	CHEN, REX HUAN-YUEH	ASUSTEK COMPUTER INC.	013424/0716
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019167/0977
10/709,789	2004/05/28	METHOD AND APPARATUS OF CONTROLLING A RESET PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM	1	JIANG, SAM SHIAW-SHIANG	ASUSTEK COMPUTER INC.	014666/0356
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019106/0877
10/710,418	2004/07/09	STATUS REPORT MISSING DETECTION IN A COMMUNICATION SYSTEM	1	JIANG, SAM SHIAW-SHIANG	ASUSTEK COMPUTER INC.	014828/0887
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019106/0864
11/160,684	2005/07/05	Enhanced SDU Discard Procedure for a Special Data Segmentation in a Wireless Communications System	1	JIANG, SAM SHIAW-SHIANG	ASUSTEK COMPUTER INC.	016223/0316
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019100/0689
11/161,591	2005/08/09	Method for On-Line Recovery of Parameter	1	JIANG, SAM SHIAW-SHIANG	ASUSTEK COMPUTER INC.	016368/0480

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		Synchronization for Ciphering Applications	2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019104/0112
11/161,356	2005/08/01	Enhanced polling method for preventing deadlock in a wireless communications system	1	JIANG, SAM SHIAW-SHIANG	ASUSTEK COMPUTER INC.	016330/0765
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019121/0914
10/122,436	2002/04/12	Robust RLC reset procedure in a wireless communication system	1	KUO, LEE-CHEE	ASUSTEK COMPUTER INC.	012804/0553
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019102/0267
11/306,201	2005/12/20	Method of CRC Residue Error Detection and Handling	1	JIANG, SAM SHIAW-SHIANG	ASUSTEK COMPUTER INC.	016923/0051
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019123/0767
11/278,545	2006/04/04	Method and Related Apparatus for Reconfiguring Size of a Receiving Window in a Communications System	1	JIANG, SAM SHIAW-SHIANG	ASUSTEK COMPUTER INC.	017433/0263
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019123/0774
11/278,546	2006/04/04	Error Handling In A Wireless Communications System	1	JIANG, SAM SHIAW-SHIANG	ASUSTEK COMPUTER INC.	017433/0257
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019119/0535
11/379,576	2006/04/21	Method and Apparatus of a Procedure for Receiving Window Size Reconfiguration in a Communication System	1	JIANG, SAM SHIAW-SHIANG	ASUSTEK COMPUTER INC.	017508/0278
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019104/0022
11/380,654	2006/04/28	Method and Apparatus for Polling Transmission Status in a Wireless Communication System	1	JIANG, SAM SHIAW-SHIANG	ASUSTEK COMPUTER INC.	017541/0372
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019104/0077

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11/380,420	2006/05/24	Method and Apparatus for Reducing Jitter in a Receiver of a Selective Combining System	1	JIANG, SAM SHIAW-SHIANG	ASUSTEK COMPUTER INC.	017557/0746
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	020146/0762
11/383,759	2006/05/17	Method and Apparatus of Data Segmentation in a Mobile Communications System	1	JIANG, SAM SHIAW-SHIANG	ASUSTEK COMPUTER INC.	017625/0669
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019104/0090
10/428,549	2003/05/02	Abnormal case handling for acknowledged mode transmission and unacknowledged mode transmission	1	JIANG, SAM SHIAW-SHIANG	ASUSTEK COMPUTER, INC.	014035/0805
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019099/0207
11/247,003	2005/10/11	Window-based Polling Scheme for A Wireless Communications Protocol	1	JIANG, SAM SHIAW-SHIANG	ASUSTEK COMPUTER INC.	018932/0910
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	020129/0800
10/314,539	2002/12/09	Timer based stall avoidance mechanism for high speed wireless communication system	1	JIANG, SAM SHIAW-SHIANG	ASUSTEK COMPUTER INC.	013559/0864
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019123/0738
10/428,550	2003/05/02	Flexible scheme for configuring "Traffic volume measurement reporting criteria"	1	CHEN, HUAN-YUEH	ASUSTEK COMPUTER INC.	014035/0808
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019123/0780
10/427,501	2003/05/01	METHOD AND APPARATUS FOR SAVING BATTERY POWER IN A MOBILE DEVICE USING RECOVERY MECHANISM FOR CELL UPDATE PROCEDURE IN CELL_DCH STATE	1	CHEN, HUAN-YUEH	ASUSTEK COMPUTER INC.	014032/0033
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019122/0267

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11/524,367	2006/09/21	METHOD AND APPARATUS FOR TRANSMITTING SIGNALING DATA MESSAGES IN A WIRELESS COMMUNICATIONS SYSTEM	1	TSENG, LI-CHIH JIANG, SHIAW-SHIANG	ASUSTEK COMPUTER INC.	018331/0553
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019123/0513
11/524,486	2006/09/21	METHOD AND APPARATUS FOR HANDLING CONTROL PDUS DURING RE-ESTABLISHING RECEIVING SIDES IN A WIRELESS COMMUNICATIONS SYSTEM	1	JIANG, SAM SHIAW-SHIANG	ASUSTEK COMPUTERS INC.	018333/0947
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019123/0679
11/528,453	2006/09/28	Method and Apparatus for Initiating a Storage Window in a Wireless Communications System	1	JIANG, SAM-SHIAW-SHIANG	ASUSTEK COMPUTER INC.	018356/0768
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019123/0645
11/591,490	2006/11/02	METHOD AND APPARATUS FOR RLC PROTOCOL ERROR HANDLING IN A WIRELESS COMMUNICATIONS SYSTEM	1	JIANG, SAM SHIAW-SHIANG	INNOVATIVE SONIC LIMITED	018492/0689
11/649,239	2007/01/04	METHOD AND APPARATUS FOR INITIALIZATION OF INTEGRITY PROTECTION	1	JIANG, SAM SHIAW-SHIANG	INNOVATIVE SONIC LIMITED	018762/0621
11/649,228	2007/01/04	METHOD AND APPARATUS OF MODIFYING INTEGRITY PROTECTION CONFIGURATION IN A MOBILE USER EQUIPMENT OF A WIRELESS COMMUNICATIONS SYSTEM	1	JIANG, SAM SHIAW-SHIANG	INNOVATIVE SONIC LIMITED	018775/0031
10/358,295	2003/02/05	SCHEME TO DISCARD AN ERRONEOUS PDU RECEIVED IN A WIRELESS COMMUNICATION SYSTEM	1	WU, FRANK CHIH-HSIANG	ASUSTEK COMPUTER INC.	013743/0420
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019119/0387

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11/702,652	2007/02/06	Method of Resetting Radio Link Control Entity in a Mobile Communications System and Related Apparatus	1	JIANG, SAM SHIAW-SHIANG	INNOVATIVE SONIC LIMITED	018965/0762
11/716,614	2007/03/12	Method and Related Apparatus for Stopping Point-to-Multipoint MBMS Service in a Wireless Communications System	1	KUO, RICHARD LEE-CHEE	INNOVATIVE SONIC LIMITED	019085/0309
11/716,632	2007/03/12	Method and Related Apparatus for Handling Point-to-Multipoint MBMS Service in a Wireless Communications System	1	KUO, RICHARD LEE-CHEE	INNOVATIVE SONIC LIMITED	019088/0209
11/714,775	2007/03/07	Method and Apparatus for Triggering a New Scheduling Information Transmission in a Wireless Communications System	1	JIANG, SAM SHIAW-SHIANG	INNOVATIVE SONIC LIMITED	019080/0821
11/717,705	2007/03/14	Method and Apparatus for Acquiring Point-to-Multipoint MBMS Service Information in a Wireless Communications System	1	KUO, RICHARD LEE-CHEE	INNOVATIVE SONIC LIMITED	019097/0612
11/717,121	2007/03/13	Method and Apparatus for Acquiring Point-to-Multipoint MBMS Service Information in a Wireless Communications System	1	KUO, RICHARD LEE-CHEE	INNOVATIVE SONIC LIMITED	019095/0968
11/724,225	2007/03/15	Method and Related Apparatus of Handling Point-to-Multipoint MBMS Service in a Wireless Communications System	1	KUO, RICHARD LEE-CHEE	INNOVATIVE SONIC LIMITED	019118/0088
11/723,132	2007/03/16	Method and Apparatus for De-activating Hybrid Automatic Repeat Request Process in a Wireless Communications System	1	JIANG, SAM SHIAW-SHIANG	INNOVATIVE SONIC LIMITED	019109/0128

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11/727,188	2007/03/23	Method and Apparatus for Activating Hybrid Automatic Repeat Request Process in a Wireless Communications System	1	JIANG, SAM SHIAW-SHIANG TSENG, LI-CHIH	INNOVATIVE SONIC LIMITED	019149/0269
11/723,906	2007/03/22	Method and Apparatus for Handling Retransmissions in a Wireless Communications System	1	JIANG, SAM SHIAW-SHIANG	INNOVATIVE SONIC LIMITED	019154/0658
11/727,566	2007/03/27	Method and Apparatus for Handling Uplink Transmission Start in a Wireless Communications System	1	JIANG, SAM SHIAW-SHIANG	INNOVATIVE SONIC LIMITED	019148/0698
11/790,650	2007/04/26	Method and Apparatus of Deciphering Parameter Synchronization in a Wireless Communications Device	1	JIANG, SAM-SHIAW-SHIANG	INNOVATIVE SONIC LIMITED	019299/0636
11/790,636	2007/04/26	Method of Handling Packet Data in a Wireless Communications System and Related Apparatus	1	TSENG, LI-CHIH	INNOVATIVE SONIC LIMITED	019298/0944
11/797,300	2007/05/02	Method and Apparatus of Handling Variable of RLC Reset Procedure during Receiver-Side-only Re-establishment in Wireless Communications System	1	JIANG, SAM SHIAW-SHIANG	INNOVATIVE SONIC LIMITED	019322/0761
11/797,478	2007/05/03	Method and related Apparatus of Default Timer Configurations of Wireless Communications System	1	JIANG, SAM SHIAW-SHIANG	INNOVATIVE SONIC LIMITED	019324/0349
11/798,001	2007/05/09	Method and Apparatus for Setting Ciphering Activation Time in a Wireless Communications System	1	JIANG, SAM SHIAW-SHIANG KUO, RICHARD LEE-CHEE	INNOVATIVE SONIC LIMITED	019330/0882
11/806,502	2007/05/31	Dual Receiving Window Method and Apparatus for Automatic Retransmission Request	1	JIANG, SAM SHIAW-SHIANG	INNOVATIVE SONIC LIMITED	019418/0141

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11/812,213	2007/06/15	METHOD OF CONSTRUCTING PACKETS FOR MAC LAYER IN WIRELESS COMMUNICATIONS SYSTEM AND RELATED APPARATUS	1	KUO, RICHARD LEE-CHEE TSENG, LI-CHIH	INNOVATIVE SONIC LIMITED	019485/0276
11/812,217	2007/06/15	Method and Apparatus of Handling Packet Data in a Wireless Communications System	1	JIANG, SAM SHIAW-SHIANG TSENG, LI-CHIH	INNOVATIVE SONIC LIMITED	019490/0349
11/812,212	2007/06/15	Method and Apparatus for Uplink Data Handling upon Handover in a Wireless Communications System	1	JIANG, SAM SHIAW-SHIANG	INNOVATIVE SONIC LIMITED	019490/0352
11/812,350	2007/06/18	METHOD AND APPARATUS FOR DETECTION AND RECOVERY OF HARQ DTX TO NACK ERROR	1	KUO, RICHARD LEE-CHEE JIANG, SAM SHIAW-SHIANG TSENG, LI-CHIH	INNOVATIVE SONIC LIMITED	019500/0565
11/812,651	2007/06/20	Method and Apparatus for Detection of Local NACK in a Wireless Communications System	1	JIANG, SAM SHIAW-SHIANG	INNOVATIVE SONIC LIMITED	019505/0432
11/812,653	2007/06/20	Method and Apparatus for Data Framing in a Wireless Communications System	1	JIANG, SAM SHIAW-SHIANG TSENG, LI-CHIH	INNOVATIVE SONIC LIMITED	019504/0621
11/812,938	2007/06/22	Method and Apparatus of Packet Discard in a Wireless Communications System	1	JIANG, SAM SHIAW-SHIANG	INNOVATIVE SONIC LIMITED	019525/0521
11/524,487	2006/09/21	METHOD AND APPARATUS FOR HANDLING CONTROL PDUS DURING RE-ESTABLISHMENT OF TRANSMITTING SIDES IN WIRELESS COMMUNICATIONS SYSTEMS	1	JIANG, SAM SHIAW-SHIANG	ASUSTEK COMPUTER INC.	018324/0330
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019123/0653

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11/522,992	2006/09/19	Method and Apparatus for Improving Transmission Delay of Status Report in a Wireless Communications System	1	JIANG, SAM SHIAW-SHIANG	ASUSTEK COMPUTER INC.	018321/0395
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019123/0665
11/878,892	2007/07/27	Method and Apparatus for Setting Field Data of Scheduling Information in a Wireless Communications System	1	JIANG, SAM SHIAW-SHIANG	INNOVATIVE SONIC LIMITED	019678/0618
11/524,488	2006/09/21	METHOD AND APPARATUS FOR HANDLING TIMERS DURING RE-ESTABLISHING RECEIVING SIDES IN A WIRELESS COMMUNICATIONS SYSTEM	1	JIANG, SAM SHIAW-SHIANG	ASUSTEK COMPUTER INC.	018324/0307
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019123/0623
11/524,368	2006/09/21	METHOD AND APPARATUS FOR HANDLING TIMERS DURING REESTABLISHING TRANSMITTING SIDES IN WIRELESS COMMUNICATIONS SYSTEMS	1	JIANG, SAM SHIAW-SHIANG	ASUSTEK COMPUTER INC.	018331/0546
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019100/0707
11/902,303	2007/09/20	METHOD FOR DETECTING RADIO LINK FAILURE IN WIRELESS COMMUNICATIONS SYSTEM AND RELATED APPARATUS	1	JEN, YU-CHIH	INNOVATIVE SONIC LIMITED	019921/0267
11/850,580	2007/09/05	Method of Reporting MBMS Service Information for User Equipment in a Wireless Communications System and Related Apparatus	1	KUO, RICHARD LEE-CHEE	INNOVATIVE SONIC LIMITED	020456/0334
11/898,562	2007/09/13	Method of Selecting Operating Frequency for User Equipment in a Wireless Communications System and Related Apparatus	1	KUO, RICHARD LEE-CHEE	INNOVATIVE SONIC LIMITED	019859/0765
11/898,732	2007/09/14	Method and Apparatus for Setting Serving Grant in a Wireless Communications System	1	TSENG, LI-CHIH JIANG, SAM SHIAW-SHIANG	INNOVATIVE SONIC LIMITED	019876/0743

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11/905,097	2007/09/27	METHOD AND APPARATUS FOR DISTRIBUTION AND ATTACHMENT GATEWAY SUPPORT NODE IN WIRELESS COMMUNICATIONS SYSTEM	1	JEN, YU-CHIH	INNOVATIVE SONIC LIMITED	019949/0620
11/905,310	2007/09/28	Method and Apparatus for Performing Radio Bearer Mapping in a Wireless Communications System	1	GUO, YU-HSUAN	INNOVATIVE SONIC LIMITED	019951/0752
11/561,900	2006/11/21	METHOD FOR HANDLING TIMERS AFTER AN RLC RE-ESTABLISHMENT IN A WIRELESS COMMINICATIONS SYSTEM	1	WU, CHIH-HSIANG	ASUSTEK COMPUTER INC.	018540/0191
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019233/0679
11/564,306	2006/11/29	METHOD FOR HANDLING PERIODIC STATUS REPORT TIMER AFTER AN RLC RESET IN A WIRELESS COMMUNICATIONS SYSTEM	1	WU, CHIH-HSIANG	ASUSTEK COMPUTER INC.	018559/0060
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019233/0624
11/564,305	2006/11/29	METHOD FOR HANDLING PERIODIC STATUS REPORT TIMER AFTER AN RLC RE-ESTABLISHMENT IN A WIRELESS COMMUNICATIONS SYSTEM	1	WU, CHIH-HSIANG	ASUSTEK COMPUTER INC.	018559/0062
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019233/0616
11/564,304	2006/11/29	METHOD FOR HANDLING DATA DISCARD TIMER AFTER AN RLC RESET OR RE-ESTABLISHMENT IN A WIRELESS COMMUNICATIONS SYSTEM	1	WU, CHIH-HSIANG	ASUSTEK COMPUTER INC.	018559/0064
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019233/0604
11/564,303	2006/11/29	METHOD FOR HANDLING A POLLING TIMER AFTER RE-ESTABLISHMENT IN A WIRELESS COMMUNICATIONS SYSTEM	1	WU, CHIH-HSIANG	ASUSTEK COMPUTER INC.	018559/0066
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019233/0575
11/564,293	2006/11/29	METHOD FOR HANDLING A POLL PROHIBIT TIMER	1	WU, CHIH-HSIANG	ASUSTEK COMPUTER INC.	018558/0907

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		AFTER RE-ESTABLISHMENT IN A WIRELESS COMMUNICATIONS SYSTEM	2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019233/0554
11/564,294	2006/11/29	METHOD FOR HANDLING STATUS REPORT PROHIBIT TIMER AFTER RE-ESTABLISHMENT IN A WIRELESS COMMUNICATIONS SYSTEM	1	WU, CHIH-HSIANG	ASUSTEK COMPUTER INC.	018558/0909
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019233/0512
11/564,296	2006/11/29	METHOD FOR HANDLING RESET TIMER AFTER AN RLC RE-ESTABLISHMENT IN A WIRELESS COMMUNICATIONS SYSTEM	1	WU, CHIH-HSIANG	ASUSTEK COMPUTER INC.	018558/0911
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019233/0488
11/564,298	2006/11/29	METHOD FOR HANDLING DATA DISCARD SIGNALING TIMER AFTER AN RLC RE-ESTABLISHMENT IN A WIRELESS COMMUNICATIONS SYSTEM	1	WU, CHIH-HSIANG	ASUSTEK COMPUTER INC.	018558/0918
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019233/0448
11/976,049	2007/10/19	Method of Calculating Start Value for Security for User Equipment in a Wireless Communications System and Related Apparatus	1	KUO, RICHARD LEE-CHEE	INNOVATIVE SONIC LIMITED	020041/0799
11/979,050	2007/10/30	Method and Apparatus for Header Setting in a Wireless Communications System	1	JIANG, SAM SHIAW-SHIANG	INNOVATIVE SONIC LIMITED	020099/0512
11/979,692	2007/11/07	Method and Apparatus for Performing Uplink Transmission in a Multi-input Multi-output User Equipment of a Wireless Communications System	1	JEN, YU-CHIH	INNOVATIVE SONIC LIMITED	020148/0371
11/984,789	2007/11/21	Method and Apparatus for Performing Integrity Protection in a Wireless Communications System	1	JIANG, SAM SHIAW-SHIANG	INNOVATIVE SONIC LIMITED	020191/0016

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11/984,650	2007/11/20	Method and Related Apparatus for Ciphering Algorithm Change in a Wireless Communications System	1	KUO, RICHARD LEE-CHEE	INNOVATIVE SONIC LIMITED	020191/0821
11/987,878	2007/12/05	Method and Apparatus for Performing Reordering in a Wireless communications System	1	JIANG, SAM SHIAW-SHIANG	INNOVATIVE SONIC LIMITED	020247/0742
12/000,067	2007/12/07	Method and Apparatus for Handling Reordering in a Wireless Communications System	1	JIANG, SAM SHIAW-SHIANG	INNOVATIVE SONIC LIMITED	020253/0833
11/984,073	2007/11/13	Method and Apparatus of Selecting Operating Frequency for User Equipment in a Wireless Communications System	1	KUO, RICHARD LEE-CHEE	INNOVATIVE SONIC LIMITED	020148/0271
11/984,074	2007/11/13	Method and Apparatus of Selecting MBMS Operating Frequency for User Equipment in a Wireless Communications System	1	KUO, RICHARD LEE-CHEE	INNOVATIVE SONIC LIMITED	020148/0173
12/003,046	2007/12/19	Method and Apparatus for Recovering Protocol Error in a Wireless Communications System	1	JIANG, SAM SHIAW-SHIANG	INNOVATIVE SONIC LIMITED	020314/0307
12/000,987	2007/12/19	Method of Improving Continuous Packet Connectivity in a Wireless Communications System and Related Apparatus	1	TSENG, LI-CHIH	INNOVATIVE SONIC LIMITED	020328/0798
10/286,588	2002/11/01	Local suspend scheme for wireless communication systems	1	JIANG, SAM SHIAW-SHIANG	ASUSTEK COMPUTER INC.	018900/0686
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019509/0115
10/374,235	2003/02/25	Scheme to prevent HFN un-synchronization for UM RLC in a high speed wireless communication system	1	WU, CHIH-HSIANG	ASUSTEK COMPUTER INC.	013815/0823
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019561/0700

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10/351,186	2003/01/25	Inter Node B serving HS-DSCH cell change mechanism in a high speed wireless communication system	1	WU, CHIH-HSIANG	ASUSTEK COMPUTER INC.	013708/0904
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019561/0647
10/330,879	2002/12/27	Window based stall avoidance mechanism for high speed wireless communication system	1	JIANG, SAM SHIAW-SHIANG	ASUSTEK COMPUTER, INC.	013620/0675
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019252/0179
12/007,341	2008/01/09	Method and Apparatus for Handling Reset in a Wireless Communications System	1	JIANG, SAM SHIAW-SHIANG	INNOVATIVE SONIC LIMITED	020381/0579
12/010,191	2008/01/22	Method and Related Apparatus for Improving MIMO Procedure in a Wireless Communications System	1	KUO, RICHARD LEE-CHEE	INNOVATIVE SONIC LIMITED	020447/0540
12/010,286	2008/01/23	Method of Enhancing Continuous Packet Connectivity in a Wireless Communications System and Related Apparatus	1	JEN, YU-CHIH	INNOVATIVE SONIC LIMITED	020446/0091
10/355,481	2003/01/31	Stall avoidance schemes using HARQ process receiving status	1	JIANG, SAM SHIAW-SHIANG	ASUSTEK COMPUTER INC.	013728/0533
			2	ASUSTEK COMPUTER INC.	INNOVATIVE SONIC LIMITED	019561/0660
12/010,886	2008/01/30	Method and Apparatus for Handling Packets in a Wireless Communications System	1	JIANG, SAM SHIAW-SHIANG	INNOVATIVE SONIC LIMITED	020747/0782
11/812,216	2007/06/15	Method and Apparatus for Data Framing in a Wireless Communications System	1	JIANG, SAM SHIAW-SHIANG	INNOVATIVE SONIC LIMITED	019491/0038
11/812,743	2007/06/21	Method and Apparatus for Handling Status Report after Handover in a Wireless Communications System	1	JIANG, SAM SHIAW-SHIANG	INNOVATIVE SONIC LIMITED	019506/0383

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12/029,388	2008/02/11	Method for Improving High-Speed Downlink Operation in CELL_FACH State for a Wireless Communications System and Related Apparatus	1	KUO, RICHARD LEE-CHEE TSENG, LI-CHIH	INNOVATIVE SONIC LIMITED	020611/0772
12/029,385	2008/02/11	Method and Related Apparatus for Enhancing Resource Utility Rate in a Wireless Communications System	1	JIANG, SAM SHIAW-SHIANG GUO, YU-HSUAN	INNOVATIVE SONIC LIMITED	020668/0636
11/987,332	2007/11/29	Method of Enhancing Continuous Packet Connectivity in a Wireless Communications System and Related Apparatus	1	KUO, RICHARD LEE-CHEE	INNOVATIVE SONIC LIMITED	020224/0187
12/004,000	2008/01/04	Method and Related Apparatus for Improving MIMO Procedure in a Wireless Communications System	1	KUO, RICHARD LEE-CHEE	INNOVATIVE SONIC LIMITED	020376/0634
			2	KUO, RICHARD LEE-CHEE	INNOVATIVE SONIC LIMITED	020380/0274
11/812,218	2007/06/15	Method and Apparatus for Handling Downlink Data upon Handover in a Wireless Communications System	1	JIANG, SAM SHIAW-SHIANG	INNOVATIVE SONIC LIMITED	019490/0346
11/905,098	2007/09/27	METHOD AND APPARATUS FOR DISTRIBUTION AND ATTACHMENT GATEWAY SUPPORT NODE IN WIRELESS COMMUNICATIONS SYSTEM	1	JEN, YU-CHIH	INNOVATIVE SONIC LIMITED	019949/0631
11/979,716	2007/11/07	METHOD FOR HANDLING RADIO LINK FAILURE IN WIRELESS COMMUNICATIONS SYSTEM AND RELATED APPARATUS	1	JEN, YU-CHIH	INNOVATIVE SONIC LIMITED	020148/0334
12/003,028	2007/12/19	Method and Apparatus of Continuous Packet Connectivity Enhancement in a Wireless Communications System	1	TSENG, LI-CHIH	INNOVATIVE SONIC LIMITED	020314/0359

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11/902,454	2007/09/21	METHOD OF HANDLING RADIO LINK FAILURE IN WIRELESS COMMUNICATIONS SYSTEM AND RELATED DEVICE	1	JEN, YU-CHIH	INNOVATIVE SONIC LIMITED	019922/0383
11/902,462	2007/09/21	METHOD OF HANDLING RADIO LINK FAILURE IN WIRELESS COMMUNICATIONS SYSTEM AND RELATED DEVICE	1	JEN, YU-CHIH	INNOVATIVE SONIC LIMITED	019922/0570
12/003,027	2007/12/19	Method and Apparatus for Providing Voice Communication Service in a Wireless Communications System	1	JIANG, SAM SHIAW-SHIANG	INNOVATIVE SONIC LIMITED	020314/0296
11/979,694	2007/11/07	Method and Apparatus for Performing Multi-input Multi-output Transmission in a Wireless Communications System	1	JEN, YU-CHIH	INNOVATIVE SONIC LIMITED	020148/0353
11/984,790	2007/11/21	Method and Apparatus for Performing Ciphering in a Wireless Communications System	1	JIANG, SAM SHIAW-SHIANG	INNOVATIVE SONIC LIMITED	020191/0019
12/010,283	2008/01/23	Method of Enhancing Continuous Packet Connectivity in a Wireless Communications System and Related Apparatus	1	JEN, YU-CHIH	INNOVATIVE SONIC LIMITED	020446/0221
12/010,281	2008/01/23	Method of Enhancing Continuous Packet Connectivity in a Wireless Communications System and Related Apparatus	1	JEN, YU-CHIH	INNOVATIVE SONIC LIMITED	020447/0517
12/010,285	2008/01/23	Method of Detecting Slot Format of Physical Signaling Channel in a Wireless Communications System and Related Apparatus	1	JEN, YU-CHIH	INNOVATIVE SONIC LIMITED	020461/0523

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12/029,360	2008/02/11	Method for Improving High-Speed Downlink Operation in CELL_FACH State for a Wireless Communications System and Related Apparatus	1	KUO, RICHARD LEE-CHEE TSENG, LI-CHIH	INNOVATIVE SONIC LIMITED	020668/0631

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IPR2024-01143

Electronic Acknowledgement Receipt

EFS ID:	3690752
Application Number:	11278546
International Application Number:	
Confirmation Number:	6559
Title of Invention:	Error Handling In A Wireless Communications System
First Named Inventor/Applicant Name:	Sam Shiaw-Shiang Jiang
Customer Number:	64044
Filer:	Winston Hsu
Filer Authorized By:	
Attorney Docket Number:	5413-0196PUS1
Receipt Date:	31-JUL-2008
Filing Date:	04-APR-2006
Time Stamp:	06:31:18
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes) /Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	IVS.pdf	2597920 b7ceac18d8ef6c61e57766fa473d0dbd9001b87a	no	19

Warnings:	
Information:	

Total Files Size (in bytes):	2597920

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

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www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/278,546	04/04/2006	Sam Shiaw-Shiang Jiang	5413-0196PUS1	6559

64044 7590 06/09/2008

BIRCH, STEWART, KOLASCH & BIRCH, LLP
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SUITE 100 EAST
FALLS CHURCH, VA 22315

EXAMINER	
BATISTA, MARCOS	
ART UNIT	**PAPER NUMBER**
4134	
MAIL DATE	**DELIVERY MODE**
06/09/2008	PAPER

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

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

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Office Action Summary	Application No.	Applicant(s)	
	11/278,546	JIANG, SAM SHIAW-SHIANG	
	Examiner	Art Unit	
	MARCOS BATISTA	4134	

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

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

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

Status

1)☒ Responsive to communication(s) filed on *23 April 2008*.

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

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

Disposition of Claims

4)☒ Claim(s) *1-7* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7* is/are rejected.

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

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

Application Papers

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

10)☒ The drawing(s) filed on *04/04/2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

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

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

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

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

a)☐ All b)☐ Some * c)☐ None of:

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

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

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

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

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *04/18/2008,01/03/07,08/23/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

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DETAILED ACTION

Response to Argument

1. Applicant's arguments with respect to claims 1-7 have been considered but are moot in view of the new ground(s) of rejection. This action is made Non-Final.

Claim Rejections - 35 USC § 103

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

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 2 and 4-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Petrovic et al. (US 20040208160 A1), hereafter “Petrovic,” in view of Chintada et al. (US 20040187068 A1), hereafter “Chintada.”

Consider claim 1, a method of detecting an erroneous sequence number of a status report unit in a wireless communications system, the method comprising (**see [0002] and [0128]**): Petrovic discloses receiving a status report unit output from a receiver of the wireless communications system (**see [0128]**).

Petrovic discloses the invention as claim in above, but does not particular refer to detecting whether a negatively acknowledged sequence number lies in a range of greater than or equal to a sequence number following a sequence number of a last in

sequence acknowledged packet of a transmitter and less than a sequence number of a next packet to be transmitted for the first time by the transmitter when the negatively acknowledged sequence number is detected in the status report unit. Petrovic neither particular refer to detecting a status report unit comprises an erroneous sequence number when the negatively acknowledged sequence number is not in the range

Chintada, in analogous art, teaches detecting whether a negatively acknowledged sequence number lies in a range of greater than or equal to a sequence number following a sequence number of a last in sequence acknowledged packet of a transmitter and less than a sequence number of a next packet to be transmitted for the first time by the transmitter when the negatively acknowledged sequence number is detected in the status report unit (**see fig. 6, [0024] and [0028] lines 1-5**). Chintada also teaches detecting a status report unit comprises an erroneous sequence number when the negatively acknowledged sequence number is not in the range (**see [0028] lines 1-5 – The variable V(A) is only updated after receiving a error-free I-frame, which implies that the system needs to check if that condition is met**).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the invention of Petrovic and have it include detecting whether a negatively acknowledged sequence number lies in a range of greater than or equal to a sequence number following a sequence number of a last in sequence acknowledged packet of a transmitter and less than a sequence number of a next packet to be transmitted for the first time by the transmitter when the negatively

acknowledged sequence number is detected in the status report unit and detecting a status report unit comprises an erroneous sequence number when the negatively acknowledged sequence number is not in the range, as taught by Chintada. The motivation would have been in order to provide an error detection mechanism while communication with another device (**see fig. 6, pars. 0024 and 0028**).

Consider claim 2, Petrovic as modified by Chintada teaches claim 1 above. Petrovic also teaches initiating a reset procedure when the status report unit comprises the erroneous sequence number (see abstract, [0104] – [0109].

Consider claim 4, Petrovic as modified by Chintada teaches claim 1 above. Chintada also teaches piggybacked status report unit (see [0042] lines 12-15).

It would have been obvious to have modified Petrovic's invention with the teaching of Chintada. The motivation would have been in order to provide an error detection mechanism while communication with another device (see fig. 6, pars. 0024 and 0028).

.

Consider claim 5, Petrovic as modified Chintada teaches claim 1 above. Petrovic also teaches third generation mobile communication systems (see [0011] – [0014].

Consider claim 6, Petrovic as modified Chintada teaches claim 1 above. Petrovic also teaches third generation mobile communication systems operating in an acknowledged mode (see [0043] and [0104]).

Consider claim 7, Petrovic as modified Chintada teaches claim 1 above. Petrovic also teaches a reset procedure to be performed as per claim 1(see [0104] – [0111] - A reset procedure is known in the art to include processing unit, memory and program code).

4. Claims 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Petrovic et al. (US 20040208160 A1), hereafter "Petrovic," in view of Chintada et al. (US 20040187068 A1), hereafter "Chintada," and in further view of Minagawa (US 6483855 B1), hereafter "Minagawa."

Consider claim 3, Petrovic as modified by Chintada teaches claim 1 above. But neither Petrovic nor Chintada particularly refer to modulus operation with the sequence number following the sequence number of the last in-sequence acknowledged packet of the transmitter as a modulus base.

Minagawa teaches transmission and reception sequence numbers based on modulo (see col 2, lines 43-49 and col 22, lines 29-34).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the invention of Petrovic as modified by Chintada and

have it include modulus operation with the sequence number following the sequence number of the last in-sequence acknowledged packet of the transmitter as a modulus base, as taught by Minagawa. The motivation would have been in order to provide a consistent error checking mechanism (see col 2, lines 43-49).

Conclusion

5. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Marcos Batista, whose telephone number is (571) 270-5209. The Examiner can normally be reached on Monday-Thursday from 8:00am to 5:00pm.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Lun-Yi Lao can be reached at (571) 272-7671. 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) or 703-305-3028.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist/customer service whose telephone number is (571) 272-2600.

Marcos Batista
/M. B./
05/08/2008

/LUN-YI LAO/
Supervisory Patent Examiner, Art Unit 4134

Notice of References Cited	Application/Control No. 11/278,546	Applicant(s)/Patent Under Reexamination JIANG, SAM SHIAW-SHIANG	
	Examiner MARCOS BATISTA	Art Unit 4134	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2004/0187068 A1	09-2004	Chintada et al.	714/776
	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	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.

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IPR2024-01143

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Art Unit: 2616

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From : Winston Hsu, Registration No. 41,526

Serial No. : 11/278,546

Attorney Docket No.: ASTP0061USA

Subject: **Information Disclosure Statement (IDS)**

Total Pages :145pages (including cover page)

Winston Hsu Date: AUG 2 3 2006

ASTP0061USA0_D1_1

PAGE 1/145 * RCVD AT 8/23/2006 10:32:32 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-5/13 * DNIS:2738300 * CSID:17039974517 * DURATION (mm-ss):61-02

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.B./

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IPR2024-01143

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TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Total Number of Pages in This Submission: 144

Application Number	11/278,546
Filing Date	04/04/2006
First Named Inventor	Sam Shiaw-Shiang Jiang
Art Unit	2616
Examiner Name	N/A
Attorney Docket Number	ASTP0061USA

ENCLOSURES *(Check all that apply)*

- [✓] Fee Transmittal Form
  - [ ] Fee Attached
- [ ] Amendment/Reply
  - [ ] After Final
  - [ ] Affidavits/declaration(s)
- [ ] Extension of Time Request
- [ ] Express Abandonment Request
- [✓] Information Disclosure Statement
- [ ] Certified Copy of Priority Document(s)
- [ ] Reply to Missing Parts/ Incomplete Application
  - [ ] Reply to Missing Parts under 37 CFR 1.52 or 1.53
- [ ] Drawing(s)
- [ ] Licensing-related Papers
- [ ] Petition
- [ ] Petition to Convert to a Provisional Application
- [ ] Power of Attorney, Revocation Change of Correspondence Address
- [ ] Terminal Disclaimer
- [ ] Request for Refund
- [ ] CD, Number of CD(s) _____
  - [ ] Landscape Table on CD
- [ ] After Allowance Communication to TC
- [ ] Appeal Communication to Board of Appeals and Interferences
- [ ] Appeal Communication to TC (Appeal Notice, Brief, Reply Brief)
- [ ] Proprietary Information
- [ ] Status Letter
- [ ] Other Enclosure(s) (please identify below):

Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	North America Intellectual Property Corporation		
Signature			
Printed name	Winston Hsu		
Date	AUG 23 2006	Reg No	41,526

CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria VA 22313-1450 on the date shown below:

Signature			
Typed or printed name	Jun Yu	Date	AUG 23 2006

This collection of information is required by 37 CFR 1.5. 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 2 hours 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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Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818)

FEE TRANSMITTAL
For FY 2005

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT ($) 0.00

Complete if Known	
Application Number	11/278,546
Filing Date	04/04/2006
First Named Inventor	Sam Shiaw-Shiang Jiang
Examiner Name	2616
Art Unit	N/A
Attorney Docket No.	ASTP0061USA

METHOD OF PAYMENT (check all that apply)

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

☑ Deposit Account Deposit Account Number: 50-3105 Deposit Account Name: North America Intellectual Property Corporation

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

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☑ Charge any additional fee(s) or underpayments of fee(s) under 37 CFR 1.16 and 1.17 ☑ Credit any overpayments

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FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES

Application Type	FILING FEES Fee ($)	FILING FEES Small Entity Fee ($)	SEARCH FEES Fee ($)	SEARCH FEES Small Entity Fee ($)	EXAMINATION FEES Fee ($)	EXAMINATION FEES Small Entity Fee ($)	Fees Paid ($)
Utility	300	150	500	250	200	100	
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	
Provisional	200	100	0	0	0	0	

2. EXCESS CLAIM FEES

Fee Description	Fee ($)	Small Entity Fee ($)
Each claim over 20 (including Reissues)	50	25
Each independent claim over 3 (including Reissues)	200	100
Multiple dependent claims	360	180

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

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

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

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 $250 ($125 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).

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

4. OTHER FEE(S)

Non-English Specification, $130 fee (no small entity discount) Fees Paid ($) _____

Other (e.g., late filing surcharge): submission of Information Disclosure Statement 0.00

SUBMITTED BY

Signature	[signature]	Registration No (Attorney/Agent) 41,526	Telephone 3027291562
Name (Print/Type)	Winston Hsu		Date AUG 23 2006

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Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 2

Complete if Known	
Application Number	11/278,546
Filing Date	04/04/2006
First Named Inventor	Sam Shiaw-Shiang Jiang
Art Unit	2616
Examiner Name	N/A
Attorney Docket Number	ASTP0061USA

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-			
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FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3] Number[4] Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]
	1	EP 1 465 369 A1	10-06-2004	Matsushita Electric Industrial Co., LTD		
	2	EP 1 361 707 A2/A3	11-12-2003	ASUSTek Computer Inc		
	3	EP 1 507 365 A2	02-16-2005	ASUSTek Computer Inc.		

Examiner Signature	/Marcos Batista/	Date Considered	06/09/2008

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant's unique citation designation number (optional). 2 See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. 3 Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). 4 For Japanese patent documents the indication of the year of the reign of the Emperor must precede the serial number of the patent document. 5 Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. 6 Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours 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 (1-800-786-9199) and select option 2

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.B./

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Substitute for form 1449B/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

Sheet	2	of	2

	Complete if Known
Application Number	11/278,546
Filing Date	04/04/2006
First Named Inventor	Sam Shiaw-Shiang Jiang
Art Unit	2616
Examiner Name	N/A
Attorney Docket Number	ASTP0061USA

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T [2]
	4	"Universal Mobile Telecommunications System(UMTS);Radio Link Control (RLC) protocol specification . ETSI TS 125 322 V4.10.0. Date 2003-09, Page14-16,42-44,54 . Sections 4.2.1.3 9.4 and 10.1. ETSI, FRANCE XP014016803; ISSN 000-0001	

Examiner Signature	/Marcos Batista/	Date Considered	06/09/2008

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.
1 Applicant's unique citation designation number (optional). 2 Applicant is to place a check mark here if English language Translation is attached.
This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours 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 (1-800-786-9199) and select option 2

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Docket No.: 5413-0196PUS1
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Sam Shiaw-Shiang JIANG

Application No.: 11/278,546 Confirmation No.: 6559

Filed: April 4, 2006 Art Unit: 2616

For: ERROR HANDLING IN A WIRELESS COMMUNICATIONS SYSTEM Examiner: Not Yet Assigned

INFORMATION DISCLOSURE STATEMENT (SUBMISSION AFTER FILING OF AN APPLICATION BUT BEFORE FINAL REJECTION OR NOTICE OF ALLOWANCE OR CONCURRENTLY WITH A RULE 1.114 RCE APPLICATION)

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

Sir:

Pursuant to 37 C.F.R. §§ 1.97 and 1.98, applicant(s) hereby submit(s) an Information Disclosure Statement for consideration by the Examiner.

I. LIST OF PATENTS, PUBLICATIONS OR OTHER INFORMATION

The patents, publications, or other information submitted for consideration by the Office are listed on the PTO-SB08(s), attached hereto.

II. COPIES

☒ a. Copies of cited U.S. patents and patent application publications are not included. Copies of foreign patent documents and non-patent literature are included.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.B./

Petitioners' Exhibit 1007, p. 243
AT&T et al v. Innovative Sonic
IPR2024-01143

☐ b. Some or all of the documents listed on the PTO-SB08 are not enclosed because they were cited in the International Search Report and copies should already be in the PTO file. If copies are needed, please contact the undersigned.

☐ c. REFERENCES PREVIOUSLY CITED OR SUBMITTED - Pursuant to 37 C.F.R. §1.98(d), consideration of information listed on the PTO-SB08 form(s) is requested since any patents, publications, or other information which are listed on the PTO-SB08 form(s) but for which copies are not enclosed herewith, were previously cited by or submitted to the PTO in one of the following applications which has been relied upon for an earlier filing date under 35 U.S.C. § 120:

U.S. Appl. No(s) and U.S. Filing Date

@@@ filed @@@

III. CONCISE EXPLANATION OF THE RELEVANCE

(check at least one box)

☒ a. DOCUMENTS IN THE ENGLISH LANGUAGE - The patents, publications, or other information listed on the attached PTO SB08 are in the English language and therefore, do not require a statement of relevancy.

☐ b. DOCUMENTS NOT IN THE ENGLISH LANGUAGE - A concise explanation of the relevance of all patents, publications, or other information listed that is not in the English language is as follows:

☐ c. ENGLISH LANGUAGE SEARCH REPORT - An English language version of the search report or action that indicates the degree of relevance found by the foreign office is attached, thereby satisfying the requirement for a concise explanation. See MPEP 609(III)(A)(3).

☐ d. OTHER - The following additional information is provided for the Examiner's consideration.

KM/cb

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.B./

Petitioners' Exhibit 1007, p. 244
AT&T et al v. Innovative Sonic
IPR2024-01143

Application No.: 11/278,546 Docket No.: 5413-0196PUS1

IV. FEES (check one box)

☐ a. This Information Disclosure Statement is being filed concurrently with the filing of a new patent application; therefore, no fee is required.

☐ b. This Information Disclosure Statement is being filed concurrent with the filing of a continuation-in-part, continuation, or divisional patent application; therefore, no fee is required.

☐ c. This Information Disclosure Statement is being filed within three months of the filing date of a national application (37 C.F.R. § 1.97(b)(1)). No fee or statement is required. *(This section is not to be used with RCE's.)*

☐ d. This Information Disclosure Statement is being filed within three months of the date of entry of the national stage as set forth in § 1.491 in an international application (37 C.F.R. § 1.97(b)(2)). No fee or statement is required.

☐ e. This Information Disclosure Statement is being filed concurrently with the filing of a Request for Continued Examination under § 1.114 (37 C.F.R. § 1.97(b)(4)). No fee or statement is required.

☒ f. This Information Disclosure Statement is being filed before the mailing date of a first Action on the merits (37 C.F.R. § 1.97(b)(3)). No fee or statement is required. In the event that a first Office Action on the merits has been issued, please consider this IDS under 37 C.F.R. § 1.97(c) and see the statement under 37 C.F.R. § 1.97(e) below, or, if no statement has been made, charge our deposit account for the fee as required by 37 C.F.R. § 1.17(p).

☐ g. This Information Disclosure Statement is being filed before the mailing date of a Final Office Action under 37 C.F.R. § 1.113 (See 37 C.F.R. § 1.97(c)(1)) or before the mailing date of a Notice of Allowance under 37 C.F.R. § 1.311 (See 37 C.F.R. § 1.97(c)(2)).

☐ No statement; therefore, a fee as required by 37 C.F.R. § 1.17(p) is attached.

or

KM/cb

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.B./

Petitioners' Exhibit 1007, p. 245
AT&T et al v. Innovative Sonic
IPR2024-01143

Application No.: 11/278,546 Docket No.: 5413-0196PUS1

☐ See the statement below. No fee is required.

V. STATEMENT UNDER 37 C.F.R. § 1.97(e)

(check only one box)

The undersigned hereby states that:

☐ **a. Each item of information contained in the IDS was first cited in any communication from a foreign Patent Office in a counterpart foreign application not more than 30 days prior to the filing of this IDS; or**

☐ b. Each item of information contained in the IDS was first cited in any communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS; or

☐ c. No item of information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of IDS was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of the IDS.

☐ d. Some of the items of information were cited in a communication from a foreign Patent Office. As to this information, the undersigned states that each item of information contained in the IDS was first cited in a communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS. As to the remaining information, the undersigned hereby states that no item of this remaining information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application and, to the best of my knowledge after making reasonable inquiry, was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this statement.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.B./

Petitioners' Exhibit 1007, p. 246
AT&T et al v. Innovative Sonic
IPR2024-01143

Application No.: 11/278,546 Docket No.: 5413-0196PUS1

VI. PAYMENT OF FEES (check one box)

☐ The required fee is listed on the attached Fee Transmittal.

☒ No fee is required.

If the Examiner has any questions concerning this IDS, he/she is requested to contact the undersigned. If it is determined that this IDS has been filed under the wrong rule, the PTO is requested to consider this IDS under the proper rule and charge the appropriate fee to Deposit Account No. 02-2448.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to our Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under § 1.17; particularly, extension of time fees.

Dated: January 3, 2007

Respectfully submitted,

By _____
Joe McKinney Muncy
Registration No.: 32,334
BIRCH, STEWART, KOLASCH & BIRCH, LLP
8110 Gatehouse Road
Suite 100 East
P.O. Box 747
Falls Church, Virginia 22040-0747
(703) 205-8000
Attorney for Applicant

Attachment(s):

☒ PTO-SB08
☒ Documents (one)
☐ Foreign Search Report
☐ Fee
☐ Other:

KM/cb

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.B./

Petitioners' Exhibit 1007, p. 247
AT&T et al v. Innovative Sonic
IPR2024-01143

PTO/SB/08A/B (09-06)
Approved for use through 03/31/2007. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet	1	of	1

Complete if Known	
Application Number	11/278,546-Conf. #6559
Filing Date	April 4, 2006
First Named Inventor	Sam Shiaw-Shiang JIANG
Art Unit	2616
Examiner Name	Not Yet Assigned
Attorney Docket Number	5413-0196PUS1

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number: Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document: Country Code[3]-Number[4]-Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		3GPP TS 25.322 V6.3.0 (2005-03), "Radio Link Control (RLC) Protocol Specification".	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1]Applicant's unique citation designation number (optional). [2]Applicant is to place a check mark here if English language Translation is attached.

January 3, 2007

Examiner Signature	/Marcos Batista/	Date Considered	06/09/2008

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.B./

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11278546	JIANG, SAM SHIAW-SHIANG
	Examiner	Art Unit
	MARCOS BATISTA	4134

SEARCHED

Class	Subclass	Date	Examiner
455	115.1	1/16/2008	mb
709	230	1/16/2008	mb
714	776	5/8/2008	mb

SEARCH NOTES

Search Notes	Date	Examiner
Consulted with D'Agosta	1/15/2008	mb
PLUS Search	01/9/08	mb
EAST Search	12/27/2007	mb
Inventor's Name Search	12/27/2007	mb
Consulted with Rafael Perez Gutierrez	5/8/2008	mb

INTERFERENCE SEARCH

Class	Subclass	Date	Examiner

Used in Lieu of PTO/SB/08A/B
(Based on PTO 12-07 version)

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	11/278,546-Conf. #6559
Filing Date	April 4, 2006
First Named Inventor	Sam Shiaw-Shiang JIANG
Art Unit	2627
Examiner Name	M. V. Battaglia
Attorney Docket Number	5413-0196PUS1

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]
	BA	CN-1581731-A	02-16-2005			
	BB	EP-1 507 365-A2	08-06-2004			

Examiner Signature		Date Considered	

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NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]

Examiner Signature	/Marcos Batista/	Date Considered	06/09/2008

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1]Applicant's unique citation designation number (optional). [2]Applicant is to place a check mark here if English language Translation is attached.

Birch, Stewart, Kolasch & Birch, LLP

PCL/mmm

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.B./

EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	1	11/278,546	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2007/12/27 10:15
S2	2	"6804804".pn.	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2007/12/27 11:19
S3	12	("4410989" | "5007055" | "5280488" | "5357525" | "5465261" | "5701316" | "5815516" | "6173333" | "6412092" | "6625241").PN. OR ("6804804").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2007/12/27 11:22
S4	11	S3 and (SN or sequence)	US-PGPUB; USPAT; USOCR	ADJ	ON	2007/12/27 11:24
S5	6789	(detect$3 or find$3) near4 erro$6 with (SN or sequence)	US-PGPUB; USPAT; USOCR	ADJ	ON	2007/12/27 11:36
S6	244	(detect$3 or find$3) near4 erro$6 with (SN or sequence) with protocol	US-PGPUB; USPAT; USOCR	ADJ	ON	2007/12/27 11:36
S7	216	S6 and (@rlad<"20050404" or @ad<"20050404")	US-PGPUB; USPAT; USOCR	ADJ	ON	2007/12/27 11:38
S8	8	(detect$3 or find$3) near4 erro$6 with (SN or sequence) with protocol with reset	US-PGPUB; USPAT; USOCR	ADJ	ON	2007/12/27 11:38
S9	7	S8 and (@rlad<"20050404" or @ad<"20050404")	US-PGPUB; USPAT; USOCR	ADJ	ON	2007/12/27 11:38
S10	2182	(detect$3 or find$3) with protocol near5 erro$6	US-PGPUB; USPAT; USOCR	ADJ	ON	2007/12/27 11:42
S11	39	(detect$3 or find$3) with protocol near5 erro$6 with (SN or Sequence Number)	US-PGPUB; USPAT; USOCR	ADJ	ON	2007/12/27 11:43
S12	35	S11 and (@rlad<"20050404" or @ad<"20050404")	US-PGPUB; USPAT; USOCR	ADJ	ON	2007/12/27 11:43
S14	40	(detect$3 or find$3) with protocol near5 erro$6 with (SN or Sequence Number)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2007/12/27 13:32

S15	36	S14 and (@rlad<"20050404" or @ad<"20050404")	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2007/12/27 13:33
S16	1	11/278,546	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2007/12/27 13:59
S17	54203	"vt(s)"	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2007/12/27 14:38
S19	207	"vt(s)" and pdu	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2007/12/27 14:39
S20	42	"vt(s)" and pdu same sn	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2007/12/27 14:39
S21	91	"vt(s)" and pdu same (sn or sequence number)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2007/12/27 14:39
S23	41	"vt(s)" and pdu same (sn or sequence number) same erro$6	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2007/12/27 14:40
S24	36	S23 and (@rlad<"20050404" or @ad<"20050404")	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2007/12/27 14:40
S25	41	"vt(s)" and pdu same (sn or sequence number) same erro$6	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/02 07:35
S26	36	S25 and (@rlad<"20050404" or @ad<"20050404")	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/02 07:35

S27	8	S26 and expect	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/02 07:35
S28	41	"vt(s)" and pdu same (sn or sequence number) same erro$6	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/02 11:49
S29	36	S28 and (@rlad<"20050404" or @ad<"20050404")	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/02 11:49
S30	1	("5959995").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2008/01/02 12:04
S31	1	("6141784").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2008/01/02 12:06
S32	161	protocol erro$5 detection	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/02 12:09
S33	8	protocol erro$5 detection with (SN or sequence number)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/02 12:10
S34	46	"vt(s)" and protocol error	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/02 13:20
S35	30	"vt(s)" and protocol error and range	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/02 13:25
S37	10	(US-20040085932-$ or US-20060221853-$ or US-20040062222-$ or US-20060067238-$ or US-20050039101-$ or US-20040208160-$ or US-20040047331-$ or US-20030157927-$).did. or (US-6629147-$ or US-6483855-$).did.	US-PGPUB; USPAT	ADJ	ON	2008/01/02 14:20
S41	4	(US-20060067238-$ or US-20050039101-$ or US-20040047331-$ or US-20040208160-$).did.	US-PGPUB	ADJ	ON	2008/01/02 14:22

S44	3	(protocol erro$5 detection) and piggy	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/02 14:23
S45	7	S37 and report	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/02 14:25
S46	4	"2003016698".pn.	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/15 16:31
S48	75	"0016698"	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/15 16:32
S49	1	S48 AND PROTOCOL	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/15 16:33
S51	1	"200316698"	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/15 16:34
S52	1	"200316698".pn.	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/15 16:34
S53	2	"20030016698".pn.	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/15 16:39
S54	2	"6473399".pn.	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/15 17:24

S55	11	(US-20040085932-$ or US-20060221853-$ or US-20040062222-$ or US-20060067238-$ or US-20050039101-$ or US-20040208160-$ or US-20040047331-$ or US-20030157927-$ or US-20030016698-$).did. or (US-6629147-$ or US-6483855-$).did.	US-PGPUB; USPAT	ADJ	ON	2008/01/15 18:00
S56	11	(US-20040085932-$ or US-20060221853-$ or US-20040062222-$ or US-20060067238-$ or US-20050039101-$ or US-20040208160-$ or US-20040047331-$ or US-20030157927-$ or US-20030016698-$).did. or (US-6629147-$ or US-6483855-$).did.	US-PGPUB; USPAT	ADJ	ON	2008/01/15 18:00
S57	36011	mod	US-PGPUB; USPAT	ADJ	ON	2008/01/15 18:01
S58	2	S56 and mod	US-PGPUB; USPAT	ADJ	ON	2008/01/15 18:01
S59	461	("455"/$).ccls. and status report	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/16 13:15
S60	69	S59 and (SN or sequence number)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/16 13:17
S61	57	S60 and (@rlad<"20050404" or @ad<"20050404")	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/16 13:19
S62	93	(("SAM SHIAW-SHIANG") near2 (JIANG)).INV.	US-PGPUB; USPAT	ADJ	ON	2008/01/16 14:20
S63	56	S62 and (@rlad<"20050404" or @ad<"20050404")	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/16 14:23
S64	867	("709"/$).ccls. and status report	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/16 14:39

S66	697	(455/115.1).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2008/01/17 15:23
S67	112	S66 and protocol	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/17 15:24
S68	69	S67 and error	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/17 15:24
S69	2584	(709/230).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2008/01/17 15:26
S70	1291	S69 and error	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/17 15:26
S71	391	S70 and report	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/17 15:26
S72	77	S71 and sequence number	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/17 15:26
S73	2	(interval or range) with "VT (A)" with "VT(S)"	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/05/07 11:17
S74	34	"VT(A)" with "VT(S)"	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/05/07 11:19
S75	34	"VT(A)" with "VT(S)"	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/05/07 11:19
S78	57501	("714").CLAS.	US-PGPUB; USPAT; USOCR	OR	OFF	2008/05/07 17:02
S79	254	(detect$3 or find$3) near4 erro$6 with (SN or sequence) with protocol	US-PGPUB; USPAT; USOCR	ADJ	ON	2008/05/07 17:03

S80	42	S78 and S79	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/05/07 17:03
S82	1128	S78 and state near2 variable	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/05/07 17:06
S83	60	S78 and state near2 variable same (range or interval)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/05/07 17:07
S84	1	("4841526").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2008/05/07 17:24

5/ 8/ 2008 5:24:24 PM
C:\ Documents and Settings\ mbatista\ My Documents\ EAST\ Workspaces\ 11278546 ERROR HANDLING IN A WIRELESS COMMUNICATIONS SYSTEM.wsp

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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11278546	JIANG, SAM SHIAW-SHIANG
	Examiner	Art Unit
	MARCOS BATISTA	4134

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

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

CLAIM		DATE								
Final	Original	01/16/2008								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
	6	✓								
	7	✓								

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PTO/SB/97
APR 23 2008
PATENT & TRADEMARK OFFICE

AMENDMENT TRANSMITTAL LETTER

Docket No.
5413-0196PUS1

Application No.	Filing Date	Examiner	Art Unit
11/278,546-Conf. #6559	April 4, 2006	M. Batista	4134

Applicant(s): Sam Shiaw-Shiang JIANG

Invention: ERROR HANDLING IN A WIRELESS COMMUNICATIONS SYSTEM

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

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

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

CLAIMS AS AMENDED

	Claims Remaining After Amendment	Highest Number Previously Paid		Number Extra Claims Present	Rate	
Total Claims	7	- 20	=	0	x 50.00	0.00
Independent Claims	1	- 3	=	0	x 210.00	0.00
Multiple Dependent Claims (check if applicable)	☐					
Other fee (please specify):						
TOTAL ADDITIONAL FEE FOR THIS AMENDMENT:						0.00

[x] Large Entity ☐ Small Entity

[x] No additional fee is required for this amendment.

☐ Please charge Deposit Account No. _____ in the amount of $ _____.
A duplicate copy of this sheet is enclosed.

☐ A check in the amount of $ _____ is enclosed.

☐ Payment by credit card. Form PTO-2038 is attached.

[x] The Director is hereby authorized to charge and credit Deposit Account No. 02-2448 as described below. A duplicate copy of this sheet is enclosed.

[x] Credit any overpayment.

[x] Charge any additional filing or application processing fees required under 37 CFR 1.16 and 1.17.

#61007

Dated: April 23, 2008

Paul C. Lewis
Attorney Reg. No.: 43,368

BIRCH, STEWART, KOLASCH & BIRCH, LLP
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IAP97
APR 23 2008
PATENT & TRADEMARK OFFICE

Docket No.: 5413-0196PUS1
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Sam Shiaw-Shiang JIANG

Application No.: 11/278,546 | Confirmation No.: 6559

Filed: April 4, 2006 | Art Unit: 4134

For: ERROR HANDLING IN A WIRELESS COMMUNICATIONS SYSTEM | Examiner: M. Batista

REPLY IN RESPONSE TO NON-FINAL OFFICE ACTION

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

Sir:

INTRODUCTORY COMMENTS

In response to the Examiner's Office Action dated January 23, 2007, the following remarks are respectfully submitted in connection with the above-identified application.

This reply includes:

Remarks.

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REMARKS

Applicant appreciates the Examiner's thorough consideration provided the present application. Claims 1-7 are now present in the application. No claims have been amended in this Reply. Claim 1 is independent. Reconsideration of this application is respectfully requested.

Claim Rejection Under 35 U.S.C. §102 & 103

Claims 1, 2 and 5-7 stand rejected under 35 U.S.C. 102(e) as being anticipated by Petrovic, U.S. Patent Application Publication No. US 2004/0208160. Claim 3 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Petrovic in view of Minagawa, U.S. Patent No. 6,483,855. Claim 4 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Petrovic in view of Olsson, U.S. Patent Application Publication No. US 2006/0067238. These rejections are respectfully traversed.

Independent claim 1 recites a combination of steps including "detecting whether a negatively acknowledged sequence number lies in a range of greater than or equal to a sequence number following a sequence number of a last in-sequence acknowledged packet of a transmitter and less than a sequence number of a next packet to be transmitted for the first time by the transmitter when the negatively acknowledged sequence number is detected in the status report unit" and "detecting that the status report unit comprises an erroneous sequence number when the negatively acknowledged sequence number is not in the range."

Applicant respectfully submits that the above combination of steps as set forth in independent claim 1 is not disclosed nor suggested by the references relied on by the Examiner.

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The Examiner alleged that Petrovic in paragraphs [0049]-[0070] and [0080] teaches detecting whether a negatively acknowledged sequence number lies in a range of greater than or equal to a sequence number following a sequence number of a last in sequence acknowledged packet of a transmitter and less than a sequence number of a next packet to be transmitted for the first time by the transmitter when the negatively acknowledged sequence number is detected in the status report unit. The Examiner also alleged that Petrovic in paragraphs [0106]-[0108] teaches detecting a status report unit comprises an erroneous sequence number when the negatively acknowledged sequence number is not in the range. Applicant respectfully disagrees.

In terms of state variables, which have the same definitions in the specification of the instant application and in Petrovic, Petrovic discloses in paragraph [0106] that an SN of a missing PDU is an erroneous Sequence Number if the SN is not within the interval between VT(A) and VT(S) – 1. In other words, Petrovic's checking condition is: VT(A) <= SN <= VT(S) – 1. Unlike Petrovic, the checking condition in caim 1 is: VT(A) <= SN < VT(S).

When VT(S) is a regular integer, the above two conditions are equivalent to each other. However, since VT(S) is represented by finite bits, say 12 bits, to overcome wrap around from the maximum representing value by the finite bits to zero, modulus operation with a modulo base must be used. Consequently, SN <= VT(S) – 1 becomes different from SN < VT(S) when VT(S) is represented by finite bits rather than a regular integer. This will be illustrated in detail below.

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Difference between the comparison SN ≤ VT(S) – 1 and the comparison SN < VT(S)

The following description is quoted from the admitted prior art of Petrovic (see paragraph [0043]), 3GPP TSG RAN TS 25.322: RLC Protocol Specification V5.3.0 (Section 9.4, second paragraph) (and also illustrated in paragraph 11 of the specification of the instant application):

> All arithmetic operations contained in the present document on VT(S), VT(A), VT(MS), VR(R), VR(H) and VR(MR) are affected by the AM modulus. ...When performing arithmetic comparisons of state variables or Sequence number values a modulus base shall be used. This modulus base is subtracted (within the appropriate field) from all the values involved and then an absolute comparison is performed. At the Sender, VT(A) and VT(US) shall be assumed to be the modulus base in AM and UM respectively. At the Receiver, VR(R) and VR(US) shall be assumed to be the modulus base in AM and UM respectively.

a. What is difference between SN ≤ VT(S) – 1 and SN < VT(S)?

According to the above quotation,

(1) SN ≤ VT(S) – 1 means

$$(SN - VT(A)) \bmod 4096 \leq (VT(S) - 1 - VT(A)) \bmod 4096$$

(2) SN < VT(S) means

$$(SN - VT(A)) \bmod 4096 < (VT(S) - VT(A)) \bmod 4096$$

The difference between the two equations cannot be determined simply from Equations (1) and (2) due to the "mod"-operation. And the difference is best seen through example scenarios.

b. What problems will arise when employing SN ≤ VT(S) – 1?

A problem arises when VT(S) = VT(A). For example, when VT(S) = VT(A) = 200 and SN = 300 is negatively acknowledged due to protocol error. (The scenario of this example is given in paragraphs 18-21 of the specification of the instant application.). SN = 300 is apparently

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an erroneous SN. But Petrovic cannot detect this erroneous SN by SN ≤ VT(S) – 1. This is because, from Equation (1), Petrovic checks if (300 – 200) mod 4096 ≤ (200 – 1 – 200) mod 4096, i.e., 100 ≤ (-1) mod 4096 or 100 ≤ 4095, which is true.

Consequently, Petrovic finds that SN = 300 is inside the interval VT(A) ≤ SN ≤ VT(S) – 1 so that Petrovic *wrongly determines that SN = 300 is not an erroneous SN.* In other words, *when VT(A) = VT(S), Petrovic using SN ≤ VT(S) – 1 does not work properly.*

c. Why would determining SN < VT(S) solve these problems?

For example, when VT(S) = VT(A) = 200 and SN = 300 is negatively acknowledged due to protocol error. The claimed invention as set forth in claim 1 will use Equation (2) to check if (300 – 200) mod 4096 < (200 – 200) mod 4096, i.e., 100 < (0) mod 4096 or 100 < 0, which is NOT true.

Consequently, the claimed invention as set forth in claim 1 finds that SN = 300 is outside the interval VT(A) ≤ SN < VT(S) so that the claimed invention as set forth in claim 1 *correctly determines that SN = 300 is an erroneous SN.*

Please also note that for the case of VT(S) ≠ VT(A), both Petrovic and the claimed invention as set forth in claim 1 will work (see paragraphs 39-43 of the specification of the instant application).

With regard to the Examiner's reliance on the secondary references, these references have only been relied on for their teachings related to some dependent claims. These references also

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fail to disclose the above combination of steps as set forth in independent claim 1. Accordingly, these references fail to cure the deficiencies of Petrovic.

Accordingly, none of the references utilized by the Examiner individually or in combination teach or suggest the limitations of independent claim 1 or its dependent claims. Therefore, Applicant respectfully submits that claim 1 and its dependent claims clearly define over the teachings of the references relied on by the Examiner.

Accordingly, reconsideration and withdrawal of the rejection under 35 U.S.C. §§ 102 and 103 are respectfully requested.

Conclusion

It is believed that a full and complete response has been made to the Office Action, and that as such, the Examiner is respectfully requested to send the application to Issue.

In the event there are any matters remaining in this application, the Examiner is invited to contact Cheng-Kang (Greg) Hsu, Registration No. 61,007 at (703) 205-8000 in the Washington, D.C. area.

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If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§1.16 or 1.17; particularly, extension of time fees.

Dated: April 23, 2008

Respectfully submitted,

By #61007
for Paul C. Lewis
Registration No.: 43,368
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Attorney for Applicant

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Docket No.: 5413-0196PUS1
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Sam Shiaw-Shiang JIANG

Application No.: 11/278,546 | Confirmation No.: 6559

Filed: April 4, 2006 | Art Unit: 4134

For: ERROR HANDLING IN A WIRELESS COMMUNICATIONS SYSTEM | Examiner: M. Batista

INFORMATION DISCLOSURE STATEMENT
(SUBMISSION AFTER FILING OF AN APPLICATION BUT BEFORE FINAL REJECTION OR NOTICE OF ALLOWANCE OR CONCURRENTLY WITH A RULE 1.114 RCE APPLICATION)

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

Sir:

Pursuant to 37 C.F.R. §§ 1.97 and 1.98, applicant(s) hereby submit(s) an Information Disclosure Statement for consideration by the Examiner.

I. LIST OF PATENTS, PUBLICATIONS OR OTHER INFORMATION

The patents, publications, or other information submitted for consideration by the Office are listed on the PTO-SB08(s), attached hereto.

II. COPIES

☒ a. Copies of cited U.S. patents and patent application publications are not included. Copies of foreign patent documents and non-patent literature are included.

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☐ b. Some or all of the documents listed on the PTO-SB08 are not enclosed because they were cited in the International Search Report and copies should already be in the PTO file. If copies are needed, please contact the undersigned.

☐ c. REFERENCES PREVIOUSLY CITED OR SUBMITTED - Pursuant to 37 C.F.R. §1.98(d), consideration of information listed on the PTO-SB08 form(s) is requested since any patents, publications, or other information which are listed on the PTO-SB08 form(s) but for which copies are not enclosed herewith, were previously cited by or submitted to the PTO in one of the following applications which has been relied upon for an earlier filing date under 35 U.S.C. § 120:

III. CONCISE EXPLANATION OF THE RELEVANCE

(check at least one box)

☒ a. DOCUMENTS IN THE ENGLISH LANGUAGE – Some or all of the patents, publications, or other information listed on the attached PTO SB08 are in the English language and therefore, do not require a statement of relevancy.

☐ b. DOCUMENTS NOT IN THE ENGLISH LANGUAGE - A concise explanation of the relevance of all patents, publications, or other information listed that is not in the English language is as follows:

☐ c. ENGLISH LANGUAGE SEARCH REPORT - An English language version of the search report or action that indicates the degree of relevance found by the foreign office is attached, thereby satisfying the requirement for a concise explanation. See MPEP 609(III)(A)(3).

☒ d. OTHER - The following additional information is provided for the Examiner's consideration. CN-1581731-A corresponds to EP-1 507 365-A.

IV. FEES (check one box)

☐ a. This Information Disclosure Statement is being filed concurrently with the filing of a new patent application; therefore, no fee is required.

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☐ b. This Information Disclosure Statement is being filed concurrent with the filing of a continuation-in-part, continuation, or divisional patent application; therefore, no fee is required.

☐ c. This Information Disclosure Statement is being filed within three months of the filing date of a national application (37 C.F.R. § 1.97(b)(1)). No fee or statement is required. *(This section is not to be used with RCE's.)*

☐ d. This Information Disclosure Statement is being filed within three months of the date of entry of the national stage as set forth in § 1.491 in an international application (37 C.F.R. § 1.97(b)(2)). No fee or statement is required.

☐ e. This Information Disclosure Statement is being filed concurrently with the filing of a Request for Continued Examination under § 1.114 (37 C.F.R. § 1.97(b)(4)). No fee or statement is required.

☒ f. This Information Disclosure Statement is being filed before the mailing date of a first Action on the merits (37 C.F.R. § 1.97(b)(3)). No fee or statement is required. In the event that a first Office Action on the merits has been issued, please consider this IDS under 37 C.F.R. § 1.97(c) and see the statement under 37 C.F.R. § 1.97(e) below, or, if no statement has been made, charge our deposit account for the fee as required by 37 C.F.R. § 1.17(p).

☐ g. This Information Disclosure Statement is being filed before the mailing date of a Final Office Action under 37 C.F.R. § 1.113 (See 37 C.F.R. § 1.97(c)(1)) or before the mailing date of a Notice of Allowance under 37 C.F.R. § 1.311 (See 37 C.F.R. § 1.97(c)(2)).

☐ No statement; therefore, a fee as required by 37 C.F.R. § 1.17(p) is attached.

or

☐ See the statement below. No fee is required.

V. STATEMENT UNDER 37 C.F.R. § 1.97(e)

(check only one box)

The undersigned hereby states that:

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☐ **a. Each item of information contained in the IDS was first cited in any communication from a foreign Patent Office in a counterpart foreign application not more than 30 days prior to the filing of this IDS; or**

☒ b. Each item of information contained in the IDS was first cited in any communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS; or

☐ c. No item of information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of IDS was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of the IDS.

☐ d. Some of the items of information were cited in a communication from a foreign Patent Office. As to this information, the undersigned states that each item of information contained in the IDS was first cited in a communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS. As to the remaining information, the undersigned hereby states that no item of this remaining information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application and, to the best of my knowledge after making reasonable inquiry, was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this statement.

VI. PAYMENT OF FEES (check one box)

☐ The required fee is listed on the attached Fee Transmittal.

☒ No fee is required.

If the Examiner has any questions concerning this IDS, he/she is requested to contact the undersigned. If it is determined that this IDS has been filed under the wrong rule, the PTO is

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requested to consider this IDS under the proper rule and charge the appropriate fee to Deposit Account No. 02-2448.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to our Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under § 1.17; particularly, extension of time fees.

Dated: April 18, 2008

Respectfully submitted,

By Paul C. Lewis #40,953

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P.O. Box 747
Falls Church, Virginia 22040-0747
(703) 205-8000
Attorney for Applicant

Attachment(s):

- ☒ PTO/SB/08
- ☒ Document(s)
- ☐ Foreign Search Report(s)
- ☐ Fee
- ☐ Other:

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Used in Lieu of PTO/SB/08A/B
(Based on PTO 12-07 version)

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet	1	of	1

Complete if Known	
Application Number	11/278,546-Conf. #6559
Filing Date	April 4, 2006
First Named Inventor	Sam Shiaw-Shiang JIANG
Art Unit	2627
Examiner Name	M. V. Battaglia
Attorney Docket Number	5413-0196PUS1

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]
	BA	CN-1581731-A	02-16-2005			
	BB	EP-1 507 365-A2	08-06-2004			

Examiner Signature		Date Considered	

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[19] 中华人民共和国国家知识产权局

[51] Int. Cl[7]
H04B 7/26
H04B 1/06 H04B 1/02

[12] 发明专利申请公开说明书

[21] 申请号 200410056744.1

[43] 公开日 2005 年 2 月 16 日

[11] 公开号 CN 1581731A

[22] 申请日 2004.8.13
[21] 申请号 200410056744.1
[30] 优先权
[32] 2003. 8.15 [33] US [31] 60/495,106
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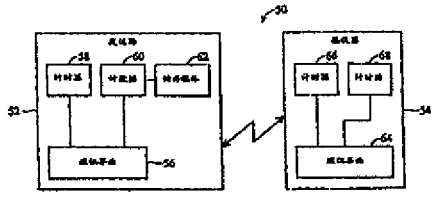
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权利要求书 3 页 说明书 14 页 附图 9 页

[54] 发明名称 无线通讯系统的接收器、发送器以及控制重置程序的方法与装置

[57] 摘要

一种无线通讯系统的控制重置程序的方法。本发明方法对回报暂禁定时器设定一适当计时期间，以防止回报周期定时器影响重置指令发送次数的计量。此外，本发明方法使用一改进的重置程序触发条件，使发送器于该重置程序执行期间，忽略状态回报数据。因此，计量重置指令发送次数的重置传送次数值不会不正常地增加，使该重置程序可根据所配置的协议参数正确地执行其应有的传送次数。



ISSN1008-4274

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1. 一种无线通讯系统的控制重置程序的方法，其适用于一发送器与一接收器间的无线通讯连结，其包括下列步骤：

(a)所述接收器传送至少一接收状态报告给所述发送器；

(b)在一第一预定期间限制所述接收器输出另一接收状态报告给所述发送器，所述第一预定期间为 P1；

(c)所述发送器自所述接收器接收至少一接收状态报告，确定所述接收状态报告包含协议错误，传送一重置指令给所述接收器，并且启动一第一定时器以对一第二预定期间进行计时，所述二预定期间为 P2；

(d)在所述重置指令的传送数目达到一既定值之前，每当所述第一定时器计时结束时，所述发送器输出一重置指令给所述接收器，其中所述既定值为 M；以及

(e)当所述重置指令的传送数目达到 M，且所述第一定时器计时结束或触发一重置指令以利用步骤(c)进行传送时，所述发送器检测到一无法修复的协议错误；

其中，步骤(b)中的 P1 不小于 P2 与 M 相乘的乘积。

2. 如权利要求 1 所述的无线通讯系统的控制重置程序的方法，其特征在于，步骤(b)还包括当一接收状态报告自所述接收器输出时，利用所述接收器启动一第二定时器以对 P1 进行计时。

3. 一种无线通讯系统的控制重置程序的方法，其适用于一发送器与一接收器间的无线通讯连结，包括下列步骤：

(a)所述接收器传送至少一接收状态报告给所述发送器；

(b)所述发送器自所述接收器接收至少一第一接收状态报告，确定所述第一接收状态报告包含协议错误，执行一重置程序，并且传送一重置指令给所述接收器；以及

(c)在所述发送器接收到所述接收器回应的一重置收讫信令之前，确认所

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述重置程序为执行状态;

其中，步骤(c)还包括当执行所述重置程序时，控制所述发送器忽略自所述接收器输出的至少一第二接收状态报告，其中所述第二接收状态报告在所述第一接收状态报告之后才接收到。

4. 如权利要求 3 所述的无线通讯系统的控制重置程序的方法，其特征在于步骤(b)还包括在所述重置指令的传送数目达到一既定值前，且在所述发送器接收到所述接收器输出的所述重置收讫信令前，利用所述发送器根据一预定期间定期输出一重置指令给所述接收器。

5. 如权利要求 4 所述的无线通讯系统的控制重置程序的方法，其特征在于，步骤(b)还包括当所述发送器输出一重置指令时，利用所述发送器启动一定时器以对所述预定期间进行计时.

6. 一种接收器，其用于与一发送器进行无线通讯，所述接收器传送至少一接收状态报告，其特征在于所述发送器接收至少一接收状态报告，传送一重置指令给所述接收器并且启动一第一定时器以对一第一预定期间进行计时，所述第一预定期间为 P1，当确定所述接收状态报告包含协议错误，储存一既定值，所述既定值为 M，并且计算所述重置指令的传送数目，其中在所述重置指令的传送数目达到 M 前，每当所述第一定时器计时结束时，所述发送器输出一重置指令给所述接收器，并且当所述重置指令的传送数目达到 M，且所述第一定时器计时结束或触发一重置指令的传送时，所述发送器检测到一无法修复的协议错误;

所述接收器包括:

一通讯界面，其用以在一第二预定期间限制所述接收器输出另一接收状态报告给所述发送器，所述第二预定期间为 P2，其中 P2 不小于 P1 与 M 相乘的乘积。

7. 如权利要求 6 所述的接收器，其特征在于其还包括一第二定时器，其

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连接至所述通讯界面以对 P2 进行计时，且所述通讯界面在输出一接收状态报告时启动所述第二定时器。

8. 一种发送器，其用于与一接收器进行无线通讯，所述发送器自所述接收器接收至少一第一接收状态报告，所述发送器包括：

一通讯界面，其用以执行一重置程序，并且当确定所述第一接收状态报告包含一协议错误时，传送一重置指令给所述接收器；以及

一决定逻辑单元，其电性耦接于所述通讯界面，用以在所述通讯界面接收到所述接收器响应的一重置收讫信令前，确认所述重置程序为执行状态；

其中，当执行所述重置程序时，所述决定逻辑单元控制所述通讯界面忽略自所述接收器输出的至少一第二接收状态报告，其中所述第二接收状态报告在所述第一接收状态报告之后才接收到。

9. 如权利要求 8 所述的接收器，其特征在于，所述接收器在所述重置指令的传送数目达到一既定值前，根据一预定期间定期输出一重置指令给所述接收器。

10. 如权利要求 9 所述的接收器，其特征在于还包括一定时器，其电性耦接于所述通讯界面，用以对所述预定期间进行计时，其中所述通讯界面在输出一重置指令时启动所述定时器。

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无线通讯系统的接收器、发送器以及控制重置程序的方法与装置

技术领域

本发明有关一种驱动无线通讯系统触发一重置程序的方法，且特别是有关一种无线通讯系统的控制重置程序的方法与装置。

背景技术

许多通讯协议典型的是利用三阶层法（three-layered approach）进行通讯。图 1 是显示现有的三阶层通讯协议方块图，在典型的无线环境中，第一站台 10 与一或多个第二站台 30 以无线方式进行通讯。第一站台 10 中的应用程序 13 产生信息 11，并且通过第三层（Layer 3）界面 12 将信息 11 传送至第二站台 30。第三层界面 12 将信息 11 封装成第二层（Layer 2）服务数据单元（Service Data Units，SDUs）14，然后传送至第二层界面 16。第二层服务数据单元 14 可为任意长度，第二层界面 16 包括一无线连结控制（Radio Link Control，RLC）层 18 与一媒体存取控制（Media Access Control，MAC）层 20，其中无线连结控制层 18 在媒体存取控制层 20 之上，且与其进行通讯。无线连结控制层 18 支持流程控制、序号检查与编码等功能。媒体存取控制层 20 为无线连结控制层 18 与第一层（Layer 1）界面 22 间的传输界面。对高层界面（无线连结控制层 18 与更高层界面）而言，可建立许多不同性质的连结通道（channel），然而，上述通道必须并入一单一串流（single stream），以提供给第一层界面 22 使用，此为媒体存取控制层 20 主要目的之一。因此，媒体存取控制层 20 输出该单一串流中的协议数据单元（Protocol Data Unit，PDU）给第一层界面 22。换句话说，第二层界面 16 将第二层服务数据单元 14 组合成一或多个第二层协议数据单元 24。每一第二层协议数据单元 24 具有固定长度，且被传送至第一层界面 22。

第一层界面 22 为用来传送数据给第二站台 30 的实体层，传送的数据由第二

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站台 30 的第一层界面 42 所接收，并且还原为一或多个协议数据单元 44，然后被传送至第二层界面 36。第二层界面 36 亦包括一无线连结控制层 38 与一媒体存取控制层 40。媒体存取控制层 40 接收协议数据单元 44，且将协议数据单元 44 分派给各相关连结通道。接着，无线连结控制层 38 根据媒体存取控制层 40 分派的协议数据单元 44 组合还原回一或多个第二层服务数据单元 34，然后将第二层服务数据单元 34 传送到第三层界面 32。第三层界面 32 依序将第二层服务数据单元 34 还原为一信息 31，其与原本第一站台 10 的应用程序 13 所产生的信息 11 完全相同。最后，将信息 31 传送给第二站台 30 的应用程序 33。

无线传输在高噪声干扰的环境中，接收器（如基站或手机）常会漏接数据，即部分第二层协议数据单元 24 会因而被遗漏掉。因此，无线通讯协议需周密设计，以解决上述问题。多数人都知道，每一协议数据单元拥有一特定序号，且所有协议数据单元均被依序编号。若其中一协议数据单元发生传送或接收错误，无线连结控制层 18、38 可利用协议数据单元的序号进行检测。根据第三代行动通讯伙伴合作计划相关技术规格（3GPP TS）25.322 V4.9.0（2003-6）的无线连结控制（RLC）协议规格书中所定义的，发送器执行轮询功能（polling function），要求其相应的接收器回报一接收状态报告或简称为状态报告（status report）。换句话说，即要求该接收器回报其接收状态，以确认该接收器有没有接收到协议数据单元。每一状态报告由一或数个状态回报数据（STATUS PDUs）所组成。请注意，状态回报数据亦可嵌入或附挂在数据协议数据单元（DATA PDUs）中，成为附挂式状态回报数据（piggybacked STATUS PDUs）。

此外，若接收器检测到一或多个遗漏的协议数据单元，接收器可主动传送一状态报告给发送器。另外，当一回报周期定时器计时结束时，接收器亦可主动传送一状态报告给发送器。换句话说，接收器可周期性地定期传送一状态报告给发送器。状态回报数据与附挂式状态回报数据具有相似的数据结构，且皆可包括多个复合字段（super field，SUFIs）。复合字段包括有用的序号（SN）信息，发送器可据以判断接收器是否正确接收到其传送过去的协议数据单元。举例来说，LIST、BITMAP、RLIST 等复合字段可用以表示欠收（negatively acknowledge）的序号。ACK 复合字段具有一 LSN 字段，其用以表示除了在同一状态回报数据或附挂式状态回报数据中表示为欠收的序号外，其它所有 SN <= LSN - 1 的协议数

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据单元均已收讫。

此外，接收器与发送器皆具有用以接收与传送协议数据单元的范围限制窗。发送器具有一传送窗，其是由两状态变量（state variable）－VT(A) 与 VT(MS) －所定义。VT(A) 表示该传送窗的起点，而 VT(MS) 表示该传送窗的终点。发送器只能传送序号在该传送窗范围内的协议数据单元，序号必须在 VT(A)（含）与 VT(MS)（不含）之间的协议数据单元始能进行传送。当发送器开始传送数据时，发送器自序号为 VT(A) 的协议数据单元开始传送，且持续进行传送，直到序号到达 VT(MS) 的前一号。也就是说，发送器依序传送协议数据单元，其起始于 VT(A) 且结束于 VT(MS)－1。状态变量 VT(S) 表示下一个待传送的新的协议数据单元的序号。也就是说，序号等于或小于 VT(S)－1 的协议数据单元已经至少被传送过一次。

因此，依照上述定义，序号等于或大于 VT(S) 的协议数据单元必定均尚未曾被发送器传送过。现在假定发送器自接收器接收到一状态回报数据，并且读取到状态回报数据内的 LIST、BITMAP 或 RLIST 复合字段。当 LIST、BITMAP 或 RLIST 复合字段所表示的欠收序号在 VT(A) 与 VT(S)－1 界定的区间外，则表示状态回报数据包含一错误序号。此外，当 ACK 复合字段中的 LSN 字段的值在 VT(A) 与 VT(S) 的区间外，亦视状态回报数据为包括一错误序号。根据现有技术中的 RLC 规格书，发送器丢弃包含错误序号的状态回报数据或附挂式状态回报数据，且输出一重置指令（RESET PDU）给接收器，以执行一重置程序。

图 2 是显示现有的重置程序的第一时序图。在图 2 中，为求简明，忽略了发送器与接收器间的传输延迟时间。在重置程序完成前，利用状态变量 VT(RST) 计算发送器输出至接收器的重置指令的传送次数。VT(RST) 变数为一计数值，每当将一重置指令排进传送队列待传时，则将该计数值加 1，并且当发送器自接收器接收到一重置收讫信令（RESET ACK PDU）时，则将 VT(RST) 函数重置为 0。此外，VT(RST) 的初始值为 0。协议参数 MaxRST 表示 VT(RST) 的上限临界值。若 VT(RST) 等于 MaxRST，则该队列待传的重置指令停止传送，且发送器通知上层有无法修复的错误，需解除该无线连结（radio bearer）。也就是说，一重置指令的可传送最大次数等于 MaxRST－1。该重置程序的运作会牵涉到回报周期定时器与重置定时器。重置定时器于一重置指令自发送器传送出去时开始计时。若重置定时器计时结束，则重传该重置指令。至于另一回报周期定时器，其用以触发接收器，以

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定期回报接收状态。因此，若回报周期定时器计时结束，则接收器回报状态回报数据给发送器，并且令回报周期计时器重新开始计时。如图 2 所示，重置传送次数值 VT(RST) 在重置程序开始前，其初始值为 0。此外，回报周期定时器在接收器顺利配置以进行接收协议数据单元时开始计时。因此，回报周期定时器在重置程序执行前即已开始发生动作。

假定重置定时器的计时长度设定为 100 毫秒，且将协议参数 MaxRST 设定为 4。在时间 t_0 时，接收器被触发而输出一状态回报数据给发送器。然而，因为协议错误或先前的传送错误，发送器在时间 t_0（忽略传输延迟时间）接收到该状态回报数据，且判读后认为状态回报数据包含一错误序号。因此，发送器输出一重置指令给接收器以执行重置程序，并且等候自接收器传送回来的重置收讫信令。重置定时器开始计时 100 毫秒。此外，重置传送次数值 VT(RST) 加 1，故重置传送次数值 VT(RST) 在时间 t_0 时为 1。

在时间 t_0 + 100 时，重置定时器计时结束，且尚未收到所需的重置收讫信令。因此，发送器重传该重置指令，并且持续等候该所需的重置收讫信令。重置传送次数值 VT(RST) 再加 1，故重置传送次数值 VT(RST) 在时间 t_0 + 100 时为 2。同样的，重置定时器在时间 t_0 + 200 时计时结束。假定，仍未收到所需的重置收讫信令，则发送器重传重置指令，且持续等候该所需的重置收讫信令。重置传送次数值 VT(RST) 再加 1，故重置传送次数值 VT(RST) 在时间 t_0 + 200 时为 3。

注意到，回报周期定时器在时间 T′ 时计时结束，其在时间 t_0 + 200 与时间 t_0 + 300 之间。因此，触发接收器，以输出一状态回报数据给发送器，该状态回报数据的内容与之前的状态回报数据相同。再者，发送器在时间 T′ 时（忽略传输延迟时间）接收到该状态回报数据且判断其包含一错误序号。重置指令排定在时间 T′ 时进行重传，此时重置传送次数值 VT(RST) 加 1，重置传送次数值 VT(RST) 在时间 T′ 时为 4。此时，重置传送次数值 VT(RST) 的值等于协定参数 MaxRST。因此，发送器取消该次重置指令的重传，且于时间 T′ （忽略处理延迟时间）指示上层发生一无法修复的错误，需解除该无线连结（radio bearer）。

因为协议参数 MaxRST 设为 4，发送器给予接收器三次机会回应一重置收讫信令。换句话说，发送器原容许接收器在 300 毫秒内回应。若接收器可在时间 t_0 + 300 之前响应，则发送器可在重置各项协议参数后，重新执行发送器与接收器间的数

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据传送。然而，回报周期定时器触发接收器在时间 t_0 + 300 前传送定期状态回报数据，且重置程序在时间 T′ 的时候终止。接收器可能在时间 T"时响应重置收讫信令，其在时间 T′ 与时间 t_0 + 300 之间。然而，因为在时间 T′ 时，上层发现一无法修复的错误，故发送器无法重新执行发送器与接收器间的数据传送，则无线连结（radio bearer）将根据现有重置程序予以解除。也就是说，回报周期定时器的操作影响了协议参数 MaxRST 的原定功能。

图 3 是显示现有的重置程序的第二时序图。如同图 2 所示，为求简明，忽略了发送器与接收器间的传输延迟时间。图 3 的例子中，重置定时器的计时长度设定为 700 毫秒，回报周期定时器的计时长度设定为 100 毫秒，且协议参数 MaxRST 设定为 4。在时间 t_0 时，接收器回报包含一状态回报数据的状态报告，通知发送器其对各协议数据单元的接收状态。假定，发送器在时间 t_0 接收到该状态回报数据，且发现其包含错误序号，因而造成一无法修复的错误。因此，发送器在时间 t_0 送出一重置指令给接收器，以执行重置程序，并且等候接收器传回重置收讫信令。重置定时器开始计时 700 毫秒进行，且重置传送次数值 VT(RST) 加 1，故重置传送次数值 VT(RST) 在时间 t_0 时为 1。在时间 t_0 + 100 时，回报周期定时器计时结束，接收器发送一状态报告给发送器。由于该期间内，发送器并没有发送任何数据协议数据单元，因此，该状态报告内容与之前的状态报告相同。发送器又判断状态报告中有一错误序号。因此，重传该重置指令给接收器，且持续等候所需的重置收讫信令。重置传送次数值 VT(RST) 再加 1，故重置传送次数值 VT(RST) 在时间 t_0 + 100 时为 2。同样的，回报周期定时器在时间 t_0 + 200 时计时结束，接收器发送一状态报告。该状态报告再次被发送器判断为包含一错误序号。因此，发送器再次重传该重置指令给接收器，且持续等候该所需的重置收讫信令。重置传送次数值 VT(RST) 再加 1，故重置传送次数值 VT(RST) 在时间 t_0 + 200 时为 3。

同样的，回报周期定时器在时间 t_0 + 300 计时结束，再次触发接收器输出一状态报告，其与先前状态报告的内容完全相同。因此，发送器接收到该状态报告，且判断其在时间 t_0 + 300 时包含一错误序号。当重置指令排定在时间 t_0 + 300 时进行传送时，重置传送次数值 VT(RST) 加 1，故重置传送次数值 VT(RST) 在时间 t_0 + 300 时为 4。此时，重置传送次数值 VT(RST) 的值等于协定参数 MaxRST。因此，发送器取消该次重置指令的重传，且在时间 t_0 + 300 时指示上层发生一无法

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修复的错误，需解除该无线连结（radio bearer）。注意到，发送器原容许接收器在 3*700 毫秒内回应重置收讫信令。若接收器可在时间 t_0 + 3*700 之前回应，则发送器可重新执行发送器与接收器间的数据传送。然而，回报周期定时器触发接收器响应非预期的状态报告，造成发送器在早于预期的时间 t_0 + 3*700 指示上层有一无法修复的错误。接收器有可能在时间 t_0 + 300 之后响应一重置收讫信令。然而，在现有技术中，无法修复的错误太早回报给上层，使其据以解除该无线连结（radio bearer）。也就是说，回报周期定时器的运作影响了协议参数 MaxRST 的正常功能。

发明内容

有鉴于此，本发明的目的是提供一种无线通讯系统的控制重置程序的方法与装置，用以避免在重置程序的执行期间，由未预期的状态回报数据所产生的不良影响。

基于上述目的，本发明提供一种无线通讯系统的控制重置程序的方法，其包括下列步骤：(a)一接收器传送至少一接收状态报告给一发送器。(b)在一第一预定期间限制该接收器输出另一接收状态报告给该发送器，该第一预定期间为 P1。(c)该发送器自该接收器接收至少一接收状态报告，确定该接收状态报告包含协议错误，传送一重置指令给该接收器，并且启动一第一定时器以对一第二预定期间进行计时，该二预定期间为 P2。(d)在该重置指令的传送数目达到一既定值之前，每当该第一定时器计时结束时，该发送器输出一重置指令给该接收器，其中该既定值为 M。(e)当该重置指令的传送数目达到 M，且该第一定时器计时结束或触发一重置指令以利用步骤(c)进行传送时，该发送器检测到一无法修复的协议错误。步骤(b)中的 P1 不小于 P2 与 M 相乘的乘积。

本发明还提供一种无线通讯系统的控制重置程序的方法，其包括下列步骤。(a)一接收器传送至少一接收状态报告给一发送器。(b)该发送器自该接收器接收至少一第一接收状态报告，确定该第一接收状态报告包含协议错误，执行一重置程序，并且传送一重置指令给该接收器。(c)在该发送器接收到该接收器回应的一重置收讫信令前，确认该重置程序为执行状态。其中，步骤(c)

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还包括当执行该重置程序时，控制该发送器忽略自该接收器输出的至少一第二接收状态报告，其中该第二接收状态报告在该第一接收状态报告的后才接收到。

本发明还提供一种接收器，其用于与一发送器进行无线通讯，该接收器传送至少一接收状态报告，其中该发送器接收至少一接收状态报告，传送一重置指令给该接收器并且启动一第一定时器以对一第一预定期间进行计时，该第一预定期间为 P1，当确定该接收状态报告包含协议错误，储存一既定值，该既定值为 M，并且计算该重置指令的传送数目，其中在该重置指令的传送数目达到 M 前，每当该第一定时器计时结束时，该发送器输出一重置指令给该接收器，并且当该重置指令的传送数目达到 M，且该第一定时器计时结束或触发一重置指令的传送时，该发送器检测到一无法修复的协议错误。该接收器包括一通讯界面，其用以在一第二预定期间限制该接收器输出另一接收状态报告给该发送器，该第二预定期间为 P2，其中 P2 不小于 P1 与 M 相乘的乘积

本发明还提供一种发送器，其用于与一接收器进行无线通讯，该发送器自该接收器接收至少一第一接收状态报告。该发送器包括一通讯界面，其用以执行一重置程序，并且当确定该第一接收状态报告包含一协议错误时，传送一重置指令给该接收器。以及一决定逻辑单元，其电性耦接于该通讯界面，用以在该通讯界面接收到该接收器响应的一重置收讫信令前，确认该重置程序为执行状态。其中，当执行该重置程序时，该决定逻辑单元控制该通讯界面忽略自该接收器输出的至少一第二接收状态报告，其中该第二接收状态报告在该第一接收状态报告之后才接收到。

简单来说，本发明的控制重置程序的方法对回报暂禁定时器设定一适当的计器长度，以避免回报周期定时器影响对重置传送次数值 VT(RST) 的计量。此外，本发明方法利用改良的触发条件。因此，当重置程序执行期间，发送器忽略所收到的状态回报数据。综上所述，重置传送次数值 VT(RST) 不会以不正常的方式计量，且重置程序可根据所设定的协议参数 MaxRST 正常执行，其中协议参数 MaxRST 等于 M + 1，且 M 为上述既定值。

附图说明

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图 1 是显示现有的三阶层通讯协议方块图.

图 2 是显示现有的重置程序的第一时序图.

图 3 是显示现有的重置程序的第二时序图.

图 4 是显示本发明第一实施例的重置程序的第一时序图.

图 5 是显示本发明第一实施例的重置程序的第二时序图.

图 6 是显示本发明第二实施例的重置程序的第一时序图.

图 7 是显示本发明第二实施例的重置程序的第二时序图.

图 8 是显示本发明第一实施例的无线通讯系统的控制重置程序的方块图.

图 9 是显示本发明第二实施例的无线通讯系统的控制重置程序的方块图.

具体实施方式

为让本发明的上述和其它目的、特征和优点能更明显易懂，下文特举出较佳实施例，并配合附图进行详细说明.

在本发明第一实施例中，适当设定一回报暂禁定时器的计时长度，以避免回报周期定时器影响协议参数 MaxRST 的原定功能. 回报暂禁定时器的运作方法，说明如后. 图 4 是显示本发明第一实施例的重置程序的第一时序图. 在回报暂禁定时器开始计时后，状态回报数据暂时不得传送，直到回报暂禁定时器计时结束为止. 譬如，重置定时器的计时长度设为 100 毫秒，且协定参数 MaxRST 设为 4. 在第一实施例中，将回报暂禁定时器的计时长度设为不小于 MaxRST－1 与重置定时器的计时长度相乘所得的乘积. 举例来说，在第一实施例中，可将回报暂禁定时器的计时长度设为 350 毫秒.

回报周期定时器在重置程序执行前即已开始计时. 在时间 t_0 时，接收器检测到有遗漏未收到协议数据单元的状况，因而输出一状态回报数据给发送器. 因为协议错误或先前的传送错误，发送器在 t_0 时接收到该状态回报数据，且判断该状态回报数据包含一错误序号. （如先前所述，在图 4 中，忽略了发送器与接收器间的传输延迟时间，以求简明. ）因此，发送器输出一重置指令给接收器，以执行重置程序，并且等候自接收器传送的重置收讫信令. 重置定时器开始计时 100 毫秒. 此外，在发送器接收到该状态报告前，将重置传送次数值 VT(RST) 设为初始值 0. 在 t_0 时，发送器将重置传送次数值 VT(RST) 加 1，故重置传送次数值 VT(RST)

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在时间 t_0 时为 1。注意到，回报暂禁定时器于接收器输出状态回报数据给发送器时，开始计时 350 毫秒。回报周期定时器则按原先正常方式，周期性地反复计时运作。

重置定时器在时间 t_0 + 100 时计时结束。因此，发送器重传该重置指令，并且等候该所需的重置收讫信令。重置传送次数值 VT(RST) 再加 1，故重置传送次数值 VT(RST) 在时间 t_0 + 100 时为 2。同时，重置定时器再度开始计时 100 毫秒。同样的，重置定时器在时间 t_0 + 200 时计时结束。接着，发送器再度重传重置指令，且持续等候该所需的重置收讫信令。重置传送次数值 VT(RST) 再加 1，故重置传送次数值 VT(RST) 在时间 t_0 + 200 时为 3。

在接收器端，回报周期定时器在时间 T′ 时计时结束，触发一状态报告。然而，由于此时回报暂禁定时器处于计时中状态，状态报告被延迟，暂时不能发出。因此，接收器在时间 T′ 时不发送任何状态报告。重置定时器在时间 t_0 + 300 时计时结束。

接下来，重置指令排定在时间 t_0 + 300 时进行重传，此时重置传送次数值 VT(RST) 加 1，其值为 4，已等于协定参数 MaxRST。因此，发送器取消该次重置指令的重传，并于时间 t_0 + 300 指示上层发生一无法修复的错误，需解除该无线连结（radio bearer）。因为协议参数 MaxRST 设为 4，发送器给予接收器三次机会接收重置指令并且响应一重置收讫信令。注意到，回报暂禁定时器的时钟周期不小于 300 毫秒。换句话说，协议参数 MaxRST 产生正常作用，使得发送器在第一次发现状态回报数据包含错误序号而发出重置指令后，容许接收器在 300 毫秒内回应一重置收讫信令。譬如，接收器有可能在时间 T"时响应重置收讫信令，其在时间 T′ 与时间 t_0 + 300 之间，发送器便可重置其各项协议参数，并且重新执行发送器与接收器间的数据传输。注意到，图示中的传输延迟时间忽略不计，以更易于了解其所表达的意思。在实际设定回报暂禁定时器的计时长度时，则应考虑到的实际上来回传输延迟的问题。如图 4 所示，回报暂禁定时器在时间 t_0 + 350 时计时结束。换句话说，因回报周期定时器在时间 T′ 计时结束而触发的状态报告，需延迟到时间 t_0 + 350 时才能发送出去，因此不会影响到协议参数 MaxRST 的功能。与图 2 所示的现有重置程序相比，图 4 所示的重置程序并不会发生太早结束重置程序的状况。也就是说，发送器实际上给予接收器足够的机会接收与足够的

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时间响应重置指令。由于回报暂禁定时器的计时长度设定适当，回报周期定时器的运作状不会影响协议参数 MaxRST 的功能。

图 5 是显示本发明第一实施例的重置程序的第二时序图。其中，重置定时器的计时长度设定为 700 毫秒，回报周期定时器的计时长度设定为 100 毫秒，且协议参数 MaxRST 设为 4。如上所述，在第一实施例中，回报暂禁定时器的计时长度设为不小于 MaxRST－1 与重置定时器的计时长度相乘的乘积。举例来说，在第一实施例运用在图 5 时，可将回报暂禁定时器计时的计时长度设为 2500 毫秒。

回报周期定时器在时间 t_0 时计时结束，因而触发接收器输出一状态报告，通知发送器任何欠收与收讫的协议数据单元。假定，发送器在时间 t_0 时接收到该状态报告，且判断该状态报告包含一错误序号。注意到，当接收器输出该状态报告的最后一笔状态回报数据时，回报暂禁定时器开始以其计时长度（例如 2500 毫秒）进行计时。举例来说，在时间 t_0 之后，若再有任何因回报周期定时器计时结束而触发的状态报告，其传送将会被延迟，直到回报暂禁定时器计时结束为止。同时，在时间 t_0 时，发送器输出一重置指令给接收器，以执行重置程序，并且持续等候所需的重置收讫信令。重置定时器开始以其计时长度（700 毫秒）进行计时，且重置传送次数值 VT(RST) 加 1，此时其值为 1。

因为回报暂禁定时器开始计时，当回报周期定时器虽在时间 t_0 + 100、时间 t_0 + 200、时间 t0 + 300...时计时结束，接收器将不会输出另一状态报告，直到回报暂禁定时器计时结束为止。因此，若重置指令遗漏掉且没有被接收器所接收，则重置定时器可顺利在时间 t_0 + 700 时计时结束。此时，发送器重传重置指令，并且持续等候所需的重置收讫信令。此外，重置传送次数值 VT(RST) 加 1，其值成为 2，且重置定时器在时间 t_0 + 700 时重新开始计时 700 毫秒。

根据上述操作，当重置传送次数值 VT(RST) 等于协定参数 MaxRST 时（未显示于图 5 中），发送器指示上层发生一无法修复的错误，需解除该无线连结（radio bearer）。因为协议参数 MaxRST 设为 4，发送器给予接收器三次机会接收重置指令并且响应一重置收讫信令。注意到，回报暂禁定时器的计时长度不小于 2100 毫秒。换句话说，协议参数 MaxRST 可产生正常作用，使得发送器容许接收器共三次机会在 2100 毫秒内接收重置指令与进行响应。若接收器可在时间 t_0 + 2100 前响应重置收讫信令，发送器可借助重置其各项协议参数，以修复该状态报告中的错

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误序号所指示的协议错误，并且可重新执行发送器与接收器间的数据传输。如上所述，回报暂禁定时器将在时间 t_0 + 2500 时计时结束，接收器对回报周期定时器先前触发的状态报告的传送解除禁令。于上述无法修复的错误状况下，无线连结（radio bearer）已因为该无法修复的协议错误而解除时，该延迟传送的状态报告自然已经无效。然而，如果该状态报告中没有错误序号的情况，此一延迟的状态报告仍可维持状态回报机制的正常运作。与图 3 所示的现有重置程序相比，图 5 所示的重置程序并不会发生太早结束重置程序的状况。也就是说，发送器实际上给予接收器足够的机会接收与足够的时间响应重置指令。由于回报暂禁定时器的计时长度设定适当，回报周期定时器的运作状不会影响协议参数 MaxRST 的功能。

本发明的第二实施例，是改进现有技术中，发送器用于传送重置指令的触发条件。也就是说，当发送器接收到载有一错误序号的状态回报数据，仅当其未执行重置程序时，发送器方可传送一重置指令给接收器。换句话说，在触发一重置程序后，发送器即停止接收任何状态回报数据。其意味着：在重置程序启动之后一直到重置程序结束之前，发送器所收到的任何状态回报数据均可忽略或丢弃不理。图 6 是显示本发明第二实施例的重置程序的第一时序图。其中，重置定时器的计时长度设定为 100 毫秒，协议参数 MaxRST 设为 4。如图 6 所示，重置传送次数值 VT(RST) 在重置程序执行前为初始值 0。此外，当接收器的各项参数配置成功，可开始接收协议数据单元时，回报周期定时器即开始进行周期性计时。因此，在重置程序开始执行前，回报周期定时器即已启动。在时间 t_0 时，接收器检测到有遗漏未收到的协议数据单元的状况，因而输出一状态回报数据给发送器。假定，在时间 t_0 时，发送器接收到该状态报告，并且判断该状态报告包含一错误序号。此时间尚未有任何正在执行中的重置程序。因此，根据第二实施例所述，发送器输出一重置指令给接收器，以执行一重置程序，且等候接收器回应的重置收讫信令。重置定时器开始计时 100 毫秒。此外，将重置传送次数值 VT(RST) 加 1，故其值在时间 t_0 时为 1。

重置定时器在时间 t_0 + 100 时计时结束，且未接收到所需的重置收讫信令。因此，发送器重传该重置指令，且持续等候该所需的重置收讫信令。重置传送次数值 VT(RST) 再加 1，其值在时间 t_0 + 100 时为 2 。同样的，重置定时器在时

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间 t_0 + 200 时计时结束，且仍未接收到所需的重置收讫信令。因此，发送器重传重置指令，且持续等候该所需的重置收讫信令。重置传送次数值 VT(RST) 再加 1，其值在时间 t_0 + 200 时为 3。

假定，回报周期定时器在时间 T′ 时计时结束，其在时间 t_0 + 200 与时间 t_0 + 300 之间。因此，接收器在时间 T′ 时输出一状态报告。发送器接收到该状态报告，其被发送器视为包含错误序号。然而，由于此时已有一重置程序正在执行中，发送器根据前述（即第二实施例所述）改进后的重置程序触发条件，该状态报告被忽略或丢弃。如图 6 所示，发送器在时间 T′ 时并不响应该状态回报数据。因此，重置传送次数值 VT(RST) 仍保持目前的储存值，即重置传送次数值 VT(RST) 的值目前为 3，且重置定时器在时间 T′ 之后持续计时不断。很明显的，重置定时器会在时间 t_0 + 300 时计时结束。于是，重置指令排定在时间 t_0 + 300 时进行重传。惟此时重置传送次数值 VT(RST) 加 1，成为 4，已等于协议参数 MaxRST 之值，因此，发送器取消该次重置指令的重传，且指示上层发生一无法修复的错误，需解除该无线连结（radio bearer）。因为协议参数 MaxRST 设为 4，发送器给予接收器三次机会回应一重置收讫信令。由于使用改进后的触发条件，接收器实际上有三次机会接收重置指令以及总共 300 毫秒的时间响应重置收讫信令给发送器。换句话说，回报周期定时器不会造成任何的影响，且可获得协议参数 MaxRST 的预期的正确功能。

图 7 是显示本发明第二实施例的重置程序的第二时序图。其中，重置定时器的计时长度设定为 700 毫秒，回报周期定时器的计时长度设定为 100 毫秒，协议参数 MaxRST 同样设为 4。回报周期定时器在时间 t_0 时计时结束，因而触发接收器输出一状态报告，通知发送器所有欠收与收讫的协议数据单元。假定，在时间 t_0 时，发送器接收到该状态报告且判断该状态报告包含一错误序号。因此，发送器输出一重置指令给接收器，执行一重置程序，且持续等候接收器回应的重置收讫信令。重置定时器开始计时 700 毫秒，且重置传送次数值 VT(RST) 加 1，此时其值为 1。回报周期定时器在时间 t_0 + 100 时计时结束，接收器输出一状态报告，其被发送器接收且判断其中包含一错误序号。然而，根据前述第二实施例的改进后的重置程序触发条件，由于重置程序已在时间 t_0 + 100 之前开始执行，且在时间 t_0 + 100 时仍继续执行中，该状态报告被忽略或丢弃。注意到在第二实施例中，

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当一重置程序正在执行时，发送器是否接收且解析状态报告的内容，或发送器是否仅仅忽略状态报告已经没什么差别。如图 7 所示，发送器在时间 t_0 + 100 时并不响应该状态回报数据。因此，重置传送次数值 VT(RST) 仍保持目前的储存值，且重置定时器在时间 T′之后持续计时不断。同样的，接收器在时间 t_0 + 200、时间 t_0 + 300、时间 t_0 + 400、时间 t_0 + 500、时间 t_0 + 600 以及时间 t_0 + 700 时分别输出状态报告，且发送器同样不回应这些状态报告。注意到，重置定时器在时间 t_0 + 700 时计时结束。因此，顺利触发发送器重传重置指令，然后将重置传送次数值 VT(RST) 加 1，故重置传送次数值 VT(RST) 在时间 t_0 + 700 时为 2。

根据上述操作，当重置传送次数值 VT(RST) 等于协定参数 MaxRST 时（未显示于图 7 中），发送器指示上层发生一无法修复的错误，需解除该无线连结（radio bearer）。因为协议参数 MaxRST 设为 4，发送器给予接收器三次机会接收重置指令并且响应一重置收讫信令。很明显的，在重置程序的执行期间，本发明的第二实施例使回报周期定时器完全不会造成任何的影响。换句话说，协议参数 MaxRST 可正常运作，使得发送器可给予接收器三次机会接收重置指令。

图 8 系显示本发明第一实施例的无线通讯系统 50 的控制重置程序的方块图。无线通讯系统 50 包括一发送器 52 与一接收器 54。发送器 52 包括一通讯界面 56、电性连接于通讯界面 56 的定时器 58、电性连接于通讯界面 56 的计数器 60、以及电性连接于计数器 60 的储存媒体 62。接收器 54 包括一通讯界面 64 与电性连接于通讯界面 64 的二定时器 66 与 68。通讯界面 56、64 是用以建立发送器 52 与接收器 54 间的无线连结（radio bearer）。在本实施例中，定时器 58 表示重置定时器，储存媒体 62 用以储存一重置指令的传送最大数，计数器 60 用以对重置传送次数值 VT(RST) 进行计数。就接收器 54 而言，定时器 66 是表示回报周期定时器，而定时器 68 是表示回报暂禁定时器。定时器 68 的计时长度需适当地设定，以防止重置传送次数值 VT(RST) 被错误计数。注意到，本发明的控制重置程序的方法的第一实施例已清楚地揭露于前。因此，相关流程在此不再赘述。

图 9 是显示本发明第二实施例的无线通讯系统 70 的控制重置程序的方块图。无线通讯系统 70 包括一接收器 72 与一发送器 74。注意到，当接收器 72 输出数据给发送器 74，则发送器 74 在此时是当成一"接收器"，而接收器 72 在此时是当成一"发送器"。也就是说，接收器 72 与发送器 74 的角色是根据当时传输数据的

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方向而定。

发送器 74 以无线通讯方式和接收器 72 连接，发送器 74 包括一通讯界面 76、电性连接于通讯界面 76 的决定逻辑单元 78、电性连接于通讯界面 76 的定时器 80、电性连接于通讯界面 76 的计数器 82、以及电性连接于计数器 82 的储存媒体 84。通讯界面 76 是用以建立发送器 74 与接收器 72 间的无线连结（radio bearer）。在本实施例中，定时器 80 是表示重置定时器，储存媒体 84 用以储存一重置指令的传送最大数，定时器 82 用以对重置传送次数值 VT(RST) 进行计时。此外，决定逻辑单元 78 是用以检测重置程序是否正在执行，以防止重置传送次数值 VT(RST) 被错误计算。换句话说，因为有决定逻辑单元 78，在重置程序的执行期间，可避免回报暂禁定时器及回报周期定时器的计时长度的不当设定所造成的影响。注意到，本发明的控制重置程序的方法的第二实施例已清楚地揭示于前。因此，相关流程在此不再赘述。

与现有技术相比，本发明的控制重置程序的方法给回报暂禁定时器设定一适当的计时长度，以防止回报周期定时器影响重置传送次数值的计算。此外，本发明的控制重置程序的方法利用改进后的重置程序触发条件，使发送器在重置程序执行期间忽略带有错误序号的状态回报数据。综上所述，重置传送次数值的值不会太早增加，且重置程序根据配置好的协议参数可正确执行其应有的传送次数。

虽然本发明已以较佳实施例揭示如上，然而其并非用以限定本发明，任何熟悉本技术的人员在不脱离本发明的精神和范围内，当可作各种等效的改变或替换，因此本发明的保护范围当视后附的本申请权利要求范围所界定的为准。

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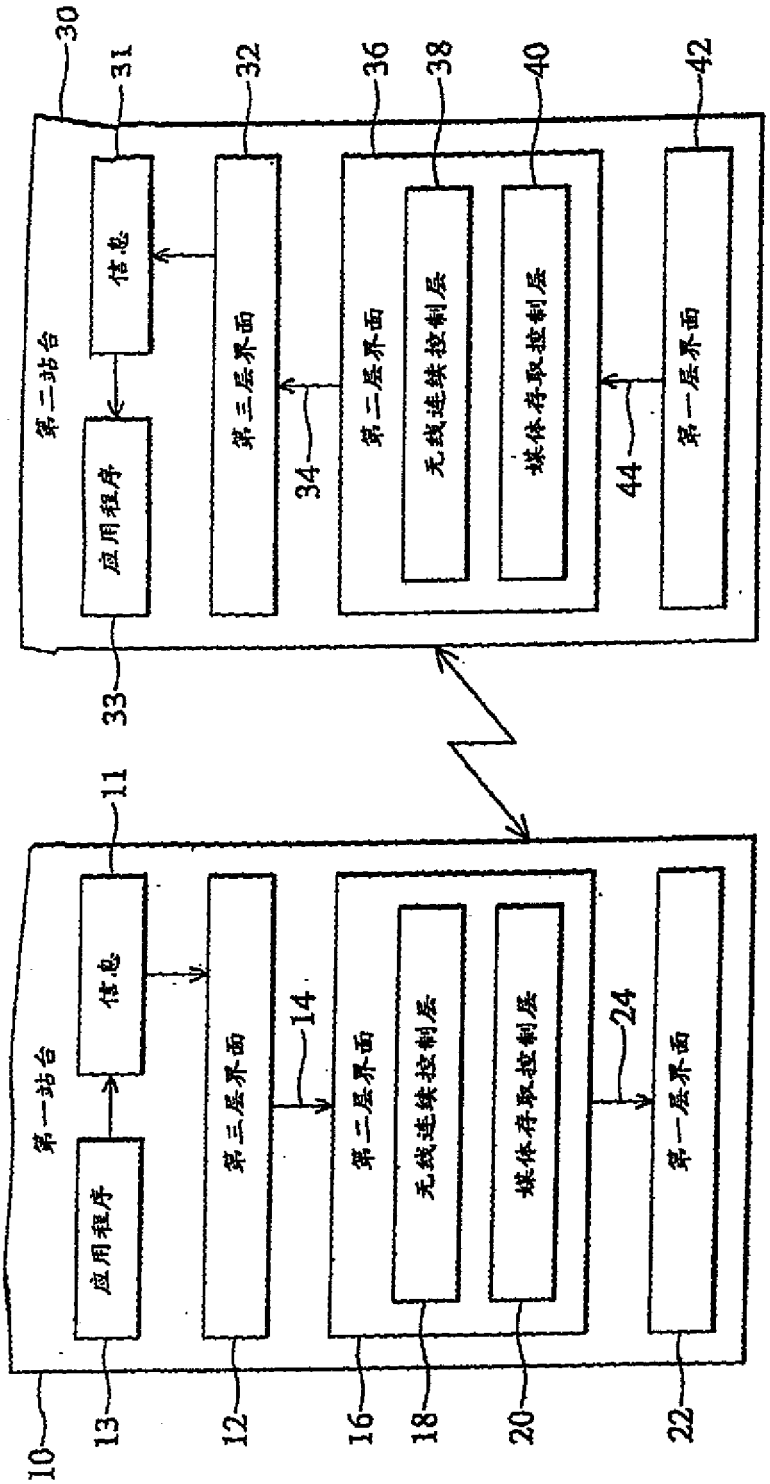


图 1

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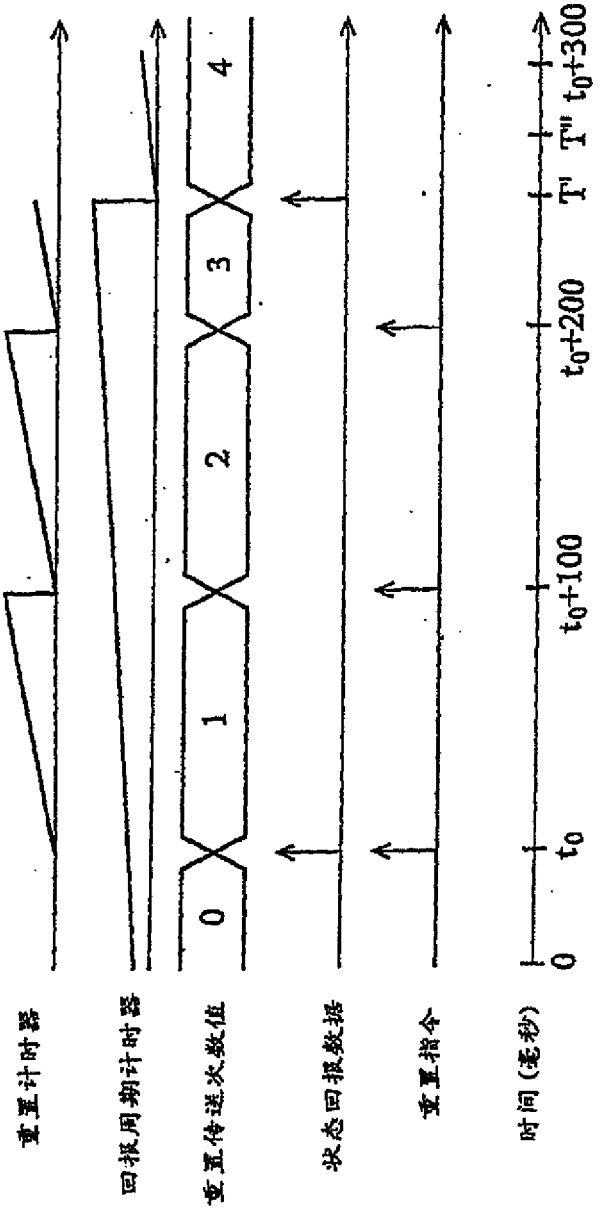


图 2

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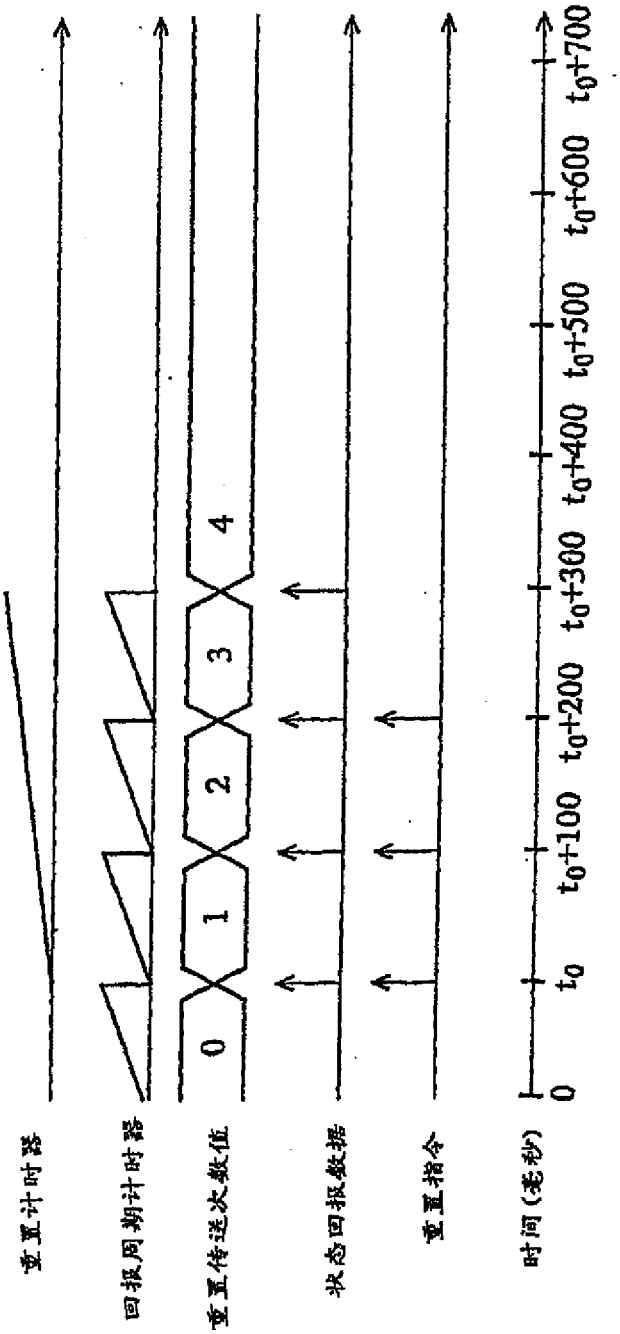


图 3

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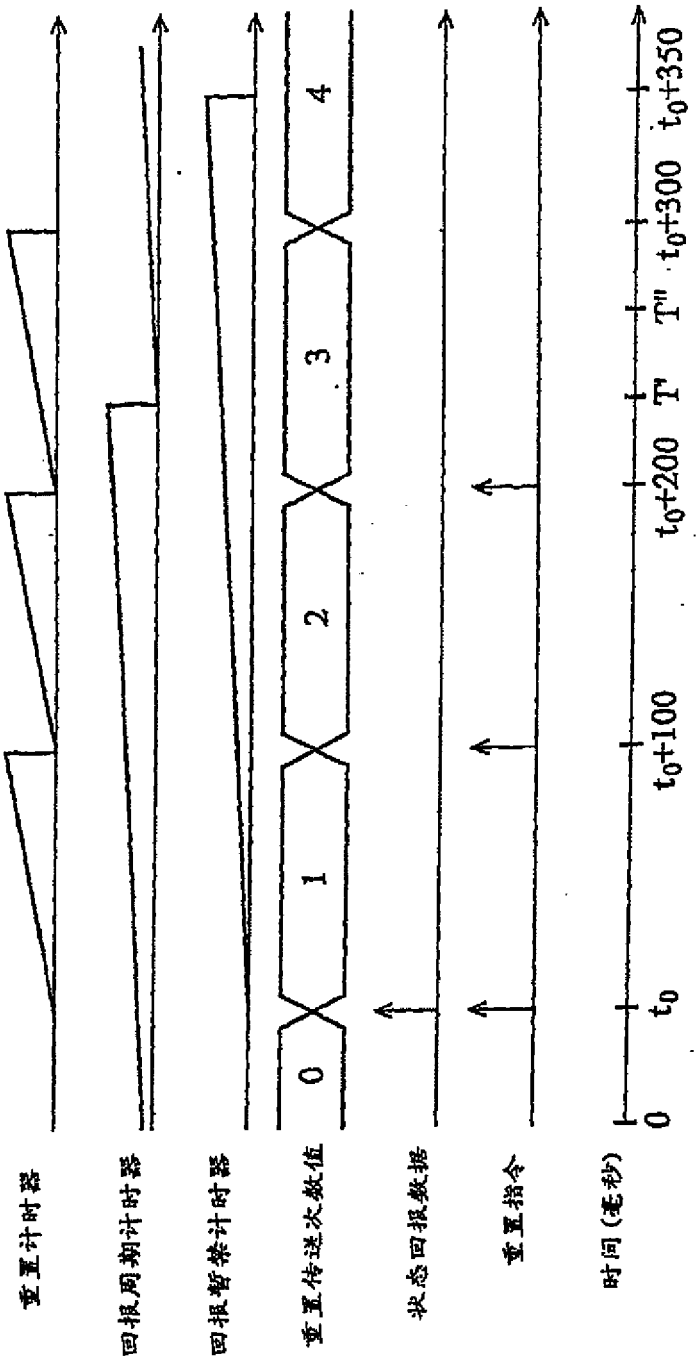


图 4

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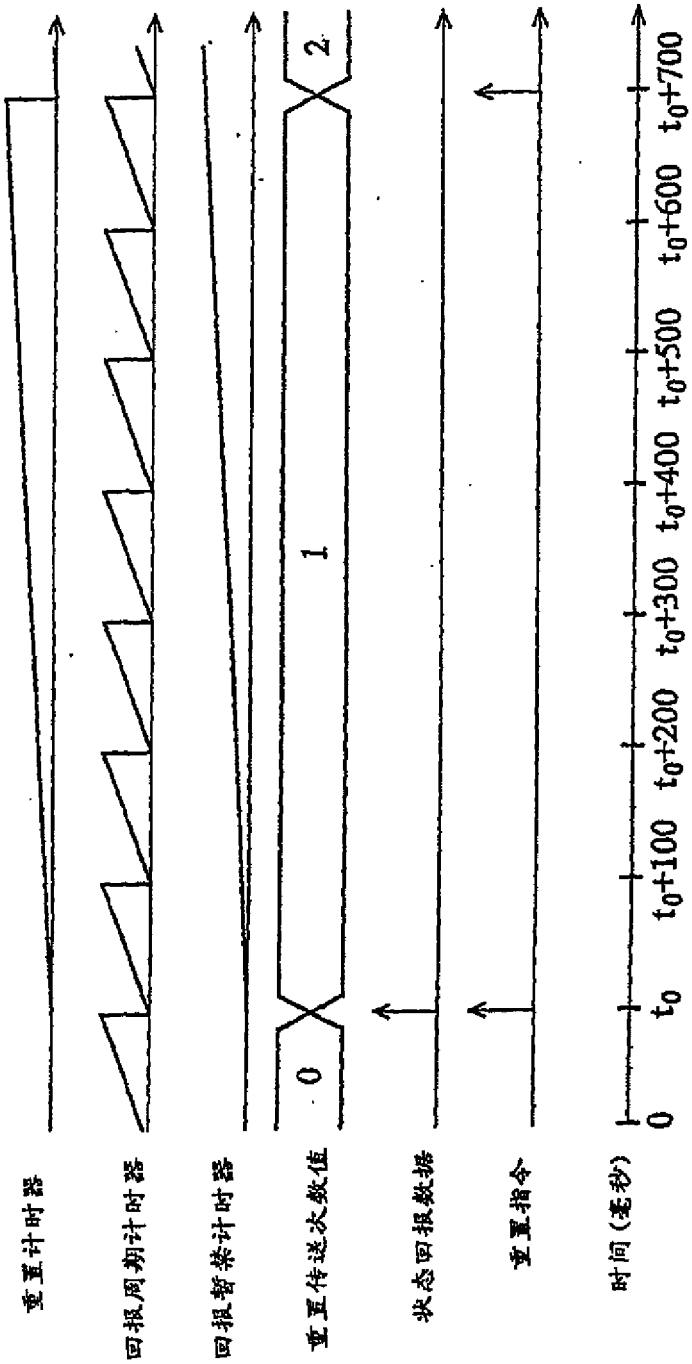


图 5

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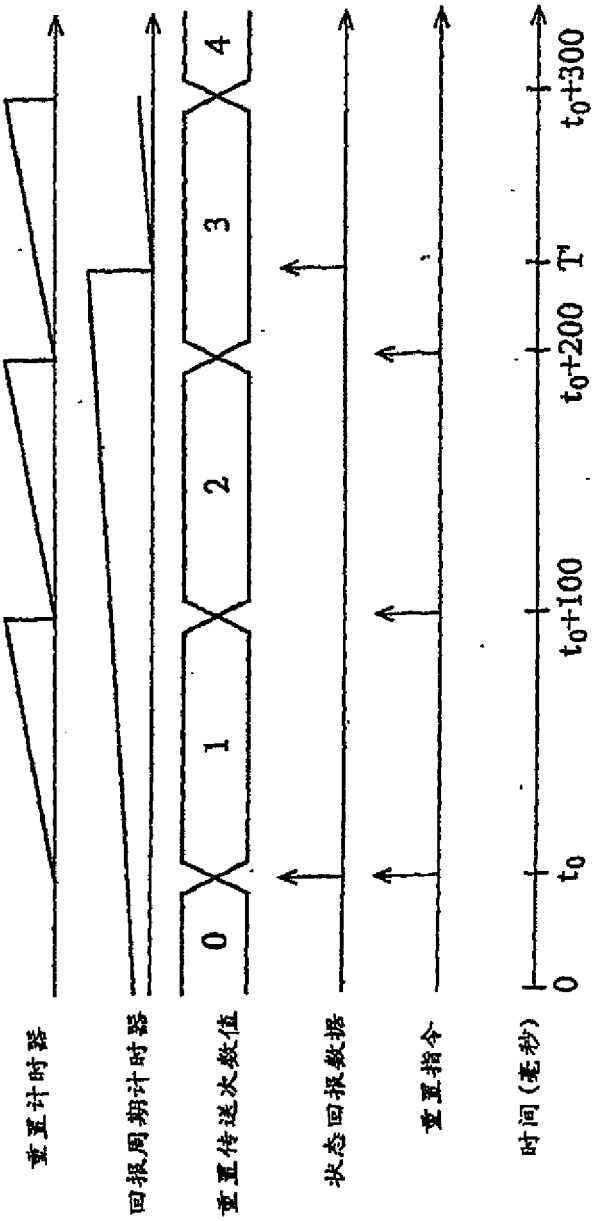


图 6

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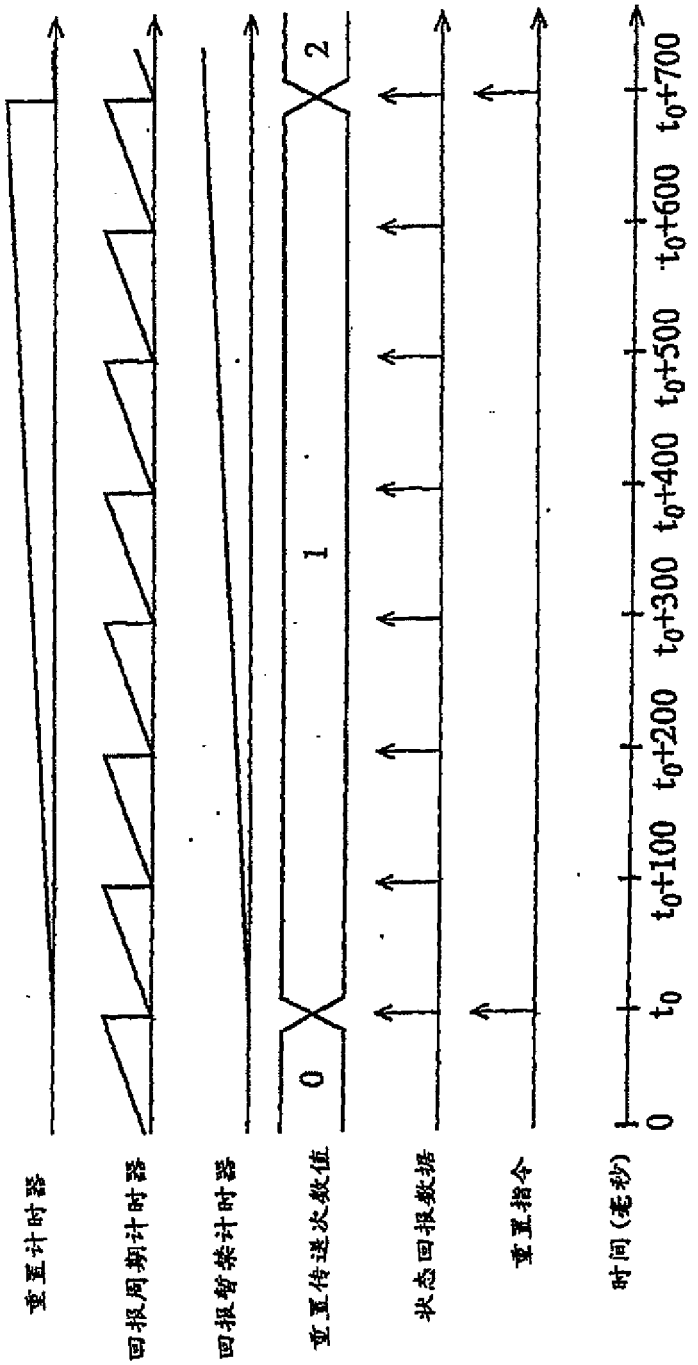


图 7

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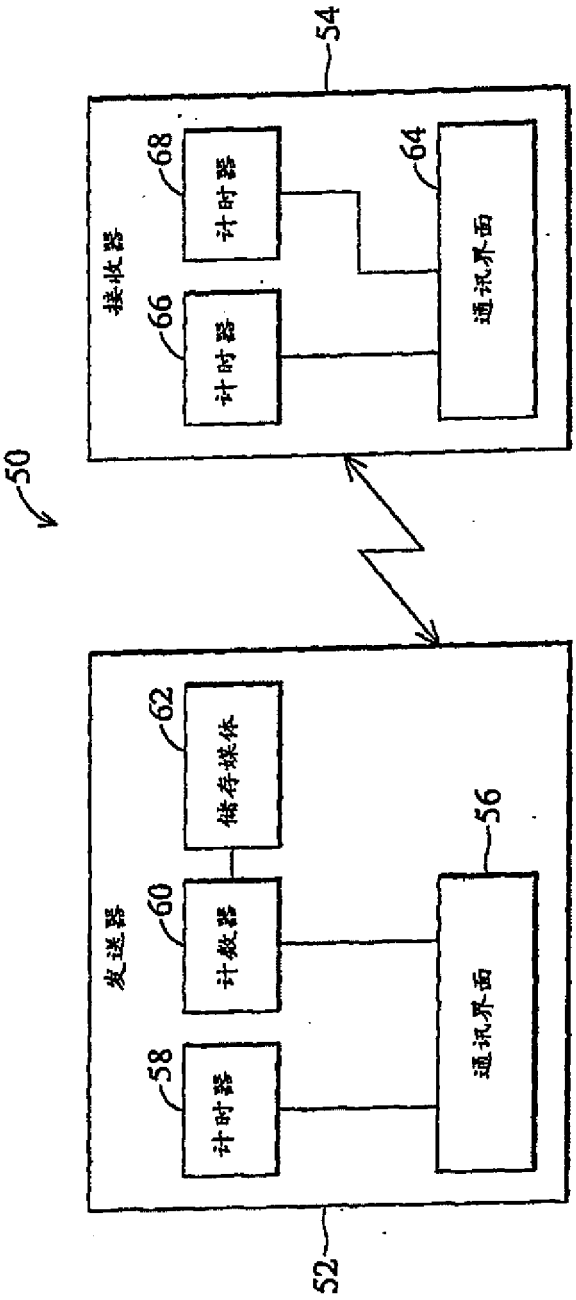


图 8

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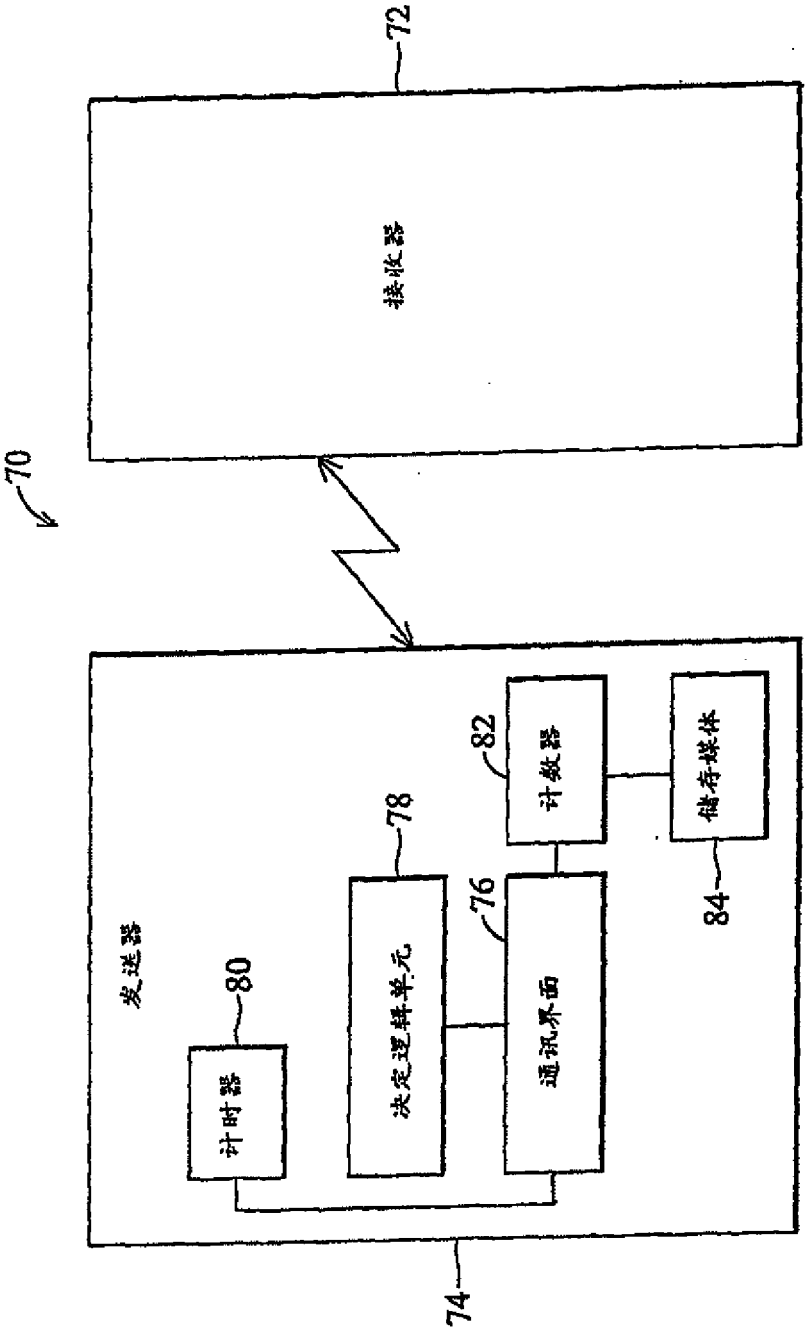


图 9

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(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 507 365 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
16.02.2005 Bulletin 2005/07

(51) Int Cl.[7]: **H04L 12/28**

(21) Application number: **04018713.0**

(22) Date of filing: **06.08.2004**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL HR LT LV MK

(30) Priority: **15.08.2003 US 495106 P**

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(54) Method and apparatus of controlling a reset procedure in a wireless communication system

(57) A method of controlling a reset procedure in a wireless communication system sets a proper clocked period to the timer Timer_Status_Prohibit for blocking the timer Timer_Status_Period from interfering with the counting of the state variable VT(RST). In addition, the method of controlling a reset procedure makes use of an amended triggering condition. Therefore, the sender ignores the STATUS PDUs when the reset procedure is ongoing. To sum up, the state variable VT (RST) is not incremented abnormally, and the reset procedure behaves correctly according to the configured protocol parameter MaxRST.

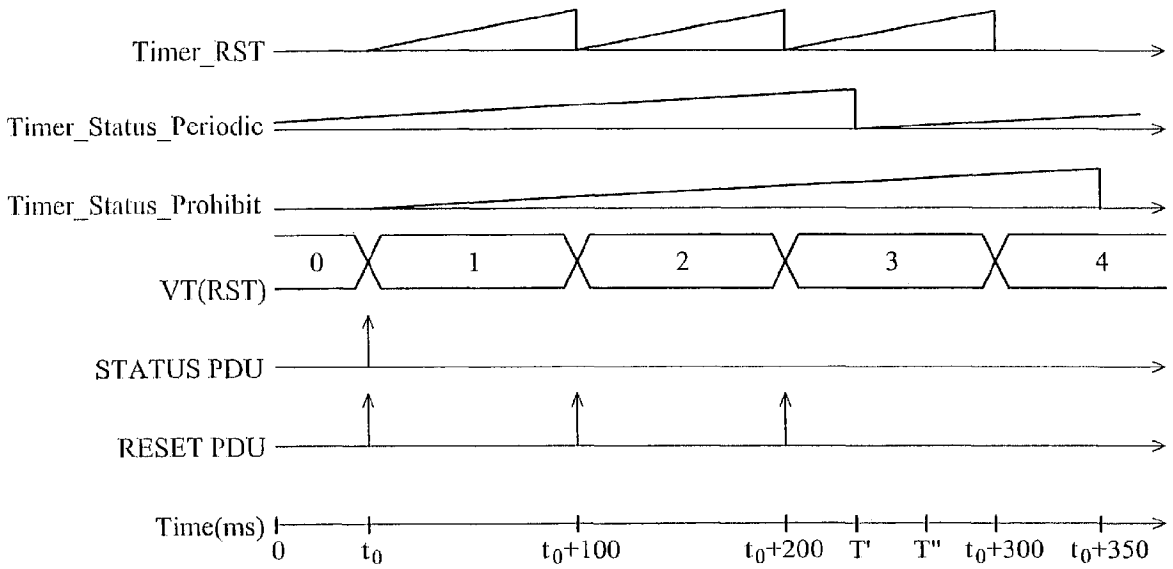


FIG. 4

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Description

Cross Reference To Related Applications

[0001] The application claims the benefit of U.S. Provisional Application No. 60/495, 106, which was filed on 08/15/2003 and entitled "Triggering condition of RLC Reset Procedure in Wireless Communication Systems".

Background of Invention

1. Field of the Invention

[0002] The present invention relates to a method of driving a wireless communications system to trigger a reset procedure, and more specifically, to a method and an apparatus of controlling a reset procedure in a wireless communications system.

2. Description of the Prior Art

[0003] Many communications protocols typically utilize a three-layered approach to communications. Please refer to Fig.1, which is a block diagram of the three layers in such a prior art communications protocol. In a typical wireless environment, a first station 10 is in wireless communications with one or more second stations 30. An application 13 on the first station 10 composes a message 11 and has it delivered to the second station 20 by handing the message 11 to a layer 3 interface 12. The layer 3 interface 12 then delivers the message 11 to a layer 2 interface 16 in the form of layer 2 service data units (SDUs) 14. The layer 2 SDUs 14 may be of any length. The layer 2 interface 16 comprises a radio link control (RLC) layer 18 on top of a medium access control (MAC) layer 20, and in communications with the medium access control layer 20. The RLC layer 18 supports many functions such as the flow control, the sequence number check, and the ciphering. The MAC layer 20 acts as an interface between the RLC layer 18 and the layer 1 interface 22. From an upper-layer perspective (the RLC layer 18 and higher layers), many channels may be established. Functionally, however, these channels must be consolidated into a single stream for presentation to the layer 1 interface 22. This is one of the main purposes of the MAC layer 20. Therefore, the MAC layer 20 outputs the PDUs arranged in a single stream to the layer 1 interface 22. In other words, the layer 2 interface 16 composes the SDUs 14 into one or more layer 2 protocol data units (PDUs) 24. Each layer 2 PDU 24 is of a fixed length, and is delivered to the layer 1 interface 22.

[0004] The layer 1 interface 22 is the physical layer used for transmitting data to the second station 30. The transmitted data is received by the layer 1 interface 42 of the second station 30 and reconstructed into one or more PDUs 44, which are passed up to the layer 2 interface 36. The layer 2 interface 36 also includes a RLC layer 38 and a MAC layer 40. The MAC layer 40 receives the incoming PDUs 44, and dispatches these PDUs 44 to each channels. The RLC layer 38 then assembles one or more layer 2 SDUs 34 according to the PDUs 44 dispatched from the MAC layer 40. Then, the layer 2 SDUs 34 are passed up to the layer 3 interface 32. The layer 3 interface 32, in turn, converts the layer 2 SDUs 34 back into a message 31, which should be identical to the original message 11 that was generated by the application 13 on the first station 10. In the end, the received message 31 is passed to an application 33 on the second station 30.

[0005] In a noisy environment of wireless transmissions, a receiver, such as a base station or a mobile unit, often misses data. That is, some layer 2 PDUs 24 will therefore be missing. Thus, wireless protocols are carefully designed to address such problems. It is well-known that each PDU has a specific sequence number, and the PDUs are sequentially numbered. The RLC layers 18, 38 are capable of utilizing the sequence numbers of the PDUs to detect if one PDU is erroneously transmitted or received. As specified in the 3GPP TS 25. 322 V4. 9. 0 (2003-6) Radio Link Control (RLC) protocol specification, a sender enables a polling function to request a peer receiver for a status report. In other words, the receiver transmits status reports to the corresponding sender to inform the sender about which PDUs have been received and not received. Each status report consists of one or several STATUS PDUs. Please note that the status report can also be carried by piggybacked STATUS PDUs embedded within DATA PDUs.

[0006] Furthermore, if the receiver detects one or several missing PDUs, it can trigger the transmission of a status report to the sender. In addition, the receiver can also trigger the transmission of a status report to the sender when a timer Timer_Status_Periodic expires. In other words, the receiver is capable of triggering the transmission of a status report to the sender periodically. Both the STATUS PDU and the Piggybacked STATUS PDU have a similar data structure, and they include a plurality of super fields (SUFIs) . The SUFIs contain useful sequence number (SN) information used by the sender to determine if the receiver correctly receives the PDUs outputted from the sender. For example, the LIST, BITMAP or RLIST SUFIs can be used to indicate negatively acknowledged sequence numbers. ACK SUFI with a LSN field can be used to indicate that SN <= LSN -1 is positively acknowledged unless this SN is negatively acknowledged in the same STATUS PDU or Piggybacked STATUS PDU.

[0007] In addition, both the receiver and the sender have windows within which they expect to receive the PDUs and transmit the PDUs. The sender has a transmitting window that is delimited by two state variables: VT(A) and VT(MS). VT(A) marks the beginning of the transmitting window, and VT(MS) marks the end of the transmitting window. The sender will only transmit PDUs that have sequence numbers within the range of the

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transmitting window, i.e. , that are sequentially on or after VT (A) , and are sequentially before VT (MS) . The sender has an additional state variable VT (S). When the sender begins transmitting the PDUs that lie within the transmitting window, the sender begins with a PDU having a sequence number given by the state variable VT (A), and works sequentially forward until it reaches a PDU having a sequence number that is just prior to VT(MS). That is, the sender transmits the PDUs in sequence, beginning at VT (A) and ending at VT (MS) -1. The state variable VT (S) holds the sequence number of the next new PDU to be transmitted. Thus, the PDUs with sequence numbers on or sequentially before VT (S) -1 have been transmitted at least one time.

[0008] Therefore, PDUs with sequence numbers on or after VT(S) have not yet been transmitted by the sender. Suppose that the sender receives a STATUS PDU from the peer receiver, and reads a LIST, BITMAP or RLIST SUFI within the STATUS PDU. When a negatively acknowledged sequence number indicated by the LIST, BITMAP or RLIST SUFI is outside an interval delimited by VT (A) and VT (S) -1, the STATUS PDU is regarded to include an erroneous sequence number. In addition, when the value of the LSN field in an ACK SUFI is outside an interval delimited by VT (A) and VT (S) , the STATUS PDU is also regarded to include an erroneous sequence number. Based on the prior art RLC specification, the sender discards the STATUS PDU or the Piggybacked STATUS PDU including the erroneous sequence number, and outputs a RESET PDU to the receiver for activating a corresponding reset procedure.

[0009] Please refer to Fig.2, which is a first timing diagram illustrating the prior art reset procedure. In Fig. 2, the transmission delay between the sender and the receiver is neglected for simplicity. The state variable VT (RST) is used to count the number of times for the RESET PDUs outputted from the sender to the receiver before the reset procedure is completed. VT(RST) functions as a count value, and is increased by 1 each time a RESET PDU is scheduled to be transferred, and is reset when the sender receives a RESET ACK PDU from the receiver. In addition, an initial value of the VT (RST) is equal to 0. A protocol parameter MaxRST stands for an upper threshold of the VT (RST) . If VT (RST) equals MaxRST, the sender informs upper layers about an unrecoverable error to release the radio bearer. That is, the maximum number of transmissions of the transmitted RESET PDU is equal to MaxRST-1. Two timers Timer_Status_Periodic and Timer_RST are involved in the reset procedure. The timer Timer_RST is started when a RESET PDU is transferred from the sender to the receiver. However, if the timer Timer_RST expires, the RESET PDU is transmitted again to the receiver. Concerning another timer Timer_Status_Periodic, it is used to trigger the receiver to deliver status reports to the sender periodically. Therefore, if the timer Timer_Status_Periodic expires, the receiver outputs a status report containing STATUS PDUs to the sender, and the timer Timer_Status_Periodic is restarted. As shown in Fig.2, the state variable VT (RST) stores the initial value equaling 0 before the reset procedure is activated. In addition, the timer Timer_Status_Periodic is started when the receiver is successfully configured for receiving PDUs. Therefore, the timer Timer_Status_Periodic starts working before the reset procedure is activated.

[0010] Suppose that the timer Timer_RST is used to count a clocked period equal to 100ms, and the protocol parameter MaxRST is set to 4. At to, the receiver is triggered to output a status report to the sender. However, because of protocol error or transmission error, the sender receives this STATUS PDU at to and decides that the STATUS PDU contains an erroneous sequence number. Therefore, the sender outputs a RESET PDU to the receiver for activating the reset procedure, and waits for the RESET ACK PDU delivered from the receiver. The timer Timer_RST is started to count the clocked period (100ms). In addition, the state variable VT (RST) is incremented by 1, and stores 1 at t_0.

[0011] At t_0+100, the timer Timer_RST expires and the wanted RESET ACK PDU is not received. Therefore, the sender retransmits the RESET PDU to the receiver, and continues waiting for the wanted RESET ACK PDU. The state variable VT(RST) is further increased by 1, and keeps 2 at t_0+100. Similarly, the timer Timer_RST will expire at t_0+200. Suppose that the wanted RESET ACK PDU is not received still. Then, the sender retransmits the RESET PDU to the receiver, and continues waiting for the wanted RESET ACK PDU. The state variable VT (RST) is further increased by 1, and keeps 3 at t_0+200.

[0012] Please note that the timer Timer_Status_Periodic expires at T' that is between t_0+200 and t_0+300. Therefore, the receiver is triggered to output a status report to the sender with the same content as the previous STATUS PDU. Again, the sender receives the STATUS PDU and decides it contains an erroneous sequence number at T' . When the RESET PDU is scheduled to be transferred at T', the state variable VT(RST) is increased by 1, and stores 4 at T'. At this time, the state variable VT (RST) stores a value equaling the protocol parameter MaxRST. Therefore, the sender indicates an unrecoverable error to the upper layers at T', and the radio bearer is accordingly released.

[0013] Because the protocol parameter MaxRST is set to 4, the sender gives the receiver 3 chances to respond a RESET ACK PDU. In other words, the sender originally permits the receiver to respond within 300ms. If the receiver can respond the RESET ACK PDU before t_0+300, the sender will be able to restart data transmission between the sender and the receiver after resetting protocol parameters. However, the timer Timer_Status_Periodic triggers the receiver to respond the periodic status report before t_0+300, and the reset procedure is terminated at T' . It is possible that the re-

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ceiver responds the RESET ACK PDU at T" between T' and t_0+300. However, the sender cannot restart data transmission between the sender and the receiver because an unrecoverable error has been indicated to the upper layers at T' and the radio bearer will be released according to the prior art reset procedure. That is, the operation of the timer Timer_Status_Periodic impedes the functionality of the defined protocol parameter MaxRST.

[0014] Please refer to Fig.3, which is a second timing diagram illustrating the prior art reset procedure. Same as Fig. 2, the transmission delay between the sender and the receiver is neglected in Fig. 3 for simplicity. Suppose that the timer Timer_RST is used to count a clocked period equal to 700ms, timer Timer_Status_Period is used to count a clocked period equal to 100ms, and the protocol parameter MaxRST is set to 4. At t_0, the timer Timer_Status_Period expires, and the receiver is triggered to output a status report to inform the sender of the PDU receiving status. Suppose that the sender receives this status report at to and finds it contains an erroneous sequence number. Therefore, the sender outputs a RESET PDU to the receiver at t_0 for activating the reset procedure, and waits for the RESET ACK PDU delivered from the receiver. The timer Timer_RST is started to count the clocked period (700ms) , and the state variable VT (RST) is incremented by 1 to store 1. At t_0+100, the timer Timer_Status_Period expires. The receiver sends a status report to the sender with the same content of the previous status report since there is no data PDUs sent by the sender during this period. The sender determines there is an erroneous sequence number in the status report again. Therefore, the sender retransmits the RESET PDU to the receiver, and continues waiting for the wanted RESET ACK PDU. The state variable VT (RST) is further increased by 1, and keeps 2 at t_0+100. Similarly, the timer Timer_Status_Periodic will expire at t_0+200. The receiver sends a status report, which is considered as containing an erroneous sequence number again by the sender. Thus, the sender retransmits the RESET PDU to the receiver, and continues waiting for the wanted RESET ACK PDU. The state variable VT (RST) is further increased by 1, and keeps 3 at t_0+200.

[0015] Similarly, the timer Timer_Status_Periodic expires at t_0+300. Again, the receiver is triggered to output a status report with exactly the same content as before. Therefore, the sender receives the status report and determines that it includes an erroneous sequence number at t_0+300. When the RESET PDU is scheduled to be transferred at t_0+300, the state variable VT(RST) is increased by 1, and stores 4 at t_0+300. At this time, the state variable VT (RST) stores a value equaling the protocol parameter MaxRST. Therefore, the sender indicates an unrecoverable error to the upper layers at t_0+300, and the radio bearer is accordingly rleased. Please note that the sender originally permits the receiver to respond the RESET ACK PDU within 3*700ms. If the receiver can respond the RESET ACK PDU before t_0+3*700 ms, the sender will be able to restart data transmission between the sender and the receiver. However, the timer Timer_Status_Periodic triggers the receiver to respond the unexpected status reports, and an unrecoverable error is indicated to the upper layers earlier than the expected t_0+3*700 at the sender. It is possible that the receiver responds the RESET ACK PDU after t_0+300. However, an unrecoverable error has been reported to upper layers prematurely to release the radio bearer according to the prior art reset procedure. That is, the operation of the timer Timer_Status_Periodic impedes the correct functionality of the defined protocol parameter MaxRST.

Summary of Invention

[0016] It is therefore a primary objective of the claimed invention to provide a method and an apparatus of controlling a reset procedure in a wireless communications system for canceling interference introduced by unexpected STATUS PDUs during the ongoing reset procedure.

[0017] The present invention discloses a method of controlling a reset procedure for a radio communication link between a sender and a receiver comprising the steps of: (a) the receiver transmitting at least a receiving status report to the sender; (b) blocking the receiver from outputting another receiving status report to the sender for a first predetermined period of time, called P1 hereafter; (c) the sender receiving at least one receiving status report sent from the receiver, determining that the receiving status report contains protocol error, transmitting a RESET PDU to the receiver, and starting a first timer for clocking a second predetermined period of time, called P2 hereafter; (d) before the number of transmissions of the RESET PDUs reaches a predetermined value, called M hereafter, the sender outputting a RESET PDU to the receiver each time the first timer expires; and (e) when the number of transmissions of the RESET PDUs reaches M and either the first timer expires or a RESET PDU is triggered to transmit by step (c), the sender detecting an unrecoverable protocol error; wherein P1 in step (b) is not less than the result of P2 multiplied by M.

[0018] The claimed invention further discloses a method of controlling a reset procedure for a radio communication link between a sender and a receiver comprising the steps of: (a) the receiver transmitting at least a receiving status report to the sender; (b) the sender receiving at least a first receiving status report sent from the receiver, determining that the receiving status report contains protocol error, activating a reset procedure, and transmitting a RESET PDU to the receiver; and (c) recognizing the reset procedure as ongoing before the sender receives a RESET ACK PDU outputted from the receiver; wherein step (c) further comprises controlling the sender to ignore at least a second receiving status

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report outputted from the receiver when the reset procedure is ongoing, wherein the second receiving status report is received later than the first receiving status report.

[0019] In addition, a receiver in wireless communication with a sender for transmitting at least a receiving status report is disclosed. The sender receives at least the receiving status report, transmits a RESET PDU to the receiver and starts a first timer for clocking a first predetermined period of time, called P1 hereafter, when determining that the receiving status report contains protocol error, stores a predetermined value, called M hereafter and counts the number of transmissions of the RESET PDUs, wherein before the number of transmissions of the RESET PDUs reaches M, the sender outputs a RESET PDU to the receiver each time the first timer expires, and the sender detects an unrecoverable protocol error when the number of transmissions of the RESET PDUs reaches M and either the first timer expires or a RESET PDU is triggered to transmit. The claimed receiver comprises a communication interface for blocking the receiver from outputting another receiving status report for a second predetermined period of time, called P2 hereafter, wherein P2 is not less than the result of P1 multiplied by M.

[0020] According to one preferred embodiment, a sender in wireless communication with a receiver for receiving at least a first receiving status report sent from the receiver is disclosed. The claimed sender comprises a communication interface for activating a reset procedure and transmitting a RESET PDU to the receiver when determining that the first receiving status report contains protocol error; and a decision logic electrically connected to the communication interface for recognizing the reset procedure as ongoing before the communication interface receives a RESET ACK PDU outputted from the receiver, wherein the decision logic controls the communication interface to ignore at least a second receiving status report outputted from the receiver when the reset procedure is ongoing. The second receiving status report is received later than the first receiving status report.

[0021] Briefly summarized, the claimed method of controlling a reset procedure sets a proper clocked period to the timer Timer_Status_Prohibit for blocking the timer Timer_Status_Period from interfering with the counting of the state variable VT(RST). In addition, the claimed method of controlling a reset procedure makes use of an amended triggering condition. Therefore, the sender ignores the STATUS PDUs when the reset procedure is ongoing. To sum up, the state variable VT (RST) is not computed abnormally, and the reset procedure behaves correctly according to the configured protocol parameter MaxRST, which is equal to M + 1 where M is the predetermined value described above.

[0022] These and other objectives of the claimed invention will no doubt become obvious to those of ordinary skill in the art at reading the following detailed description of the preferred embodiments that are illustrated in the various figures and drawings.

Brief Description of Drawings

[0023]

Fig.1 is a block diagram of the three layers in such a prior art communications protocol.

Fig.2 is a first timing diagram illustrating the prior art reset procedure.

Fig.3 is a second timing diagram illustrating the prior art reset procedure.

Fig. 4 is a first timing diagram illustrating a reset procedure according to a first embodiment of the present invention.

Fig.5 is a second timing diagram illustrating a reset procedure according to the first embodiment of the present invention.

Fig. 6 is a first timing diagram illustrating a reset procedure according to a second embodiment of the present invention.

Fig.7 is a second timing diagram illustrating a reset procedure according to the second embodiment of the present invention.

Fig.8 is a block diagram of a wireless communication system for controlling the reset procedure of the first embodiment according to the present invention.

Fig.9 is a block diagram of a wireless communication system for controlling the reset procedure of the second embodiment according to the present invention.

Detailed Description

[0024] As a first embodiment of the preferred embodiments, the duration of a timer Timer_Status_Prohibit is configured properly to block the timer Time_Status_Periodic from impeding the defined protocol parameter MaxRST. The usage of the timer Timer_Status_Prohibit is explained as follows. Please refer to Fig.4, which is a first timing diagram illustrating the abnormal case handling for a reset procedure according to a first embodiment of the present invention. After the timer Timer_Status_Prohibit is started, the transmission of the triggered status reports is delayed until the timer Timer_Status_Prohibit expires. Suppose that the timer Timer_RST is used to count a clocked period equal to 100ms, and the protocol parameter MaxRST is set to 4. In this first preferred embodiment, the duration of the timer Timer_Status_Prohibit is set to a value that is not less than a product of MaxRST-1 and the clocked period of the timer Timer_RST. For example, the period counted by the timer Timer_Status_Prohibit in the first preferred embodiment is set to 350ms.

[0025] The timer Timer_Status_Periodic works before the reset procedure is activated. At t_0, the receiver de-

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tects missing PDUs and outputs a status report to the sender. Because of protocol error or transmission error, the sender receives the STATUS PDU and decides that the STATUS PDU contains an erroneous sequence number at t_0. As before, the transmission delay between the sender and the receiver is neglected in Fig. 4 for simplicity. Then, the sender outputs a RESET PDU to the receiver for activating the reset procedure, and waits for the RESET ACK PDU delivered from the receiver. The timer Timer_RST is started to count the clocked period (100ms). In addition, the state variable VT (RST) is reset by an initial value before the sender receives the STATUS REPORT, and is incremented by 1, and stores 1 at t_0. Please note that the timer Timer_Status_Prohibit is enabled to count its clocked period (350ms) when the receiver outputs the STATUS PDU to the sender. The timer Timer_Status_Periodic counts normally.

[0026] At t_0+100, the timer Timer_RST expires. Therefore, the sender retransmits the RESET PDU to the receiver, and continues waiting for the wanted RESET ACK PDU. The state variable VT(RST) is further increased by 1, and keeps 2 at t_0+100. Similarly, the timer_Timer_RST expires at t_0+200. Then, the sender retransmits the RESET PDU to the receiver, and continues waiting for the wanted RESET ACK PDU. The state variable VT(RST) is further increased by 1, and keeps 3 at t_0+200.

[0027] In the receiver side, at T', the timer Timer_Status_Periodic expires. A status report is triggered. However, since the timer Timer_Status_Prohibit has been started, the triggered status report is delayed. No status report is sent out by the receiver at T'.

[0028] Next, the timer Timer_RST expires at t_0+300. When the RESET PDU is scheduled to be transferred at t_0+300, the state variable VT (RST) is increased by 1, and stores 4. At this time, the state variable VT (RST) stores a value equaling the protocol parameter MaxRST. Therefore, the sender indicates an unrecoverable error to the upper layers, and the radio bearer is accordingly released. Because the protocol parameter MaxRST is set to 4, the sender gives the receiver 3 chances to receive the RESET PDU and accordingly to respond a RESET ACK PDU. Please note that the clocked period of the timer Timer_Status_Prohibit is not less that 300ms. In other words, the protocol parameter MaxRST functions normally to make the sender capable of permitting the receiver to respond with a RESET ACK PDU within 300ms after the STATUS PDU found to contain erroneous sequence number for the first time. Suppose that the receiver responds a RESET ACK PDU at T" between T' and to + 300, the sender can reset its protocol parameters and restart data transmission between the sender and the receiver. Note that, since we neglect the transmission delay in the drawings for easy to understand, the round-way transmission delay shall be considered in setting the actual duration of the timer Timer_Status_Prohibit. As shown in Fig. 4, the timer Timer_Status_Prohibit expires at t_0+350. In other words, the delayed status report triggered by expiration of the timer Timer_Status_Periodic at T' can only be sent at t_0+350, which will not impede the MaxRST functionality now. Compared with the prior art reset procedure shown in Fig.2, the claimed reset procedure shown in Fig.4 is not terminated prematurely. That is, the sender really gives the receiver enough chances to receive and enough time to respond to the RESET PDU. With the help of the adequately configured duration of the timer Timer_Status_Prohibit, the operation of the timer Timer_Status_Periodic does not impede the functionality of the defined protocol parameter MaxRST.

[0029] Please refer to Fig.5, which is a second timing diagram illustrating the abnormal case handling for a reset procedure according to the first embodiment of the present invention. Suppose that the timer Timer_RST is used to count a clocked period equal to 700ms, timer Timer_Status_Period is used to count a clocked period equal to 100ms, and the protocol parameter MaxRST is set to 4. As mentioned above, the duration of the timer Timer_Status_Prohibit, in the first preferred embodiment, is set to a value that is not less than a product of MaxRST-1 and the clocked period of the timer Timer_RST. For example, the duration of the timer Timer_Status_Prohibit in the first preferred embodiment is set to 2500ms.

[0030] At to, the timer Timer_Status_Period expires, and the receiver is triggered to output a status report to inform the sender of any missing and receiving PDUs. Suppose that the sender receives this status report and determines that the status report contains an erroneous sequence number at t_0. Please note that the timer Timer_Status_Prohibit is started to count its clocked period, e.g., 2500ms, when the receiver outputs the last STATUS PDU of the status report to the sender. If there is any further status report trigger, for example by the expiration of the timer Timer_Status_Periodic, after T_0, the status report will be delayed until the timer Timer_Status_Prohibit expires. In the meantime, the sender outputs a RESET PDU to the receiver for activating the reset procedure at t_0, and waits for the RESET ACK PDU delivered from the receiver. The timer Timer_RST is started to count the clocked period (700ms), and the state variable VT(RST) is incremented by 1 to store 1.

[0031] Because the timer Timer_Status_Prohibit is started, the receiver will not output further status report when the timer Timer_Status_Periodic expires at t_0 + 100, t_0 + 200, t_0 + 300, etc., until the timer Timer_Status_Prohibit expires. Therefore, if the RESET PDU is missing and not received by the receiver, the timer Timer_RST can successfully expire at t_0+700. At this time, the sender retransmits the RESET PDU to the receiver, and waits for the RESET ACK PDU delivered from the receiver. In addition, the state variable VT (RST) is incremented by 1 to store 2, and the timer Timer_RST restarts at t_0+700.

[0032] According to the above-mentioned operations,

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when the state variable VT(RST) stores a value equaling the protocol parameter MaxRST, the sender indicates an unrecoverable error to the upper layers, and the radio bearer is released. Because the protocol parameter MaxRST is set to 4, the sender gives the receiver 3 chances to receive the RESET PDU and to correspondingly respond a RESET ACK PDU. Please note that the clocked period of the timer Timer_Status_Prohibit is not less that 2100ms. In other words, the protocol parameter MaxRST functions normally to make the sender capable of permitting the receiver three times for receiving the RESET PDU and to respond within 2100ms in total. If the receiver can respond the RESET ACK PDU before t_0+2100, the sender can recover the protocol error indicated by the erroneous sequence number in a status report by reset its protocol parameters and can restart data transmission between the sender and the receiver. As mentioned above, the timer Timer_Status_Prohibit will expire at t_0+2500, and the receiver stop blocking status reports previously triggered by the timer Timer_Status_Periodic. For the case that an unrecoverable protocol error is reported to upper layers by the sender, the delayed status reports is useless since this radio bearer will be released because of unrecoverable protocol error. However, for the case that there is no erroneous sequence number in the first STATUS report, the delayed status report maintains the status reporting mechanism normal. Compared with the prior art reset procedure shown in Fig.3, the claimed reset procedure shown in Fig.5 is not terminated prematurely. That is, the sender really gives the receiver enough chances to receive and enough time to respond to the RESET PDU. With the help of the adequately configured duration of the timer Timer_Status_Prohibit, the operation of the timer Timer_Status_Periodic does not impede the functionality of the defined protocol parameter MaxRST.

[0033] As a second embodiment of the preferred embodiments, one of the prior art triggering conditions for the sender to transmit RESET PDUs to the receiver is amended. That is, the sender is capable of delivering a RESET PDU to the receiver when the sender receives a STATUS PDU carrying an erroneous sequence number only if there is no ongoing reset procedure. In other words, after a reset procedure is triggered, the sender stops receiving any STATUS PDU. This means that any arrived or received STATUS PDU after the reset procedure is initiated and before the reset procedure is terminated will be ignored and discarded. Please refer to Fig.6, which is a first timing diagram illustrating the reset procedure according to the second embodiment of the present invention. Suppose that the timer Timer_RST is used to count a clocked period equal to 100ms, and the protocol parameter MaxRST is set to 4. As shown in Fig. 6, the state variable VT (RST) stores the initial value equaling 0 before the reset procedure is activated. In addition, the timer Timer_Status_Periodic is started when the receiver is successfully configured to receiving PDUs. Therefore, the timer Timer_Status_Periodic starts working before the reset procedure is activated. At to, the receiver detects missing PDUs and outputs a status report to the sender. Suppose that the sender receives this status report and determines that the status report contains an erroneous sequence number at t_0. There is no ongoing reset procedure at this moment. Thus, by the second embodiment of this claimed invention, the sender outputs a RESET PDU to the receiver, activates a reset procedure, and waits for the RESET ACK PDU delivered from the receiver. The timer Timer_RST is started to count the clocked period (100ms) . In addition, the state variable VT(RST) is incremented by 1, and stores 1 at t_0.

[0034] At t_0+100, the timer Timer_RST expires and the wanted RESET ACK PDU is not received yet. Therefore, the sender retransmits the RESET PDU to the receiver, and continues waiting for the wanted RESET ACK PDU. The state variable VT(RST) is further increased by 1, and keeps 2 at t_0+100. Similarly, the timer Timer_RST will expire at t_0+200 when the wanted RESET ACK PDU is still not received yet. Thus, the sender retransmits the RESET PDU to the receiver, and continues waiting for the wanted RESET ACK PDU. The state variable VT (RST) is further increased by 1, and keeps 3 at t_0+200.

[0035] Suppose that the timer Timer_Status_Periodic expires at T' that is between t_0+200 and t_0+300. Therefore, the receiver outputs a status report at T' owing to the triggering of the timer Timer_Status_Periodic expiration. The sender receives this status report, which is deemed to contain erroneous sequence number by the sender. However, since there is an ongoing reset procedure at this moment, the sender is blocked from retransmitting the RESET PDU according to the amended triggering condition mentioned above, i.e. the second embodiment of this claimed invention. As shown in Fig. 6, the sender does not respond to the received STATUS PDU at T'. Therefore, the state variable VT(RST) still holds the currently stored value, i.e., 3, and the timer Timer_RST keeps clocking after T'. It is obvious that the timer Timer_RST expires at t_0+300, and the RESET PDU is scheduled to be transferred at t_0+300. Therefore, the state variable VT (RST) is increased by 1, and stores 4 at t_0+300. At this time, the state variable VT (RST) stores a value equaling the protocol parameter MaxRST, and the sender indicates an unrecoverable error to the upper layers to release this radio bearer. Because the protocol parameter MaxRST is set to 4, the sender gives the receiver three chances to receive the RESET PDU and to correspondingly respond a RESET ACK PDU. With the help of the amended triggering condition, the receiver is actually given 3 chances to receive the RESET PDU and 300ms in total to answer the RESET ACK PDU to the sender. In other words, the interference introduced by the timer Timer_Status_Periodic is cancelled, and the correct functionality of the defined protocol parameter MaxRST is obtained.

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[0036] Please refer to Fig.7, which is a second timing diagram illustrating the reset procedure according to the second embodiment of the present invention. Suppose that the timer Timer_RST is used to count a clocked period equal to 700ms, timer Timer_Status_Period is used to count a clocked period equal to 100ms, and the protocol parameter MaxRST is set to 4. At t_0, the timer Timer_Status_Period expires, and the receiver is triggered to output a status report to inform the sender of any missing or received PDUs. Suppose that the sender receives the status report and determines that the status report contains an erroneous sequence number. Therefore, the sender outputs a RESET PDU to the receiver, activates a reset procedure, and waits for the RESET ACK PDU delivered from the receiver. The timer Timer_RST is started to count the clocked period (700ms), and the state variable VT (RST) is incremented by 1 to store 1. At t_0+100, the timer Timer_Status_Period expires, the receiver outputs a status report, which is received and considered as including an erroneous sequence number by the sender. However, the sender is blocked from retransmitting the RESET PDU according to the amended triggering condition mentioned above. The reason is that the reset procedure has been started before t_0+100, and the reset procedure is ongoing at t_0+100. Please note that by the second embodiment of the present invention, when a reset procedure is ongoing, there is no difference whether the sender receives and interprets the content of the status report or the sender simply ignores the status report. As shown in Fig. 7, the sender does not respond to the received STATUS PDU at t_0+100. Therefore, the state variable VT(RST) still holds the currently stored value, and the timer Timer_RST keeps clocking after t_0+100. Similarly, the receiver outputs status reports respectively at t_0+200, t_0+300, t_0+400, t_0+500, t_0+600, and t_0+700, and the sender does not respond to these outputted from the receiver. Please note that the timer Timer_RST expires at t_0+700. Therefore, the sender is successfully triggered to transmit the RESET PDU to the receiver again, and the state variable VT(RST) is increased by 1 to store 2 at t_0+700.

[0037] According to the above-mentioned operations, when the state variable VT(RST) stores a value equaling the protocol parameter MaxRST, the sender indicates an unrecoverable error to the upper layers, and the radio bearer is accordingly released. Because the protocol parameter MaxRST is set to 4, the sender gives the receiver three chances to receive the RESET PDU and to correspondingly respond a RESET ACK PDU. It is clear that the interference introduced by the timer Timer_Status_ Periodic, is cancelled during the ongoing reset procedure. In other words, the protocol parameter MaxRST functions normally to make the sender capable of giving the receiver three chances to receive the RESET PDU.

[0038] Please refer to Fig.8, which is a block diagram of a wireless communication system 50 for controlling the reset procedure of the first embodiment according to the present invention. The wireless communication system 50 includes a sender 52 and a receiver 54. The sender 52 has a communication interface 56, a timer 58 electrically connected to the communication interface 56, a counter 60 electrically connected to the communication interface 56, and a storage unit 62 electrically connected to the counter 60. The receiver 54 has a communication interface 64 and two timers 66 and 68 electrically connected to the communication interface 64. The communication interfaces 56, 64 are used to establish radio links (radio bearers) between the sender 52 and the receiver 54. In this preferred embodiment, the timer 58 stands for the timer Timer_RST, the storage unit 62 is used to store the maximum number of transmissions of a RESET PDU, and the counter 60 is used to count the state variable VT (RST) . For the receiver 54, the timer 66 stands for the timer Timer_Status_Periodic, and another timer 68 represents the timer Timer_Status_Prohibit. Therefore, the timer 68 is appropriately set to prevent the state variable VT (RST) from being erroneously counted. Please note that the method of controlling the reset procedure according to the above-mentioned first embodiment has been clearly disclosed. Therefore, the lengthy description of the operations implemented by corresponding device elements is not repeated for simplicity.

[0039] Please refer to Fig.9, which is a block diagram of a wireless communication system 70 for controlling the reset procedure of the second embodiment according to the present invention. The wireless communication system 70 has a receiver 72 and a sender 74. Please note that when the receiver 72 outputs data to the sender 74, the originally named sender 74 becomes a "receiver", and the originally named receiver 72 becomes a "sender". That is, the naming of the receiver 72 and the sender 74 depends on the operations of the receiver 72 and the sender 74.

[0040] The sender 74 is in wireless communication with the receiver 72, and the sender 74 includes a communication interface 76, a decision logic 78 electrically connected to the communication interface 76, a timer 80 electrically connected to the communication interface 76, a counter 82 electrically connected to the communication interface 76, and a storage unit 84 electrically connected to the counter 82. The communication interface 76 is used to establish radio links (radio bearers) between the sender 74 and the receiver 72. In this preferred embodiment, the timer 80 stands for the timer Timer_RST, the storage unit 84 is used to store the maximum number of transmissions of a RESET PDU, and the counter 82 is used to count the state variable VT (RST). In addition, the decision logic 78 is used to detect if the reset procedure is ongoing for preventing the state variable VT(RST) from being erroneous counted. In other words, with the help of the decision logic 78, the interference introduced by improper blocking of the timer Timer_RST by the Timer_Status_ Periodic is cancelled

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during the ongoing reset procedure. Please note that the method of controlling the reset procedure according to the above-mentioned second embodiment has been clearly disclosed. Therefore, the lengthy description of the operations implemented by corresponding device elements is not repeated for simplicity.

[0041] In contrast to the prior art, the claimed method of controlling a reset procedure sets a proper clocked period to the timer Timer_Status_Prohibit for blocking the timer Timer_Status_Period from interfering with the counting of the state variable VT(RST). In addition, the claimed method of controlling a reset procedure makes use of an amended triggering condition. Therefore, the sender ignores the STATUS PDUs having erroneous sequence numbers during the ongoing reset procedure. To sum up, the state variable VT (RST) is not increased prematurely, and the reset procedure behaves correctly according to the configured protocol parameter MaxRST.

[0042] Those skilled in the art will readily observe that numerous modifications and alterations of the device may be made while retaining the teachings of the invention. Accordingly, the above disclosure should be construed as limited only by the metes and bounds of the appended claims.

Claims

1. A method of controlling a reset procedure for a radio communication link between a sender and a receiver comprising the steps of:

   (a) the receiver transmitting at least a receiving status report to the sender;
   (b) blocking the receiver from outputting another receiving status report to the sender for a first predetermined period of time, called P1 hereafter;
   (c) the sender receiving at least one receiving status report sent from the receiver, determining that the receiving status report contains protocol error, transmitting a RESET PDU to the receiver, and starting a first timer for clocking a second predetermined period of time, called P2 hereafter;
   (d) before the number of transmissions of the RESET PDUs reaches a predetermined value, called M hereafter, the sender outputting a RESET PDU to the receiver each time the first timer expires; and
   (e) when the number of transmissions of the RESET PDUs reaches M and either the first timer expires or a RESET PDU is triggered to transmit by step (c), the sender detecting an unrecoverable protocol error;

   wherein P1 in step (b) is not less than the result of P2 multiplied by M.

2. The method of claim 1 wherein step (b) further comprises utilizing the receiver to start a second timer for clocking P1 when a receiving status report is outputted from the receiver.

3. The method of claim 2 wherein the second timer is a timer Timer_Status_Prohibit and the first timer is a timer Timer_RST according to a 3GPP specification.

4. A method of controlling a reset procedure for a radio communication link between a sender and a receiver comprising the steps of:

   (a) the receiver transmitting at least a receiving status report to the sender;
   (b) the sender receiving at least a first receiving status report sent from the receiver, determining that the receiving status report contains protocol error, activating a reset procedure, and transmitting a RESET PDU to the receiver; and
   (c) recognizing the reset procedure as ongoing before the sender receives a RESET ACK PDU outputted from the receiver;

   wherein step (c) further comprises controlling the sender to ignore at least a second receiving status report outputted from the receiver when the reset procedure is ongoing, wherein the second receiving status report is received later than the first receiving status report.

5. The method of claim 4 wherein step (b) further comprises utilizing the sender to periodically output a RESET PDU to the receiver according to a predetermined period of time before the number of transmissions of the RESET PDUs reaches a predetermined value and before the sender receives the RESET ACK PDU outputted from the receiver.

6. The method of claim 5 wherein step (b) further comprises utilizing the sender to start a timer for clocking the predetermined period of time when the sender outputs a RESET PDU.

7. The method of claim 6 wherein the timer is a timer Timer_RST according to a 3GPP specification.

8. A receiver in wireless communication with a sender for transmitting at least a receiving status report, wherein the sender receives at least the receiving status report, transmits a RESET PDU to the receiver and starts a first timer for clocking a first predetermined period of time, called P1 hereafter, when determining that the receiving status report contains protocol error, stores a predetermined value,

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called M hereafter and counts the number of transmissions of the RESET PDUs, wherein before the number of transmissions of the RESET PDUs reaches M, the sender outputs a RESET PDU to the receiver each time the first timer expires, and the sender detects an unrecoverable protocol error when the number of transmissions of the RESET PDUs reaches M and either the first timer expires or a RESET PDU is triggered to transmit;
the receiver comprising:

a communication interface for blocking the receiver from outputting another receiving status report for a second predetermined period of time, called P2 hereafter;wherein P2 is not less than the result of P1 multiplied by M.

9. The receiver of claim 8 further comprises a second timer electrically connected to the communication interface for clocking P2, and the communication interface starts the second timer when outputting a receiving status report.

10. The receiver of claim 9 wherein the second timer is a timer Timer_Status_Prohibit and the first timer is a timer Timer_RST according to a 3GPP specification.

11. A sender in wireless communication with a receiver for receiving at least a first receiving status report sent from the receiver, the sender comprising:

a communication interface for activating a reset procedure and transmitting a RESET PDU to the receiver when determining that the first receiving status report contains protocol error; and
a decision logic electrically connected to the communication interface for recognizing the reset procedure as ongoing before the communication interface receives a RESET ACK PDU outputted from the receiver;

wherein the decision logic controls the communication interface to ignore at least a second receiving status report outputted from the receiver when the reset procedure is ongoing; wherein the second receiving status report is received later than the first receiving status report.

12. The sender of claim 11 periodically outputting a RESET PDU to the receiver according to a predetermined period of time before the number of transmissions of the RESET PDUs reaches a predetermined value.

13. The sender of claim 12 further comprising a timer electrically connected to the communication interface for clocking the predetermined period of time, wherein the communication interface starts the timer when outputting a RESET PDU.

14. The sender of claim 13 wherein the timer is a timer Timer_RST according to a 3GPP specification.

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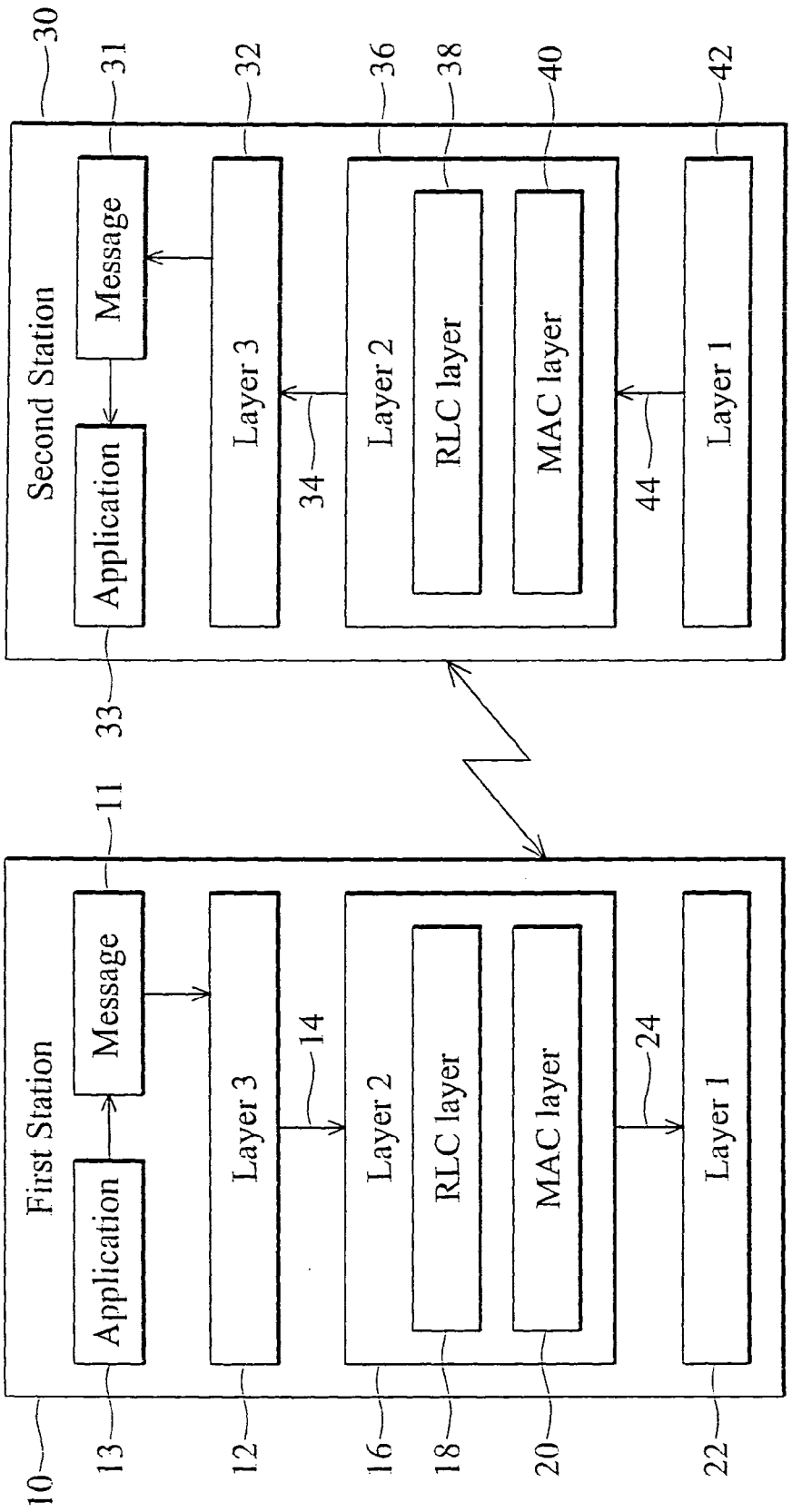


FIG. 1 (RELATED ART)

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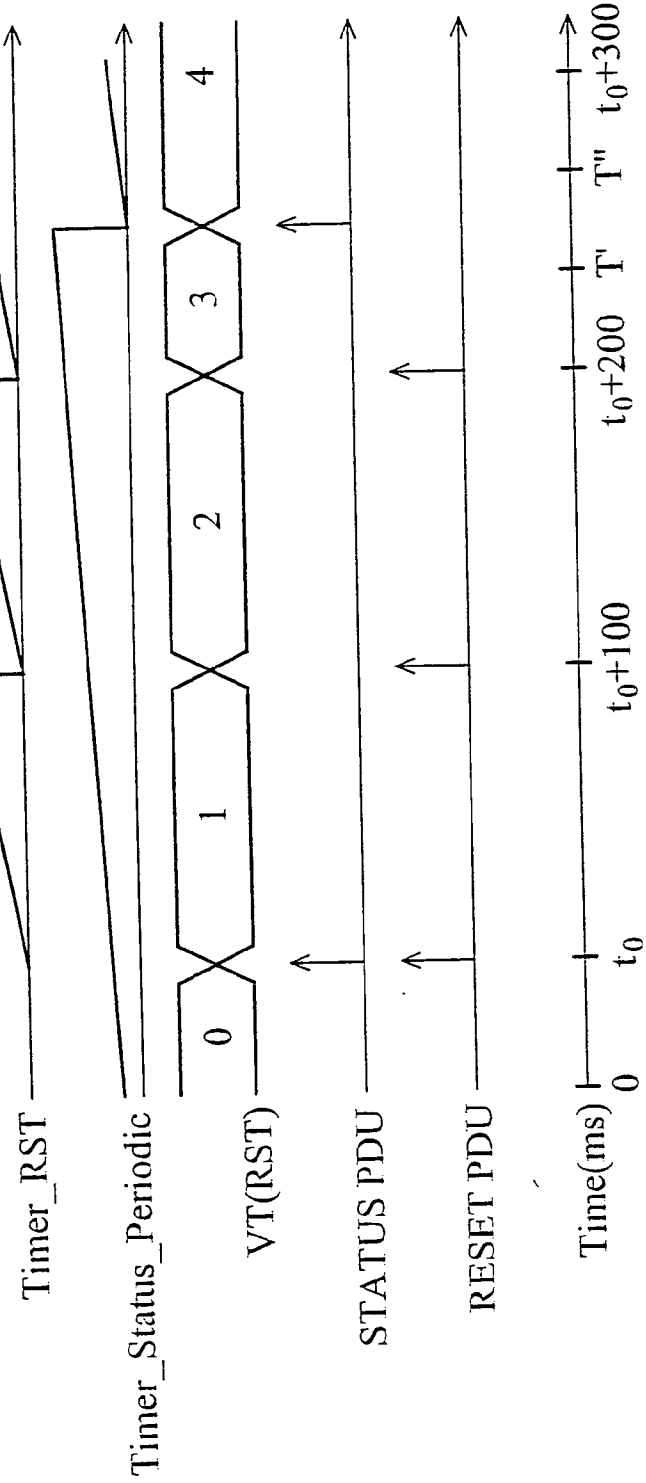


FIG. 2 (RELATED ART)

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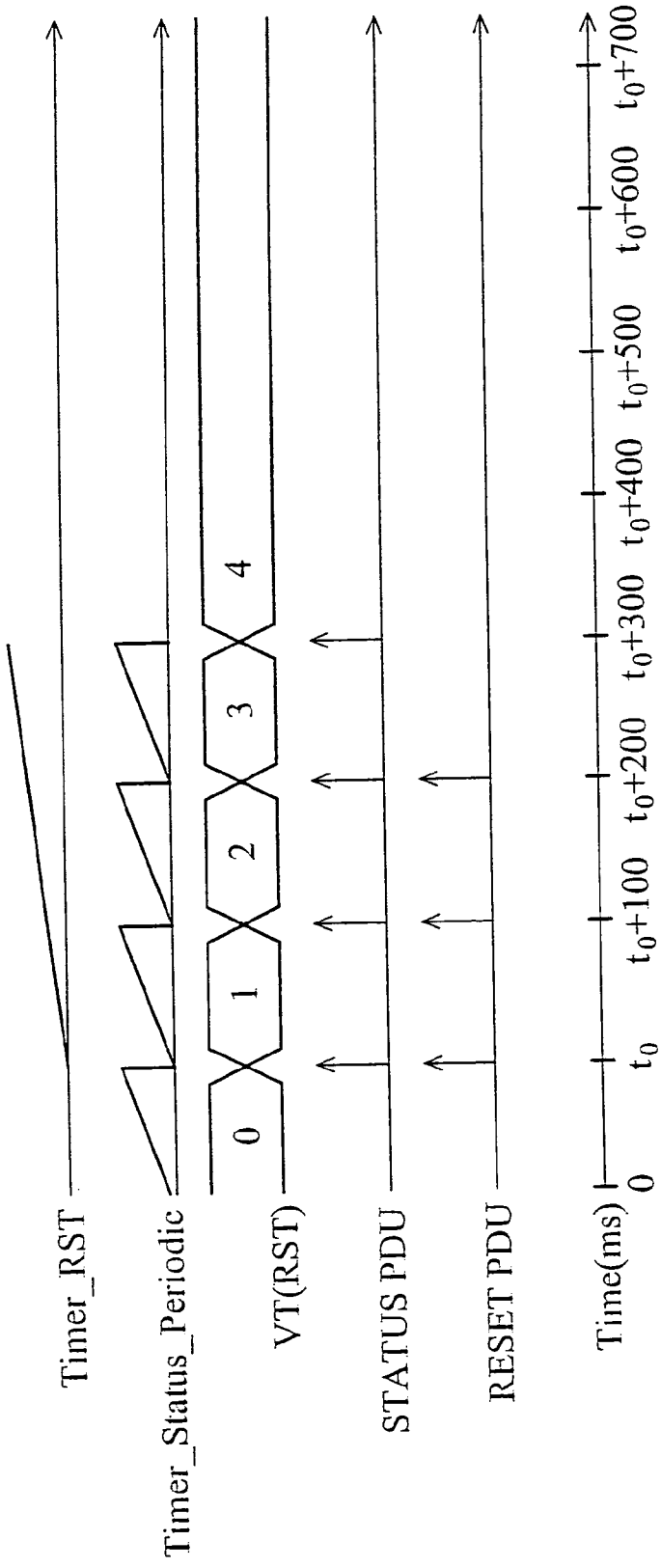


FIG. 3 (RELATED ART)

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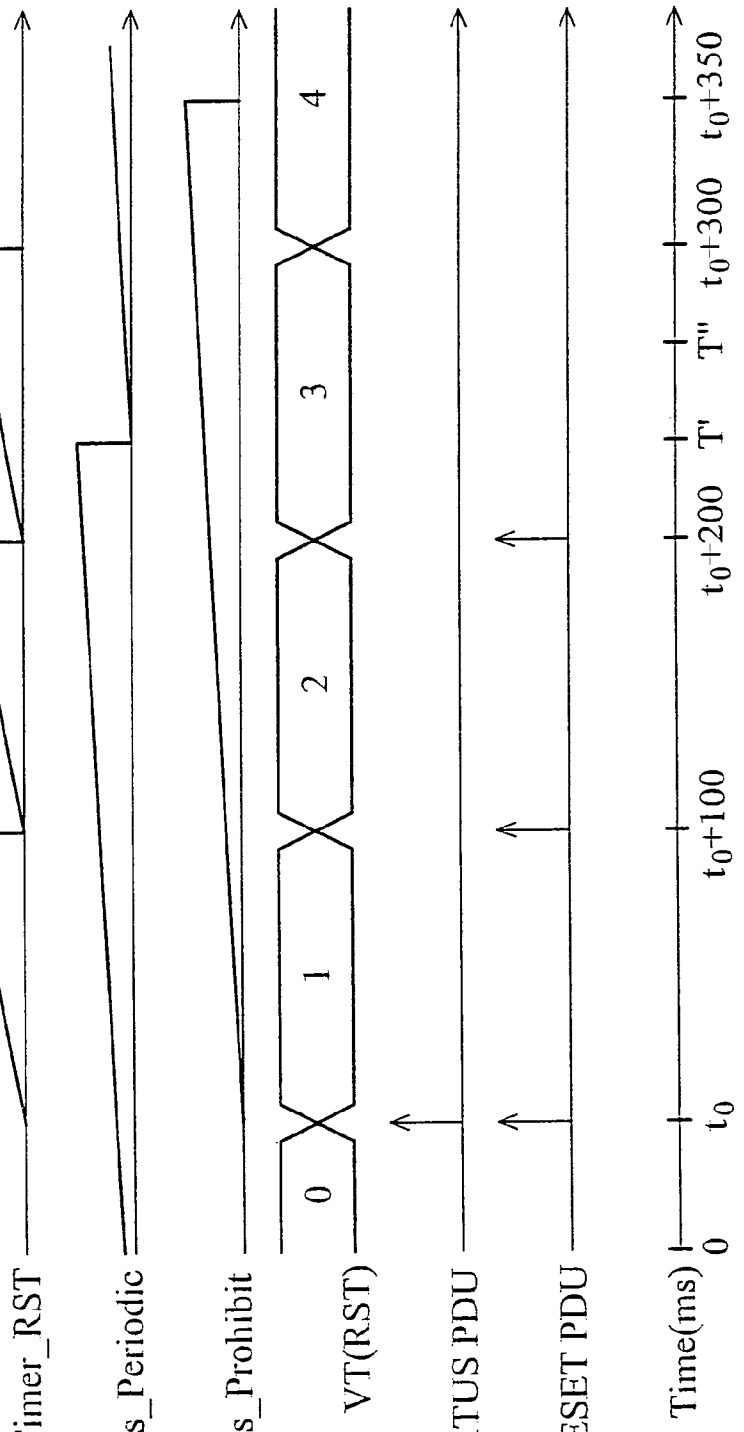


FIG. 4

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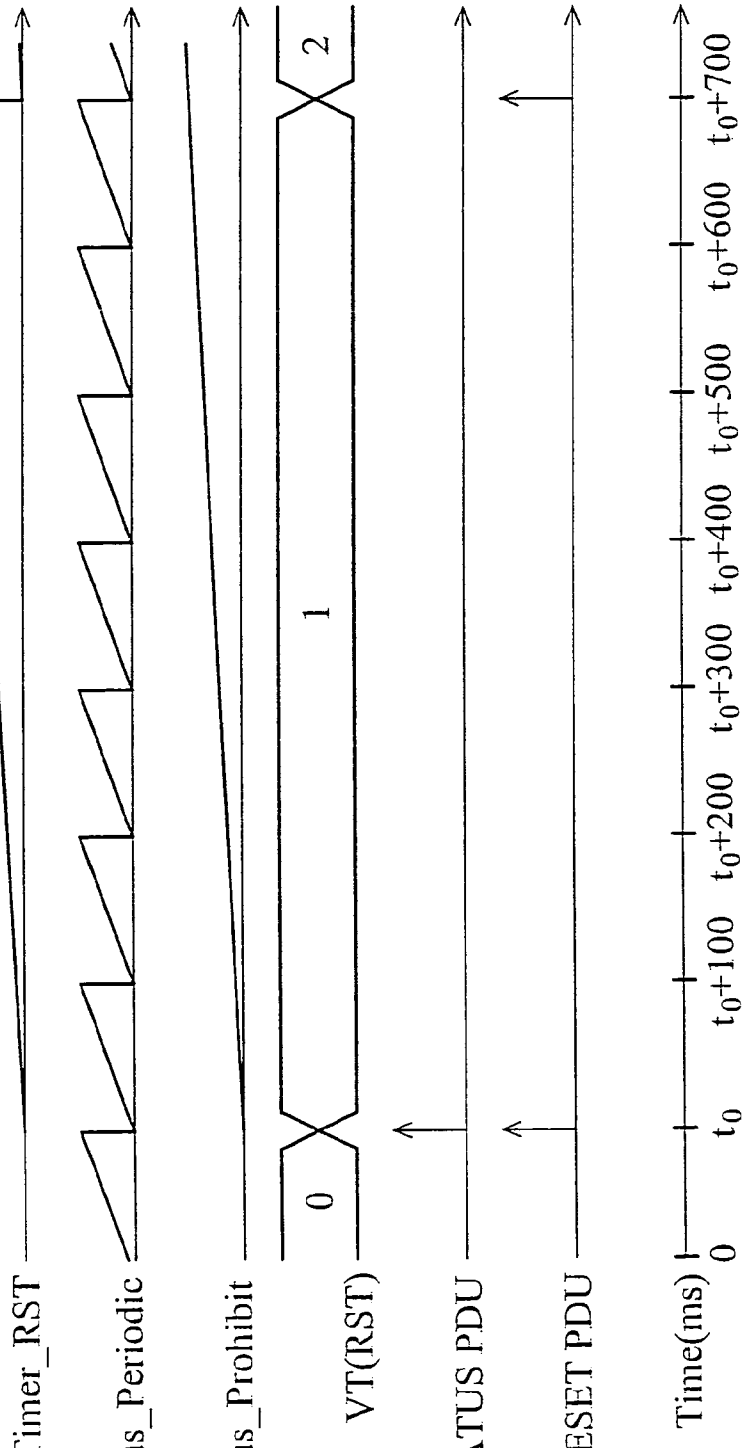


FIG. 5

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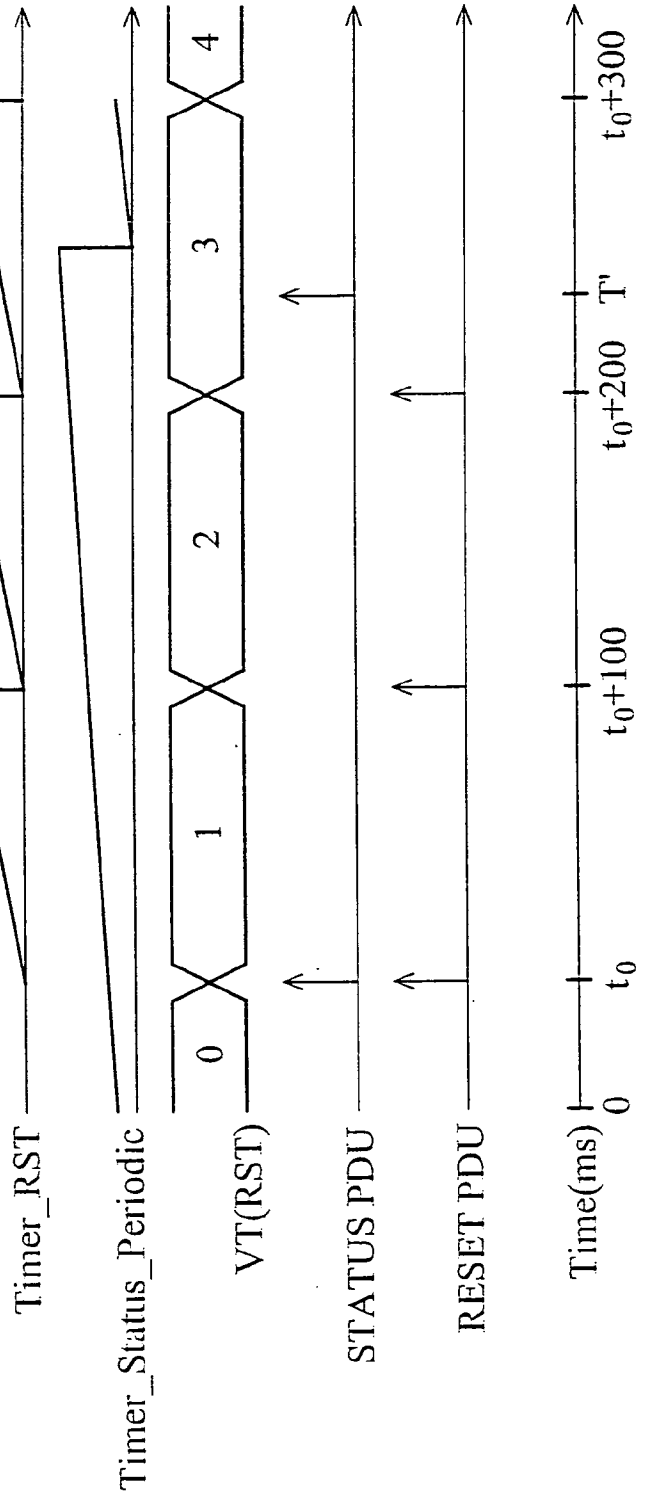


FIG. 6

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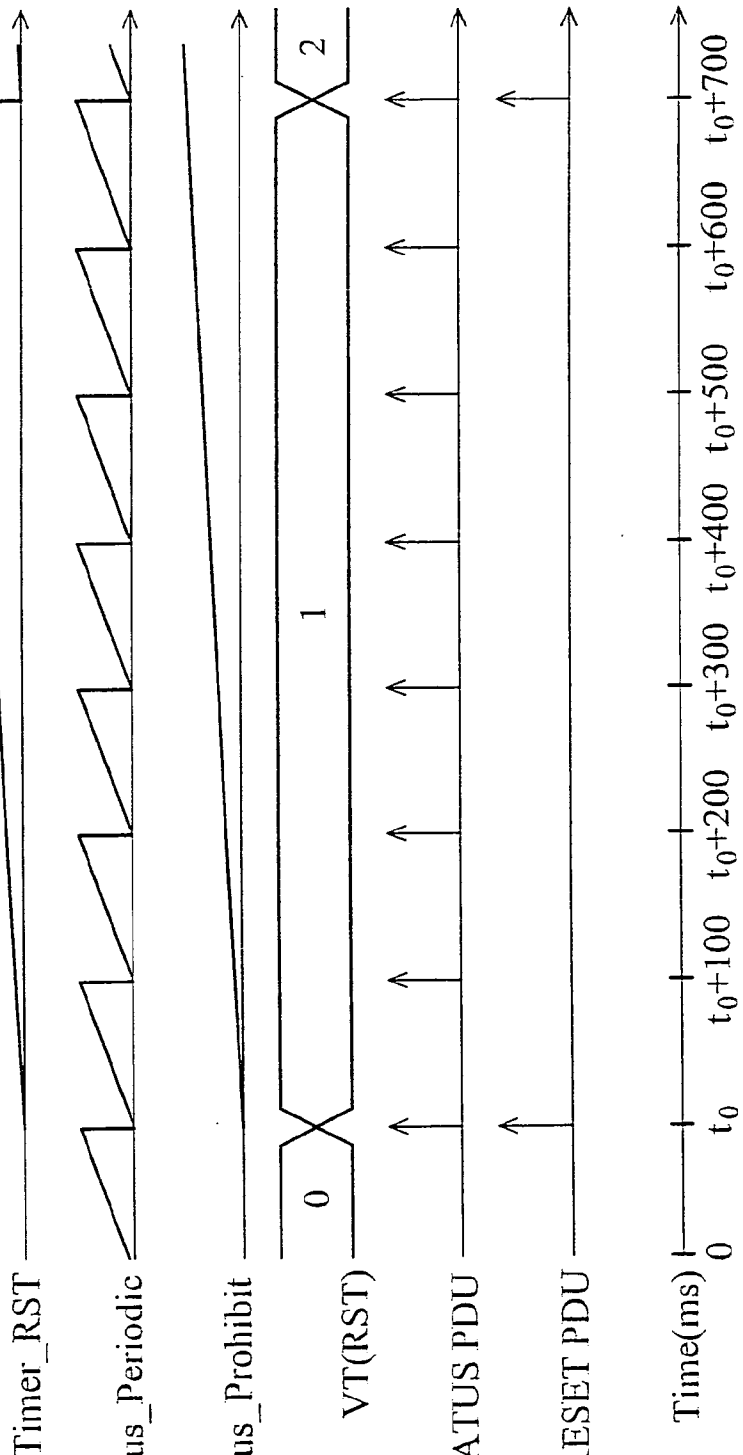


FIG. 7

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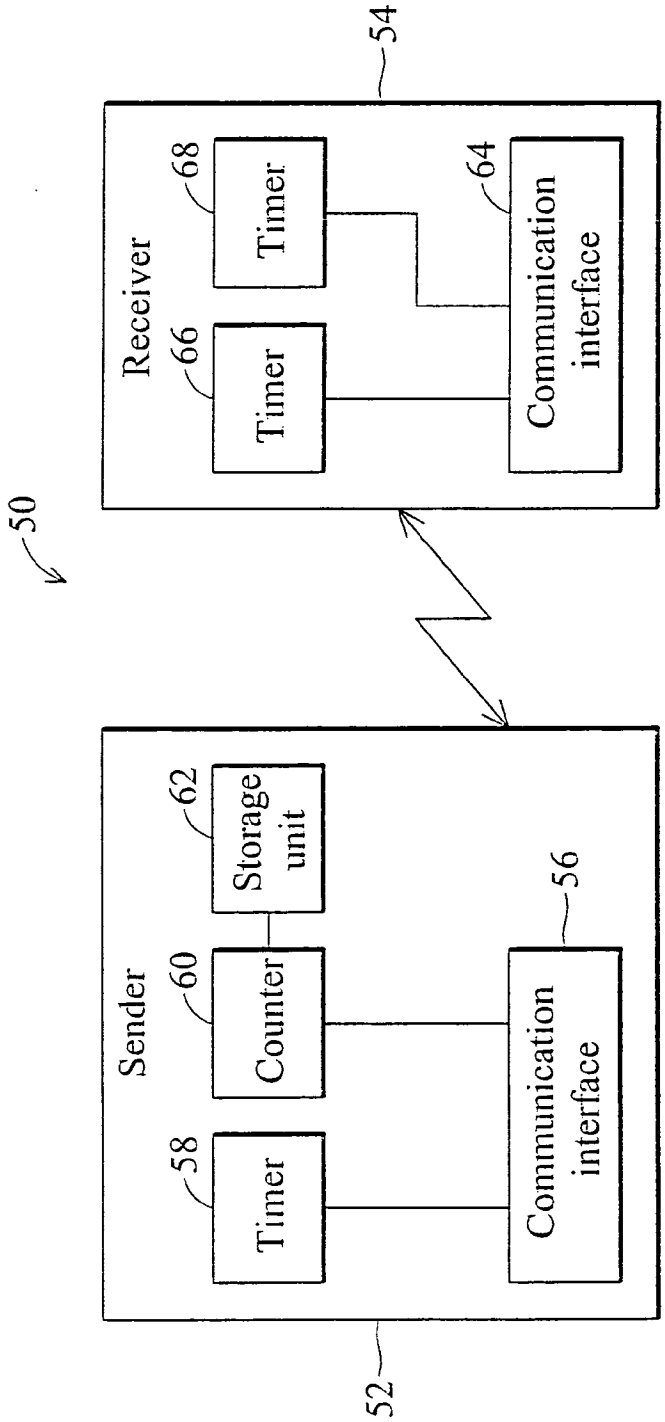


FIG. 8

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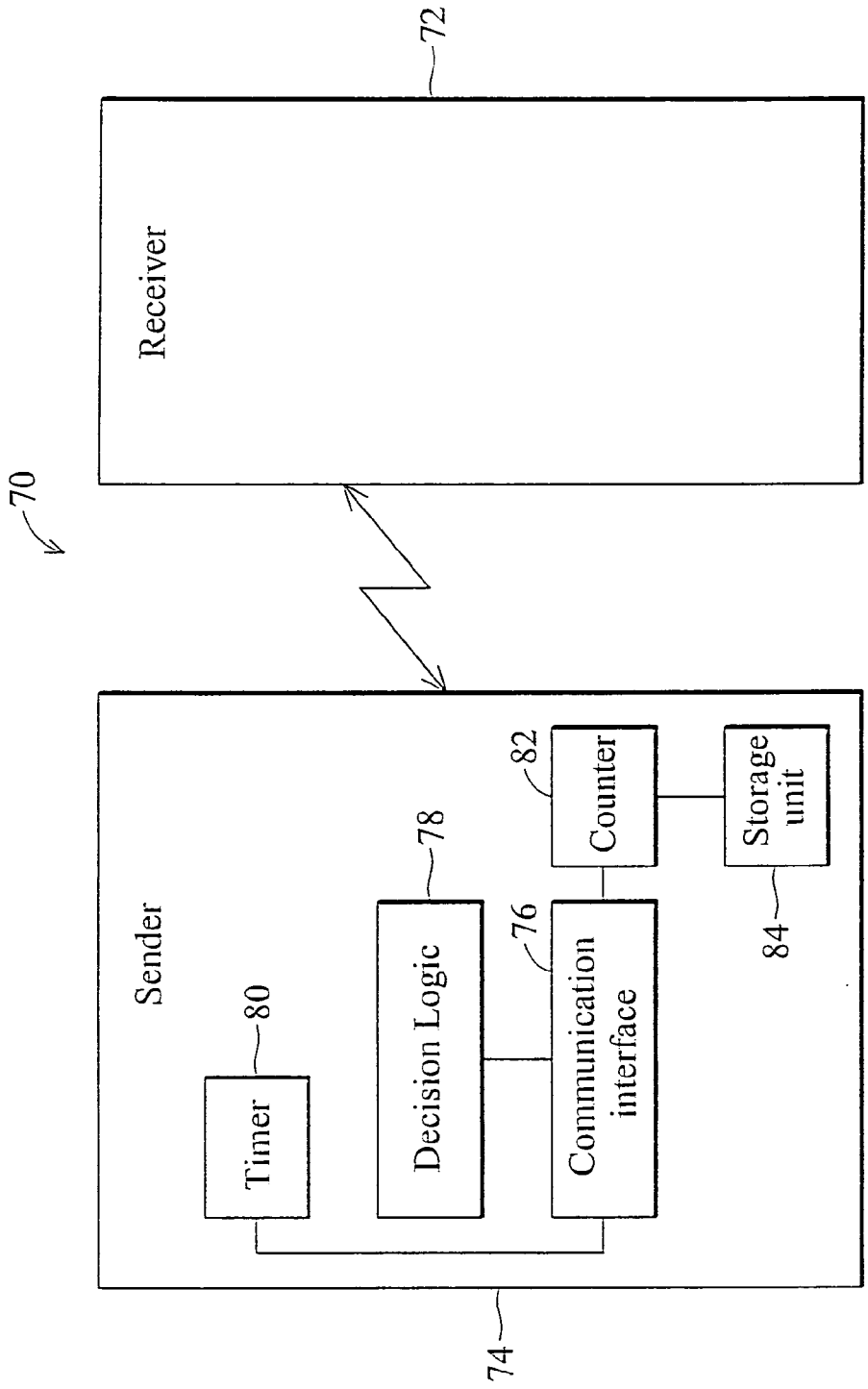


FIG. 9

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Electronic Acknowledgement Receipt

EFS ID:	3178373
Application Number:	11278546
International Application Number:	
Confirmation Number:	6559
Title of Invention:	Error Handling In A Wireless Communications System
First Named Inventor/Applicant Name:	Sam Shiaw-Shiang Jiang
Customer Number:	64044
Filer:	Paul C. Lewis/Mary Mejia
Filer Authorized By:	Paul C. Lewis
Attorney Docket Number:	5413-0196PUS1
Receipt Date:	18-APR-2008
Filing Date:	04-APR-2006
Time Stamp:	18:00:19
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		20080418IDS.pdf	163167 7c653b501a20fbfffa4788781577e0a6c64a06fd	yes	6

	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Information Disclosure Statement Letter		1	5	
	Information Disclosure Statement (IDS) Filed		6	6	
Warnings:					
Information:					
2	Foreign Reference	CN1581731A.PDF	817561 508fd9879ac0771a5bf939ea0d7a06ab2a4740a8	no	27
Warnings:					
Information:					
3	Foreign Reference	EP1507365.pdf	947808 84cad5d1d67e27eb9169c3c1621c8a86b58cdf19	no	19
Warnings:					
Information:					
		Total Files Size (in bytes):	1928536		

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

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

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

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

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/278,546	04/04/2006	Sam Shiaw-Shiang Jiang	5413-0196PUS1	6559

64044 7590 01/23/2008

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EXAMINER	
BATISTA, MARCOS	
ART UNIT	PAPER NUMBER
4134	

MAIL DATE	DELIVERY MODE
01/23/2008	PAPER

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

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

Office Action Summary	Application No.	Applicant(s)	
	11/278,546	JIANG, SAM SHIAW-SHIANG	
	Examiner	Art Unit	
	MARCOS BATISTA	4134	

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

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

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

Status

1)☒ Responsive to communication(s) filed on *04/04/2006*.

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

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

Disposition of Claims

4)☒ Claim(s) *1-7* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7* is/are rejected.

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

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

Application Papers

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

10)☒ The drawing(s) filed on *04/04/2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

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

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

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

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

a)☐ All b)☐ Some * c)☐ None of:

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

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

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

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

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *01/03/07,08/23/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

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DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1 and 2 are rejected under 35 U.S.C. 102(e) as being anticipated by Petrovic et al. (US 20040208160 A1).

Consider claim 1, a method of detecting an erroneous sequence number of a status report unit in a wireless communications system, the method comprising (see: Petrovic [0002] and [0128]): Petrovic discloses receiving a status report unit output from a receiver of the wireless communications system (see [0128]). Petrovic also teaches detecting whether a negatively acknowledged sequence number lies in a range of greater than or equal to a sequence number following a sequence number of a last in sequence acknowledged packet of a transmitter and less than a sequence number of a next packet to be transmitted for the first time by the transmitter when the negatively acknowledged sequence number is detected in the status report unit (see [0049] - [0070] and [0080]).

Petrovic further teaches detecting a status report unit comprises an erroneous sequence number when the negatively acknowledged sequence number is not in the range (see [0106] - [0108]).

Consider claim 2, Petrovic discloses initiating a reset procedure when the status report unit comprises the erroneous sequence number (see abstract, [0104] – [0109].

Claim Rejections - 35 USC § 103

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

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Petrovic et al. (US 20040208160 A1), hereafter “Petrovic,” in view of Minagawa (US 6483855 B1), hereafter “Minagawa.”

Consider claim 3, Petrovic discloses a method for detecting an erroneous sequence number of a status report unit in a wireless communications system, as stated in claim 1, but does not particularly refer to modulus operation with the sequence number following the sequence number of the last in-sequence acknowledged packet of the transmitter as a modulus base. Minagawa teaches transmission and reception sequence numbers based on modulo (see col 2, lines 43-49 and col 22, lines 29-34).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the invention of Petrovic and have it include modulus operation with the sequence number following the sequence number of the last in-sequence acknowledged packet of the transmitter as a modulus base, as taught by Minagawa. The motivation would have been in order to provide a consistent error checking mechanism (see col 2, lines 43-49).

5. Claims 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Petrovic et al. (US 20040208160 A1), hereafter “Petrovic,” in view of Olsson et al. (US 20060067238 A1), hereafter “Olsson.”

Consider claim 4, Petrovic discloses a method for detecting an erroneous sequence number of a status report unit in a wireless communications system, as stated in claim 1, but does not particularly refer to a piggybacked status report unit. Olsson teaches a piggybacked status report (see [0139]).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the invention of Petrovic and have it include piggybacked status report unit, as taught by Olsson. The motivation would have been in order to monitor all the sequence numbers in a current transmission window (see [0139]).

6. Claims 5, 6 and 7 are rejected under 35 U.S.C. 102(e) as being anticipated by Petrovic et al. (US 6483855 B1).

Consider claim 5, Petrovic teaches third generation mobile communication systems (see [0011] – [0014].

Consider claim 6, Petrovic teaches third generation mobile communication systems operating in an acknowledged mode (see [0043] and [0104]).

Consider claim 7, Petrovic teaches a reset procedure to be performed as per claim 1(see [0104] – [0111] - A reset procedure is known in the art to include processing unit, memory and program code).

Conclusion

7. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Marcos Batista, whose telephone number is (571) 270-5209. The Examiner can normally be reached on Monday-Thursday from 8:00am to 5:00pm.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Derrick Ferris can be reached at (571) 272-3123. 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) or 703-305-3028.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist/customer service whose telephone number is (571) 272-2600.

Marcos Batista
/M. B./
01/17/08

/DERRICK W. FERRIS/
Supervisory Patent Examiner, Art Unit 4134

Notice of References Cited	Application/Control No. 11/278,546	Applicant(s)/Patent Under Reexamination JIANG, SAM SHIAW-SHIANG	
	Examiner MARCOS BATISTA	Art Unit 4134	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,483,855 B1	11-2002	Minagawa, Tetsuo	370/493
*	B	US-2004/0208160 A1	10-2004	Petrovic et al.	370/350
*	C	US-2006/0067238 A1	03-2006	Olsson et al.	370/242
	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	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.

Petitioners' Exhibit 1007, p. 328
AT&T et al v. Innovative Sonic
IPR2024-01143

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11278546	JIANG, SAM SHIAW-SHIANG
	Examiner	Art Unit
	MARCOS BATISTA	4134

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

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

CLAIM		DATE								
Final	Original	01/16/2008								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
	6	✓								
	7	✓								

Petitioners' Exhibit 1007, p. 329
AT&T et al v. Innovative Sonic
IPR2024-01143

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11278546	JIANG, SAM SHIAW-SHIANG
	Examiner	Art Unit
	MARCOS BATISTA	4134

SEARCHED

Class	Subclass	Date	Examiner
455	115.1	1/16/2008	mb
709	230	1/16/2008	mb

SEARCH NOTES

Search Notes	Date	Examiner
Consulted with D'Agosta	1/15/2008	mb
PLUS Search	01/9/08	mb
EAST Search	12/27/2007	mb
Inventor's Name Search	12/27/2007	mb

INTERFERENCE SEARCH

Class	Subclass	Date	Examiner

Petitioners' Exhibit 1007, p. 330
AT&T et al v. Innovative Sonic
IPR2024-01143

Docket No.: 5413-0196PUS1
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Sam Shiaw-Shiang JIANG

Application No.: 11/278,546 Confirmation No.: 6559

Filed: April 4, 2006 Art Unit: 2616

For: ERROR HANDLING IN A WIRELESS COMMUNICATIONS SYSTEM Examiner: Not Yet Assigned

INFORMATION DISCLOSURE STATEMENT (SUBMISSION AFTER FILING OF AN APPLICATION BUT BEFORE FINAL REJECTION OR NOTICE OF ALLOWANCE OR CONCURRENTLY WITH A RULE 1.114 RCE APPLICATION)

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

Sir:

Pursuant to 37 C.F.R. §§ 1.97 and 1.98, applicant(s) hereby submit(s) an Information Disclosure Statement for consideration by the Examiner.

I. LIST OF PATENTS, PUBLICATIONS OR OTHER INFORMATION

The patents, publications, or other information submitted for consideration by the Office are listed on the PTO-SB08(s), attached hereto.

II. COPIES

☒ a. Copies of cited U.S. patents and patent application publications are not included. Copies of foreign patent documents and non-patent literature are included.

☐ b. Some or all of the documents listed on the PTO-SB08 are not enclosed because they were cited in the International Search Report and copies should already be in the PTO file. If copies are needed, please contact the undersigned.

☐ c. REFERENCES PREVIOUSLY CITED OR SUBMITTED - Pursuant to 37 C.F.R. §1.98(d), consideration of information listed on the PTO-SB08 form(s) is requested since any patents, publications, or other information which are listed on the PTO-SB08 form(s) but for which copies are not enclosed herewith, were previously cited by or submitted to the PTO in one of the following applications which has been relied upon for an earlier filing date under 35 U.S.C. § 120:

U.S. Appl. No(s) and U.S. Filing Date

@@@ filed @@@

III. CONCISE EXPLANATION OF THE RELEVANCE

(check at least one box)

☒ a. DOCUMENTS IN THE ENGLISH LANGUAGE - The patents, publications, or other information listed on the attached PTO SB08 are in the English language and therefore, do not require a statement of relevancy.

☐ b. DOCUMENTS NOT IN THE ENGLISH LANGUAGE - A concise explanation of the relevance of all patents, publications, or other information listed that is not in the English language is as follows:

☐ c. ENGLISH LANGUAGE SEARCH REPORT - An English language version of the search report or action that indicates the degree of relevance found by the foreign office is attached, thereby satisfying the requirement for a concise explanation. See MPEP 609(III)(A)(3).

☐ d. OTHER - The following additional information is provided for the Examiner's consideration.

Petitioners' Exhibit 1007, p. 332
AT&T et al v. Innovative Sonic
IPR2024-01143

IV. FEES (check one box)

☐ a. This Information Disclosure Statement is being filed concurrently with the filing of a new patent application; therefore, no fee is required.

☐ b. This Information Disclosure Statement is being filed concurrent with the filing of a continuation-in-part, continuation, or divisional patent application; therefore, no fee is required.

☐ c. This Information Disclosure Statement is being filed within three months of the filing date of a national application (37 C.F.R. § 1.97(b)(1)). No fee or statement is required. *(This section is not to be used with RCE's.)*

☐ d. This Information Disclosure Statement is being filed within three months of the date of entry of the national stage as set forth in § 1.491 in an international application (37 C.F.R. § 1.97(b)(2)). No fee or statement is required.

☐ e. This Information Disclosure Statement is being filed concurrently with the filing of a Request for Continued Examination under § 1.114 (37 C.F.R. § 1.97(b)(4)). No fee or statement is required.

☒ f. This Information Disclosure Statement is being filed before the mailing date of a first Action on the merits (37 C.F.R. § 1.97(b)(3)). No fee or statement is required. In the event that a first Office Action on the merits has been issued, please consider this IDS under 37 C.F.R. § 1.97(c) and see the statement under 37 C.F.R. § 1.97(e) below, or, if no statement has been made, charge our deposit account for the fee as required by 37 C.F.R. § 1.17(p).

☐ g. This Information Disclosure Statement is being filed before the mailing date of a Final Office Action under 37 C.F.R. § 1.113 (See 37 C.F.R. § 1.97(c)(1)) or before the mailing date of a Notice of Allowance under 37 C.F.R. § 1.311 (See 37 C.F.R. § 1.97(c)(2)).

☐ No statement; therefore, a fee as required by 37 C.F.R. § 1.17(p) is attached.

or

Petitioners' Exhibit 1007, p. 333
AT&T et al v. Innovative Sonic
IPR2024-01143

☐ See the statement below. No fee is required.

V. STATEMENT UNDER 37 C.F.R. § 1.97(e)

(check only one box)

The undersigned hereby states that:

☐ **a. Each item of information contained in the IDS was first cited in any communication from a foreign Patent Office in a counterpart foreign application not more than 30 days prior to the filing of this IDS; or**

☐ b. Each item of information contained in the IDS was first cited in any communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS; or

☐ c. No item of information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of IDS was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of the IDS.

☐ d. Some of the items of information were cited in a communication from a foreign Patent Office. As to this information, the undersigned states that each item of information contained in the IDS was first cited in a communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS. As to the remaining information, the undersigned hereby states that no item of this remaining information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application and, to the best of my knowledge after making reasonable inquiry, was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this statement.

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AT&T et al v. Innovative Sonic
IPR2024-01143

Application No.: 11/278,546 Docket No.: 5413-0196PUS1

VI. PAYMENT OF FEES (check one box)

☐ The required fee is listed on the attached Fee Transmittal.

☒ No fee is required.

If the Examiner has any questions concerning this IDS, he/she is requested to contact the undersigned. If it is determined that this IDS has been filed under the wrong rule, the PTO is requested to consider this IDS under the proper rule and charge the appropriate fee to Deposit Account No. 02-2448.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to our Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under § 1.17; particularly, extension of time fees.

Dated: January 3, 2007

Respectfully submitted,

By _____
Joe McKinney Muncy
Registration No.: 32,334
BIRCH, STEWART, KOLASCH & BIRCH, LLP
8110 Gatehouse Road
Suite 100 East
P.O. Box 747
Falls Church, Virginia 22040-0747
(703) 205-8000
Attorney for Applicant

Attachment(s):

☒ PTO-SB08
☒ Documents (one)
☐ Foreign Search Report
☐ Fee
☐ Other:

KM/cb

Petitioners' Exhibit 1007, p. 335
AT&T et al v. Innovative Sonic
IPR2024-01143

PTO/SB/08A/B (09-06)
Approved for use through 03/31/2007. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet	1	of	1

Complete if Known	
Application Number	11/278,546-Conf. #6559
Filing Date	April 4, 2006
First Named Inventor	Sam Shiaw-Shiang JIANG
Art Unit	2616
Examiner Name	Not Yet Assigned
Attorney Docket Number	5413-0196PUS1

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
/M.B./		3GPP TS 25.322 V6.3.0 (2005-03), "Radio Link Control (RLC) Protocol Specification".	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1]Applicant's unique citation designation number (optional). [2]Applicant is to place a check mark here if English language Translation is attached.

January 3, 2007

Examiner Signature	/Marcos Batista/	Date Considered	01/16/2008

Birch, Stewart, Kolasch & Birch, LLP

Petitioners' Exhibit 1002, p. 336
AT&T et al v. Innovative Sonic
IPR2024-01143

EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L3	0	(455/115).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2008/01/17 15:22
L4	697	(455/115.1).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2008/01/17 15:23
L5	112	4 and protocol	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/17 15:24
L6	69	5 and error	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/17 15:24
L7	2584	(709/230).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2008/01/17 15:26
L8	1291	7 and error	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/17 15:26
L9	391	8 and report	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/17 15:26
L10	77	9 and sequence number	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/17 15:26
S1	1	11/278,546	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2007/12/27 10:15
S2	2	"6804804".pn.	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2007/12/27 11:19
S3	12	("4410989" | "5007055" | "5280488" | "5357525" | "5465261" | "5701316" | "5815516" | "6173333" | "6412092" | "6625241").PN. OR ("6804804").URPN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2007/12/27 11:22

S4	11	S3 and (SN or sequence)	US-PGPUB; USPAT; USOCR	ADJ	ON	2007/12/27 11:24
S5	6789	(detect$3 or find$3) near4 erro$6 with (SN or sequence)	US-PGPUB; USPAT; USOCR	ADJ	ON	2007/12/27 11:36
S6	244	(detect$3 or find$3) near4 erro$6 with (SN or sequence) with protocol	US-PGPUB; USPAT; USOCR	ADJ	ON	2007/12/27 11:36
S7	216	S6 and (@rlad<"20050404" or @ad<"20050404")	US-PGPUB; USPAT; USOCR	ADJ	ON	2007/12/27 11:38
S8	8	(detect$3 or find$3) near4 erro$6 with (SN or sequence) with protocol with reset	US-PGPUB; USPAT; USOCR	ADJ	ON	2007/12/27 11:38
S9	7	S8 and (@rlad<"20050404" or @ad<"20050404")	US-PGPUB; USPAT; USOCR	ADJ	ON	2007/12/27 11:38
S10	2182	(detect$3 or find$3) with protocol near5 erro$6	US-PGPUB; USPAT; USOCR	ADJ	ON	2007/12/27 11:42
S11	39	(detect$3 or find$3) with protocol near5 erro$6 with (SN or Sequence Number)	US-PGPUB; USPAT; USOCR	ADJ	ON	2007/12/27 11:43
S12	35	S11 and (@rlad<"20050404" or @ad<"20050404")	US-PGPUB; USPAT; USOCR	ADJ	ON	2007/12/27 11:43
S14	40	(detect$3 or find$3) with protocol near5 erro$6 with (SN or Sequence Number)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2007/12/27 13:32
S15	36	S14 and (@rlad<"20050404" or @ad<"20050404")	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2007/12/27 13:33
S16	1	11/278,546	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2007/12/27 13:59
S17	54203	"vt(s)"	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2007/12/27 14:38
S18	0	"vt(s) and vt(a)"	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2007/12/27 14:38

S19	207	"vt(s)" and pdu	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2007/12/27 14:39
S20	42	"vt(s)" and pdu same sn	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2007/12/27 14:39
S21	91	"vt(s)" and pdu same (sn or sequence number)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2007/12/27 14:39
S23	41	"vt(s)" and pdu same (sn or sequence number) same erro$6	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2007/12/27 14:40
S24	36	S23 and (@rlad<"20050404" or @ad<"20050404")	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2007/12/27 14:40
S25	41	"vt(s)" and pdu same (sn or sequence number) same erro$6	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/02 07:35
S26	36	S25 and (@rlad<"20050404" or @ad<"20050404")	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/02 07:35
S27	8	S26 and expect	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/02 07:35
S28	41	"vt(s)" and pdu same (sn or sequence number) same erro$6	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/02 11:49
S29	36	S28 and (@rlad<"20050404" or @ad<"20050404")	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/02 11:49
S30	1	("5959995").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2008/01/02 12:04

S31	1	("6141784").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2008/01/02 12:06
S32	161	protocol erro$5 detection	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/02 12:09
S33	8	protocol erro$5 detection with (SN or sequence number)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/02 12:10
S34	46	"vt(s)" and protocol error	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/02 13:20
S35	30	"vt(s)" and protocol error and range	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/02 13:25
S36	0	("vt(s)" and protocol error) same range	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/02 13:25
S37	10	(US-20040085932-$ or US-20060221853-$ or US-20040062222-$ or US-20060067238-$ or US-20050039101-$ or US-20040208160-$ or US-20040047331-$ or US-20030157927-$).did. or (US-6629147-$ or US-6483855-$).did.	US-PGPUB; USPAT	ADJ	ON	2008/01/02 14:20
S41	4	(US-20060067238-$ or US-20050039101-$ or US-20040047331-$ or US-20040208160-$).did.	US-PGPUB	ADJ	ON	2008/01/02 14:22
S44	3	(protocol erro$5 detection) and piggy	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/02 14:23
S45	7	S37 and report	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/02 14:25

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S46	4	"2003016698".pn.	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/15 16:31
S47	0	US2003016698	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/15 16:31
S48	75	"0016698"	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/15 16:32
S49	1	S48 AND PROTOCOL	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/15 16:33
S50	0	US200316698	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/15 16:34
S51	1	"200316698"	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/15 16:34
S52	1	"200316698".pn.	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/15 16:34
S53	2	"20030016698".pn.	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/15 16:39
S54	2	"6473399".pn.	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/15 17:24

S55	11	(US-20040085932-$ or US-20060221853-$ or US-20040062222-$ or US-20060067238-$ or US-20050039101-$ or US-20040208160-$ or US-20040047331-$ or US-20030157927-$ or US-20030016698-$).did. or (US-6629147-$ or US-6483855-$).did.	US-PGPUB; USPAT	ADJ	ON	2008/01/15 18:00
S56	11	(US-20040085932-$ or US-20060221853-$ or US-20040062222-$ or US-20060067238-$ or US-20050039101-$ or US-20040208160-$ or US-20040047331-$ or US-20030157927-$ or US-20030016698-$).did. or (US-6629147-$ or US-6483855-$).did.	US-PGPUB; USPAT	ADJ	ON	2008/01/15 18:00
S57	36011	mod	US-PGPUB; USPAT	ADJ	ON	2008/01/15 18:01
S58	2	S56 and mod	US-PGPUB; USPAT	ADJ	ON	2008/01/15 18:01
S59	461	("455"/$).ccls. and status report	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/16 13:15
S60	69	S59 and (SN or sequence number)	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/16 13:17
S61	57	S60 and (@rlad<"20050404" or @ad<"20050404")	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/16 13:19
S62	93	(("SAM SHIAW-SHIANG") near2 (JIANG)).INV.	US-PGPUB; USPAT	ADJ	ON	2008/01/16 14:20
S63	56	S62 and (@rlad<"20050404" or @ad<"20050404")	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/16 14:23
S64	867	("709"/$).ccls. and status report	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2008/01/16 14:39

Petitioners' Exhibit 1007, p. 342
AT&T et al v. Innovative Sonic
IPR2024-01143

1/17/2008 3:37:18 PM
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Petitioners' Exhibit 1007, p. 343
AT&T et al v. Innovative Sonic
IPR2024-01143



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North America
Intellectual Property Corporation

P.O. BOX 506, Merrifield, VA 22116, U.S.A.
Voice Mail: 302-729-1562
FAX: 806-498-6673
e-mail:winstonhsu@naipo.com
Customer No.: 27765

Art Unit: 2616

Tel: (571)-272-2600
Fax: (571)-273-8300

From : Winston Hsu, Registration No. 41,526

Serial No. : 11/278,546

Attorney Docket No.: ASTP0061USA

Subject: **Information Disclosure Statement (IDS)**

Total Pages :145pages (including cover page)

Winston Hsu Date: AUG 2 3 2006

ASTP0061USA0_D1_1

PAGE 1/145 * RCVD AT 8/23/2006 10:32:32 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-5/13 * DNIS:2738300 * CSID:17039974517 * DURATION (mm-ss):61-02

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PTO/SB/21 (07-06)

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TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Total Number of Pages in This Submission: 144

Application Number	11/278,546
Filing Date	04/04/2006
First Named Inventor	Sam Shiaw-Shiang Jiang
Art Unit	2616
Examiner Name	N/A
Attorney Docket Number	ASTP0061USA

ENCLOSURES (Check all that apply)

- [✓] Fee Transmittal Form
  - [ ] Fee Attached
- [ ] Amendment/Reply
  - [ ] After Final
  - [ ] Affidavits/declaration(s)
- [ ] Extension of Time Request
- [ ] Express Abandonment Request
- [✓] Information Disclosure Statement
- [ ] Certified Copy of Priority Document(s)
- [ ] Reply to Missing Parts/ Incomplete Application
  - [ ] Reply to Missing Parts under 37 CFR 1.52 or 1.53
- [ ] Drawing(s)
- [ ] Licensing-related Papers
- [ ] Petition
- [ ] Petition to Convert to a Provisional Application
- [ ] Power of Attorney, Revocation Change of Correspondence Address
- [ ] Terminal Disclaimer
- [ ] Request for Refund
- [ ] CD, Number of CD(s) _____
  - [ ] Landscape Table on CD
- [ ] After Allowance Communication to TC
- [ ] Appeal Communication to Board of Appeals and Interferences
- [ ] Appeal Communication to TC (Appeal Notice, Brief, Reply Brief)
- [ ] Proprietary Information
- [ ] Status Letter
- [ ] Other Enclosure(s) (please identify below):

Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	North America Intellectual Property Corporation		
Signature			
Printed name	Winston Hsu		
Date	AUG 23 2006	Reg No	41,526

CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria VA 22313-1450 on the date shown below:

Signature			
Typed or printed name	Jun Yu	Date	AUG 23 2006

This collection of information is required by 37 CFR 1.5. 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 2 hours 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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Effective on 12/08/2004.
Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818)

FEE TRANSMITTAL
For FY 2005

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT ($) 0.00

Complete if Known	
Application Number	11/278,546
Filing Date	04/04/2006
First Named Inventor	Sam Shiaw-Shiang Jiang
Examiner Name	2616
Art Unit	N/A
Attorney Docket No.	ASTP0061USA

METHOD OF PAYMENT (check all that apply)

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

☑ Deposit Account Deposit Account Number: 50-3105 Deposit Account Name: North America Intellectual Property Corporation

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

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

☑ Charge any additional fee(s) or underpayments of fee(s) under 37 CFR 1.16 and 1.17 ☑ Credit any overpayments

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

FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES

Application Type	FILING FEES Fee ($)	FILING FEES Small Entity Fee ($)	SEARCH FEES Fee ($)	SEARCH FEES Small Entity Fee ($)	EXAMINATION FEES Fee ($)	EXAMINATION FEES Small Entity Fee ($)	Fees Paid ($)
Utility	300	150	500	250	200	100	
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	
Provisional	200	100	0	0	0	0	

2. EXCESS CLAIM FEES

Fee Description	Fee ($)	Small Entity Fee ($)
Each claim over 20 (including Reissues)	50	25
Each independent claim over 3 (including Reissues)	200	100
Multiple dependent claims	360	180

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

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

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

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

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

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 $250 ($125 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).

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

4. OTHER FEE(S)

	Fees Paid ($)
Non-English Specification, $130 fee (no small entity discount)	
Other (e.g., late filing surcharge): submission of Information Disclosure Statement	0.00

SUBMITTED BY

Signature	[signature]	Registration No (Attorney/Agent) 41,526	Telephone 3027291562
Name (Print/Type)	Winston Hsu		Date AUG 23 2006

This collection of information is required by 37 CFR 1.136. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 2

Complete if Known	
Application Number	11/278,546
Filing Date	04/04/2006
First Named Inventor	Sam Shiaw-Shiang Jiang
Art Unit	2616
Examiner Name	N/A
Attorney Docket Number	ASTP0061USA

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
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FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3] Number[4] Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]
/M.B./	1	EP 1 465 369 A1	10-06-2004	Matsushita Electric Industrial Co., LTD		
/M.B./	2	EP 1 361 707 A2/A3	11-12-2003	ASUSTek Computer Inc		
/M.B./	3	EP 1 507 365 A2	02-16-2005	ASUSTek Computer Inc.		

Examiner Signature	/Marcos Batista/	Date Considered	01/16/2008

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant's unique citation designation number (optional). 2 See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. 3 Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). 4 For Japanese patent documents the indication of the year of the reign of the Emperor must precede the serial number of the patent document. 5 Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. 6 Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours 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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Substitute for form 1449B/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

	Complete if Known
Application Number	11/278,546
Filing Date	04/04/2006
First Named Inventor	Sam Shiaw-Shiang Jiang
Art Unit	2616
Examiner Name	N/A
Attorney Docket Number	ASTP0061USA

Sheet 2 of 2

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
/M.B./	4	"Universal Mobile Telecommunications System(UMTS);Radio Link Control (RLC) protocol specification ", ETSI TS 125 322 V4.10.0, Date 2003-09, Page14-16,42-44,54 , Sections 4.2.1.3 9.4 and 10.1, ETSI, FRANCE, XP014016803; ISSN 000-0001	

Examiner Signature	/Marcos Batista/	Date Considered	01/16/2008

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.
1 Applicant's unique citation designation number (optional). 2 Applicant is to place a check mark here if English language Translation is attached.
This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours 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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BIB DATA SHEET

CONFIRMATION NO. 6559

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
11/278,546	04/04/2006	370	4134	5413-0196PUS1

APPLICANTS
Sam Shiaw-Shiang Jiang, Taipei City, TAIWAN;

**** CONTINUING DATA ***************************
This appln claims benefit of 60/594,415 04/05/2005

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

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **** ** SMALL ENTITY **
05/23/2006

Foreign Priority claimed ☐ Yes ☑ No 35 USC 119(a-d) conditions met ☐ Yes ☐ No Verified and Acknowledged /MARCOS BATISTA/ Examiner's Signature	☐ Met after Allowance Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		TAIWAN	3	7	1

ADDRESS

BIRCH, STEWART, KOLASCH & BIRCH, LLP
8110 GATEHOUSE ROAD
SUITE 100 EAST
FALLS CHURCH, VA 22315
UNITED STATES

TITLE

Error Handling In A Wireless Communications System

FILING FEE RECEIVED		
1000	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

Petitioners' Exhibit 1007, p. 349
AT&T et al v. Innovative Sonic
IPR2024-01143

PLUS Search Results for S/N 11278546, Searched Tue Jan 08 12:06:20 EST 2008

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.

20060221853 99
6978413 72
20040148546 72
20030223385 66
20050036477 66
20060067238 66
20060245430 66
20020015385 61
6798842 60
20020142731 60
6717927 60
20030189909 60
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20040004954 46
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20060221965 46
20070047452 46
20070091810 46

IFW



Docket No.: 5413-0196PUS1
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Sam Shiaw-Shiang JIANG

Application No.: 11/278,546 — Confirmation No.: 6559

Filed: April 4, 2006 — Art Unit: 2616

For: ERROR HANDLING IN A WIRELESS COMMUNICATIONS SYSTEM — Examiner: Not Yet Assigned

ASSERTION OF SMALL ENTITY STATUS

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

Sir:

The above-identified application qualifies for small entity status. This written assertion of small entity status should satisfy the requirements of 37 C.F.R. § 1.27.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Dated:

Respectfully submitted,

By _____
Joe McKinney Muncy
Registration No.: 32,334 #43,368
BIRCH, STEWART, KOLASCH & BIRCH, LLP
8110 Gatehouse Road
Suite 100 East
P.O. Box 747
Falls Church, Virginia 22040-0747
(703) 205-8000
Attorney for Applicant

FOR

AS KM/tg

Petitioners' Exhibit 1007, p. 351
AT&T et al v. Innovative Sonic
IPR2024-01143

Docket No.: 5413-0196PUS1
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Sam Shiaw-Shiang JIANG

Application No.: 11/278,546 Confirmation No.: 6559

Filed: April 4, 2006 Art Unit: 2616

For: ERROR HANDLING IN A WIRELESS COMMUNICATIONS SYSTEM Examiner: Not Yet Assigned

INFORMATION DISCLOSURE STATEMENT (SUBMISSION AFTER FILING OF AN APPLICATION BUT BEFORE FINAL REJECTION OR NOTICE OF ALLOWANCE OR CONCURRENTLY WITH A RULE 1.114 RCE APPLICATION)

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

Sir:

Pursuant to 37 C.F.R. §§ 1.97 and 1.98, applicant(s) hereby submit(s) an Information Disclosure Statement for consideration by the Examiner.

I. LIST OF PATENTS, PUBLICATIONS OR OTHER INFORMATION

The patents, publications, or other information submitted for consideration by the Office are listed on the PTO-SB08(s), attached hereto.

II. COPIES

☒ a. Copies of cited U.S. patents and patent application publications are not included. Copies of foreign patent documents and non-patent literature are included.

☐ b. Some or all of the documents listed on the PTO-SB08 are not enclosed because they were cited in the International Search Report and copies should already be in the PTO file. If copies are needed, please contact the undersigned.

☐ c. REFERENCES PREVIOUSLY CITED OR SUBMITTED - Pursuant to 37 C.F.R. §1.98(d), consideration of information listed on the PTO-SB08 form(s) is requested since any patents, publications, or other information which are listed on the PTO-SB08 form(s) but for which copies are not enclosed herewith, were previously cited by or submitted to the PTO in one of the following applications which has been relied upon for an earlier filing date under 35 U.S.C. § 120:

U.S. Appl. No(s) and U.S. Filing Date

@@@ filed @@@

III. CONCISE EXPLANATION OF THE RELEVANCE

(check at least one box)

☒ a. DOCUMENTS IN THE ENGLISH LANGUAGE - The patents, publications, or other information listed on the attached PTO SB08 are in the English language and therefore, do not require a statement of relevancy.

☐ b. DOCUMENTS NOT IN THE ENGLISH LANGUAGE - A concise explanation of the relevance of all patents, publications, or other information listed that is not in the English language is as follows:

☐ c. ENGLISH LANGUAGE SEARCH REPORT - An English language version of the search report or action that indicates the degree of relevance found by the foreign office is attached, thereby satisfying the requirement for a concise explanation. See MPEP 609(III)(A)(3).

☐ d. OTHER - The following additional information is provided for the Examiner's consideration.

Petitioners' Exhibit 1007, p. 353
AT&T et al v. Innovative Sonic
IPR2024-01143

IV. FEES (check one box)

☐ a. This Information Disclosure Statement is being filed concurrently with the filing of a new patent application; therefore, no fee is required.

☐ b. This Information Disclosure Statement is being filed concurrent with the filing of a continuation-in-part, continuation, or divisional patent application; therefore, no fee is required.

☐ c. This Information Disclosure Statement is being filed within three months of the filing date of a national application (37 C.F.R. § 1.97(b)(1)). No fee or statement is required. *(This section is not to be used with RCE's.)*

☐ d. This Information Disclosure Statement is being filed within three months of the date of entry of the national stage as set forth in § 1.491 in an international application (37 C.F.R. § 1.97(b)(2)). No fee or statement is required.

☐ e. This Information Disclosure Statement is being filed concurrently with the filing of a Request for Continued Examination under § 1.114 (37 C.F.R. § 1.97(b)(4)). No fee or statement is required.

☒ f. This Information Disclosure Statement is being filed before the mailing date of a first Action on the merits (37 C.F.R. § 1.97(b)(3)). No fee or statement is required. In the event that a first Office Action on the merits has been issued, please consider this IDS under 37 C.F.R. § 1.97(c) and see the statement under 37 C.F.R. § 1.97(e) below, or, if no statement has been made, charge our deposit account for the fee as required by 37 C.F.R. § 1.17(p).

☐ g. This Information Disclosure Statement is being filed before the mailing date of a Final Office Action under 37 C.F.R. § 1.113 (See 37 C.F.R. § 1.97(c)(1)) or before the mailing date of a Notice of Allowance under 37 C.F.R. § 1.311 (See 37 C.F.R. § 1.97(c)(2)).

☐ No statement; therefore, a fee as required by 37 C.F.R. § 1.17(p) is attached.

or

Petitioners' Exhibit 1007, p. 354
AT&T et al v. Innovative Sonic
IPR2024-01143

☐ See the statement below. No fee is required.

V. STATEMENT UNDER 37 C.F.R. § 1.97(e)

(check only one box)

The undersigned hereby states that:

☐ **a. Each item of information contained in the IDS was first cited in any communication from a foreign Patent Office in a counterpart foreign application not more than 30 days prior to the filing of this IDS; or**

☐ b. Each item of information contained in the IDS was first cited in any communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS; or

☐ c. No item of information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of IDS was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of the IDS.

☐ d. Some of the items of information were cited in a communication from a foreign Patent Office. As to this information, the undersigned states that each item of information contained in the IDS was first cited in a communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS. As to the remaining information, the undersigned hereby states that no item of this remaining information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application and, to the best of my knowledge after making reasonable inquiry, was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this statement.

Petitioners' Exhibit 1007, p. 355
AT&T et al v. Innovative Sonic
IPR2024-01143

VI. PAYMENT OF FEES (check one box)

☐ The required fee is listed on the attached Fee Transmittal.

☒ No fee is required.

If the Examiner has any questions concerning this IDS, he/she is requested to contact the undersigned. If it is determined that this IDS has been filed under the wrong rule, the PTO is requested to consider this IDS under the proper rule and charge the appropriate fee to Deposit Account No. 02-2448.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to our Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under § 1.17; particularly, extension of time fees.

Dated: January 3, 2007

Respectfully submitted,

By _____
Joe McKinney Muncy
Registration No.: 32,334
BIRCH, STEWART, KOLASCH & BIRCH, LLP
8110 Gatehouse Road
Suite 100 East
P.O. Box 747
Falls Church, Virginia 22040-0747
(703) 205-8000
Attorney for Applicant

Attachment(s):

☒ PTO-SB08
☒ Documents (one)
☐ Foreign Search Report
☐ Fee
☐ Other:

KM/cb

Petitioners' Exhibit 1007, p. 356
AT&T et al v. Innovative Sonic
IPR2024-01143

PTO/SB/08A/B (09-06)
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Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet	1	of	1

Complete if Known	
Application Number	11/278,546-Conf. #6559
Filing Date	April 4, 2006
First Named Inventor	Sam Shiaw-Shiang JIANG
Art Unit	2616
Examiner Name	Not Yet Assigned
Attorney Docket Number	5413-0196PUS1

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number: Number-Kind Code[2] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document: Country Code[3]-Number[4]-Kind Code[5] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		3GPP TS 25.322 V6.3.0 (2005-03), "Radio Link Control (RLC) Protocol Specification".	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1]Applicant's unique citation designation number (optional). [2]Applicant is to place a check mark here if English language Translation is attached.

January 3, 2007

Examiner Signature		Date Considered	

Electronic Acknowledgement Receipt

EFS ID:	1414768
Application Number:	11278546
International Application Number:	
Confirmation Number:	6559
Title of Invention:	Error Handling In A Wireless Communications System
First Named Inventor/Applicant Name:	Sam Shiaw-Shiang Jiang
Customer Number:	64044
Filer:	Joe McKinney Muncy/Pamela Hughes
Filer Authorized By:	Joe McKinney Muncy
Attorney Docket Number:	5413-0196PUS1
Receipt Date:	03-JAN-2007
Filing Date:	04-APR-2006
Time Stamp:	19:39:12
Application Type:	Utility

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Filed	20070103IDS.pdf	165170	no	6
Warnings:					

Information:					
This is not an USPTO supplied IDS fillable form					
2	NPL Documents	Citation11.pdf	7742953	no	82
Warnings:					
Information:					
			Total Files Size (in bytes):	7908123	

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.

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
www.uspto.gov

APPLICATION NUMBER	FILING OR 371 (c) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/278,546	04/04/2006	Sam Shiaw-Shiang Jiang	5413-0196PUS1

CONFIRMATION NO. 6559

OC000000021734740

64044
BIRCH, STEWART, KOLASCH & BIRCH, LLP
8110 GATEHOUSE ROAD
SUITE 100 EAST
FALLS CHURCH, VA 22315

Date Mailed: 12/26/2006

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 12/14/2006.

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.

SYED AREEBUDDIN
PTOSS (703) 308-9150 EXT 148

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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
11/278,546	04/04/2006	Sam Shiaw-Shiang Jiang	ASTP0061USA

CONFIRMATION NO. 6559

OC000000021734700

27765
NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION
P.O. BOX 506
MERRIFIELD, VA 22116

Date Mailed: 12/26/2006

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 12/14/2006.

- 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).

SYED AREEBUDDIN
PTOSS (703) 308-9150 EXT 148

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OIPE IAP44
DEC 14 2006
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TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Total Number of Pages in This Submission	3

Application Number	11/278,546-Conf. #6559
Filing Date	April 4, 2006
First Named Inventor	Sam Shiaw-Shiang JIANG
Art Unit	2616
Examiner Name	Not Yet Assigned
Attorney Docket Number	5413-0196PUS1

ENCLOSURES (*Check all that apply*)

- [ ] Fee Transmittal Form
  - [ ] Fee Attached
- [ ] Amendment/Reply
  - [ ] After Final
  - [ ] Affidavits/declaration(s)
- [ ] Extension of Time Request
- [ ] Express Abandonment Request
- [ ] Information Disclosure Statement
- [ ] Certified Copy of Priority Document(s)
- [ ] Reply to Missing Parts/ Incomplete Application
  - [ ] Reply to Missing Parts under 37 CFR 1.52 or 1.53
- [ ] Drawing(s)
- [ ] Licensing-related Papers
- [ ] Petition
- [ ] Petition to Convert to a Provisional Application
- [x] Power of Attorney, Revocation Change of Correspondence Address
- [ ] Terminal Disclaimer
- [ ] Request for Refund
- [ ] CD, Number of CD(s) _____
  - [ ] Landscape Table on CD
- [ ] After Allowance Communication to TC
- [ ] Appeal Communication to Board of Appeals and Interferences
- [ ] Appeal Communication to TC **(Appeal Notice, Brief, Reply Brief)**
- [ ] Proprietary Information
- [ ] Status Letter
- [x] Other Enclosure(s) (please Identify below):

Return Receipt Postcard
Statement Under 37 CFR 3.73(b)

Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	BIRCH, STEWART, KOLASCH & BIRCH, LLP		
Signature			
Printed name	Joe McKinney Muncy		
Date	DEC 14 2006	Reg. No.	32,334

KM/hb

OIPE IAP44
DEC 14 2006
PATENT & TRADEMARK OFFICE

PTO/SB/80 (04-05)
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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: 64044

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: 64044

OR

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

Assignee Name and Address:

ASUSTeK COMPUTER INC.

4F, No.150, Li-Te Rd., Peitou, Taipei City, Taiwan, R.O.C.

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	Shih, Tsung-Tang	Date	OCT 16 2006
Name	Tsung-Tang Shih	Telephone	+886-2- 2894-3447
Title	President		

OIPE IAP44
DEC 14 2006
PATENT & TRADEMARK OFFICE

STATEMENT UNDER 37 CFR 3.73(b)

Applicant/Patent Owner: Sam Shiaw-Shiang Jiang

Application No./Patent No.: 11/278,546 Filed/Issue Date: 04/04/2006

Entitled: Error Handling In A Wireless Communications System

ASUSTeK COMPUTER INC. , a Corporation
(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that it is:

1. [V] the assignee of the entire right, title, and interest; or

2. [ ] an assignee of less than the entire right, title and interest.
The extent (by percentage) of its ownership interest is _____ %

in the patent application/patent identified above by virtue of either:

A. [V] 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 017433 , Frame 0257 , or for which a copy thereof is attached.

OR

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

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.

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.

[ ] Additional documents in the chain of title are listed on a supplemental sheet.

[ ] Copies of assignments or other documents in the chain of title are attached.
[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, if the assignment is to be recorded 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.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Signature — Date: OCT 16 2006

Tsung-Tang Shih — Printed or Typed Name

+886-2- 2894-3447 — Telephone Number

President — Title

AST P0061 US/A

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North America
Intellectual Property Corporation

P.O. BOX 506, Merrifield, VA 22116, U.S.A.
Voice Mail: 302-729-1562
FAX: 806-498-6673
e-mail:winstonhsu@naipo.com
Customer No.: 27765

Art Unit: 2616

Tel: (571)-272-2600
Fax: (571)-273-8300

From : Winston Hsu, Registration No. 41,526

Serial No. : 11/278,546

Attorney Docket No.: ASTP0061USA

Subject: **Information Disclosure Statement (IDS)**

Total Pages :145 pages (including cover page)

Winston Hsu Date: AUG 23 2006

ASTP0061USA0_D1_1

PAGE 1/145 * RCVD AT 8/23/2006 10:32:32 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-5/13 * DNIS:2738300 * CSID:17039974517 * DURATION (mm-ss):61-02

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TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Total Number of Pages in This Submission: 144

Application Number	11/278,546
Filing Date	04/04/2006
First Named Inventor	Sam Shiaw-Shiang Jiang
Art Unit	2616
Examiner Name	N/A
Attorney Docket Number	ASTP0061USA

ENCLOSURES (Check all that apply)

- [✓] Fee Transmittal Form
  - [ ] Fee Attached
- [ ] Amendment/Reply
  - [ ] After Final
  - [ ] Affidavits/declaration(s)
- [ ] Extension of Time Request
- [ ] Express Abandonment Request
- [✓] Information Disclosure Statement
- [ ] Certified Copy of Priority Document(s)
- [ ] Reply to Missing Parts/ Incomplete Application
  - [ ] Reply to Missing Parts under 37 CFR 1.52 or 1.53
- [ ] Drawing(s)
- [ ] Licensing-related Papers
- [ ] Petition
- [ ] Petition to Convert to a Provisional Application
- [ ] Power of Attorney, Revocation Change of Correspondence Address
- [ ] Terminal Disclaimer
- [ ] Request for Refund
- [ ] CD, Number of CD(s) _____
  - [ ] Landscape Table on CD
- [ ] After Allowance Communication to TC
- [ ] Appeal Communication to Board of Appeals and Interferences
- [ ] Appeal Communication to TC (Appeal Notice, Brief, Reply Brief)
- [ ] Proprietary Information
- [ ] Status Letter
- [ ] Other Enclosure(s) (please identify below):

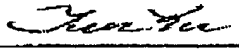
Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	North America Intellectual Property Corporation		
Signature			
Printed name	Winston Hsu		
Date	AUG 2 3 2006	Reg No	41,526

CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria VA 22313-1450 on the date shown below:

Signature			
Typed or printed name	Jun Yu	Date	AUG 2 3 2006

This collection of information is required by 37 CFR 1.5. 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 2 hours 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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Effective on 12/08/2004.
Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818)

FEE TRANSMITTAL
For FY 2005

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT ($) 0.00

Complete if Known	
Application Number	11/278,546
Filing Date	04/04/2006
First Named Inventor	Sam Shiaw-Shiang Jiang
Examiner Name	2616
Art Unit	N/A
Attorney Docket No.	ASTP0061USA

METHOD OF PAYMENT (check all that apply)

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

☑ Deposit Account Deposit Account Number: 50-3105 Deposit Account Name: North America Intellectual Property Corporation

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

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

☑ Charge any additional fee(s) or underpayments of fee(s) under 37 CFR 1.16 and 1.17 ☑ Credit any overpayments

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

FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES

Application Type	FILING FEES Fee ($)	FILING FEES Small Entity Fee ($)	SEARCH FEES Fee ($)	SEARCH FEES Small Entity Fee ($)	EXAMINATION FEES Fee ($)	EXAMINATION FEES Small Entity Fee ($)	Fees Paid ($)
Utility	300	150	500	250	200	100	
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	
Provisional	200	100	0	0	0	0	

2. EXCESS CLAIM FEES

Fee Description	Fee ($)	Small Entity Fee ($)
Each claim over 20 (including Reissues)	50	25
Each independent claim over 3 (including Reissues)	200	100
Multiple dependent claims	360	180

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

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

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

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

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

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 $250 ($125 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).

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

4. OTHER FEE(S)

	Fees Paid ($)
Non-English Specification, $130 fee (no small entity discount)	
Other (e.g., late filing surcharge): submission of Information Disclosure Statement	0.00

SUBMITTED BY

Signature	[signature]	Registration No (Attorney/Agent) 41,526	Telephone 3027291562
Name (Print/Type)	Winston Hsu		Date AUG 23 2006

This collection of information is required by 37 CFR 1.136. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 2

Complete if Known	
Application Number	11/278,546
Filing Date	04/04/2006
First Named Inventor	Sam Shiaw-Shiang Jiang
Art Unit	2616
Examiner Name	N/A
Attorney Docket Number	ASTP0061USA

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-			
		US-			
		US-			
		US-			
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FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3] Number[4] Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]
	1	EP 1 465 369 A1	10-06-2004	Matsushita Electric Industrial Co., LTD		
	2	EP 1 361 707 A2/A3	11-12-2003	ASUSTek Computer Inc		
	3	EP 1 507 365 A2	02-16-2005	ASUSTek Computer Inc.		

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant's unique citation designation number (optional). 2 See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. 3 Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). 4 For Japanese patent documents the indication of the year of the reign of the Emperor must precede the serial number of the patent document. 5 Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. 6 Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours 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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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

Sheet 2 of 2

Complete if Known	
Application Number	11/278,546
Filing Date	04/04/2006
First Named Inventor	Sam Shiaw-Shiang Jiang
Art Unit	2616
Examiner Name	N/A
Attorney Docket Number	ASTP0061USA

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
	4	"Universal Mobile Telecommunications System(UMTS);Radio Link Control (RLC) protocol specification . ETSI TS 125 322 V4.10.0. Date 2003-09, Page14-16,42-44,54 . Sections 4.2.1.3 9.4 and 10.1. ETSI, FRANCE XP014016803; ISSN 000-0001	

Examiner Signature		Date Considered	

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Cite No. 1.

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 465 369 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
06.10.2004 Bulletin 2004/41

(51) Int Cl 7: H04L 12/56

(21) Application number: 03007317.8

(22) Date of filing: 31.03.2003

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PT RO SE SI SK TR
Designated Extension States:
AL LT LV MK

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(54) Reset synchronisation method for a retransmission protocol

(57) A method of retransmission protocol reset synchronisation in a radio network of a communication system, said radio network including at least one radio network controller RNC for controlling a plurality of base stations in communication with mobile terminals, wherein the RNC communicates with a communication terminal using a radio link control RLC procedure and the plurality of base stations communicate with the mobile terminals using a medium access control MAC procedure, comprising the steps of initiating a RLC reset procedure upon occurrence of an unrecoverable protocol error and initiating a MAC reset procedure in response to a RLC reset procedure

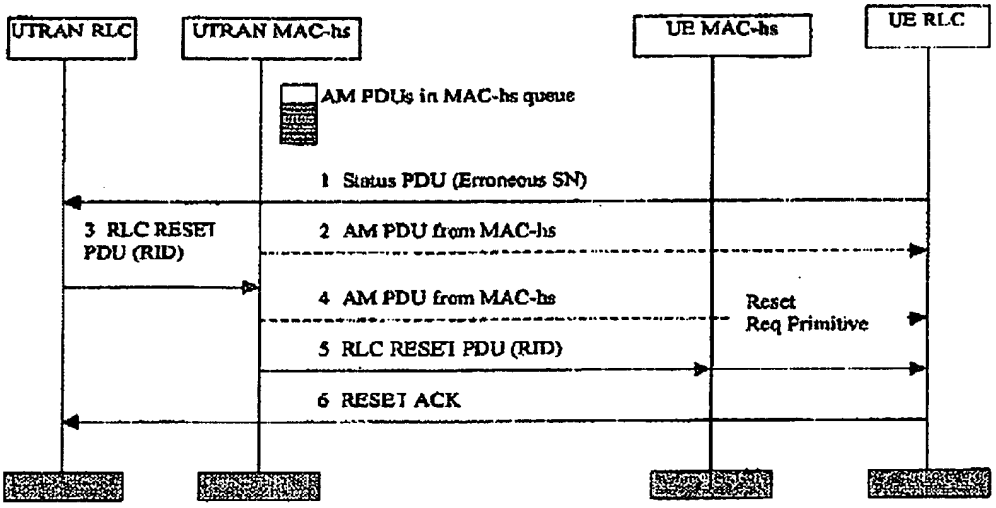


Fig. 17

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Description

[0001] This invention relates to reset procedures of retransmission protocols in radio network of a mobile communication system

[0002] The most common technique for error detection of non-real time services is based on Automatic Repeat reQuest (ARQ) schemes which is combined with Forward Error Correction (FEC), called hybrid ARQ. If an error is detected by Cyclic Redundancy Check (CRC), the receiver requests the transmitter to send additional bits. From different existing schemes the stop-and-wait (SAW) and selective-repeat (SR) continuous ARQ are most often used in mobile communication

[0003] A data unit will be encoded before transmission. Depending on the bits that are retransmitted three different types of ARQ are defined:

Type I: The erroneous Protocol Data Units (PDUs) are discarded and new copy of that PDU is retransmitted and decoded separately. There is no combining of earlier and later versions of that PDU.

Type II: The erroneous PDU that needs to be retransmitted is not discarded, but is combined with some incremental redundancy bits provided by the transmitter for subsequent decoding. Retransmitted PDU's sometimes have higher coding rates and are combined at the receiver with the stored values. That means that only little redundancy is added in each retransmission.

Type III: Is the same as Type II only that every retransmitted PDU is now self-decodable. This implies that the PDU is decodable without the combination with previous PDU's. This is useful if some PDU's are so heavily damaged that almost no information is reusable.

Type II and Type III schemes are more beneficial from the point of view of robustness against transmission failures as received (re)transmissions are combined. In a way it is a link adaptation technique, since the redundancy can be adapted according to the channel conditions.

[0004] Another technique that falls under this category of link adaptation is adaptive modulation and coding (AMC). The principle of AMC is to change the modulation and coding format in accordance with variations in the channel conditions, subject to system restrictions. The channel conditions can be estimated e.g. based on feedback from the receiver. In a system with AMC, users in favourable positions e.g. users close to the cell site are typically assigned higher order modulation with higher code rates (e.g. 64 QAM with R=3/4 Turbo Codes), while users in unfavourable positions e.g. users close to the cell boundary, are assigned lower order modulation with lower code rates (e.g. QPSK with R=1/2 Turbo Codes). In the following the different combinations of coding and modulation will be referred to as Modulation Coding Scheme (MCS) levels. A transmission will be split into Transmission Time Intervals (TTI), whereas the MCS level could change each TTI. TTI interval for HSDPA (High Speed Downlink Packet Access) is equal to 2 ms. The main benefits of AMC are, a) higher data rates are available for users in favourable positions which in turn increases the average throughput of the cell and b) reduced interference variation due to link adaptation based on variations in the modulation/coding scheme instead of variations in transmit power.

[0005] Transmission format of a packet has yet another configurable parameter. By increasing the number of orthogonal codes in one TTI, overall amount of information that can be transmitted is also increased. In the following text it will be referred to the number of orthogonal codes and MCS as Transmission Format Resource Combination (TFRC).

[0006] Packet scheduling is a resource management algorithm used for allocating transmission opportunities and transmission formats to the users admitted to a shared medium. Thus, it is used in packed based mobile radio networks in combination with adaptive modulation and coding to maximise throughput by e.g. allocating transmission opportunities to the users in favourable channel conditions. In further explanations, it will be assumed that the scheduler operates on TTI basis.

[0007] The high level architecture of Universal Mobile Telecommunication System (UMTS) is shown in the Figure 1. The network elements are functionally grouped into Core Network (CN), UMTS Terrestrial Radio Access Network (UTRAN) and User Equipment (UE). UTRAN is responsible for handling all radio-related functionality, while CN is responsible for routing calls and data connections to external networks. The interconnections of these network elements are defined by open interfaces as can be seen in the Figure. It should be noted that UMTS system is modular and it is therefore possible to have several network elements of the same type.

[0008] Figure 2 illustrates the current architecture of UTRAN. A number of Radio Network Controllers RNCs are connected to CN. Each RNC controls one or several base stations (Node Bs) which in turn communicate with the UEs. An RNC controlling several base stations is called Controlling RNC (C-RNC) for these base stations. A set of controlled base stations accompanied by their C-RNC is referred to as Radio Network Subsystem (RNS). For each connection

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between UE and the UTRAN one RNS is the Serving RNS (S-RNS) It maintains the Iu connection with the Core Network (CN) When required, Drift RNSs (D-RNS) support the Serving RNS by providing radio resources as shown in Figure 3 Respective RNCs are termed Serving RNC (S-RNC) and Drift RNC (D-RNC) In the following text it will be generally assumed that C-RNC and D-RNC are identical and in this case only abbreviations S-RNC or RNC will be used

[0009] High Speed Downlink Packet Access (HSDPA) is a new technique that is standardised in UMTS It shall provide higher data rates in the downlink by introducing enhancements at the Uu interface such as adaptive modulation and coding HSDPA relies on hybrid Automatic Repeat Request protocol (HARQ) Type II/III, rapid selection of users which are active on the shared channel and adaptation of transmission format parameters according to the time varying channel conditions

[0010] The User Plane Radio Interface Protocol Architecture of HSDPA is shown in Figure 4 and described in 3GPP TSG RAN TR 25 308: "High Speed Downlink Packet Access (HSDPA): Overall Description Stage 2 V5 2 0, in particular Sections 5 1 and 6 1 4 HARQ protocol and scheduling function belong to the Medium Access Control MAC-hs sublayer which is distributed across Node B and UE. It should be noted that an SR ARQ protocol based on sliding window mechanisms could be also established between RNC and UE on the level of RLC sublayer in acknowledged mode The service that is offered from RLC sublayer for point-to-point connection between CN and UE is referred to as Radio Access Bearer (RAB) Each RAB is subsequently mapped to a service offered from MAC layer This service is referred to as Logical Channel (LC)

[0011] HS-DSCH FP (High Speed Downlink Shared Channel Frame Protocol) is responsible for flow control between Node B and RNC. It determines the capacity that can be granted to RNC for transmitting packets across transport network based on requests obtained from RNC More specifically, the capacity is requested by CAPACITY REQUEST messages of HS-DSCH FP originating from S-RNC. The permission to transmit certain amount of data over certain period of time is granted by CAPACITY GRANT messages sent from Node B

[0012] Parameters of the protocols are configured by signalling in the Control Plane This signalling is governed by Radio Resource Control (RRC) protocol for the signalling between radio network (S-RNC and UE) and by application protocols, Node B Application Part (NBAP) on the Iub interface and RNSAP (Radio Network Subsystem Application Part) on the Iur interface.

[0013] The UE HSDPA Architecture is shown in Figure 6 It can be noted that each HARQ process is assigned a certain amount of soft buffer memory for combining the bits of the packets from outstanding retransmissions Once a packet is received successfully, it is forwarded to the reordering buffer providing the in-sequence delivery to RLC sublayer According to the current architecture, reordering queue is tied to a specific priority

[0014] It should be noted that the available soft buffer size depends on the UE radio access capability parameters Processing time of UE for certain MCS level and minimum inter-TTI interval (minimum time between two successive scheduling instants) can also be considered as capability parameter These are signalled from UE to the RNC by RRC protocol and further from RNC to the Node B

[0015] The architecture of a HSDPA Base Station is depicted in Figure 6. There are X different data flows (logical channels) with data packets to be transmitted from the Node B to the UE The set of HARQ transmitting and receiving entities, located in Node B and UE respectively, will be referred to as HARQ process The maximum number of HARQ processes per UE is usually predefined. These data flows can have different QoS (e g delay and error requirements) and may require different configuration of HARQ instances The scheduler will consider these parameters in allocating resources to different UEs. The scheduling function controls the allocation of shared channel (HS-DSCH: High Speed Downlink Shared Channel) to different users or to data flows of the same user, the current MCS level in one TTI and manages existing HARQ instances for each user. A data flow or even a particular packet of a data flow may have a different priority Therefore the data packets can be queued in different priority queues Different data flows with similar QoS requirements may also be multiplexed together (e g. data flow #3 and #4) Besides the HS-DSCH that carries the data packets there is control data which is mapped onto the High Speed Shared Control Channel (HS-SCCH) This channel could carry data such as the HARQ process ID, the modulation scheme, code allocation, transport format etc. that is needed by the receiver to correctly receive, demodulate, combine and decode the packets

[0016] It should be noted that there may be a number of packets waiting to be scheduled for the initial transmission to some of the available HARQ processes and also a number of packets pending for retransmissions Further, the state of HARQ processes is distinguished by whether they are available for accepting packets for initial transmission or they still retransmit the pending packets that are to be combined in UE In further explanations, it will be referred to this information as *HARQ context* or *MAC-hs protocol context of a UE*. In summary, HARQ context includes packets waiting for initial transmission, packets waiting for retransmission and the state of HARQ processes

[0017] HS-PDSCH is transmitted with Associated Dedicated Physical Channel (A-DPCH) (see 3GPP TSG RAN WG1#28 "Further simulation results on HS-SCCH power control and HSDPA system throughput performance") As a dedicated channel, A-DPCH is power controlled Power control commands referring to the A-DPCH obtained from the UE can be used as an index for estimating channel quality Another possibility to estimate the channel quality is by

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means of Channel Quality Indicator (CQI) obtained from uplink signalling

[0018] The relation between Relation Between Radio Bearers (RBs), Logical Channels (LCs) and Transport Channels (TrChs) will be explained with a reference to the Figure 7. It can be seen that MAC sublayer (see 3GPP TSG RAN TS 25.321: MAC Protocol Specification. V 5.3.0 section 4.2.4) consists of three entities: MAC-d (located in S-RNC), MAC-c/sh (located in D-RNC) and MAC-hs (located in Node B). It will be assumed that MAC-c/sh entity is bypassed without loosing generality of explanations. It should be noted that there exists a separate MAC-d entity for each user, while there can be more than one RLC entity per user. Each RLC RB is usually mapped to one DTCH (Dedicated Transport Channel). It may happen that RLC Control PDUs are mapped to a separate logical channel and that this channel is mapped to a DCH or HS-DSCH without multiplexing or multiplexed with logical channels of higher priority than that carrying RLC Data PDUs and subsequently mapped to HS-DSCH. It is noted that in both cases, RLC Control PDUs and RLC Data PDUs are mapped to different priority queues in the Node B. These DTCHs can be multiplexed in corresponding MAC-d entity as described below.

[0019] The general format of the MAC PDU is given in Figure 8. It can be seen that MAC PDU consists of an optional header and MAC Service Data Unit (SDU). The contents and size of the header depends on the type of logical channel the transport channel it is mapped to. The size of MAC SDU is equal to the size of RLC PDU since RLC is the only upper instance on which segmentation/concatenation is performed. TCTF (Target channel type field) provides identification of the logical channel class on Forward Access Channel (FACH) and Random Access Channel (RACH) transport channels. UE-Id type field ensures the correct interpretation of UE-Id field. UE-Id field provides an identification of an UE on common transport channels. C/T field provides an identification of logical channel instance when several logical channels are carried on a same transport channel. Therefore, if there is one-to-one correspondence between logical and transport channels the format is shown in Figure 9, case a). However, if several DTCHs are mapped onto one DCH, MAC PDU has the format as in Figure 9, case b). The size of the C/T field is limited to 4 bits and exact structure is given in Table 1.

Table 1:

Structure of C/T field	
C/T field	Designation
0000	Logical channel 1
0001	Logical channel 2
1110	Logical channel 15
1111	Reserved (PDUs with this coding will be discarded by this version of the protocol)

[0020] We refer to a set of MAC-d PDUs belonging to one DTCH (in case logical channel multiplexing is not used) or to a set of MAC-d PDUs belonging to several DTCHs (in case logical channel multiplexing is used) as MAC-d flow. This term corresponds to the term data flow used in the Figure 6 and in the explanations throughout the previous subsection. One MAC-d flow is mapped to one priority queue in the Node B. Hence, if logical channel multiplexing is used, the packets from more than one RLC transmitting entity can be mapped to the same priority queue.

[0021] As detailed further in the Figure 7, MAC-d flows (i.e. the packets from the priority queues) are mapped to HS-DSCH TrCh.

[0022] HSDPA uplink signalling is carried out by means of dedicated uplink feedback channel transmitted by UE. CQI transmitted on this channel contains TFRC. Primary benefit of requesting a TFRC compared to signalling the channel state is that it can deal with different UE implementation resulting in different performance for a certain transport format at a specific channel state. A low TFRC value corresponds to bad channel conditions (lower level modulation, low code rate) and a high TFRC value maximises throughput for good channel conditions. The Node B does not necessarily have to follow the request of the UE. A UE uses certain criteria to determine which transmission format it is able to receive in given channel conditions. All the coded bits will be mapped onto the HSDPA Uplink Dedicated Physical Control Channel (UL-DPCCH). In UMTS FDD (Frequency Division Duplex), the HS-DSCH related uplink signalling can use DPCCH+HS with a Spreading Factor=256 that is code multiplexed with the existing dedicated uplink physical channels.

[0023] The transmission cycle and timing for channel quality indicator is determined by UTRAN and signalled by the control plane. Measurement feedback cycle k has a possible value of [1, 5, 10, 20, 40, 80] TTI. The larger the value of k the smaller is the signalling overhead in the uplink at the expense of decreased scheduling performance in the downlink. The set of values for measurement feedback offset I has yet to be determined. An illustration of feedback

measurement transmission timing is given in Figure 10.

[0024] This section will first introduce a number of definitions (see also 3GPP TSG RAN WG2: "Radio Resource management Strategies" V 4 0 0, sections 5 1 1 to 5 1 4 3) Some procedures related to mobility management will be explained afterwards

[0025] *Radio link* is a logical association between single UE and a single UTRAN access point Its physical realisation comprises radio bearer transmissions

[0026] *Handover* is defined as transfer of UE connection from one radio bearer to another (hard handover) with a temporary break in connection or inclusion / exclusion of a radio bearer to/from UE connection so that UE is constantly connected to UTRAN (soft handover) Soft handover is specific for networks employing Code Division Multiple Access (CDMA) technology Handover execution is controlled by S-RNC in mobile radio network

[0027] *Active Set comprises* a set of radio links simultaneously involved in a specific communication service between UE and radio network

[0028] *Active set update procedure* modifies the active set of the communication between UE and UTRAN The procedure comprises three functions: radio link addition, radio link removal and combined radio link addition and removal. The maximum number of simultaneous radio links is set to eight New radio links are added to the active set once the pilot signal strengths of respective base stations exceed certain threshold relative to the pilot signal of the strongest member within active set A radio link is removed from the active set once the pilot signal strength of the respective base station exceeds certain threshold relative to the strongest member of the active set Threshold for radio link addition is typically chosen to be higher than that for the radio link deletion Hence, addition and removal events form a hysteresis with respect to pilot signal strengths Pilot signal measurements are reported to the network (S-RNC) from UE by means of RRC signalling Before sending measurement results, some filtering is usually performed to average out the fast fading Typical filtering duration is about 200 ms and it contributes to handover delay Based on measurement results, S-RNC may decide to trigger the execution of one of the functions of active set update procedure

[0029] It is noted that HSDPA architecture is distributed in two different aspects: (1) downlink transmitting entities of ARQ protocols, RLC and MAC-hs, are located in S-RNC and Node B respectively and (2) radio resource management algorithms, handover control and packet scheduling are based on two independent measurements obtained from UE and are located in S-RNC and Node B respectively

[0030] HS-PDSCH (High Speed Physical Downlink Shared channel) is a physical channel associated to HS-DSCH The frame of HS-PDSCH (TTI of 2 ms) was chosen to be very short compared to that of dedicated channels (10 ms) to allow fast scheduling and link adaptation Applying soft handover would cause problem in distributing scheduling responsibilities across all Node Bs of the active set and would require extremely tight timing to provide the scheduling decision to all members of the active set even if distribution of scheduling function were resolved Therefore, soft handover is not supported for HS-PDSCH Soft handover for A-DPCH is allowed which means it can be transmitted from more than one base station to a UE which combines obtained signals. Handover procedure related to HSDPA radio link is called *serving HS-DSCH cell change* (see 3GPP TSG RAN TR 25.308: "High Speed Downlink Packet Access (HSDPA): Overall Description Stage 2 V5 2 0, section 9)

[0031] During serving HS-DSCH cell change procedure, the role of serving HS-DSCH link is transferred from one radio link to another The two cells involved in the procedure are denoted source HS-DSCH cell and target HS-DSCH cell (Figure 11) The *network-controlled serving HS-DSCH cell change* is characterised in that the network makes the decision of the target cell In UMTS, this decision process is currently carried out in S-RNC Cell change procedure can be initiated by UE and it is then referred to as *UE-controlled serving HS-DSCH change procedure*. Further exposition will be limited to network-controlled procedure Another criterion for categorising cell change procedure is the one with respect to the serving HS-DSCH Node B

[0032] The Node B controlling the serving HS-DSCH cell for a specific UE is defined as the *serving HS-DSCH Node B. Intra- Node B serving HS-DSCH cell change procedure* is the cell change procedure with source and target HS-DSCH cells being controlled by the same Node B In *inter-Node B serving HS-DSCH cell change procedure*, source and target HS-DSCH cells are controlled by different Node Bs

[0033] Finally, it is noted that the present exposition will be limited to *synchronised serving cell change procedures* in which Node B and UE can simultaneously start transmitting/receiving signals after handover completion. Synchronisation between the UE and the network is maintained with activation timers which are set by RRC entity in S-RNC. Due to unknown delays over Iub/Iur interfaces, processing and protocol delays, a suitable margin is assumed when determining activation timer setting The margin also contributes to handover delay

[0034] It should be noted that executing an inter-Node B serving HS-DSCH cell change procedure also implies executing *serving HS-DSCH Node B relocation procedure* and this is where the problem of HARQ context relocation arises

[0035] A simplified example according to current standard of synchronised inter-Node B serving HS-DSCH cell change procedure is shown in Figure 12 It is assumed that the decision on triggering active set update and cell change

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procedures is made in the S-RNC simultaneously

[0036] It is assumed that the UE transmits a MEASUREMENT REPORT message to the S-RNC via RRC signalling The S-RNC determines the need for the combined radio link addition and serving HS-DSCH cell change based on received measurement reports As the first step, the SRNC initiates establishment of a new radio link for the dedicated channels to the target Node B by transmitting RADIO LINK SETUP REQUEST message via RNSAP / NBAP protocol Target Node B confirms the establishment of a radio link by transmitting RADIO LINK SETUP RESPONSE message via RNSAP/NBAP protocol RRC further transmits an ACTIVE SET UPDATE message to the UE via RRC protocol The ACTIVE SET UPDATE message includes the necessary information for establishment of the dedicated physical channels in the added radio link (but not the HS-PDSCH) When the UE has added the new radio link it returns an ACTIVE SET UPDATE COMPLETE message via RRC protocol This completes the addition of the new radio link for dedicated channels

[0037] The S-RNC will now carry on with the next step of the procedure, which is the serving HS-DSCH cell change For the synchronised serving HS-DSCH cell change, both the source and target Node Bs are first prepared for execution of the handover and the cell change at the activation time

[0038] The S-RNC first exchanges signalling messages with source Node B (RADIO LINK RECONFIGURATION PREPARE, RADIO LINK RECONFIGURATION READY and RADIO LINK RECONFIGURATION COMIT via NBAP / RNSAP protocols) It should be noted that RADIO LINK RECONFIGURATION COMMIT message contains activation time information for source Node B The same set of messages are subsequently exchanged with target Node B. The only difference in signalling intended for source and target Node B is that S-RNC informs source Node B to carry out the reset of MAC-hs entity by MAC-hs RELEASE REQUEST message of the NBAP / RNSAP protocol.

[0039] Finally, a PHYSICAL CHANNEL RECONFIGURATION is sent to the UE via RRC signalling. It contains activation time information and request for MAC-hs reset to the UE. When the communication is established, the UE responds with PHYSICAL CHANNEL RECONFIGURATION COMPLETE message

[0040] The following summarises the operation of RLC protocol in the acknowledged mode (AM) RLC AM protocol (see 3GPP TSG RAN TS 25.322: RLC Protocol Specification, V 5.3.0) basically operates as a selective repeat sliding window ARQ protocol. It should be noted that the level of details in this and all paragraphs referring to RLC protocol is kept only to an extent sufficient to provide an understanding of the follow up explanations meaning that the descriptions of some state variables timers and parameters may be shortened or even omitted

RLC Protocol Data Units (PDUs)

[0041] RLC PDUs for RLC configured in acknowledged mode are divided into RLC acknowledged mode data PDUs (RLC AM PDUs) and RLC acknowledged mode control PDUs The former are used for transferring the packets from higher layers, while the latter are used for providing the feedback necessary for protocol operation Control PDUs may consists of several super fields (SUFIs) essentially representing the concatenation of control packets with different information

[0042] RLC AM transmitting entity encompasses segmentation function. Segmentation is carried out so that payload size is always equal to a number of octets

RLC State Variables

[0043] The RLC maintains the following state variables at the transmitter The values of these variables are dynamically updated during the operation

a) VT(S) - Send state variable
The sequence number of the next PDU to be transmitted for the first time (i.e excluding retransmission)

b) VT(A) - Acknowledge state variable
The sequence number of the next in-sequence PDU expected to be acknowledged, which forms the lower edge of the window of acceptable acknowledgements

c) VT(DAT)
This state variable counts the number of times a PDU has been transmitted There is one VT(DAT) for each PDU and it is incremented each time the PDU is transmitted

d) VT(MS) - Maximum Send state variable
The sequence number of the first PDU not allowed by the peer receiver (i.e the receiver will allow up to VT (MS) - 1], VT(MS) = VT(A) + VT(WS) This value represents the upper edge of the transmit window.

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e) VT(RST) - Reset state variable
It is used to count the number of times a RESET PDU is transmitted VT(RST) is incremented with 1 each time a RESET PDU is transmitted VT(RST) is reset only upon the reception of a RESET ACK PDU, i e VT(RST) is not reset when an RLC reset occurs which was initiated from the peer RLC entity

f) VT(MRW) - MRW command send state variable
It is used to count the number of times a MRW command is transmitted VT(MRW) is incremented with 1 each time an MRW command is transmitted

g) VT(WS) - Transmitter window size state variable

[0044] The RLC maintains the following state variables at the receiver:

a) VR(R) - Receive state variable
The sequence number of the next in-sequence PDU expected to be received

b) VR(H) - Highest expected state variable
The sequence number of the highest expected PDU This state variable is set equal to SN+1 only when a new PDU is received with VR(MR)>SN≥VR(H) The initial value of this variable is 0

c) VR(MR) - Maximum acceptable Receive state variable
The sequence number of the first PDU not allowed by the receiver [i e the receiver will allow up to VR(MR) - 1], VR(MR) = VR(R) + Configured_Rx_Window_Size The receiver shall discard PDUs with SN≥VR(MR)

d) VR(US) - Receiver Send Sequence state variable
The sequence number of the next PDU to be received It shall set equal to SN + 1 upon reception of a PDU. The initial value of this variable is 0

RLC Timers

[0045] The values of timers are set by Control Plane (RRC)

a) Timer_Discard
This timer is used for the SDU discard function. In the transmitter, the timer is activated upon reception of an SDU from upper layer One timer is used for each SDU that is received from upper layer For UM/Tr, if the timer expires before the SDU is submitted to a lower layer, "SDU discard without explicit signalling" shall be started For AM, if the timer expires before the SDU is acknowledged, "SDU discard with explicit signalling" shall be started

b) Timer_Status_Prohibit
This timer is only used when the STATUS prohibit function is used It prohibits the receiving side from sending status reports containing any of the status reprts The timer is started when the successful or unsuccessful transmission of the last STATUS PDU in a status report is indicated by lower layer (in UE) or the last STATUS PDU in a status report is submitted to lower layer (in UTRAN).

c) Timer_Status_Periodic
This timer is only used when timer based status report sending is used The timer is started when the RLC entity is created Each time the timer expires the transmission of a status report is triggered and the timer is re-started The value of the timer is signalled by upper layers This timer can be blocked by upper layers In this case, the timer shall not be active The timer shall be reset and restarted when it is unblocked by upper layers

c) Timer_Poll
This timer is only used when the poll timer trigger is used It is started when the successful or unsuccessful transmission of a PDU containing a poll is indicated by lower layer (in UE) or a PDU containing a poll is submitted to lower layer (in UTRAN) The timer is stopped when receiving a STATUS PDU that contains an acknowledgement of all AMD PDUs with SN up to and including VT(S)-1 at the time the poll was submitted to lower layor, or when a negative acknowledgement of the same PDU is received

d) Timer_Poll_Periodic

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This timer is only used when the timer based polling is used. The timer is started when the RLC entity is created. Each time the timer expires, the timer is restarted and a poll is triggered (either by the transmission of a PDU which was not yet sent, or by a retransmission) If there is no PDU to be transmitted and all PDUs have already been acknowledged a poll shall not be triggered and the timer shall only be restarted

e) Timer_RST

This timer is used to detect the loss of RESET ACK PDU from the peer RLC entity This timer is started when the successful or unsuccessful transmission of a RESET PDU is indicated by lower layer (in UE) or a RESET PDU is submitted to lower layer (in UTRAN) It will only be stopped upon reception of RESET ACK PDU, i e this timer is not stopped when an RLC reset occurs which was initiated from the peer RLC entity If it expires, RESET PDU will be retransmitted

f) Timer_MRW

This timer is used as part of the Move Receiving Window protocol It is used to trigger the retransmission of a status report containing an MRW SUFI field The timer is started when the successful or unsuccessful transmission of a STATUS PDU containing the MRW SUFI is indicated by lower layer (in UE) or a STATUS PDU containing the MRW SUFI is submitted to lower layer (in UTRAN) Each time the timer expires the MRW SUFI is retransmitted and the timer is restarted (at the time specified above) It shall be stopped when one of the termination criteria for the SDU discard is fulfilled

RLC Parameters

[0046] The values of parameters are set by Control Plane (RRC)

a) MaxDAT

It is the maximum value for the number of retransmissions of a PDU This parameter is an upper limit of counter VT(DAT). When the value of VT(DAT) comes to MaxDAT, either RLC RESET procedure or SDU discard procedure shall be initiated according to configuration by upper layer

b) MaxMRW

It is the maximum value for the number of retransmissions of a MRW command This parameter is an upper limit of counter VT(MRW) When the value of VT(MRW) comes to MaxMRW, RLC RESET procedure shall be initiated.

c) Configured_Tx_Window_Size

The maximum allowed transmitter window size.

d) Configured_Rx_Window_Size.

The allowed receiver window size

[0047] An SDU can be discarded with explicit signalling when MaxDAT number of retransmissions is reached (Figure 13) or the transmission time exceeds a predefined value (Timer_Discard) for an SDU in acknowledged mode RLC Move Receiving Window (MRW) command is sent to the receiver so that AMD PDUs carrying discarded SDU are discarded in the receiver and the receiver window is updated accordingly If Send MRW is not configured and no segments of an SDU were submitted to a lower layer, the SDU is simply discarded in the transmitter without notification to the receiver If Send MRW is configured, a Move Receiving Window request shall be sent to the receiver even if no segments of the SDU were submitted to a lower layer The MRW command is defined as a super-field in the RLC STATUS PDU, and can be piggybacked to status information of transmissions in the opposite direction

[0048] The RLC transmitting entity initiates this procedure when any of the following conditions are fulfilled:

1) Timer based SDU discard with explicit signalling is used, Timer_Discard expires for an SDU, and one or more segments of the SDU have been submitted to a lower layer.
2) SDU discard after MaxDAT number of retransmissions is used, and MaxDAT number of retransmissions is reached for an SDU

[0049] The sender shall discard all PDUs that contain segments of the associated SDUs If the concatenation function is active, PDUs carrying segments of other SDUs that have not timed out shall not be discarded VT(A) and VT(S) state variables are updated accordingly

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[0050] The RLC transmitting entity shall start timer Timer_MRW Upon expiry of this timer and without receiving MRW_ACK super field, RLC transmitting entity shall retransmit MRW super field up to MaxMRW times VT(MRW) state variable is updated accordingly

[0051] If a new SDU discard procedure is triggered when Timer MRW is running, no new MRW SUFIs shall be sent before the current SDU discard procedure is terminated by one of the termination criteria (reception of MRW ACK super field or reaching MaxMRW number of retransmissions of MRW super field)

[0052] A RLC Reset Procedure (see for details, e g 3GPP TSG RAN TS 25 322: RLC Protocol Specification, V 5 3.0, section 11.4, JP 200202714; WO 02063913) is initiated when the protocol error occurs It is used to reset peer RLC entities when operating in the acknowledged mode (AM) RLC reset procedure is carried out by exchanging RLC RESET and RLC RESET ACK control PDUs between transmitting and receiving RLC entities as detailed in the Figure 14. Together with the reset procedure, RLC entities shall discard invalid PDUs and RLC entity initiating reset procedure shall notify upper layer on unrecoverable error occurrence Following events are considered as unrecoverable protocol errors

a) If the RLC entity receives a PDU including "erroneous Sequence Number", state variables between peer entities may be inconsistent Following shows "erroneous Sequence Number" examples:

- Each Sequence Number of missing Protocol Data Unit (PDU) informed by receiver feedback is not within the interval between "Acknowledge state variable(VT(A))" and "Send state variable(VT(S)) - 1"
- The sequence number of last acknowledged PDU is not within the interval between "Acknowledge state variable(VT(A))" and "Send state variable(VT(S))-1"

b) Inconsistent status indication of a PDU: If a received STATUS PDU indicates different status for the same PDU, then the transmitter shall discard the STATUS PDU and initiate RESET procedure

c) Invalid PDU format :If the RLC PDU format contains reserved or invalid values, the RLC PDU shall be discarded and RESET procedure should be initiated.

d) When discarding an RLC SDU and if the number of retransmissions of an MRW command (i e VT(MRW)) reaches MaxMRW, an error indication shall be passed to upper layers and RESET procedure shall be performed.

e) Reset procedure shall be initiated after MaxDAT number of retransmissions of an AMD PDU if no_discard after MaxDAT retransmissions is used

[0053] It may be noted that the last case is rare since HARQ retransmission protocol implemented in MAC-hs is quite effective and MaxDAT can be set equal to arbitrarily high constant. The probability of this case is somewhat higher only after executing inter Node B serving cell change procedure Other cases, however, may occur relatively more frequently

[0054] An RLC entity receiving a RESET PDU, has to (among other things)

- reset the transmission window [VT(A), VT(MS)], and the receiving window [VR(R), VR(MR)] to the initial values, i e after RESET, VT(A)=0, VT(MS)= Configured_Tx_Window_size, VR(R)= 0, VR(MR)= Configured_Rx_Window_Size, and reset other state variables (except for VT(RST))
- stop all the timers except Timer_RST, Timer_Discard, Timer_Poll_Periodic and Timer_Status_Periodic;
- discard all RLC PDUs in the receiving side of the AM RLC entity;
- discard all RLC SDUs that were transmitted before the reset in the transmitting side of - the AM RLC entity

[0055] An RLC entity sending an RLC RESET PDU upon receiving RLC RESET ACK PDU has to:

- reset the transmission window [VT(A), VT(MS)], and the receiving window [VR(R), VR(MR)] to the initial values, i e. after RESET, VT(A)=0, VT(MS)= Configured_Tx_Window_size, VR(R)= 0, VR(MR)= Configured_Rx_Window_Size, and reset other state variables.
- stop all the timers except Timer_Discard Timer_Poll_Periodic and Timer_Status_Periodic;
- discard all RLC PDUs in the receiving side of the AM RLC entity;

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- discard all RLC SDUs that were transmitted before the reset in the transmitting side of the AM RLC entity

[0056] Timer_Status_Prohibit shall only be used when so configured by upper layers It is meant to prohibit the receiver from sending consecutive acknowledgement status reports except for the generation of a status report triggered by MAC-hs reset.

[0057] From the time an acknowledgement status report is triggered until the Timer_Status_Prohibit timer expires, acknowledgement is prohibited If another such status report is triggered by others than an indication from lower layers following a MAC-hs reset while acknowledgement is prohibited, its transmission shall be delayed until the timer expires The status report may be updated during this time If a status report is triggered by an indication from lower layers following a MAC-hs reset, a status report shall be transmitted immediately and the timer shall be restarted.

[0058] This procedure is particularly useful during inter Node B serving cell change provided that RLC sublayer is configured in the acknowledged mode (AM) As detailed in the section on the synchronised inter Node B serving cell change procedure, MAC-hs entities in both source Node B and UE are reset thus leading to the lose of HARQ protocol context The packets lost during MAC-hs reset from the Node B buffer have to be retransmitted by RLC as soon as possible Hence, status report is unconditionally triggered following MAC-hs reset thus requesting RLC retransmissions

[0059] We conclude that there exists a mechanism for synchronising MAC-hs reset procedure to RLC operation However, as detailed in the previous subsection, RLC reset procedure may also occur completely independently of MAC-hs operation

[0060] It was described above there is a connection between MAC-hs reset and Timer_Status_prohibit handling of RLC However, there is a coordination missing in another case: RLC protocol has been reset and MAC-hs continues normal operation Given this assumption, the following scenario is possible (Figure 15)

1 A STATUS PDU is received in the UTRAN RLC This STATUS PDU contains an erroneous SN as specified in the subsection on RLC reset procedure This assumption for the cause of reset does not decrease the generality of exposition RLC AM reset procedure can be invoked by any other reason Thus the UTRAN RLC generates a RESET PDU to be transmitted to its peer on the UE side. At this point in time no AM PDUs should be transmitted because an inconsistency between the peer RLCs is expected

2 The potential inconsistency between the RLC entities is unknown in MAC-hs Therefore the scheduler may still decide to transmit data to the UE These data are likely to be discarded in the UE

3 The UTRAN RLC sends a RESET PDU to MAC-hs.

4 The MAC-hs does not know that the received PDU is a RESET PDU Therefore, MAC-hs continues transmitting MAC-hs PDUs

5 The RESET is received on the UE side

6 The RESET ACK is sent to UTRAN thus completing the RESET procedure

[0061] This example shows that in the event of an RLC reset a number of MAC-hs PDUs may be transmitted over the air interface that cannot be utilised by the UE. Hence, radio resources are not exploited efficiently As noted in the subsection explaining the relation between Radio Bearers (RBs), Logical Channels (LCs) and Transport Channels (TrChs), MAC-d flows corresponding to RLC control and data PDUs are mapped to different priority queues. Therefore, the total amount of MAC-hs PDUs that are transmitted in vain depends essentially on the scheduling algorithm and priorities assigned to the respective queues In the following the influence of erroneously delivered RLC PDUs on RLC AM operation at UE side is examined

[0062] After the RESET PDU has been received by RLC entity in the UE, two cases can be distinguished with respect to the sequence numbers of "old PDUs" that remained in the Node B Priority Queue after initiating the reset procedure

a) All old PDUs have sequence numbers which are not within initialised reception window at the UE ([0, Configured_Rx_Window_Size])

b) Some or all of old PDUs have sequence numbers which are inside initialised reception window at the UE ([0, Configured_Rx_Window_Size])

[0063] In the first case, no malfunctions will ensue, because all old PDUs received after initiation of RLC reset pro-

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cedure will be discarded

[0064] In the second case, old PDUs will be treated as having been sent from the peer RLC entity on the network side Consequently, all "real" RLC PDUs sent after reset procedure will be discarded as duplicate PDUs Moreover, after concatenation old PDUs will be delivered to higher layer causing possibly further malfunction Finally, receiving RLC entity will send a control PDU to the network containing feedback reporting for received old PDUs, while new PDUs with corresponding sequence numbers have not yet been sent This will in turn trigger a new RLC reset procedure due to "erroneous sequence numbers" of control PDUs as explained in the subsection RLC Reset Procedure It is noted that the probability of old PDUs having sequence numbers inside initialised reception window increases with increasing Configured_Rx_Window_Size parameter

[0065] A special case for b) is when one of old PDUs is a control PDU with MRW SUFI In this case even an additional lose of packets in receiving RLC entity may ensue It should also be noted that certain inefficiencies are caused in the operation of MAC-hs at the UE side when delivering MAC-hs packets with old RLC PDUs

[0066] As a result, firstly, soft buffer and available HARQ processes are not utilised efficiently These resources could have been used for receiving the packets from MAC-d flows that are not connected to reset RLC AM entities Secondly, old packets consume unnecessarily some space in the reordering buffer at the receiver

[0067] To conclude, RLC AM reset, when not synchronised to MAC-he operation, may cause following undesirable consequences, such as inefficient utilisation of radio resources, malfunctions in operation of RLC sublayer, malfunctions in operation of higher layer, loss of RLC AM PDUs and inefficient utilisation of HARQ hardware on UE side

[0068] The object of the present invention is to provide a method to overcome the above-mentioned deficiencies, in particular, to provide an effective utilization of the radio resources and avoid malfunctions in the operation of the retransmission protocol and losses of data

[0069] This object is solved by a method defined in claim 1 Preferred embodiments of the method are subject to various dependent claims

[0070] Reset of Radio Link Control protocol (RLC) is typically initiated when some irregular conditions are identified The invention is based on the consideration that this operation is not synchronised to the operation of another retransmission protocol that may exist closer to air interface to eliminate unnecessary delay. Continuation of operation after resetting only RLC may cause irregular conditions again and repetitive resets of RLC The present invention provides a method aiming at coordinating reset procedures and operation of retransmission protocols in order to achieve a synchronisation of the RLC reset procedure and MAC-hs operation to avoid the adverse implications mentioned above According to a preferred embodiment, this synchronisation should be carried out in Node B and UE separately

[0071] According to an advantageous embodiment, synchronising means that old RLC PDUs remaining in a priority queue should not be transmitted from Node B once RLC AM reset procedure has been invoked Furthermore, it is preferred that all MAC-hs PDUs containing old RLC PDUs and remaining in UE reordering buffer and soft buffer are flushed (related HARQ processes should be reset) once RLC AM reset procedure has been invoked

[0072] The invention is particularly applicable to HSDPA Although most of the presented embodiments refer to HSDPA, the invention is not restricted to this system. Therefore the data transmission does not necessarily depend on a particular radio access scheme. The present invention will be explained in the following in further detail with reference to the accompanying drawings, which the figures illustrate the following:

Figure 1: High Level UMTS Architecture
Figure 2: Current Architecture of UTRAN
Figure 3: Drift and Serving Radio Network Subsystem
Figure 4: User Plane Radio Interface Architecture of HSDPA
Figure 5: UE HSDPA Architecture
Figure 6: Node B HSDPA Architecture
Figure 7: UTRAN Side MAC Architecture
Figure 8: Format of MAC PDU
Figure 9: Format of MAC PDU depending on logical channel multiplexing
Figure 10: Feedback measurement transmission timing
Figure 11: Source and target HS-DSCH cell
Figure 12: Inter Node B serving HS-DSCH cell change signalling
Figure 13: SDU Discard Procedure with Explicit Signalling
Figure 14: RLC Reset procedure signalling between sending and receiving RLC entities
Figure 15: RLC AM reset procedure without synchronisation with MAC-hs
Figure 16: Proposed MAC PDU format
Figure 17: RLC AM Reset procedure with synchronisation with MAC-hs.

[0073] As noted in the section above once a reset procedure is triggered in RLC sending entity (located in the SRNC

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for downlink transmission) the operation of MAC-hs entities in both Node B and UE shall be synchronised

[0074] First, synchronisation of reset in Node B will be explained This can be achieved, for instance by a MAC-hs RELEASE / REQUEST message of the RNSAP / NBAP protocols, which are sent from SRNC to Node B to initiate MAC-hs reset in the Node B

[0075] Next, synchronisation of reset in UE is illustrated There are several ways of synchronising reset in the UE As a first example, a PHYSICAL CHANNEL RECONFIGURATION message shall be sent from RRC entity in the SRNC to RRC entity in the UE to initiate MAC-hs reset in the UE (see also Figure 9) As a second possibility, for carrying out the RLC reset procedure, RESET and RESET ACK RLC PDUs are exchanged between sending and receiving RLC entity (see Figure 14). To synchronise the reset of RLC to the reset of receiving MAC-hs entity, an intralayer primitive (Reset Req) can be sent from receiving RLC entity to the receiving MAC-hs entity It is noted that this option requires less signalling, but an additional intralayer primitive has to be introduced

[0076] As noted in the section explaining the relation of Radio Bearers (RBs), Logical Channels (LCs) and Transport Channels (TrChs), the packets belonging to more than one RB can be buffered in the single priority queue in Node B and reordered in the single reordering buffer in UE Hence, flushing the priority queue or reordering buffer of MAC-hs after resetting only one RLC AM entity would lead to the lose of those MAC-hs PDUs which are, due to logical channel multiplexing, associated with other RLC AM entities We therefore propose a way of partly flushing the contents of the buffer.

[0077] As explained in Figure 8 and Table 1, C/T field exists in the header of MAC PDU if logical channel multiplexing is applied There are two ways of partially flushing the contents of Priority Queue/Reordering Buffer/Soft Buffer

[0078] A first possibility is using in-band identification of RLC Reset PDU encapsulated within MAC PDU This solution is illustrated in Figure 17 and it is applicable when DTCH carrying RLC control PDUs is mapped to HS-DSCH with high priority or when a single DTCH mapped to HS-DSCH is used for both RLC control and RLC data PDUs

[0079] To distinguish the RLC RESET PDU (Figure 14) in Node B, we propose using the reserved value (1111 - Table 1) in the C/T field if logical channel multiplexing is applied to indicate RLC reset Additionally, another 4 bit field called Reset ID (RID, Figure 16) will contain information on logical channel being tied to a particular RB To reduce the overhead, the field should be only appended if logical channel multiplexing is enabled If the field is not present, the whole priority queue can be flushed

[0080] The RID field could be used on UE side in an analogous manner to decide whether to flush complete Reordering Buffer or just part of it We note that logical channel identity field is a part of RB mapping info IE that is sent from SRNC to UE by means of RRC signalling Therefore this field can also be used in the UE instead of RID field The Reset Req primitive between RLC and MAC-hs entities should contain one of these fields.

[0081] A second option is the usage of signalling for synchronising RLC reset when logical channel multiplexing is enabled would require introducing new information element (IE) in MAC-hs RELEASE / REQUEST messageThis element would contain logical channel identification analogous to RID field

[0082] Finally, it is noted that some of MAC-hs PDUs may contain MAC-d PDUs from different RBs They should also be flushed in case any RLC entity corresponding to these RBs has been reset The lost RLC AM PDUs will be retransmitted on RLC AM level but this will not cause inefficient use of radio resources

[0083] Based on the explanations given above, the benefits of the unveiled invention are a more efficient utilisation of radio resources, especially HARQ hardware on UE side and to avoid malfunctions in the operation of RLC (this benefit increases with increasing Configured_Tx_Window_Size parameter which is analogous to increasing available data rates), and higher layers Finally, loss of RLC PDUs belonging to the same RB is also avoided

[0084] Finally, it is noted that the feasibility study for Enhanced Uplink Packet Access is being considered in 3GPP (TSG RAN TR 25 896 V 0 3 0) The transport channel used in this case is denoted as Enhanced Uplink Dedicated Channel (EUDCH) HARQ method where erroneous packets are stored for subsequent combining may be also applied to provide time diversity for uplink transmissions Transmitting and receiving MAC-hs and RLC entities would be located in UE and Node B respectively It is clear to those skilled in the art that signalling messages analogous to the previous explanations may be exchanged The primitive Reset Req can be used within UE protocol stack as in the downlink case It has not been decided whether reordering buffer for uplink HARQ is located in the Node B or in the RNC. In both cases some information on logical channel multiplexing should be transmitted to Node B so that appropriate parts of soft buffer (and reordering buffer) are flushed

Claims

1. A method of retransmission protocol reset synchronisation in a radio network of a communication system, said radio network including at least one radio network controller RNC for controlling a plurality of base stations in communication with mobile terminals, wherein the RNC communicates with a communication terminal using a radio link control RLC procedure and the plurality of base stations communicate with the mobile terminals using

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a medium access control MAC procedure, comprising the steps of:

performing a RLC reset procedure by an RLC sending entity;

initiating a MAC reset procedure in response to a RLC reset procedure

2. The method according to claim 1, wherein the RLC reset procedure is initiated upon occurrence of unrecoverable protocol error or upon reaching a predetermined number of retransmissions or upon transmitting a discard notification for a predetermined number of times

3. The method according to claim 1 or 2, wherein the MAC reset procedure is carried out at the base station and the mobile terminal

4. The method according to one of claims 1 to 3, wherein the MAC reset procedure in the base station is initiated by a MAC release request message sent by the RNC

5. The method according to one of claims 1 to 4, wherein the MAC reset procedure in the mobile terminal is initiated by a channel reconfiguration message included in a radio resource control RRC protocol sent from the RNC to the mobile terminal

6. The method according to one of claims 1 to 5, wherein the MAC reset procedure in the mobile terminal is initiated by a reset request primitive sent from the receiving RLC entity to the receiving MAC entity upon receiving a RLC RESET protocol data unit PDU

7. The method according to one of claims 1 to 6, wherein the radio network is the UMTS terrestrial radio access network UTRAN using high speed downlink packet access HSDPA for data transmission

8. The method according to claim 7, wherein the RLC procedure and MAC procedure transmit protocol data units PDUs over the network employing a hybrid automatic repeat request HARQ protocol where erroneous packets are stored for subsequent combining

9. The method according to claim 8, wherein remaining RLC PDUs stored in a priority queue at a base station shall not be transmitted once an RLC reset procedure has been invoked

10. The method according to one of claims 8 or 9, wherein the MAC PDUs containing RLC PDUs remaining in a reordering or soft buffer of the mobile terminal are flushed once RLC reset procedure has been invoked

11. The method according to one of claims 8 to 10, wherein the MAC PDUs contain a reset identification RID field comprising logical channel identification

12. The method according to claim 10 or 11, wherein the MAC reset procedure with partial priority queue flush in the base station is initiated when receiving a MAC PDU with predefined inband identification and RID field

13. The method according to claim 10 or 11, wherein the MAC reset procedure with partial priority queue flush in the base station is initiated when receiving a MAC release request message with RID field as an information element

14. The method according to one of the claims 1-13, wherein the radio network is the UMTS terrestrial radio access network using enhanced uplink dedicated channel (EUDCH) access employing HARQ protocol where erroneous packets are stored for subsequent combining

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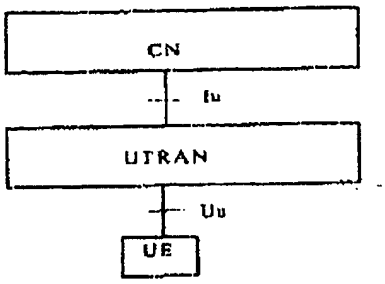


Fig. 1

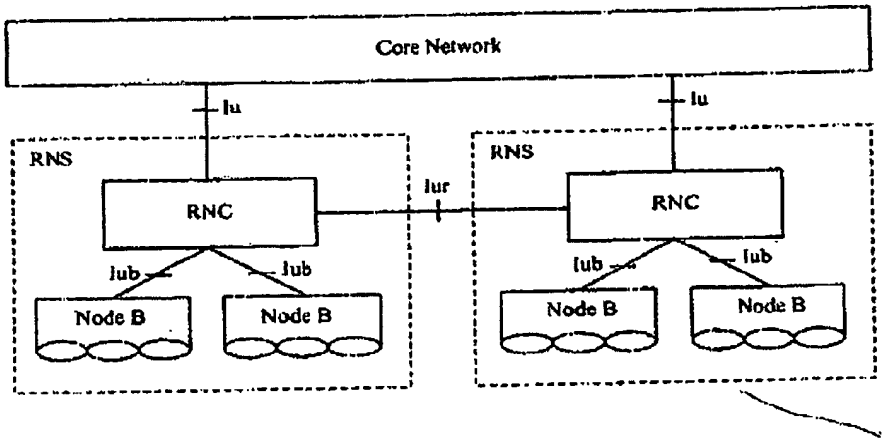


Fig. 2

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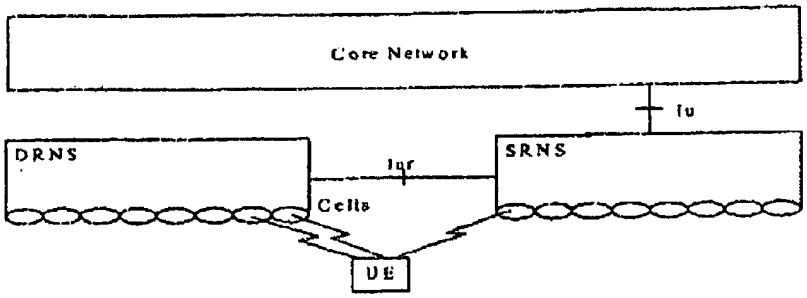


Fig. 3

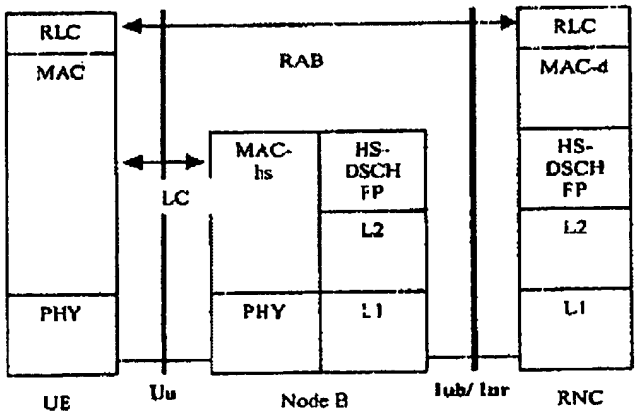


Fig. 4

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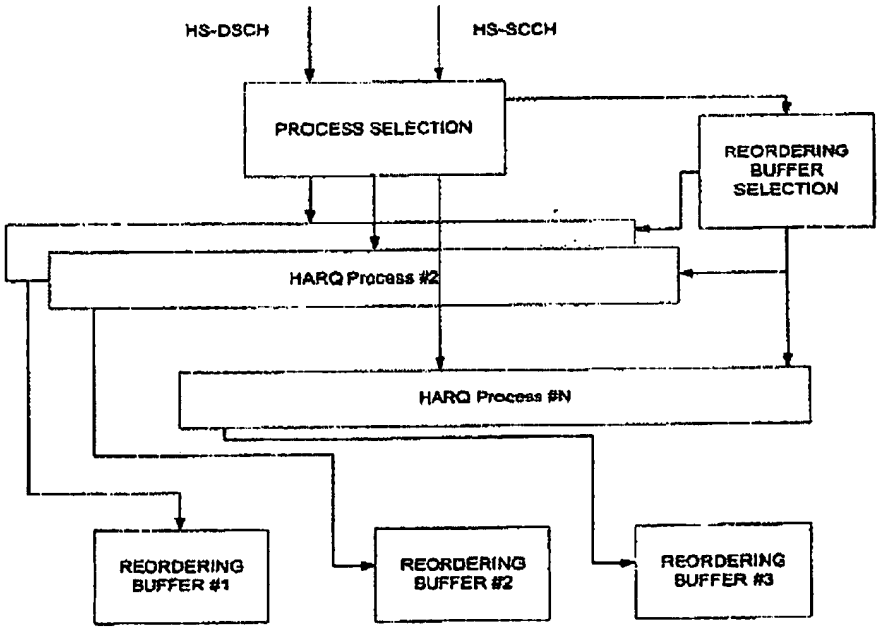


Fig. 5

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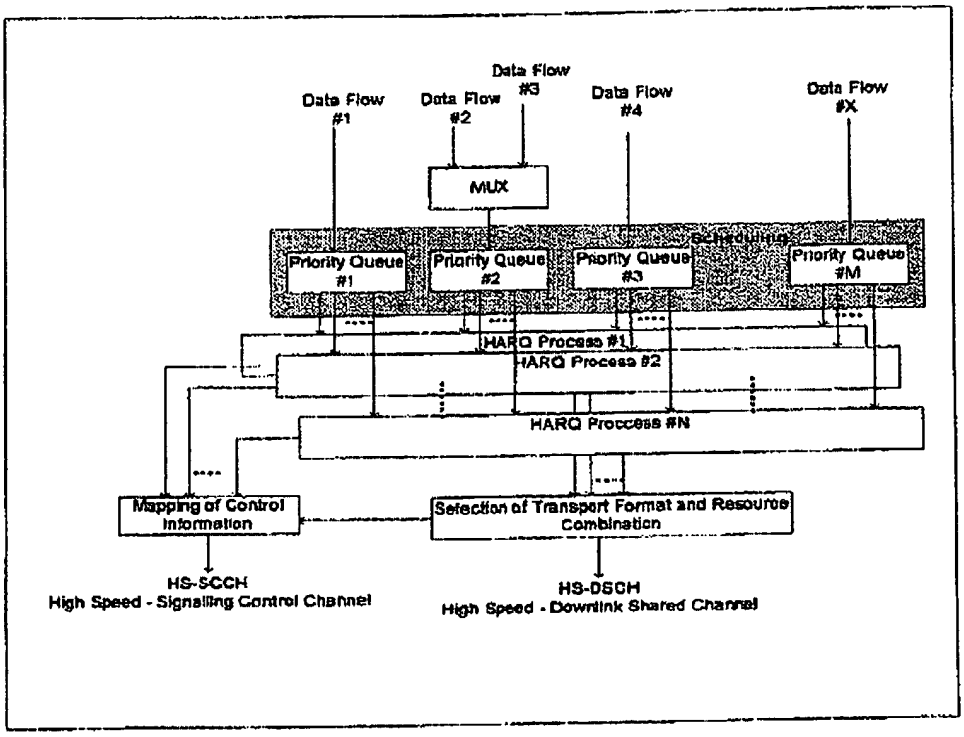


Fig. 6

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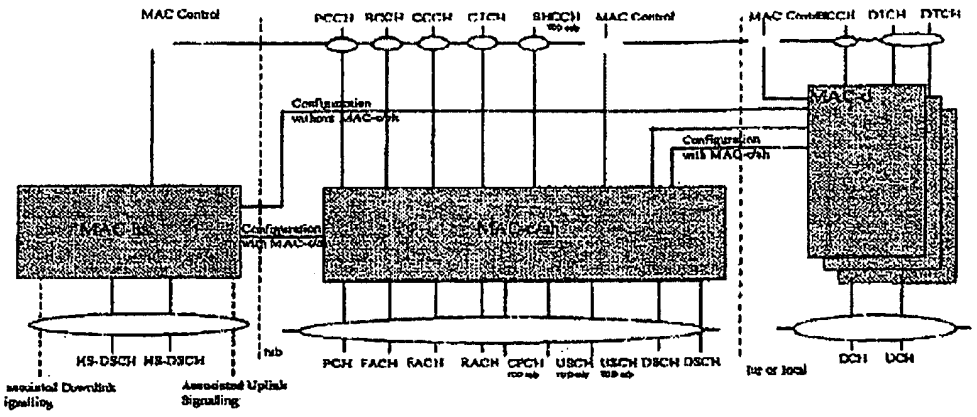


Fig. 7

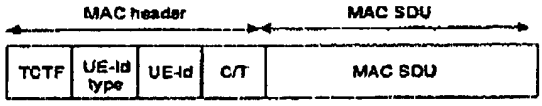


Fig 8

Case b):

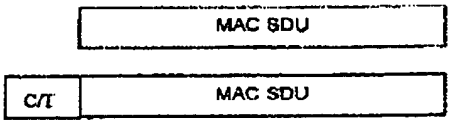


Fig. 9

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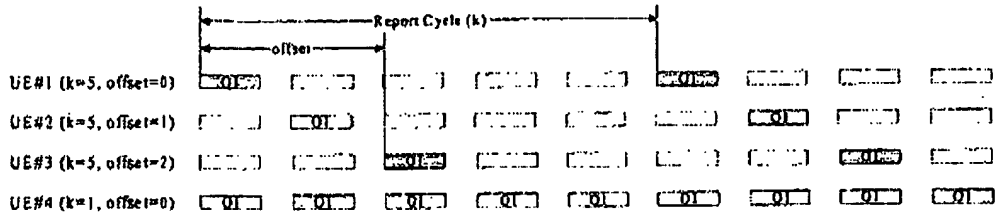


Fig. 10

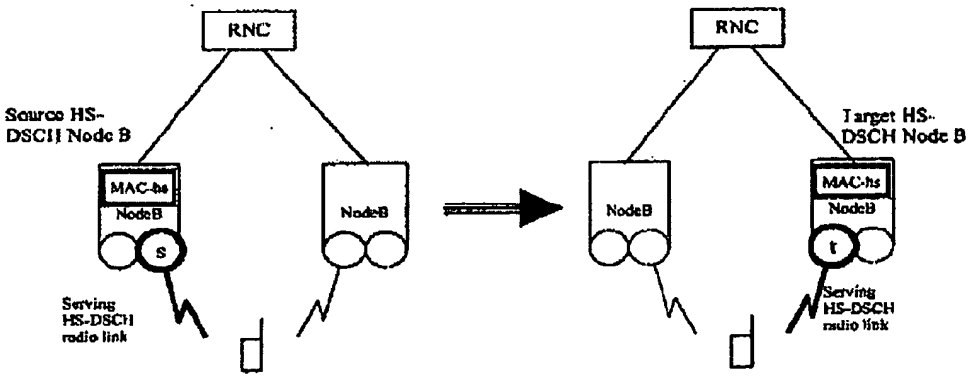


Fig. 11

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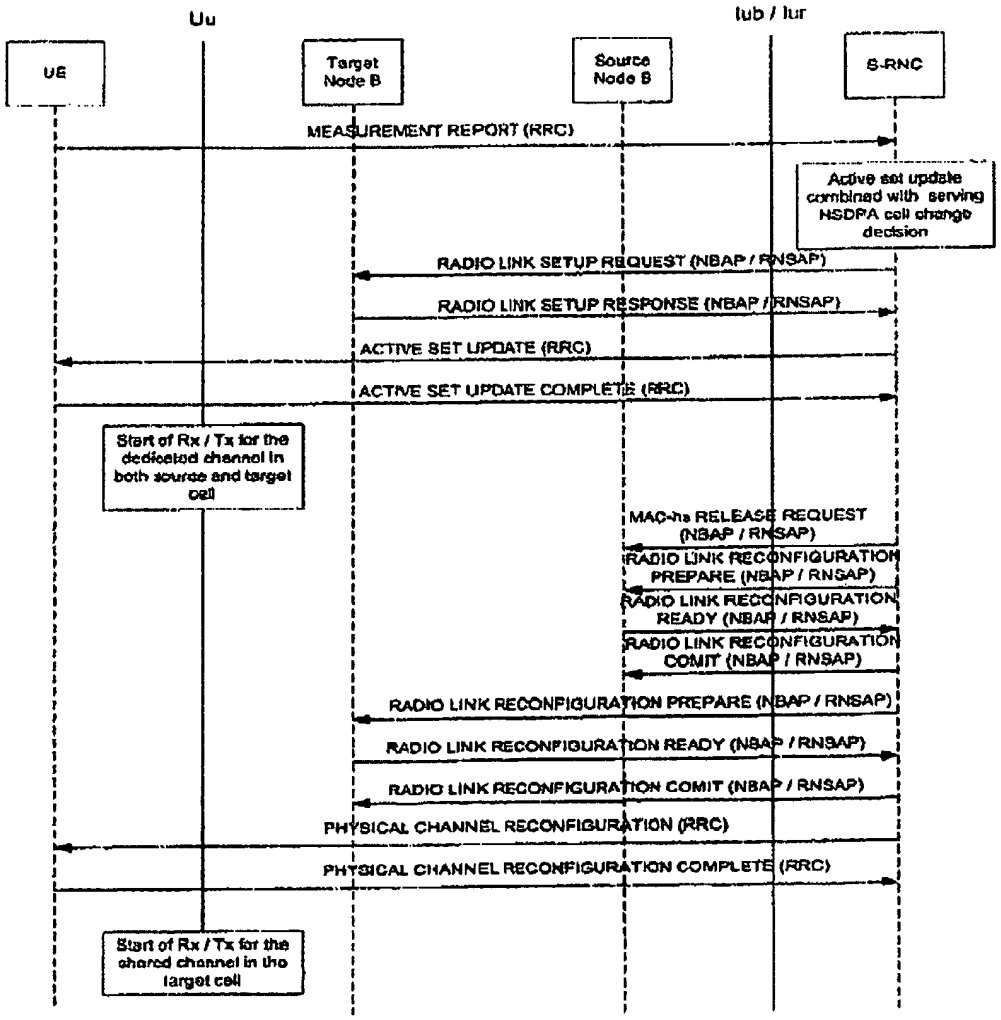


Fig. 12

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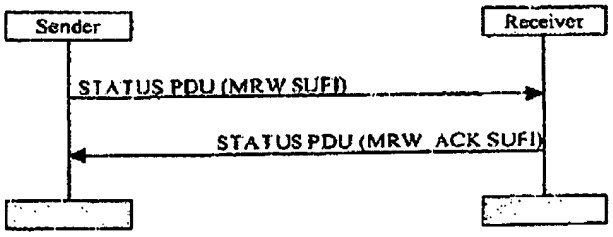


Fig. 13

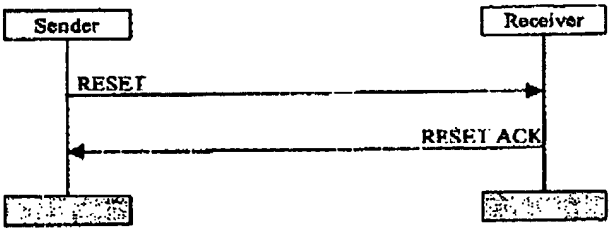


Fig. 14

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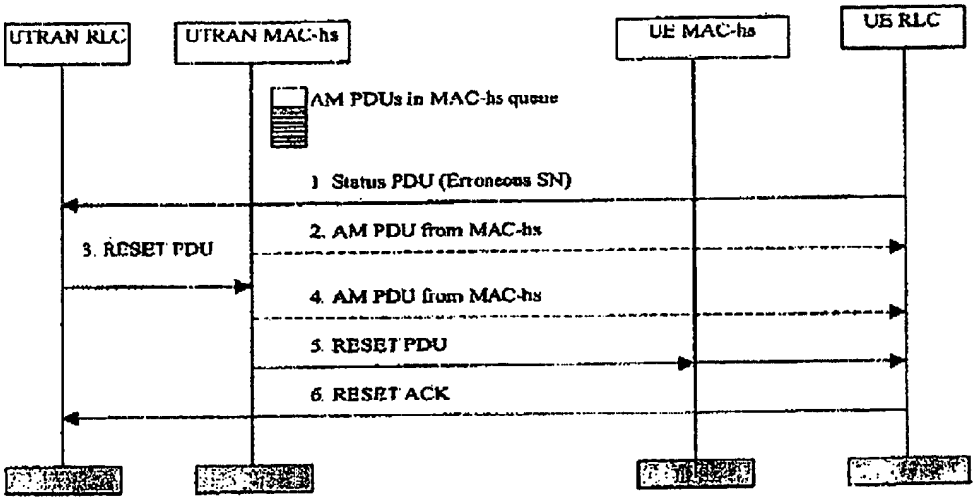


Fig. 15

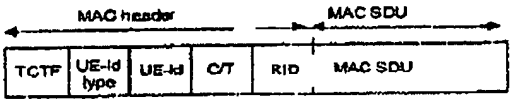


Fig. 16

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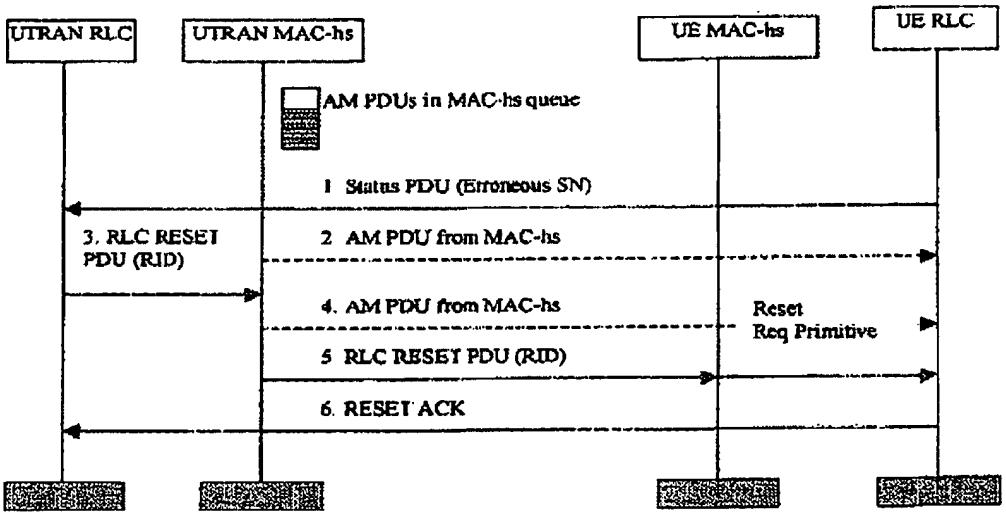


Fig. 17

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European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 00 7317

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 2003/016698 A1 (KIM SEONG-HUN ET AL) 23 January 2003 (2003-01-23) * abstract * * paragraphs [0009], [0017], [0019], [0024] * * paragraphs [0048]-[0052], [0068]-[0070] * * paragraphs [0078]-[0085], [0092], [0104] * * claims 1-3 * * figures 2,13 *	1-14	H04L12/56

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

H04L
H04Q

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	8 August 2003	Alonso Maleta, J

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
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E : earlier patent document, but published on, or after the filing date
D : document cited in the application
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO EP 03 00 7317

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on. The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

08-08-2003

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2003016698 A1	23-01-2003	CN 1404250 A	19-03-2003
		DE 10230722 A1	20-02-2003
		FR 2828974 A1	28-02-2003
		GB 2380104 A	26-03-2003
		JP 2003111147 A	11-04-2003

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No 12/82

(17)

Cite No. 2.

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 361 707 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
12.11.2003 Bulletin 2003/46

(51) Int Cl 7: H04L 12/56

(21) Application number: 03010042.4

(22) Date of filing: 02.05.2003

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PT RO SE SI SK TR
Designated Extension States:
AL LT LV MK

(30) Priority: 08.05.2002 US 380106 P

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(54) Abnormal case handling for acknowledged mode transmission and unacknowledged mode transmission

(57) Whenever the Receiver of this invention receives an AMD PDU or a UMD PDU with its "Length Indicator" having an invalid or a reserved value, the Receiver discards such a PDU and treats it as never received. The Receiver may report its receiving status accordingly if a report is required. This invention avoids invoking unnecessary RLC reset procedures and reduces the chance of losing HFN synchronization during AM or UM data transmissions.

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Description

Cross Reference Application

[0001] This application claims priority from U S. Provisional Patent Application No 60/380,106 filed on May 6, 2002

BACKGROUND

[0002] This invention relates to wireless communication More particularly, this invention provides more efficient way to handle several abnormal cases for Acknowledged Mode transmission and Unacknowledged Mode transmission

[0003] Under the acknowledged mode (AM) in a wireless communication network, data transferred between two RLC peer entities (a UE or a UTRAN can be either a Sender or a Receiver) is in the Packet Data Unit (PDU) format. Figure 1 illustrates the simplified procedure for Acknowledged mode data (AMD) transfer

[0004] The Sender packages a Radio Link Control (RLC) Service Data Units (SDUs) received from upper layers into one or multi fixed-size AMD PDUs If the AMD PDU is transmitted for the first time, the Sender shall set the "Sequence Number" field, its "Length Indicator" field and its "Polling Bit" accordingly. Otherwise, if the AMD PDU is retransmitted the Sender uses the same "Sequence Number" as the original AMD PDU has The Sender will update the "Length Indicator" field of a retransmitted AMD PDU due to that a piggybacked STATUS PDU is involved Of course the Sender also sets the "Polling bit" accordingly Afterward, if one or more AMD PDUs have been scheduled for transmission or retransmission, the Sender shall submit any ready AMD PDUs to lower layer to transmit

[0005] Upon receiving an AMD PDU, the Receiver shall update its state variables for each received AMD PDU The Receiver reassembles the received AMD PDUs into RLC SDUs If "In-Sequence Delivery" is configured, the Receiver delivers the RLC SDUs in-sequence (i e in the same order as the RLC SDUs were originally transmitted by the peer entity- the Sender) to upper layers through the AM Service Access Point (AM-SAP) Otherwise, deliver the RLC SDUs in arbitrary order to upper layers through the AM-SAP

[0006] Furthermore, the Sender and the Receiver uses a RLC reset procedure to resynchronize the peer entities when an abnormal condition happened Figure 2 illustrates the elementary procedure for an RLC reset During the reset procedure the hyper frame numbers (HFN) in the Sender and the Receiver are synchronized. Usually, the RESET PDUs and the RESET ACK PDUs have higher priority than AMD PDUs When a reset procedure has been initiated it can only be ended upon reception of a RESET ACK PDU with the same Reset Sequence Number (RSN) value as in the corresponding RESET PDU, or upon request of re-establishment or release from upper layer A reset procedure is not interrupted by the reception of a RESET PDU from the peer entity

[0007] The Sender and the Receiver use many techniques, such as the "Sequence Number" of each PDU, the "Length Indicator" with allowable values or reserved values, the transmitting and receiving window size and others, to monitor any error occurring during transmission and to maintain synchronization between them

[0008] Figure 3 illustrates how an AMD PDU with abnormal condition is processed. If the Receiver receives an AMD PDU outside the range of its reception window (Steps 5 and 10), the Receiver will discard the AMD PDU (Step 15) and go to Step 20 If the sequence number is within the range, then the Receiver checks if the value of "Length Indicator" of the received PDU is invalid or reserved (Step 40) If the "Length Indicator" has an invalid or a reserved value, the Receiver discards this AMD PDU and treats the discarded AMD PDU as a missing one (Step 50) An invalid value of the "Length Indicator" can be a value greater than the size of data field in the PDU Additionally, an invalid value can be caused by using any value that violates the rules of the RLC protocol, such as using both values of 1111110 and 1111111 for "Length Indicator" in the same PDU, using the value 1111110 not followed by an extension bit of value 0, or using an incorrect order of the "Length Indicators" etc Otherwise, if the "Length Indicator" is valid and is not reserved, the Receiver shall update its state variables (Step 45). Next, at Step 20, the Receiver checks if the "polling Bit" of the received AMD PDU is set to be "1" If it is, the Receiver shall initiate the STATUS PDU transfer procedure (Step 30) and then reassemble the received AMD PDUs into RLC SDUs (Step 55) Moreover, if the "Polling Bit" is not "1", the Receiver further checks if the "Missing PDU Indicator" is configured and the Receiver detects any missing AMD PDU (Step 25). If the Indicator is configured and a PDU is missing, the Receiver initiates the Status PDU transfer procedure in Step 30 and then go to Step 55 However, if "Missing PDU Indicator" is not configured or if the Receiver detects no missing PDU, the receiver will reassemble the received AMD PDU(s) into RLC SDU(s) and deliver the AMD SDU(s) to upper layers through AM_SAP (Steps 55, 60).

[0009] Also at the Receiver side, once the triggering of a STATUS report has occurred, as shown in Figure 4, the Receiver first checks if there are active status prohibit functions or active "EPC mechanism" (Steps 70, 75) If there is, the Receiver delays the submitting of the STATUS PDU until the "STATUS prohibit" or "EPC mechanism" becomes inactive (Step 100) Otherwise, the Receiver shall include negative acknowledgements for all AMD PDUs detected as missing and positive acknowledgements for all AMD PDUs received up to at least VR(R) and set up optional Super Field variables into a STATUS PDU, which will be sent back to the Sender (Steps 80 85, 90 and 95) At the Sender side when

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the Sender receives a STATUS PDU from the Receiver (Step 105), the Sender checks if the STATUS PDU including "erroneous Sequence Number" If it does, the Sender shall discard the STATUS PDU and initiate the RLC reset procedure (Steps 135, 140) If the STATUS PDU does not include "Erroneous Sequence Number", the Sender updates its state variables, VT(A) and VT (MS) (Step 115) Then the Sender checks if the STATUS PDU include negatively acknowledged AMD PDUs (Step 120) If it does not, goes to Step 130 Otherwise, if it does, the Sender shall initiate the acknowledged data transfer procedure and retransmit those negatively acknowledged AMD PDUs Last, at Step 130, the Sender processes optional Super Field variables as needed

[0010] Under the unacknowledged mode (UM) in a wireless communication network, data transferred between two RLC peer entities also is in a Packet Data Unit (PDU) format Figure 5 illustrates the elementary procedure for unacknowledged mode data (UMD) transfer

[0011] The Sender packages a Radio Link Control (RLC) Service Data Units (SDUs) received from upper layers into one or multi fixed-size UMD PDUs The UMD PDU is transmitted once only The Sender shall set the "Sequence Number" field and its "Length Indicator" field accordingly For example, the UM data state variable, VT(US), contains the "Sequence Number" of the next UMD PDU to be transmitted. It shall be incremented by 1 each time a UMD PDU is transmitted If one or more UMD PDUs have been scheduled for transmission, the Sender shall submit any ready UMD PDUs to lower layer for transmission When the Sequence Number wraps around from the maximum value of 7-bit representation, i e 127, back to 0, the associated hyper frame number (HFN) is incremented by one The HFNs are not sent explicitly in the UMD PDUs. Instead, they are maintained independently in the peer Sender and Receiver A ciphering mechanism will use HFN as a parameter to cipher at the Sender and decipher at the Receiver If the HFNs of the peer entity are not kept in synchronization, the ciphering mechanism will fail

[0012] Upon receiving a UMD PDU from a Sender (Step 150), as shown in Figure 6, the Receiver checks if the value of the "Length Indicator" of the received UM PDU is invalid or reserved (Step 155), e.g the Receiver checks if the "Length Indicator" has a value that is either larger than the size of data field in the PDU (invalid) or a value specified to be reserved for UMD PDU for other purposes, such as functions for later releases If it is invalid or is reserved, the Receiver discards the UMD PDU and treats the UMD PDU as missing (Step 160) then go to Step 190 Otherwise, the Receiver updates the Receiver Send Sequence State Variable, VR(US), to contain the "Sequence Number" following that of the last UMD PDU received (Step 170) For example, when a UMD PDU with "Sequence Number" x is received, the VR(US) shall be set to x+1 The Receiver further checks if any UMD PDU is missing i e the Receiver checks if the updating step of VR(US) is greater than one (Step 175) If the updating step of VR(US) is not greater than one, the Receiver checks if the received UMD PDU is the first segment of an SDU by looking for a predefined "Length Indicator" value "1111100" or "1111 11111111 100", which is used to indicate the first data octet in this UMD PDU is the first octet of an RLC SDU (Steps 180, 185) If the received UMD PDU is not the first segment of an SDU, the Receiver shall assemble the received UMD PDU into RLC SDU(s) and submit the RLC SDU (s) to upper layer through UM-SAP (Steps 195 and 200) However if there is any missing UMD PDU detected in Steps 175 and 180, the Receiver shall discard any SDU (s) having segments in the missing UMD PDU(s) (Step 190)

[0013] Overall, the prior art has an inefficient way to process an AMD PDU with its "Length Indicator" having an invalid or a reserved value in an Acknowledged Mode transmission There are cases caused by the physical layer CRC residue error so that the erroneous bit string of the AMD PDU is not detected by the CRC scheme In this situation, sequence number of the AMD PDU might also contain errors. The Receiver treats an AMD PDU with its "Length Indicator" having an invalid or a reserved value as a missing PDU See Step 50 in Figure 3 When a status report is triggered, the report would include negative acknowledgement of this AMD PDU of possible contaminated sequence number See Step 80 in Figure 4 Moreover, if the contaminated sequence number is outside the transmission window, the Sender recognizes this status report as containing an "erroneous Sequence Number" and will initiate a RLC reset procedure accordingly (See Step 140 in Figure 5) Thus, when the AMD PDU with invalid or reserved length indicator is treated as a missing PDU, the Sender might initiate an unnecessary RLC reset procedure

[0014] The similar inefficient process also occurs in an Unacknowledged Mode Transmission. Where the Receiver may receive a UMD PDU with its "Length Indicator" having an invalid or a reserved value Just as the AM transmission, this may because of a physical layer CRC residue error, i.e , there are errors in the bit string of the UMD PDU and these errors are not detected by the CRC scheme. In this situation, sequence number of the UMD PDU might also contain errors In the prior art design, the Receiver treats a UMD PDU with invalid or reserved "Length Indicator" as a missing PDU If the sequence number is also contaminated, the Receiver will discard wrong SDUs See Steps 160 and 190 in Figure 6. In addition, if the contaminated sequence number changes the order from increment to decrement compared to the previously received UMD PDU, the Receiver will discard the UMD PDU but will mistakenly increment the HFN value so that the HFNs will not be synchronous with the Sender any more Consequently, the ciphering mechanism will fail and cause all the following transmitted UMD PDUs lost. Thus, when the UMD PDU with a "Length Indicator" having an invalid or a reserved

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value is treated as a missing PDU, the Receiver might discard wrong SDUs and also might make the HFNs unsynchronized with the Sender

SUMMARY

[0015] To avoid invoking unnecessary RLC reset procedure or losing HFN synchronization, a better and more efficient method to handle an AMD PDU or UM PDU with its "Length Indicator" having an invalid or a reserved value is needed

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] Following drawings with reference numbers and exemplary embodiments are referenced for explanation purpose.

Figure 1 illustrates a simplified AM data transfer procedure;
Figure 2 illustrates the elementary procedure for an RLC reset;
Figure 3 briefly illustrates the AMD PDU handling procedure by the Receiver for the received AMD PDUs;
Figure 4 briefly illustrates a STATUS report handling procedure by a Sender and a Receiver in AM;
Figure 5 illustrates a simplified UM data transfer procedure;
Figure 6 briefly illustrates the UMD PDU handling procedure by the Receiver when a UMD PDU is received
Figure 7 briefly illustrates the AMD PDU handling procedure of the invention by the Receiver for the received AMD PDUs;
Figure 8 briefly illustrates the UMD PDU handling procedure of the invention by the Receiver when a UMD PDU is received;
Figure 9 briefly illustrates another AMD PDU handling procedure of the invention by the Receiver for the received AMD PDUs;

DESCRIPTION OF THE INVENTION

[0017] This invention modifies the way the prior art processing a PDU with its "Length Indicator" having an invalid or a reserved value In AM, when the Receiver receives an AMD PDU with an invalid or reserved value of a "Length Indicator", instead of discarding the AMD PDU and treating it as missing, the Receiver shall discard the AMD PDU and treat it as never received, while setting up the content of a status report accordingly
[0018] Figure 7 is an exact copy of Figure 3, except Step 50 in Figure 3, which is changed to Step 51 in Figure 7 where the Step 51 will "ignore the AMD PDU and treat the AMD PDU as never received when a PDU is reported" Furthermore, Step 52 follows Step 51 in Figure 7 and the procedure ends The similar modification shall be implemented in UM Figure 8 is an exact copy of Figure 6 except Step 160 of Figure 6 which is replaced with Step 161 of Figure 8 When the Receiver receives a UMD PDU with it "Length Indicator" having an invalid or a reserved value, instead of discarding the UM PDU and treating the UM PDU as missing, the Receiver shall discard or ignore the UMD PDU and treat it as never received while the Receiver maintains the HFN values and discards relevant SDUs accordingly Thus, Step 160 of Figure 6 shall be changed to Step 161 of Figure 8 where the step will "ignore the UMD PDU and treat it as never received" Of course, there is no need to go to Step 190 after Step 161 in Figure 8 Instead, Step 162 follows Step 161 in Figure 8 and the procedure ends.
[0019] Moreover, in AM, once the receiver receives an AMD PDU with its "Length Indicator" having an invalid or a reserved value, besides discarding the AMD PDU, the Receiver shall further check if its "Polling Bit" in the discarded AMD PDU is set to "1". If it is, the AMD PDU will trigger a poll for status report, the Receiver sends a status report with the content set as if the AMD PDU is never received This is illustrated in Figure 9 Figure 9 is an exact copy of Figure 7 with the exception that the procedure goes to Step 20 after Step 51 in Figure 9.
[0020] For the AM transmission case, when an unnecessary RLC reset procedure is initiated, the network wastes a lot of radio resource since RESET PDUs and RESET ACK PDUs needed to be signaled between the peer entities In addition the network data transmission will be further delayed due to many unnecessary occurrences of RLC reset procedure. This invention can help the existing networks and mobiles to avoid many unnecessary RLC reset procedures and to enhance their efficiency With respect to the UM transmission case, the invention can help the existing networks and mobiles to avoid from discarding wrong SDUs and the problems of HFN unsynchronization

Claims

1. A method to reduce the occurrences of RLC reset or the chance of losing HFN synchronization during data block transmission between the sender and the receiver in a wireless communication system, wherein data blocks may contain different status related fields, wherein the method comprising the steps of:

   At the receiver:

   receiving data block from the sender while the data transmission operation is in a particular mode;
   determining the status of status related fields of the received data block; and

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discarding the received data block and treating the discarded data block as if it has never been received if one particular status related field matches one of a plurality of abnormal conditions

2. The method as claimed in claim 1, wherein the data transmission operation is in an Acknowledge mode

3. The method as claimed in claim 1, wherein the data transmission operation is in an Unacknowledge mode

4. The method as claimed in claim 2, wherein one particular status related field is the "Length Indicator" field.

5. The method as claimed in claim 4, wherein if one particular status related field matches one of a plurality of abnormal conditions further comprising of the "Length Indicator" having an invalid value

6. The method as claimed in claim 4, wherein if one particular status related field matches one of a plurality of abnormal conditions further comprising of the "Length Indicator" having a reserved value

7. The method as claimed in claim 4, wherein treating the data block as if it has never been received further comprising the steps of:

checking the "Polling Bit" field of the discarded received data block; and
if the "Polling Bit" indicates that a status report is requested, reporting a receiving status with the content set as the discarded data block has never been received

8. The method as claimed in claim 3, wherein one particular status related field is the "Length Indicator" field

9. The method as claimed in claim 8, wherein if one particular status related field matches one of a plurality of abnormal conditions further comprising of the "Length Indicator" having an invalid value

10. The method as claimed in claim 8, wherein if one particular status field matches one of a plurality of abnormal conditions further comprising of the "Length Indicator" having a reserved value

11. A receiver for reducing the occurrences of RLC reset or the chance of losing HFN synchronization during data block transmission between the sender and the receiver in a wireless communication system, wherein data blocks may contain different status related fields, wherein the receiver comprising:

means for receiving data block from the sender while the data transmission operation is in a particular mode;
means for determining the status of status related fields of the received data block; and
means for discarding the received data block and treating the discarded data block as if it has never been received if one particular status related field matches one of a plurality of abnormal conditions

12. The receiver as claimed in claim 11, wherein the data transmission operation is in an Acknowledge mode

13. The receiver as claimed in claim 11, wherein the data transmission operation is in an Unacknowledge mode

14. The receiver as claimed in claim 12, wherein one particular status related field is the "Length Indicator" field.

15. The receiver as claimed in claim 14, wherein if one particular status related field matches one of a plurality of abnormal conditions further comprising of the "Length Indicator" having an invalid value.

16. The receiver as claimed in claim 14, wherein if one particular status related field matches one of a plurality of abnormal conditions further comprising of the "Length Indicator" having a reserved value

17. The receiver as claimed in claim 14, wherein treating the data block as if it has never been received further comprising:

means for checking the "Polling Bit" field of the discarded received data block; and if the "Polling Bit" indicates that a status report is requested, means for reporting a receiving status with the content set as the discarded data block has never been received

18. The receiver as claimed in claim 13, wherein one particular status related field is the "Length Indicator" field

19. The receiver as claimed in claim 18, wherein if one particular status related field matches one of a plurality of abnormal conditions further comprising of the "Length Indicator" having an invalid value

20. The receiver as claimed in claim 18, wherein if one particular status field matches one of a plurality of abnormal conditions further comprising of the "Length Indicator" having a reserved value

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Figure 1: Acknowledged mode data transfer procedure

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Petitioners' Exhibit 1007, p. 400
AT&T et al v. Innovative Sonic
IPR2024-01143

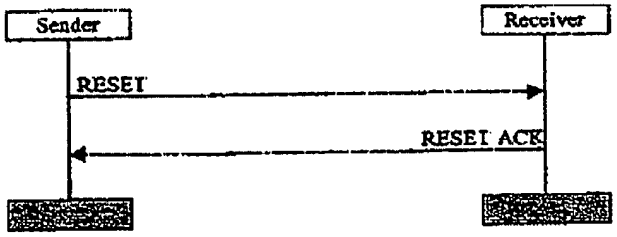


Figure 2: RLC reset procedure

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Petitioners' Exhibit 1007, p. 401
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IPR2024-01143

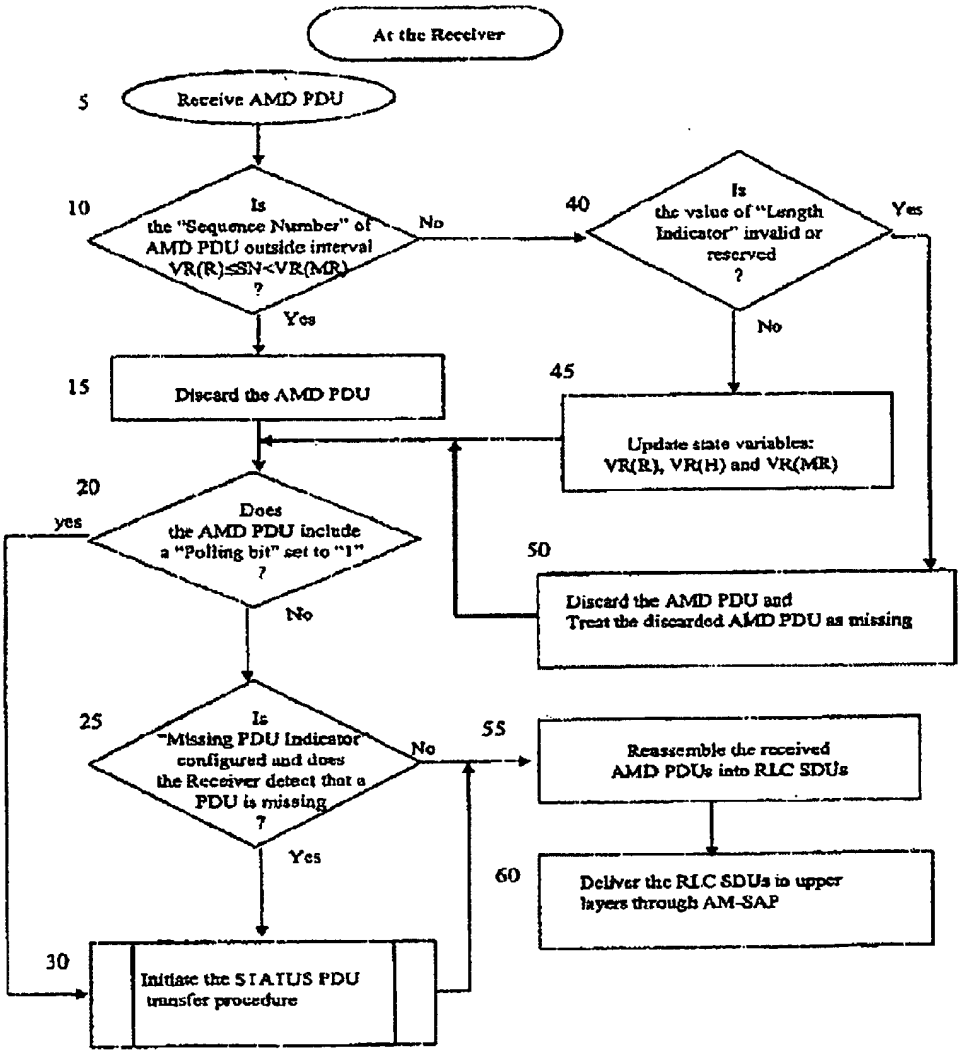


Figure 3: Prior Art on Reception of AMD PDU by the Receiver

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Petitioners' Exhibit 1007, p. 402
AT&T et al v. Innovative Sonic
IPR2024-01143

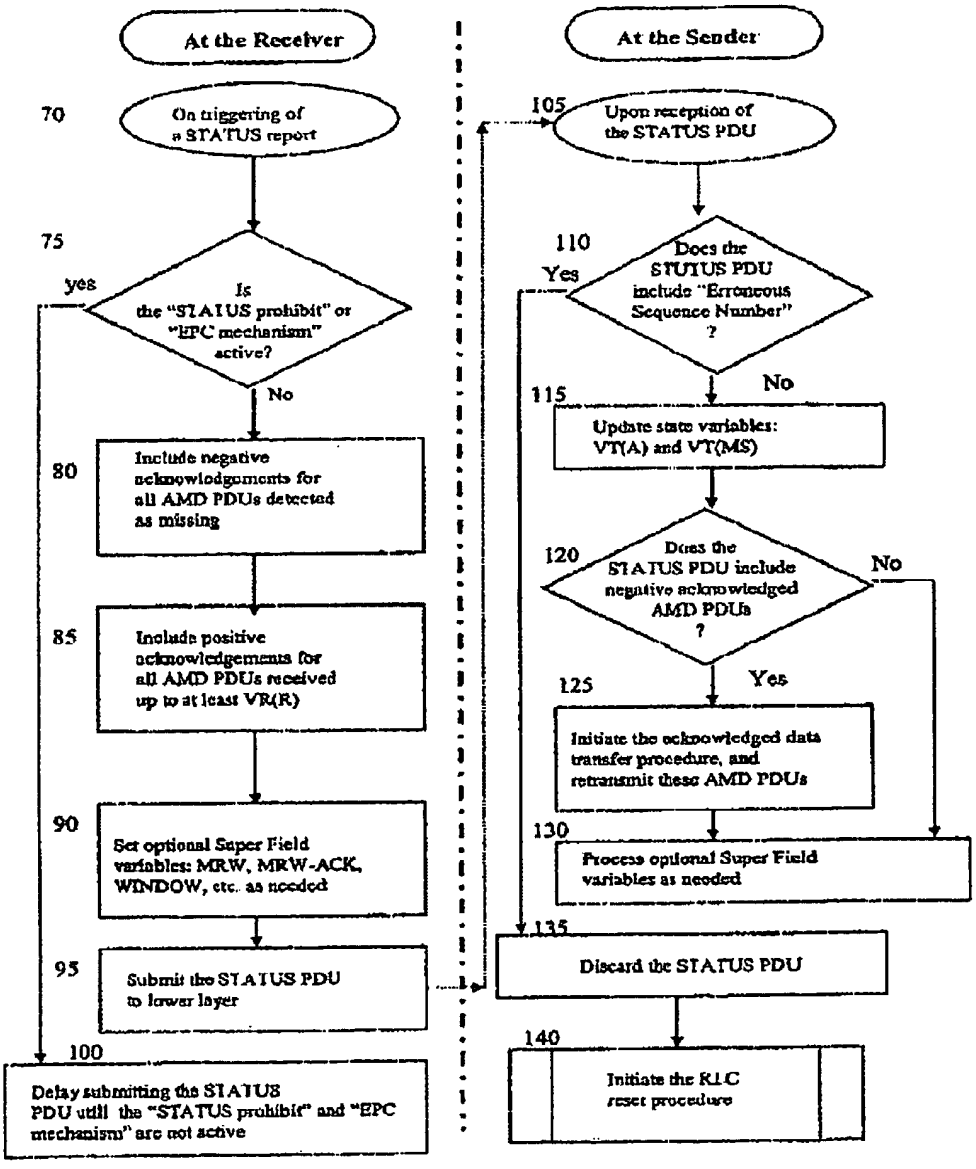


Figure 4: Prior Art on Triggering and Reception of STATUS Report

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Figure 5: Unacknowledged mode transfer procedure

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Petitioners' Exhibit 1007, p. 404
AT&T et al v. Innovative Sonic
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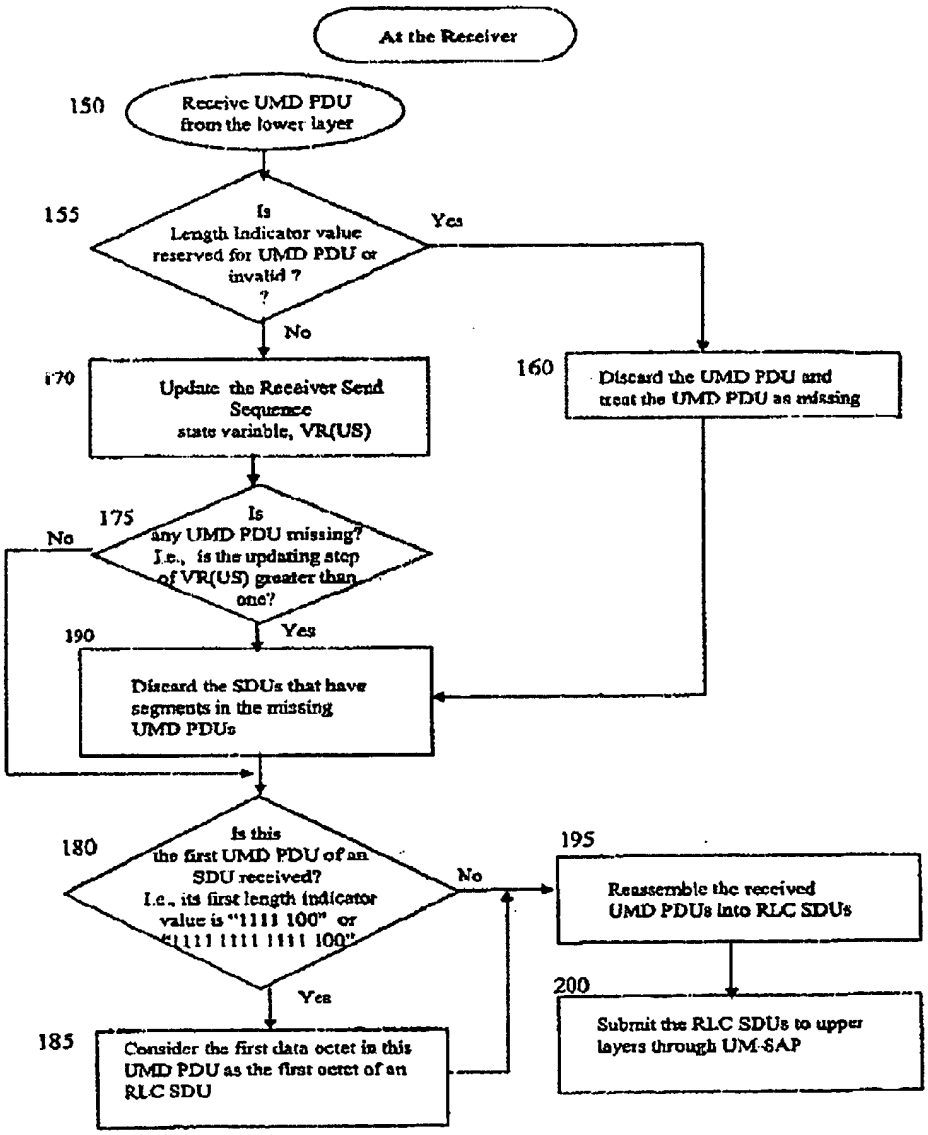


Figure 6: Prior Art on Reception of UMD PDU by the Receiver

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Petitioners' Exhibit 1007, p. 405
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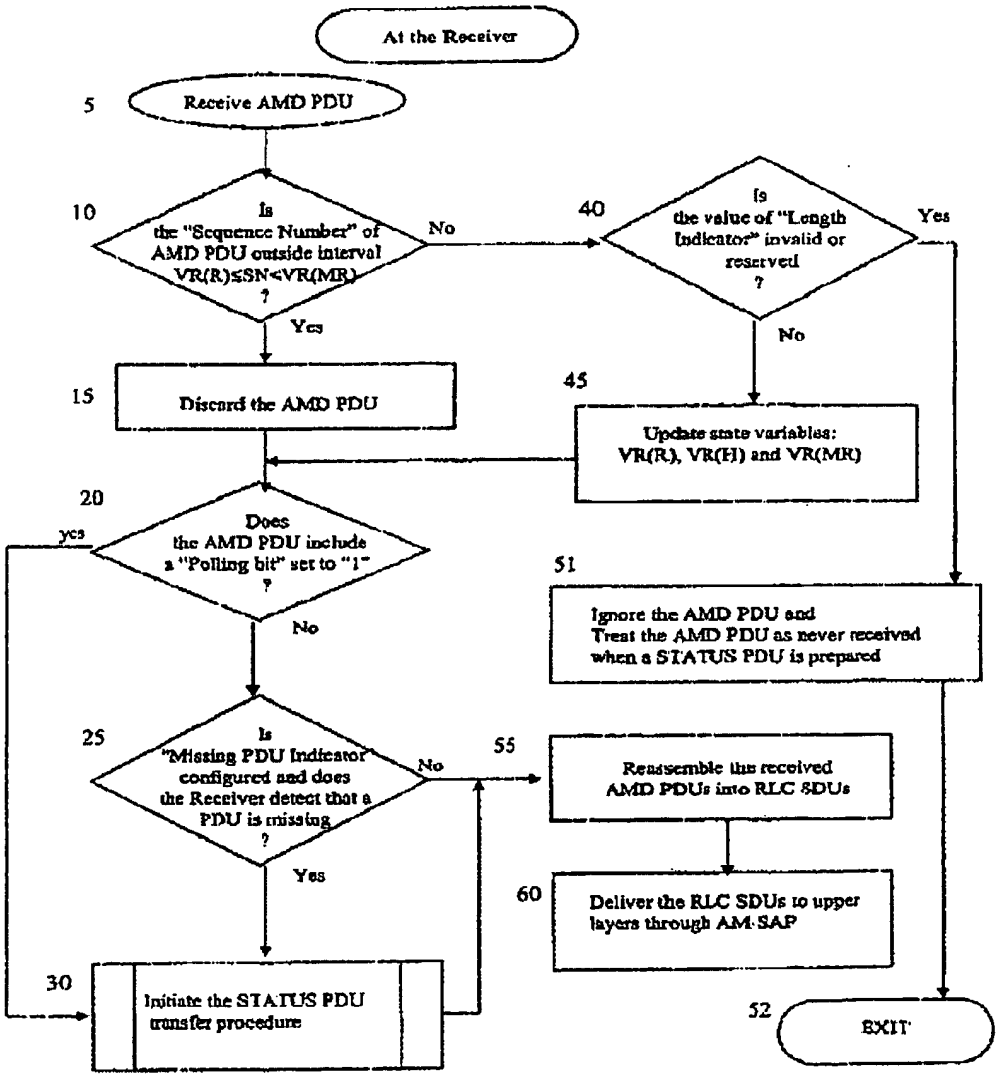


Figure 7: The Invention on Reception of AMD PDU by the Receiver

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Petitioners' Exhibit 1007, p. 406
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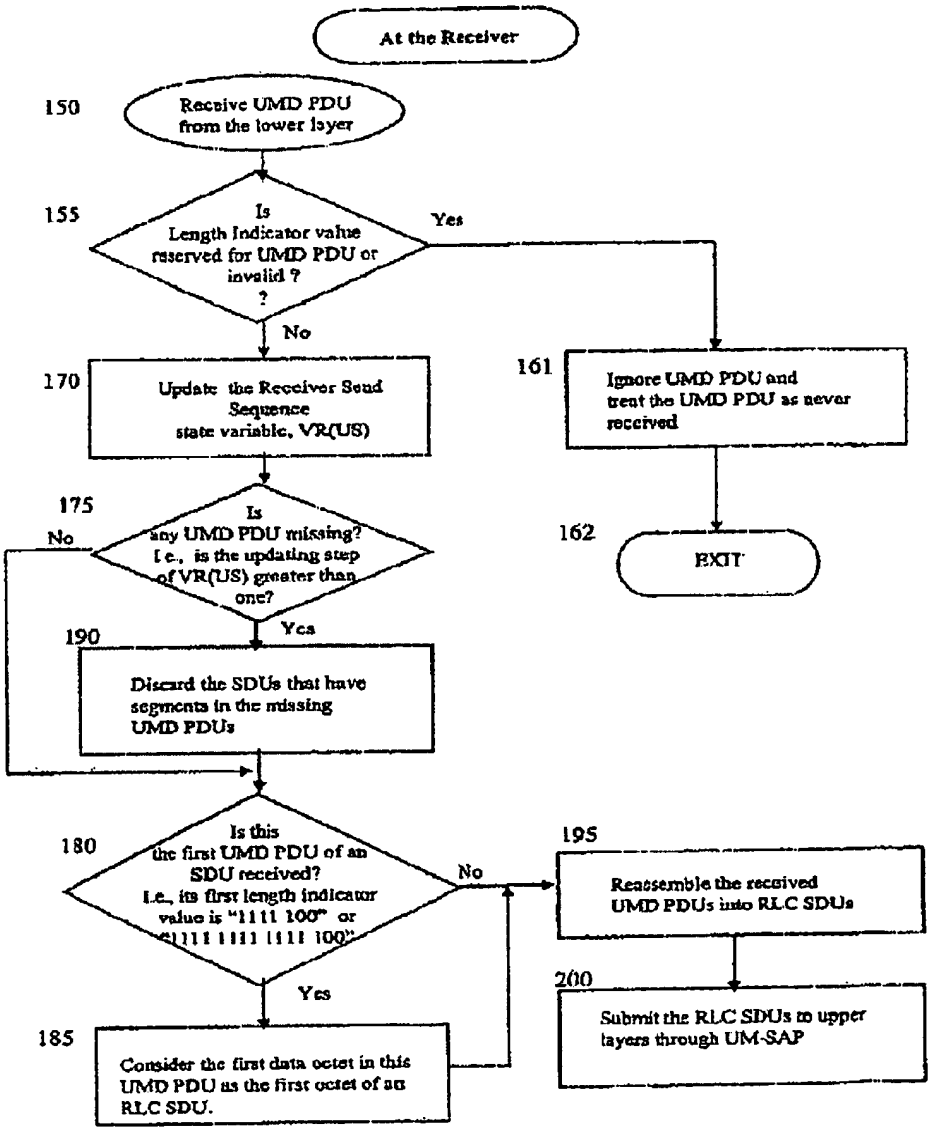


Figure 8: The Invention on Reception of UMD PDU by the Receiver

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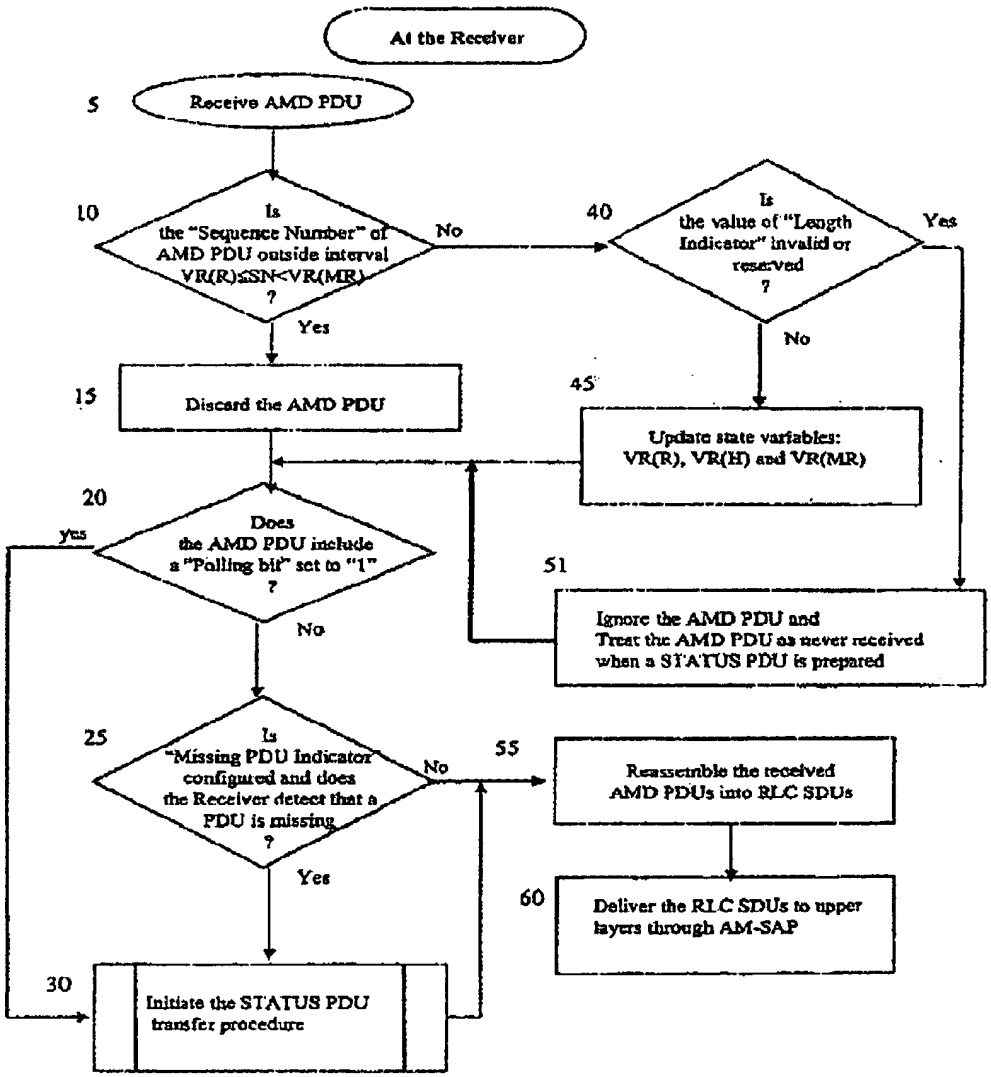


Figure 9: The Invention on Reception of AMD PDU by the Receiver

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IPR2024-01143

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 361 707 A3

(12) EUROPEAN PATENT APPLICATION

(88) Date of publication A3:
03.12.2003 Bulletin 2003/49

(51) Int Cl.7: H04L 12/56, H04L 1/18

(43) Date of publication A2:
12.11.2003 Bulletin 2003/46

(21) Application number: 03010042.4

(22) Date of filing: 02.05.2003

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PT RO SE SI SK TR
Designated Extension States:
AL LT LV MK

(30) Priority: 06.05.2002 US 380106 P

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(54) Abnormal case handling for acknowledged mode transmission and unacknowledged mode transmission

(57) Whenever the Receiver of this invention receives an AMD PDU or a UMD PDU with its "Length Indicator" having an invalid or a reserved value, the Receiver discards such a PDU and treats it as never received. The Receiver may report its receiving status accordingly if a report is required. This invention avoids invoking unnecessary RLC reset procedures and reduces the chance of losing HFN synchronization during AM or UM data transmissions.

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EPODOC: <EP 1361707A3 >

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 01 0042

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	ETSI: "Universal Mobile Telecommunication System (UMTS);RLC Protocol Specification (3GPP TS 25.322 version 3.10.0 Release 1999)" ETSI TS 125 322 V3.10.0, March 2002 (2002-03), pages 1-74, XP002225627 * paragraph [09.2] * * paragraph [10.1] * * paragraphs [11.2.4.1],[11.2.4.2] * * paragraphs [11.3.4.5]-[11.3.4.6] * * paragraph [11.4.2] *	1-20	H04L12/56 H04L1/18
A	WO 00 33503 A (ERICSSON TELEFON AB L M) 8 June 2000 (2000-06-08) * page 1, line 14 - page 2, line 7 * * page 3, line 18 - page 4, line 2 *	1-20	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)
H04L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	6 October 2003	Chimet, D

CATEGORY OF CITED DOCUMENTS
X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
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D : document cited in the application
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 03 01 0042

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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06-10-2003

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For more details about this annex : see Official Journal of the European Patent Office, No 12/82

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IPR2024-01143

(19)

Cite No. 3.

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 507 365 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
16.02.2005 Bulletin 2005/07

(51) Int Cl.7: H04L 12/28

(21) Application number: 04018713.0

(22) Date of filing: 06.08.2004

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL HR LT LV MK

(30) Priority: 15.08.2003 US 495106 P

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(54) Method and apparatus of controlling a reset procedure in a wireless communication system

(57) A method of controlling a reset procedure in a wireless communication system sets a proper clocked period to the timer Timer_Status_Prohibit for blocking the timer Timer_Status_Period from interfering with the counting of the state variable VT(RST). In addition, the method of controlling a reset procedure makes use of an amended triggering condition. Therefore, the sender ignores the STATUS PDUs when the reset procedure is ongoing. To sum up, the state variable VT (RST) is not incremented abnormally, and the reset procedure behaves correctly according to the configured protocol parameter MaxRST.

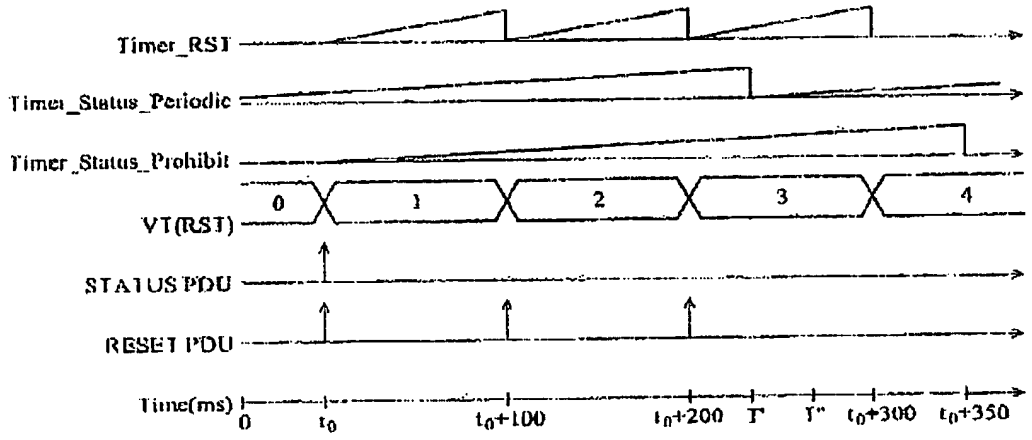


FIG. 4

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Description

Cross Reference To Related Applications

[0001] The application claims the benefit of U S Provisional Application No 60/495, 106, which was filed on 08/15/2003 and entitled "Triggering condition of RLC Reset Procedure in Wireless Communication Systems"

Background of Invention

1. Field of the Invention

[0002] The present invention relates to a method of driving a wireless communications system to trigger a reset procedure, and more specifically, to a method and an apparatus of controlling a reset procedure in a wireless communications system.

2 Description of the Prior Art

[0003] Many communications protocols typically utilize a three-layered approach to communications Please refer to Fig 1, which is a block diagram of the three layers in such a prior art communications protocol In a typical wireless environment, a first station 10 is in wireless communications with one or more second stations 30 An application 13 on the first station 10 composes a message 11 and has it delivered to the second station 20 by handing the message 11 to a layer 3 interface 12 The layer 3 interface 12 then delivers the message 11 to a layer 2 interface 16 in the form of layer 2 service data units (SDUs) 14 The layer 2 SDUs 14 may be of any length. The layer 2 interface 16 comprises a radio link control (RLC) layer 18 on top of a medium access control (MAC) layer 20, and in communications with the medium access control layer 20 The RLC layer 18 supports many functions such as the flow control, the sequence number check, and the ciphering The MAC layer 20 acts as an interface between the RLC layer 18 and the layer 1 interface 22 From an upper-layer perspective (the RLC layer 18 and higher layers), many channels may be established Functionally, however, these channels must be consolidated into a single stream for presentation to the layer 1 interface 22 This is one of the main purposes of the MAC layer 20. Therefore, the MAC layer 20 outputs the PDUs arranged in a single stream to the layer 1 interface 22 In other words, the layer 2 interface 16 composes the SDUs 14 into one or more layer 2 protocol data units (PDUs) 24 Each layer 2 PDU 24 is of a fixed length, and is delivered to the layer 1 interface 22

[0004] The layer 1 interface 22 is the physical layer used for transmitting data to the second station 30 The transmitted data is received by the layer 1 interface 42 of the second station 30 and reconstructed into one or more PDUs 44 which are passed up to the layer 2 interface 36 The layer 2 interface 36 also includes a RLC layer 38 and a MAC layer 40 The MAC layer 40 receives the incoming PDUs 44, and dispatches these PDUs 44 to each channels The RLC layer 38 then assembles one or more layer 2 SDUs 34 according to the PDUs 44 dispatched from the MAC layer 40 Then, the layer 2 SDUs 34 are passed up to the layer 3 interface 32 The layer 3 interface 32 in turn, converts the layer 2 SDUs 34 back into a message 31, which should be identical to the original message 11 that was generated by the application 13 on the first station 10 In the end, the received message 31 is passed to an application 33 on the second station 30

[0005] In a noisy environment of wireless transmissions, a receiver, such as a base station or a mobile unit, often misses data That is, some layer 2 PDUs 24 will therefore be missing Thus, wireless protocols are carefully designed to address such problems It is well-known that each PDU has a specific sequence number, and the PDUs are sequentially numbered The RLC layers 18, 38 are capable of utilizing the sequence numbers of the PDUs to detect if one PDU is erroneously transmitted or received As specified in the 3GPP TS 25 322 V4. 9 0 (2003-6) Radio Link Control (RLC) protocol specification, a sender enables a polling function to request a peer receiver for a status report. In other words, the receiver transmits status reports to the corresponding sender to inform the sender about which PDUs have been received and not received. Each status report consists of one or several STATUS PDUs. Please note that the status report can also be carried by piggybacked STATUS PDUs embedded within DATA PDUs

[0006] Furthermore, if the receiver detects one or several missing PDUs, it can trigger the transmission of a status report to the sender In addition, the receiver can also trigger the transmission of a status report to the sender when a timer Timer_Status_Periodic expires. In other words, the receiver is capable of triggering the transmission of a status report to the sender periodically Both the STATUS PDU and the Piggybacked STATUS PDU have a similar data structure, and they include a plurality of super fields (SUFIs) The SUFIs contain useful sequence number (SN) information used by the sender to determine if the receiver correctly receives the PDUs outputted from the sender For example, the LIST, BITMAP or RLIST SUFIs can be used to indicate negatively acknowledged sequence numbers ACK SUFI with a LSN field can be used to indicate that SN <= LSN -1 is positively acknowledged unless this SN is negatively acknowledged in the same STATUS PDU or Piggybacked STATUS PDU

[0007] In addition, both the receiver and the sender have windows within which they expect to receive the PDUs and transmit the PDUs The sender has a transmitting window that is delimited by two state variables: VT(A) and VT(MS) VT(A) marks the beginning of the transmitting window and VT(MS) marks the end of the transmitting window The sender will only transmit PDUs that have sequence numbers within the range of the

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transmitting window, i e , that are sequentially on or after VT (A) , and are sequentially before VT (MS) The sender has an additional state variable VT (S) When the sender begins transmitting the PDUs that lie within the transmitting window, the sender begins with a PDU having a sequence number given by the state variable VT (A), and works sequentially forward until it reaches a PDU having a sequence number that is just prior to VT(MS) That is, the sender transmits the PDUs in sequence, beginning at VT (A) and ending at VT (MS) -1 The state variable VT (S) holds the sequence number of the next new PDU to be transmitted Thus, the PDUs with sequence numbers on or sequentially before VT (S) -1 have been transmitted at least one time

[0008] Therefore, PDUs with sequence numbers on or after VT(S) have not yet been transmitted by the sender Suppose that the sender receives a STATUS PDU from the peer receiver, and reads a LIST, BITMAP or RLIST SUFI within the STATUS PDU When a negatively acknowledged sequence number indicated by the LIST, BITMAP or RLIST SUFI is outside an interval delimited by VT (A) and VT (S) -1, the STATUS PDU is regarded to include an erroneous sequence number In addition, when the value of the LSN field in an ACK SUFI is outside an interval delimited by VT (A) and VT (S) , the STATUS PDU is also regarded to include an erroneous sequence number Based on the prior art RLC specification, the sender discards the STATUS PDU or the Piggybacked STATUS PDU including the erroneous sequence number, and outputs a RESET PDU to the receiver for activating a corresponding reset procedure

[0009] Please refer to Fig 2, which is a first timing diagram illustrating the prior art reset procedure In Fig 2, the transmission delay between the sender and the receiver is neglected for simplicity. The state variable VT (RST) is used to count the number of times for the RESET PDUs outputted from the sender to the receiver before the reset procedure is completed VT(RST) functions as a count value, and is increased by 1 each time a RESET PDU is scheduled to be transferred, and is reset when the sender receives a RESET ACK PDU from the receiver In addition, an initial value of the VT (RST) is equal to 0 A protocol parameter MaxRST stands for an upper threshold of the VT (RST) If VT (RST) equals MaxRST, the sender informs upper layers about an unrecoverable error to release the radio bearer That is, the maximum number of transmissions of the transmitted RESET PDU is equal to MaxRST-1 Two timers Timer_Status_Periodic and Timer_RST are involved in the reset procedure The timer Timer_RST is started when a RESET PDU is transferred from the sender to the receiver However, if the timer Timer_RST expires, the RESET PDU is transmitted again to the receiver Concerning another timer Timer_Status_Periodic, it is used to trigger the receiver to deliver status reports to the sender periodically Therefore if the timer Timer_Status_Periodic expires, the receiver outputs a status report containing STATUS PDUs to the sender, and the timer Timer_Status_Periodic is restarted As shown in Fig 2 the state variable VT (RST) stores the initial value equaling 0 before the reset procedure is activated In addition the timer Timer_Status_Periodic is started when the receiver is successfully configured for receiving PDUs Therefore, the timer Timer_Status_Periodic starts working before the reset procedure is activated

[0010] Suppose that the timer Timer_RST is used to count a clocked period equal to 100ms, and the protocol parameter MaxRST is set to 4 At to, the receiver is triggered to output a status report to the sender However, because of protocol error or transmission error, the sender receives this STATUS PDU at to and decides that the STATUS PDU contains an erroneous sequence number Therefore, the sender outputs a RESET PDU to the receiver for activating the reset procedure, and waits for the RESET ACK PDU delivered from the receiver The timer Timer_RST is started to count the clocked period (100ms) In addition, the state variable VT (RST) is incremented by 1, and stores 1 at t_0

[0011] At t_0+100, the timer Timer_RST expires and the wanted RESET ACK PDU is not received. Therefore, the sender retransmits the RESET PDU to the receiver, and continues waiting for the wanted RESET ACK PDU The state variable VT(RST) is further increased by 1, and keeps 2 at t_0+100 Similarly, the timer Timer_RST will expire at t_0+200 Suppose that the wanted RESET ACK PDU is not received still. Then, the sender retransmits the RESET PDU to the receiver and continues waiting for the wanted RESET ACK PDU The state variable VT (RST) is further increased by 1, and keeps 3 at t_0+200

[0012] Please note that the timer Timer_Status_Periodic expires at T' that is between t_0+200 and t_0+300 Therefore, the receiver is triggered to output a status report to the sender with the same content as the previous STATUS PDU. Again, the sender receives the STATUS PDU and decides it contains an erroneous sequence number at T' . When the RESET PDU is scheduled to be transferred at T', the state variable VT(RST) is increased by 1, and stores 4 at T' At this time, the state variable VT (RST) stores a value equaling the protocol parameter MaxRST Therefore, the sender indicates an unrecoverable error to the upper layers at T', and the radio bearer is accordingly released

[0013] Because the protocol parameter MaxRST is set to 4, the sender gives the receiver 3 chances to respond a RESET ACK PDU In other words, the sender originally permits the receiver to respond within 300ms If the receiver can respond the RESET ACK PDU before t_0+300, the sender will be able to restart data transmission between the sender and the receiver after resetting protocol parameters However, the timer Timer_Status_Periodic triggers the receiver to respond the periodic status report before t_0+300, and the reset procedure is terminated at T' It is possible that the re-

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ceiver responds the RESET ACK PDU at T' between T' and t_0+300. However, the sender cannot restart data transmission between the sender and the receiver because an unrecoverable error has been indicated to the upper layers at T' and the radio bearer will be released according to the prior art reset procedure. That is, the operation of the timer Timer_Status_Periodic impedes the functionality of the defined protocol parameter MaxRST.

[0014] Please refer to Fig 3, which is a second timing diagram illustrating the prior art reset procedure. Same as Fig. 2, the transmission delay between the sender and the receiver is neglected in Fig. 3 for simplicity. Suppose that the timer Timer_RST is used to count a clocked period equal to 700ms, timer Timer_Status_Period is used to count a clocked period equal to 100ms, and the protocol parameter MaxRST is set to 4. At t_0, the timer Timer_Status_Period expires, and the receiver is triggered to output a status report to inform the sender of the PDU receiving status. Suppose that the sender receives this status report at to and finds it contains an erroneous sequence number. Therefore, the sender outputs a RESET PDU to the receiver at t_0 for activating the reset procedure, and waits for the RESET ACK PDU delivered from the receiver. The timer Timer_RST is started to count the clocked period (700ms), and the state variable VT (RST) is incremented by 1 to store 1. At t_0+100, the timer Timer_Status_Period expires. The receiver sends a status report to the sender with the same content of the previous status report since there is no data PDUs sent by the sender during this period. The sender determines there is an erroneous sequence number in the status report again. Therefore, the sender retransmits the RESET PDU to the receiver, and continues waiting for the wanted RESET ACK PDU. The state variable VT (RST) is further increased by 1, and keeps 2 at t_0+100. Similarly, the timer Timer_Status_Periodic will expire at t_0+200. The receiver sends a status report, which is considered as containing an erroneous sequence number again by the sender. Thus, the sender retransmits the RESET PDU to the receiver, and continues waiting for the wanted RESET ACK PDU. The state variable VT (RST) is further increased by 1, and keeps 3 at t_0+200.

[0015] Similarly, the timer Timer_Status_Periodic expires at t_0+300. Again, the receiver is triggered to output a status report with exactly the same content as before. Therefore, the sender receives the status report and determines that it includes an erroneous sequence number at t_0+300. When the RESET PDU is scheduled to be transferred at t_0+300, the state variable VT(RST) is increased by 1, and stores 4 at t_0+300. At this time, the state variable VT (RST) stores a value equaling the protocol parameter MaxRST. Therefore, the sender indicates an unrecoverable error to the upper layers at t_0+300, and the radio bearer is accordingly released. Please note that the sender originally permits the receiver to respond the RESET ACK PDU within 3*700ms. If the receiver can respond the RESET ACK PDU before t_0+3*700 ms, the sender will be able to restart data transmission between the sender and the receiver. However, the timer Timer_Status_Periodic triggers the receiver to respond the unexpected status reports, and an unrecoverable error is indicated to the upper layers earlier than the expected t_0+3*700 at the sender. It is possible that the receiver responds the RESET ACK PDU after t_0+300. However, an unrecoverable error has been reported to upper layers prematurely to release the radio bearer according to the prior art reset procedure. That is, the operation of the timer Timer_Status_Periodic impedes the correct functionality of the defined protocol parameter MaxRST.

Summary of Invention

[0016] It is therefore a primary objective of the claimed invention to provide a method and an apparatus of controlling a reset procedure in a wireless communications system for canceling interference introduced by unexpected STATUS PDUs during the ongoing reset procedure.

[0017] The present invention discloses a method of controlling a reset procedure for a radio communication link between a sender and a receiver comprising the steps of: (a) the receiver transmitting at least a receiving status report to the sender; (b) blocking the receiver from outputting another receiving status report to the sender for a first predetermined period of time called P1 hereafter; (c) the sender receiving at least one receiving status report sent from the receiver, determining that the receiving status report contains protocol error, transmitting a RESET PDU to the receiver, and starting a first timer for clocking a second predetermined period of time, called P2 hereafter; (d) before the number of transmissions of the RESET PDUs reaches a predetermined value, called M hereafter, the sender outputting a RESET PDU to the receiver each time the first timer expires; and (e) when the number of transmissions of the RESET PDUs reaches M and either the first timer expires or a RESET PDU is triggered to transmit by step (c), the sender detecting an unrecoverable protocol error; wherein P1 in step (b) is not less than the result of P2 multiplied by M.

[0018] The claimed invention further discloses a method of controlling a reset procedure for a radio communication link between a sender and a receiver comprising the steps of: (a) the receiver transmitting at least a receiving status report to the sender; (b) the sender receiving at least a first receiving status report sent from the receiver determining that the receiving status report contains protocol error, activating a reset procedure, and transmitting a RESET PDU to the receiver; and (c) recognizing the reset procedure as ongoing before the sender receives a RESET ACK PDU outputted from the receiver; wherein step (c) further comprises controlling the sender to ignore at least a second receiving status

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report outputted from the receiver when the reset procedure is ongoing, wherein the second receiving status report is received later than the first receiving status report

[0019] In addition, a receiver in wireless communication with a sender for transmitting at least a receiving status report is disclosed The sender receives at least the receiving status report, transmits a RESET PDU to the receiver and starts a first timer for clocking a first predetermined period of time, called P1 hereafter, when determining that the receiving status report contains protocol error, stores a predetermined value, called M hereafter and counts the number of transmissions of the RESET PDUs, wherein before the number of transmissions of the RESET PDUs reaches M, the sender outputs a RESET PDU to the receiver each time the first timer expires, and the sender detects an unrecoverable protocol error when the number of transmissions of the RESET PDUs reaches M and either the first timer expires or a RESET PDU is triggered to transmit The claimed receiver comprises a communication interface for blocking the receiver from outputting another receiving status report for a second predetermined period of time, called P2 hereafter, wherein P2 is not less than the result of P1 multiplied by M

[0020] According to one preferred embodiment, a sender in wireless communication with a receiver for receiving at least a first receiving status report sent from the receiver is disclosed The claimed sender comprises a communication interface for activating a reset procedure and transmitting a RESET PDU to the receiver when determining that the first receiving status report contains protocol error; and a decision logic electrically connected to the communication interface for recognizing the reset procedure as ongoing before the communication interface receives a RESET ACK PDU outputted from the receiver, wherein the decision logic controls the communication interface to ignore at least a second receiving status report outputted from the receiver when the reset procedure is ongoing The second receiving status report is received later than the first receiving status report.

[0021] Briefly summarized, the claimed method of controlling a reset procedure sets a proper clocked period to the timer Timer_Status_Prohibit for blocking the timer Timer_Status_Period from interfering with the counting of the state variable VT(RST) In addition, the claimed method of controlling a reset procedure makes use of an amended triggering condition Therefore, the sender ignores the STATUS PDUs when the reset procedure is ongoing To sum up, the state variable VT (RST) is not computed abnormally, and the reset procedure behaves correctly according to the configured protocol parameter MaxRST, which is equal to M + 1 where M is the predetermined value described above

[0022] These and other objectives of the claimed invention will no doubt become obvious to those of ordinary skill in the art at reading the following detailed description of the preferred embodiments that are illustrated in the various figures and drawings

Brief Description of Drawings

[0023]

Fig 1 is a block diagram of the three layers in such a prior art communications protocol

Fig 2 is a first timing diagram illustrating the prior art reset procedure

Fig 3 is a second timing diagram illustrating the prior art reset procedure

Fig 4 is a first timing diagram illustrating a reset procedure according to a first embodiment of the present invention

Fig 5 is a second timing diagram illustrating a reset procedure according to the first embodiment of the present invention

Fig 6 is a first timing diagram illustrating a reset procedure according to a second embodiment of the present invention

Fig 7 is a second timing diagram illustrating a reset procedure according to the second embodiment of the present invention

Fig 8 is a block diagram of a wireless communication system for controlling the reset procedure of the first embodiment according to the present invention

Fig 9 is a block diagram of a wireless communication system for controlling the reset procedure of the second embodiment according to the present invention

Detailed Description

[0024] As a first embodiment of the preferred embodiments, the duration of a timer Timer_Status_Prohibit is configured properly to block the timer Time_Status_Periodic from impeding the defined protocol parameter MaxRST The usage of the timer Timer_Status_Prohibit is explained as follows Please refer to Fig 4, which is a first timing diagram illustrating the abnormal case handling for a reset procedure according to a first embodiment of the present invention. After the timer Timer_Status_Prohibit is started, the transmission of the triggered status reports is delayed until the timer Timer_Status_Prohibit expires. Suppose that the timer Timer_RST is used to count a clocked period equal to 100ms, and the protocol parameter MaxRST is set to 4 In this first preferred embodiment, the duration of the timer Timer_Status_Prohibit is set to a value that is not less than a product of MaxRST-1 and the clocked period of the timer Timer_RST For example, the period counted by the timer Timer_Status_Prohibit in the first preferred embodiment is set to 350ms

[0025] The timer Timer_Status_Periodic works before the reset procedure is activated At t_0, the receiver de-

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tects missing PDUs and outputs a status report to the sender Because of protocol error or transmission error, the sender receives the STATUS PDU and decides that the STATUS PDU contains an erroneous sequence number at t_0 As before, the transmission delay between the sender and the receiver is neglected in Fig 4 for simplicity Then, the sender outputs a RESET PDU to the receiver for activating the reset procedure, and waits for the RESET ACK PDU delivered from the receiver The timer Timer_RST is started to count the clocked period (100ms) In addition, the state variable VT (RST) is reset by an initial value before the sender receives the STATUS REPORT, and is incremented by 1, and stores 1 at t_0 Please note that the timer Timer_Status_Prohibit is enabled to count its clocked period (350ms) when the receiver outputs the STATUS PDU to the sender The timer Timer_Status_Periodic counts normally

[0026] At t_0+100, the timer Timer_RST expires Therefore, the sender retransmits the RESET PDU to the receiver, and continues waiting for the wanted RESET ACK PDU The state variable VT(RST) is further increased by 1, and keeps 2 at t_0+100. Similarly, the timer_Timer_RST expires at t_0+200 Then, the sender retransmits the RESET PDU to the receiver, and continues waiting for the wanted RESET ACK PDU The state variable VT(RST) is further increased by 1, and keeps 3 at t_0+200

[0027] In the receiver side, at T' the timer Timer_Status_Periodic expires A status report is triggered. However, since the timer Timer_Status_Prohibit has been started, the triggered status report is delayed No status report is sent out by the receiver at T'

[0028] Next, the timer Timer_RST expires at t_0+300 When the RESET PDU is scheduled to be transferred at t_0+300, the state variable VT (RST) is increased by 1, and stores 4 At this time, the state variable VT (RST) stores a value equaling the protocol parameter MaxRST Therefore, the sender indicates an unrecoverable error to the upper layers, and the radio bearer is accordingly released. Because the protocol parameter MaxRST is set to 4, the sender gives the receiver 3 chances to receive the RESET PDU and accordingly to respond a RESET ACK PDU Please note that the clocked period of the timer Timer_Status_Prohibit is not less that 300ms In other words, the protocol parameter MaxRST functions normally to make the sender capable of permitting the receiver to respond with a RESET ACK PDU within 300ms after the STATUS PDU found to contain erroneous sequence number for the first time Suppose that the receiver responds a RESET ACK PDU at T" between T' and to + 300, the sender can reset its protocol parameters and restart data transmission between the sender and the receiver. Note that, since we neglect the transmission delay in the drawings for easy to understand, the round-way transmission delay shall be considered in setting the actual duration of the timer Timer_Status_Prohibit As shown in Fig 4, the timer Timer_Status_Prohibit expires at t_0+350 In other words the delayed status report triggered by expiration of the timer Timer_Status_Periodic at T' can only be sent at t_0+350 which will not impede the MaxRST functionality now. Compared with the prior art reset procedure shown in Fig.2, the claimed reset procedure shown in Fig 4 is not terminated prematurely That is, the sender really gives the receiver enough chances to receive and enough time to respond to the RESET PDU With the help of the adequately configured duration of the timer Timer_Status_Prohibit the operation of the timer Timer_Status_Periodic does not impede the functionality of the defined protocol parameter MaxRST

[0029] Please refer to Fig 5, which is a second timing diagram illustrating the abnormal case handling for a reset procedure according to the first embodiment of the present invention Suppose that the timer Timer_RST is used to count a clocked period equal to 700ms, timer Timer_Status_Period is used to count a clocked period equal to 100ms, and the protocol parameter MaxRST is set to 4 As mentioned above, the duration of the timer Timer_Status_Prohibit, in the first preferred embodiment, is set to a value that is not less than a product of MaxRST-1 and the clocked period of the timer Timer_RST For example, the duration of the timer Timer_Status_Prohibit in the first preferred embodiment is set to 2500ms

[0030] At to, the timer Timer_Status_Period expires, and the receiver is triggered to output a status report to inform the sender of any missing and receiving PDUs Suppose that the sender receives this status report and determines that the status report contains an erroneous sequence number at t_0 Please note that the timer Timer_Status_Prohibit is started to count its clocked period, e g., 2500ms, when the receiver outputs the last STATUS PDU of the status report to the sender If there is any further status report trigger, for example by the expiration of the timer Timer_Status_Periodic, after T_0, the status report will be delayed until the timer Timer_Status_Prohibit expires In the meantime, the sender outputs a RESET PDU to the receiver for activating the reset procedure at t_0, and waits for the RESET ACK PDU delivered from the receiver The timer Timer_RST is started to count the clocked period (700ms), and the state variable VT(RST) is incremented by 1 to store 1.

[0031] Because the timer Timer_Status_Prohibit is started, the receiver will not output further status report when the timer Timer_Status_Periodic expires at t_0 + 100, t_0 + 200, t_0 + 300, etc., until the timer Timer_Status_Prohibit expires. Therefore, if the RESET PDU is missing and not received by the receiver, the timer Timer_RST can successfully expire at t_0+700 At this time, the sender retransmits the RESET PDU to the receiver, and waits for the RESET ACK PDU delivered from the receiver In addition, the state variable VT (RST) is incremented by 1 to store 2, and the timer Timer_RST restarts at t_0+700

[0032] According to the above-mentioned operations,

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when the state variable VT(RST) stores a value equaling the protocol parameter MaxRST, the sender indicates an unrecoverable error to the upper layers and the radio bearer is released. Because the protocol parameter MaxRST is set to 4, the sender gives the receiver 3 chances to receive the RESET PDU and to correspondingly respond a RESET ACK PDU. Please note that the clocked period of the timer Timer_Status_Prohibit is not less that 2100ms. In other words, the protocol parameter MaxRST functions normally to make the sender capable of permitting the receiver three times for receiving the RESET PDU and to respond within 2100ms in total. If the receiver can respond the RESET ACK PDU before t_0+2100, the sender can recover the protocol error indicated by the erroneous sequence number in a status report by reset its protocol parameters and can restart data transmission between the sender and the receiver. As mentioned above, the timer Timer_Status_Prohibit will expire at t_0+2500, and the receiver stop blocking status reports previously triggered by the timer Timer_Status_Periodic. For the case that an unrecoverable protocol error is reported to upper layers by the sender, the delayed status reports is useless since this radio bearer will be released because of unrecoverable protocol error. However, for the case that there is no erroneous sequence number in the first STATUS report, the delayed status report maintains the status reporting mechanism normal. Compared with the prior art reset procedure shown in Fig 3, the claimed reset procedure shown in Fig 5 is not terminated prematurely. That is, the sender really gives the receiver enough chances to receive and enough time to respond to the RESET PDU. With the help of the adequately configured duration of the timer Timer_Status_Prohibit, the operation of the timer Timer_Status_Periodic does not impede the functionality of the defined protocol parameter MaxRST.

[0033] As a second embodiment of the preferred embodiments, one of the prior art triggering conditions for the sender to transmit RESET PDUs to the receiver is amended. That is, the sender is capable of delivering a RESET PDU to the receiver when the sender receives a STATUS PDU carrying an erroneous sequence number only if there is no ongoing reset procedure. In other words, after a reset procedure is triggered, the sender stops receiving any STATUS PDU. This means that any arrived or received STATUS PDU after the reset procedure is initiated and before the reset procedure is terminated will be ignored and discarded. Please refer to Fig 6, which is a first timing diagram illustrating the reset procedure according to the second embodiment of the present invention. Suppose that the timer Timer_RST is used to count a clocked period equal to 100ms, and the protocol parameter MaxRST is set to 4. As shown in Fig 6, the state variable VT (RST) stores the initial value equaling 0 before the reset procedure is activated. In addition, the timer Timer_Status_Periodic is started when the receiver is successfully configured to receiving PDUs. Therefore, the timer Timer_Status_Periodic starts working before the reset procedure is activated. At t_0, the receiver detects missing PDUs and outputs a status report to the sender. Suppose that the sender receives this status report and determines that the status report contains an erroneous sequence number at t_0. There is no ongoing reset procedure at this moment. Thus, by the second embodiment of this claimed invention, the sender outputs a RESET PDU to the receiver, activates a reset procedure, and waits for the RESET ACK PDU delivered from the receiver. The timer Timer_RST is started to count the clocked period (100ms). In addition, the state variable VT(RST) is incremented by 1, and stores 1 at t_0.

[0034] At t_0+100, the timer Timer_RST expires and the wanted RESET ACK PDU is not received yet. Therefore, the sender retransmits the RESET PDU to the receiver, and continues waiting for the wanted RESET ACK PDU. The state variable VT(RST) is further increased by 1, and keeps 2 at t_0+100. Similarly, the timer Timer_RST will expire at t_0+200 when the wanted RESET ACK PDU is still not received yet. Thus, the sender retransmits the RESET PDU to the receiver, and continues waiting for the wanted RESET ACK PDU. The state variable VT (RST) is further increased by 1, and keeps 3 at t_0+200.

[0035] Suppose that the timer Timer_Status_Periodic expires at T' that is between t_0+200 and t_0+300. Therefore, the receiver outputs a status report at T' owing to the triggering of the timer Timer_Status_Periodic expiration. The sender receives this status report, which is deemed to contain erroneous sequence number by the sender. However, since there is an ongoing reset procedure at this moment, the sender is blocked from retransmitting the RESET PDU according to the amended triggering condition mentioned above, i.e. the second embodiment of this claimed invention. As shown in Fig 6, the sender does not respond to the received STATUS PDU at T'. Therefore, the state variable VT(RST) still holds the currently stored value, i.e., 3, and the timer Timer_RST keeps clocking after T'. It is obvious that the timer Timer_RST expires at t_0+300, and the RESET PDU is scheduled to be transferred at t_0+300. Therefore, the state variable VT (RST) is increased by 1, and stores 4 at t_0+300. At this time, the state variable VT (RST) stores a value equaling the protocol parameter MaxRST, and the sender indicates an unrecoverable error to the upper layers to release this radio bearer. Because the protocol parameter MaxRST is set to 4, the sender gives the receiver three chances to receive the RESET PDU and to correspondingly respond a RESET ACK PDU. With the help of the amended triggering condition, the receiver is actually given 3 chances to receive the RESET PDU and 300ms in total to answer the RESET ACK PDU to the sender. In other words, the interference introduced by the timer Timer_Status_Periodic is cancelled, and the correct functionality of the defined protocol parameter MaxRST is obtained.

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[0036] Please refer to Fig 7 which is a second timing diagram illustrating the reset procedure according to the second embodiment of the present invention Suppose that the timer Timer_RST is used to count a clocked period equal to 700ms, timer Timer_Status_Period is used to count a clocked period equal to 100ms, and the protocol parameter MaxRST is set to 4. At t_0, the timer Timer_Status_Period expires, and the receiver is triggered to output a status report to inform the sender of any missing or received PDUs Suppose that the sender receives the status report and determines that the status report contains an erroneous sequence number Therefore, the sender outputs a RESET PDU to the receiver, activates a reset procedure, and waits for the RESET ACK PDU delivered from the receiver The timer Timer_RST is started to count the clocked period (700ms), and the state variable VT (RST) is incremented by 1 to store 1 At t_0+100, the timer Timer_Status_Period expires, the receiver outputs a status report, which is received and considered as including an erroneous sequence number by the sender However, the sender is blocked from retransmitting the RESET PDU according to the amended triggering condition mentioned above The reason is that the reset procedure has been started before t_0+100, and the reset procedure is ongoing at t_0+100 Please note that by the second embodiment of the present invention, when a reset procedure is ongoing, there is no difference whether the sender receives and interprets the content of the status report or the sender simply ignores the status report. As shown in Fig 7, the sender does not respond to the received STATUS PDU at t_0+100 Therefore, the state variable VT(RST) still holds the currently stored value, and the timer Timer_RST keeps clocking after t_0+100 Similarly, the receiver outputs status reports respectively at t_0+200, t_0+300, t_0+400, t_0+500, t_0+600, and t_0+700, and the sender does not respond to these outputted from the receiver. Please note that the timer Timer_RST expires at t_0+700 Therefore, the sender is successfully triggered to transmit the RESET PDU to the receiver again, and the state variable VT(RST) is increased by 1 to store 2 at t_0+700

[0037] According to the above-mentioned operations, when the state variable VT(RST) stores a value equaling the protocol parameter MaxRST, the sender indicates an unrecoverable error to the upper layers, and the radio bearer is accordingly released Because the protocol parameter MaxRST is set to 4, the sender gives the receiver three chances to receive the RESET PDU and to correspondingly respond a RESET ACK PDU It is clear that the interference introduced by the timer Timer_Status_ Periodic, is cancelled during the ongoing reset procedure In other words, the protocol parameter MaxRST functions normally to make the sender capable of giving the receiver three chances to receive the RESET PDU

[0038] Please refer to Fig 8, which is a block diagram of a wireless communication system 50 for controlling the reset procedure of the first embodiment according to the present invention The wireless communication system 50 includes a sender 52 and a receiver 54 The sender 52 has a communication interface 56 a timer 58 electrically connected to the communication interface 56, a counter 60 electrically connected to the communication interface 56, and a storage unit 62 electrically connected to the counter 60 The receiver 54 has a communication interface 64 and two timers 66 and 68 electrically connected to the communication interface 64 The communication interfaces 56, 64 are used to establish radio links (radio bearers) between the sender 52 and the receiver 54 In this preferred embodiment, the timer 58 stands for the timer Timer_RST, the storage unit 62 is used to store the maximum number of transmissions of a RESET PDU, and the counter 60 is used to count the state variable VT (RST) For the receiver 54, the timer 66 stands for the timer Timer_Status_Periodic, and another timer 68 represents the timer Timer_Status_Prohibit Therefore, the timer 68 is appropriately set to prevent the state variable VT (RST) from being erroneously counted. Please note that the method of controlling the reset procedure according to the above-mentioned first embodiment has been clearly disclosed Therefore, the lengthy description of the operations implemented by corresponding device elements is not repeated for simplicity

[0039] Please refer to Fig.9, which is a block diagram of a wireless communication system 70 for controlling the reset procedure of the second embodiment according to the present invention The wireless communication system 70 has a receiver 72 and a sender 74 Please note that when the receiver 72 outputs data to the sender 74, the originally named sender 74 becomes a "receiver", and the originally named receiver 72 becomes a "sender" That is, the naming of the receiver 72 and the sender 74 depends on the operations of the receiver 72 and the sender 74

[0040] The sender 74 is in wireless communication with the receiver 72, and the sender 74 includes a communication interface 76, a decision logic 78 electrically connected to the communication interface 76, a timer 80 electrically connected to the communication interface 76, a counter 82 electrically connected to the communication interface 76, and a storage unit 84 electrically connected to the counter 82 The communication interface 76 is used to establish radio links (radio bearers) between the sender 74 and the receiver 72 In this preferred embodiment, the timer 80 stands for the timer Timer_RST, the storage unit 84 is used to store the maximum number of transmissions of a RESET PDU, and the counter 82 is used to count the state variable VT (RST). In addition, the decision logic 78 is used to detect if the reset procedure is ongoing for preventing the state variable VT(RST) from being erroneous counted In other words, with the help of the decision logic 78, the interference introduced by improper blocking of the timer Timer_RST by the Timer_Status_ Periodic is cancelled

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during the ongoing reset procedure Please note that the method of controlling the reset procedure according to the above-mentioned second embodiment has been clearly disclosed Therefore, the lengthy description of the operations implemented by corresponding device elements is not repeated for simplicity

[0041] In contrast to the prior art, the claimed method of controlling a reset procedure sets a proper clocked period to the timer Timer_Status_Prohibit for blocking the timer Timer_Status_Period from interfering with the counting of the state variable VT(RST) In addition, the claimed method of controlling a reset procedure makes use of an amended triggering condition Therefore, the sender ignores the STATUS PDUs having erroneous sequence numbers during the ongoing reset procedure To sum up, the state variable VT (RST) is not increased prematurely, and the reset procedure behaves correctly according to the configured protocol parameter MaxRST.

[0042] Those skilled in the art will readily observe that numerous modifications and alterations of the device may be made while retaining the teachings of the invention Accordingly, the above disclosure should be construed as limited only by the metes and bounds of the appended claims

Claims

1. A method of controlling a reset procedure for a radio communication link between a sender and a receiver comprising the steps of:

   (a) the receiver transmitting at least a receiving status report to the sender;
   (b) blocking the receiver from outputting another receiving status report to the sender for a first predetermined period of time, called P1 hereafter;
   (c) the sender receiving at least one receiving status report sent from the receiver, determining that the receiving status report contains protocol error, transmitting a RESET PDU to the receiver, and starting a first timer for clocking a second predetermined period of time, called P2 hereafter;
   (d) before the number of transmissions of the RESET PDUs reaches a predetermined value, called M hereafter, the sender outputting a RESET PDU to the receiver each time the first timer expires; and
   (e) when the number of transmissions of the RESET PDUs reaches M and either the first timer expires or a RESET PDU is triggered to transmit by step (c), the sender detecting an unrecoverable protocol error;

   wherein P1 in step (b) is not less than the result of P2 multiplied by M

2. The method of claim 1 wherein step (b) further comprises utilizing the receiver to start a second timer for clocking P1 when a receiving status report is outputted from the receiver

3. The method of claim 2 wherein the second timer is a timer Timer_Status_Prohibit and the first timer is a timer Timer_RST according to a 3GPP specification

4. A method of controlling a reset procedure for a radio communication link between a sender and a receiver comprising the steps of:

   (a) the receiver transmitting at least a receiving status report to the sender;
   (b) the sender receiving at least a first receiving status report sent from the receiver, determining that the receiving status report contains protocol error, activating a reset procedure, and transmitting a RESET PDU to the receiver; and
   (c) recognizing the reset procedure as ongoing before the sender receives a RESET ACK PDU outputted from the receiver;

   wherein step (c) further comprises controlling the sender to ignore at least a second receiving status report outputted from the receiver when the reset procedure is ongoing, wherein the second receiving status report is received later than the first receiving status report

5. The method of claim 4 wherein step (b) further comprises utilizing the sender to periodically output a RESET PDU to the receiver according to a predetermined period of time before the number of transmissions of the RESET PDUs reaches a predetermined value and before the sender receives the RESET ACK PDU outputted from the receiver

6. The method of claim 5 wherein step (b) further comprises utilizing the sender to start a timer for clocking the predetermined period of time when the sender outputs a RESET PDU

7. The method of claim 6 wherein the timer is a timer Timer_RST according to a 3GPP specification.

8. A receiver in wireless communication with a sender for transmitting at least a receiving status report, wherein the sender receives at least the receiving status report, transmits a RESET PDU to the receiver and starts a first timer for clocking a first predetermined period of time, called P1 hereafter, when determining that the receiving status report contains protocol error, stores a predetermined value,

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called M hereafter and counts the number of transmissions of the RESET PDUs, wherein before the number of transmissions of the RESET PDUs reaches M the sender outputs a RESET PDU to the receiver each time the first timer expires, and the sender detects an unrecoverable protocol error when the number of transmissions of the RESET PDUs reaches M and either the first timer expires or a RESET PDU is triggered to transmit;
the receiver comprising:

a communication interface for blocking the receiver from outputting another receiving status report for a second predetermined period of time, called P2 hereafter;wherein P2 is not less than the result of P1 multiplied by M

9. The receiver of claim 8 further comprises a second timer electrically connected to the communication interface for clocking P2, and the communication interface starts the second timer when outputting a receiving status report.

10. The receiver of claim 9 wherein the second timer is a timer Timer_Status_Prohibit and the first timer is a timer Timer_RST according to a 3GPP specification

11. A sender in wireless communication with a receiver for receiving at least a first receiving status report sent from the receiver, the sender comprising:

a communication interface for activating a reset procedure and transmitting a RESET PDU to the receiver when determining that the first receiving status report contains protocol error; and
a decision logic electrically connected to the communication interface for recognizing the reset procedure as ongoing before the communication interface receives a RESET ACK PDU outputted from the receiver;

wherein the decision logic controls the communication interface to ignore at least a second receiving status report outputted from the receiver when the reset procedure is ongoing; wherein the second receiving status report is received later than the first receiving status report

12. The sender of claim 11 periodically outputting a RESET PDU to the receiver according to a predetermined period of time before the number of transmissions of the RESET PDUs reaches a predetermined value

13. The sender of claim 12 further comprising a timer electrically connected to the communication interface for clocking the predetermined period of time, wherein the communication interface starts the timer when outputting a RESET PDU

14. The sender of claim 13 wherein the timer is a timer Timer_RST according to a 3GPP specification

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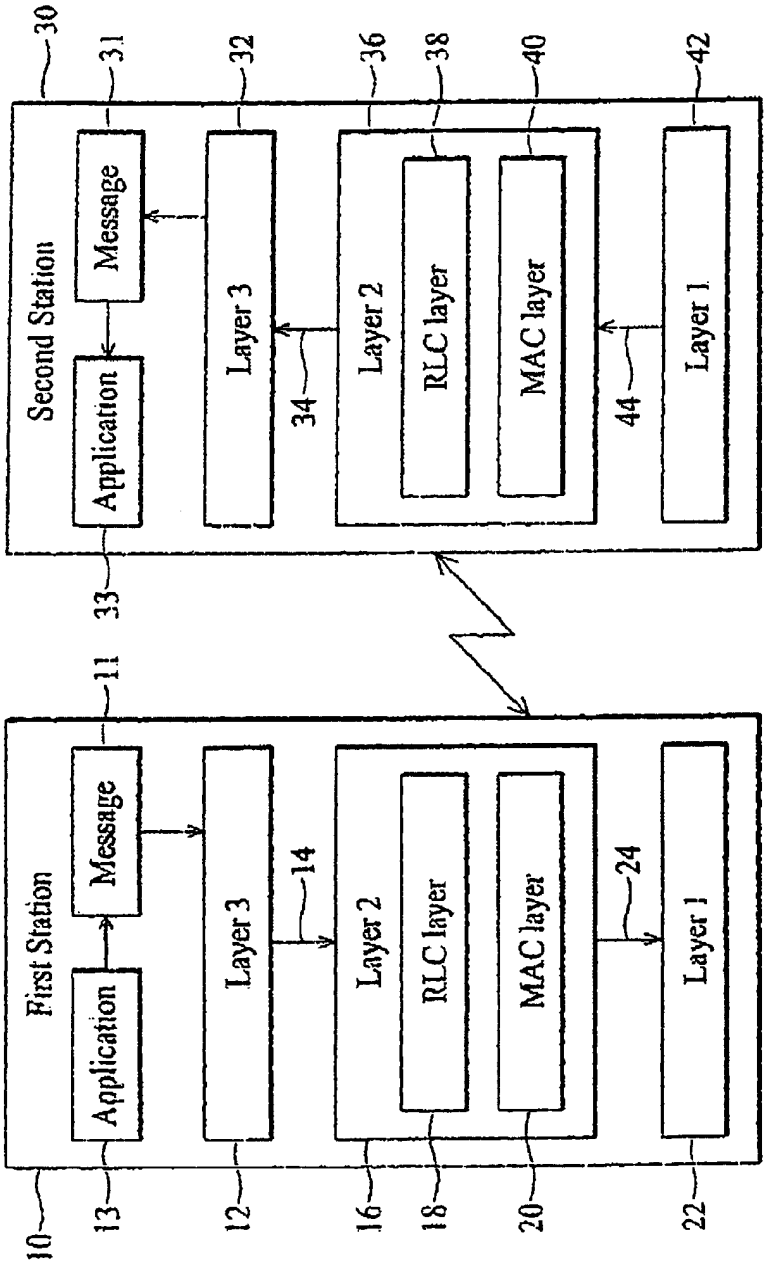


FIG. 1 (RELATED ART)

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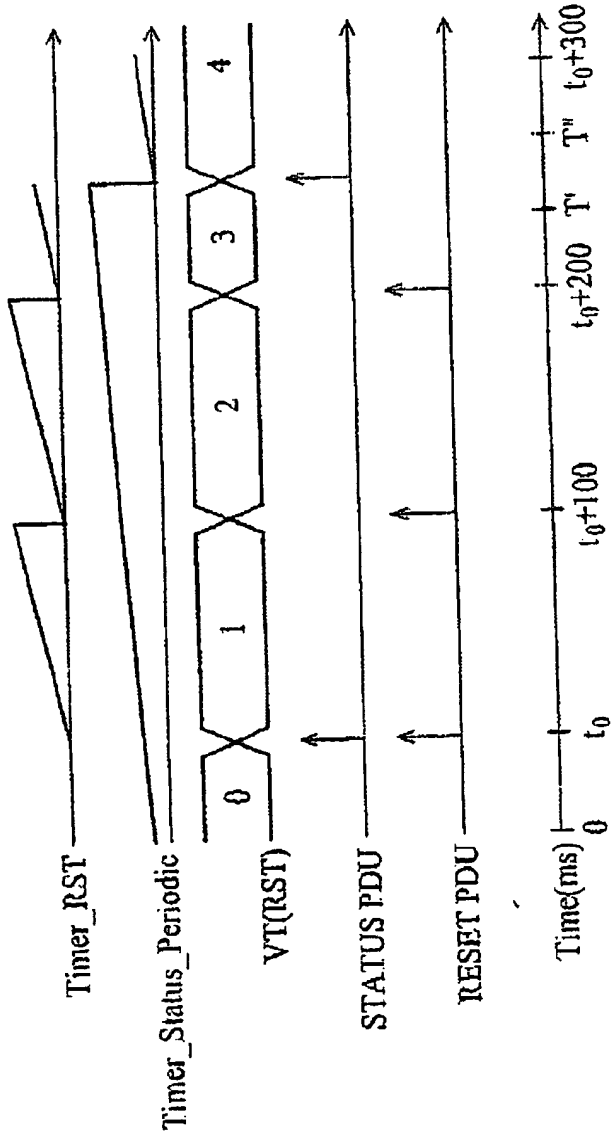


FIG. 2 (RELATED ART)

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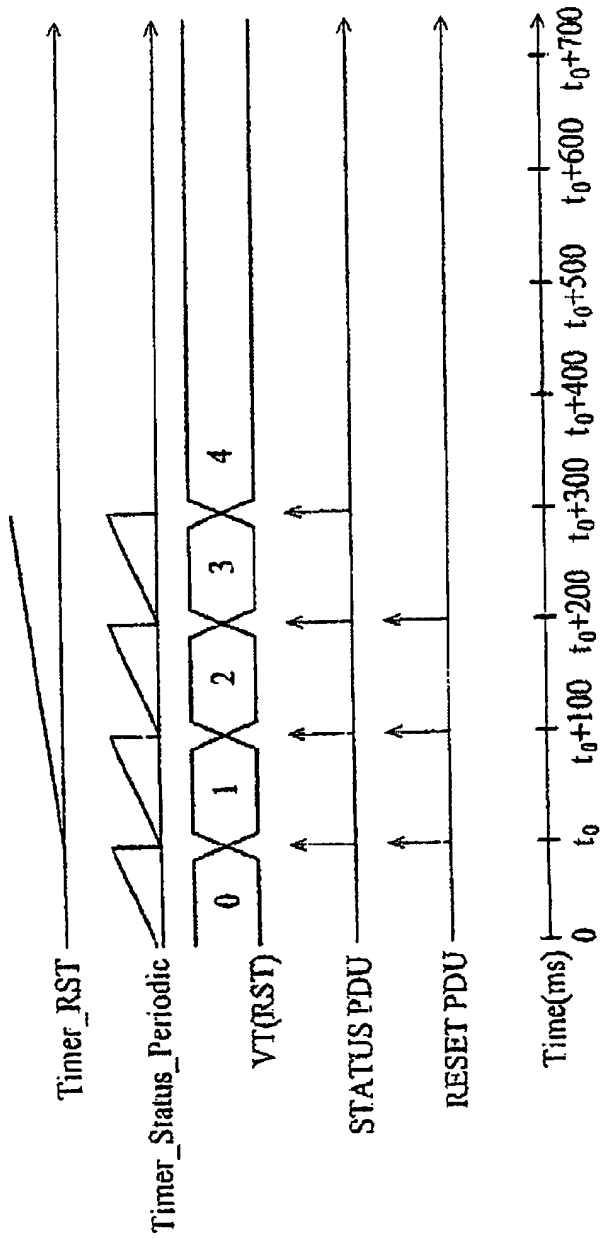


FIG. 3 (RELATED ART)

EPNXMLID: <EP_____. 1507365A2.I.>

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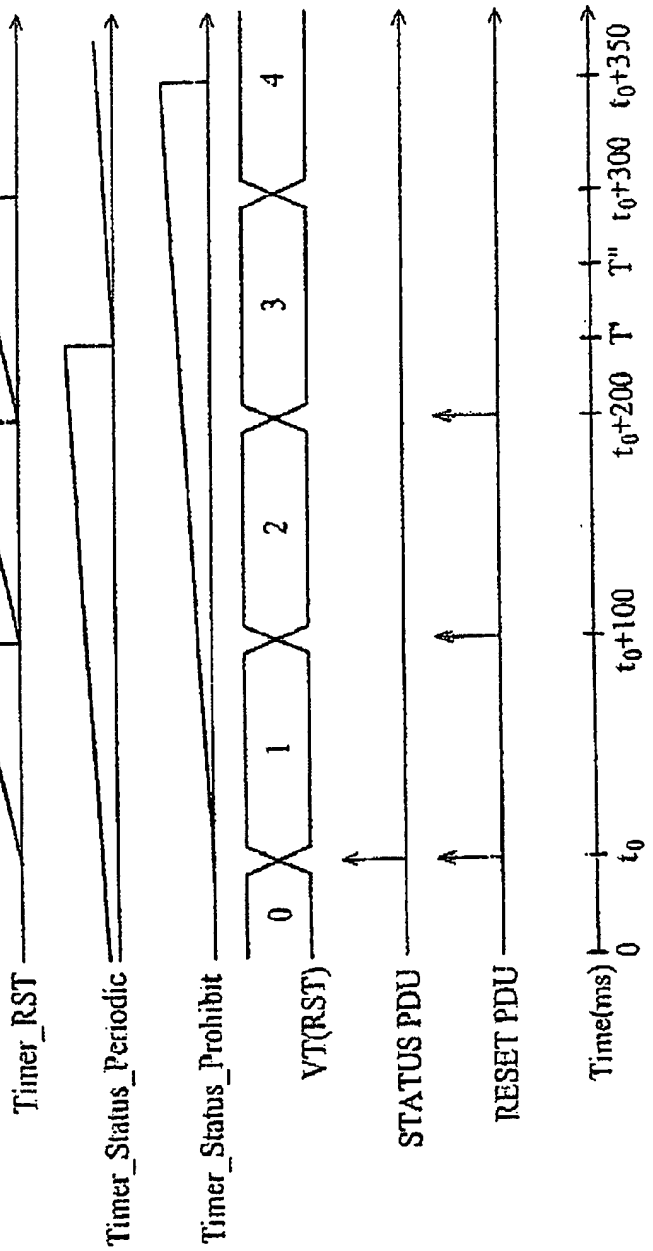


FIG. 4

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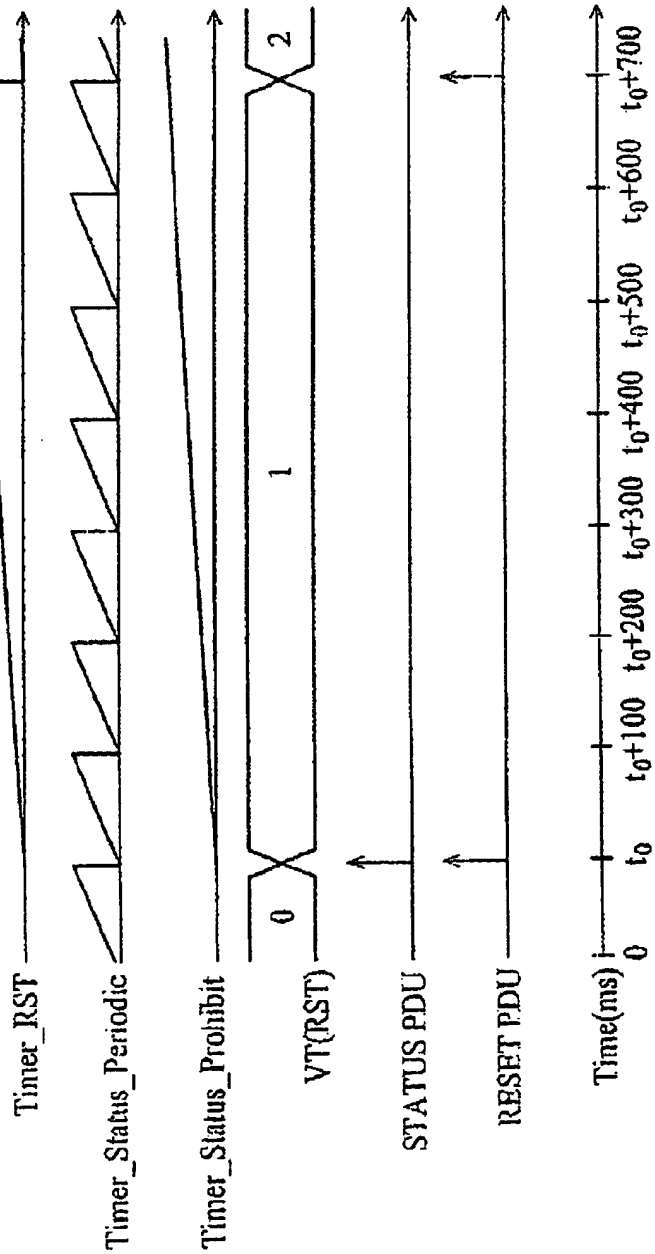


FIG. 5

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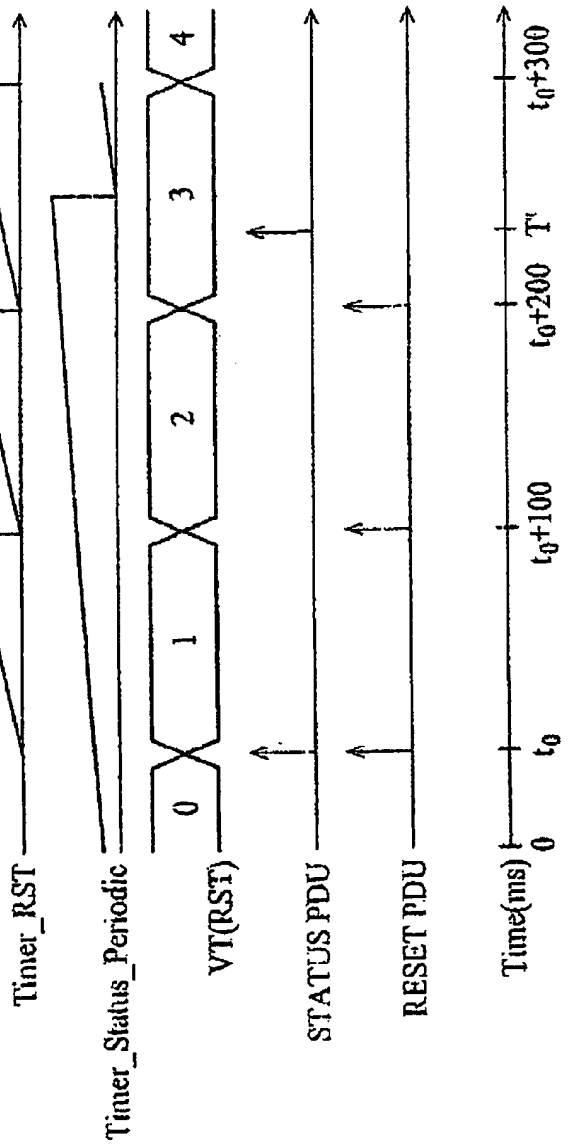


FIG. 6

EN3DOCID: <EP ___ ___ 1507365A2_I_>

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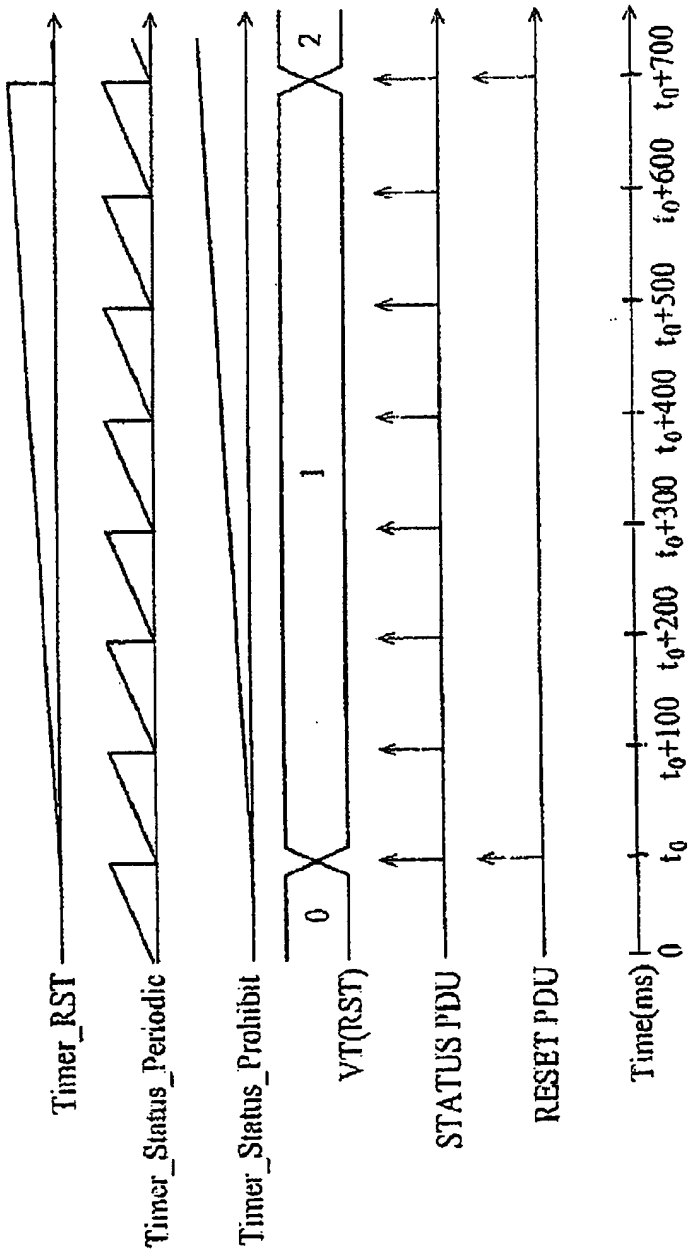


FIG. 7

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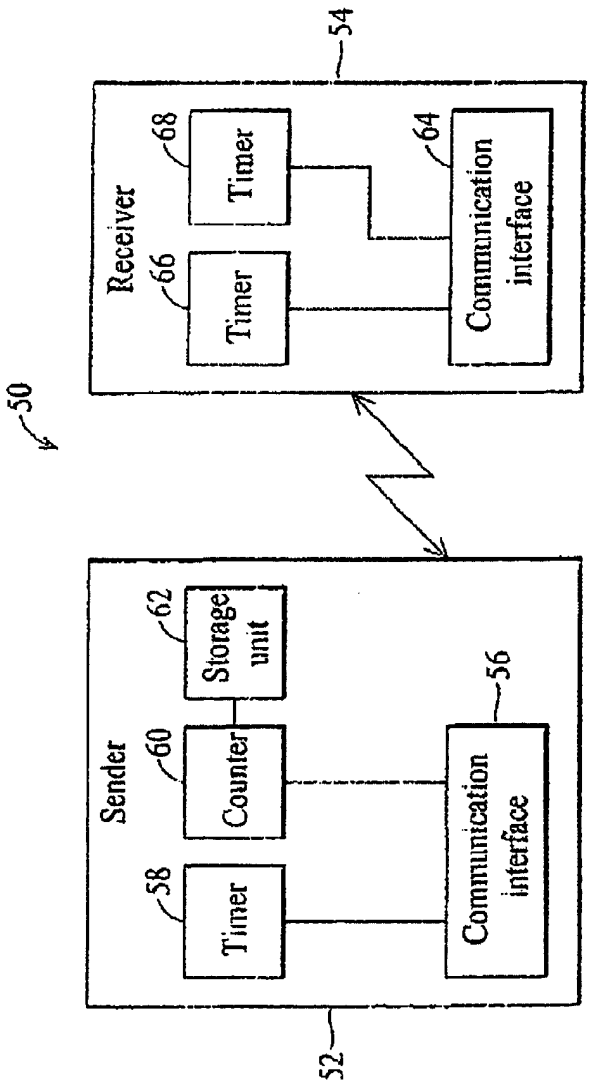


FIG. 8

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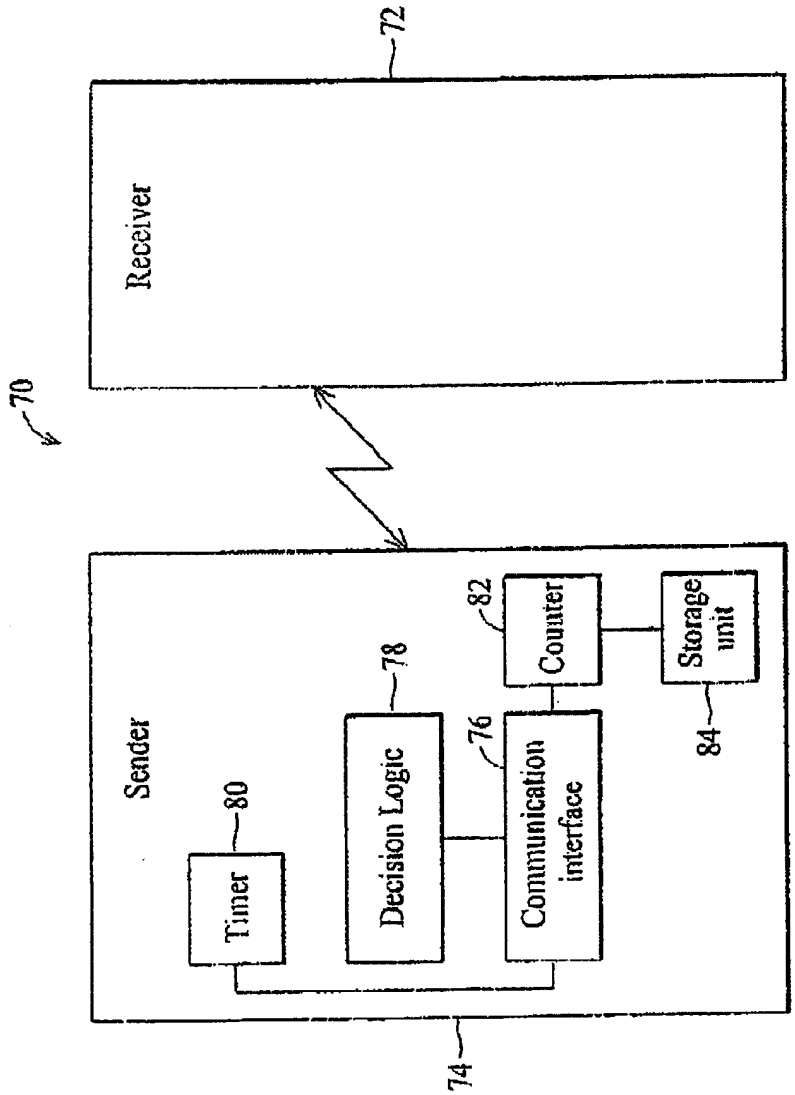


FIG. 9

EN3DOCID: <EP_____1507365A2_I >

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Error Handling In A Wireless Communications System

DESCRIPTION

Cross Reference To Related Applications

[Para 1] This application claims the benefit of U.S. Provisional Application No. 60/594,415, filed 04/05/2005,and included herein by reference.

Background of the Invention

[Para 2] 1. Field of the Invention

[Para 3] The present invention is a method and a device of detecting an erroneous sequence number in a status report unit in a wireless communications system, in particular a method of effectively detecting a status report unit comprising the erroneous sequence number and activating a reset mechanism at an appropriate time, and a device implementing the method.

[Para 4] 2. Description of the Prior Art

[Para 5] With the coming of the information age, requirements of mobile voice, data communications, and various mobile services increase each day. Communications systems of prior art are facing bottlenecks of channel usage overflowing and inefficient transmission speeds. Therefore, the third generation mobile communication was developed to have better usage of the frequency spectrum and higher-speed transmission service. Compared to the existing second generation mobile communication technology, the most significant

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difference with the third generation mobile communication is that the third generation mobile communication uses a Wideband Code Division Multiple Access (WCDMA) protocol for wireless access. The WCDMA protocol provides a more efficient channel usage, outstanding coverage, and high quality, high-speed multimedia data transmission. The WCDMA protocol can satisfy different service requirements of QoS, provide flexible duplex transmission services, and also better communication quality.

[Para 6] Taking a specification set by the 3rd Generation Partnership Project (3GPP), the 3rd generation mobile communications system can provide different levels of transmission quality and operates in different modes according to the different requirements, for instance, Transparent Mode (TM), Unacknowledged Mode (UM), Acknowledged Mode (AM). TM is used for services requiring instant transmission, UM is used for services requiring instant transmission as well as packet orders, and AM is used for robust services requiring data accuracy but not instant transmission.

[Para 7] In AM, for better data accuracy and robustness, Radio Link Control (RLC) layers of a transmitter and a receiver initiate a status report procedure at an appropriate time to have the receiver transmit a status report unit, or a piggybacked status report unit to the transmitter. The transmitter then executes procedures followed according to the status report unit from the receiver.

[Para 8] For more efficient transmission, under the AM, the transmitter defines status variables below:

1. Variable VT(S): represents a Sequence Number (SN) of a next Protocol Data Unit

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(PDU) to be transmitted for a first time (i.e. excluding retransmitted PDUs). The variable is updated after corresponding PDUs are transmitted. An initial value of the variable is 0.

[Para 9] 2. Variable VT(A): represents an SN of a next expected acknowledged PDU, meaning the SN following an SN of a last in-sequence acknowledged PDU. The variable is updated after a status report unit showing the expected PDU had been positively acknowledged.

[Para 10] According to the variables VT(S) and VT(A), the RLC layer is able to detect whether an SN in a status report unit is correct. Please see the description below.

[Para 11] With the specification defined by the 3GPP, in AM, an SN of a PDU is represented by 12 bits. If a status report unit (or a piggybacked status report unit) comprises an erroneous SN, meaning when a negatively acknowledged SN in the status report unit (or the piggybacked status report unit) does not agree with $VT(A) \leq SN \leq VT(S)-1$, an RLC reset procedure will be initiated to recover the error. Comparisons between SNs are done by modulus operations with VT(A) as a modulus base. With the base = VT(A) and a negatively acknowledged SN x, determination is made whether x lies outside an interval $\{x \mid (VT(A) - base) \bmod 4096 \leq (x - base) \bmod 4096 \leq (VT(S) - 1 - base) \bmod 4096\}$, in order to detect whether any erroneous SN is contained in the status report unit.

[Para 12] For example, in AM, suppose that a transmitter has transmitted PDUs with SN = 0 to SN = 249 (inclusive) and the PDUs with SN = 0 to SN = 199 (inclusive) are positively acknowledged. From definitions of the status variables, it is known that VT(A) = 200, and VT(S) = 250. Assuming a protocol error occurs and makes a status report unit received by a receiver show a PDU with SN = 300 is negatively acknowledged when in fact, the transmitter

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may have not yet transmitted the PDU with SN = 300. Now with a modulus base = 200, check if

[Para 13] {x | (VT(A) – base) mod 4096 ≤ (x – base) mod 4096 ≤ (VT(S) – 1 – base) mod 4096}

[Para 14] = {x| (200 – 200) mod 4096 ≤ (x – 200) mod 4096 ≤ (250 – 1 – 200) mod 4096}

[Para 15] = {x | 0 ≤ (x – 200) mod 4096 ≤ 49}

[Para 16] Since the SN = 300 is not inside a set {x | 0 ≤ (x – 200) mod 4096 ≤ 49}, the status report unit transmitted from a receiver comprising an erroneous SN is detected. Thereafter, the RLC layer initiates a reset procedure to recover this kind of error.

[Para 17] From the above descriptions of the prior art, when a negatively acknowledged SN of a status report unit and the SN lies outside a set {x | (VT(A) – base) mod 4096 ≤ (x – base) mod 4096 ≤ (VT(S) – 1 – base) mod 4096}, the prior art is able to detect an erroneous SN in the status report unit. However, when VT(A) = VT(S), meaning an SN of a next PDU to be transmitted for a first time equals an SN of a next expected acknowledged PDU, problems will occur in the above detection method.

[Para 18] For example, in AM, suppose that a transmitter has transmitted PDUs with SN = 0 to SN = 199 (inclusive) and the PDUs are all positively acknowledged. From definitions of the status variables, it is known that VT(A) = VT(S) = 200. Assuming a protocol error occurs and makes a status report unit received by a receiver show a PDU with SN = 300 is negatively acknowledged when in fact, the transmitter may have not yet transmitted the PDU with SN = 300. Now with a modulus base = 200, check if

[Para 19] {x | (VT(A) – base) mod 4096 ≤ (x – base) mod 4096 ≤ (VT(S) – 1 – base) mod 4096}

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[Para 20] = {x| (200 – 200) mod 4096 ≤ (x – 200) mod 4096 ≤ (200 – 1 – 200) mod 4096}

[Para 21] = {x | 0 ≤ (x – 200) mod 4096 ≤ 4095}.

[Para 22] Since the SN = 300 lies inside a set {x | 0 ≤ (x – 200) mod 4096 ≤ 4095}, the prior art is unable to determine whether the status report unit comprises an erroneous SN, so an RLC reset procedure cannot be initiated. This leads to errors not being recovered and waste in wireless transmission resources.

[Para 23] To summarize, when an SN of a next PDU to be transmitted for a first time equals an SN of a next expected acknowledged PDU, which means that all PDUs transmitted by a transmitter are positively acknowledged, any negative acknowledgement of a PDU in a status report unit must be caused by a protocol error. However, the prior art is unable to detect errors as such, which leads to not initiating a reset procedure instantly, and causes waste in wireless resources.

Summary of the Invention

[Para 24] According to the claimed invention, a method of detecting an erroneous sequence number of a status report unit in a wireless communications system includes receiving a status report unit output from a receiver of the wireless communications system. Whether the received status report includes a negatively acknowledged sequence that number lies in a range of greater than or equal to a sequence number following a sequence number of a last in-sequence acknowledged packet of a transmitter and less than a sequence number of a next packet to be transmitted for the first time by the transmitter is detected. Determination that the status report unit includes an erroneous sequence number is made when the negatively acknowledged sequence number is not in the range.

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[Para 25] These and other objectives of the present invention will no doubt become obvious to those of ordinary skill in the art after reading the following detailed description of the preferred embodiment that is illustrated in the various figures and drawings.

Brief Description of the Drawings

[Para 26] Fig. 1 is a flow chart of detecting whether a status report unit comprises an erroneous SN in a wireless communications system.

[Para 27] Fig. 2 is a block diagram of a wireless communication transmission device.

[Para 28] Fig. 3 is a diagram of the program code in Fig. 2.

Detailed Description

[Para 29] Please refer to Fig. 2. Fig. 2 is a block diagram of a wireless communications transmission device (transmitter) 200 used in a wireless communications system. For clarity, Fig. 2 only shows an input device 202, an output device 204, a control circuit 206, a central processor 208, a storage device 210, a program code 212, and a transceiver 214 of the wireless communications transmission device 200. In the wireless communications transmission device 200, the control circuit 206 executes the program code 212 stored in the storage device 210 with the central processor 208, and then controls operations of the wireless communication transmission device 200. The wireless communications transmission device 200 can receive signals input by users through the input device 202, or output signals through the output device 204. The transceiver 214 is used for receiving or transmitting wireless signals. In a structure of a communications protocol, the transceiver

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214 is known as a part of a first layer, whereas the control circuit 206 is an application of a second and a third layer.

[Para 30] Please refer to Fig. 3. Fig. 3 is a schematic diagram of the program code 212 in Fig. 2. The program code 212 comprises an application program layer 300, a third layer interface 302, a second layer interface 306, and a first layer interface 318. When transmitting signals, the second layer interface 306 stores a plurality of Service Data Units (SDUs) 308, which are submitted from the third layer interface 302, in a buffer 312. Then, the second layer interface 306 generates a plurality of Protocol Data Units (PDUs) 314 according to the SDUs 308 stored in the buffer 312, and outputs the PDUs 314 generated to a destination through the first layer interface 318.

[Para 31] For improving robustness of data transmission, when in AM, the program code 212 receives a status report unit 310 or a piggybacked status report unit 310 of a receiver from the first layer interface 308, in order to detect a receiving status of the receiver. Under this situation, the present invention provides a negatively acknowledged SN detecting program code 309 for detecting whether the status report unit comprises an erroneous SN.

[Para 32] Please refer to Fig. 1. Fig. 1 is a flow chart of a procedure 10 that detects whether a status report unit comprises an erroneous SN in a wireless communications system. The wireless communications system can be a 3rd generation mobile communications system operating in AM. The procedure 10 can be complied into the negatively acknowledged SN detecting program code 309, and the procedure 10 comprises:

[Para 33] Step 100: start.

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[Para 34] Step 102: receive a status report unit output from a receiver of the wireless communications system.

[Para 35] Step 104: detect whether a negatively acknowledged SN lies in a range of greater than or equal to an SN following an SN of a last in-sequence acknowledged packet of a transmitter and less than an SN of a next packet to be transmitted for the first time by the transmitter when the negatively acknowledged SN is detected in the status report unit. If the negatively acknowledged SN does not lie in the range, go to step 106; otherwise, go to step 108.

[Para 36] Step 106: the status report unit comprises an erroneous SN.

[Para 37] Step 108: end.

[Para 38] In accordance to the procedure 10, when a status report unit shows a negatively acknowledged SN, the present invention detects whether the negatively acknowledged SN lies in a range of greater than or equal to an SN following an SN of a last in-sequence acknowledged packet of a transmitter and less than an SN of a next packet to be transmitted for the first time by the transmitter, meaning to detect whether the negatively acknowledged SN agrees with $VT(A) \leq SN < VT(S)$. The status report unit is determined to comprise an erroneous SN when disagreement occurs. Furthermore, a reset procedure is initiated when the status report unit is determined to comprise an erroneous SN. As the equation $VT(A) \leq SN < VT(S)$ shows, a modulus operation with VT(A) as a modulus base, meaning that base = VT(A), is used to detect whether the SN x lies outside the set $\{x \mid (VT(A) - base) \bmod 4096 \leq (x - base) \bmod 4096 < (VT(S) - base) \bmod 4096\}$ and hence detect whether the status report unit comprises an erroneous SN.

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[Para 39] For example, in AM, suppose that a transmitter has transmitted PDUs with SN = 0 to SN = 249 (inclusive) and the PDUs with SN = 0 to SN = 199 (inclusive) are positively acknowledged. From definitions of the status variables, it is known that VT(A) = 200 and VT(S) = 250. Assuming a protocol error occurs and makes a status report unit received by a receiver show a PDU with SN = 300 is negatively acknowledged when in fact, the transmitter may have not yet transmitted the PDU with SN = 300. Now with a modulus base = 200, check if

[Para 40] $\{x \mid (VT(A) - base) \bmod 4096 \leq (x - base) \bmod 4096 < (VT(S) - base) \bmod 4096\}$

[Para 41] $= \{x \mid (200 - 200) \bmod 4096 \leq (x - 200) \bmod 4096 < (250 - 200) \bmod 4096\}$

[Para 42] $= \{x \mid 0 \leq (x - 200) \bmod 4096 < 50\}$.

[Para 43] Since the SN = 300 lies outside a set $\{x \mid 0 \leq (x - 200) \bmod 4096 < 50\}$, the status report unit is detected as comprising an erroneous SN. The RLC layer then initiates a reset procedure to recover from the error.

[Para 44] In addition, when VT(A) = VT(S), meaning an SN of a next PDU to be transmitted for a first time equals an SN of a next expected acknowledged PDU, the present invention also can effectively detect a status report unit comprising an erroneous SN.

[Para 45] For example, in AM, suppose that a transmitter has transmitted PDUs with SN = 0 to SN = 199 (inclusive) and the PDUs are all positively acknowledged. From definitions of the status variables, it is known that VT(A) = VT(S) = 200. Assuming a protocol error occurs and makes a status report unit received by a receiver show a PDU with SN = 300 is negatively acknowledged when in fact, the transmitter may have not yet transmitted the PDU with SN = 300. Now with a modulus base = 200, check if

[Para 46] $\{x \mid (VT(A) - base) \bmod 4096 \leq (x - base) \bmod 4096 < (VT(S) - base) \bmod 4096\}$

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[Para 47] = {x| (200 – 200) mod 4096 ≤ (x – 200) mod 4096 < (200 – 200) mod 4096}

[Para 48] = {x | 0 ≤ (x – 200) mod 4096 < 0}.

[Para 49] Since the SN = 300 lies outside a set {x | 0 ≤ (x – 200) mod 4096 < 0}, therefore the status report unit comprising an erroneous SN is detected. The RLC layer then initiates a reset procedure.

[Para 50] As described before, when an SN of a next PDU to be transmitted for a first time equals an SN of a next expected acknowledged PDU, it represents all PDUs having been transmitted by a transmitter are positively acknowledged. So, any negative acknowledgement by a status report unit must be an error caused by a protocol. The prior art cannot detect protocol errors in this case. In comparison to the present invention in the same situation, with VT(A) ≤ SN < VT(S), it is known that none of the negatively acknowledged SNs agree with VT(A) ≤ SN < VT(S) when VT(A) = VT(S). In fact, there should not be any negatively acknowledged PDUs reported from a status report unit, and if there is, it must be a protocol error. So the present invention is able to detect this kind of error with VT(A) ≤ SN < VT(S).

[Para 51] When applying the procedure 10 of the present invention, as known by people who are familiar in this field that designers can write (burn-in) the procedures 10 into a storage device (firmware) of a communication device as a program code. There are many modifications or variations of design that can be made while retaining essence of the present invention.

[Para 52] In summary, when an SN of a next PDU to be transmitted for a first time equals an SN of a next expected acknowledged PDU, all PDUs transmitted by a transmitter are

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positively acknowledged. Therefore, any negative acknowledgement by a status report unit must be an error caused by a protocol. The present invention can effectively detect this kind of error and initiate an RLC reset procedure at an appropriate time, avoiding waste in system resources, and hence increase transmission efficiency and save system resources.

[Para 53] Those skilled in the art will readily observe that numerous modifications and alterations of the device and method may be made while retaining the teachings of the invention. Accordingly, the above disclosure should be construed as limited only by the metes and bounds of the appended claims.

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What is claimed is:

[Claim 1] 1. A method of detecting an erroneous sequence number of a status report unit in a wireless communications system, the method comprising:

receiving a status report unit output from a receiver of the wireless communications system;

detecting whether a negatively acknowledged sequence number lies in a range of greater than or equal to a sequence number following a sequence number of a last in-sequence acknowledged packet of a transmitter and less than a sequence number of a next packet to be transmitted for the first time by the transmitter when the negatively acknowledged sequence number is detected in the status report unit; and

detecting that the status report unit comprises an erroneous sequence number when the negatively acknowledged sequence number is not in the range.

[Claim 2] 2. The method of claim 1 further comprising initiating a reset procedure when the status report unit comprises the erroneous sequence number.

[Claim 3] 3. The method of claim 1 wherein detecting whether the negatively acknowledged sequence number lies in the range of greater than or equal to the sequence number following the sequence number of the last in-sequence acknowledged packet of the transmitter and less than the sequence number of the next packet to be transmitted for the first time by the transmitter when the negatively acknowledged sequence number is detected in the status report unit is performed by modulus operation with the sequence number following the sequence number of the last in-sequence acknowledged packet of the transmitter as a modulus base.

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[Claim 4] 4. The method of claim 1 wherein the status report unit is a piggybacked status report unit.

[Claim 5] 5. The method of claim 1 wherein the wireless communications system is a third generation mobile communications system.

[Claim 6] 6. The method of claim 5 wherein the third generation mobile communications system is operating in an acknowledged mode.

[Claim 7] 7. A wireless device comprising a central processing unit in electrical communications with a memory, the memory comprising program code for implementing the method of claim 1.

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ABSTRACT

A method for detecting an erroneous sequence number in a status report in a wireless communications system includes receiving a status report sent from a receiver of the wireless communications system, detecting whether a negatively acknowledged sequence number is within a range that is larger than or equal to the sequence number following the sequence number of the last in-sequence acknowledged packet and smaller than the sequence number of the next packet to be transmitted for the first time, and detecting that the status report includes an erroneous sequence number when a negatively acknowledged sequence number is not within the abovementioned range.

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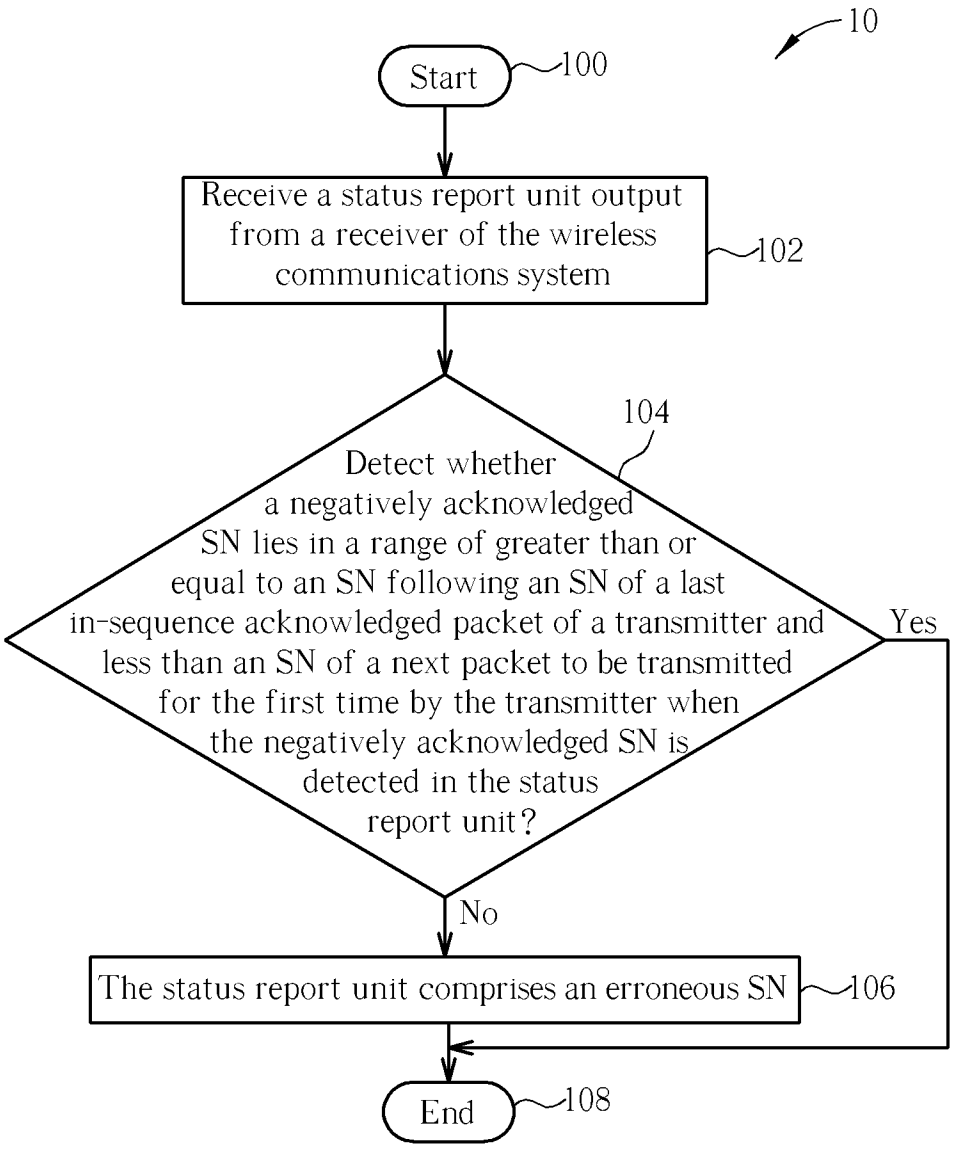


Fig. 1

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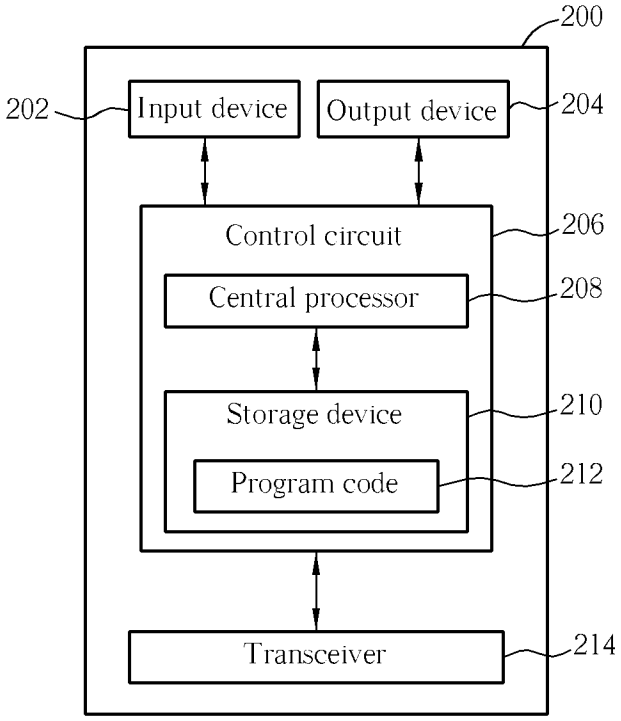


Fig. 2

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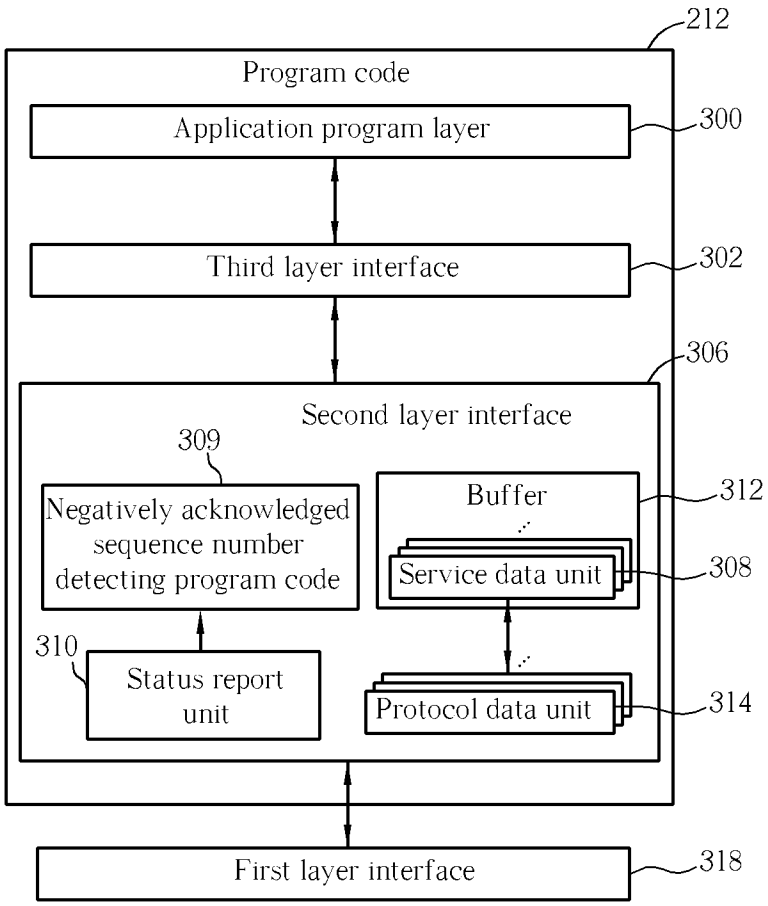


Fig. 3

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	ASTP0061USA
	Application Number	
Title of Invention	Error Handling In A Wireless Communications System	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
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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.)

Applicant Information:

Applicant 1 Remove

Applicant Authority ◉ Inventor ○ Legal Representative under 35 U.S.C. 117 ○ Party of Interest under 35 U.S.C. 118

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City	Taipei City	State/Province	
Postal Code		Country	Taiwan, Province of China

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	27765		
Email Address	winstonhsu@naipo.com	Add Email	Remove Email

Application Information:

Title of the Invention	Error Handling In A Wireless Communications System		
Attorney Docket Number	ASTP0061USA	Small Entity Status Claimed	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Suggested Class (if any)		Sub Class (if any)	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)	3	Suggested Figure for Publication (if any)	

PTO/SB/14 (08-05)
Approved for use through 07/31/2006. 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	ASTP0061USA
	Application Number	
Title of Invention	Error Handling In A Wireless Communications System	

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 been and will not be the subject of an application filed in another country, or under a multilateral 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.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ US Representative (37 CFR 11.9)
Customer Number	027765		

Domestic Priority Information:

This section allows for the applicant to claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c). 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(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	non provisional of	60594415	2005-04-05

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

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).

Remove

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

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

Assignee 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.

Assignee 1 Remove

If the Assignee is an Organization check here. ☐

PTO/SB/14 (08-05)
Approved for use through 07/31/2006. 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	ASTP0061USA
	Application Number	
Title of Invention	Error Handling In A Wireless Communications System	

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

Mailing Address Information:			
Address 1			
Address 2			
City		**State/Province**	
Country		Postal Code	
Phone Number		Fax Number	
Email Address			
Additional Assignee Data may be generated within this form by selecting the **Add** button.			Add

Signature:

A signature of the applicant or representative is required in accordance with 37 CFR 1.33 and 10.18. Please see 37 CFR 1.4(d) for the form of the signature.					
Signature	/WINSTON HSU/			Date (YYYY-MM-DD)	2006-04-03
First Name	WINSTON	Last Name	HSU	Registration Number	41,526

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

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

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

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

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

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

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

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

COMBINED DECLARATION AND POWER OF ATTORNEY

As a below named inventor , I hereby declare that :

I believe I am the sole (if only one name appears below) , or joint (if more than one name appears) , original and first inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled :

"Error Handling In A Wireless Communications System"

\+ The specification for the above entitled invention is filed herewith.

_____ The specification for the above entitled invention was filed previously with application serial number: _____ Filing Date: _____

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

I acknowledge the duty to disclose information which is material to the patentability of the invention disclosed in this application in accordance with Title 37, Code of Federal Regulations, Section 1.56 (a). I further acknowledge the duty in any continuation-in-part application to disclose to the Patent and Trademark Office all information known to be material to the patentability of the invention disclosed in this application, as defined in 1.56, which became available to me between the filing date of the prior application and the filing date of this application.

PRIORITY CLAIM

_____ There is no claim of priority

\+ Claim of priority is based on the following:

(1) This is a Non-Provisional of U.S. provisional application No.:60/594,415, filed 2005/04/05

POWER OF ATTORNEY and CORRESPONDENCE ADDRESS INDICATION

I hereby revoke all previous powers of attorney given in the above-identified application.

I hereby appoint the practitioners associated with the Customer Number: 027765 as my/our attorney(s) or agent(s) to prosecute the application identified above, and to transact all business in the United States Patent and Trademark Office connected therewith.

Please recognize or change the correspondence address for the above-identified application to the address associated with the above-mentioned Customer Number.

Petitioners' Exhibit 1007, p. 452
AT&T et al v. Innovative Sonic
IPR2024-01143

DECLARATION

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true: and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued hereon.

(請發明人務必簽署日期)

Date: April 3, 2006 Sam Shiaw-Shiang Jiang

Printed Name: Sam Shiaw-Shiang Jiang

Post Office Address and Residence: 4F, No.150, Li-Te Rd., Peitou, Taipei City, Taiwan, R.O.C.

Citizen of: R.O.C.

Petitioners' Exhibit 1007, p. 453
AT&T et al v. Innovative Sonic
IPR2024-01143

COMBINED DECLARATION AND POWER OF ATTORNEY

As a below named inventor , I hereby declare that :

I believe I am the sole (if only one name appears below) , or joint (if more than one name appears) , original and first inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled :

"Error Handling In A Wireless Communications System"

\+ The specification for the above entitled invention is filed herewith.

_____ The specification for the above entitled invention was filed previously with application serial number: _____ Filing Date: _____

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

I acknowledge the duty to disclose information which is material to the patentability of the invention disclosed in this application in accordance with Title 37, Code of Federal Regulations, Section 1.56 (a). I further acknowledge the duty in any continuation-in-part application to disclose to the Patent and Trademark Office all information known to be material to the patentability of the invention disclosed in this application, as defined in 1.56, which became available to me between the filing date of the prior application and the filing date of this application.

PRIORITY CLAIM

_____ There is no claim of priority

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(1) This is a Non-Provisional of U.S. provisional application No.:60/594,415, filed 2005/04/05

POWER OF ATTORNEY and CORRESPONDENCE ADDRESS INDICATION

I hereby revoke all previous powers of attorney given in the above-identified application.

I hereby appoint the practitioners associated with the Customer Number: 027765 as my/our attorney(s) or agent(s) to prosecute the application identified above, and to transact all business in the United States Patent and Trademark Office connected therewith.

Please recognize or change the correspondence address for the above-identified application to the address associated with the above-mentioned Customer Number.

Petitioners' Exhibit 1007, p. 454
AT&T et al v. Innovative Sonic
IPR2024-01143

DECLARATION

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true: and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued hereon.

(請發明人務必簽署日期)

Date: April 3, 2006 Sam Shiaw-Shiang Jiang

Printed Name: Sam Shiaw-Shiang Jiang

Post Office Address and Residence: 4F, No.150, Li-Te Rd., Peitou, Taipei City, Taiwan, R.O.C.

Citizen of: R.O.C.

Petitioners' Exhibit 1007, p. 455
AT&T et al v. Innovative Sonic
IPR2024-01143

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	Error Handling In A Wireless Communications System
First Named Inventor:	Sam Shiaw-Shiang Jiang
Filer:	Winston Hsu
Attorney Docket Number:	ASTP0061USA

Filed as Large Entity

Utility Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility application filing	1011	1	300	300
Utility Search Fee	1111	1	500	500
Utility Examination Fee	1311	1	200	200
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**1000**

Electronic Acknowledgement Receipt

EFS ID:	1016736
Application Number:	11278546
Confirmation Number:	6559
Title of Invention:	Error Handling In A Wireless Communications System
First Named Inventor:	Sam Shiaw-Shiang Jiang
Customer Number:	27765
Filer:	Winston Hsu
Filer Authorized By:	
Attorney Docket Number:	ASTP0061USA
Receipt Date:	04-APR-2006
Filing Date:	
Time Stamp:	03:20:27
Application Type:	Utility
International Application Number:	

Payment information:

Submitted with Payment	yes
Payment was successfully received in RAM	$1000.0
RAM confirmation Number	287
Deposit Account	503105
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.16 and 1.17	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)	Multi Part	Pages
1	Specification	astp0061-0-a1-abx-DESC.PDF	53029	no	11
Warnings:					
Information:					
2	Claims	astp0061-0-a1-abx-CLMS.PDF	19360	no	2
Warnings:					
Information:					
3	Abstract	astp0061-0-a1-abx-ABST.PDF	16674	no	1
Warnings:					
Information:					
4	Drawings	astp0061-0-a1-abx-DRAW.PDF	43536	no	3
Warnings:					
Information:					
5	Application Data Sheet	astp0061-0-a1-ads.PDF	1391477	no	4
Warnings:					
Information:					
6	Oath or Declaration filed	astp0061-0-a1-dec.PDF	117490	no	2
Warnings:					
Information:					
7	Power of Attorney (may include Associate POA)	astp0061-0-a1-poa.PDF	117490	no	2
Warnings:					
Information:					
8	Fee Worksheet (PTO-875)	fee-info.pdf	8332	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	1767388		

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.