S268	1	370/344.ccls. and enhanced near uplink	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/23 21:51
S269	1	370/344.ccls. and enhanced near uplink	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/23 21:52
S270	31	455/436.ccls. and enhanced near uplink	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/23 21:52
S271	211	455/439.ccls. and ((universal near mobile near telecommunication near system) or UMTS)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/23 21:54
S272	152	chase near combin$3 and (ACK or NACK) with((cyclic near redundan$3 near check) or CRC)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/23 21:55
S273	31	RNC with primary near2 ((base near station) or (basestation) or bs or (node near b) or "node-b" or (access near point))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/23 21:56
S274	302	455/442.ccls. and ((universal near mobile near telecommunication near system) or UMTS)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/23 21:57
S275	29	Node-B with (H-ARQ or HARQ) and ACK and NACK and MCS and time	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/23 21:57
S276	1333	high near speed near uplink near packet near access	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/27 15:39
S277	1260	enhanced near uplink	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/27 15:39

S278	377	enhanced near uplink near dedicat$3 near channel	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/27 15:40
S279	397	enhanced near2 uplink near dedicat$3 near channel	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/27 15:40
S280	1335	enhanced near2 uplink	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/27 16:01
S281	2432	(enhanced near2 uplink or S276)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/27 16:01
S282	37	370/310.ccls. and (enhanced near2 uplink or S276)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/27 16:01
S283	355	370/328-334.ccls. and (enhanced near2 uplink or S276)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/27 16:02
S284	14	370/389.ccls. and (enhanced near2 uplink or S276)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/27 16:05
S285	5	370/392.ccls. and (enhanced near2 uplink or S276)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/27 16:10
S286	17	370/400-401.ccls. and (enhanced near2 uplink or S276)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/27 16:10
S287	778	(enhanced near2 uplink or S276) and HARQ	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/27 16:10

S288	0	370/410.ccls. and (enhanced near2 uplink or S276)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/27 16:53
S289	8	370/427-428.ccls. and (enhanced near2 uplink or S276)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/27 16:53
S290	0	370/4431.ccls. and (enhanced near2 uplink or S276)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/27 16:53
S291	5	370/431.ccls. and (enhanced near2 uplink or S276)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/27 16:53
S292	5	370/442-443.ccls. and (enhanced near2 uplink or S276)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/27 16:53
S293	2	"20020191544".pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/27 17:08
S294	1	370/458.ccls. and (enhanced near2 uplink or S276)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/27 17:29
S295	69	370/462-478.ccls. and (enhanced near2 uplink or S276)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/27 17:29
S296	2	370/498.ccls. and (enhanced near2 uplink or S276)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/27 17:29
S297	12	455/403.ccls. and (enhanced near2 uplink or S276)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/27 17:34

S298	14	455/422.1.ccls. and (enhanced near2 uplink or S276)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/27 17:34
S299	48	455/436.ccls. and (enhanced near2 uplink or S276)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/27 17:38
S300	75	455/450.ccls. and (enhanced near2 uplink or S276)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/27 17:38
S301	5	455/451.ccls. and (enhanced near2 uplink or S276)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/27 17:41
S302	28	455/452.1.ccls. and (enhanced near2 uplink or S276)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/27 17:41
S303	27	455/452.2.ccls. and (enhanced near2 uplink or S276)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/27 17:41
S304	45	455/442.ccls. and (enhanced near2 uplink or S276)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/27 17:42
S305	158	455/507-524.ccls. and (enhanced near2 uplink or S276)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/27 17:43
S306	43	455/68-70.ccls. and (enhanced near2 uplink or S276)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/27 17:54
S307	0	714/100.ccls. and (enhanced near2 uplink or S276)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB		ON	2010/07/27 18:00

IPR2023-01270 Page 402

S308	0	714/699.ccls. and (enhanced near2 uplink or S276)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/27 18:00
S309	91	"714"/$.ccls. and (enhanced near2 uplink or S276)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/07/27 18:00

EAST Search History (Interference)

< This search history is empty>

7/29/2010 8:47:32 PM
C:\Documents and Settings\broberts\My Documents\EAST\Workspaces\11434330a.wsp

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.
11/434,330	05/15/2006	Guodong Zhang	I-2-0674.2US	5166

24374 7590 08/05/2010
VOLPE AND KOENIG, P.C.
DEPT. ICC
UNITED PLAZA
30 SOUTH 17TH STREET
PHILADELPHIA, PA 19103

EXAMINER	
ROBERTS, BRIAN S	

ART UNIT	PAPER NUMBER
2466	

NOTIFICATION DATE	DELIVERY MODE
08/05/2010	ELECTRONIC

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

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

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

eoffice@volpe-koenig.com
hrivera@volpe-koenig.com

Interview Summary	Application No.	Applicant(s)	
	11/434,330	ZHANG ET AL.	
	Examiner	Art Unit	
	BRIAN ROBERTS	2466	

All participants (applicant, applicant's representative, PTO personnel):

(1) *BRIAN ROBERTS*. (3)____.

(2) *MELISSA DOOGAN (applicant's representative)*. (4)____.

Date of Interview: *21 July 2010*.

Type: a)☒ Telephonic b)☐ Video Conference
c)☐ Personal [copy given to: 1)☐ applicant 2)☐ applicant's representative]

Exhibit shown or demonstration conducted: d)☐ Yes e)☒ No.
If Yes, brief description: ____.

Claim(s) discussed: *9 and 10*.

Identification of prior art discussed: *N/A*.

Agreement with respect to the claims f)☐ was reached. g)☐ was not reached. h)☒ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: *The Examiner explained that some steps of the method of claims 9-10 in the amendment filed 07/08/2010 were directed to a single data packet while other steps were directed to multiple data packets. The Applicant's representative agreed to file a supplemental amendment to amend the method to be directed to a single data packet..*

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN A NON-EXTENDABLE PERIOD OF THE LONGER OF ONE MONTH OR THIRTY DAYS FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

/Brian Roberts/
Examiner, Art Unit 2466

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record
A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews
Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.
All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:
- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:

1) A brief description of the nature of any exhibit shown or any demonstration conducted,
2) an identification of the claims discussed,
3) an identification of the specific prior art discussed,
4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
5) a brief identification of the general thrust of the principal arguments presented to the examiner,
   (The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
6) a general indication of any other pertinent matters discussed, and
7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the **PATENT APPLICATION** of:	
Zhang et al.	
Application No.: 11/434,330	
Confirmation No.: 5166	
Filed: May 15, 2006	
For: SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER	
Group: 2466	
Examiner: Brian S. Roberts	

Our File: I-2-0674.2US

Date: November 5, 2010

REPLY PURSUANT TO 37 C.F.R. §1.111

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

Sir:

This Reply is being timely filed in response to the Office Action dated August 5, 2010.

Please amend the application without prejudice or disclaimer as follows:

Amendments to the Claims:

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

1-8. (Canceled)

9. (Previously Presented) A method for enhanced uplink communication during soft handover implemented in a Node-B operating as a primary Node-B, comprising:

transmitting to a wireless transmit/receive unit (WTRU) specified scheduling information, wherein the specified scheduling information is not transmitted to the WTRU by any non-primary Node-B;

receiving an enhanced uplink data packet from the WTRU in response to transmitting the specified scheduling information;

performing a cyclic redundancy check (CRC) on the enhanced uplink data packet;

transmitting an acknowledgement (ACK) or a negative acknowledgment (NACK) to the WTRU in response to the received enhanced uplink data packet wherein the transmission of either the ACK or NACK is based on the results of the CRC; and

further transmitting a successfully received enhanced uplink data packet to a radio network controller (RNC).

10. (Previously Presented) The method of claim 14, further comprising:

soft combining the unsuccessfully received enhanced uplink data packet, stored in the buffer, with a retransmission of the enhanced uplink data packet for transmission to the RNC.

11-13. (Canceled).

14. (Previously Presented) The method of claim 9 further comprising: storing an unsuccessfully received enhanced uplink data packet in a buffer.

REMARKS/ARGUMENTS

After the foregoing Amendments, claims 9, 10 and 14 are currently pending in this application. Claims 1-8 and 11-13 were previously canceled without prejudice.

Claim Rejections - 35 USC § 103

Claims 9-10, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 7,346,035 to Lee et al. (hereinafter "Lee") in view of U.S. Patent Application No. 2002/0191544 to Cheng et al. (hereinafter "Cheng"). Applicant respectfully disagrees.

Lee and Cheng do not disclose, teach or suggest "transmitting to a wireless transmit/receive unit (WTRU) specified scheduling information, wherein the specified scheduling information is not transmitted to the WTRU by any non-primary Node-B" and "receiving an enhanced uplink data packet from the WTRU in response to transmitting the specified scheduling information" as recited in independent claim 9.

Lee teaches retransmitting uplink (UL) packet data from a user equipment (UE) to Node-Bs in a mobile communication system servicing an enhanced uplink dedicated transport channel (EUDCH). (Lee, col. 1, lines 25-28). After the EUDCH is established, the *UE transmits to a Node B* a data rate and uplink channel

condition required for scheduling. (Lee, col. 2, lines 29-31). Lee does not teach, suggest or disclose "transmitting *to* a wireless transmit/receive unit (WTRU) specified scheduling information" as recited in independent claim 9. In addition, while Lee suggests the UE transmits packet data to the Node B, the "enhanced uplink data packet" is not transmitted "*in response to* ... the specified scheduling information" since the UE in Lee *does not receive* scheduling information. Therefore, the UE does not use the scheduling information to transmit the packet data to the Node B and the Node B does not receive "an enhanced uplink data packet from the WTRU in response to transmitting the specified scheduling information".

The office action dated August 5, 2010 states that Lee does not teach all of the elements of independent claim 9 and cites Cheng as performing a cyclic redundancy check. Cheng teaches inter layer control at a network node by receiving and decoding a protocol data unit (PDU) from a lower protocol layer at an upper layer. (Cheng, [0044]). A CRC is performed to determine if the PDU is valid. While Cheng teaches the performance of a CRC, Cheng does not cure the deficiencies of Lee. Further, nothing in the combination of Lee and Cheng suggest the above-argued elements of independent claim 9.

For at least this reason independent claim 9 is patentable over the combination of Lee and Cheng. In addition, claims 10 and 14 are patentable over Lee and Cheng at least by virtue of their dependence upon independent claim 9.

For the reasons presented above, withdrawal of the 35 USC § 103 rejection of claims 9, 10 and 14 is respectfully requested.

Conclusion

If the Examiner believes that any additional minor formal matters need to be addressed in order to place this application in condition for allowance, or that a telephonic interview will help to materially advance the prosecution of this application, the Examiner is invited to contact the undersigned by telephone at the Examiner's convenience.

In view of the foregoing remarks, Applicants respectfully submit that the present application is in condition for allowance and a notice to that effect is respectfully requested.

Respectfully submitted,

Zhang et al.

By/Melissa D. Doogan/
Melissa D. Doogan
Registration No. 63,025

Volpe and Koenig, P.C.
United Plaza
30 South 17th Street
Philadelphia, PA 19103-4009
Telephone: (215) 568-6400
Facsimile: (215) 568-6499

MDD/kmc

Electronic Acknowledgement Receipt

EFS ID:	8780594
Application Number:	11434330
International Application Number:	
Confirmation Number:	5166
Title of Invention:	Supporting enhanced uplink transmission during soft handover
First Named Inventor/Applicant Name:	Guodong Zhang
Customer Number:	24374
Filer:	Robert D. Leonard/Katie Carlson
Filer Authorized By:	Robert D. Leonard
Attorney Docket Number:	I-2-0674.2US
Receipt Date:	05-NOV-2010
Filing Date:	15-MAY-2006
Time Stamp:	15:55:12
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		20101105_I_2_0674_2US_Reply.pdf	106864 6d8d459c152fbbf254039fffd2c26c2e4f9b2ea9	yes	7

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
	Claims	2	3
	Applicant Arguments/Remarks Made in an Amendment	4	7

Warnings:	
Information:	
Total Files Size (in bytes):	106864

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
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 11/434,330	Filing Date 05/15/2006	☐ To be Mailed

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)	SMALL ENTITY ☐		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)		RATE ($)	FEE ($)
☐ BASIC FEE (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

		(Column 1)		(Column 2)	(Column 3)	SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
	11/05/2010	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
AMENDMENT	Total (37 CFR 1.16(i))	* 3	Minus	** 20	= 0	X $ =		OR	X $52=	0
	Independent (37 CFR 1.16(h))	* 1	Minus	***3	= 0	X $ =		OR	X $220=	0
	☐ 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	0

		(Column 1)		(Column 2)	(Column 3)					
		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
AMENDMENT	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:
/GAIL D. D. WOOTEN/

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

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

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.
11/434,330	05/15/2006	Guodong Zhang	I-2-0674.2US	5166

24374 7590 01/21/2011
VOLPE AND KOENIG, P.C.
DEPT. ICC
UNITED PLAZA
30 SOUTH 17TH STREET
PHILADELPHIA, PA 19103

EXAMINER	
ROBERTS, BRIAN S	

ART UNIT	PAPER NUMBER
2466	

NOTIFICATION DATE	DELIVERY MODE
01/21/2011	ELECTRONIC

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

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

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

eoffice@volpe-koenig.com

Office Action Summary	Application No.	Applicant(s)	
	11/434,330	ZHANG ET AL.	
	Examiner	Art Unit	
	BRIAN ROBERTS	2466	

-- 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 *05 November 2010*.

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) *9,10 and 14* 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) *9-10, 14* 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: ____.

DETAILED ACTION

- Claims 9-10, and 14 remain pending.

Claim Rejections - 35 USC § 103

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.

Claims 9-10 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. (US 7346035) in view of Cheng et al. (US 2002/0191544).

- In reference to claim 9

Lee et al. teaches a method comprising:

- transmitting to a wireless transmit/receive unit (*e.g. Figure 2, UE 112; col. 2 lines 25-26*) specified scheduling information (*e.g. modulation scheme and the number of available codes; Figure 2, step 204; col. 2 lines 49-55)*, wherein the specified scheduling information is not transmitted to the WTRU by any non-primary Node-B (*e.g. not Node B 110*)
- receiving an enhanced uplink data packet from the WTRU in response to transmitting the specified scheduling information (*Figure 2, step 207; col. 2 lines 64-66*)
- performing an error check on the enhanced uplink data packet (*Figure 2, step 208; col. 2 lines 66-67*)

- transmitting an acknowledgement (ACK) or a negative acknowledgment (NACK) to the WTRU in response to the received enhanced uplink data packet wherein the transmission of either the ACK or NACK is based on the results of the error check (*Figure 2, step 209; col. 3 lines 1-4*); and
- further transmitting a successfully received enhanced uplink data packet to a radio network controller (*Figure 12, step 1295; col. 2 lines 47-49*).

While Lee et al. suggest using a cyclic redundancy check (*col. 6 lines 62-65*) does not explicitly teach that the error check on the enhanced uplink data packet is a cyclic redundancy check (CRC).

In Figure 2, Cheng et al. teaches performing a cyclic redundancy check (*s6; par. 0044*) to determine if a received packet is valid and transmitting either a ACK or NACK based on the results of the CRC (*s9; par. 0044*)

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the error check of Lee et al. to be a cyclic redundancy check wherein the transmission of either the ACK or NACK is based on the results of the CRC as suggested by Cheng et al. because it allows for a primary node-B to determine whether a received packet is valid so that the node-B may transmit either an ACK or NACK to a UE in order to reduce an error rate of a communication between the UE and the node-B.

- In reference to claim 10

The combination of Lee et al. and Cheng et al. teaches a method that covers substantially all limitations of the parent claim. Lee et al. further teaches soft combining the unsuccessfully received enhanced uplink data packet, stored in the buffer, with a retransmission of the enhanced uplink data packet for transmission to the RNC (*col. 12 lines 46-52; col. 13 lines 54-58*).

- In reference to claim 14

The combination of Lee et al. and Cheng et al. teaches a method that covers substantially all limitations of the parent claim. Lee et al. further teaches storing an unsuccessfully received enhanced uplink data packet in a buffer (*i.e. storing previous unsuccessfully received packet in memory for soft-combining with current packet; col. 12 lines 40-42; col. 13 lines 54-58*).

Response to Arguments

Applicant's arguments filed 11/05/2010 have been fully considered but they are not persuasive.

- On page 5 of the Amendment, the Applicant contends that Lee does not teach suggest or disclose "transmitting *to* a wireless transmit/receive unit (WTRU) specified scheduling information" as recited in independent claim 9. In addition, while Lee suggests the UE transmits packet data to the Node B, the "enhanced uplink data packet" is not transmitted "in *response to* ... the specified scheduling information" since the UE in Lee *does not receive*

scheduling information. Therefore, the UE does not use the scheduling information to transmit the packet data to the Node B and the Node B does not receive "an enhanced uplink data packet from the WTRU in response to transmitting the specified scheduling information".

- The Examiner respectfully disagrees. In Figure 2 step 204, Lee discloses Node B 110 transmitting to UE 112 specified scheduling information (*e.g. modulation scheme and the number of available codes; col. 2 lines 49-55*). Lee further discloses UE 112 receiving the scheduling information ("*In step 205, the Node B [sic] 112 selects its data rate according to the* ***received*** *highest data rate; col. 2 lines 55-57*") and using the scheduling information to transmit a packet to Node B 110 (*Figure 2, step 207; col. 2 lines 64-66*). Thus Lee meets the limitations "transmitting to a wireless transmit/receive unit specified scheduling information, wherein the specified scheduling information is not transmitted to the WTRU by any non-primary Node-B" and "receiving an enhanced uplink data packet from the WTRU in response to transmitting the specified scheduling information".

Conclusion

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 BRIAN ROBERTS whose telephone number is (571)272-3095. The examiner can normally be reached on M-F 10:00-7:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, DANIEL RYMAN can be reached on (571) 272-3152. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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

BSR
01/12/2011

/Daniel J. Ryman/
Supervisory Patent Examiner, Art Unit 2466

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11434330	ZHANG ET AL.
	Examiner	Art Unit
	BRIAN ROBERTS	2466

✓	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	01/12/2011								
	1	-								
	2	-								
	3	-								
	4	-								
	5	-								
	6	-								
	7	-								
	8	-								
	9	✓								
	10	✓								
	11	-								
	12	-								
	13	-								
	14	✓								

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11434330	ZHANG ET AL.
	Examiner	Art Unit
	BRIAN ROBERTS	2466

SEARCHED

Class	Subclass	Date	Examiner

SEARCH NOTES

Search Notes	Date	Examiner
PALM inventor search	1/12/2011	BSR
Search focused on: 370/310,328-334,389,392,400,401,410,427-428,431,442,443,458,462,464,469-478,498 455/403,422.1,436,442,450,451,452.1,452.2507,509,510,514,517-519,524,68,70 714/100,699,709,746-752,758,776,799,819-821,	1/12/2011	BSR
EAST text search: see search history printout	1/12/2011	BSR

INTERFERENCE SEARCH

Class	Subclass	Date	Examiner

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S310	516	"455"/$.ccls. and uplink with scheduler	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 19:32
S311	322	uplink with scheduler and CRC	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 19:44
S312	1621	high near speed near uplink near packet near access	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 19:49
S313	48	370/310.ccls. and (enhanced near2 uplink or S312)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 19:49
S314	450	370/328-334.ccls. and (enhanced near2 uplink or S312)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 19:49
S315	16	370/389.ccls. and (enhanced near2 uplink or S312)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 19:51
S316	5	370/392.ccls. and (enhanced near2 uplink or S312)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 19:52
S317	19	370/400-401.ccls. and (enhanced near2 uplink or S312)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 19:52

S318	2	"7346035".pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 19:53
S319	902	(enhanced near2 uplink or S312) and HARQ	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 20:04
S320	0	370/410.ccls. and (enhanced near2 uplink or S312)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 20:04
S321	8	370/427-428.ccls. and (enhanced near2 uplink or S312)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 20:04
S322	6	370/431.ccls. and (enhanced near2 uplink or S312)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 20:04
S323	5	370/442-443.ccls. and (enhanced near2 uplink or S312)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 20:05
S324	2	370/458.ccls. and (enhanced near2 uplink or S312)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 20:05
S325	81	370/462-478.ccls. and (enhanced near2 uplink or S312)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 20:05
S326	2	370/498.ccls. and (enhanced near2 uplink or S312)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 20:38

S327	12	455/403.ccls. and (enhanced near2 uplink or S312)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 20:38
S328	22	455/422.1.ccls. and (enhanced near2 uplink or S312)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 20:38
S329	54	455/436.ccls. and (enhanced near2 uplink or S312)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 20:38
S330	93	455/450.ccls. and (enhanced near2 uplink or S312)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 20:42
S331	6	455/451.ccls. and (enhanced near2 uplink or S312)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 20:43
S332	33	455/452.1.ccls. and (enhanced near2 uplink or S312)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 20:45
S333	38	455/452.2.ccls. and (enhanced near2 uplink or S312)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 20:46
S334	46	455/442.ccls. and (enhanced near2 uplink or S312)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 20:48
S335	195	455/507-524.ccls. and (enhanced near2 uplink or S312)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 20:49

S336	56	455/68-70.ccls. and (enhanced near2 uplink or S312)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 20:51
S337	104	"714"/$.ccls. and (enhanced near2 uplink or S312)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 20:52

EAST Search History (Interference)

< This search history is empty>

1/14/2011 3:53:51 PM
C:\Documents and Settings\broberts\My Documents\EAST\Workspaces\11434330b.wsp

PTO/SB/30EFS (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 contains a valid OMB control number.

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

Application Number	11434330	Filing Date	2006-05-15	Docket Number (if applicable)	I-2-0674.2US	Art Unit	2466
First Named Inventor	Zhang et al.			Examiner Name	Brian S. Roberts		

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 090435

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

☐ Applicant Signature

PTO/SB/30EFS (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 contains a valid OMB control number.

Signature of Registered U.S. Patent Practitioner			
Signature	/Melissa D. Doogan/	Date (YYYY-MM-DD)	2011-04-21
Name	Melissa D. Doogan	Registration Number	63025

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

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

Privacy Act Statement

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

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

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

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

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

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

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

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

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

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

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

Electronic Patent Application Fee Transmittal

Application Number:	11434330
Filing Date:	15-May-2006
Title of Invention:	Supporting enhanced uplink transmission during soft handover
First Named Inventor/Applicant Name:	Guodong Zhang
Filer:	Robert D. Leonard/Katie Carlson
Attorney Docket Number:	I-2-0674.2US

Filed as Large 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($)
Miscellaneous:				
Request for continued examination	1801	1	810	810
		Total in USD ($)		**810**

Electronic Acknowledgement Receipt

EFS ID:	9927432
Application Number:	11434330
International Application Number:	
Confirmation Number:	5166
Title of Invention:	Supporting enhanced uplink transmission during soft handover
First Named Inventor/Applicant Name:	Guodong Zhang
Customer Number:	24374
Filer:	Robert D. Leonard/Katie Carlson
Filer Authorized By:	Robert D. Leonard
Attorney Docket Number:	I-2-0674.2US
Receipt Date:	21-APR-2011
Filing Date:	15-MAY-2006
Time Stamp:	12:19:38
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$810
RAM confirmation Number	11739
Deposit Account	090435
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1		20110421_I_2_0674_2US_Reply.pdf	111829 295ff48f9d44b41a1d5248d0439a3c11e6e04746	yes	7

Multipart Description/PDF files in .zip description		
Document Description	**Start**	**End**
Amendment After Final	1	1
Claims	2	3
Applicant Arguments/Remarks Made in an Amendment	4	7

Warnings:

Information:

2	Request for Continued Examination (RCE)	20110421_I_2_0674_2US_RCE.PDF	884335 bcfb8f35fbf075aca2688f8ae3608837265eb79a	no	3

Warnings:

Information:

3	Fee Worksheet (PTO-875)	fee-info.pdf	30252 884bd24e16c9c6d3a9236b520ce6b3a419e2f299	no	2

Warnings:

Information:

Total Files Size (in bytes):	1026416

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the **PATENT APPLICATION** of:	
Zhang et al.	
Application No.:	11/434,330
Confirmation No.:	5166
Filed:	May 15, 2006
For: SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER	
Group:	2466
Examiner:	Brian S. Roberts

Our File: I-2-0674.2US

Date: April 21, 2011

REPLY PURSUANT TO 37 C.F.R. §1.114

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

Sir:

This Reply is being timely filed in response to the Office Action dated January 21, 2011. A Request for Continued Examination (RCE) is filed concurrently herewith.

Please amend the application without prejudice or disclaimer as follows:

Amendments to the Claims:

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

1-8. (Canceled)

9. (Currently Amended) A method for enhanced uplink communication during soft handover implemented in a Node-B operating as a primary Node-B, comprising:

receiving quality information from a radio network controller (RNC);

using the quality information to determine specified scheduling information including the maximum transmission power of a wireless transmit/receive unit (WTRU);

transmitting to the ~~a wireless transmit/receive unit [[(]]~~WTRU[[)]] the specified scheduling information, wherein the specified scheduling information is not transmitted to the WTRU by any non-primary Node-B;

receiving an enhanced uplink data packet from the WTRU in response to transmitting the specified scheduling information;

performing a cyclic redundancy check (CRC) on the enhanced uplink data packet;

transmitting an acknowledgement (ACK) or a negative acknowledgment (NACK) to the WTRU in response to the received enhanced uplink data packet wherein the transmission of either the ACK or NACK is based on the results of the CRC; and

further transmitting a successfully received enhanced uplink data packet to the ~~a radio network controller~~ [[(]]RNC[[)]].

10. (Previously Presented) The method of claim 14, further comprising:

soft combining the unsuccessfully received enhanced uplink data packet, stored in the buffer, with a retransmission of the enhanced uplink data packet for transmission to the RNC.

11-13. (Canceled).

14. (Previously Presented) The method of claim 9 further comprising:

storing an unsuccessfully received enhanced uplink data packet in a buffer.

REMARKS/ARGUMENTS

After the foregoing Amendments, claims 9, 10 and 14 are currently pending in this application. Claims 1-8 and 11-13 were previously canceled without prejudice. Claim 9 has been amended.

Claim Rejections - 35 USC § 103

Claims 9-10, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 7,346,035 to Lee et al. (hereinafter "Lee") in view of U.S. Patent Application No. 2002/0191544 to Cheng et al. (hereinafter "Cheng"). Applicant respectfully disagrees.

Lee and Cheng do not disclose, teach or suggest "receiving quality information from a radio network controller (RNC)" and "using the quality information to determine specified scheduling information including the maximum transmission power of a wireless transmit/receive unit (WTRU)" as recited in independent claim 9.

Lee teaches retransmitting uplink (UL) packet data from a user equipment (UE) to NodeBs in a mobile communication system servicing an enhanced uplink dedicated transport channel (EUDCH). (Lee, col. 1, lines 25-28). After the EUDCH is established, the *UE transmits to a Node B* a data rate and uplink channel condition required for scheduling. (Lee, col. 2, lines 29-31). The Node B then

determines the highest data rate for the EUDCH *using the information provided by the UE* and provides the determined rate to the UE. (Lee, col. 2, lines 45-48). Lee does not teach, suggest or disclose "receiving quality information from a radio network controller (RNC)" as recited in independent claim 9.

While Lee suggests the NodeB provides a highest data rate to the UE, the highest data rate is based on the channel condition information provided by the UE and the data rate requested by the UE. (Lee, col. 2, lines 45-47). The NodeB does not use *quality information*, provided by an RNC, *to determine specified scheduling information including the maximum transmission power of a wireless transmit/receive unit (WTRU).*

The office action dated January 21, 2011 states that Lee does not teach all of the elements of independent claim 9 and cites Cheng as performing a cyclic redundancy check. Cheng teaches inter layer control at a network node by receiving and decoding a protocol data unit (PDU) from a lower protocol layer at an upper layer. (Cheng, [0044]). A CRC is performed to determine if the PDU is valid. While Cheng teaches the performance of a CRC, Cheng does not cure the deficiencies of Lee. Further, nothing in the combination of Lee and Cheng suggest the above-argued elements of independent claim 9.

For at least this reason independent claim 9 is patentable over the combination of Lee and Cheng. In addition, claims 10 and 14 are patentable over Lee and Cheng at least by virtue of their dependence upon independent claim 9.

For the reasons presented above, withdrawal of the 35 USC § 103 rejection of claims 9, 10 and 14 is respectfully requested.

Conclusion

If the Examiner believes that any additional minor formal matters need to be addressed in order to place this application in condition for allowance, or that a telephonic interview will help to materially advance the prosecution of this application, the Examiner is invited to contact the undersigned by telephone at the Examiner's convenience.

In view of the foregoing remarks, Applicants respectfully submit that the present application is in condition for allowance and a notice to that effect is respectfully requested.

Respectfully submitted,

Zhang et al.

By/Melissa D. Doogan/
Melissa D. Doogan
Registration No. 63,025

Volpe and Koenig, P.C.
United Plaza
30 South 17th Street
Philadelphia, PA 19103-4009
Telephone: (215) 568-6400
Facsimile: (215) 568-6499

MDD/kmc

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

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
11/434,330	05/15/2006	

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 04/21/2011

	(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))	* 3	Minus	** 20	= 0	x $ =		OR	x $52=	0
Independent (37 CFR 1.16(h))	* 1	Minus	***3	= 0	x $ =		OR	x $220=	0
☐ 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	0

AMENDMENT

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		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:
/PARTHENIA MERRILL/

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

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

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0674.2US	SERIAL NO. 11/434,330
	APPLICANT Zhang et al.	
	FILING DATE May 15, 2006	GROUP 2466

U.S. PATENT DOCUMENTS							
EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
		6,678,249	01/2004	Toskala et al.[4]			
		6,778,830	08/2004	Oizumi et al.			
		6,892,071	05/2005	Park et al.			
		7,013,143	03/2006	Love et al.			
		7,346,035	03/2008	Lee et al.			
		7,414,989	08/2002	Kuchibhotla et al.			
		2002/0095635	07/2002	Wager et al.			
		2002/0191544	12/2002	Cheng et al.			
		2003/0007480	01/2003	Kim et al.			
		2003/0054824	03/2003	Choi et al.			
		2003/0081692	05/2003	Kwan et al.			
		2003/0161284	08/2003	Chen			
		2003/0210668	11/2003	Malladi et al.			
		2004/0004954	01/2004	Terry et al.			
		2004/0072567	04/2004	Cao et al.			
		2004/0085934	05/2004	Balachandran et la.			
		2004/0120306	06/2004	Wigard et al.			
		2004/0160925	08/2004	Heo et al.[1]			
		2004/0202129	10/2004	Kolding et al.			
		2004/0203991	10/2004	Chen et al.			
		2004/0219917	11/2004	Love et al.			
		2004/0219919	11/2004	Whinnett et al.			
		2004/0219920	11/2004	Love et al.			
		2004/0228313	11/2004	Cheng et al.			
		2005/0041694	02/2005	Liu			

EXAMINER	DATE CONSIDERED

EXAMINER: Initial if citation 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.

1624815-1

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0674.2US	SERIAL NO. 11/434,330
	APPLICANT Zhang et al.	
	FILING DATE May 15, 2006	GROUP 2466

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
		2005/0047354	03/2005	Zeira et al.			
		2005/0048920	03/2005	Liu			
		2005/0083888	04/2005	Smee et al.			
		2007/0047501	03/2007	Usuda et al.[2]			

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	TRANSLATION NO
	*	0 977 393	02/2000	EP [5]				
		2 353 439	02/2001	GB				
		2001-128209	05/2001	JP			X**	
		02/01893	01/2002	WO				
		03/053087	06/2003	WO				
		03/067953	08/2003	WO				
		03/088545	10/2003	WO				
		2003112283	12/2005	RU			X**	
		2005110767	10/2006	RU			X**	
		00/074263	12/2000	WO[3]				

OTHER DOCUMENTS

EXAMINER INITIAL		DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Feasibility Study for Enhanced Uplink for UTRA FDD; (Release 6)," 3GPP TR 25.896 V1.0.2 (October 2003).
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Feasibility Study for Enhanced Uplink for UTRA FDD (Release 6)," 3GPP TR 25.896 V6.0.0 (March 2004).

EXAMINER	DATE CONSIDERED

EXAMINER: Initial if citation 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.

1624815-1

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0674.2US	SERIAL NO. 11/434,330
	APPLICANT Zhang et al.	
	FILING DATE May 15, 2006	GROUP 2466

EXAMINER INITIAL		DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 1999)," 3GPP TS 25.212 V3.11.0 (September 2002).
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 1999)." 3GPP TS 25.321 V3.16.0 (September 2003).
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 4)," 3GPP TS 25.212 V4.6.0 (September 2002).
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 5)," 3GPP TS 25.212 V5.6.0 (September 2003).
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 5)," 3GPP TS 25.212 V5.9.0 (June 2004).
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 6)," 3GPP TS 25.212 V6.2.0 (June 2004).
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 1999)," 3GPP TS 25.321 V3.17.0 (June 2004).
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 6)," 3GPP TS 25.321 V6.2.0 (June 2004).
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 4)," 3GPP TS 25.321 V4.9.0 (September 2003).
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 5)," 3GPP TS 25.321 V5.9.0 (June 2004).
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 4)," 3GPP TS 25.321 V4.10.0 (June 2004).
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 5)," 3GPP TS 25.321 V5.6.0 (September 2003).

EXAMINER	DATE CONSIDERED

EXAMINER: Initial if citation 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.

1624815-1

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0674.2US	SERIAL NO. 11/434,330
	APPLICANT Zhang et al.	
	FILING DATE May 15, 2006	GROUP 2466

EXAMINER INITIAL		DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
		3GPP, "Third Generation Partnership Project; Technical Specification Group Radio Access Network; FDD Enhanced Uplink; Overall Description; Stage 2 (Release 6)," 3GPP TS 25.309 V6.0.0 (September 2004).
		3GPP2 C.20003-C, "Medium Access Control (MAC) Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Release C, August 2004.
		3GPP2 C.S0004-C, "Signaling Link Access Control (LAC) Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Revision C, July 23, 2004.
		3GPP2 C.S0005-C, "Upper Layer (Layer 3) Signaling Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Revision c, July 23, 2004.
		GPP2 C.S0002-C, "Physical Layer Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Revision C, July 23, 2004.

X** Abstract only

[1] Corresponds to RU2004104196; [2] Corresponds to RU 2006130462; [3] Corresponds to RU 2001135846; [4] Corresponds to WO 03/067953; [5] Corresponds to WO 98/47253.

EXAMINER	DATE CONSIDERED

EXAMINER: Initial if citation 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.

1624815-1

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 977 393 A1

(12) EUROPEAN PATENT APPLICATION

published in accordance with Art. 158(3) EPC

(43) Date of publication:
02.02.2000 Bulletin 2000/05

(21) Application number: **98914026.4**

(22) Date of filing: **15.04.1998**

(51) Int. Cl.[7]: **H04J 13/00**

(86) International application number:
PCT/JP98/01717

(87) International publication number:
WO 98/47253 (22.10.1998 Gazette 1998/42)

(84) Designated Contracting States:
DE FR GB IT SE

(30) Priority: **16.04.1997 JP 11435697**

(71) Applicant:
NTT MOBILE COMMUNICATIONS NETWORK INC.
Minato-ku, Tokyo 105-8436 (JP)

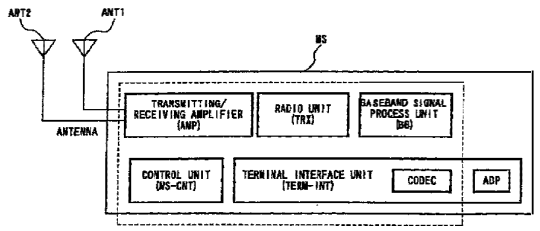
(72) Inventors:
- **HIGASHI, Akihiro**
  Yokosuka-shi, Kanagawa 238-0315 (JP)
- **NAGATA, Kiyohito**
  Yokohama-shi, Kanagawa 235-0036 (JP)
- **YUNOKI, Kazufumi**
  Yokosuka-shi, Kanagawa 239-0841 (JP)
- **TAKAGI, Hirofumi**
  Yokohama-shi, Kanagawa 235-0033 (JP)
- **OGAWA, Shinsuke,**
  1-14-15-2, Morigaoka,
  Yokohama-shi, Kanagawa 235-0024 (JP)
- **OHNO, Koji**
  Yokohama-shi, Kanagawa 235-0033 (JP)
- **NAKAMURA, Takehiro**
  Yokosuka-shi, Kanagawa 239-0841 (JP)
- **HAGIWARA, Junichiro**
  Yokohama-shi, Kanagawa 235-0041 (JP)
- **NAKA, Nobuhiko**
  Yokohama-shi, Kanagawa 235-0041 (JP)
- **HIGUCHI, Kenichi**
  Yokosuka-shi, Kanagawa 238-0313 (JP)
- **HATTORI, Hiroyuki**
  Yokohama-shi, Kanagawa 232-0066 (JP)

(74) Representative: **HOFFMANN - EITLE**
Patent- und Rechtsanwälte
Arabellastrasse 4
81925 München (DE)

(54) CDMA COMMUNICATION METHOD

(57) A mobile station MS regarding this invention is consists of a transmission and receiving amplifier unit AMP, a radio unit TRX, a baseband signal processing unit BB, a control unit MS-CNT and a terminal interface unit TERM-INT. In the multi-code-transmission, the efficiency in use of the frequency resources is enhanced and the improvement of the communication quality is realized by transmitting the control information (a pilot symbol and a TPC symbol), with increasing the transmission power by one designated dedicated physical channel only. It is possible to improve the efficiency in use of the frequency resources and the communication quality, and to reduce the power consumption, by determining the transmission/discard of the transmission information according to the communication quality or the communication status. Furthermore, it is possible to improve the efficiency in use of the frequency resources and to reduce the power consumption, by avoiding that the calling occurs frequently.

FIG. 2



EP 0 977 393 A1

IPR2023-01270 Page 450

Description

TECHNICAL FIELD

[0001] The present invention relates to a wide band CDMA (Code Division Multiple Access) communication method.

BACKGROUND ART

[0002] The use of mobile telephones has become wide spread in recent years. Conventionally, TDMA (Time Division Multiple Access) and FDMA (Frequency Division Multiple Access) have been employed as mobile telephone access methods. These days, however, CDMA is being adopted instead of TDMA and FDMA because of its various merits, such as highly efficient use of frequency bands, easy ability to change the transmission speed, and security from eavesdropping. It is also possible in CDMA to reduce the impact from fading by employing redundancy, and to carry out error correction coding. Further, communication quality is improved by a handover which does not involve frequency switching.

[0003] However, CDMA according to the prior art has a technical limitation in that its transmission speed is low since it is prepared mainly for voice transmission. Thus, due to the low transmission speed, CDMA is not suitable for data communication. With the development of multimedia in recent years, high-speed transmission has been desired because data to be transmitted includes not only voice data, but also various types of data that can be processed in a computer. Specifically, an extremely high transmission speed is required when image data is transmitted.

[0004] In mobile communications applying conventional CDMA, problems are encountered such as a narrow spreading band width, and a limited ability to reduce the effect of fading. Moreover, mobile communications employing conventional CDMA are also problematic because it is difficult to realize a seamless indoor/outdoor communication environment due to synchronization between base stations, and to realize high-accuracy control of the electrical power for transmission.

[0005] Additionally, in a mobile telephone, reduction of power consumption is a crucial issue, since a chargeable battery is used as the power supply.

DISCLOSURE OF THE INVENTION

[0006] It is therefore an object of the present invention to provide a wide band CDMA communication method that can solve the above-mentioned problems to set a frequency band to be used to width band basically. Furthermore, it is an object of the present invention to provide the reduction of the power consumption, the improving of the communication quality, and the utilization efficiency of the frequency resources. The present invention provides a wide band CDMA communication method which transmits spread information after spreading transmission information using predetermined codes; wherein when the transmission information different from one another are transmitted at the same time through a plurality of channels using common control information, the wide band CDMA communication method comprises the steps of: spreading various transmission information using codes, the codes being allocated to the channels, respectively; transmitting the spread transmission information through the channels; spreading the control information using a common code, the common code being common to the plurality of channels; and transmitting the spread control information.. By virtue of the above invention, it is possible to improve the efficiency in use of the frequency resources, because the same control information which is transmitted individually using a plurality of codes in conventional method, is transmitted by one code. Furthermore, it is possible to improve the receiving accuracy, that is, the communication quality, avoiding the unevenness of the receiving power level in the receiving side, if the control information is transmitted by one channel, and if the transmission power of the control information is the transmission power of the transmitted information multiplied by the number of the channels through which the spread transmission information are transmitted.

[0007] The present invention provides a wide band CDMA communication method which transmits spreaded information to a radio section after spreading the transmission information using a predetermined code; wherein the wide band CDMA communication method comprises the step of determining to transmit or to discard the transmission information on the basis of the communication quality of the radio section. By virtue of the above invention, a practical effective transmission speed of the transmission information is adjusted in accordance with the communication quality in the radio section, and information is transmitted efficiently. Therefore, it is possible to improve the efficiency in use of the frequency resources and the reduction of the power consumption.

[0008] Furthermore, the present invention provides a wide band CDMA communication method which transmits spreaded information to a radio section after spreading the transmission information using a predetermined code; wherein the wide band CDMA communication method comprises the step of: determining to transmit or to discard the transmission information on the basis of the communication status of the radio section. By virtue of the above invention,

IPR2023-01270 Page 451

it is possible to prevent recalling for retransmitting the transmission information that the calling has been failed, and to improve the efficiency in use of the frequency resources and the reduction of the power consumption, if the transmission information to be transmitted is discarded, when the calling has been failed, for example.

[0009] Furthermore, the present invention provides a wide band CDMA communication method which transmits spreaded information to a radio section after spreading transmission information using a predetermined code; wherein the wide band CDMA communication method comprises the steps of: discarding the transmission information until a predetermined time passes after a call is released. By virtue of the above invention, it is possible to restrain the frequent calling result from the transmission information which occurs sporadically, and to improve the efficiency in use of the frequency resources and the reduction of the power consumption.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010]

Fig. 1 is a block diagram showing a system overview of a preferred embodiment in this invention.
Fig. 2 is a block diagram showing the constitution of a mobile station MS in the same preferred embodiment.
Fig. 3 is a block diagram showing the constitution of a transmitting/receiving amplifier AMP and a radio unit TRX.
Fig 4 is a block diagram showing the constitution of a base band-signal processing unit BB.
Fig. 5 is a block diagram showing the constitution of a terminal interface unit TERM-INT.
Fig. 6 is a diagram showing the constitution of a logical channel of the same preferred embodiment.
Fig. 7 is a diagram showing the constitution of a physical channel of the same preferred embodiment.
Fig. 8 is a conceptual diagram showing a signal format which is other than that for an uplink common control physical channel.
Fig. 9 is a conceptual diagram showing a signal format for an uplink common control physical channel.
Fig. 10 is a conceptual diagram showing the relationship between the physical channel and the logical channel to be mapped.
Fig. 11 is a conceptual diagram showing an example of a logical channel mapping onto a perch channel.
Fig. 12 is a conceptual diagram showing a mapping method for PCH.
Fig. 13 is a conceptual diagram showing a mapping method for FACH.
Fig. 14 is a conceptual diagram showing a method for mapping DTCH and ACCH onto an dedicated physical channel,
Fig. 15 is a conceptual diagram showing a method for mapping ACCH to the super frame of a dedicated physical channel at each symbol rate.
Fig. 16 is a conceptual diagram showing a coding method for BCCH1, BCCH2 (16 ksps).
Fig. 17 is a conceptual diagram showing a coding method for PCH (64 ksps).
Fig. 18 is a conceptual diagram showing a coding method for FACH-L (64 ksps).
Fig. 19 is a conceptual diagram showing a coding method for FACH-S (64 ksps) in normal mode.
Fig. 20 is a conceptual diagram showing a coding method for FACH-S (64 ksps) in ACK mode.
Fig. 21 is a conceptual diagram showing a coding method for RACH-L (64 ksps).
Fig. 22 is a conceptual diagram showing a coding method for RACH-S (64 ksps).
Fig. 23 is a conceptual diagram showing a coding method for SDCCH (32 ksps).
Fig. 24 is a conceptual diagram showing a coding method for ACCH (32/64 ksps).
Fig. 25 is a conceptual diagram showing a coding method for ACCH (128 ksps).
Fig. 26 is a conceptual diagram showing a coding method for ACCH (256 ksps).
Fig. 27 is a conceptual diagram showing a coding method for DTCH (32 ksps).
Fig. 28 is a conceptual diagram showing a coding method for DTCH (64 ksps).
Fig. 29 is a conceptual diagram showing a coding method for DTCH (128 ksps).
Fig. 30 is a conceptual diagram showing a coding method for DTCH (256ksps).
Fig. 31 is a conceptual diagram showing a coding method for DTCH (512 ksps).
Fig. 32 is a conceptual diagram showing a coding method for TCH (1024 ksps).
Fig. 33 is a conceptual diagram showing a coding method for UPCH (32 ksps).
Fig. 34 is a conceptual diagram showing a coding method for UPCH (64 ksps).
Fig. 35 is a conceptual diagram showing a coding method for UPCH (128 ksps).
Fig. 36 is a conceptual diagram showing a coding method for UPCH (256 ksps).
Fig. 37 is a conceptual diagram showing a usage method for a W-bit bit pattern.
Fig. 38 is a block diagram showing the constitution of a convolutional coding device.
Fig. 39 is a conceptual diagram showing the correspondence between SFN and sfn which is to be transmitted.
Fig. 40 is a timing chart showing the transmission timing and the long code phase in the perch channel and the

IPR2023-01270 Page 452

common control physical channel.

Fig. 41 is a timing chart showing the transmission timing and the long code phase in the reverse common control physical channel.

Fig. 42 is a timing chart showing the transmitting/reception timing and the long code phase in a dedicated physical channel.

Fig. 43 is a timing chart showing the transmitting/reception timing and the long code phase in a dedicated physical channel.

Fig. 44 is a block diagram showing an example of the constitution of a forward long code generator.

Fig. 45 is a block diagram showing an example of the constitution of a reverse long code generator.

Fig. 46 is a conceptual diagram showing a short code generating method.

Fig. 47 is a block diagram showing an example of the constitution of the short code generator for the long code mask symbol.

Fig. 48 is a block diagram showing a spreading code generating method using the long code and the short code.

Fig. 49 is a block diagram showing an example of the constitution of a spreading unit.

Fig. 50 is a timing chart showing a random access transmission method.

Fig. 51 is a conceptual diagram showing a first example of a multi-code transmission method.

Fig. 52 is a conceptual diagram showing a second example of a multi-code transmission method.

Fig. 53 is a timing chart showing a transmitting pattern of the perch channel.

Fig. 54 is a timing chart showing a transmitting pattern of the downlink common control channel (for FACH).

Fig. 55 is a timing chart showing a transmitting pattern of the downlink common control channel (for PCH).

Fig. 56 is a timing chart showing a transmitting pattern of the uplink common control channel (for RACH).

Fig. 57 is a timing chart showing a transmitting pattern of the dedicated physical channel.

Fig. 58 is a block diagram showing the constitution of a logical network in a voice communication service.

Fig. 59 is a block diagram showing the constitution of a logical network in an unrestricted digital signal communication service.

Fig. 60 is a block diagram showing an example of the constitution of a logical network in a packet signal communication service.

Fig. 61 is a block diagram showing an example of the constitution of a logical network in a modem signal communication service.

Fig. 62 is a conceptual diagram showing each protocol stack for voice communication on the C-Plane (Control Plane) and U-Plane (User Plane) on the TE side interface of the ADP of a mobile station MS.

Fig. 63 is a block diagram showing an outline of voice CODEC processing.

Fig. 64 is a timing chart showing the transmission timing of a pre-postamble signal.

Fig. 65 is a conceptual diagram showing each protocol stack for unrestricted digital signal transmission on the C-Plane (Control Plane) and U-Plane (User Plane) on the TE side interface of the ADP of a mobile station MS.

Fig. 66 is a conceptual diagram showing each protocol stack for packet signal transmission under a PPP dial-up connection environment of the C-Plane and U-Plane on the TE side interface of the ADP of a mobile station MS.

Fig. 67 is a conceptual diagram showing each protocol stack for packet signal transmission under an Ethernet connection environment of the C-Plane and U-Plane on the TE side interface of the ADP of a mobile station MS.

Fig. 68 is a conceptual diagram showing each protocol stack for modem signal transmission of the C-Plane and U-Plane on the TE side interface of the ADP of a mobile station MS.

Fig. 69 is a block diagram showing an example of the constitution of the connection between a plurality of terminal interface units TERM-INT and the MS core in the C-Plane.

Fig. 70 is a conceptual diagram showing a concept of the detection of the connection of the terminal interface unit TERM-INT.

Figs. 71 and 72 are flowcharts respectively showing the detecting process of the connection of the terminal interface unit TERM-INT.

Fig. 73 is a conceptual diagram showing the details of the protocol stack.

Fig. 74 is a block diagram showing an example of the constitution of the connection between a plurality of terminal interface units TERM-INT and the MS core in the U-Plane.

Fig. 75 is a conceptual diagram showing the state of U-plane selection control.

Fig. 76 is a block diagram showing the constitution of the LAC-U frame.

Figs. 77 through 90 are conceptual diagrams respectively showing the format for PDU in an error control sub-layer.

Fig. 91 is a conceptual diagram showing a TPC bit soft decision in a preferred embodiment.

Fig. 92 is a timing chart showing the timing of transmission power control in the same preferred embodiment.

Fig. 93 is a sequence diagram showing an outline of synchronization establishment of dedicated physical channels in the same preferred embodiment.

Fig. 94 is a sequence diagram showing the procedure for establishing synchronization in a diversity handover

IPR2023-01270 Page 453

between cells in the same preferred embodiment.

Fig. 95 is a sequence diagram showing switching control in a handover control in the same preferred embodiment.

Fig. 96 is a sequence diagram showing the handover control procedure between cells in the same preferred embodiment.

Fig. 97 is a conceptual diagram showing a concept of outer coding synchronization.

Fig. 98 is a flowchart showing the process for establishing synchronization.

Fig. 99 is a flowchart showing the process for monitoring whether the communication is out of synchronization or not.

Fig. 100 is a block diagram showing a concept of the connection between outer terminals and a mobile station MS in the same preferred embodiment.

BEST MODE FOR CARRYING OUT INVENTION

[0011] The best mode for carrying out the present invention will now be described with reference to the drawings.

A: CONSTITUTION OF EMBODIMENT

A-1: Overview

[0012] Fig. 1 is a block diagram showing an overview of the system according to a preferred embodiment of this invention. In Fig. 1, BS designates radio base stations that transmit and receive signals with a mobile station MS by radio waves. The base stations BS are connected to switching center MCC-SIM. Computer, telephone, LAN (Local Area Network) and the like are connected to switching center MCC-SIM.

[0013] In this discussion, the mobile station MS carries out radio communication with the base station BS, and comprises all the functions which are described below. However, it is also possible to construct a system in which the mobile station MS has only a portion of the functions (for example, a function to support voice communication) described below.

[0014] Fig. 2 is a block diagram showing the constitution of the mobile station MS shown in Fig. 1. In Fig. 2, ANT1 designates a receiving antenna and ANT2 designates a transmitting antenna. AMP designates a transmitting/receiving amplifier that amplifies transmitted and received signals. The transmitting/receiving amplifier AMP comprises a transmitting amplifier (described below) which amplifies a transmitted RF signal and a low noise amplifier (described below) which amplifies a received RF signal. The transmitting/receiving amplifier AMP multiplexes RF transmitting signals and extracts each RF receiving signal from others. TRX designates a radio unit which carries out D/A conversion on a baseband spread transmitting signal, transforms this result to an RF signal using quadrature modulation, and outputs this result to a transmitting amplifier. Furthermore, the radio unit TRX performs semi-synchronized detection of a received signal from the receiving amplifier, and supplies the result to baseband signal processing unit BB after A/D conversion.

[0015] A baseband signal processing unit BB carries out various processing for the baseband, such as error correction coding of the transmitting data, frame conversion, data modulation, spreading modulation, despreading of the received signal, chip synchronization, error correction decoding, separating of data, and diversity handover combining. A control unit MS-CNT controls each unit of the mobile station MS. A terminal interface unit TERM-INT has a voice CODEC, an adapter function (ADP) for data, and an interface function between the handset and image/data terminal. However, it is possible to realize the adapter function for data by outer circuits.

A-2. Transmitting/receiving amplifier AMP and radio unit TRX

[0016] Fig. 3 is a block diagram showing the constitutions of transmitting/receiving amplifier AMP and radio unit TRX. In Fig. 3, 10b designates a transmitting amplifier which amplifies a signal from the radio unit TRX to the required power sufficient for the base station BS to receive the signal. 10a designates a low noise amplifier which amplifies the received RF signal to the power required for subsequent processing. In this case, the transmitting amplifier 10b controls its own gain on the basis of the transmission power designating signal supplied from the baseband signal processing unit BB. That is, transmitting power is controlled in accordance with the transmission power designating signal. 20 designates a local oscillator which generates a local oscillating signal for carrying out frequency conversion by oscillating in accordance with a frequency band designating signal supplied from the control unit MS-CNT. The oscillation frequency is revised by a frequency revising signal (AFC) supplied from the baseband signal processing unit BB. 21 designates a mixer for receiving which converts the received RF signal to the baseband signal by multiplying the received RF signal and the local oscillating signal. The output signal of the mixer 21 is converted to a digital signal by an A/D converter 22, and is outputted to baseband signal processing unit BB. 24 designates a D/A converter which converts the spread transmitting signal supplied from the baseband signal processing unit BB to an analog signal. The output signal of the

IPR2023-01270 Page 454

D/A converter 24 is converted to a radio frequency band signal by multiplying with the local oscillating signal in the mixer 23 on the transmitting side.

A-3: Baseband signal processing unit BB

[0017] Fig. 4 is a block diagram showing the constitution of baseband signal processing unit BB. In order that the figures do not become overly complicated, a description of all or a portion of the names of the various parts has been omitted in Fig. 4 and in Fig. 5, which will be described below.

[0018] In Fig. 4, 31 designates a convolutional coding unit which carries out the predetermined convolutional coding for user data supplied from the terminal interface unit TERM-INT. The reason for carrying out such convolutional coding is so that an error can be corrected by Viterbi decoding at the time of reception, even when the information is incorrect in the transmission channel. A convolutional coded data is subjected to interleave processing in interleaving unit 32. After that, a TPC bit is added to the data in a TPC bit adding unit 33. Interleaving processing is carried out because it is possible to convert a burst error that has occurred in a transmission channel to a random error by arranging (interleaving) the data series properly on the transmitting side, and by reverting (de-interleaving) to the original data series on the receiving side. The convolutional coding and the Viterbi decoding processing can correct the random error effectively. The TPC bit will be explained later below.

[0019] A spreading unit 34 processes the signal to which the TPC bit has been added. That is, the signal is spread using a designated spreading code on the transmitting side, and the spread signal is reverted to the original signal by multiplying it by the designated spreading code on the receiving side. The spreading code for spreading is generated by multiplying the designated short code and long code. Specifically, the short code and the long code designated by the spreading-code-designating signal outputted from the control unit MS-CNT are generated in a short code generator 35 and a long code generator 36, respectively. The spreading code for spreading is then generated by multiplying the short code and the long code. The data spread by the spreading code is output to the radio unit TRX.

[0020] Next, the elements indicated by numeral 40 are despreading units which carry out despreading using a predetermined spreading code. The spreading code used in despreading is generated by multiplying the designated short and long codes. Specifically, the short code and the long code designated by the spreading-code-designating signal outputted from the control unit MS-CNT are generated in a short code generator 42 and a long code generator 41, and the spreading code for despreading is generated by multiplying the short code and the long code. A plurality of despreading units 40 is provided for RAKE combining processing which will be described later. The despreading processed data is processed by a RAKE combining unit 43. In RAKE combining processing, it is possible to obtain a diversity effect by exploiting the fact that multi-paths having different delay times can be separated in the despreading process, and synthesizing the separated paths appropriately. The effect of fading is decreased by RAKE combining processing.

[0021] 45 designates a path-searching unit which measures the transmission delay and the amplitude of the multi-path which are supplied to the mobile station MS, and informs spreading code unit 47 (the short code generator 42 and the long code generator 41) of the reception timing. 46 designates a cell/sector searcher which detects the level of the perch channel (described below) of the nearby cells and sectors when the initial synchronization establishment is carried out in the mobile station MS, and judges the cell/sector where the mobile station MS is located. 50 designates a frequency gap detector which detects the frequency gap based on the received signal on which RAKE combining has been carried out. The frequency gap detector 50 detects the frequency gap between the received radio signal and the standard frequency of the mobile station MS, and outputs a frequency revision signal AFC in accordance with the detected results. The frequency gap in the local oscillator 20 is revised on the basis of the frequency revision signal AFC.

[0022] 53 designates a de-interleaving unit which carries out the de-interleaving process for the received signal, and supplies the result to Viterbi decoder 54. The received signal which is decoded with Viterbi decoding is outputted and supplied to terminal interface unit TERM-INT.

[0023] 51 designates a TPC bit detector which detects the TPC bit including the received signal, and generates the transmission power designating signal in accordance with the detected result. This transmission power designating signal is used for gain control of transmitting amplifier 10b as described above. In this way, the transmitting power control on the mobile station MS side is controlled by the TPC bit (a command that designates power increase or the power decrease) which is transmitted through the downlink communication channel from the base station BS.

[0024] 55 designates an FER measurement unit which measures the FER (Frame Error Rate) for a signal which is decoded with Viterbi decoding, generates a renew value for the target SIR value from the measured result, and supplies the renew value to the SIR measurement/comparing unit 52. The FER expresses the proportion of error frames present with respect to all frames within a predetermined measured time duration. In this embodiment, when an error of one or more bits is detected in a frame, the frame is considered to be an error frame. The SIR measurement/comparing unit 52 measures the SIR value of the received signal, and determines the value of the TPC bit by comparing the measured

IPR2023-01270 Page 455

value and the renewed SIR value, and furthermore outputs the determined value to the TPC bit adder 33. The measurement of the above-mentioned SIR value and the FER value is carried out to estimate the communication quality. The TPC bit adder 33 adds the TPC bit, which corresponds to the determined value, to the transmitting signal. In other words, in this embodiment, the TPC bit is generated in order to control the transmitting power of the base station BS. As mentioned above, the communication quality can be constant even if the propagation environment varies because the transmitting power of the base station BS and the mobile station MS are controlled.

A-4: Terminal interface unit TERM-INT

[0025] Fig. 5 is a block diagram showing the constitution of terminal interface unit TERM-INT. In Fig. 5, each of 10a and 10b designates a switching means, which switches the signal transmitting line in accordance with a telephone/non-telephone switching signal supplied from the control unit MS-CNT. That is, switching means 10a supplies a signal supplied from the baseband signal processing unit BB to a voice decoding unit 70, when calling. As a result, the voice signal is decoded, and is supplied to the receiver of the hand set after the signal is converted to an analog signal by a D/A convener 71. The voice signal outputted from the mouthpiece of the hand set is convened to a digital signal by a A/D converter 73, and is coded by a voice coding unit 72. The coded voice signal is supplied to the convolutional coding unit 31 of the baseband signal processing unit BB through switching means 10b. In the voice decoding unit 70 and the voice coding unit 72, decoding and coding are carried out for transmitting the voice data with lower bits.

[0026] On the other hand, in non-calling, the switching means 10a supplies the received signal which is outputted from the Viterbi decoding unit 54 of the baseband signal processing unit BB to the deinterleaving unit 60. As a result, deinterleaving processing is carried out on the received signal, and RS decoding is carried out in the RS decoding unit 61 for that signal. This signal is then outputted to an external apparatus such as an ISDN terminal and a personal computer (PC). The signal outputted from the external apparatus is coded with RS coding in the RS coding unit 63, and subjected to interleave processing in the interleaving unit 62. Furthermore, this signal is supplied to the convolutional coding unit 31 of baseband processing unit BB through the switching means 10b. In the RS coding unit 61 and the RS decoding unit 63, the coding and decoding of the RS code as an outer code for error correction are carried out. In other words, in this embodiment, not only is convolutional coding/Viterbi decoding (refer to the convolutional coding unit 31 and the Viterbi decoding unit 54 in Fig. 4) carried out in order to achieve higher quality communications (low error rate), but coding and decoding of the RS code is also performed.

A-5: Main parameters

[0027] Table 1 shows an example of the main parameters of the radio interface in this embodiment. The notation for the item "symbol rate" in Table 1 means that it is possible to freely set the symbol rate from 16 ksps (kilo-symbols per second) to 1024 ksps.

Table 1

Radio interface main parameter		
No.	Item	Parameter
1	Radio access method	DS-CDMA FDD
2	Frequency	2 GHz band width
3	Modulation/demodulation method	Information: QPSK, pilot symbol synchronization Detecting wave RAKE Spreading: QPSK
4	Coding/decoding	Inside coding: convolutional coding (R=1/3 or 1/2, K=9)/Viterbi soft decision decoding Outside coding: Reed Solomon code (for data transmission)
5	Symbol rate	16 ksps - 1024 ksps
6	Information transmission rate	Variable
7	Synchronization between base stations	Asynchronous

IPR2023-01270 Page 456

B: DETAIL AND FUNCTION OF EACH UNIT OF SYSTEM

B-1: Channel constitution

[0028] The constitution of the radio channels in this embodiment will now be described.

[0029] In this embodiment, the radio channels may be classified into logical channels shown in Fig. 6 according to logical features and classified into physical channels shown in Fig. 7 according to physical features.

B-1-1: Logical channel

[0030] First, the logical channels shown in Fig. 6 will be described. The logical channels can be classified as shown in the tree diagram in Fig. 6. The function of each channel which makes up the tree will be listed as follows.

(1) Broadcasting channel1 and 2 (BCCH1 and BCCH2)

[0031] Each of broadcasting channels 1 and 2 (BCCH1 and BCCH2) is a unidirectional channel for broadcasting systematic control information for each cell or for each sector from the base station BS to the mobile stations MS, respectively. Broadcasting channels 1 and 2 (BCCH1 and BCCH2) transmit information the content of which changes over time, such as SFN (System Frame Number), the uplink interference power amount and the like.

(2) Paging channel (PCH)

[0032] A paging channel (PCH) is a unidirectional channel which broadcasts the same information from the base station BS to the mobile stations MS over a wide area. The PCH is used for paging.

(3) Forward access channel - long (FACH-L)

[0033] A forward access channel - long (FACH-L) is a unidirectional channel for transmitting control information or user packet data from the base station BS to the mobile station MS. The FACH-L is used in the case where the network recognizes a cell where the mobile station MS is located. Basically, this channel is used when a comparatively numerous amount of information is transmitted.

(4) Forward access channel - short (FACH-S)

[0034] A forward access channel - short (FACH-S) is a unidirectional channel for transmitting control information or user packet data from the base station BS to the mobile station MS. The FACH-S has a mode in which an ACK (acknowledgment signal) is transmitted for random access reception. This logical channel is used in the case where the network recognizes a cell where the mobile station MS is located. Basically, this channel is used in the case where comparatively little information is transmitted.

(5) Random access channel - long (RACH-L)

[0035] A random access channel - long (RACH-L) is a unidirectional channel for transmitting control information or user packet data from the mobile station MS to the base station BS. The RACH-L is used in the case where the mobile station MS recognizes a cell where the mobile station MS is located. Basically, this channel is used when a comparatively numerous amount of information is transmitted.

(6) Random access channel - short (RACH-S)

[0036] A random access channel - short (RACH-S) is a unidirectional channel for transmitting control information or user packet data from the mobile station MS to the base station BS. The random access channel - short (RACH-S) is used in the case where the mobile station MS recognizes a cell where the mobile station MS is located. Basically, this channel is used in the case where a comparatively little information is transmitted.

(7) Stand-alone dedicated control channel (SDCCH)

[0037] A stand-alone dedicated control channel (SDCCH) is a point-to-point bi-directional channel. This channel is used for transmitting control information. This logical channel occupies one physical channel.

IPR2023-01270 Page 457

(8) Associated control channel (ACCH)

[0038] An associated Control Channel (ACCH) is a point-to-point bi-directional channel. This channel is used for transmitting control information. This logical channel is the control channel associated with DTCH that will be described next.

(9) Dedicated traffic channel (DTCH)

[0039] A dedicated traffic channel (DTCH) is a point-to-point bi-directional channel, and is used for transmitting user information.

(10) User packet channel (UPCH)

[0040] A user packet channel (UPCH) is a point-to-point bi-directional channel, and is used for transmitting user packet data.

B-1-2: Physical channel

[0041] Next, the constitution of the physical channels shown in Fig. 7 will be described. As shown in Fig. 7, the physical channels are classified into common physical channels and dedicated physical channels. The common physical channels are further classified into perch channels and a common control physical channel. The perch channels are further classified into a first perch channel and a second perch channel. The characteristic of each physical channel is shown in Table 2. Note that, as shown in Table 2, closed-loop transmission power control of each time slot within one frame is not carried out in the common control physical channel in this embodiment.

Table 2

Characteristic of each physical channel			
	Perch channel	Common control channel	Dedicated physical channel
Symbol rate	16 ksps	Downlink: 64 ksps Uplink: 16.64 ksps	32 - 1024 ksps
characteristics	The transmission power control is not adopted. There is a first perch channel wherein symbols are transmitted constantly and a second perch channel wherein a portion of the symbols are transmitted.	• Only radio frames having transmission information are transmitted. No symbols, including pilot symbols, are transmitted in radio frames which do not have transmission information. The PD (Paging Display) portion of PCH is always transmitted. • High rate closed loop transmission power control is not carried out. • All symbols are transmitted at constant power.	High rate closed loop transmission power control can be carried out..

[0042] Next, the functions of each of the physical channels will be described.

(1) Perch channel

[0043] The perch channel is a physical channel, the reception level of which is subject to measurement, for cell selection of the mobile stations MS. The perch channel is also the physical channel that is initially captured when power supply to the mobile stations MS is started up. This perch channel consists of a first perch channel and a second perch channel. In the first perch channel, the symbols are spread by the sole short code of the system and are transmitted

IPR2023-01270 Page 458

constantly so that a cell can be selected quickly when the power supply to the mobile station MS is started. In the second perch channel, a portion of the symbols are spread by the short code in correspondence with the downlink long code. These perch channels are unidirectional physical channels from the base station BS to the mobile stations MS.

(2) Common control physical channel

[0044] The common control physical channel is a physical channel which is used by a plurality of the mobile stations MS that are present in the same sector. Uplink of the common control physical channel can be randomly accessed.

(3) Dedicated physical channel

[0045] The dedicated physical channel is a physical channel which is set in a point-point manner between the base station BS and the mobile station MS.

B-1-3: Signal format of physical channel

[0046] Next, the signal format of the physical channel will be described with reference to Figs. 8 and 9. Fig. 8 is a conceptual diagram showing a signal format other than the uplink common control physical channel, and Fig. 9 is a conceptual diagram showing the signal format of the uplink common control physical channel. The numbers shown in the figures designate the symbol number in the field.

[0047] As shown in the figures, all physical channels consist of three layers. From the top layer sequentially, these are: a super frame, a radio frame and a time slot (time slot is designated simply as "slot" in the figures). The constitution of the radio frame or the time slot differs according to the type and the symbol rate of the physical channel. Each unit shown in Figs. 8 and 9 will now be described.

(1) Super frame

[0048] A super frame consists of 64-block radio frames. The radio frame at the head position and the radio frame at the tail position are determined based on the SFN, which will be described below. Concretely, the radio frame at the head position and the radio frame at the tail position are as follows:.

radio frame at head position: the radio frame where SFN mod 64 = 0
radio frame at tail position: radio frame where SFN mod 64 = 63

[0049] "Mod" is a modulo operator, and the "SFN mod 64" designates a remainder obtained by dividing SFN by 64. In the following description, *n* block frames or units will be described as "n frames" or "n units" in order to avoid complicating the description.

(2) Pilot symbol and SW (Synchronization Word)

[0050] In this embodiment, the first and third symbols of the pilot symbol in each time slot are designated as SW, and the modulation method is QPSK so that each bit forming the pilot symbol is spread into I and Q. When the pilot symbol pattern of a time slot in an uplink common control physical channel in which the symbol rate is 16 ksps (kilo-symbols per second) is 11110101, the order of separating becomes, for example, I = 1, Q = 1, I = 1, Q = 1, I = 0, Q = 1, I = 0, Q = 1 in order from the left.

[0051] In the downlink common control physical channel, burst transmission of a plurality of radio frames is permitted. In this case, the pilot symbol is added to the end of the burst signal. On the contrary, since there is one burst in one radio frame in the uplink common control physical channel, the pilot symbol is added to the end of one radio frame as shown in Fig. 9.

(3)TPC symbol

[0052] The relationship between the TPC symbol pattern and the transmitting power control amount is shown in Table 3. As shown in Table 3, the TPC symbol pattern is used to control transmitting power. In this embodiment, the content of the received TPC symbol is judged by soft decision which will be described later. In the case where the TPC bit is not received because the communication is out of synchronization or the like, the transmitting power does not change in this embodiment.

IPR2023-01270 Page 459

Table 3

Relationship between TPC symbol pattern and transmitting power control amount	
TPC symbol	TRANSMITTING POWER CONTROL AMOUNT
11	+ 1.0 dB
00	- 1.0 dB

(4) Long code masking symbol

[0053] The long code masking symbols are spread using only the short code. Therefore, the long code is not used to spread the long code masking symbols. With the exception of the long code mask symbol, the symbols of the perch channel are spread using the short code of the layered orthogonal code series shown in Fig. 46. The long code mask symbols are spread using the short code of an orthogonal Gold code which has a code length of 256.

[0054] Furthermore, only one symbol of the long code mask symbols is included per time slot in the first and second perch channels only. This symbol pattern is "11" in the first perch channel and the second perch channel. In the perch channel, two spreading codes are used. The long code mask symbol is transmitted in each of the first and second perch channels. As is clear from Fig. 8, only a portion of the long code mask symbol is transmitted, while the other symbols are not transmitted.

B-1-4: Mapping onto physical channel of logical channel

[0055] Next, mapping onto the physical channel of the logical channel will be described.

[0056] Fig. 10 is a conceptual diagram showing the correspondence between the physical channel and the logical channel mapped to the physical channel. The mapping with regard to each channel will now be described with reference to this figure.

B-1-4-1: Mapping with regard to perch channel

[0057] Fig. 11 is a conceptual diagram showing an example of the mapping of the logical channel to the perch channel. The mapping rules for realizing the example shown in Fig. 11 are as follows.

(1) The perch channel is divided into a plurality of blocks within one super frame. Only BCCH1 and BCCH2 are mapped to the perch channel.
(2) BCCH1 is mapped from the head frame in the dividing unit (block) of the super frame, but does not overlap the dividing unit. BCCH2 is mapped onto the remaining frame within the dividing units. BCCH2 is recognized based on the structure information of the perch channel included in BCCH1.
(3) With respect to BCCH1 and BCCH2, one radio unit is comprised of two radio frames. Therefore, BCCH1 and BCCH2 are transmitted by continuously transmitting 2 x N radio frames, so that one layer 3 information is transmitted. The layer 3 information which is transmitted by BCCH1 and BCCH2 does not overlap the super frame.
(4) The sfn, which is generated in the base station BS and will be described in detail later, and the uplink interference power amount are set each 20 ms in each radio unit of the perch channel. The uplink interference power amount is the newest measured result measured at the base station BS. The transmitting content of this information changes over time.

B-1-4-2: Mapping for common control physical channel

[0058] The rules for mapping the logical channel to the common control physical channel are described below.

(1) PCH and FACH are mapped to a downlink control physical channel which has a symbol rate of 64 ksps.
(2) Only RACH is mapped to an uplink common control physical channel which has a symbol rate of 16 ksps.
(3) Either FACH or PCH is mapped to one downlink common control physical channel.
(4) One downlink common control physical channel in which FACH is mapped and one uplink common control

IPR2023-01270 Page 460

physical channel are used as a pair. The pair is designated by the base station BS as the spreading code pair. The designation of the pair corresponds to the physical channel, and is not limited to a correspondence with the size (S: short or L: long) of FACH and RACH. FACH of the downlink control physical channel and RACH of the uplink control physical channel, which form a pair, are used as the FACH and RACH received and transmitted respectively by one mobile station MS. In an ACK transmission from the base station BS in response to the RACH from the mobile station MS, the ACK is transmitted via FACH-S of the downlink control physical channel which is paired with the uplink common control physical channel which transmits the RACH.

B-1-4-3: Mapping of PCH to downlink common control physical channel

[0059] The method for mapping PCH to the downlink common control physical channel is shown in Fig. 12. As clear from Fig. 12, the mobile stations MS in this embodiment are classified into several groups by a predetermined method. The mobile stations MS are called as a group. The details of how mobile stations MS operate in these groups will be described below. Basically, the mobile stations MS judge whether or not there is an incoming call at any of the mobile station MS that are present in the same group, based on the result of a soft decision in the PD part, which will be described below. When the mobile stations MS judge that a call has come, the mobile stations MS operate so as to receive the I portion (described below) of the PCH equivalent to the PD part.

[0060] The rules for mapping PCH to the downlink common control physical channel are described below.

(1) The PCH is divided into several groups in one super frame, and layer 3 information is transmitted in each group. In this embodiment, there are 256 groups per one common control physical channel. Each group in PCH has an information quantity equivalent to 4 time slots, and consists of a total of 6 information parts: two paging display parts (PD-parts) - for indicating whether there are incoming calls or not, and four termination user identification number parts (I-parts) - for indicating the paged mobile user. In each group, PD-parts precede I-parts in transmission.

(2) In each group, six information parts are allocated in a certain pattern within a twenty-four time slot range. By shifting each pattern by four time slots, a plurality of groups are allocated on one downlink common control physical channel.

(3) The PCH of the first group is allocated so that the head symbol of the super frame becomes the head symbol of the PD-part in PCH of the first group. Furthermore, by shifting each pattern by four time slots, PCH of the second group, PCH of the third group, ... are allocated in the radio frame for PCH. The group of the last number is allocated to overlap with the super frame.

B-1-4-4: Mapping of FACH to downlink common control physical channel

[0061] An example of the mapping of FACH to the downlink common control physical channel is shown in Fig. 13. The rules of this mapping are as follows.

(1) The optional radio frame for FACH on one downlink common physical channel can be used for either logical channels of FACH-L and FACH-S. The logical channel having the earliest transmitting request is transmitted by the radio frame for FACH. The FACH-L is used when the information length to be transmitted by the FACH is longer than the prescribed value, while FACH-S is used when it is shorter. In the FACH-S mapping, 4 FACH-S are time multiplexed in one FACH radio frame and transmitted. Therefore, when the information length is shorter, it is possible to multiplex many logical channels.

(2) One FACH-S consists of four time slots. Each time slot is allocated in one radio frame at four time slots intervals. Furthermore, four sequential FACH-S are allocated by shifting by one time slot. In the example shown in Fig. 13, the time slots used by each FACH-S are described as follows.

First FACH-S: 1st, 5th, 9th, 13th time slots
Second FACH-S: 2nd, 6th, 10th, 14th time slots
Third FACH-S: 3rd, 7th, 11th, 15th time slots
Fourth FACH-S: 4th, 8th, 12th, 16th time slots

(3) When the logical channel having the earliest transmitting request is a FACH-S, the base station BS can transmit other FACH-Ss stored in the buffer at that time, by multiplexing a maximum of four other FACH-Ss into the same radio frame for FACH. At that time, FACH-Ls are also stored, so that the base station BS can transmit FACH-Ss for which the transmitting request occurred later than the transmitting request timing of FACH-L after multiplexing.

(4) The mobile stations MS can receive FACH-L and all FACH-Ss on one downlink common control physical chan-

IPR2023-01270 Page 461

nel at the same time. It is acceptable that the mobile station MS receive one downlink common control physical channel, even when the base station BS transmits a plurality of downlink common control physical channels for FACH. The determination of which downlink common control physical channel for FACH transmission from among a plurality thereof is received is arranged at the application level in the mobile stations MS and the base station BS.

(5) There are transmission formats for two modes in FACH-S. One mode is a format (layer 3 transmission mode) that transmits layer 3 or higher information, and the other mode is a format (ACK mode) that transmits an ACK for reception of RACH. FACH-S in the ACK mode carries ACKs for a maximum of seven mobile stations MS. FACH-S in ACK mode sure to be transmitted by the first FACH-S, and is transmitted with the highest priority, even when the transmission request timing is later than other FACHs.

(6) When the quantity of information present in the upper Common Part Sub-layer (CPS) transmitted in the FACH radio unit is equivalent to a plurality of FACH radio units, continuous transmission is guaranteed. In other words, interruption by and transmission of other CPS does not occur. This also applies for FACH-S in ACK mode.

(7) When one CPS is transmitted by a plurality of FACH radio units, only FACH-L or FACH-S is used, i.e., FACH-L and FACH-S are not both used at the same time. When one CPS is transmitted continuously using a plurality of FACH-S radio units, the n FACH-S radio unit is followed by the $n+1$ FACH-S radio unit. However, in the case of an interruption by an ACK mode FACH-S, the fourth FACH-S radio unit is followed by the second FACH-S radio unit. When an ACK mode FACH-S interruption does not interrupt, the fourth FACH-S radio unit is followed by the first FACH-S radio unit.

B-1-4-5: Mapping of RACH to uplink common control physical channel

[0062] As shown in Fig. 10, the RACH-S is mapped to the 16ksps uplink common control physical channel. The RACH-L is mapped to the 64ksps uplink common control physical channel. As shown in Fig. 9, the RACH-S and RACH-L consists of one radio frame (10ms) respectively. The RACH-S and RACH-L are transmitted after the four symbols worth of pilot symbols in time slot #1 are added to the last frame of the radio frame at the time of radio section transmission. When the mobile station MS transmits RACH, RACH-L and RACH-S can be freely used in accordance with the amount of information transmitted.

[0063] The base station BS transmits ACK to the mobile station MS by FACH-S when it correctly receives RACH-L or RACH-S. The transmission frame timing of RACH in the mobile station MS is delayed only by a predetermined offset with respect to the frame timing of the downlink common control physical channel on to which the FACH which transmits ACK is mapped. In this embodiment, 16 types of offsets are provided. The mobile station MS selects at random one offset from the 16 offset types, and transmits RACH at a timing in accordance with the selected offset. The base station BS must have a means for simultaneously receiving RACH-L and RACH-S at a timing in accordance to all the offset types.

B-1-4-6: Mapping to dedicated physical channel

[0064] The rules for mapping the logical channel to a dedicated physical channel are as follows. Fig. 14 is a conceptual diagram showing a method for mapping DTCH and ACCH to a dedicated physical channel. Fig. 15 is a conceptual diagram showing the method for mapping ACCH to the super frame of the dedicated physical channel, for each symbol rate. The following description will refer to Figs. 14 and 15.

[0065] SDCCH and UPCH each monopolize one dedicated physical channel. On the dedicated physical channel for which the symbol rate is 32 - 256ksps, DTCH and ACCH share one dedicated physical channel by means of time multiplexing. On dedicated physical channels for which the symbol rate is 512 and 1024ksps, ACCH is not multiplexed, and only DTCH monopolizes the dedicated physical channel. For each time slot, the time multiplexing for DTCH and ACCH is realized by dividing the symbols for the logical channel in the time slot as shown in Fig. 14. The ratio of the dividing differs for each symbol rate of the dedicated physical channel.

[0066] As shown in Fig. 15, the radio frame number which forms the radio units of ACCH differs according to the symbol rate of the dedicated physical channel. In the following description, the radio units of ACCH will be described as "ACCH radio units" or "ACCH units", and will be noted simply by the term "unit" in the figures. ACCH radio units are allocated in synchronization with the super frame. In all time slots in one radio frame or a plurality of radio frames, ACCH radio units are divided according to the time slot number, and are allocated. In multi-code transmission, ACCH radio units do not overlap between dedicated physical channels, and are transmitted with only a specified code (one dedicated physical channel) designated by the base station BS.

B-1-5: Coding of logical channel

[0067] Next, the coding of the logical channel will be described.

IPR2023-01270 Page 462

B-1-5-1: Overview

[0068] Figs. 16 through 36 show the coding method for each logical channel, i.e., the frame disassembly and reassembly process in baseband processing unit BB. This process will be described first with reference to the figures, followed by descriptions of each of the units such as CRC, PAD and the like shown in the figures.

[0069] Figs. 16 through 20 show the coding method of each logical channel in the downlink. The downlink procedure will be described with reference to these figures. Note that while the physical channels for mapping differ depending on the logical channel, in Figs. 16 through 20, the physical channels are designated as "reception physical channels." That is, the substance of the reception physical channel differs depending on the figure.

[0070] Fig. 16 is a conceptual diagram showing the coding method for signals transmitted through BCCH1 and BCCH2 at 16 ksps. The reception physical channel in Fig. 16 is a perch channel, which permits transmission at 16 ksps. First, 10 bits of data, excluding the pilot symbol and LC masking symbol (the total symbol number is five-symbols/time slot), are extracted from each time slot of each radio frame received by the reception physical channel. When the extraction procedure over 32 time slots is completed, a BCCH radio unit (BCCH1 radio unit in the figures) is generated by combining 32 data units (the total length is 320 bits). Furthermore, bit de-interleaving and soft decision Viterbi decoding are performed on the BCCH radio unit, and 96 bits of data, excluding the table bit and the like which will be described later, are extracted from the obtained data. A plurality of 96 bit data is obtained by repeating this process, and combined. Layer 3 information is then obtained by extracting CPS PDU from the combined data.

[0071] Other logical channels of the downlink are clear from the above mentioned descriptions for Fig. 16, which deals with BCCH1, BCCH2 (16ksps), and Figs. 17 through 20, which deal with the other logical channels. Therefore, in order to avoid complicating the description, a disclosure of the subject of each figure will substitute for descriptions.

[0072] Fig. 17 shows the coding method for signals transmitted through PCH at 64 ksps. Fig. 18 shows the coding method for signals transmitted through FACH-L at 64ksps. Fig. 19 shows the coding method for signals transmitted through the normal mode of FACH-S at 64ksps. Fig. 20 shows the coding method for signals transmitted through ACK mode of FACH-S at 64ksps. Figs. 21 through 36 show the coding methods for signals transmitted through various uplink or reverse logical channels. The procedures in the uplink will be described with reference to these figures.

[0073] Fig. 21 shows the coding method of RACH-L (64ksps). As shown in Fig. 21, in the coding of RACH-L (64ksps), first, layer 3 information (user information/control information) is stored in CPS PDU, and data including this CPS PDU is partitioned to the inner coding units (66oct). Convolutional coding and bit interleaving are performed for the inner coding units after the table bit etc,. is added to each inner coding unit. The data obtained by such procedures is divided into 16 time slots, and the pilot symbol (4 symbols/time slot) is added to each of 16 time slots. These 16 time slots are mapped to the physical channel. These types of procedures are carried out for each inner coding unit.

[0074] Other logical channels of the uplink are clear from the above mentioned descriptions for Fig. 21, which deals with RACH-L (64ksps), and Figs. 22 through 36, which deal with the other logical channels. Therefore, in order to avoid complicating the description, a disclosure of the subject of each figure will substitute for descriptions.

[0075] Fig. 22 shows the coding method for RACH-S (16ksps). Fig. 23 shows the coding method for SDCCH (32ksps). Fig. 24 shows the coding method for ACCH (32ksps/64ksps). Fig. 25 shows the coding method for ACCH (128ksps). Fig. 26 shows the coding method for ACCH (256ksps). Fig. 27 shows the coding method for DTCH (32ksps). Fig. 28 shows the coding method for DTCH (64ksps). Fig. 29 shows the coding method for DTCH (128ksps). Fig. 30 shows the coding method for DTCH (256ksps). Fig. 31 shows the coding method for DTCH (512ksps). Fig. 32 shows the coding method for TCH (1024ksps). Fig. 33 shows the coding method for UPCH (32ksps). Fig. 34 shows the coding method for UPCH (64ksps). Fig. 35 shows the coding method for UPCH (128ksps). Fig. 36 shows the coding method for UPCH (256ksps).

[0076] Next, each part shown in Figs. 16 through 36 will be described in detail.

B-1-5-2: Error detection code (CRC)

[0077] The error detection code (CRC) is added to each CPS PDU (Common Part Controller Protocol Data Unit), each inner coding unit, and each selecting synthesis unit (for example, refer to Fig. 24). The generating polynomials (1) - (4) are shown as follows.

(1) 16 bit CRC (CRC16)

[0078] 16 bit CRC is applied to CPS PDUs on all logical channels excluding DTCH and PCH, inner coding units transported through UPCH at any symbol rate, selecting synthesis units transported through DTCH at 32 ksps, and inner coding units transported through SDCCH, FACH-S/L, and RACH-S/L. The generating polynomial of this is shown as follows.

IPR2023-01270 Page 463

$$G_{CRC16}(X) = X^{16}+X^{12}+X^{5}+1 \quad (1)$$

(2) 14 bit CRC (CRC14)

[0079] 14 bit CRC is applied to ACCH of all symbol rates. This generating polynomial is shown as follows.

$$G_{CRC14}(X) = X^{14}+X^{13}+X^{5}+X^{3}+X^{2}+1 \quad (2)$$

(3) 13 bit CRC (CRC13)

[0080] 13 bit CRC is applied to each of the selecting synthesis units of 64/128/256/512/1024ksps DTCH. This generating polynomial is shown as follows.

$$G_{CRC13}(X) = X^{13}+X^{12}+X^{7}+X^{6}+X^{5}+X^{4}+X^{2}+1 \quad (3)$$

(4) 8 bit CRC (CRC8)

[0081] 8 bit CRC is applied to CPS PDU of PCH. This generating polynomial is shown as follows.

$$G_{CRC8}(X) = X^{8}+X^{7}+X^{2}+1 \quad (4)$$

[0082] The applicability of the CRC computation mentioned above is as follows.

CRC for each CPS PDU: entire CPS PDU.
CRC for each the selecting synthesis unit of ACCH • DTCH: all bits except tale bit.
CRC for each the inner coding unit of SDCCH、UPCH, FACH, RACH: all bits except tale bit.

[0083] The range of applicability of the CRC computation and CRC bit are hatched in Figs. 16 through 36.
[0084] The results of the above-mentioned CRC checks are used as follows.

CRC for each CPS PDU: Judge whether retransmission with the retransmission protocol of the upper layer (SSCOP, layer 3 retransmission) is necessary or not.
CRC for each selecting synthesis unit of ACCH • DTCH: (i) the outer loop transmission power control, (ii) reliability for selecting synthesis.
CRC for each of the inner coding units of UPCH: outer loop transmission power control.
CRC for each of the inner coding units of RACH: layer 1 retransmission.
CRC for each of the inner coding units of SDCCH: (i) outer loop transmission power control, (ii) judgment of necessity of wire transmission.

B-1-5-3: Each function of PAD. Length and W bit

(1) PAD

[0085] The PAD is applied to CPS PDU of logical channels other than DTCH. PAD is included in CPS PDU to make the length of CPS PDU an integer multiple of the length of the inner coding unit or the length of the selecting synthesis unit. PAD is included in CPS PDU in 1 octet units, and all bits of PAD are "0."

(2) Length

[0086] The length is applied to CPS PDU of logical channels other than DTCH, and designates the padding information amount (octet number) within the CPS PDU unit.

(3) W bit

[0087] W bit designates the header, continuation and termination of CPS PDU for each of the inner coding units or the selecting synthesis units. The correspondence between the bit pattern and designating contents of the W bit is shown in Table 4, and an example of the method of use of W bit is shown in Fig. 37.

IPR2023-01270 Page 464

Table 4

Correspondence between bit pattern and designating contents of W bit	
W bit	Designating contents
00	Continuation & continuation
01	Continuation & termination
10	Start & continuation
11	Start & termination

B-1-5-4: Inner coding

[0088] Inner coding will now be described. Inner coding is a convolutional coding that is carried out in convolutional coding unit 31 in this embodiment. Fig. 38 shows the constitution of the convolutional coding unit. In this case, the output order of the convolutional coding unit becomes: output 0, output 1 and output 2. However, for a coding ratio 1/2, the convolutional coding unit outputs until output 1. The initial value of the shift register of the convolutional coding unit is "0" for all bits.

[0089] The parameters of the inner coding of each logical channel are shown in Table 5. Radio characteristics change in accordance with the interleaving depth. Thus, in this embodiment, as shown in Table 5, the interleaving depth is changeable so that the radio characteristics can be improved.

Table 5

Inner coding Parameters of each logical channel			
Logical channel type	Coding scheme	Coding rate	Interleaving depth
BCCH1	9	1/2	10
BCCH2			10
PCH			12
FACH-L			72
FACH-S			72
RACH-L			72
RACH-S			32
SDCCH			30
ACCH(32/64ksps)			6
ACCH(128ksps)			10
ACCH(256ksps)			26
DTCH(32ksps)		1/3	24
DTCH(64ksps)			64
DTCH(128ksps)			140
DTCH(256ksps)			278

B-1-5-5: Outer coding

[0090] Next, outer coding will be described.

IPR2023-01270 Page 465

(1) Reed-Solomon coding and decoding (the process of RS coding unit 63 and RS decoding unit 61 shown in Fig. 5)

[0091] The coding form is reduced code RS (36, 32), which has been reduced from primitive RS code (255, 251) defined on GALOA GF (2^8). The primitive polynomial is expressed by equation (5), and the code generating polynomial is expressed by equation (6), as follows.

$$p = X^8+X^7+X^2+X+1 \quad (5)$$

$$G(X) = (X+1)(X+\alpha)(X+\alpha^2)(X+\alpha^3) \quad (6)$$

[0092] The outer coding process is adopted only at the time of unrestricted digital transfer in the line switching mode. The outer coding process is carried out every 64kbps (1 B), independent of transmission speed.

(2) Symbol interleaving (functions of interleaving unit 32)

[0093] In this embodiment, interleaving is carried out at each 8 bit symbol. The depth of the interleaving is 36 symbols, irrespective of the symbol rate of DTCH.

(3) Outer code processing synchronization

[0094] Every 80 ms of data is designated as an outer code processing unit. The outer code processing is carried out synchronizing with radio frames. The ordering number is added to each radio frame in the outer code processing unit, i.e., numbers 0 - 7 are added in order of transmission. Outer code processing synchronization is established in accordance with this order.

B-1-5-6: Informing interference power

[0095] Next, the process for informing of the uplink interference power will be described. The interference power is informed by BCCH1 and BCCH2. The informed contents is a measured value of a newest uplink interference power, which is the total reception power including the thermal noise, of each sector. Table 6 shows an example of the relationship between the bit value and the value of the uplink interference power. Each of the bit patterns shown under the "Bit value" column in Table 6 is transmitted from the left side bit, respectively.

Table 6

Relationship of the uplink interference power and the bit value	
Bit value	Uplink interference power
1010 0001	Equal to or more than 60.0 dBμ
1010 0000	Equal to or more than 59.5 dBμ, equal to or less than 60.0dBμ
:	:
0000 0001	Equal to or more than -20.0 dBμ, equal to or less than -19.5dBμ
0000 0000	Equal to or less than -20.0 dBμ

B-1-5-7: Functions of SFN

[0096] Next, the SFN (System Frame Number) will now be described. This information is informed by BCCH1 and BCCH2. The value of the SFN has a 1-to-1 correspondence with the radio frame. Furthermore, the SFN is incremented by at every 10 ms radio frame. This information will be expressed in the capital letters "SFN."

[0097] The SFN is transmitted by BCCH1 and BCCH2 by using the head radio frame from among the two radio frames in the transmitting timing of BCCH1 and BCCH2. This SFN transmitted in the transmission timing of BCCH1 and BCCH2 is expressed as small letters "sfn." Fig. 39 shows the relationship of SFN and sfn which is to be transmitted.

[0098] When SFN and sfn have the relationship shown in Fig. 39, the base station BS generates a count value on the basis of the timing designated by the transmission channel. The mobile station MS calculates a modulo of SFN, and recognizes the super frame by the result. SFN takes a value in the range from 0 to 2^{16} - 1. When the radio frame takes

IPR2023-01270 Page 466

SFN=2^{16} - 1, the next radio frame takes SFN = 0. The sfn is transmitted every 16 bits.

[0099] The usage of SFN will be described as follows.

(1) Uplink long code phase calculation

[0100] The mobile station MS generates the long code by calculating an uplink long code phase at the time of a call setup due to call origination or incoming call acceptance and diversity handover, according to the description at section B-2 entitled "Base station BS transmitting/receiving timing" and also in Figs. 40 - 43.

(2) Super frame synchronization

[0101] The radio frame that is SFN mod 64=0 becomes the head frame of the super frame, and the radio frame that is SFN mod 64=63 becomes the termination frame of the super frame.

B-1-5-8: Functions of PID

[0102] Next, PID (Packet ID) will be described as follows. This information is adopted for RACH-S/L and FACH-S/L. PID functions as a call in connection with transmission information, or as an identifier for identifying the mobile station MS, on the common control physical channel. The length of information is 16 bits. There are two applications for this information, as follows. Note that the following functions belong to the application software (software for controlling).

(1) SDCCH setting request and setting response

[0103] PID is used for a SDCCH (Stand-alone Dedicated Control Channel) setting request in RACH (Random Access Channel) from the mobile station MS to the base station BS and the setting response in FACH (Forward Access Channel) from the base station BS to the mobile station MS. PID in FACH which transmits the setting response is the same as PID in RACH which transmits the setting request. The value of PID in this usage takes a value selected at random by the mobile station MS.

(2) Packet data transmission

[0104] PID is used in a packet data transmission by RACH and FACH. The value of PID in this usage is determined in the base station BS. The base station BS selects a unique value for each sector.

[0105] The main usages are as mentioned above. PID is data of 16 bits, with the value of PID ranging from 0 to 65535. The range of PID values is divided to a plurality of ranges for each usage, and employed. Table 7 shows the range of PID values in each usage. PID is transmitted from MSB side.

Table 7

Range of PID value	
Usage	Range of values
SDCCH setting request directly before SDCCH setting and setting response	0 - 63
Packet transmission	64 - 65535

B-1-5-9: Functions of other bits

(1) U/C

[0106] Next, information U/C will be described. With the exception of FACH-S ACK mode, this information U/C is adopted in the RACH-S/L, FACH-S/L, and in the UPCH of all symbol rates. Information U/C is used as an identifier for identifying whether information included in CPS SDU (CPS Service Data Unit) is the user information or the control information. Table 8 shows the constitution of the U/C bit.

IPR2023-01270 Page 467

Table 8

U/C bit constitution	
bit	Identifying contents
0	User information
1	Control information

(2) TN

[0107] Next, information TN will be described. With the exception of the FACH-S ACK mode, this information TN is adopted in RACH-S/L, FACH-S/L and UPCH of all symbol rates. Information TN is used as identifier for identifying whether information included in CPS SDU indicates the termination node of the base station BS or not. Table 9 shows the constitution of the TN bit.

Table 9

U/C bit constitution		
Bit	Identified contents	
	RACH, uplink UPCH	FACH, downlink UPCH
0	MCC-SIM termination	Transmission from MCC-SIM
1	Base station termination	Transmission from base station

(3) Sequence Number

[0108] Next, the sequence number (S bit) will be described. This information is adopted in RACH. Its objective is to reassemble CPS PDU with high efficiency, while taking into consideration the retransmission (layer 1 retransmission) between mobile stations MS and the base station BS with RACH. The range of the sequence number values is 0 - 15. A CPS PDU is reassembled on the basis of the result of CRC. The sequence number value in the head radio unit of CPS PDU is "0."

(4) Mo

[0109] Next, information Mo will be described. This information is adopted in FACH-S, and is a bit for identifying the mode of FACH-S. Table 10 shows the constitution of the Mo bit.

Table 10

Mo bit constitution	
bit	Identified contents
0	Normal mode
1	ACK mode

(5) CPS SDU

[0110] Next, the maximum length of CPS SDU will be described. In this embodiment, the maximum length is Lcps, independent of the logical channel. Lcps is recorded as a system parameter.

B-2: Transmission and reception timing of the base station BS

[0111] The transmission and reception timing of the base station BS will now be described.

IPR2023-01270 Page 468

[0112] A concrete example of the radio frame transmission and reception timing and a long code phase for each physical channel is shown in Figs. 40 though 43. As clear from these figures, sfn is not added to any physical channels other than the perch channel. However, the frame number FN corresponding to SFN is considered in all physical channels. The correspondence between SFN and frame number FN is shown in Figs. 40 through 43.

[0113] The base station BS generates the frame timing (standard SFN of the base station BS) that is used as a standard on the transmission channel. The radio frame transmission and reception timing of the various physical channels is set as a timing offset with respect to the standard SFN of the base station BS.

[0114] The phase in which the head chip of the frame timing of the base station BS standard SFN=0 is "long code phase" = 0 is designated as the base station BS standard long code phase. "Chip" is the minimum pulse of the spreading code series. The long code phase of various physical channels is set as a phase that is offset with respect to the standard long code phase of the base station BS.

[0115] The radio frame transmission and reception timing and the long code phase for each physical channel will be described with reference to Figs. 40 through 43. The parameters employed in the explanation will be described later.

[0116] The radio frame transmission and reception timing and the long code phase for each physical channel will be described with reference to Figs. 40 through 43. The parameters employed in the explanation will be described later.

[0117] Fig. 40 is a timing chart showing the transmission timing and the long code phase of the perch channel and the common control physical channel. As shown in Fig. 40, the transmission timing and long code phase of the radio frame in the perch channel are offset by T_{SECT} chip (offset in each sector) with respect to BTS standard SFN. The variable T_{SECT} varies according to the sector. The transmission timing of the radio frame in the forward common control channel is offset by T_{CCCH} chip (time slot offset) with respect to the transmission timing of the perch channel. The long code phase of the forward common control channel coincides with the long code phase of the perch channel.

[0118] Fig. 41 is a timing chart showing the transmission timing and the long code phase in the reverse common control physical channel. As shown in Fig. 41, the receiving radio frame of the MS common control physical channel is delayed with respect to the transmission radio frame of the BTS common control physical channel. This delay is caused by the transmission delay. The offset of the transmission timing of the radio frame and the long code phase in each transmission timing (transmission timing 0 through transmission timing 15) of RACH take the value which results when a predetermined value (2560 chips) is added in order to the reception timing of the radio frame of the MS common control physical channel. For example, the transmission timing of the radio frame and the long code phase in transmission timing 0 of RACH are offset by 2560 chips for the reception timing of the radio frame in the MS common control physical channel, the transmission timing of the radio frame and the long code phase in transmission timing 1 are offset by 5120 chips, ... and the transmission timing of the radio frame and the long code phase in transmission timing 15 are offset by 38400 chips.

[0119] Fig. 42 is a timing chart showing the transmission and reception timing and the long code phase in a dedicated physical channel. As shown in Fig. 40, the transmission radio frame of the BTS perch channel is offset by T_{SECT} chip for BTS standard SFN. As shown in Fig. 42, the transmission timing of the radio frame in the BTS dedicated physical channel is offset by T_{FRAME} (frame offset) + T_{SLOT} for the transmission radio frame in BTS perch channel. The long code phase of the BTS dedicated physical channel coincides with the transmission timing of the radio frame in the BTS perch channel.

[0120] The receiving radio frame on the MS perch channel lags behind the transmission timing of the radio frame on the BTS perch channel because of the transmission delay. The reception timing on the radio frame in the MS forward dedicated physical channel is offset by $T_{FRAME} + T_{SLOT}$ chips with respect to the reception timing of the radio frame on the MS perch channel. The transmission timing of the radio frame on the MS reverse dedicated physical channel is offset by 1280 chips with respect to the reception timing of the radio frame on the MS forward dedicated physical channel. On the other hand, the long code phase of the radio frame in the. MS reverse dedicated physical channel coincides with the reception timing of the radio frame on the MS perch channel, its value beginning at zero when SFN=0, beginning at 40960 when SFN=2, ..., and beginning at $40960 \times 2^{16}-1$ when SFN = $2^{16}- 1$.

[0121] The reception timing of the radio frame in the BTS reverse dedicated physical channel is offset by $T_{FRAME} + T_{SLOT}$ + 1280 + TRANSMISSION DELAY x 2 chips with respect to the transmission timing of the radio frame in the BTS perch channel.

[0122] Fig. 43 is a timing chart showing the transmission timing and the long code phase in the dedicated physical channel for DHO. "DHO" means "diversity hand over." In DHO, the call connection is handed over to the base station BS toward which the mobile station MS is moving in such a manner that the new call connection is established while the previous call connection is still maintained between the mobile station MS and the base station BS from which the mobile station MS is moving away. In the following description, "new" channel and "new" BTS indicates that they are newly adopted for the new call connection due to DHO and "previous" channel and "previous" BTS indicates that they have been utilized for the previous call connection prior to DHO.

[0123] As shown in Fig. 43, the transmission timing of a radio frame on a new perch channel by a new BTS is offset by T_{SECT2} chips (offset in each sector) with respect to the new BTS standard SFN for DHO. The reception timing of a

IPR2023-01270 Page 469

radio frame on a new perch channel by the mobile station lags behind the transmission timing of the radio frame by the new BTS because of path delay.

[0124] On the other hand, the transmission timing of a radio frame on a reverse dedicated physical channel by the mobile station is offset by 1280 + β chips with respect to the reception timing of the radio frame on the previous reverse dedicated physical channel by the mobile station. The difference between the transmission timing of a radio frame on the reverse dedicated physical channel by the mobile station and the transmission timing of a radio frame on the new perch channel by the mobile station is a frame time difference measurement value designated as T_{DHO}.

[0125] The reception timing of a radio frame on the new reverse dedicated physical channel by the new BTS lags behind the transmission timing of the radio frame by the mobile station by the path delay, and is offset by C + 1280 chips with respect to the long code phase of a radio frame on the reverse dedicated physical channel transmitted by the new BTS. The value of the long code phase of the radio frame on the reverse dedicated physical channel transmitted by the new BTS begins at zero when SFN = 2^{16}- 1, begins at 40960 when SFN = 0, ..., and begins at '40960 x 2^{16} - 1' when SFN = 2^{16} - 2. The transmission timing of a radio frame on the forward dedicated physical channel by the new BTS is offset by T_{DHO} - 1280 - α chips with respect to the transmission timing of a radio frame on the perch channel by the new BTS. The long code phase on the new forward dedicated physical channel by the new BTS coincides with the transmission timing of the radio frame on the new perch channel by the new BTS. The reception timing of a radio frame on the new forward dedicated physical channel by the mobile station lags behind the transmission timing of the radio frame on the forward dedicated physical channel by the new BTS because of path delay.

[0126] Table 11 shows the offset value of the transmission and reception timing of the radio frame and the long code offset value in various physical channels.

Table 11

Physical channel transmission/reception offset value (chip number)		
Physical channel	Radio frame transmission/Reception timing	Long code phase
Perch channel	T_{SECT}	T_{SECT}
Forward common control physical channel	T_{SECT}+ T_{CCCH}	T_{SECT}
Forward dedicated physical channel (non-DHO)	T_{SECT}+ T_{FRAME}+ T_{SLOT}	T_{SECT}
Forward dedicated physical channel (as of new base station at the time of DHO)	T_{SECT}+ 〈T_{DHO}〉 -340 x C	T_{SECT}
Reverse common control physical channel (RACH)	(1)T_{SECT}+ T_{CCCH} (2)T_{SECT}+ T_{CCCH}+ 640 x C (3)T_{SECT}+ T_{CCCH}+ 1280 x C : (16)T_{SECT}+ T_{CCCH}+ 9600 x C	(1)T_{SECT}+ T_{CCCH} (2)T_{SECT}+ T_{CCCH}+ 640 x C (3)T_{SECT}+ T_{CCCH}+ 1280 x C : (16)T_{SECT}+ T_{CCCH}+ 9600 x C
Reverse dedicated physical channel (non-DHO)	T_{SECT}+ T_{FRAME}+ T_{SLOT} + 340 x C	T_{SECT}
Reverse dedicated physical channel (as of new base station at the time of DHO)	T_{SECT}+ T_{DHO}	T_{SECT}+ T_{DHO}+ T_{FRAME}+ T_{SLOT} -340 x C

[0127] In Table 11, [〈〉] means to cut chip unit value T_{DHO} to a symbol unit value, and "DHO" means "diversity hand over." In DHO, the call connection is handed over to the base station BS toward which the mobile station MS is moving in such a manner that the new call connection is established while the previous call connection is still maintained between the mobile station MS and the base station BS from which the mobile station MS is moving away. In contrast, in non-DHO, the previous call connection between the mobile station MS and the base station BS from which the mobile station is moving away is terminated temporally and then the new call connection is established between the mobile station MS and the base station BS toward which the mobile station is moving. In Table 11, '340 x C' is the chip number

IPR2023-01270 Page 470

corresponding to 1/2 of a time slot. Thus, 'C' varies according to chip rate. In this embodiment, C = 4, 8, and 16 and chip rate = 4.096, 8.192, and 16.384 Mcps (megachips per second).

[0128] The offset values T_{SECT}, T_{DHO}, T_{CCCH}, T_{FRAME}, and T_{SLOT} in Table 11 will now be described.

(1) T_{SECT}

[0129] The offset value T_{SECT} varies according to the sector. The same offset value is adopted to all physical channels in each sector. The value T_{SECT} is less than or equal to the value of the time slot interval and is represented in chip unit. The long code phase of the forward dedicated physical channel is unified with the offset value T_{SECT}, so that a reduction in the amount of interference due to forward quadrature may be anticipated. It is possible to avoid the long code masking symbol from becoming the same timing between the sectors by differing the offset value T_{SECT} between the sectors, so that more appropriate cell selection by mobile station MS is achieved.

(2) T_{CCCH}

[0130] T_{CCCH} is an offset value used for the radio frame timing of the common control physical channel. This offset value T_{CCCH} can be set in each common control physical channel. Thus, it is possible to reduce the frequency with which transmission patterns in different common control physical channels coincide with each other with respect to a single sector. Accordingly, it is possible to make the amount of forward interference even. The value T_{CCCH} is less than or equal to the value of the time slot interval and is represented in chip unit.

(3) T_{FRAME}

[0131] T_{FRAME} is an offset value used for the radio frame timing of the dedicated physical channel. This offset value T_{FRAME} can be set in each dedicated physical channel. Thus, it is possible to plan for uniformity in the transmission traffic for higher efficiency in the wired ATM transmission. The value T_{FRAME} is less than or equal to the value of the radio frame interval and is represented in chip unit.

(4) T_{SLOT}

[0132] T_{SLOT} is an offset value for the radio frame timing of the dedicated physical channel. This offset value T_{SLOT} can be set in each dedicated physical channel. Thus, it is possible to avoid coinciding transmission patterns and to uniformize the amount of interference. The value T_{SLOT} is less than or equal to the value of the time slot interval and is represented in chip unit.

(5) T_{DHO}

[0133] T_{DHO} is an offset value for the radio frame timing and the reverse long code phase in the dedicated physical channel. This offset value T_{DHO} is a measured value of the difference between the reverse transmission time at the mobile station MS and the perch reception time at the new base station measured by the mobile station MS. The value T_{DHO} is less than or equal to the value of the recerse long code phase and is represented in chip unit. However, for hardware, one radio frame interval is sufficient to enable measurement.

[0134] In the base station BS, although the reception timing with respect to the reverse physical channel roughly coincides with that shown in Table 11, a difference results from the transmission delay between the mobile station MS and the base station BS, and changes in the transmission delay. The base station BS adopts a reception method that can cancel the above differences. In the radio frame timing of the dedicated physical channel, the reverse channel transmission is controlled to lag behind the forward channel transmission by half of one time slot interval (for example, it is 1280 chips when the chip rate is 4.096 Mcps). In this way, the transmission power control delay becomes 1 time slot. Accordingly it is possible to plan for a decrease in control error. The specific setting method for the timing difference is shown in Figs. 42 and 43.

[0135] The reverse common control physical channel (RACH) will be described as follows. First of all, the radio frame timing of RACH takes an offset timing with respect to the radio frame timing of the corresponding forward common control physical channel (FACH). In this case, this offset value takes 16 steps of the time slot interval (for example, it is 2560 chips when the chip rate is 4.096Mcps), as shown in Figs. 42 and 43, for example. The head of the radio frame is adjusted to the initial value of the long code phase. Therefore, the long code phase also has 16 types of offset values. The mobile station MS can transmit a signal by selecting an optional timing among the 16 types of offset values. Thus, the base station BS in this embodiment can constantly receive RACH signal which is transmitted with all types of offset timings simultaneously.

IPR2023-01270 Page 471

B-3: Spreading code

[0136] Next, the methods for generating spreading codes at the long code generating units 36 and 41 and the short code generating units 35 and 42 and the method for arranging each generated spreading code will be described. The spreading code includes a forward long code, a reverse long code and a short code. Each code will be described below. The generation and arrangement of the spreading code is carried out at the base station BS in the same manner as at the mobile station MS.

B-3-1: Generating method

(1) Forward long code

[0137] The forward long code generated in the long code generating unit 41 is, for example, generated by the forward long code generating device shown in Fig. 44. In this embodiment, this forward long code is a Gold code in which an M series which is obtained from the generating polynomial expressions (7) and (8) below is used.

$$\text{Shift register 1} : X^{18}+X^{7}+1 \tag{7}$$

$$\text{Shift register 2} : X^{18}+X^{10}+X^{7}+X^{5}+1 \tag{8}$$

[0138] In Fig. 44, the state in which the value of the shift register 1 is a long code number and the value of the shift register 2 is all '1', is designated as the initial state in the long code number. In this case, the range of the long code number is 00000h - 3FFFFh in hexadecimal notation. The MSB side of the long code number is input into the right side of the shift register 1.

[0139] The forward long code has one radio frame period. Thus, the output of the long code generating device is terminated by the output after 10 ms progress, and repeats in a pattern from phase 0 to a phase corresponding to the 10 ms progress. The range of the phase is different according to the chip rate as shown in Table 12.

Table 12

Correspondence between chip rate and forward long code phase range		
Chip rate (Mcps)	Range of phase (chip)	
	For in-phase component	For quadrature component
4.096	0 - 40959	1024 - 41983
8.192	0 - 81919	1024 - 82943
16.384	0 - 163839	1024 - 164863

[0140] Table 12 shows the range of the phase for the in-phase component and the quadrature component. The long code phase is shifted by a predetermined shift quantity (shift: 1024 chips) in the in-phase component and the quadrature component. The shift quantity is not required to be 1024, but may be a value that allows recognition of the delay signal and the quadrature component. The shift quantity is fixed irrespective of the chip rate, so that the constitution of the mobile station MS can be simplified. Thus, the shift quantity may be changed according to the chip rate.

[0141] The long code generating device shown in Fig. 44 can create a state wherein the phase is shifted by any clock from the initial phase state.

(2) Reverse long code

[0142] The reverse long code which is generated in the long code generating unit 36 is generated by the reverse long code generating device shown in Fig. 45, for example, and, in this embodiment, is a Gold code in which an M series that is obtained from generating polynomial expressions (9) and (10) below is used.

$$\text{Shift register 1} : X^{41}+X^{3}+1 \tag{9}$$

$$\text{Shift register 2} : X^{41}+X^{20}+1 \tag{10}$$

IPR2023-01270 Page 472

[0143] In Fig. 45, the state wherein the value of the shift register 1 is a long code number, and the value of the shift register 2 is all '1', is designated as the initial state in the long code number. In this case, the range of the long code number is 00000000000h - 1FFFFFFFFFh in hexadecimal notation. The MSB side of the long code number is input into the right side of shift register 1.

[0144] The reverse long code has a period corresponding to the total time for transmitting 2^{16} radio frames (2^{10} super frames). Thus, the output of the long code generating device is terminated by the output of the 2^{16} radio frames, and is repeated in a pattern from phase 0 to a phase of 2^{16} radio frames. The range of the phase varies according to the chip rate as shown in Table 13.

Table 13

Correspondence between chip rate and reverse long code phase range		
Chip rate (Mcps)	Range of phase (chip)	
	For in-phase component	For quadrature component
4.096	0 to 2^{16}x 40960 -1	1024 to 2^{16}x 41960 + 1023
8.192	0 to 2^{16}x 81920 - 1	1024 to 2^{16}x 82920 + 1023
16.384	0 to 2^{16}x 163840 - 1	1024 to 2^{16}x 164840 + 1023

[0145] Table 13 shows the range of the phase for the in-phase component and the quadrature component. The long code phase is shifted by a predetermined shift quantity (shift: 1024 chips) in the in-phase component and the quadrature component. The shift quantity is not required to be 1024 fixed as above described. The long code generating device shown in Fig. 45 can generate a state wherein the phase is shifted by any clock from the state of the initial phase.

(3) Short code

[0146] Next, the methods for generating short codes in the short code generating units 35 and 42 will be described. Two methods are provided: one is for generating the short codes for the long code mask symbol on the perch channel and the other is for generating other short codes. The hierarchical quadrature code series shown below is used for the symbols of all physical channels other than the perch channel, and for the symbols other than the long code mask symbols of the perch channel.

[0147] The short code which consists of the hierarchical quadrature code series is designated by the code type number (Class) and the code number (Number). The period of the short code differs for each code type number.

[0148] Fig. 46 shows the method for generating the short code, where the short code is indicated as C_{Class} (number) in the figure.

[0149] The period of the short code is set as the symbol period. Thus, if the chip rate (spreading band) is the same, the period of the short code and the code number which can be used differ according to the symbol rate. Table 14 shows parameters of various short codes.

Table 14

Parameters of various short codes							
Code Type number	Short code period (chip)	Short code number	Code number	Symbol rate (ksps)			
				chip rate 1.024 Mcps	4.096 Mcps	8.192 Mcps	16.384 Mcps
2	4	4	0 to 3	256	1024		
3	8	8	0 to 7	128	512	1024	
4	16	16	0 to 15	64	256	512	1024
5	32	32	0 to 31	32	128	256	512
6	64	64	0 to 63	16	64	128	256

IPR2023-01270 Page 473

Table 14 (continued)

Parameters of various short codes							
Code Type number	Short code period (chip)	Short code number	Code number	Symbol rate (ksps)			
				chip rate 1.024 Mcps	4.096 Mcps	8.192 Mcps	16.384 Mcps
7	128	128	0 to 127		32	64	128
8	256	256	0 to 255		16	32	64
9	512	512	0 to 511			16	32
10	1024	1024	0 to 1023				16

[0150] In Table 14, the short code period, the number of the short code (short code number) expressed by the same code type number, the number (code number) given to the short code in the same code type number, and the symbol rate for various chip rates, are indicated according to the code type number. As described above, the short code number system consists of the code type number and the code number. The code type number is expressed in a binary 4 bit and the code number is expressed in a binary 12 bit. The short code phase is synchronized with a modulation and demodulation symbol. Thus, the short code phase is zero in the head chip of the symbol. Note that it is also acceptable to specify the short code by the code number only, without dividing it into the code number and the code type.

[0151] Next, the short code for the long code mask symbol will be described. The short code for the long code mask symbol of the perch channel differs from the case of other symbols. For example, the short code is generated by the short code generating device shown in Fig. 47. In this embodiment, the short code is a quadrature Gold code in which an M series which is obtained from generating polynomial expressions (11) and (12) below is used

$$\text{Shift register 1: } X^8+X^4+X^3+X^2+1 \quad (11)$$

$$\text{Shift register 2: } X^8+X^6+X^5+X^3+1 \quad (12)$$

[0152] In Fig.47, the initial value of the shift register 1 is short code number N_{LMS} ($0 \leq N_{LMS} \leq 255$) for the long code masking symbol. The MSB side of N_{LMS} is input to the left side of the shift register 1. On the other hand, the initial value of the shift register 2 is all '1'. When all values of the shift register 2 are detected as '1', the shifting procedure is terminated, and '0' is inserted. The first chip of the short code output becomes '0'. The period is one symbol (256 chips) of the perch channel.

B-3-2: Method for arranging spreading code

[0153] Next, the method for arranging the spreading code will be described.

(1) Forward long code

[0154] In the forward long code, the one long code number common to all sectors in one cell is arranged for the forward long code under system operation. Note, however, that when the base station BS apparatus is constructed, it is possible for different long code numbers to be arranged in each sector. The forward long code, which is used by a plurality of forward physical channels of the various types transmitted in a sector, uses the same long code number in all physical channels.

[0155] The long code phase is the same as that described at section B-2 entitled "Transmission and reception timing of the base station BS."

(2) Reverse long code

[0156] In the reverse long code, the long code number is arranged for every reverse physical channel. The dedicated physical channel which is mapped with DTCH, ACCH and UPCH, uses the reverse long code that was arranged for each mobile station MS. The dedicated physical channel and the common physical channel which are mapped with other logical channels use the reverse long code that was arranged for each base station BS.

IPR2023-01270 Page 474

[0157] The long code phase is the same as that described described at section B-2 entitled "Transmission and reception timing of the base station BS."

(3) Short code

[0158] The short code for physical channels other than the perch channel is arranged for each physical channel, and for each reverse/forward.

[0159] On the other hand, the short code for the perch channel is arranged as follows.

[0160] The short code number for symbols other than the long code mask symbol of the first perch channel is common with all the cells, and is C8(0). As hardware constitution, it is possible to use any short code as the first perch channel.

[0161] The short code number for the long code mask symbol of the first perch channel is common over all the cells, and is $N_{LMS} = 1$. As hardware constitution, it is possible to use any short code number N_{LMS} for the long code mask symbol of the first perch channel.

[0162] The short code number for the long code mask symbol of the second perch channel uses one of the plurality of predetermined short codes in each sector under the system. The short code number for the predetermined short code is recorded in the mobile station MS and the applications of the BSC (Base Station Controller) included in the base station BS. As hardware constitution, it is possible to use any long code masking short code for the second perch channel.

[0163] One short code number for long code masking of the second perch channel corresponds to a plurality of forward long codes used in the same sector. Table 15 shows an example of the above-mentioned corresponding relationship. The information about the corresponding relationship is stored by the applications of the BSC and the mobile station MS. As hardware constitution, it is possible to use any long code masking symbol short code and the forward long code in the same sector.

Table 15

Correspondence between second perch channel short code and forward long code	
Short code number N_{TPC} for second perch channel long code mask symbol	Forward long code
2	00001h - 00020h
3	00021h - 00040h
4	00041h - 00060h
5	00061h - 00080h

B-4. Spreading modulation signal generating method

[0164] Next, the spreading modulation signal generating method in the spreading unit 34 will be described. The spreading modulation signal is generated in the base station BS in the same manner as for the mobile station MS.

(1) Spreading modulation method

[0165] QPSK is adopted in both the reverse and forward channels as the spreading modulation method. However, it is also possible to adopt BPSK as the spreading modulation method.

(2) Short code assignment method

[0166] The short code assignment method assigns the same short codes to the short code SCi for the in-phase component and the short code SCq for the quadrature component according to the designated short code number system (code type number: Class, code number: Number).

[0167] Namely, the short code SCi becomes as follows.

$$SCi = SCq = C_{Class}(Number) \quad (13)$$

IPR2023-01270 Page 475

[0168] In the reverse and forward channels, the short code number system is assigned separately so that it is possible to use the different short code in the reverse and forward channels.

(3) Long code assignment method

[0169] Assume that the long code number is LN and the output value of the long code generating device at the point at which the long code generating device has been activated by the clock shift number 'Clock' from an initial state (i.e., the state in which the long code number is set into the shift register 1, and all '1's are set into the shift register 2) is designated G_{LN} (Clock). In this case, the output value LCi(PH) of the long code generating device for the in-phase component (PH is the long code phase) and the output value LCq(PH) of the long code generating device for the quadrature component in the long code phase shown in Fig. 40 through Fig. 43 is expressed by the following equations (14) and (15) in both forward channel and reverse channel.

$$LCi(PH) = G_{LN}(PH) \quad (14)$$

$$LCq(PH) = G_{LN}(PH+1024) \text{ (LCq(PH) is '0' in the case of BPSK)} \quad (15)$$

[0170] The range of the long code phase in the in-phase component and the quadrature component is shown in Tables 12 and 13.

(4) Long code + short code generating method

[0171] The method for generating the spreading code Ci for the in-phase component and the spreading code Cq for the quadrature component using the long code and the short code are as shown in Fig.48.

(5) Constitution of spreading unit 34

[0172] The constitution of the spreading unit 34, which spreads the in-phase component Di and the quadrature component Dq of the transmitting data by using the spreading codes Ci, Cq so as to generate the in-phase component Si and the quadrature component Sq of the spread signal, is as shown in Fig. 49.

B-5: Random access control

[0173] An example of the random access transmission method is shown in Fig. 50. In Fig. 50, the mobile station MS transmits an RACH frame at a time which is delayed randomly with respect to the receiving the frame on the forward common control channel. The random delay quantity is an offset timing of the 16 types shown in Fig. 41. The mobile station MS selects the offset timing randomly whenever RACH is transmitted. For the RACH, frame transmission method is employed.

[0174] On the other hand, when an RACH frame in which the results of the CRC checks of the inner coding units are OK is detected, the base station BS transmits a PID of RACH in which the CRC check is OK by using the ACK mode of FACH-S, with the next FACH radio frame of the FACH radio frame which is transmitted at the detected time,

[0175] The mobile station MS transmits the next radio frame after receiving an ACK for the prior radio frame by ACK mode of FACH-S, when there are a plurality of RACH radio frames to be transmitted. The mobile station MS uses the same PID value for all RACH radio units, when one CPS information to be transmitted consists of a plurality of RACH radio units. The mobile station MS does not use both RACH-L and RACH-S simultaneously, but uses only either RACH-L or RACH-S for transmitting one CPS information.

[0176] The mobile station MS retransmits the same RACH radio unit when it cannot receive the PID value of previously transmitted RACH radio unit by ACK mode of FACH-S for a predetermined time T_{RA} ms after the RACH has been transmitted previously. In this case, the PID value employs the same value, and the maximum retransmission number is N_{RA}. Thus, the same RACH radio unit is transmitted at most $N_{RA} + 1$ times, including the first transmission. A maximum of up to 7 PIDs of RACH, in winch OK was detected for the CRC, can be contained in the ACK mode of FACH-S.

[0177] On the other hand, when there is a mobile station MS which does not return an ACK by RACH in which OK was detected on the basis of CRC checks by a point directly before the transmission timing of the radio frame for FACH, the base station BS transmits ACK mode FACH-S by the first FACH-S giving priority to old timings at which OK was received on the basis of CRC checks. A mobile station MS which does not return an ACK within the specified time T_{ACK} ms after OK was detected on CRC is excluded as a transmission target for ACK mode FACH-S.

IPR2023-01270 Page 476

B-6: Multi-code transmission

[0178] Next, multi-code transmission will be described. When one RL-ID (Radio Link ID: identification information assigned with one hand over branch for each one call) consists of a plurality of dedicated physical channels (spreading code), the one RL-ID is transmitted as shown below, and pilot synchronous detection and transmission power control etc,. are carried out by arrangement in all dedicated physical channels in the one RL-ID. In the case where a plurality of RL-ID is assigned to one mobile station MS, the pilot synchronous detection and the transmission power control are carried out independently for each RL-ID. The frame timing and the long code phase coincide with each other in all dedicated physical channels in the one RL-ID.

[0179] Either or both of the two examples shown below are used as the transmission method for the pilot symbol and the TPC symbol, so that it is possible to anticipate an improvement in the quality of synchronous detection and a decrease in the error rate of the TPC symbol.

[0180] A first example is shown in Fig. 51. In the example, the pilot symbol and the TPC symbol are transmitted with only one dedicated physical channel which is designated from among a plurality of dedicated physical channels in one RL-ID. In other dedicated physical channels, the pilot symbol and the TPC symbol are not transmitted. In the dedicated physical channel through which the pilot symbol and the TPC symbol are transmitted, the pilot symbol and the TPC symbol are transmitted at a transmission power which is the number of the dedicated channels in one RL-ID times the transmission power for symbols other than the pilot symbol and the TPC symbol. The reason for this is as follows.

[0181] Ordinarily, the same information is transmitted as the pilot symbol in each dedicated physical channel when a plurality of codes is transmitted. Thus, the final result is obtained by synthesizing the received signal by the receiver for each dedicated physical channel. In this method, each receiver receives the pilot symbol and the TPC symbol that were transmitted at low transmission power. In this case, it is necessary to improve the quality of each receiver to improve the precision of the final result. In the system according to the present invention, the pilot symbol and the TPC symbol are transmitted in only one dedicated physical channel at the higher transmission power than the other transmission period, and are received by only one receiver. Consequently, it is unnecessary to enhance the quality that is demanded of the receiver. That is, it is possible to comparatively easily decrease the error rate of the TPC symbol. The transmission power of the above period is made be a multiple of the dedicated channel number of the transmission power for each dedicated physical channel in other periods, so that the power in the final result becomes constant.

[0182] A second example is shown in Fig. 52. In the example, in all dedicated physical channels in one RL-ID, the short code used in one specified dedicated physical channel is used only in the pilot symbol and the TPC symbol. Since common phase portions of the pilot symbol and the TPC symbol are combined with each other, it is desirable to control the transmission power of each dedicated physical channel, so that the transmission power of the pilot symbol and TPC symbol becomes:

[transmission power of other portions] x 1/[square root of the dedicated physical channel number]

For example, in the case of the example shown in Fig. 52, it is desirable that the transmission power of each dedicated physical channel becomes a half of the transmission power for other portions since the number of the dedicated physical channel is '4'.

B-7: Transmission power control

[0183] The transmission pattern of each physical channel is shown in Figs. 53 through Fig. 57. The transmission power control in each physical channel will be described with reference to these figures.

(1) Perch channel

[0184] As shown in Fig. 53, in the first perch channel, symbols other than the long code mask symbol which is included in each time slot are constantly transmitted at the designated transmission power P_{P1}. On the other hand, the long code mask symbol which is included in each time slot is transmitted at the transmission power which is obtained by taking the designated value P_{down} from the above transmission power P_{P1}. Since the transmission power for the first perch channel is constant irrespective of the existence of transmission information of BCCH1 and BCCH2 that are mapped, the idle pattern (the PN pattern) is transmitted when there is no transmission information on the first perch channel.

[0185] In the second perch channel, only the long code mask symbol part that is included in each time slot is transmitted, and other symbols are not transmitted. The long code mask symbol in the second perch channel is transmitted at the same timing as the long code mask symbol in the first perch channel. The transmission power is a designated value P_{P2} which is constant. The values P_{P1}, P_{down} and P_{P2} are determined at the base station BS so that the mobile

IPR2023-01270 Page 477

stations MS which presents in a neighboring sector can determine a sector.

(2) Forward common control physical channel (for FACH)

[0186] As shown in Fig. 54, in a radio frame in which there is no transmission information in either FACH-L and FACH-S, the transmission becomes OFF over all periods of the radio frame including the pilot symbol. In a radio frame in which there is transmission information in FACH-L, the radio frame is transmitted at a designated transmission power value P_{FL} over all periods of the radio frame. The transmission power value is designated for each transmission information. Therefore, the transmission power value is able to become variable for each radio frame. In the radio frame, the transmission power is constant at the designated transmission power value P_{FL}.

[0187] In the case where there is transmission information only in the first FACH-S from among four FACH-Ss in the radio frame, only the time slot of the first FACH-S is transmitted at the designated transmission power value (P_{FS1}). That is, the transmission power value becomes P_{FS1} every four time slots. When the transmission information occurs in the first and second FACH-S, the time slots of the first and second FACH-S are transmitted at the transmission power values (P_{FS1} and P_{FS2}) which are designated. When the transmission information occurs in the first and third FACH-S, the time slots of the first and third FACH-S have the transmission power values (P_{FS1}, P_{FS3}) which are designated. Fig. 54 shows an example in which the mobile station MS corresponding to the first FACH-S is located closer to the base station BS than the mobile station MS corresponding to the second and third FACH-S.

[0188] The transmission power of FACH-S of the ACK mode is always the same value, and the transmission information is transmitted at the designated transmission power P_{ACK}.

[0189] As clear from Fig. 54, in this embodiment, in the time slot of FACH-L or FACH-S in which there is transmission information, the pilot symbol is transmitted without fail on both sides of the symbol part for the logical channel. Therefore, for example, in the case where the time slot of a FACH with no transmission information is located adjoining the rear of the time slot of a FACH which has transmission information, only the pilot symbol that is located near the time slot of the FACH having the transmission information must be transmitted, even in the time slot of the FACH without transmission information. The transmission power value of this pilot symbol becomes the transmission power value of the time slot of the adjoining FACH-S having the transmission information.

[0190] When there are two adjoining time slots of FACH having transmission information, the transmission power of the pilot symbol in the time slot at the later side (that is, the pilot symbol adjoining the prior time slot) becomes the higher one among the transmission powers of the adjoining time slots.

[0191] The values P_{FL}, P_{FS1} - P_{FS3} are determined by an application based on the SIR value, which is obtained by the mobile station MS receiving the perch channel, and is included in RACH.

(3) Forward common control physical channel (for PCH)

[0192] As shown in Fig. 55, the PD part, of which there are two in each group, is constantly transmitted with all groups. The transmission power is made to be the transmission power value P_{PCH} that was designated. When the PD part is transmitted, the pilot symbol in the time slot to which the PD part was mapped is also transmitted. The pilot symbol in the later-adjoining time slot is not transmitted.

[0193] The I part of each group is divided into four time slots (I1 - I4). Only the I part of a group which has calling information is transmitted, while the I part of a group which does not have calling information is not transmitted. The transmission power is made to be the transmission power value P_{PCH} that was designated by a macro. Here, "macro" means a command that is issued by the control program of the base station BS.

[0194] In the time slot in which the I part of a group which has calling information is mapped, the pilot symbol is transmitted without fail on both sides of the symbol part for the logical channel. For example, in the case where the time slot of the I part of a group which does not have calling information adjoins the rear of a time slot of the I part of a group which has calling information, only the pilot symbol must be transmitted, even in the time slot of the I part of a group which does not have calling information.

[0195] The value of P_{PCH} is determined at the base station BS so that almost all mobile stations MS in a sector can receive the pilot symbol.

(4) Reverse common control physical channel (RACH)

[0196] As shown in Fig. 56, a signal is transmitted from the mobile station MS via this channel only in the case where there is transmission information. Each signal is contained in one radio frame. The transmission power P_{RL} of RACH-L and the transmission power P_{RS} of RACH-S are determined by open loop control at the mobile station MS, and are constant in a radio frame. The pilot symbol is added to the end of the radio frame, and is transmitted. The transmission power of this pilot symbol is the same as the transmission power of the preceding radio frame.

IPR2023-01270 Page 478

(5) Forward dedicated physical channel

[0197] Fig. 57 shows a transmission pattern of the dedicated physical channel. When the initial setting of the forward dedicated physical channel is carried out, the transmission is started at a designated transmission power value P_D, irrespective of the time of the call setup due to call origination or incoming call acceptance or diversity hand over. The transmission is continuously carried out at the constant transmission power P_D, until the establishment of synchronous reception for the reverse dedicated physical channel is finished, and the decoding of the reverse TPC symbol becomes possible. The value P_D is determined by a method similar to the method in case of FACH at the base station BS.

[0198] When the establishment of synchronous reception for the reverse dedicated physical channel is finished and the decoding of the reverse TPC symbol becomes possible, high speed closed loop transmission power control is carried out in accordance with the result of decoding of the TPC symbol. In high speed closed loop transmission power control, the transmission power is adjusted in a 1 dB control step directly before each time slot on the basis of the decoding result of the TPC symbol.

(6) Reverse dedicated physical channel

[0199] On the other hand, at the time of the call setup due to call origination or incoming call acceptance, the mobile station MS starts transmission of the reverse dedicated physical channel, after the processing to establish synchronous reception for the forward dedicated physical channel has satisfied specified conditions. The transmission power value of the first time slot at the time of starting transmission is determined by the open loop control similar to that in case of RACH, and the high speed closed loop transmission power control is carried out for the transmission power value of a subsequent time slot in accordance with the decoding result of the TPC symbol in a forward dedicated physical channel.

[0200] At the time of diversity hand over, it is not necessary to newly set up the reverse dedicated physical channel. The transmission power is controlled for every time slot by the high speed closed loop transmission power control at the time of diversity hand over.

B-8: Variable rate transmission control

[0201] The variable rate transmission that is matched to ITU-T (International Telecommunication Union-Telecommunications Sector) Recommendation G. 729 or EVRC is carried out only for the dedicated physical channel for the voice service. Regarding the dedicated physical channel (128ksps over) for data transmission, the variable rate transmission is not carded out. Rate information is not transmitted, but rather the rate decision is carried out using a blind rate decision method on the receiving side that is described later.

B-9: Bit transmission method

[0202] The CRC bit is output in order from high dimension to low dimension, and the traffic channel (TCH) is output in the order of input. Bit value '0' is output for all tail bits, and bit value '1' is output for all dummy bits. Furthermore, the idle pattern is made to be an optional PN pattern. However, in the case where a dummy or idle pattern is transmitted, CRC coding is also carried out.

B-10: Incoming call acceptance control

[0203] Next, incoming call acceptance control will be described by separating into the base station BS operations and the mobile station MS operations.

B-10-1: Operation of base station BS

[0204] The mobile stations MS in this embodiment are divided into several groups by a predetermined method. When a call attempt identifying a mobile station occurs, a call attempt message is sent to all mobile stations belonging to the group which the identified mobile station belongs to.

[0205] The group division has been already carried out by an application in the base station. In the base station, the called party information, which includes the identification number of the mobile station MS that is identified by the call attempt, and the group number, which corresponds to the group of the identified mobile station MS, are designated through the macro. The base station BS transmits the called party information using the I parts (I1 - I4) of PCH corresponding to the designated group number.

[0206] The base station BS transmits two PD parts (PD1 and PD2) in PCH all of which is set as '0,' and does not transmit the I parts on the PCH corresponding to groups which do not relate to called party information.

IPR2023-01270 Page 479

[0207] When the transmission of the called party information is instructed by the macro, the base station BS sets '1' for all of PD1 and PD2 of the PCH corresponding to the designated group number, and transmits the called party information using the designated I parts in the same PCH.

B-10-2: Operation of mobile station MS

[0208] On the other hand, the mobile station MS ordinarily receives only PD1 consists of 8 bits. In other words, the mobile station MS carries out the synchronous detecting reception using the pilot symbols which consists of four symbols adjoining the front side of PD1.

[0209] The mobile station MS carries out a soft decision of majority operation for PD1. The calculated result of this operation takes a value of '0' when all of the PD parts are '0', in a state where there is no deterioration in the reception quality, and takes a predetermined positive maximum value when all of the PD parts are '1'. The mobile station MS operates as follows based on the thresholds M1 and M2 (M1 > M2) for the decision and the processing result.

(1) If the processing result is equal or more than the threshold M1, the mobile station MS decides that call attempt has reached identifying a mobile station MS of the group to which the mobile station itself belongs, and receives the I part of the same PCH.
(2) If the processing result is less than the threshold M2, the mobile station MS decides that a call attempt identifying a mobile station in the group to which the mobile station itself belongs has not reached, and sets reception off (receiving OFF) until the reception timing of PD1 in the group to which its own station belongs after receiving one super frame.
(3) If the processing result is less than the threshold value M1 but equal to or greater than the threshold value M2, the mobile station MS receives PD2 in the same PCH, and carries out the above-decribed processing (1) and (2). When the processing result is less than the threshold value M1 but equal to or greater than the threshold value M2 in PD2, the mobile station MS receives the I part of the same PCH.
(4) In the case that it does not fall under in the above-described case (1), the mobile station MS receives the I part by the above-mentioned processing (2) or (3), and decides whether or not the mobile station is called in accordance with the called party information included in the I part.

B-11: Terminal interface

[0210] Next, the terminal interface will be described. An interface (TE side interface) with an outside terminal which is connected to the mobile station MS, and an interface (MS core side interface) with a core part ("MS core" hereinafter) of the mobile station MS, in the terminal interface unit TERM-INT of the mobile station MS, will be described.

B-11-1: Overview of interface for each service

[0211] A total of four types of services are offered in this embodiment: the voice communication service, the unrestricted digital signal transmission service, the packet signal transmission service and the modem signal transmission service. The mobile station MS comprises the terminal interface unit TERM-INT corresponding to all the services on ADP (adapter). First of all, the construction of the network in each service will be described with reference to Figs. 58 through 61. In these drawings, MS CODEC in the mobile station MS indicates the voice CODEC, MS core indicates the functions other than ADP of the mobile station MS, and BTS indicates a base station.

[0212] Fig. 58 is a block diagram showing the logical constitution of the network in the voice service. In the voice communication according to the constitution shown in Fig. 58, a calling from the handset is transferred to the destination TE (terminal equipment) via the MS core, the base station BS, the switching center and the public switched telephone network (PSTN). In the case where the destination is a mobile station MS, the calling from the handset is transferred to the handset of the destination mobile station via the MS core, the base station BS, the switching center and another base station. The terminal interface unit TERM-INT is adapted such that both forward and reverse signal speed between it and the MS core is a speed corresponding to a peak speed that is determined for both forward and reverse directions in the voice communication service. When there is a possibility that the signal speed exceeds the speed corresponding to the peak speed, speed alignment by buffering is carried out. The speed corresponding to the peak speed means the transmission speed before the CODEC processing which takes into consideration a reduction in redundancy by CODEC. In the case where the buffer overflows, the signal for the overflow is quashed.

[0213] Fig. 59 is a block diagram showing the logical constitution of the network in a unrestricted digital signal transmission service. In the unrestricted digital signal transmission according to the constitution shown in Fig. 59, the calling from a TE is transferred to the destination TE via the ADP, the MS core, the base station BS, the switching center and the public network (ISDN). In the case where the destination TE is connected to a mobile station, the calling from the

IPR2023-01270 Page 480

TE is transferred to the destination TE through the ADP, the MS core, the base station BS, the switching center, another base station, and the MS core and ADP of another mobile station. The terminal interface unit TERM-INT is adapted such that both forward and reverse signal speed in the interface between the ADP and MS core is a speed corresponding to a peak speed that is determined for both forward and reverse directions in the unrestricted digital signal transmission service. When there is a possibility that the signal speed exceeds the speed corresponding to the peak speed, speed alignment by the buffering is carried out. In the case where the buffer overflows, the signal for the overflow is quashed, as in the same manner as in the voice communication service. The ADP is made such that it is able to transmit and distinguish a signal while the order of a plurality of 6B-ch is maintained in between the external interface unit and the SPU at the time of the bulk transmission. Furthermore, in the signal processing unit in the ADP, the signal speed between the MS core is set to become a speed corresponding to the peak speed that is set up for both the forward and reverse. "The speed corresponding to the peak speed" is the speed which takes into consideration redundancy part by FEC etc. For example, in the case where a FEC is carried out by half rate, a speed which is 2-fold greater than the peak speed that is set up in the external interface unit must to be secured as "the speed corresponding to peak speed."

[0214] Fig. 60 is a block diagram showing the logical constitution of the network in a packet signal transmission service. In the packet signal transmission according to the constitution shown in Fig. 60, the IP packet from the TE and ADP is transmitted to the TE of the destination side on the Internet via the mobile station MS, the base station BS, the switching center and the Internet. In the case where the TE of the destination side is connected to a mobile station, the IP packet from the TE and ADP is transmitted to the TE and ADP of the destination side through the mobile station MS, the base station BS, the switching center, (another) base station and other mobile station. In this embodiment, a LAN that is forming the Internet is also a part of the Internet. The terminal interface unit TERM-INT is adapted such that both forward and reverse signal speed at the interface output on the NW (network) side between the MS core and the terminal interface unit TERM-INT is a peak speed that is determined for both forward and reverse directions in the packet signal transmission service. In the case where there is a possibility that the signal speed exceeds the peak speed, speed alignment by buffering is carried out. In the case where the buffer overflows, the signal for the overflow is quashed. In the signal processing unit of ADP, the signal speed between the MS core is set to become a speed corresponding to the peak speed that is set for both the reverse and forward. "The speed corresponding to the peak speed" is the speed that takes into consideration the redundancy part by FEC etc.. Furthermore, in this embodiment, "peak speed" is set before communication by control unit MS-CNT, and the initial value is 64 kbps for both forward and reverse directions. The release of the call condition (CC) is carried out according to an indication from the switching center side which has detected that the time duration during which an IP packet was neither transmitted nor received has exceeded the time value described below. Alternatively, the release of the call condition is carried out according to a control command (for example AT command) from the TE based on the will of the user. The transmission and the reception state may be observed in the ADP of the mobile station MS.

[0215] Fig. 61 is a block diagram showing the logical constitution of the network in a modem signal transmission service. In the modem signal transmission according to the constitution shown in Fig. 61, the calling from the TE is transferred to the destination TE via the ADP, the MS core, the base station BS, the switching center, the modem, the public switching telephone network and other modem. In the case where the destination is a mobile station, the calling from the TE is transferred to the destination TE via the ADP, the MS core, the base station BS, the switching center, another base station and another mobile station. The terminal interface unit TERM-INT is adapted such that forward and reverse signal speed between it and the MS core is a peak speed that is determined for both forward and reverse directions in the modem signal transmission service. In the case where there is a possibility that the signal speed exceeds the peak speed, speed alignment by buffering is carried out. In the case where the buffer overflows, the signal for the overflow is quashed. The signal speed between the signal processing unit in the ADP and the MS core is set to become a speed corresponding to the peak speed that is set for both the forward and reverse.

[0216] The conditions which the ADP of the mobile station MS is satisfying in order to realize the four types of services described above will be described in detail for each service. Note that the interface that is provided to ADP includes the interface of the TE side and the interface of the MS core side, so that the items will be described for each interface. Since there is no difference in each of the 4 types of services, the interface of the MS core side will be described in common for all the service.

B-11-2: Interface of TE side

B-11-2-1: Interface for voice communication

B-11-2-1-1: Overview

[0217] Fig. 62 is a diagram showing each protocol stack for voice communication of C-Plane (control plane) and U-Plane (user plane) in the TE side interface of the ADP in the mobile station MS. In this figure, each stack is arranged to

IPR2023-01270 Page 481

the location that corresponds with each portion of the mobile station MS. As described above, in this embodiment, CODEC (voice CODEC) is realized on the ADP.

[0218] As clear from Fig. 62, data transmitted by U-Plane is an analog voice data, and data related to other HMI (Human Machine Interface) is transmitted by C-Plane. In this figure and each figure that is described later, each of L1, L2, L3, ... designates layer 1, layer 2, layer 3, ... of the OSI reference model. As shown in Fig. 62, although L1b-C and L2b-C are formulated in the C-Plane in this embodiment, a design is also acceptable in which data is not transmitted and received between the TE and the C-Plane by deleting these L1b-C and L2b-C. Although HMI is provided on the mobile station MS in this embodiment, HMI may be provided on an external handset. Although a microphone and a loud speaker are provided on the mobile station MS in this embodiment, the microphone and the loud speaker may be provided to only an external handset, and the L2b-U may be removed.

B-11-2-1-2: HMI (Human Machine Interface)

[0219] HMI is provided to carry out basic operations of the mobile station MS such as call origination, incoming call acceptance, and so on, and is realized as an operating unit and a display unit. A keypad for calling and answering and a display that can display simple information, are prepared on the mobile station MS. The mounting site therefor is on the mobile station MS or on an externally attached handset.

B-11-2-1-3: Voice coding method

[0220] Next, the coding method in the voice coding unit 72 will be described.

B-11-2-1-3-1: Voice coding

[0221] The voice coding algorithm of the voice CODEC in this embodiment conforms to ITU-T recommendation G. 729 (8 kbps CS-ACELP). Regarding the mobile station MS, another coding method may be added, and each method may be used by switching.

B-11-2-1-3-2: Channel coding

[0222] In this embodiment, in the case where an ITU-T recommendation G. 729 (CS-ACELP) is used for the voice coding algorithm, a signal is transmitted after the channel coding described below is performed, to protect coding data from an error in the channel.

[0223] In this embodiment, two types of error control methods for protecting coding data are prescribed: error control method 1 in which a CRC is added on the transmission side and only error detection based on this is performed, and error control method 2 in which error correction using convolutional coding is combined with an error detection by CRC. It is acceptable that the mobile station MS be able to use only error control method 1, or that the mobile station MS be able to use two types of error control methods by switching between the error control method 1 and the error control method 2 as in the case of the mobile station MS in this embodiment.

(1) Error control method 1 (in case of transmission)

[0224] Fig. 63 shows the processing outline for voice CODEC. As shown in Fig. 63, in the error control method 1, CRC of eight bits is obtained from generating polynomial expression (16) below by using the 40 bits subject to protection shown in Table 17 among 80 bits of the coded voice data of one frame part (10ms) which is output from CS-ACELP (CODER). This 8 bits CRC is transmitted by combining with the coded voice data of one frame, so that the total transmission bit rate as voice data becomes 8.8 kbps.

$$G(X) = X^8+X^7+X^4+X^3+X+1 \quad (16)$$

IPR2023-01270 Page 482

Table 17

Itemization of bits subject to protection in data for CS-ACELPone frame part		
Parameter	All bit number	Number of bits subject to protection
LSP flag (L0)	1	1
LSP first layer (L1)	7	7
LSP second layer upper (L2)	5	5
LSP second layer lower (L3)	5	0
First sub frame LAG (P1)	8	8
Parity (P0)	1	1
First sub frame CODE (C1,S1)	17	0
First sub frame GAIN (GA1,GB1)	7	7
Second sub frame LAG (P2)	5	Upper 4
Second sub frame CODE (C2,S2)	17	0
Second sub frame GAIN (GA2,GB2)	7	7
Total	80	40

[0225] In Table 17, the terms inside of brackets in the parameter column are equivalent to the notations in the ITU-T recommendation G. 729.

(2) Error control method 2 (in case of transmission)

[0226] As shown in Fig. 63, in the aforementioned error control method 2, first, CRC of eight bits is obtained from the same generating polynomial expression (16) as in error control method 1 by using the 40 bits subject to protection shown in Table 17 from among 80 bits of the coded voice data of one frame part (10 ms) which is output from CS-ACELP. Next, 6 bits of tail bit is added to the 48 bits which result when the CRC of 8 bits is added to 40 bits subject to protection, and convolutional coding is carried out. The convolutional coding device takes as conditions a rate of 1/2 and an arresting length of 7, and uses generating polynomial expressions (17), (18). Finally, the result of the convolutional coding and the coded voice data excluding that subject to protection are combined, and are transmitted after frame inner interleaving (8x19). Thus, the total transmission bit rate of the voice data becomes 14.8kbps.

$$G1(D) = 1+D^2+D^3+D^5+D^6 \quad (17)$$

$$G2(D) = 1+D+D^2+D^3+D^6 \quad (18)$$

B-11-2-1-3-3: Channel decoding

[0227] The decoding processing for the error detection code or the error correction code corresponding to the error control methods 1, 2 performed on the transmission side is carried out on the reception side.

(1) Error control method 1 (in case of reception)

[0228] When processing of the error control method 1 is carried out on the transmission side, a CRC code series of 8 bits is obtained from data from which the CRC of 8 bits that was added on the transmission side has been excluded, by using the aforementioned generating polynomial expression (16), after the voice data of one frame part is received. The CRC code series and the CRC bit series which have been added on the transmission side are compared, and a frame in which both bit series do not accord is recognized as an error frame.

IPR2023-01270 Page 483

(2) Error control method 2 (in case of reception)

[0229] When the processing of the error control method 2 is carried out on the transmission side, on the receiving side, first, the de-interleaving processing is carried out after the voice data of one frame part is received. Next, the error correction decoding is carried out to bit series on which convolutional coding had been performed. In order to carry out effective error correction decoding, a Viterbi algorithm or a decoding method having a capacity equal thereto is used. After this error correction processing, the CRC bit series are compared by the same method as in the case of error control method 1, and the frame in which both bit series do not accord is recognized as an error frame.

B-11-2-1-3-4: Error frame interpolating

[0230] It is desirable to carry out the interpolation processing on the error frame, in order to improve the decoded voice quality when a coding error has occurred. The specific interpolation process is optional. Although decoded voice quality is not prescribed, it should be of a quality which does not present a problem with respect to hearing. In this embodiment, in the case where an interpolation processing function is included, it is possible to switch between the state where interpolation operation is enabled and the state where it is disenabled by the setting of maintenance terminal (MT).

B-11-2-1-3-5: Voice decoding

[0231] Next, the decoding method in the voice decoding unit 70 will be described. The voice decoding algorithm used as the standard in this embodiment, conforms to ITU-T recommendation G. 729 (8 kbps CS-ACELP). However, in the mobile station MS, in the case where a coding method other than the aforementioned methods is added, the decoding method corresponding to the coding method is installed.

B-11-2-1-4: VOX control

[0232] In this embodiment, the base station BS and the mobile station MS have the VOX function which controls on/off of TCH transmission according to the existence of the transmission voice during the voice communication. It is possible to change whether or not, the VOX control exists optionally by the setting by MT etc. The VOX control in the case that G.729 8kbps CS-ACELP is used as voice coding algorithm will be described below.

B-11-2-1-4-1: Voice presence/silence decision

[0233] The voice CODEC in this embodiment carries out the voice presence/silence decision during voice communication, and outputs the coded voice data when the voice presents, or terminates the output of the coded data except for the periodical output of background noise information, that will be described later, when voice does not present. Although the specific voice presence/silence decision algorithm is optional, a structure is employed in the mobile station MS in this embodiment that enables the threshold value for the voice presence/silence decision to be changed by setting by MT etc.

B-11-2-1-4-2: Radio transmission processing

[0234] The mobile station MS detects the silence state in the voice CODEC during voice communication. When the mobile station MS terminates the output of the coded data with the exception of during transmission of background noise information, the mobile station MS transmits only the pilot symbol and the ACCH part while it terminates the transmission of the TCH part in the radio physical channel for the voice transmission. The controls during switchover from the voice presence to the silence state, during the silence state, and during switchover from the silence to voice presence state will be explained below with reference to Fig. 64. Fig. 64 shows the transmission timing of the preamble and post amble signal. Fig. 64 shows the cases where (i) from voice presence to silence, (ii) during silence, (iii) from silence to voice presence. In Fig. 64, the same reference number is added to each corresponding frame of 10 ms and output of the encoder.

(1) Transition from voice present state to voice silent state

[0235] In the case of transition from a voice present state to a voice silent state, the encoder side of the voice CODEC provides notification in advance of the termination of TCH transmission suspension by the post-amble when silence is detected in the voice present state. The encoder suspends the transmission after the background noise information is transmitted following the post-amble. In the example in Fig. 64, a "voice present" decision results for the transmission

IPR2023-01270 Page 484

timing of the first to second frame of 10ms, and a "voice silent" decision results for the transmission timing of the third to sixth frame of 10ms. Thus, the output of the encoder becomes the coded voice 0 - 2 in the transmission timing of the first to third frame of 10ms, becomes the post-amble in the transmission timing of the fourth frame of 10ms, becomes the coding noise (background noise information) in the transmission timing of the fifth frame of 10ms, and then terminates in the transmission timing of the sixth frame of 10ms.

When the decoder side of the voice CODEC detects the transmission termination of TCH by receiving the post-amble, it enters into the background noise generation processing, and carries out interpolation processing for the frame that received with the post-amble,

(2) Continuing silent state

[0236] In the continuing silent state, the encoder side periodically carries out the coding of the background noise, and transmits this coded background noise. When transmitting the background noise information, the encoder side transmits the post-amble prior to the background noise information. The transmission interval can be set by using a parameter, and the initial value of the parameter is 1 second. In the example of Fig. 64, the result of the voice existence decision is "silent" in the transmission timing of each frame of 10ms. Accordingly, an operation is repeated in which the encoder continuously outputs the post-amble (10ms) and the coded noise (10ms), and, after doing so, then terminates the transmission for 980ms.

[0237] Furthermore, the decoder side renews the generated background noise by using the background noise information which is transmitted periodically in the continuing silent state.

(3) Transition from voice silent state to voice present state

[0238] In the case of transition from a voice silent state to a voice present state, the encoder side provides notice in advance of the TCH transmission start by the preamble when the voice is detected in the silent state. The encoder side starts the transmission of the regular coded voice data after the preamble. In the example of Fig. 64, the result of the voice present/silent decision becomes "silent" in the transmission timing of the first to third frame of 10ms, and becomes "voice present" in the transmission timing of the fourth and fifth frame of 10ms. Thus, the output of the encoder stops at the transmission timing of the first to the third frame of 10ms, becomes the preamble in the transmission timing of the fourth frame of 10ms, and becomes the coded voices 4 - 5 in the transmission timing of the fifth and sixth frames of 10ms.

[0239] When the decoder side detects a TCH transmission start by receiving of the preamble in the continuing silent state, it stops the background noise generation from next frame of the preamble, and performs regular voice decoding operations.

[0240] An example of the unique word pattern of the preamble and post-amble signals is shown in Table 18. Table 18a shows a unique word pattern of the preamble for 8.8 kbps, 18b shows a unique word pattern of the preamble for 14.8kbps, 18c shows a unique word pattern of the post-amble for 8.8 kbps, and 18d shows a unique word pattern of the post-amble for 14.8 kbps. The preamble and post-amble signals are transmitted without being subject to channel coding. The unique word pattern must be a pattern such that speech CODEC does not incorrectly recognize the unique word as a voice. The patterns shown in Table 18 are preferred examples.

IPR2023-01270 Page 485

Table 18

Examples of unique word patterns																								
a. Preamble (for 8.8 kbps) Transmission order ->																								
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0												
b. Preamble (for 14.8 kbps) Transmission order ->																								
1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
c. Post-amble (for 8.8 kbps) Transmission order ->																								
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	0	0	0	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1												
d. Post-amble (for 14.8 kbps) Transmission order ->																								
1	0	0	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	1	1	1
1	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1
0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1
1	1	1	1	1	1	0	1	1	1	1	1	0	1	0	1	1	1	1	1	1	1	1	1	0
1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		

B-11-2-1-4-3: Background noise

[0241] The background noise of one frame part coded by the encoder is used as the background noise. The background noise in the decoder is generated by using the received background noise information. The specific generation method is optional. Whether or not there is background noise generation in the decoder can be changed by the setting of MT etc.

B-11-2-2: Interface for unrestricted digital signal transmission

[0242] The TE side interface for unrestricted digital signal transmission connects the mobile station MS and the terminal for ISDN. This interface is mounted on the body in the mobile station MS, and may also be mounted on an externally attached ADP. Fig. 65 shows each protocol stack for a unrestricted digital signal transmission-of C-Plane (Control Plane) and U-Plane (User Plant) in TE side interface of the ADP of the mobile station MS. In this figure and subsequent figures showing the protocol stack, each stack is shown arranged at a site that corresponds with each unit and TE in

IPR2023-01270 Page 486

the mobile station MS.

[0243] As clear from Fig. 65, the ADP comprises one or more interfaces (basic interface(s)) satisfying ITU-T recommendation I.430 and one or more interfaces (first group speed interface(s)) conforming to ITU-T recommendation I.431. In this embodiment, the ADP comprises two ITU-T recommendation I.430 conforming interfaces and one ITU-T recommendation I. 431 conforming interface. Thus, in this embodiment, a maximum of two callings can be treated simultaneously when the ITU-T recommendation I. 430 conforming interface is used, while a maximum of six callings can be treated simultaneously when the ITU-T recommendation I. 431 conforming interface is used. However, it is also acceptable to provide only one of either the ITU-T recommendation I. 430 conforming interface or the ITU-T recommendation I. 431 conforming interface, or to provide neither of the interfaces.

B-11-2-3: Interface for packet signal transmission

B-11-2-3-1: Physical interface

[0244] The mobile station MS has an interface (interface for outside data terminal) on ADP for connecting an outside data terminal such as a PC (personal computer) etc. for the packet signal transmission. The number of interfaces for outside data terminals which are mounted on the mobile station MS is optional. Furthermore, the interface may be mounted to an externally attached ADP. As the interface for the outside data terminal, it is possible to use any interface or combination of interfaces such as an interface like RS-232C that can connect easily to commercially available PCs etc., an infrared interface that can connect directly to an outside terminal, or connect with wireless though a predetermined interface adapter, or an Ethernet interface that can carry out high speed data transfer of 128kbps or more.

[0245] This embodiment employs Ir-DA ver. 1.1 which enables a higher speed data transfer, and not Ir-DA ver. 1.0, for the infrared interface. Easy to handle 10 Base-T is adopted to the Ethernet interface in this embodiment.

B-11-2-3-2: PPP dial up connection

[0246] Fig. 66 is a block diagram showing each protocol stack for packet signal transmission under a PPP dial up connection environment of the C-Plane and U-Plane on the TE side interface of ADP in the mobile station MS.

[0247] As clear from Fig. 66, in packet signal transmission under a PPP dial up connection environment, the PPP is provided at 12 of ADP. In this embodiment, the protocol field value that is permitted with the PPP of L2 is only the IP-related protocol and the protocol (the LCP, IPCP etc.) that is used to control between links. A PPP frame having other protocol field values is quashed in the ADP. In this embodiment, the LCP setting options ACCM, RFC and ACFC can be set by request from the TE side. The presence or absence of Van Jacobson TCP/IP header compression (RFC1144) from the MT can be set up for IP-Compression-Protocol in the IPCP setting options. Even in the case where a static IP address is assigned to TE, a setting which enables communication is possible.

[0248] In the C-Plane, the transmission protocol of a signal conforming to Hayes-AT is provided at L3 of ADP.

[0249] In the U-Plane, the ADP is set to transmit/receive only the information field in the PPP frame between LAC-Us. Note that the ADP does not thaw for the IP packet of which TCP/IP header has compressed by TE.

B-11-2-3-3: Ethernet connection

[0250] Fig. 67 is a diagram showing each protocol stack for the packet signal transmission under an Ethernet connection environment of the C-Plane and U-Plane on the TE side interface of the ADP in the mobile station MS.

[0251] As clear from Fig. 67, in packet signal transmission under an Ethernet connection environment, DIX is provided at L2 of ADP. In the C-Plane, DIX is designed such that the MT notifies ADP of the called party number of the destination. DIX is constructed to issue a call attempt command that is for the pre-designated destination having the called party number to the CNC when the IP packet from the TE is received on the U-Plane in reception stand-by state. DIX quashes the IP packet from the buffer in the case where the calling fails. Furthermore, when calling to the switching center is released (in case of normal/semi-normal), DIX views this as a failure compulsorily and does not carry out calling processing for calling to the switching center side during Tccblk [s] since release processing is completed. This is to avoid the situation in which calling to the switching center side occurs frequently. Note that in this embodiment, Tccblk can be optionally set within a predetermined range (for example, 0 [s]-3600 [s]) by control unit MS-CNT.

[0252] In the U-Plane, DIX supports ARP (refer to RFC826), and provides a proxy response of the hardware address of its own ADP to all ARP requests. In other words, the ARP packet is not transmitted to network side. The IP address is not added to the ADP. In DIX, the hardware address of the TE is stored to memory in its own ADP when the Ethernet frame from the TE is received. DIX constructs the Ethernet frame from the IP packet and the TE/ADP hardware address that is known from the network side, and transmits the Ethernet frame to the TE. Furthermore, in the case where a padding Ethernet frame is received from the TE side, only the IP packet part excluding the padding part is delivered to LAC-

IPR2023-01270 Page 487

U. When the length of the IP packet from the MS core side is short, the Ethernet frame is constructed by carrying out the padding processing, and is transmitted to the TE. In the case where the forward IP packet to be transmitted is presents in the ADP and the hardware address of the TE is unknown, DIX transmits an ARP request to the TE. In the case where the hardware address of the TE is obtained from the ARP response that is obtained as the result of the ARP request, DIX transmits the forward IP packet by capsuling the forward IP packet to be transmitted in the Ethernet frame. When there is no ARP response from the TE, DIX quashes the IP packet. In this embodiment, only IP and ARP are permitted as the type field value in the Ethernet frame. When an Ethernet frame of a type field value other than IP and ARP is received, the frame is quashed.

B-11-2-4: Interface for modem signal transmission

[0253] Fig. 68 shows each protocol stack for the modem signal transmission of C-Plane and U-Plane in TE side interface of the ADP in the mobile station MS. As clear from Fig. 68, ADP complies with a Hayes-AT conforming protocol. The contents of L2b-C and L2b-U are the items which should be designed as appropriate.

B-11-3: Interface of MS core side

B-11-3-1: C-Plane

B-11-3-1-1: Overview

[0254] Fig. 69 shows an example of connection between a plurality of terminal interface units TERM-INT and the MS core in the C-Plane. As shown in Fig. 69, the MS core is able to connect to a plurality of terminal interface units TERM-INT through a bus. Independent identification information TEmID (which may also be written as TEm#) is added to each terminal interface unit TERM-INT. A plurality of function blocs such as CNC, SYC and etc. exist in the MS core, and a unique Function ID (Function #) is added to each block. TLP canies out link control that employs the TEmID and Function ID. The link control includes the management (adding of dynamic ID) of TEmID and the monitoring of connection with the terminal interface unit TERM-INT.

B-11-3-1-2:Lla-C

[0255] Lla-C shown in Fig. 69 is a physical interface for transmitting data that is on the C-Plane between the MS core and the terminal interface unit TERM-INT, and satisfies the following conditions.

(1) Condition 1: A plurality of terminal interface units TERM-TNT can be connected to the MS core. It is possible to realize communication between terminal interface units TERM-INT, and communication between any of the terminal interface units TERM-INT and the MS core.
(2) Condition 2: It is possible to monitor all communications described above in MT.
(3) Condition 3: The terminal interface unit TERM-INT side can detect that the terminal interface unit TERM-INT is connected to the MS core, and this information can be notified to the TLP (Terminal Link Protocol) of the terminal interface unit TERM-INT.
(4) Condition 4: The transmission of TLP frame units can be carried out in an asynchronous transmission.

B-11-3-1-3: Detection concept of terminal interface unit connection

[0256] Fig. 70 shows the detection concept of the terminal interface unit TERM-INT connection, and Figs. 71 and 72 show flowcharts of the detection processing. As shown in these figures, when a new terminal interface unit TERM-INT is connected, a assignment request of the TEmID and a notification signal of the connection is transmitted from the terminal interface unit TERM-INT to the MS core side. The release of the terminal interface unit TERM-INT is observed periodically by the MS core.

B-11-3-1-4: TLP

[0257] The TLP (Terminal Link Protocol) is a L2 protocol for connecting a plurality of terminal interface units TERM-INT to an MS core. The TLP is formulated for the purpose of discriminating between a plurality of terminal interface units TERM-INT which are connected to an MS core, and enabling communication between the terminal interface unit TERM-INT and an MS core (function block), a terminal interface unit TERM-INT and a terminal interface unit TERM-INT, and an MS core (function block) and an MS core (function block). In this embodiment, it is impossible to realize

IPR2023-01270 Page 488

communication between a terminal interface unit TERM-INT and a terminal interface unit TERM-INT, and between each function block. However, the TLP itself is designed to enable the above communication, and is made so that it can expand easily.

B-11-3-1-5: Layer 3 (CNC SYC)

[0258] Fig. 73 shows the details of the protocol stack. CNC and SYC will be described below.

(1) CNC

[0259] CNC (Call Connection Control) is a layer 3 protocol between an MS core and a terminal interface unit TERM-INT for carrying out calling control. CNC is formulated for the purpose of providing the different calling control protocol (for example, Hayes-AT or ITU-T recommendation Q.931) for each service that is connected to the terminal interface unit TERM-INT as the common procedure to the MS core, reducing the load of on the MS core, and providing expandability.

[0260] At the calling origination, the terminal interface unit TERM-INT that received the calling request from the TE transforms the calling request to the calling set request message of the CNC protocol, and notifies this to the CNC Function of the MS core. The MS core that received the calling set request message starts the calling origination processing in the radio section. At the incoming call acceptance, the terminal interface unit TERM-INT starts the incoming call acceptance processing when it receives the calling set display message of the CNC protocol that is transmitted from the MS core which received the incoming call acceptance request in the radio section. The calling set display message is notified to all the terminal interface units TERM-INT that are capable of the reception.

(2) SYC

[0261] SYC (System Control) is a layer 3 protocol between an MS core and a terminal interface unit TERM-INT for carrying out the radio control. SYS is formulated for the purpose of notifying information regarding the radio control of the reception signal level etc, which is detected by the MS core, to the terminal interface unit TERM-INT. Furthermore, although it is not realized in this embodiment, the control request may be able to be transmitted from the terminal interface unit TERM-INT to the MS core.

[0262] MS core that detected the reception signal level of the perch channel and information concerning channel quality etc., notifies this information to the terminal interface unit TERM-INT by SYC protocol. The terminal interface unit TERM-INT that receives this information can notify this information to the TE with the layer 3 protocol according to the TE that is connected thereto.

B-11-3-2: U-Plane

B-11-3-2-1: Overview

[0263] Fig. 74 shows an example of connection constitutions for a plurality of terminal interface units TERM-INT and the MS core in U-Plane. As shown in Fig. 74, the MS core can connect to a plurality of terminal interface units TERM-INT through a bus.

B-11-3-2-2: Lla-U

[0264] The Lla-U shown in Fig. 74 is a physical interface for transmitting user data (U-Plane) between the MS core and the terminal interface unit TERM-INT, and satisfies the following conditions.

(1) Condition 1: A plurality of terminal interface units TERM-INT can connect to the MS core. It is possible to realize communication between each terminal interface unit TERM-INT, and communication between the terminal interface unit TERM-INT and the MS core.
(2) Condition 2: Synchronous transmission can be carried out in the transmission procedure of the voice communication service or the unrestricted digital communication service.
(3) Condition 3: A plurality of terminal interface units TERM-INT is connected to the MS core. Since it is possible that these may be used simultaneously (multi-call), a plurality of U-Plane buses is provided between the MS core and the terminal interface unit TERM-INT, and the L1a-U of the terminal interface unit TERM-INT has the capability to select one U-Plane designated from among the plurality of U-Planes.

IPR2023-01270 Page 489

[0265] The arrangement for selection control of the U-Plane is shown in Figure 75. CC number (CC #) is added to a plurality of U-Planes by the MS core. The terminal interface unit TERM-INT (CNC of C-Plane) receives a command from the MS core (CNC of the C-Plane), and selects the U-Plane in actuality.

B-11-3-2-3: LAC-U

B-11-3-2-3-1: Overview

[0266] In this embodiment, the protocol (LAC-U) that extends and modifies the ITU-T recommendation Q. 2110 (SSCOP) is used in the U-Plane of layer 2 of the radio interface. In LAC-U, the embodiment is different from standard SSCOP in the PDU format and parameter in the error control sublayer.

[0267] The maximum length of the PDU in the U-Plane is 16 - 4096 bytes (variable by 16 byte units) on the transmission side, and is 4096 bytes on the receiving side. The maximum length of the PDU on the receiving side is inevitably determined according to the upper limit value of the maximum length of the PDU on the transmission side. All of the octets including the PDU Type field are moved to the last octet of the PDU to facilitate analysis. Furthermore, the bit length of the PDU Type field is changed to 5 bits according to the addition of SDwithPOLL PDU. Note that while the use of SDwithPOLL PDU in U-Plane is not realized in this embodiment, the format of the PDU is common to the C-Plane in consideration of future extension.

B-11-3-2-3-2: Frame constitution

[0268] The frame constitution of LAC-U is shown in Fig. 76. As shown in Fig. 76, LAC-U consists of a layer-3-convergence sublayer and an error control sublayer. The LAC-U (Link Access Control for U-Plane) shown in Fig. 76 transmits a variable length service data unit (SDU) with high reliability between layer 2 users. The layer-3-convergence sublayer carries out segmentation/reassembly of the PDU, and performs layer-3-convergence of the layer 3 PDU and the primitive/parameter mapping for layer 3 and LAC-U. The error control sublayer provides a high reliability transfer function that uses the functions of error control, flow control, and so on.

B-11-3-2-3-3: Functions

B-11-3-2-3-3-1: Functions of layer-3-convergence sublayer

[0269] The layer-3- convergence sublayer has functions described below.

(1) Segmentation/reassembly function of the layer 3 PDU

(2) Link control function

(3) Code type identification function

[0270] (1) The segmentation/reassembly function of the layer 3 PDU is a function that segments/reassemblies a layer 3 PDU into/from layer-3- convergence PDUs. (2) The link control function is a function that specifies the layer 3 entity which processes the SDU of LAC-U in accordance with SAPI. (3) The code type identification function is a function that identifies the code type when a hybrid ARQ is adapted

B-11-3-2-3-3-2: Function of error control sublayer

[0271] The error control sublayer has the functions described below.

(1) Transfer order alignment function (function that aligns the order of LAC-U SDU that is transferred by this layer).
(2) Error correction function by selective retransmission (by numbering, the receiving LAC-U entity can detect the LAC-U SDU that is not received. This function corrects detected sequence error by retransmission.).
(3) Flow control function (function that enables the LAC-U receiving sides to control the speed at which information can be transmitted by the peer entities on the LAC-U transmission side).
(4) Function to notify layer management of error (function that notifies the layer management of an error occurrence when an error is generated).
(5) Keep alive function (function that confirms that two peer LAC-U entities that forms a connection are maintained in a link connection state even when there has been no data transfer for a long time).

IPR2023-01270 Page 490

(6) Local data recovery function (function that makes it possible for the local LAC-U user to recover the continuous SDU that has not been released yet from the LAC-U entities).

(7) Connection control function (function that carries out the setting, release and resynchronization of the LAC-U connections. This function enables information transfer between users of variable length without delivery guarantee).

(8) User data transfer function (function used in user data transfer between LAC-U users. This function supports either confirmation type data transmission or non-confirmation type data transmission).

(9) Protocol error detection/recovering function (function to detect/recover the error in the protocol).

(10) State notice function (function that enables the peer entities of the calling side and called side to carry out the exchange of condition information).

B-11-3-2-3-4: Primitive

B-11-3-2-3-4-1: List

[0272] Next, the primitives that are used in the layer 2 protocol, and the parameters that are used for each primitive, are shown in Table 19. In Table 19, "-" in the boxes means that parameters do not exist or are undefined for the primitive.

Table 19

Parameters used by layer 2 primitive and each primitive				
Primitive	Type			
	Request	Indication	Response	Confirmation
AA-ESTABLISH	LAC-UU BR	LAC-UU	LAC-UU BR	LAC-UU
AA-RELEASE	LAC-UU	LAC-UU Source	-	-
AA-DATA	MU	MU SN	-	-
AA-RESYNC	LAC-UU	LAC-UU	-	-
AA-RECOVER	-	-	-	-
AA- UNITDATA	MU	MU	-	-
AA-RETRIEVE	RN	MU	-	-
AA-RETRIEVE COMPLETE	-	-	-	-
MAA-ERROR	-	Code Count	-	-
MAA-UNITDATA	MU	MU	-	-

B-11-3-2-3-4-2: Definition of primitives

[0273] The definition of the primitives shown in Table 19 will be described as follows.

(1) AA-ESTABLISH: Used in the setting of the point-to-point connection for confirmation type information transfer between two peer user entities.

(2) AA-RELEASE: Used in the termination of the point-to-point connection of confirmation type information transfer between peer user entities.

(3) AA-DATA: Used in confirmation type point-to-point transfer of LAC-U SDU between peer user entities.

(4) AA-RESYNC: Used in the re-synchronous setting of LAC-U connection.

(5) AA-RECOVER: Used during the interval from protocol error to recovery.

(6) AA-UNITDATA: Used in the broadcast type transfer and the point-to-point transfer of non-confirmation type of SDU between peer user entities.

IPR2023-01270 Page 491

(7) AA-RETRIEVE: Used in the recovery of SDU that is not released from the transmission side yet but is being committed from a user to transmit.

(8) AA-RETRIEVE COMPLETE: Used to provide notice that the SDU which is to be returned to the LAC-U user has disappeared.

(9) MAA-ERROR: Used to provide notice to the layer management of particular events or an error in the LAC-U protocol.

(10) MAA-UNITDATA: Used in the broadcast type of non-confirmation type and the point-to-point transfer between LAC-U and the peer layer management entity.

B-11-3-2-3-4-3: Definition of primitive parameters

[0274] The definition of parameters in EC primitives will be described as follows.

(1) Message unit (MU): Used in the information transfer that carries the variable length messages. In the AA-DATA request, AA-UNITDATA request, and MAA-UNITDATA request, this parameter is mapped transparently to the information field of the LAC-U PDU. In the AA-DATA indication, AA-UNITDATA indication, and MAA-UNITDATA indication, the contents of the information field of the received LAC-U PDU is mapped to this parameter. In the AA-RETRIEVE indication, information to be returned to the LAC-U user from the transmission queue (data has not yet been transmitted) or transmission buffer is mapped to this parameter. The length of MU is an integer multiple of 1 octet.

(2) Information between LAC users (LAC-UU): Used to transfer messages between users of variable length during connection control. LAC-UU may be contained in the BGN, BGAK, BGREJ, RS, and END PDUs, but reception is not guaranteed. In request/indication, this parameter is mapped transparently to the LAC-UU field of the LAC-U PDU. In request/indication, the contents of the LAC-UU field of the received LAC-U PDU are mapped to this parameter. The LAC-UU may be null (not exist), but if LAC-UU exists, the length is an integer multiple of 1 octet.

(3) Sequence number (SN): Used to indicate the value of N(S) of the receiving SD PDU, and to support the data recovery operation.

(4) Recover number (RN): Used to support data recovery. RN+1 indicates the value of the N(S) of the first SD PDU to be recovered. A value representing "Unknown" indicates that only the SD PDU which have not been transmitted yet should be recovered. The value representing "Total" indicates that all SD PDUs which exist in both of the transmission buffer and the transmission queue should be recovered.

(5) Buffer release (BR): Indicates whether or not the transmission buffer is released in the subsequent release connection. This parameter permits the release of a selectively confirmed message, even during data transfer. A value representing "Yes" indicates that the transmission buffer and the transmission queue may be released, and a value representing "No" indicates that the transmission buffer and the transmission queue must not be released.

(6) Code: Indicates the type of protocol error which has occurred.

(7) Source: Indicates which of the LAC-U layer or the peer LAC-U user has started a connection release. This parameter takes the value representing either "LAC-U" or "USER." When "LAC-U" is indicated, the user must ignore it even if the LAC-UU parameters exist.

(8) Count: Indicates the number of retransmission of the SD PDU.

B-11-3-2-3-5: Format and parameter

B-11-3-2-3-5-1: Layer-3-convergence sublayer

[0275] First, the details of the parameters in the layer-3-convergence sublayer will be described.

[0276] SAPI (Service Access Point Identifier) identifies the layer-2 service type which is provided for layer 3, and indicates the service type with 3 data bits. In this embodiment, it is not used.

[0277] The W bit of two bits is used in segmentation and reassembly for keeping the correspondence between the layer 3-frame and layer-3-convergence sublayer frames.

[0278] The code type indication index designates the type of code when a hybrid ARQ is applied. Whether or not the hybrid ARQ is applied is discerned on the basis of the version of the layer-3-convergence sublayer. In this embodiment, it is not used.

[0279] The reservation indicates the version etc. of the layer-3-convergence sublayer with 2 bits. In this embodiment, it is not used.

IPR2023-01270 Page 492

B-11-3-2-3-5-2: Error control sublayer

B-11-3-2-3-5-2-1: List and format of PDU

[0280] Table 20 shows the list of the protocol data unit (PDU) that this embodiment supports.

Table 20

List of PDU in error control sublayer				
Function	Name of PDU	PDU Type field	Description	Retransmissio n number
Setting	BGN	00001	Initial request	Prescribed with MaxCC
	BGAK	00010	Acknowledgment response request	-
	BGREJ	00111	Connection rejection	-
Release	END	00011	Disconnection command	-
	ENDAK	00100	Disconnection acknowledgment response	-
Re-synchronization	RS	00101	Re-synchronization command	Prescribed with MaxCC
	RSAK	00110	Re-synchronization acknowledgment response	-
Recovery	ER	01001	Recover command	-
	ERAK	01111	Recover acknowledgment request	-
Acknowledgment type data Transfer	SD	01000	Order preservation connection type data	-
	POLL	01010	Transmission status information accompanying request for receiving status information	-
	STAT	01011	Solicitation type receiving status information	-
	USTAT	01100	Un-solicited type receiving status information	-
Non-acknowledgment type data transfer Management data transfer	UD	01101	Non-number system user data	-
	MD	01110	Non-number system management data	-

[0281] The definitions and the formats of PDUs shown in Table 20 will be described as follows.

(1) BGN PDU (Begin PDU): Used in the LAC-U link setting between two peer entities. This requests the initialization of the transmission and receiving status variable and the clearing of the transmission and receiving buffer of the peer entity. The format of this PDU is shown in Fig. 82.
(2) BGAK PDU (Begin acknowledgment PDU): Used in the acknowledgment response which indicates that a connection request from the peer entity has been received. The format of this PDU is shown in Fig. 83.

IPR2023-01270 Page 493

(3) BGREJ PDU (Begin Reject PDU): Used in the rejection of the connection from the peer LAC-U entity. The format of this PDU is shown in Fig. 84.

(4) END PDU (End PDU): Used in the release of an LAC-U connection between two peer entities. The format of this PDU is shown in Fig. 85.

(5) ENDAK PDU (End acknowledgment PDU): Used in the acknowledgment of an LAC-U connection release. The format of this PDU is shown in Fig. 86.

(6) RS PDU (Re-synchronization PDU): Used in the re-synchronization of the buffer and the data transfer status variable. The format of this PDU is shown in Fig. 87.

(7) RSAK PDU (Re-synchronization acknowledgment PDU): Used in the response acknowledging reception of the re-synchronization which is requested by the peer LAC-U entity. The format of this PDU is shown in Fig. 88.

(8) ER PDU (Error Recovery PDU): Used in the recovery from protocol error. The format of this PDU is shown in Fig. 89.

(9) ERAK PDU (Error Recovery Acknowledgment PDU): Used in the acknowledgment response of the recovery from protocol error. The format of this PDU is shown in Fig. 90.

(10) SD PDU (Sequenced Data PDU): Used to transfer PDU with the serial number including the information field that is given from the LAC-U users via the LAC-U connections. The format of this PDU is shown in Fig. 77.

(11) POLL PDU (Poll PDU): Used to request status information in regard to peer LAC-U entity through LAC-U connection. The format of this PDU is shown in Fig. 78.

(12) STAT PDU (Solicited status PDU): Used in the response to the status request which is received from peer LAC-U entity. The information relating to the receiving state of the SD PDU and SDwithPOLL PDU, the credit information for the transmission side of the peer entity, and the sequence number (N(PS)) of POLL PDU or SDwithPOLL PDU that solicitated this PDU are included in this PDU. The format of this PDU is shown Fig. 79.

(13) USTAT PDU (Unsolicited status PDU): Used when the SD PDU loss, which is equal to or more than 1, is newly detected based on the sequence number inspection of SD PDU. The information relating to the receiving status of the SD PDU and the credit information for the transmission side of the peer entity are included in this PDU. The format of this PDU is shown in Fig. 80.

(14) UD PDU (Unit data PDU): Used in an non-acknowledgment type data transfer between two LAC-U data. Although the UD PDU is used when the LAC-U user requests a non-acknowledgment type data transfer, the condition and variable of the LAC-U are not effected in this case. The UD PDU does not carry the sequence number, so that the lost is not recognized. The format of this PDU is shown in Fig. 81.

(15) MD PDU (Management data PDU): Used in a non-acknowledgment type management data transfer between two management entities. Although the MD PDU is used when the management entity requests a non-acknowledgment type management data transfer, the condition and variable of the LAC-U are not effected in this case. The format of this PDU is shown in Fig. 81.

[0282] In this embodiment, a PDU that has a PDU Type code that is not prescribed, and a PDU which does not have an appropriate length for the type of PDU displayed, are defined as invalid PDUs. The invalid PDUs is quashed without notifying the transmission side. As the result, no operations are carried out. However, a violation is reported to layer management for a PDU which is not an appropriate length for the PDU of the type which in indicated.

[0283] In Figs. 77 through 90, the maximum length k of the information octet and the maximum length j of the LAC-UU are values that satisfy the PDU maximum length which is defined under (1) in section 12-3-1-2-3.

B-11-3-2-3-5-2-2: Characteristics of each PDU format

[0284] As described above, the reservation field (R, Rsvd, Reserved) exists in each PDU. The function of the reservation field is to carry out 8 bit alignment, and this field is ignored on the receiving side. The maximum length of the information field in each SD, UD, and MD PDU is a k octet. The value of the k is set by both negotiation procedures which LAC-U does not participate in, and is able to be proscribed by other recommendations which uses LAC-U. Alternatively, the k value can be conducted from the maximum PDU length of the protocol which uses LAC-U. Furthermore, the minimum value of the k is 0 octet.

[0285] The coding of STAT, USTAT PDU will now be described.

[0286] The USTAT PDU includes two list elements, and there is a case in which the STAT massage which is transmitted is divided to a plurality of STAT PDU. The processing procedure of one STAT PDU is not related to information in the other STAT PDU. This case materializes even when a plurality of STA PDU are generated as the response of one POLL PDU, and several STAT PDU of the generated STA PDUs were quashed.

[0287] The list elements in each PDU of STAT, USTAT are odd or even number elements of the list that is used for the selection retransmission request. The odd number element expresses the first PDU of the loss part, and the even number element expresses the first PDU of the receiving sequence (excluding the case where the list is last).

IPR2023-01270 Page 494

B-11-3-2-3-5-2-3: ch indication index for MAC switching

[0288] The ch indication index for MAC switching indicates the type of desirable logical channel to be applied according to traffic, and is used to back-up the MAC switching that is carried out by the MS core. For example, the applied logical channel becomes RACH/FACH in the case where the value of the ch indication index for MAC switching is "00000000", and becomes UPCH in the case where the value of the ch indication index for MAC switching is "00000001."

B-11-3-2-3-5-2-4: States of LAC-U protocol entities

[0289] Next, the states of the LAC-U entities will be described. These states are used to prescribe the peer-to-peer protocol. These states are conceptual ideas, so that the duplication will be avoided by showing the general condition of the LAC-U entities in the signal that is exchanged with the user and the sequence of the PDU that is exchanged with the peer entity. The basic states are as follows. (1) State 1: Idle

[0290] Each LAC-U entity is initialized to the idle state (state 1) conceptually, and returns to this idle state by connection release.

(2) State 2: connection start-up on output side

[0291] The LAC-U entity which requests the connection setting to the peer entity is in the output side connection start-up state (state 2) until receiving the acknowledgment response from the peer entity.

(3) State 3: Input side connection start-up

[0292] The LAC-U entity that receives the connection setting request from the peer entity and has a response from the user is in the input side connection start-up state (state 3).

(4) State 4: Output side disconnection start-up

[0293] The LAC-U entity which requests a connection release between peers is in the output side disconnection start-up state (state 4) until receiving the acknowledgment that the peer entity has released the connection and shifted to the idle state (state 1). The LAC-U shifts to the idle state after receiving the acknowledgment.

(5) State 5: Output side re-synchronization start-up

[0294] The LAC-U entity which requests the re-synchronization of the connection to the peer entity, is in the output re-synchronization start-up state (state 5).

(6) State 6: Input side re-synchronization start-up

[0295] The LAC-U entity which receives the re-synchronization request from the peer entity and is waiting for a response from the user is in the input side re-synchronization start-up state (state 6).

(7) State 7: Output side recovery start-up

[0296] The LAC-U entity which requests error recovery of the connection with respect to the peer entity is in the output side recovery start-up state (state 7).

(8) State 8: Recovery response start-up

[0297] The LAC-U entity which is waiting for the response from the user after notifying user that error recovery is finished is in the recovery response start-up state (state 8).

(9) State 9: Input side recovery start-up

[0298] The LAC-U entity which receives the recovery request from the peer entity and is waiting for a response from the user is in the input recovery starting state (state 9).

IPR2023-01270 Page 495

(10) State 10: Data transfer possible

[0299] When the establishment of the connection, the re-synchronization, or the error recovery procedure is finished normally, both of the LAC-U entities are in the data transfer possible state (state 10), and an acknowledgment type data transfer becomes possible.

B-11-3-2-3-5-2-5: State variable of LAC-U

[0300] Next, the state variable used in peer-to-peer protocol prescriptions will be described.

[0301] The SD PDU and the POLL PDU are numbered independently and sequentially, and have a value in the range from 0 to n-1 (n is a modulus of the sequence number). The modulus is 2^8, and the sequence number circulates over the whole range from 0 to 2^8-1. All of the operation methods relating to the state variables VT(S), VT(PS), VT(A), VT(PA), VT(MS), VR(R), VR(H), VR(MR) and the sequence number use the modulo. When the comparison operation of the transmission side variable is carried out, it views VT(A) as the standard. The state variables VT(SQ) and VR(SQ) use the modulo 256 operation.

B-11-3-2-3-5-2-5-1: State variable which transmission side LAC-U is waiting for

(1) VT(S): Transmission state variable

[0302] This state variable has the sequence number (in the case of retransmission, the number that is given first) of the new SD PDU which is transmitted next. One is added to the VT(S) after transmitting the new SD PDU (excluding retransmission).

(2) VT(PS): Poll transmission state variable

[0303] This state variable has the present value of the poll sequence number. One is added to VT(PS) before transmitting the next POLL PDU.

(3) VT(A): Acknowledgment state variable

[0304] This state variable is the sequence number of the SD PDU for which delivery acknowledgment is be carried out next, and is equivalent to the minimum value of the receiving acknowledgment window. The VT(A) is renewed by sequential SD PDU acknowledgment.

(4) VT(PA): Poll acknowledgment state variable

[0305] This state variable is the poll sequence number of the next STAT PDU to be received, and is equal to the minimum value of the N(PS) window which can receive the STAT PDU. In the case where a STAT PDU which includes invalid N(PS) outside the window that is sandwiched between VT(PA) and VT(PS) is received, the recovery procedure is started, and the release is carried out. In the case where the STAT PDU is received, VT(PA) is renewed by N(PS) in the STAT PDU.

(5) VT(MS): Maximum transmission state variable

[0306] This state variable is the sequence number of the first SD PDU which is not permitted in the peer receiving side. That is, this state variable is permitted through VT(MS) - 1 on the receiving side. On the transmission side, when VT(S) = VT(MS) , a new SD PDU must not be transmitted. This state variable is renewed whenever USTAT, STAT, BGN, BGAK, RS, RSAK, ER and ERAK PDUs are received.

(6) VT(PD): Poll data state variable

[0307] This state variable is equal to the number of SD PDU which are transmitted during the time that two POLL PDU are transmitted, or the number of SD PDU which are transmitted until the first POLL PDU is transmitted after Timer_POLL starts. One is added to the VT(PD) in SD PDU transmission including retransmission, and the VT(PD) is initialized to "0" in the one POLL PDU transmission.

IPR2023-01270 Page 496

(7) VT(CC): Connection control state variable

[0308] This state variable has the PDU number of unacknowledged BGN, END, and ER, or the PDU number of RS. One is added to the VT(CC) in the transmission of each PDU of BGN, END, ER or RS. In the case where the END PDU is transmitted by the occurrence of the protocol error, the LAC-U is not waiting for ENDAK PDU (that is, LAC-U shifts directly to state 1 (idle)), and VT(CC) is not added.

(8) VT(SO): Transmission side connection sequence state variable

[0309] This state variable is used to identify whether each PDU of BGN, ER and RS is due to retransmission or not. This state variable is initialized to zero at the time of the start of the LAC-U process, and is mapped to N(SQ) field after adding 1 before transmission of each BGN, ER and RS PDU.

B-11-3-2-3-5-2-5-2: State variable which receiving side LAC-U is waiting for

(1) VR(R): Receiving state variable

[0310] This state variable is the sequence number of SD PDU of the youngest number which is expected to be received next. When the SD PDU having the expected sequence number is received, this state variable is renewed by the sequence number of SD PDU of the youngest number that is expected anew.

(2) VR(H): Maximum receiving expectation state variable

[0311] This state variable is the sequence number of the maximum SD PDU which is expected to be received next. This state variable is renewed in the two case described below.

1) New (not retransmission) SD PDU receiving
2) POLL PDU receiving

(3) VR(MR): Maximum receiving possible state variable

[0312] This state variable is the sequence number of the first SD PDU which is not permitted on the receiving side, i.e., the SD PDU is permitted through VR(MR)-1. The receiving side quashes SD PDU of N(S)≥ VR(MR) (This type of SD PDU may also cause a USTAT PDU). Note that if it is not greater than or equal to VR(HO), VR(MR) may not be set to a smaller value.

(4) VR(SQ): Receiving connection sequence state variable

[0313] This variable is used to discriminate whether or not each BGN, ER and RS PDU is due to retransmission. When each BGN, ER and RS PDU is received, the value of N(SQ) and this state variable are compared, and the value of N(SQ) is assigned to this state variable. If both values are different, PDU is processed normally, without retransmission being considered, and VR (SQ) is renewed with N (SQ). On the other hand, if both values are equal, PDU is recognized as a retransmission and the simplified process is carried out. In this case, the value of VR(SQ) is not renewed. This state variable is initialized to zero when LAC-U processing is started.

B-11-3-2-3-5-2-6: PDU parameter of LAC-U

[0314] Next, the PDU parameter of LAC-U will be described.

(1) N(S)

[0315] Whenever each PDU of a new SD or POLL is generated, the VT(S) is mapped to the N(S).

(2) Information field

[0316] The information field of each PDU of SD, MD or UD is mapped respectively from the message unit parameter of each request primitive of AA-DATA, MAA-UNITDATA, or AA-UNITDATA. Each are mapped respectively from the message unit parameters of each display primitive of AA-DATA, MAA-UNITDATA, or AA-UNITDATA.

IPR2023-01270 Page 497

(3) N(PS)

[0317] Each time POLL PDU is generated on the transmitting side, VT(PS) is mapped to N(PS) (VT(PS) is a value after addition). The receiving side of POLL PDU maps directory N(PS) of POLL PDU which is received to N(PS) field of the STAT PDU. In order to make the error recovery process simple, each time the transmission side transmits SD PDU, the transmission side stores the present value of VT(PS) as N(PS) to the transmission buffer after correlating the present value with the correspondent SD PDU.

(4) N(R)

[0318] Each time a PDU of STAT or USTAT is generated on the receiving side, VR(R) is mapped to N(R).

(5) N(MR)

[0319] Each time each PDU of STAT, USTAT, RS, RSAK, ER, ERAK, BGN or BGAK is generated, the VR(R) is mapped to N(MR). This value becomes the standard value of the credit which is permitted on the receiving side.

(6) LAC-UU

[0320] LAC-UU in each PDU of BGN, BGAK, BGREJ, END or RS is mutually mapped between the LAC-UU parameter value of the corresponding LAC-U signal.

(7) S (Source) bit

[0321] The S bit notifies which of LAC-U self/LAC-U user started the connection release in END PDU. In the case where the transmission of END PDU is started by LAC-U user, the S bit is set to "0." In contrast, when the END PDU is started by LAC-U self, the S bit is set to "1." This bit is mapped to the Source field of the AA-RELEASE indication primitive.

(8) N(SO)

[0322] This field transmits the sequence number relating to the connection control. Each time each PDU of new BGN, RS or ER is transmitted, VT(SQ) is mapped to N(SQ). This field is used together with VR(SQ) on the receiving side to identify whether each PDU of BGN, RS or ER is a retransmission or not.

(9) PDU Type field

[0323] The coding of a PDU Type field is shown in Table 20.

B-11-3-2-3-5-2-7: Timer

[0324] The timer used with the error control sub-sublayer is shown in Table 21. As shown in Table 21, a variable width is provided to the time value in this embodiment. An arrangement is also acceptable, however, in which a variable width is not provided.

Table 21

List of timers used by LAC-U				
Timer name	Default	Timer Value		
		Min/max value	Step	Number of steps
Timer_POLL	750 msec	300 ms - 1000 ms	50 msec	15
Timer_NO-RESPONSE	7 sec	300 ms - 10 sec	100 msec	98
Timer_KEEP-ALIVE	2 sec	300 ms - 5 sec	100 msec	48
Timer_IDLE	10 sec	1 sec - 10 sec	1 sec	10

IPR2023-01270 Page 498

Table 21 (continued)

List of timers used by LAC-U				
Timer name	Default	Timer Value		
		Min/max value	Step	Number of steps
Timer_CC	1 sec	300 ms - 5 sec	100 msec	48

B-11-3-2-3-5-2-8: LAC-U parameter

[0325] The value of LAC-U protocol parameter depends on the application. Each parameter will be described below.

(a) MaxCC

[0326] MaxCC is the maximum value of the state variable VT(CC), and coincides with the maximum transmission number of each BGN, END, ER or RS PDU. In this embodiment, the initial value of MaxCC is 4, and the minimum/maximum values are 1/10 respectively.

(b) MaxPD

[0327] MaxPD is the maximum possible value of the state variable VT(PD) until VT(PD) is reset to zero after POLL PDU is transmitted, and also the maximum value of counter VT(PD). VT(PD) is a counter for transmitting POLL PDU for each SD PDU of a MaxPD piece. In this embodiment, the initial value of MaxPD is 25, and the minimum/maximum values are 1/255 respectively.

(c) MaxSTAT

[0328] MaxSTAt is the maximum permission list element number in STAT PDU. In the case where the list element number becomes more than MaxSTAT, the STAT message must be divided. All of the PDU which carry the divided STAT message include the list terms of the MaxSTAT piaces (there is a case that the last one is not so). This parameter is not used to check the length on the receiving side of the STAT PDU, and is used to divide STAT message on the transmission side only. The MaxSTAT should be an odd number which is equal to or more than three. In this embodiment, the initial value of MaxSTAT is 67, and the minimum/maximum values are 3/255 respectively. The initial value can be set to an optional value, but should not be set to a value exceeding the maximum length of SD PDU.

(d) Clear-buffers

[0329] This parameter is set when the connection is established. This parameter holds either of two values, "Yes" or "No." In the case where this parameter is set to "Yes", the LAC-U can release the transmission buffers and the transmission queues when the connection is released. On the other hand, in the case where this parameter is set to "No", the LAC-U cannot release the transmission buffers and the transmission queues when the connection is released. In the case where this parameter is set to "No" during data transfer, if the past message than set up is in the delivery acknowledgment wait state, the LAC-U cannot release the message that was confirmed selectively from the sending buffer.

(e) Credit

[0330] This parameter is used to provide credit notice to the layer manager. In the case where the LAC-U is prevented from new SD PDU transmission because credit is lacking, the set value of this parameter becomes "No." In the case where the LAC-U is permitted new SD PDU transmission, this parameter is set to "Yes." This parameter is assigned to "Yes" at the time of initialization.

B-11-3-2-3-5-2-9: LAC-U credit and flow control

(1) Credit and flow control between peer entities

[0331] Between peer entities, the receiving side LAC-U provides credit in order to allow transmission of a new SD PDU to the transmitting side LAC-U of peer entities of other side. Note that the process by which the receiving entity

IPR2023-01270 Page 499

determines credit is set appropriately after taking into consideration the amount of usable buffer, the connection band, and the round trip delay.

[0332] The credit value is stored in the N(MR) field of each of BGN, BGAK, RS, RSAK, ER, ERAK, STAT, and USTAT PDUs, and then communicated to the transmitting side. N(MR) is mapped to the VT(MS) on the transmitting side. The credit value which is transmitted to the transmitting side indicates the sequence number of the initial SD PDU which is not received at the receiving side.

[0333] On the transmitting side, any SD PDU which exceeds the permitted limits based on the credit is not transmitted, while on the receiving side, all SD PDU exceeding the permitted limits based on the credit are discarded. However, depending on the situation, it is also acceptable to carry out USTAT PDU transmission using this type of SD PDU.

[0334] A previously allowed credit can be reduced on the receiving side, however, the settings are such that the credit variable VR(MR) on the receiving side is not made smaller than the current VR(H) value. In other words, the settings are such that credit value VR(MR) takes a value greater than VR(H) in the case where the receiving side accepts a SD PDU reception having number of VR(H)-1 and carries out delivery acknowledgment.

[0335] The lower limit value for the active window of the protocol on the transmitting side is prescribed by VT(A), while the upper limit value therefor is prescribed by the credit which was informed (VT(MS)-1). In addition, the active window is limited to 28-1 by the protocol modulus. Thus, the credit determined using modulo calculations on the receiving side must take a value between VR(H) and VR(R)-1. For example, if VR(MR) = VR(R) = VR(H) , then the active window is "0", while if VR(MR) = VR(R)-1 , then the active window assumes a maximum value.

[0336] On the LAC-U receiving side, buffer is assigned for maintaining the respective connections. As a general rule, in order to avoid discarding normally transmitted data, the usable buffer on the receiving side should be assigned a capacity which is the same or greater than the credit permitted on the transmitting side. However, when the buffer which can be used per connection is limited, it is acceptable to permit a credit which surpasses the usable buffer capacity. While there is a possibility that it will be necessary to discard data in the event that an error occurs, this approach allows a higher though-put to be obtained as compared to a method in which the credit value is restricted by the amount of usable buffer.

[0337] Although reception and delivery acknowledgment are completed on the receiving side, it is not possible to discard SD PDU that have not been transferred to a user of superior standing. Thus, in this embodiment, excluding the case where VR(R)=VR(H)=VR(MR) , a buffer capacity is assigned on the receiving side that is sufficient for receiving the SD PDU having the VR(MR) number and transferring it to a user of superior standing. Note that in a method which provides notification of a credit which exceeds the buffer capacity, the usable buffer allotted for maintaining the connection is limited. This type of method should be used only in the case where a LAC-U receiving side using this type of method can maintain the quality of service (QoS) which is demanded by the connection.

(2) Local flow control

[0338] A PDU or outer through inner signal reception LAC-U event is typically processed in the order generated. However, events related to the exchange of the connection state information of the LAC-U have a higher priority than data transmission. For example, a mounting arrangement may be considered in which the congestion (long queuing delay, for example) on a lower protocol layer is detected. When congestion is detected in this type of arrangement, data transmission should be temporarily postponed in order to give priority to the connection control message.

[0339] The LAC-U entity in this embodiment has a function to postpone each of the primitive services AA-DATA request, AA-UNITDATA request, and MAA-UNITDATA request, when this type of local congestion (lower layer busy) is detected. This LAC-U entity also has a function to postpone a requested SD PDU retransmission. The data transmission order employed in this embodiment realizes the above-described functions without causing a protocol error.

[0340] Because of the above-described circumstances, this embodiment provides that in relation to PDU transmissions to the receiving peer entity, the highest degree of priority is awarded to all types of PDUs, excluding SD PDU, MD PDU, and UD PDU. Note that SD PDU, MD PDU, and UD PDU all have the same degree of priority. In this embodiment, in the case where there is both a SD PDU retransmission and a new SD PDU transmission that have not been transmitted yet, the SD PDU retransmission is given priority for transmission. However, this degree of priority is effective only within LAC-U.

B-11-3-3: Example of communication when connecting MS core and a plurality of terminal interface units

[0341] A Global ID is employed for notifying a call acceptance display of CNC or reception level information displayed using SYC. The Global ID is notified to all terminal interface units TERM-INT simultaneously. Reception messages in which a self-TEmID is not set are ignored at each terminal interface TERM-INT, and are not transferred to TE. However, all messages received at an MT terminal interface TERM-INT are transferred to TE (i.e., MT). Messages from other terminal interfaces TERM-INT to the MS core are also received at each terminal interface TERM-INT, however, but are

IPR2023-01270 Page 500

ignored at all terminal interfaces TERM-INT other than those for MT use, and not transfer to TE. The preceding discussion is the same in the case of transmission between terminal interfaces TERM-INT.

B-12: Packet transmission control

[0342] Packet transmission control will now be explained.

B-12-1: Overview

[0343] Packet transmission control in this embodiment has the objective of transmitting data having diverse traffic characteristics, from low density light traffic to high density large capacity traffic, while at the same time planning for high efficiency use of radio and equipment resources. The main characteristics of this packet transmission control will be discussed below.

B-12-2: Switching access methods

[0344] With causing a reduction in service quality, this embodiment periodically switches the access method employed in response to the amount of traffic, which varies over time, so that efficient use of radio and equipment resources can be anticipated. Note that "switching access methods" means switching the physical channel/media access control method in response to traffic.

[0345] The decision to switch physical channels is carried out autonomously at the base station BS. The following three reasons may be considered as reasons for switching the physical channel. Which of these reasons is employed is based on the settings in the application.

Reason 1: in-band information (information for the physical channel which is desired for use) from ADP of the switching center and ADP of the mobile station MS
Reason 2: monitoring of the amount of reverse/forward traffic by the base station BS
Reason 3: layer 3 information from the mobile station MS to the base station BS requesting switching of employed channel

[0346] Switching of the physical channel is determined by a control unit at the base station BS which compares information notified based on reasons 1~3 with a preset threshold value. The specific switching sequence will be explained below.

[0347] The allotment of functions relating to switching access methods in this embodiment is shown in Table 16.

Table 16

Function allotment for switching access methods				
ADP		MS core		
Traffic monitoring	Switching indicator augmentation	Indicator from ADP	Traffic monitoring	Execution of switching
performed on layer 2 of U-Plane	• layer 3 of C-Plane is used • LAC-U traffic of layer 2 of U-Plane is used	• layer 3 of C-Plane considered • LAC-U traffic of layer 2 of U-Plane ignored	not performed	performed

[0348] The operation of terminal interface TERM-INT relating to access method switching will now be explained.

(1) In MAC switching (physical channel switching), the following decisions 1,2 (comparison of threshold and average traffic in layer 2 of U-Plane) are performed during transmission, and the type of logic channel desired for use is determined. This decision is carried out independently in reverse and forward channels.

Decision 1: average traffic > threshold → dedicated channel

IPR2023-01270 Page 501

Decision 2: average traffic < threshold → common channel

The above decisions are carried out each decision cycle. The average traffic value (E) is determined for the interval from the point in time of the decision back through an averaged time period (E=CPS-SDU length/CPS-SDU generation interval). When the averaged time period has not elapsed by the time of decision, the decision is omitted. Moreover, the decision is also omitted in the case where, even if the averaged time period has elapsed, it is within a specific holding time for the initial decision, and there are two or more CPS-SDU within the averaged,time period. Note that average traffic value=0 in the initial value settings in this embodiment.

(2) The result of the current decision is compared to the immediately preceding result. The current result is communicated to the MS core AP as a MAC switching request only in the case where the two results are different. This communication is carried out independently in reverse and forward channels. Note that the AP of the MS core performs MAC switching based on this request. Final MAC switching is carried out simultaneously in reverse and forward channels, so that setting of different physical channels in reverse and forward channels does not occur.

[0349] For example, when setting the ch indicator used for MAC switching in a reverse frame, the following decisions 3,4 (comparison of average traffic and threshold) are performed during communication, and the type of logic ch desired for use is set. Once set, the value is preserved and employed until the next comparison is performed. Note that the ch indicator used for MAC switching is equal to UPCH in the initial value settings.

Decision 3: Reverse average traffic > threshold → ch indicator for forward MAC switching=UPCH
Decision 4: forward average traffic < threshold → ch indicator for forward MAC switching= RACH/FACH

[0350] Note that there may be a plurality of algorithms, and that algorithm selection and parameter settings are performed according to the directives from controller MS-CNT at ADP start-up. Of course, the aforementioned setting is also possible when calling occurs or during communication, provided that there is a directive from controller MS-CNT. In the setting of initial values, the initial decision holding time is 10s, the decision cycle is 1s, the averaged time period is 10s, the threshold value is 0.1 traffic, and the measured algorithm number is a number showing the algorithms below.

[0351] In this embodiment, it is possible to use MT to set the presence or absence of MAC switching control on the C-Plane, and the method for setting the ch indicator used for MC switching in MAC switching control on the U-Plane (setting in response to traffic values/setting of specific values by indicating the ch indicator used for MAC switching).

B-12-3: Control of physical channel switching between mobile station MS and base station BS

[0352] It is possible that control of physical channel switching is carried out frequently. Accordingly, in this embodiment, switching control is executed between the mobile station MS and the base station BS, so that switching control does not extend to the control of wire transmissions. In other words, in this embodiment, control of physical channel switching does not require a wire transmission control and a base station control device, or a network control device. Note that it is acceptable to control the phenomenon of overhead increase by providing a plurality of decision threshold values in the control for physical channel switching, and frequently switching the physical channel.

B-12-4: High-speed HHO (Hard Hand Over) between cells

[0353] In this embodiment, a diversity hand over is not performed when employing a physical channel used for common control. In other words, the use of a diversity hand over is limited to dedicated physical channels (UPCH) only.

[0354] In this embodiment, a Hard Hand Over (HHO) is used as the method in packet transmission, without employing the usual DHO in the dedicated physical channel. In order to avoid an increase in the amount of interference power in a Hard Hand Over, the HHO is carried out with high frequency. However, the wire sections are subjected to a diversity hand over state, with only the radio sections subject to HHO. In this way, the increase in the radio transmission control load due to high frequency HHO can be restrained. In other words, HHO control is executed between the mobile station MS and the base station BS, and a radio transmission control and base station BS control device, and control of a network control device are not necessary.

B-12-5: Hand over control between cells

[0355] The order for processing a hand over between cells will now be explained.

(1) As in the case of a regular DHO, the mobile station MS selects the sector which satisfies the initial conditions

IPR2023-01270 Page 502

for a diversity hand over from the perch channel reception level in the surrounding sectors, and informs this to BSC via the base station BS.

(2) BSC sets the link for the wire circuit with respect to the base station BS receiving the diversity hand over, and connects a plurality of links to the DHT (diversity hand over trunk), thereby creating a DHO state between the wire sections.

(3) The mobile station MS constantly measures and compares the propagation loss between the mobile station MS to the base station BS for each base station BS from the perch channel reception level in the surrounding sectors and the perch channel reception levels of other sectors during hand over (HO). When the propagation loss in other sectors during HO is smaller than the propagation loss in the surrounding sectors, and when the difference between the propagation losses is above a specific value, the mobile station MS outputs a request to the surrounding sectors to stop the transmission/reception of packet data.

(4) When the base station BS in the sector surrounded by the mobile station MS receives a request from the mobile station MS to stop the transmission/reception of packet data, it transmits a response signal to the mobile station MS. Thereafter, transmission/reception of packet data between radio sections is halted. However, the wire link settings do not change.

(5) After receiving the response signal from the base station BS in the surrounded sector, the mobile station MS releases the radio circuit with the base station BS in the surrounded sector, and sends a signal to the base station BS in the sector receiving the HO requesting the transmission/reception of the packet data using RACH.

(6) The base station BS which is receiving the HO sets the physical channel which is to be set for packet data transmission from the information received via RACH. The base station BS receiving the HO designates the connection between the wire link and the radio link without changing the link setting for the wire.

B-12-6: Hand over control between sectors

[0356] The DHO between sectors can be controlled at the base station BS. For this reason, the DHO between sectors is performed during packet transmission as well, using the maximum ratio combining in the same way as in the case of the line switching mode.

B-12-7: Packet discard

[0357] The quality of the communications path tends to become unstable in a mobile communications environment. The ADP in this embodiment is designed to determine packet transmission/discard in response to the communication state. Specific discard processing is as described in section "B-11. Terminal interface unit TERM-INT."

C: Examples

[0358] Examples will now be explained in which suitable constants and the like have been decided in the above-described embodiments.

C-1: Antenna ANT1 and ANT2

[0359] Efficiency and other such properties of antenna ANT1 and ANT2 are set appropriately on the basis of the above description.

C-2: Radio unit TRX and transmission/reception amplifier AMP

C-2-1: Transmission characteristics

[0360] The transmission characteristics of radio unit TRX and transmission/reception amplifier AMP are set appropriately on the basis of the above description.

C-2-2: Reception characteristics

[0361] The reception characteristics of the radio unit TRX and the transmission/reception amplifier AMP are set appropriately on the basis of the above description..

IPR2023-01270 Page 503

C-2-3: Conditions for measuring characteristics

[0362] The conditions for measuring the various characteristics are set appropriately on the basis of the above description..

C-2-4: Pilot synchronized detection RAKE combining

[0363] Next, pilot synchronized detection RAKE combining in the RAKE combining unit 43 will be explained.

(1) Structure

[0364] Pilot synchronized detection RAKE combining in this embodiment is composed of the functions of RAKE combining, searcher, pilot synchronized detection channel estimate, and AFC (automatic frequency control).

(2) RAKE combining

[0365] In this embodiment, paths are selected for RAKE combining so that sufficient characteristics are obtained for each diversity branch. The combining method is maximum ratio combining.

(3) RAKE finger function

[0366] The RAKE finger number in this embodiment is 6. Each RAKE finger receives the path indicated from the path search function described below. Each finger can receive an optional path for each antenna diversity branch.

(4) Pilot synchronized detection channel estimate

[0367] In this embodiment, synchronized detection is performed using a pilot symbol received on a 0.625 ms cycle. The channel estimating algorithm is set as appropriate.

(5) AFC

[0368] AFC synchronizes the frequency of the standard signal oscillator for the carrier frequency of the reception signal.

C-3: Base band signal processing unit BB

C-3-1: Transmission power control

C-3-1-1: Overview

(1) RACH transmission power control

[0369] The base station BS provides notification of the reverse interference power and the transmission power in the perch channel. The mobile station MS determines the RACH transmission power based on the information provided by the base station BS (open loop control). This control is equivalent to the case where RACH is used in packet transmission.

(2) FACH transmission power control

[0370] The perch channel reception EB/IO measured by the mobile station MS is included in RACH. The base station BS determines the FACH transmission power corresponding to the received RACH.

(3) Reverse/forward transmission power control for dedicated physical channel (UPCH)

[0371] The UPCH initial transmission power is determined in the same way as the transmission power for RACH and FACH. Thereafter, the base station BS and the mobile station MS shift to Eb/IO base high-speed closed loop control, and open loop control is halted. In high-speed closed loop control, a comparison is made cyclically on the receiving side between the measured value of reception Eb/IO and the target value therefor. The results of this comparison are noti-

IPR2023-01270 Page 504

fied to the transmission side in TPC bits. On the transmission side, relative control of the transmission power is performed based on the TPC bits. In other words, both the base station BS and the mobile station MS have an outer loop function for renewing the target value of the reception Eb/IO in response to the reception quality, so as to satisfy the required reception quality.

(4) Transmission power control during packet transmission

[0372] The UPCH initial transmission power is determined by open loop control in the same manner as described under (1) above. Thereafter, high-speed closed loop control as described above under (3) is performed in the state where the pilot symbol and TPC symbol are being transmitted.

[0373] An explanation will now be made of transmission power control in the case where transmission of the pilot symbol and TPC symbol are halted in accordance with "C-3-12: DTX control" described below. In this case, the mobile station MS carries out high-speed closed loop control as described above under (3) in the state where the pilot symbol and TPC symbol are being received from the base station BS. In the case where there is a forward asynchronous (see "C-3-5-3-2: Determination of asynchronous") is detected due to a halt in transmission of the pilot symbol and TPC symbol from the base station BS, the mobile station MS renders the reverse transmission power constant from the time of detection of the asynchronous until the point in time when reverse transmission is halted.

[0374] Next, an explanation will be made of transmission power control in the case where transmission is reopened after there has been a halt in the transmission of the pilot symbol and TPC symbol. In this case, the initial transmission power value at the mobile station MS when transmission is reopened becomes the value which results when δ dB is added to the transmission power value immediately preceding the halting of pilot symbol and TPC symbol transmission. Note that δ may assume a negative value. At the base station BS and the mobile station MS, the side which first reopens transmission of the pilot symbol and TPC symbol transmission increases the transmission power from the initial transmission power by XdB for each S slot (where, the upper limit of the transmission power is YdBm). Transmission is subsequently initiated from the partner side, and high-speed closed loop control as described under (3) begins once the conditions for determining frame synchronization described below (see (1) under "C-3-5-3-1: Determination of synchronization establishment" below) have been satisfied.

[0375] Note that the values for the aforementioned δ, S, X and Y are designated as parameters within the mobile station MS, and may be optionally set, for example, within the following range. The value of Y may be set for each symbol rate.

δ: -10 through +10 dB
S: 1 through 256
X: 1 through 5dB
Y: Max (maximum transmission power for each UPCH) through Min (Max-35 dB)

[0376] Note that transmission power control at the mobile station MS can be halted based on the settings from MT (i.e., the transmission power is set to a specific value).

C-3-1-2: SIR base high speed closed loop transmission power control

C-3-1-2-1: Basic operation

[0377] The mobile station MS carries out the measurement of the reception Eb/IO at each cycle (0.625 ms) for transmission power control. When the measured result is larger than a standard Eb/IO value, TPC bit "00" is transmitted to the base station BS, while when the measured result is smaller than a standard Eb/IO value, TPC bit "11" is transmitted to the base station BS. The mobile station MS performs a soft decision such as shown in FIG. 91 for the received TPC bit. In the case of a region A shown in the figure, the transmission power is reduced to 1.0 dB, while in the case of a region B shown in the figure, the transmission power is raised to 1.0 dB. The timing for changing the transmission power is timed to be immediately before the pilot symbol. The maximum transmission power is designated for the reverse channel, while maximum and minimum transmission powers are each designated for the forward channel, with control carried out within these limits. The mobile station MS continues this control through the forward synchronization preservation interval described in section "C-3-5-3-2: Determination of asynchronous." Thereafter, once a determination has been made that the preservation steps have been exceeded and a deviation in synchronization has occurred, the reverse transmission power value is rendered constant and the TPC bit is assigned to always be "11."

IPR2023-01270 Page 505

C-3-1-2-2: Reverse/forward frame timing

[0378] The frame timing for a reverse/forward communications channel is designed to enable transmission power control for 1 time slot control delay, so that the pilot symbol position shifts by 1/2 time slot as shown in FIG. 92. As a result, immediate transmission power control is realized.

C-3-1-2-3: Initial operation

[0379] The method for shifting from the initial state to closed loop control is shown below.

(1) When the initial transmission power value is designated, the base station BS increases the transmission power at specific time intervals continually for a specific number of times, as a first transmission power increase process. The point in time where this first transmission power increase process is completed is defined as the designated initial transmission power value. These specific values are set in advance as system parameters. This first transmission power increase process has the objective of avoiding a sharp increase in interference power to other mobile stations MS by rapidly transmitting a large transmission power. The specific values set in the system parameters are set so that other mobile stations MS carry out a stepped increase in the transmission power to a degree which permits following of changes in the amount of interference power by the transmission power control. The TPC bit transmitted by the reverse channel at this time has a set pattern so that the transmission power of the mobile station MS gradually increases (00, 11, 11, 00, 11, 11, 00, 11, 11,..., for example). This pattern is preset as a system parameter.

(2) As a second transmission power increase process, the base station BS increases the transmission power control by a specific amount in each specific interval until reverse frame synchronization has been confirmed. These specific values are preset as system parameters, separately from the specific values in the first transmission power increase process. This second transmission power control increase process is a process for guaranteeing establishment of forward radio frame synchronization by gradually increasing the transmission power even when the initial transmission power value is not sufficient for the mobile station MS to establish forward radio frame synchronization. The specific time intervals in this process are comparatively long, on the order of 1 to several seconds.

(3) On the other hand, when the mobile station MS establishes forward frame synchronization, the transmission power value determined by open loop is designated as the initial value, and relative control of transmission power is performed in accordance with the TPC bit received from the base station BS. The TPC bit transmitted by the reverse channel at this time is determined based on the results of measurement of the forward Eb/IO.

(4) When the reverse frame synchronization is established, the base station BS carries out relative control of the transmission power in accordance with the TPC bit received from the mobile station MS. The TPC bit transmitted by the reverse channel is determined based on the results of measurement of the reverse Eb/IO.

C-3-1-3: Transmission power control during diversity hand over between sectors

[0380] In a diversity hand over between sectors, measurement of reception Eb/IO and modulation of the TPC bit are carried out after maximum ratio combining between sectors for both reverse and forward channels. The forward TPC bit transmits the same value from a plurality of sectors. Accordingly, the same transmission power control is performed as in the case where diversity hand over is not performed.

C-3-1-4: Transmission power control during diversity hand over between cells

C-3-1-4-1: Reverse transmission power control

(1) Operation of base station BS

[0381] As in the case where diversity hand over is not performed, the base station BS measures the reverse reception Eb/IO and, based on the results of this measurement, transmits the determined TPC bit to the mobile station MS.

(2) Operation of mobile station MS

[0382] The mobile station MS independently receives the TPC bit in the base station BS units (where diversity between sectors is performed). Namely, the mobile station MS measures the reliability (reception Eb/IO) of the TPC bit for each base station simultaneously, and lowers the transmission power by 1 dB if there is even one "0" in the numer-

IPR2023-01270 Page 506

ous results of soft decision on TPC bits which satisfy the required reliability. In contrast, the transmission power is increased by 1 dB in the case where there are all "1"s in these results.

C-3-1-4-2: Forward transmission power control

(1) Base station BS operation

[0383] The base station BS controls the transmission power in accordance with the received TPC bit in the same way as when diversity hand over is not carried out. When there is a deviation in the reverse synchronization, so that the TPC bit cannot be received, the base station BS renders the transmission power value constant.

(2) Operation of mobile station MS

[0384] The mobile station MS measures the reception Eb/IO after site diversity combining, and transmits the TPC bit determined based on these measured results to each base station BS.

C-3-1-5: Outer loop

[0385] The mobile station MS has an outer loop function for renewing the standard target Eb/IO for high speed closed loop transmission power control in response to quality information, so that a specific reception quality (average FER) is satisfied.

C-3-1-6: Method for correcting standard target Eb/IO

[0386] The initial value of standard target Eb/IO is designated by control unit MS-CNT. Thereafter, the mobile station MS renews standard target Eb/IO based on the results of measurement of the reception quality.

[0387] Specifically, when the control unit MS-CNT specifies to the mobile station MS the quality monitoring (FER monitoring, etc.) which is to be initiated, the mobile station MS executes the designated quality monitoring, and communicates the results of this quality monitoring to the control unit MS-CNT. The control unit MS-CNT determines whether or not standard Eb/IO is renewed in accordance with the quality monitoring results communicated by the mobile station MS. The standard Eb/IO is renewed when a determination is made that renewal be performed.

C-3-2: Multicode transmission and multicall

C-3-2-1: Overview

[0388] In this embodiment, multicall is performed in which a plurality of independent calls are set in one mobile station MS.

C-3-2-2: Parameters for multicall

[0389] The definition of multicall in this embodiment is as shown below.

(1) One mobile station MS is designed to support communications between two different terminal devices. This includes communications concluded between mobile station MS such as voice communications. Thus, when a plurality of external terminals are connected to the mobile station MS, simultaneous communications between two terminals (one terminal in the case voice communications) can be carried out. Control items are shown in (2)~(5) below.

(2) In the case of unrestricted digital communications, the communication between one pair of terminals is as follows.

Communications between terminals using interfaces comforming to ITU-T recommendation I.430 of up to 2B (64 kbps x 2).

Communications between terminals using interfaces comforming to ITU-T recommendation I.431 of up to 6B (64 kbps x 6).

(3) Multi-call between unrestricted digital communications is controlled as follows.

IPR2023-01270 Page 507

Multi-call is not carried out between terminals using ITU-T recommendations I.431 and I.430.

(4) Independent dual calling is not set up in packet communications.
(5) When multi-calling between voice communications and unrestricted digital communications, the unrestricted digital communications is up to 2B (64 kbps x 2).

[0390] When a new call using 128 ksps occurs during 128 ksps communications (user rate of 64 kbps), there is a shift up to a 256 ksps physical channel.

C-3-2-3: Parameters for multicode transmission

[0391] When one call is composed of a plurality of dedicated physical channels (diffuse code), the mobile station MS performs pilot synchronization detection and transmission power control and the like for all the dedicated physical channels within one call.

[0392] When a plurality of calls are independently generated at one mobile station MS, and a plurality of spreading codes (short code) are assigned, the mobile station MS performs transmission power control and pilot synchronization detection independently for each spreading code. However, when a plurality of calls are superimposed on one dedicated physical channel, as in the case where two 64 kbps unrestricted digital calls are independently generated and data transmission is carried out in one 256 ksps dedicated channel using shift up control, pilot synchronization detection and transmission power control are carried out in spreading code units.

C-3-3: Variable rate transmission control

[0393] Blind rate determination using liklihood during Vertibi decoding and the reception SIR difference between the pilot symbol unit and the symbol unit for the logical channel are carried out as variable rate transmission control.

C-3-4: Synchronized processing

C-3-4-1: At start-up of mobile station MS

[0394] The mobile station MS performs cell/sector selection upon start-up, and establishes perch channel synchronization.

[0395] In this embodiment, each sector is designed to transmit a perch channel in which a portion of the long code is masked. The long code mask symbol of the first perch channel is spread over through the common short codes of all cells. Thus, the mobile station MS can detect slot timings using this common short code. The long code mask symbol of the second perch channel is spread over the short code associated with the long code within a specific range. Accordingly, mobile station MS can close in on long code candidates sought using the short code.

[0396] The self-sector number and long code number of the surrounding cells are notified over the perch channel. Based on the reported information, the mobile station MS establishes perch channel synchronization in other sectors in the same cell and sectors in the surrounding cells, and measures the reception level of the perch channel. The mobile station MS can perform a cell/sector shift decision during the waiting state by comparing the perch channel reception level.

C-3-4-2: During random access

[0397] The mobile station MS transmits a RACH during location registration, calling origination, or incoming call acceptance. The base station BS establishes the synchronization of a plurality of RACH transmitted by frame offset, and receives the signal.

C-3-4-3: During establishment of dedicated channel synchronization

[0398] A summary of the procedure for establishing synchronization of SDCCH and TCH is shown in FIG. 93. In FIG. 93, the base station BS first initiates transmission of the forward channel in which an idle pattern is set.

[0399] Based on perch channel synchronization information, and the time slot offset group and frame offset group communicated from the network, the mobile station MS establishes frame synchronization and chip synchronization of the forward channel. Note that a portion of the pilot symbol pattern is used as the synchronization word. The mobile station MS begins transmission of the reverse channel at a frame timing which is delayed by 1/2 time slot with respect to the forward channel. An idle pattern is set in the reverse channel at this time. Thereafter, the mobile station MS

IPR2023-01270 Page 508

detects and waits for the usual transmission of the forward channel.

[0400] The base station BS establishes reverse channel chip and frame synchronization of the reverse channel based on the frame offset and time slot offset groups designated by the switching device. Following establishment of synchronization, the base station BS begins regular transmission of the forward channel, and wafts for regular transmission of the reverse channel.

[0401] After detecting the regular transmission of the forward channel, the mobile station MS begins regular transmission of the reverse channel. The base station BS detects the regular transmission of the reverse channel, and subsequently begins transmission to the wire section.

C-3-4-4: During diversity hand over between cells

[0402] A summary of the procedure for establishing synchronization during initiation of diversity hand over between cells is shown below, while the flow for synchronization establishment during diversity hand over between cells is shown in FIG. 94.

(1) The mobile station MS measures the difference between frame times for equivalent frame numbers between radio frames of reverse dedicated physical channels during transmission and radio frames of perch channels transmitted by the base station receiving the hand over. The mobile station MS communicates this measured value to the network. This measured value is the chip unit. The measured value is the time difference between the frame timing of the reverse dedicated physical channels with respect to the frame timing of perch channels. The measured value is always indicated by a positive value, and is in the range of 0~[forward long code cycle-1] chip.
(2) The mobile station MS communicates the measured value for the frame time difference to the base station BS control device via the diversity hand over origination of the base station BS.
(3) The base station BS control device notifies the measured value for the frame time difference which is notified to the diversity hand over termination of the base station BS, along with the time slot offset and the frame offset set which are set at the time of the calling origination and the incoming call acceptance. The base station BS control device also notifies to the mobile station MS radio parameters such as the spreading code used in the BTS of the hand over termination, via the base station BS of the hand over origination.
(4) The mobile station MS begins processing to establish chip synchronization for the forward channel from the base station BS of the hand over origination, using the radio parameters that were notified. The reverse channel being transmitted continues to be transmitted without modification.
(5) The base station BS of the hand over origination receives the measured value of the frame time difference, and notice of the frame offset and time slot offset. Using this information, this base station BS begins transmission of the dedicated physical channel, and begins processing to establish synchronization of the reverse dedicated physical channel being transmitted by the mobile station MS.
(6) The mobile station MS establishes chip synchronization of the forward channel from the base station BS of the hand over termination, based on the reception timing for the perch channel of the hand over termination. As chip synchronization is established, the mobile station MS begins maximum ratio combining with the forward channel from the base station BS of the hand over origination.

[0403] Note that the transmission timing for the forward dedicated physical channel and the method for establishing synchronization of the reverse dedicated physical channel are as explained in section "B-2: Base station BS transmission and reception timing." Channel setting in the UPCH is carried out according to the same procedure for establishing synchronization as the procedure described above. Refer to the following section "C-3-12-3: Dedicated physical channel for UPCH" for the control carried out after establishing synchronization.

C-3-4-5: Perch channel synchronization of other sectors within same cell

[0404] A perch channel spread over the same long code and same short code by a phase difference determined by the system is transmitted in each sector within the same cell. The mobile station MS receives the reported information from the sector which is in the waiting state once initial synchronization is completed. The mobile station MS obtains the self sector number and the sector number with the same cell that are included in the reported information. The mobile station MS can specify the long code phase in other sectors within the same cell based on this information, and can establish perch channel synchronization of other sectors in the same cell.

IPR2023-01270 Page 509

C-3-5: Initial synchronization establishing function

C-3-5-1: Overview

[0405] The synchronization establishing function is for shifting to a waiting state once short code, long code, frame and super frame synchronization have been established for the reception radio channel.

C-3-5-2: Request characteristics

[0406] The mobile station MS according to this embodiment can shift to a waiting state within 10s after introduction of the power source under the following conditions (1)~(3).

(1) The transmission path condition is equivalent to that prescribed for reception sensitivity.
(2) The cell/sector search indicated in "C-3-6: Pass search function" described below is performed.
(3) Perch channel detection operation is completed.

C-3-5-3: Synchronization decision

C-3-5-3-1: Decision to establish synchronization

[0407] Next, the decision to establish synchronization in the dedicated physical channel (frame synchronization establishment decision and super frame synchronization establishing decision) will be explained.

(1) Decision to establish frame synchronization

[0408] The decision to establish frame synchronization for dedicated physical channels is performed by SW detection. The decision to establish frame synchronization is made when radio frames in which the SW non-coinciding bit number is Nb or less continues for S_R frames or more. Note that the values of Nb and S_R can be optionally set, and are suitably set to be within the range of 0~255 for example.

(2) Decision to establish super frame synchronization

[0409] Since bits showing the frame number are not present in the dedicated physical channel, the mobile station MS tacitly determines the frame number and establishes super frame synchronization. Note that the frame number is a SFN modulo 64 value in which the frame number of an dedicated physical channel radio frame having a timing which deviates by a specific time interval with respect to the frame timing of the perch channel can be determined from the system frame number (SFN) which is notified through the perch channel.

C-3-5-3-2: Determination of asynchronous

[0410] Next, an explanation will be made of the determination of asynchronous with respect to the dedicated physical channel.

[0411] In a determination of asynchronous with respect to the dedicated physical channel, monitoring of each radio frame is conducted to determine whether or not the SW non-coinciding bit number is Nb or less.

[0412] The determination of the aforementioned conditions is carried out for one specific spreading code (short code) in the case of a multicode transmission in which one calling consists of a plurality of spreading codes. On the other hand, during a multicode transmission by means of a plurality of independent calls, the determination of this condition is carried out for each dedicated physical channel.

[0413] The mobile station MS determines that there is a state of asynchronous when the number of radio frames not satisfying the aforementioned conditions is continuous for S_F frames or more (forward synchronization preservation step number: S_F). If the number of radio frames satisfying the aforementioned conditions is then continuous for S_R frames or more in this state of asynchronous, then the mobile station MS determines that there is a state of synchronization maintenance (forward synchronization preservation step number: S_R). Note that the value of S_F can be optionally set, and is suitably within the range of 0~255, for example.

C-3-6: Pass search function

[0414] Next, the path search function in path searcher unit 45 will be explained.

IPR2023-01270 Page 510

(1) Overview

[0415] This function is for measuring the delay profile of a radio transmission path using RAKE finger or the path searcher unit 45 of this embodiment, and indicating the path for reception at the RAKE combining unit.

(2) Average time interval of delay profile

[0416] The delay profile average time interval, which is a parameter within the mobile station MS, is the time interval over which instantaneous changes in phasing are averaged, and is obtained by determining the moving average over 10ms through 10s (set in units of 10 ms) or the index weighted average according to corresponding time constants.

(3) RAKE reception path switching cycle

[0417] The RAKE reception path switching cycle, which is a parameter within the mobile station MS, is the cycle for selecting the required number of paths in the RAKE combining unit from the averaged delay profile. The RAKE reception path switching cycle can be set to a cycle of 10 ms through 10s (set by units of 10 ms).

(4) Pass search limits

[0418] The position where the multi-path is strongest on average is designated as the reception timing in this embodiment, and path searcher unit 45 carries out path search over a ± 31 μs range for the reception timing.

C-3-7: Cell/sector search function

[0419] The cell/sector search function in cell/sector searcher 46 will now be explained.

(1) Overview

[0420] This function is for measuring the reception level of the perch channel in surrounding cells/sectors using the designated short code and long code and reading out the BCCH content.

(2) Search/level measuring code number

[0421] In the codes shown in Table 15, measurement of the path level and path search are possible for maximum 128 codes.

(3) Channel number read out from BCCH contents

[0422] The content of BCCH, of maximum 20, is read out from code channel with the high reception level.

C-3-8: RSSI, ISSI measurement function

[0423] This function is for measuring the signal level (RSSI) of the perch channel or the channel during communications, and for measuring interference power (ISSI) other than that described above.

C-3-8-1: Measurement values by type

[0424] The items measured by this function are as follows.

(1) Desired wave level (RSSI)
(2) Interference wave level (ISSI)
(3) Ratio of interference signal power to desired wave (Eb/IO)

C-3-8-2: Range of measurement level

[0425] This function enables measurement of level ranging from the prescribed sensitivity point to the prescribed sensitivity point +70dB.

IPR2023-01270 Page 511

C-3-8-3: Measurement accuracy

[0426] The following measurement accuracy is satisfied in this function.

(1) Averaged time interval is 4 pilot symbols: ±3dB
(2) Averaged time interval is 1 frame or greater: ±1dB

[0427] Note that these prescribed conditions are for one wave static channel.

C-3-9: Function for generating transmission/reception timing

[0428] This function is for generating the transmission timing for the mobile station MS with respect to the reception timing generated by the above-described path search function. The reception timing varies according to changes in the delay profile of the transmission path, however, the amount of change in the transmission timing is limited to 1/4 chip over 10ms and 2 chips over 1s. Discrete control is limited to just the frame head.

[0429] The accuracy of the transmission timing is set to within ±0.5 chips at the antenna terminal with respect to the reception timing. However, this accuracy is premised on a normal state in which the delay profile of the transmission path does not change.

C-3-10: Hand over control

[0430] Hand over control is carried out in DTCH (including ACCH), UPCH and the FACH/RACH during packet transmission.

(1) Forward channel

[0431]

- Maximum ratio combining (diversity hand over) of the signal from each sector and cell is carried out at the mobile station MS for DTCH (including ACCH).
- The control described under section "C-3-11: Packet transmission control" is carried out for UPCH and FACH/RACH during packet transmission.

(2) Reverse channel

[0432]

- Maximum ratio combining at the base station BS is carried out between sectors, and selection at the switching center is carried out between cells, for DTCH (including ACCH).
- The control described under section "C-3-11: Packet transmission control" is carried out for UPCH and FACH/RACH during packet transmission.

(3) Branch number

[0433] When the mobile station MS carries out a diversity hand over, the connecting branch number is a maximum of 3, irrespective of the cell interval, sector interval and the mixture thereof. "Branch number" as used here means the number of cells or sectors with which the mobile station MS is communicating.

C-3-11: Packet transmission control

C-3-11-1: Overview

[0434] The main characteristics of packet transmission control are as follows. A detailed description of these characteristics is as noted under section "B-12: Packet transmission control."

(1) Channel switching in employed physical channel in response to traffic and other transmission characteristics
(2) Physical channel switching control between the mobile station MS and the base station BS
(3) High speed HHO between cells

IPR2023-01270 Page 512

(4) Packet discard

C-3-11-2: Physical channel switching control

(1) Switching determination node

[0435] A switching determination is carried out based on the following factors at the base station BS which has authority over the sectors surrounding mobile station MS.

(2) Factors for switching determination

[0436] The following factors may be employed. Which factors are employed may be optionally set at the base station.

Factor 1: in-band information from the switching center ADP and the mobile station MS ADP
Factor 2: monitoring ofreverse/forward traffic amount by the base station BS
Factor 3: layer 3 information requesting switch in employed channel made from the mobile station MS to the base station BS

(3) Method for determining switching

[0437] The information reported based on factor (2) above and a preset threshold are compared, and a determination is made at the base station BS control unit.

(4) Switching control method

[0438] The switching processing sequence is shown in FIGS. 95 (a) and (b). FIG. 95(a) shows the switching from the common control physical channel to the dedicated physical channel. FIG. 95(b) shows the sequence for switching from the dedicated physical channel to the common control physical channel. Switching control is processed only between the mobile station MS and the base station BS, and is not related to the base station BS control device and wire section. The control signal between the mobile station MS and the base station BS is layer 3 information, and is processed at the base station BS.

C-3-11-3: Hand over control between cells

[0439] The process for hand over control between cells is as shown in section "B-12-5: Hand over control between cells." An example of the processing sequence is shown in FIG. 96.

[0440] This processing sequence is the same irrespective of the physical channel employed (physical channel for common control/dedicated physical channel). In setting/release of a radio link, processing to set/release the physical channel is necessary for dedicated physical channels, but is not necessary for common control physical channels.

C-3-11-4: Hand over control between sectors

[0441] As indicated in the section "B-12-6: Hand over control between sectors," DHO between sectors can be control at the base station BS. For this reason, inter-sector DHO using maximum ratio combining can be carried out during packet transmission in the same way as in the case of a line switching mode.

[0442] Since transmission/reception timing cannot be freely set in the case of a common physical channel (FACH, RACH), maximum ratio combining for both reverse and forward is not possible. Thus, switching control is carried out between the base station BS and the mobile station MS in accordance with propagation loss in the perch channel, so that transmission/reception is carried out only in one sector. The switching control method is the same as the processing for hand over between cells shown in FIGS. 95(a) and (b).

C-3-12: DTX control

[0443] This control is applied only to dedicated physical channels.

IPR2023-01270 Page 513

C-3-12-1: DTCH, ACCH for dedicated physical channels

(1) Transmission

[0444] Under DTX control in dedicated physical channels used for voice communications, DTCH symbol transmission is ON when voice information is present, and OFF when voice information is absent (VOX function). The specific operations for the VOX function and the determination of whether or not voice information is present are as described above. For ACCH during voice communications, when voice information is present and there is no information being transmitted using ACCH, then a dummy bit is transmitted. Transmission is halted only when there is no voice information and there is no information transmitted using ACCH. When voice information is present and there is no information transmitted using ACCH, a dummy bit is inserted into the W bit and the CPS PDU portion, so that reassembly of CPS PDU in error can be avoided.

[0445] The pilot symbol and the TPC symbol are constantly transmitted, irrespective of the presence or absence of voice information and whether or not there is control information. The power ratio between transmission power (Pon) when transmission is ON and the transmission power (Poff) when transmission is OFF is set to satisfy specific conditions. The transmission ON/OFF patterns are the same for all 16 time slots within the radio frame. DTX control is carried out in radio frame (10ms) units. DTX control is not carried out for dedicated physical channels used for data transmission, but rather they are constantly transmitted. However, when there is no information to be transmitted in the ACCH of the aforementioned channel, then transmission with a dummy bit inserted in the CPS PDU portion and the W bit is carried out in the same way as during voice communications. Information for communicating the presence or absence of voice information and the presence or absence of control information is not transmitted (excluding pre/post amble for providing notice that transmission has started or ended in VOX control).

(2) Reception

[0446] The method for determining the presence or absence of reception user information (voice information) and control information is shown in Table 22. The symbol average reception power in the table indicates the average value of the reception power for all corresponding symbols within 1 radio frame. P_{DTX}dB is a parameter within the mobile station MS and here is optionally set to be within the range of -30~0dB.

Table 22

Method to determine presence or absence of reception user information and control information		
Type of Information	Information present	Information absent
voice information	Coding unit CRC in DTCH OK, or power ratio of average reception power for pilot and TPC symbol to average reception power of DTCH symbol is P_{DTX}dB or less.	Coding unit CRC in DTCH NG, and power ratio of average reception power for pilot and TPC symbol to average reception power of DTCH symbol is P_{DTX}dB or more. Where, when a determination is made that voice information is absent, DTCH data is transmitted to voice CODEC.
control information	Coding unit CRC in ACCH OK.	Determination based on W bit or coding unit CRC NG in ACCH.

C-3-12-2: Dedicated physical channel for SCCCH

[0447] The dedicated physical channel for SDCCH is placed in the SDCCH symbol transmission ON state when there is control information to be transmitted, and is placed in the SDCCH symbol transmission OFF state when there is no control information to be transmitted. The pilot symbol and TPC symbol are constantly transmitted irrespective of the presence or absence of control information. The power ratio between transmission power (Pon) during ON transmission and transmission power (Poff) during OFF transmission is set to satisfy specific conditions. The ON/OFF transmission pattern is the same for all 16 time slots within the ratio frame. In addition, DTX control is carried out in radio frame (10ms) units.

IPR2023-01270 Page 514

C-3-12-3: Dedicated physical channel for UPCH

[0448] The dedicated physical channel for UPCH is placed in the UPCH symbol transmission ON state when there is control information or user information to be transmitted, and is placed in the UPCH symbol transmission OFF state when there is no control information or user information to be transmitted. Transmission of the pilot symbol and TPC symbol are controlled as described below at the base station BS and the mobile station MS in response to the presence or absence of control information or user information to be transmitted.

C-3-12-3-1: Function for halting transmission of pilot symbol and TPC symbol

C-3-12-3-1-1: Base station BS control method

[0449] The base station BS determines the necessity for transmitting a pilot symbol and TPC symbol for each radio frame. When both of the following conditions 1,2 are satisfied in the state where the base station BS is transmitting the pilot symbol and TPC symbol, then transmission of the pilot symbol and the TPC symbol in all radio frames is halted. Even in an interval which does not have control information or user information to be transmitted, the base station BS transmits all pilot symbols and TPC symbols until the following conditions 1,2 are satisfied, and halts transmission of the UPCH symbol.

(1) Condition 1: Passage of $F_{NDATA-b}$ radio frames or more once there is no more control or user information to be transmitted
(2) Condition 2: Result of CRC check of forward reception radio frame is continuous, with F_{CRC-b} radio frames or more NG

C-3-12-3-1-2: Operation of mobile station MS

[0450] The mobile station MS determines the necessity for transmitting a pilot symbol and TPC symbol for each radio frame. When both of the following conditions 3,4 are satisfied in the state where the mobile station MS is transmitting the pilot symbol and TPC symbol, then transmission of the pilot symbol and the TPC symbol in all radio frames is halted. Even in an interval which does not have control information or user information to be transmitted, the mobile station MS transmits all pilot symbols and TPC symbols until the following conditions 3,4 are satisfied, and halts transmission of the UPCH symbol.

(1) Condition 3: Passage of $F_{NDATA-m}$ radio frames or more once there is no more control or user information to be transmitted
(2) Condition 4: Detection of deviation in reverse radio channel synchronization

[0451] The value of $F_{NDATA-m}$ is optional, and is suitably set here to be in the range of 0~255.

C-3-12-3-2: Control of reopening pilot symbol and TPC symbol transmission

[0452] Once one of the following conditions 5 and 6 is satisfied in the state where both the mobile station MS and the base station BS have each halted transmission of the pilot symbol and TPC symbol, then transmission of the pilot symbol and TPC symbol is reopened for all radio frames.

(1) Condition 5: Generation of control information or user information to be transmitted
(2) Condition 6: Detection of OK for result of CRC check when reception frame synchronization has been established

[0453] When both the base station BS and the mobile station MS make a determination to reopen transmission of the pilot symbol and TPC symbol, the W bit, U/C bit, TN bit, and CPS-SDU bit are all designated in advance as dummy bits, and a CRC coded radio frame is transmitted with a F_{Dummy} frame. Thereafter, the radio frame in which control information or user information to be transmitted is relayed. Of course, the pilot symbol and TPC symbol are also transmitted from the radio frame in which the dummy bit has been inserted. The F_{Dummy} value is optional, and here is suitably set to be in the range of 0~255.

IPR2023-01270 Page 515

C-3-12-3-3: When DTX control is OFF

[0454] The following transmission control is performed when OFF is indicated for UPCH DTX control.

[0455] In radio frames in which the pilot symbol and TPC symbol are being transmitted following execution of the above-described transmission stop/start control, and which do not have control information or user information to be transmitted, all bits (W bit, U/C, TN, inner coding units) within the UPCH CRC coding limits are set to continuous transmission ON within the radio frame. When there is no transmission information and transmission of the pilot symbol and TPC symbol are halted, transmission of the UPCH symbol is also halted and a designation of continuous transmission OFF is made in the radio frame.

[0456] The power ratio between the transmission power (Pon) during ON transmission and the transmission power (Poff) during OFF transmission for the UPCH symbol, pilot symbol and TPC symbol is set to satisfy specific conditions. The transmission ON/OFF pattern is the same for all 16 time slots in the radio frame. The DTX control is carried out in radio frame (10ms) units.

C-3-13: Function for synchronizing outer coding synchronization processing

[0457] In outer coding, 80ms of data constitutes one processing unit. The outer coding processing is carried out in synchronization with the radio frame (10ms). Sequence number (S) is assigned to each inner coded unit in the outer coding processing units, with S used to synchronize outer coding processing. A concept of outer coding synchronization is shown in FIG. 97. FIG. 98 shows the processing flow to establish synchronization and FIG. 99 shows the processing flow to monitor for synchronization deviations in the processing to maintain synchronization in outer coded synchronization. Note that the initial values for the forward preservation step number (NF) and the reverse preservation step number (NR) are both 2.

C-3-13: Bit transmission method

[0458] In this embodiment, the dummy bit is subjected to CRC coding, with all dummy bits being '0'.

[0459] The idle pattern is inserted in all CRC coded fields in the inner coding units, and includes the CRC check bit. This pattern is an optional PN pattern, and constitutes the same pattern in all the inner coding units for each logical channel. In addition, this pattern is one such that the result of the CRC check is NG when there is no error in this pattern on the receiving side.

C-4: Overview of terminal service

[0460] A connection concept for an external terminal with respect to the mobile station MS for this embodiment is shown in FIG. 100. As shown in this figure, a data terminal having an infrared interface (Ir IF) can communicate with the mobile station MS in this embodiment. In addition, if an adapter for translating IrDA, RS-232C, the Ethernet, and ITU-T recommendation 1.430 to one another is provided to the outside, a data terminal or an ISDN not having Ir IF can communicate with the mobile station MS.

C-4-1: Voice

[0461] Voice signals introduced from an external hand set or inner housed microphone are A/D converted in voice CODEC and coded at each mobile station MS in this embodiment. On the other hand, the coded signal is decoded in voice CODEC, A/D converted and output from the external handset or inner stored speaker of the mobile station MS.

C-4-2: Packet signal transmission

(1) Overview

[0462] Packet transmission in this embodiment is for carrying out TCP/IP (Transmission Control Protocol/Internet Protocol) packet service communications through radio sections. Packet transmission control as described under section "B-12: Packet transmission control" is employed for transmission control for this radio section.

[0463] As described in the section "C-3: Base band signal processing unit BB," in this embodiment, the forward interference power and the transmission power of the perch channel is informed by the base station BS through BCCH. Based on this information, the mobile station MS is able to know the quality of the forward communications. Thus, the L2 DIX of the ADP may be designed to determine transmission/discard of the packet based on this communications quality. The method for selecting the packet to be discarded is optional. For example, a design is acceptable in which a

IPR2023-01270 Page 516

packet to be retransmitted is priority discarded, so that repeating a retransmission can be avoided. A design is also acceptable in which a number of untransmitted packets corresponding to the communications quality is interpolated from the buffer, so that an anticipated buffer overflow can be avoided. Note that a design is also acceptable in which, when the forward and reverse communications quality is roughly the same, the forward communications quality is measured at the mobile station MS, and packet transmission/discard based on this communications quality is performed.

(2) Offered service

[0464] The packet transmission service in this embodiment permits changes in quality in response to traffic. The mobile station MS in this embodiment enables packet transmission up to 256 ksps (user rate 472.8 kbps), however, it is not necessary that all mobile stations be capable of a packet transmission of this speed. Namely, mobile stations may exist which do not support packet transmission itself.

C-4-3: Unrestricted digital signal transmission

(1) Overview

[0465] In this embodiment, unrestricted digital signal transmission is supported in order to carry out communications which is suitable for fixed ISDN service.

(2) Offered service

[0466] The unrestricted digital signal transmission in this embodiment offers service suitable to the Bch service in current fixed N-ISDN. This service is realized by connecting an existing ISDN terminal to the mobile station MS. The mobile station MS in this embodiment enables packet transmission of up to 1024 ksps (user rate: 384 kbps).

C-4-4: Modem signal transmission

(1) Overview

[0467] Modem signal transmission in this embodiment is for carrying out personal computer communications or other such non-telephone communications, excluding packet applications. Transmission control in the radio section uses the packet transmission control described above.

(2) Offered service

[0468] The above-described modem signal transmission is provided for communication with an existing modem (MODEM) which performs data compression based on ITU-T recommendation V.42 bis or the like, error control based on ITU-T recommendation V.42 or the like, and modulation/demodulation based on ITU-T recommendation V.34 or the like.

C-5: Human-machine interface

[0469] The location of the keypad and display are optional.

C-6: Control unit MS-CNT

[0470] The control unit MS-CNT for the mobile station MS in this embodiment carries out radio control (radio unit TRX, base band signal processing unit BB), device inner signal control, terminal interface control (terminal interface unit TERM-INT), and the like.

Claims

1. A wide band CDMA communication method which transmits spread information after spreading transmission information using predetermined codes; wherein when the transmission information different from one another are transmitted at the same time through a plurality of channels using common control information, the wide band CDMA communication method comprises the steps of:

IPR2023-01270 Page 517

spreading various transmission information using codes, the codes being allocated to the channels, respectively;

transmitting the spread transmission information through the channels;

spreading the control information using a common code, the common code being common to the plurality of channels; and

transmitting the spread control information.

2. A wide band CDMA communication method according to claim 1, wherein the spread control information is transmitted through only one channel among the channels.

3. A wide band CDMA communication method according to claim 2, wherein the transmission power of the control information is the transmission power of the transmitted information multiplied by the number of the channels through which the spread transmission information are transmitted.

4. A wide band CDMA communication method which transmits spread information to a radio section after spreading transmission information using a predetermined code; wherein the wide band CDMA communication method comprises the step of:

determining to transmit or to discard the transmission information on the basis of the communication quality of the radio section.

5. A wide band CDMA communication method which transmits spread information to a radio section after spreading transmission information using a predetermined code; wherein the wide band CDMA communication method comprises the step of:

determining to transmit or to discard the transmission information on the basis of the communication status of the radio section.

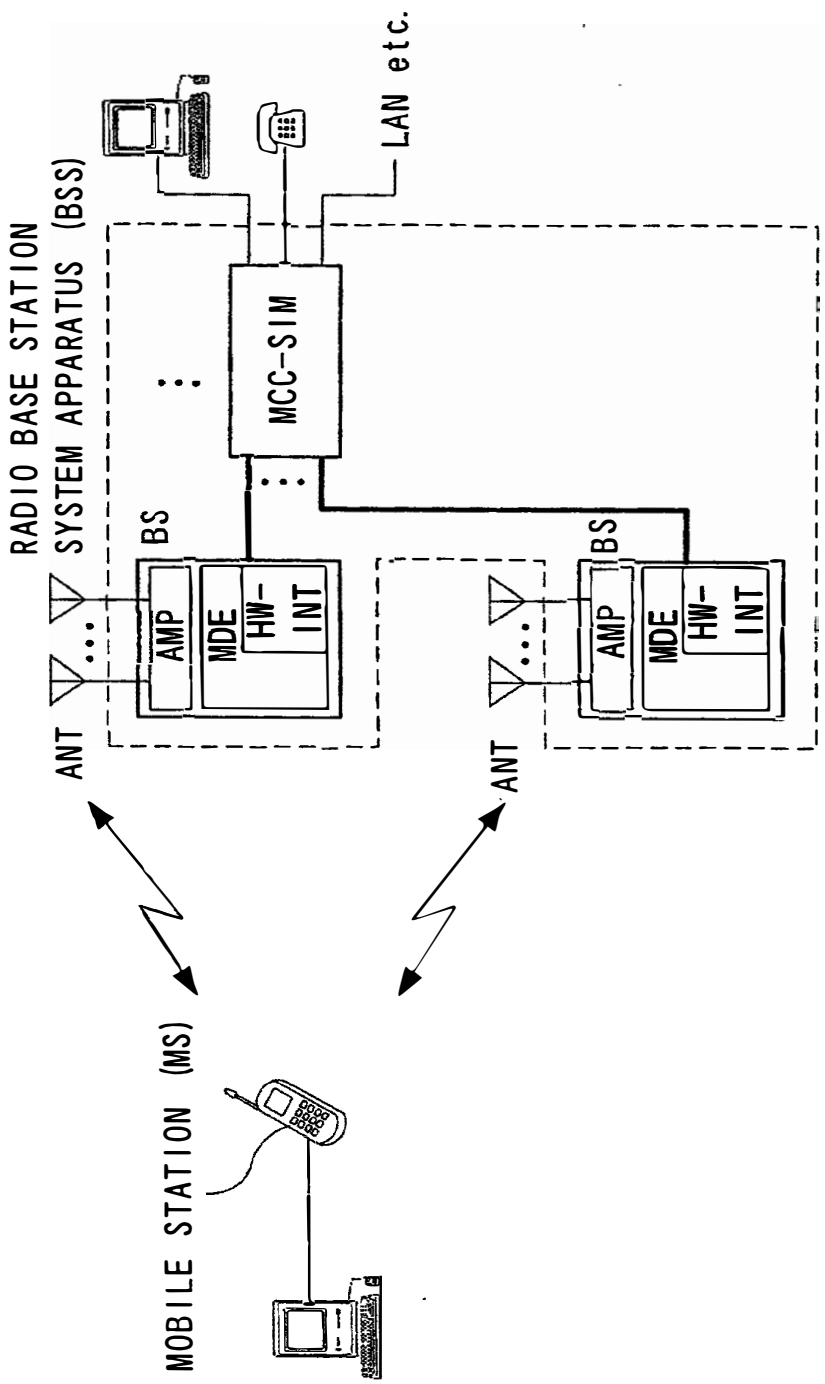
6. A wide band CDMA communication method according to claim 5, wherein the transmission information is discarded when calling fails.

7. A wide band CDMA communication method which transmits spread information to a radio section after spreading transmission information using a predetermined code; wherein the wide band CDMA communication method comprises the steps of:

discarding the transmission information until a predetermined time passes after a calling is released.

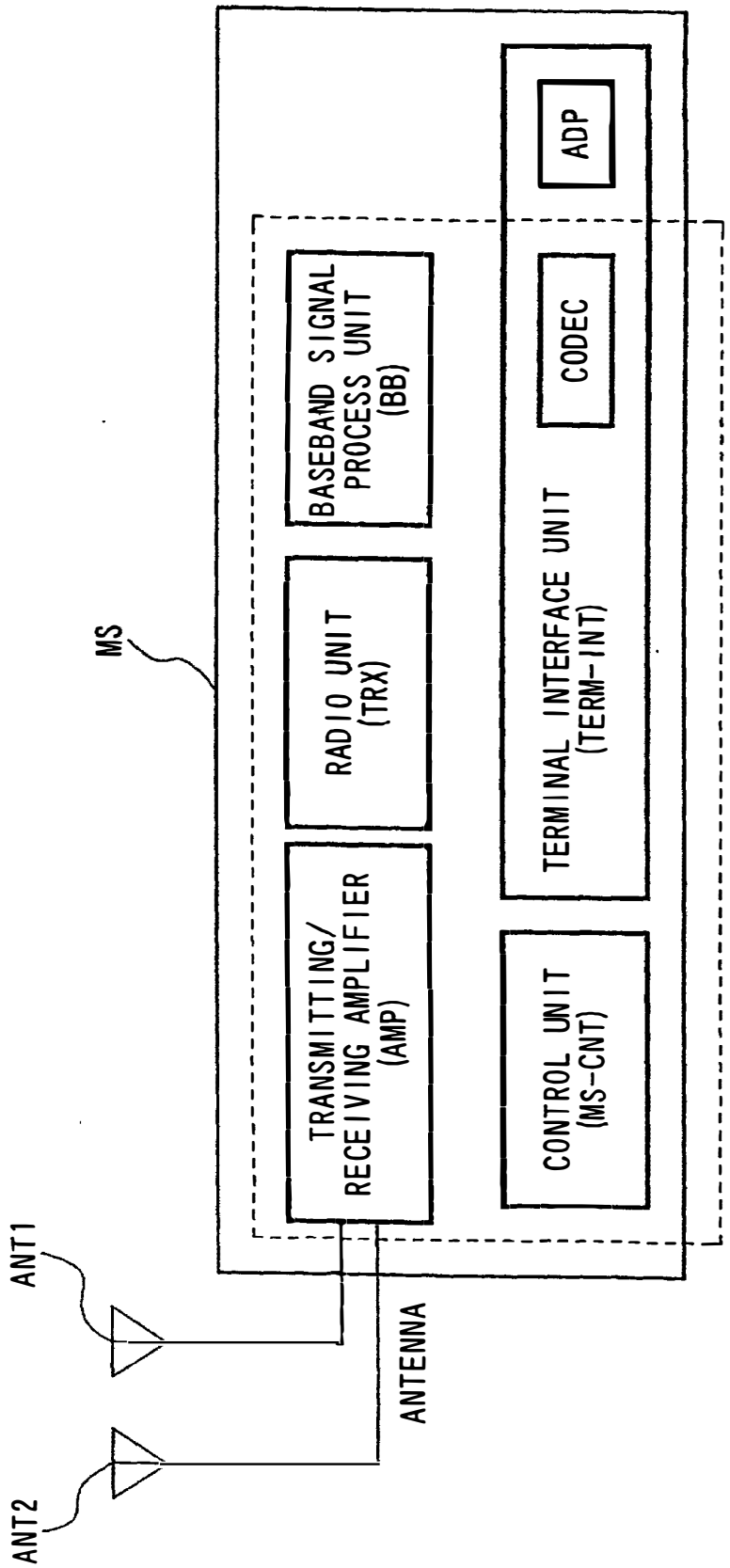
IPR2023-01270 Page 518

FIG. 1



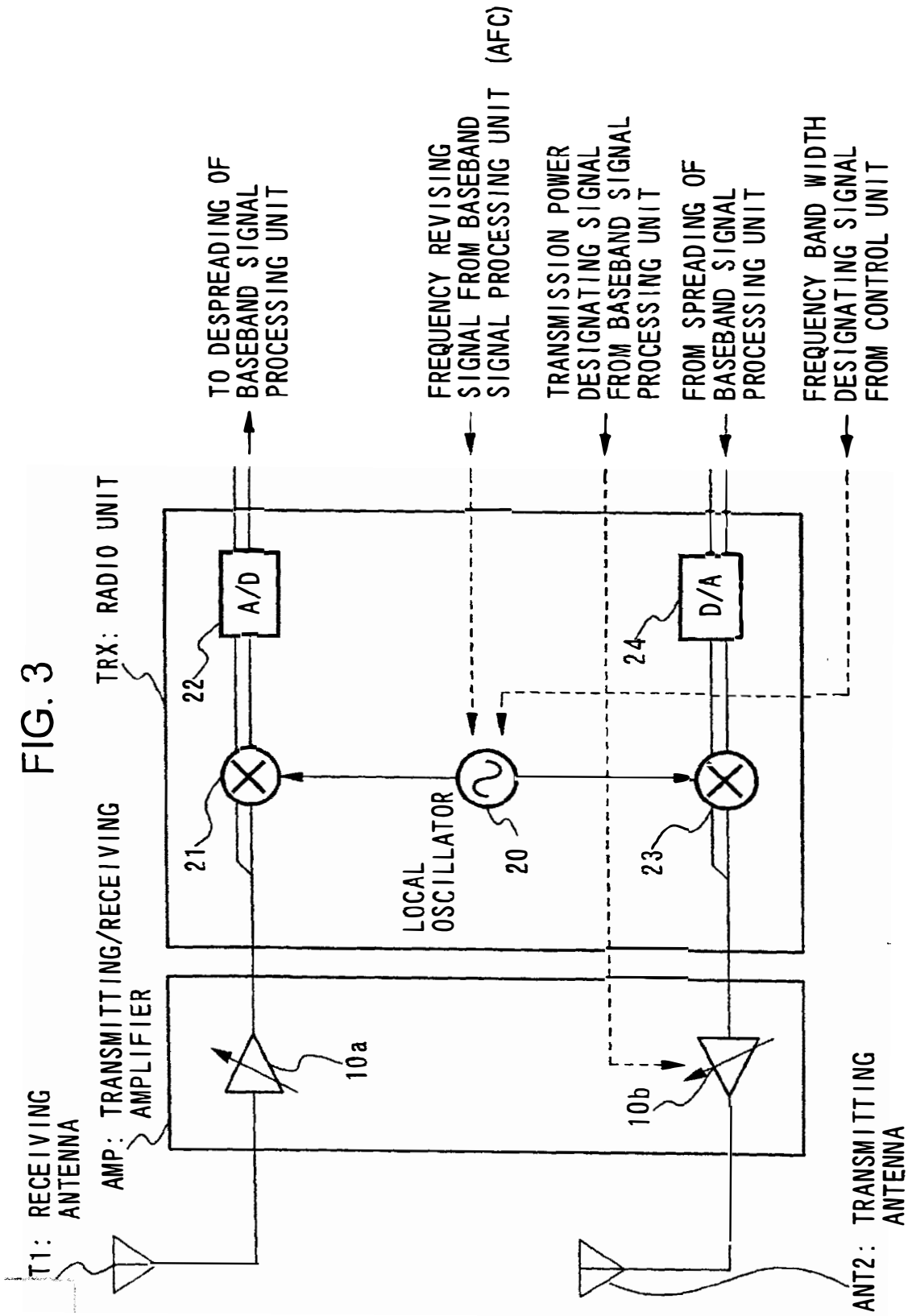
IPR2023-01270 Page 519

FIG. 2



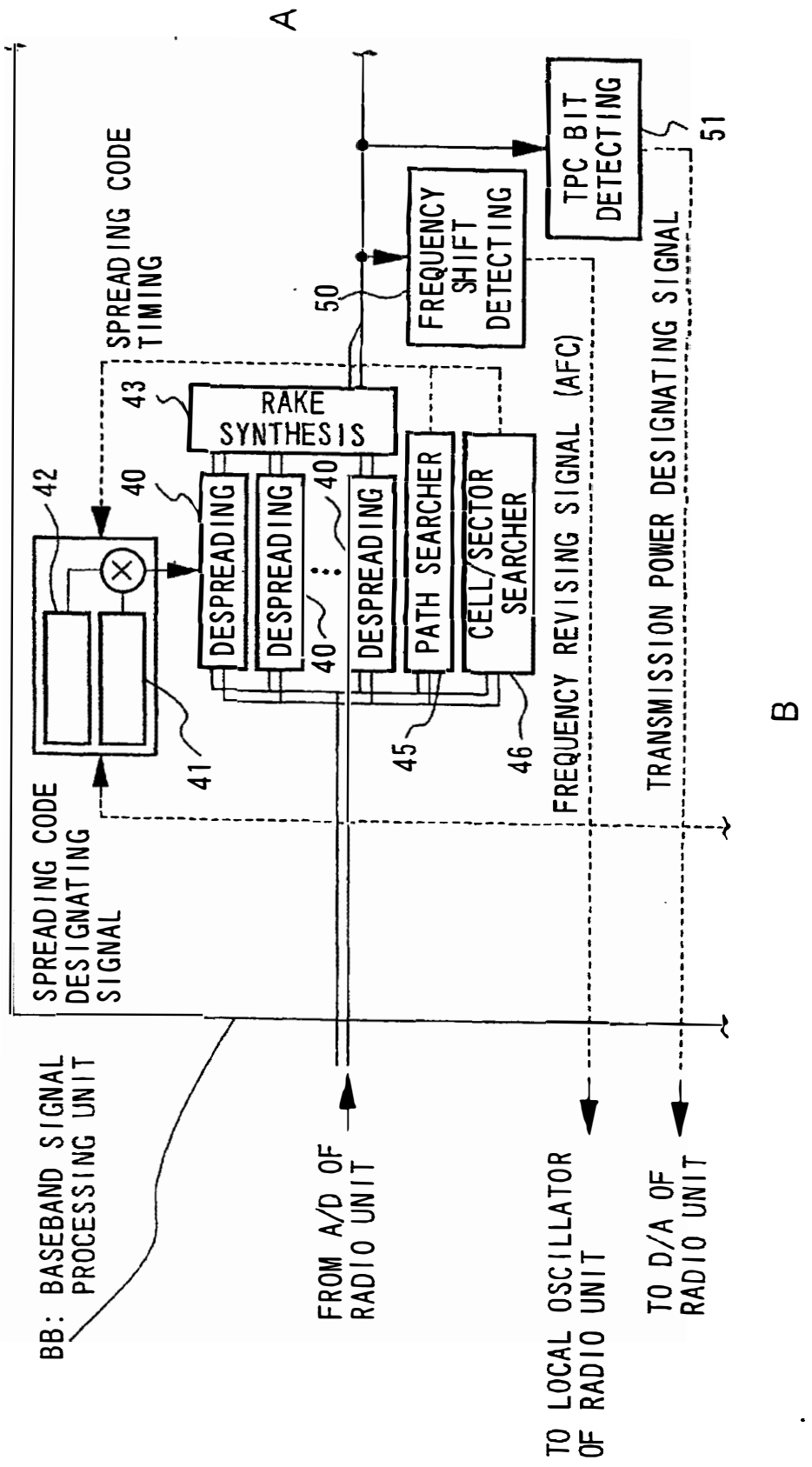
IPR2023-01270 Page 520

FIG. 3



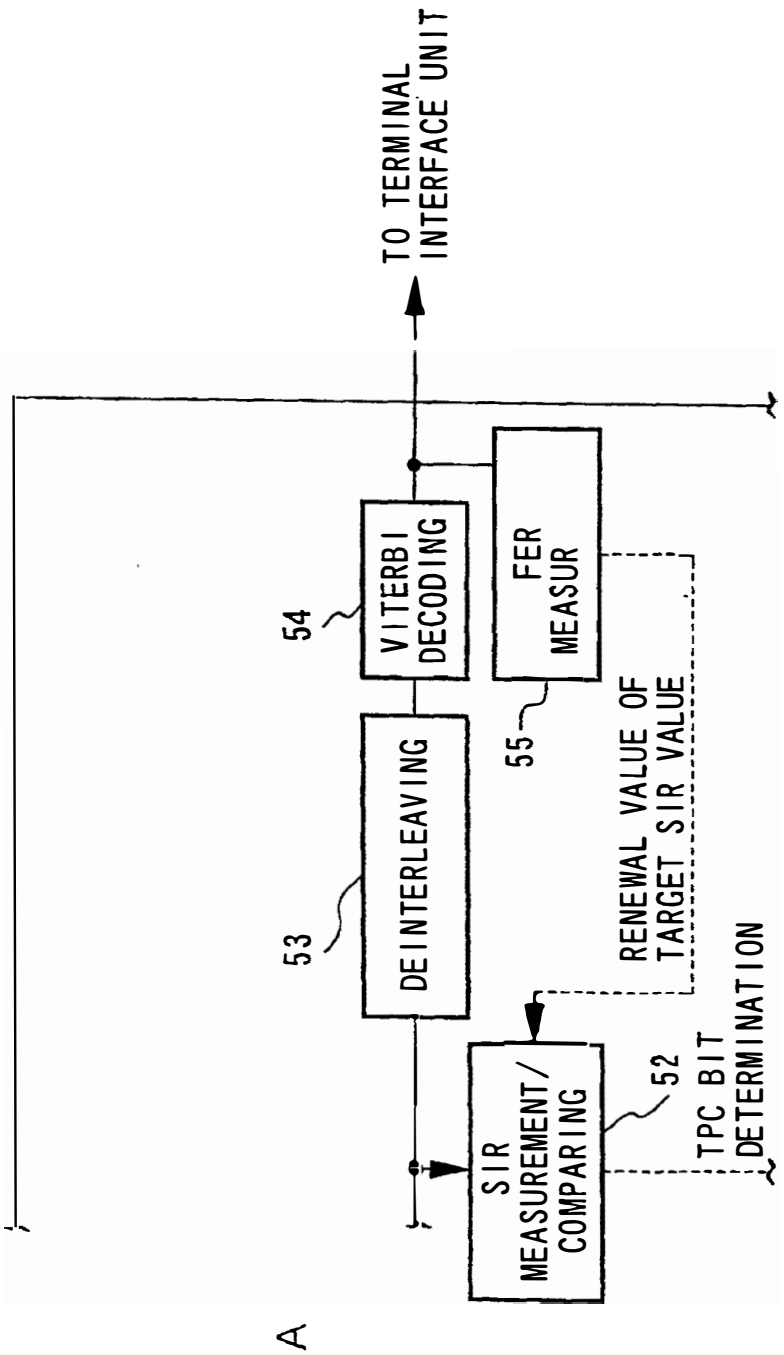
IPR2023-01270 Page 521

FIG. 4



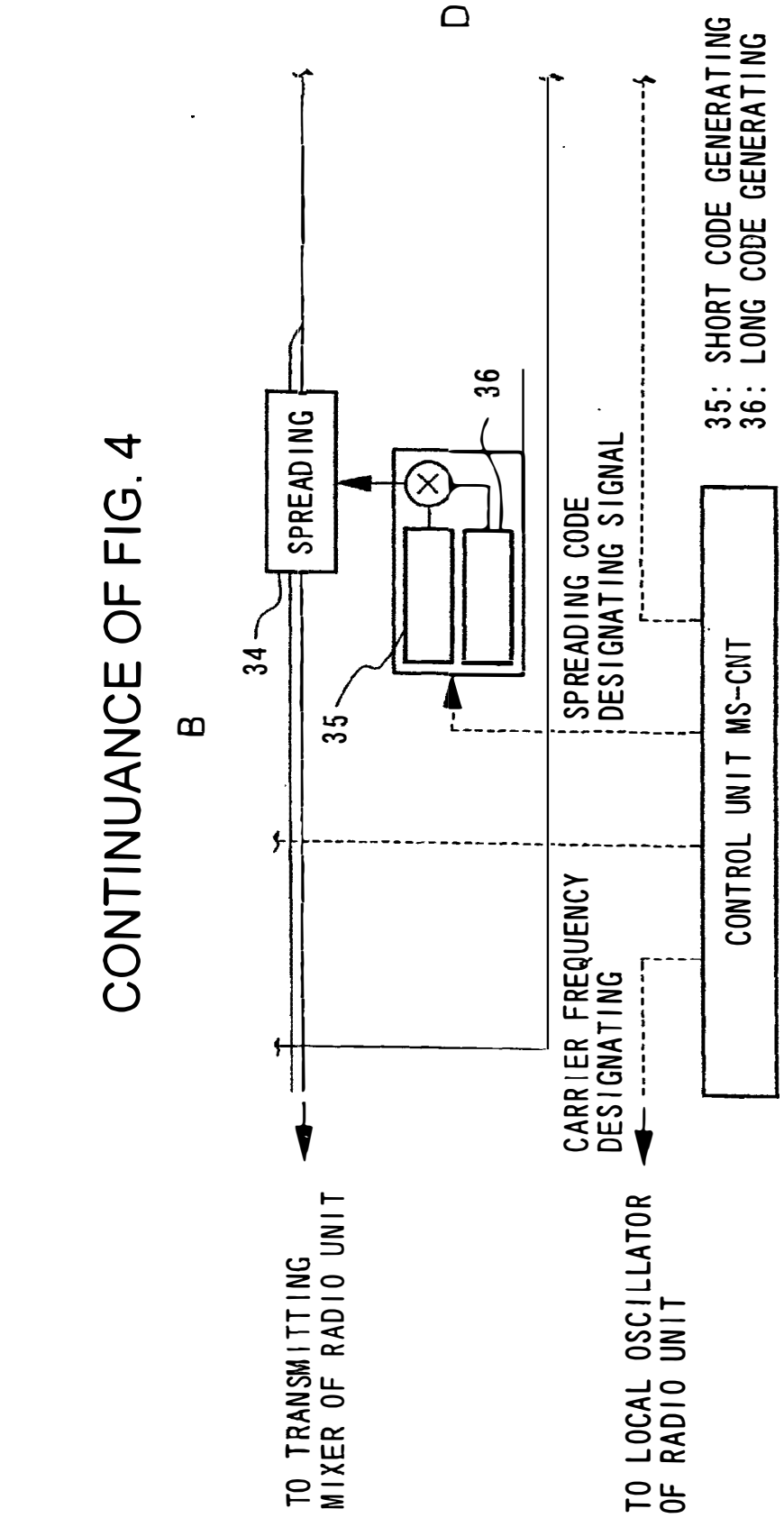
IPR2023-01270 Page 522

CONTINUANCE OF FIG. 4



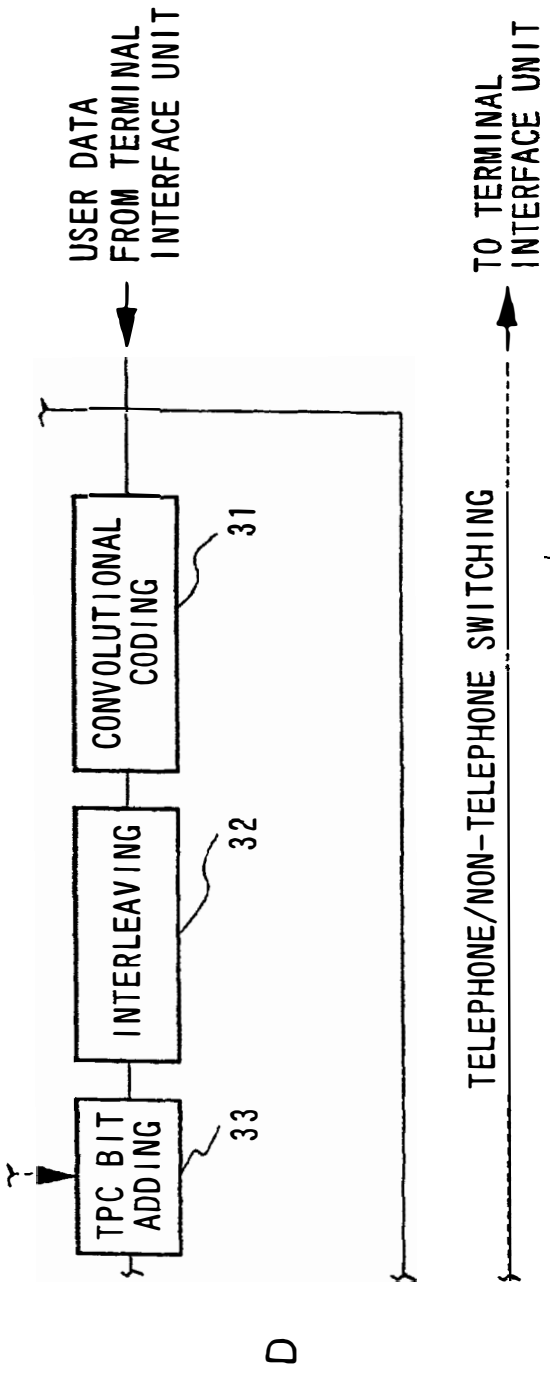
IPR2023-01270 Page 523

CONTINUANCE OF FIG. 4



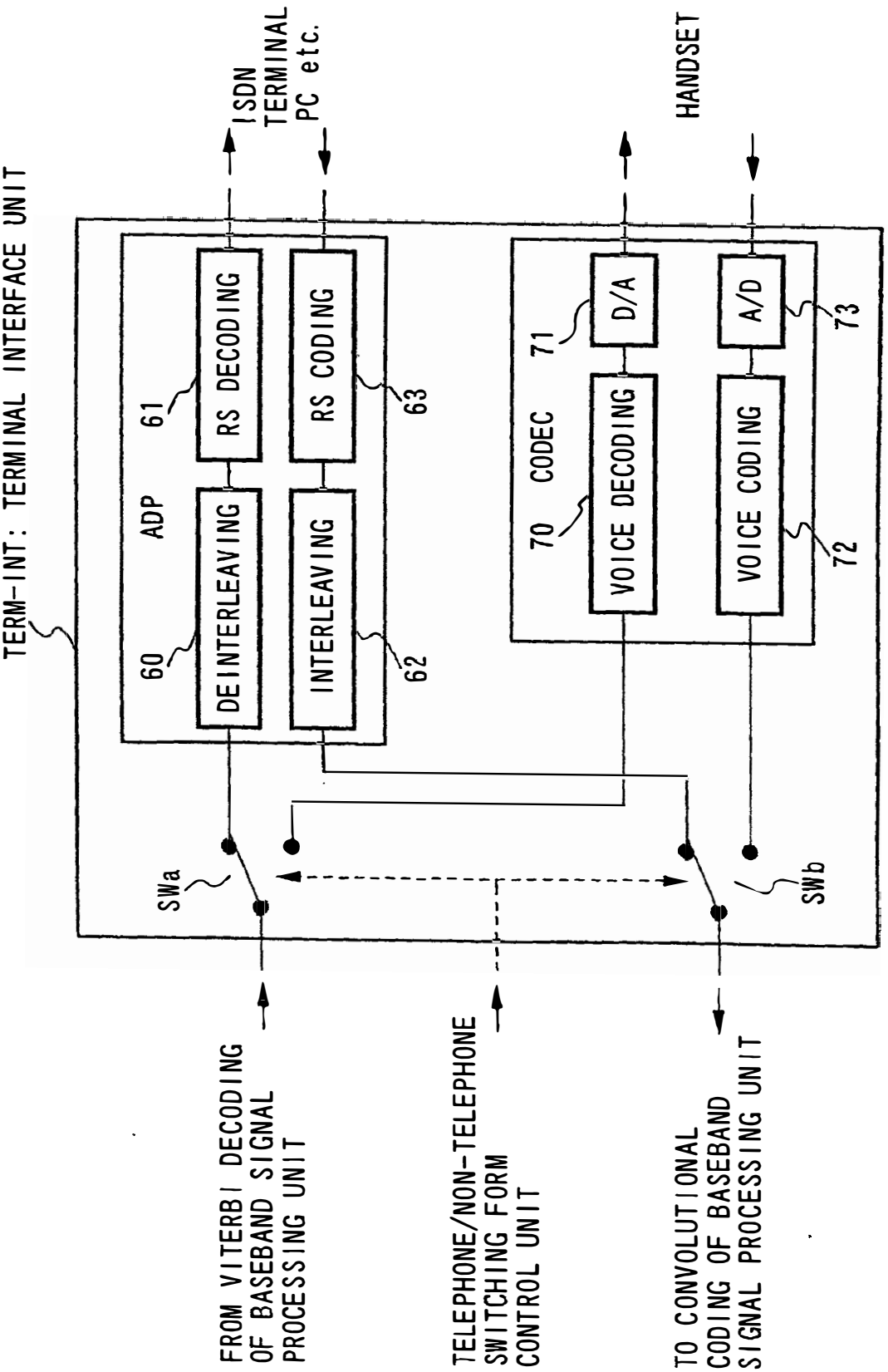
IPR2023-01270 Page 524

CONTINUANCE OF FIG. 4



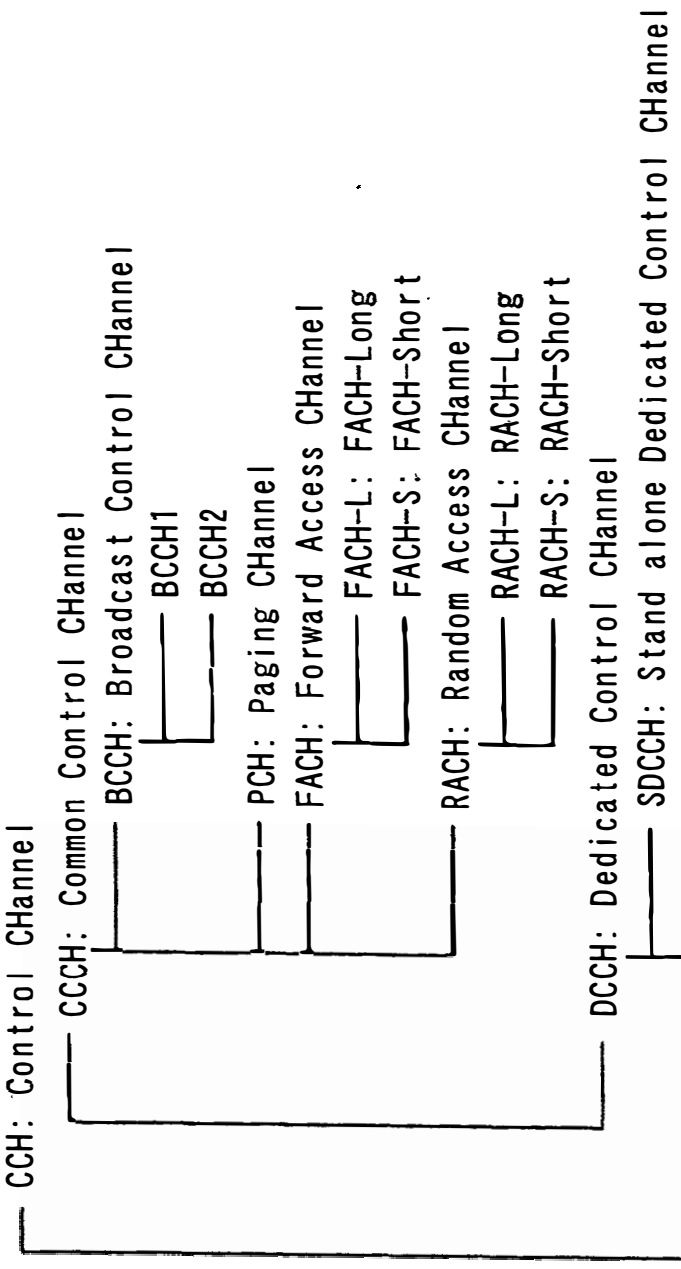
IPR2023-01270 Page 525

FIG. 5



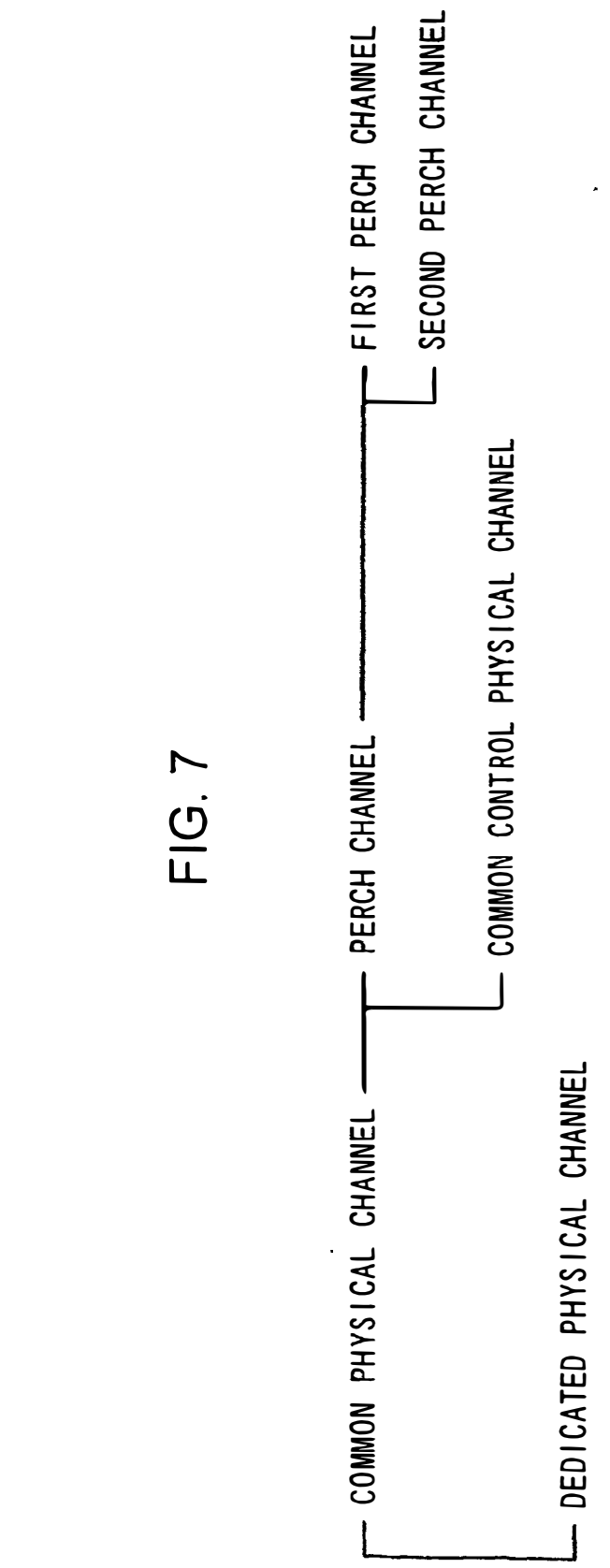
IPR2023-01270 Page 526

FIG. 6



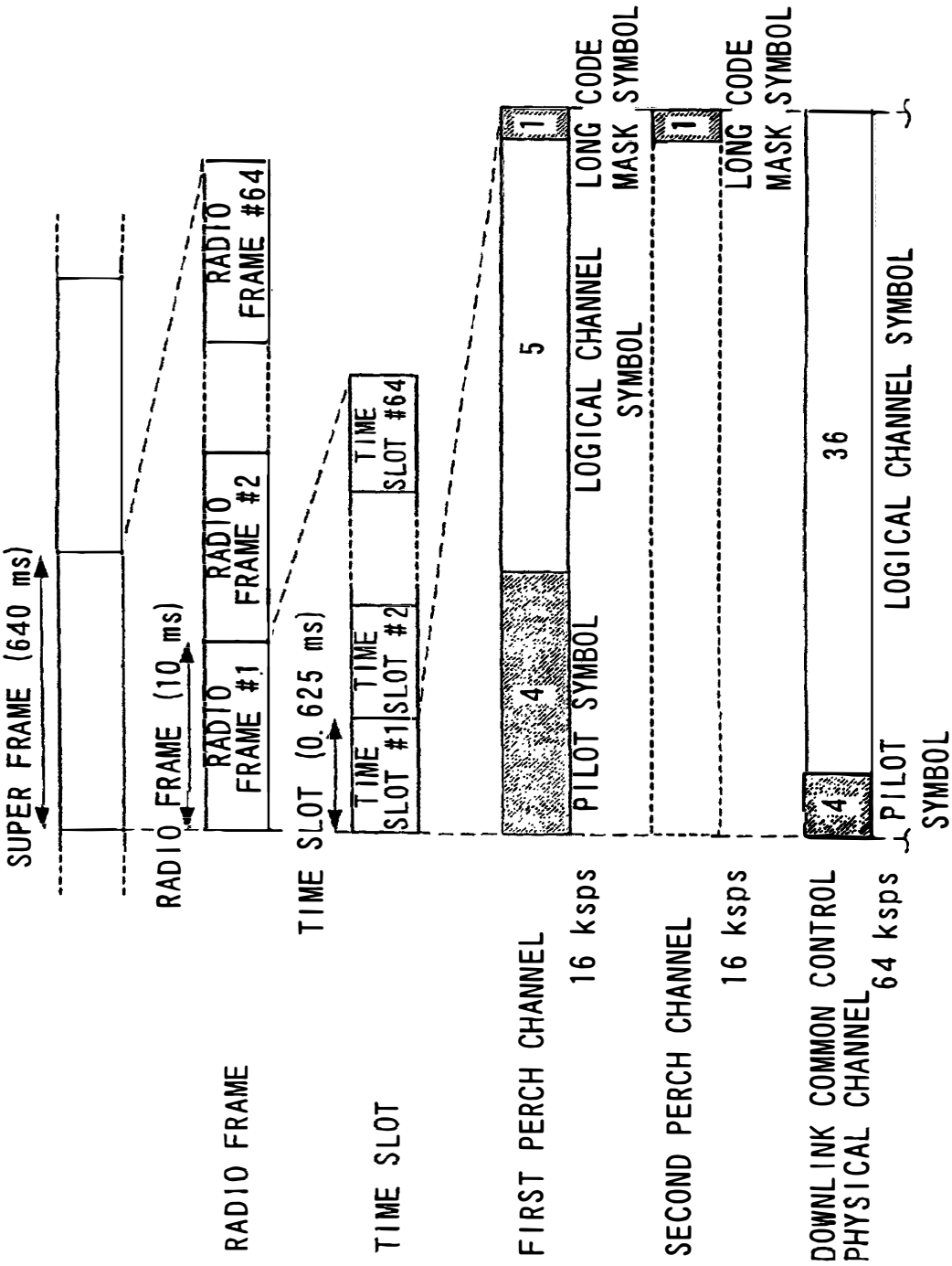
IPR2023-01270 Page 527

FIG. 7



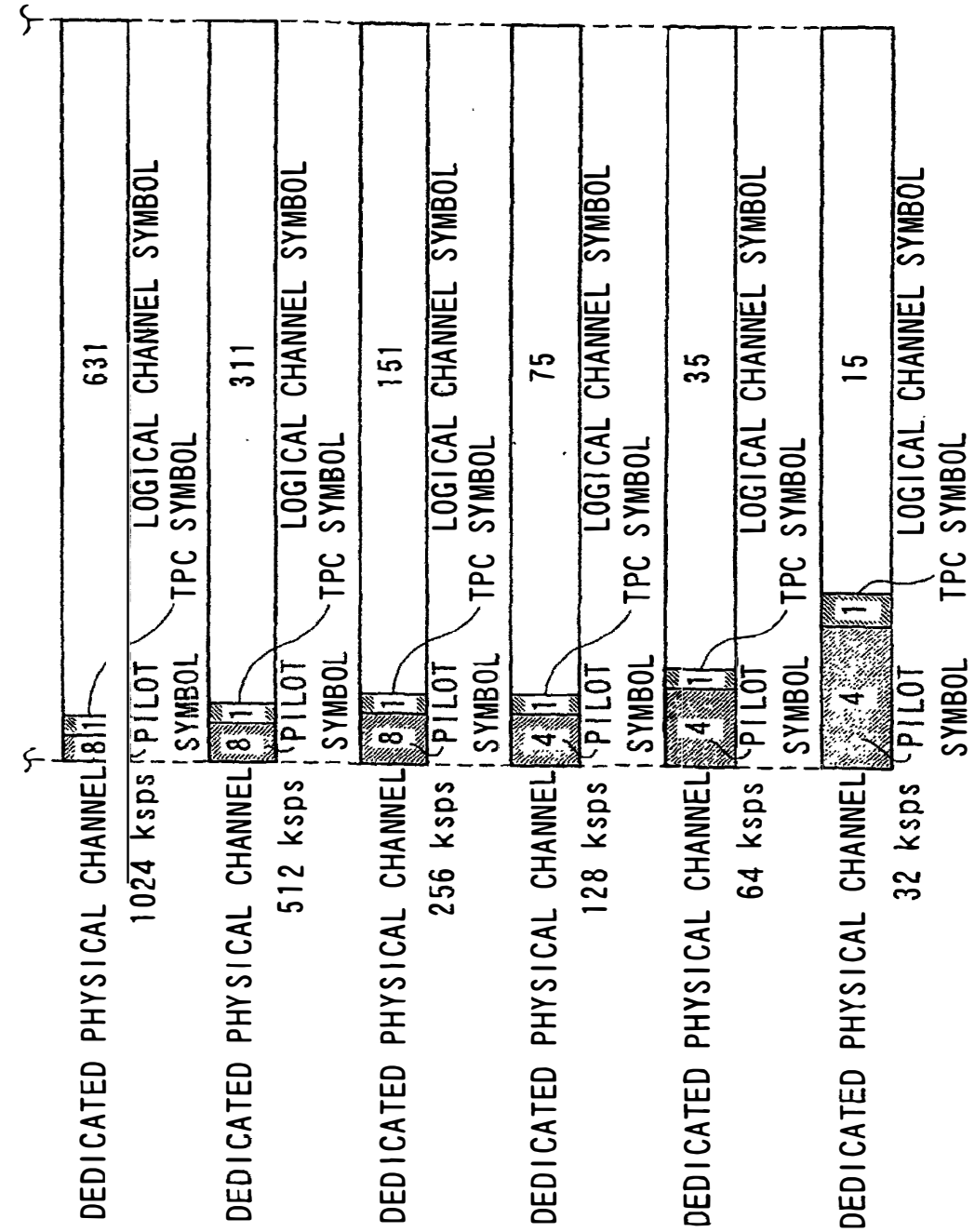
IPR2023-01270 Page 528

FIG. 8



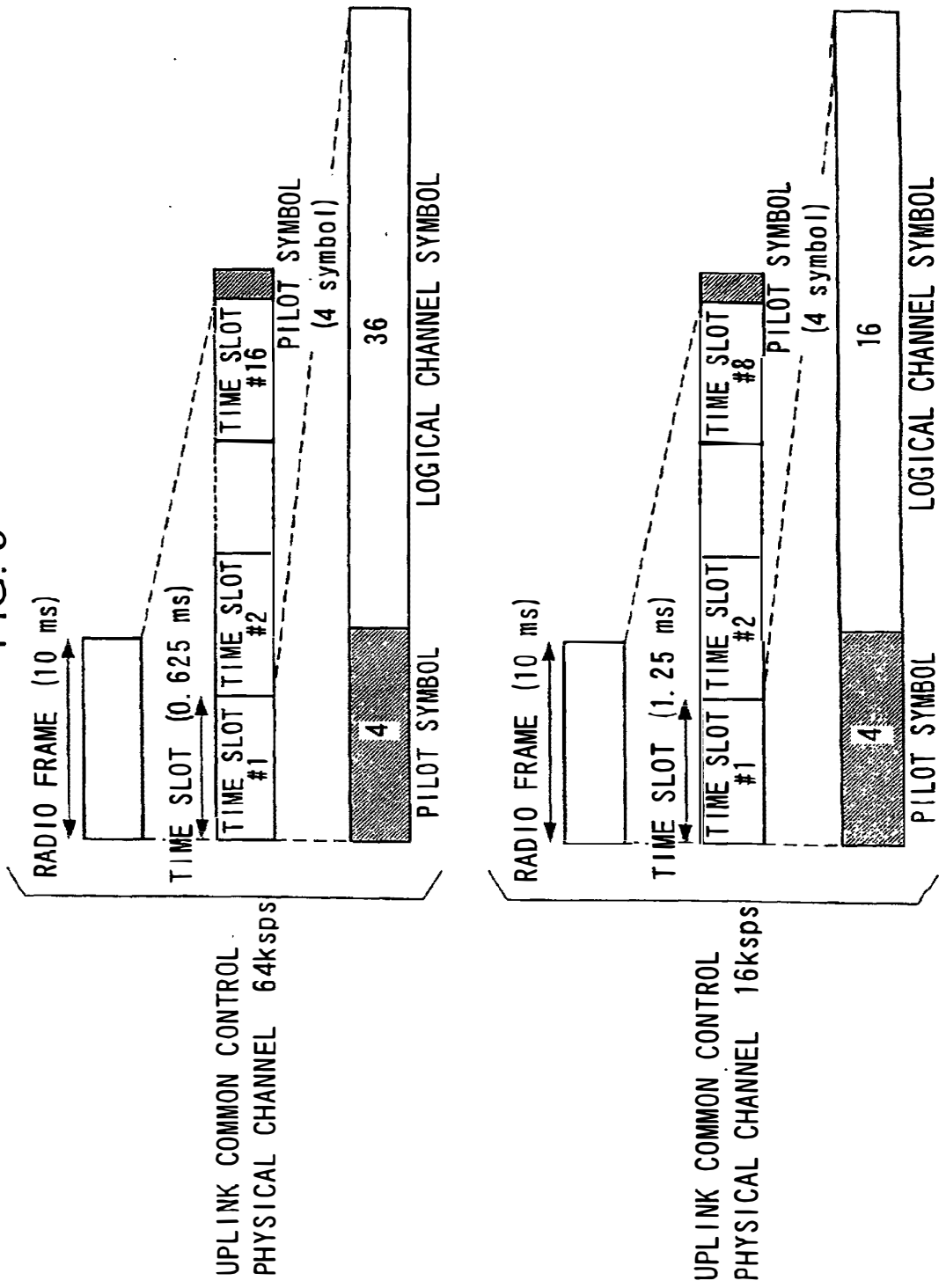
IPR2023-01270 Page 529

CONTINUANCE OF FIG. 8



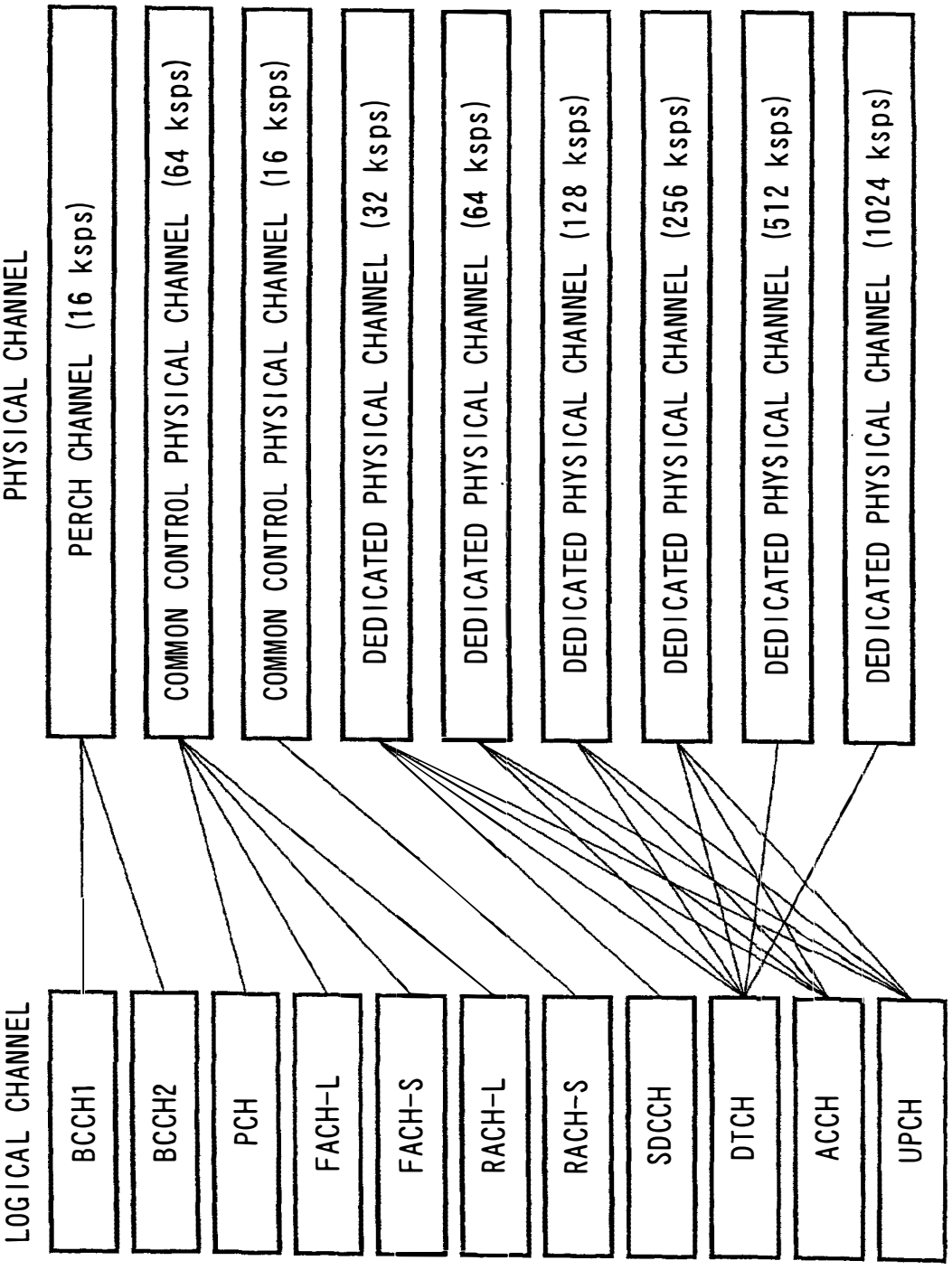
IPR2023-01270 Page 530

FIG. 9



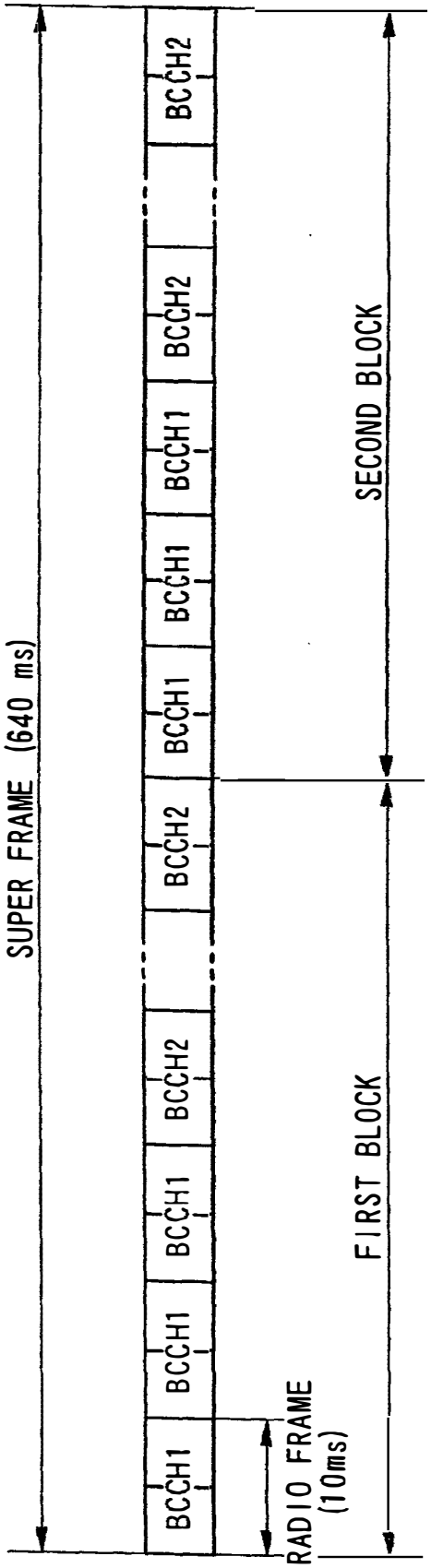
IPR2023-01270 Page 531

FIG. 10



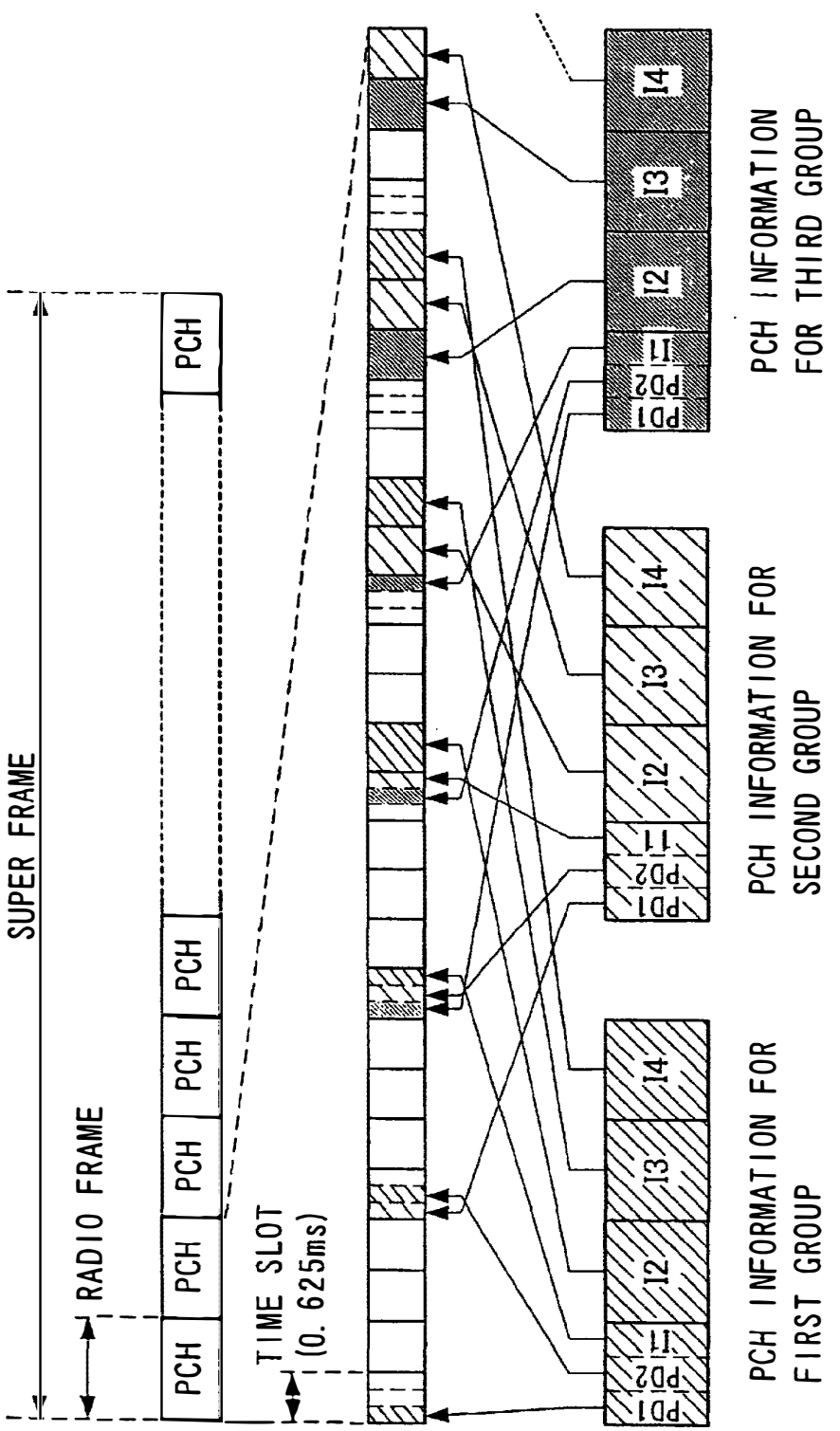
IPR2023-01270 Page 532

FIG. 11



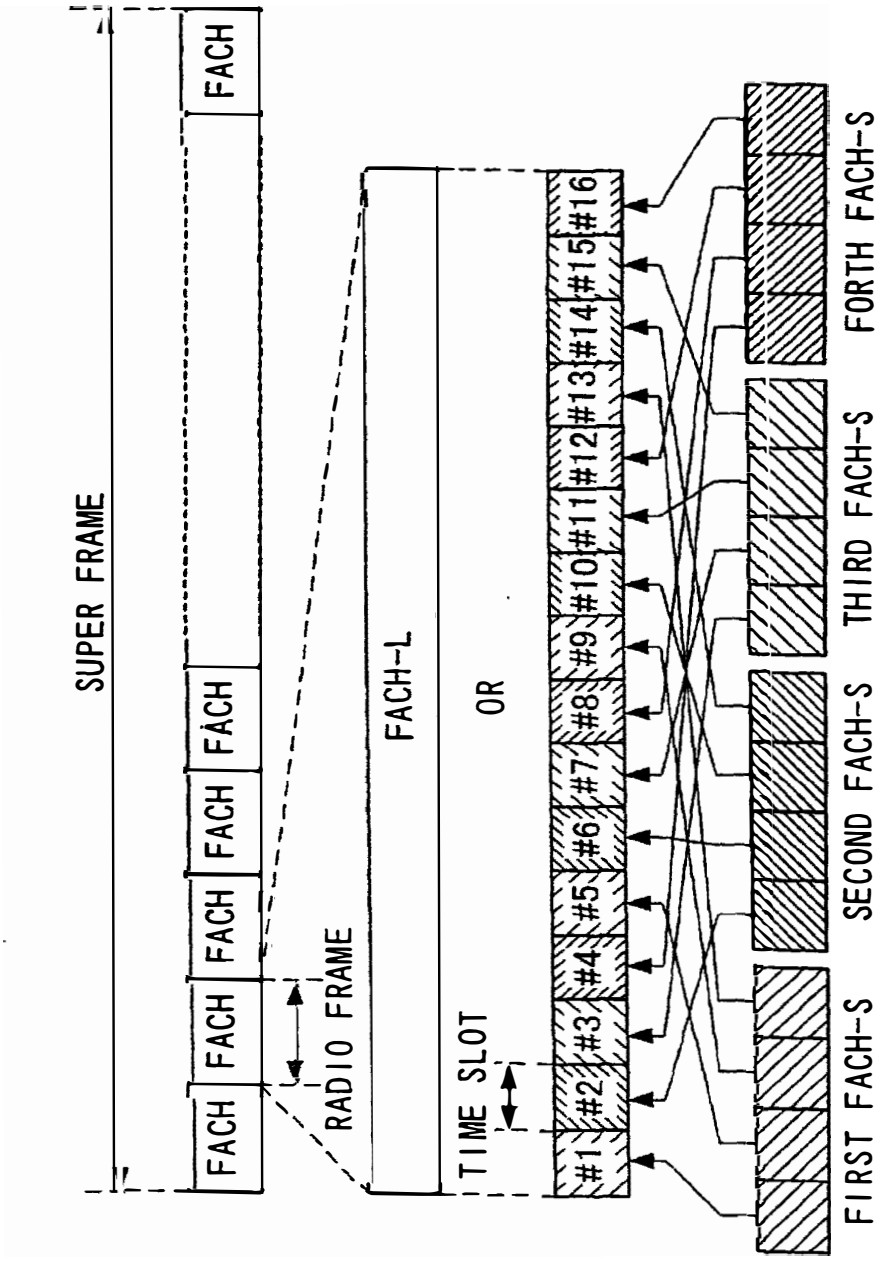
IPR2023-01270 Page 533

FIG. 12



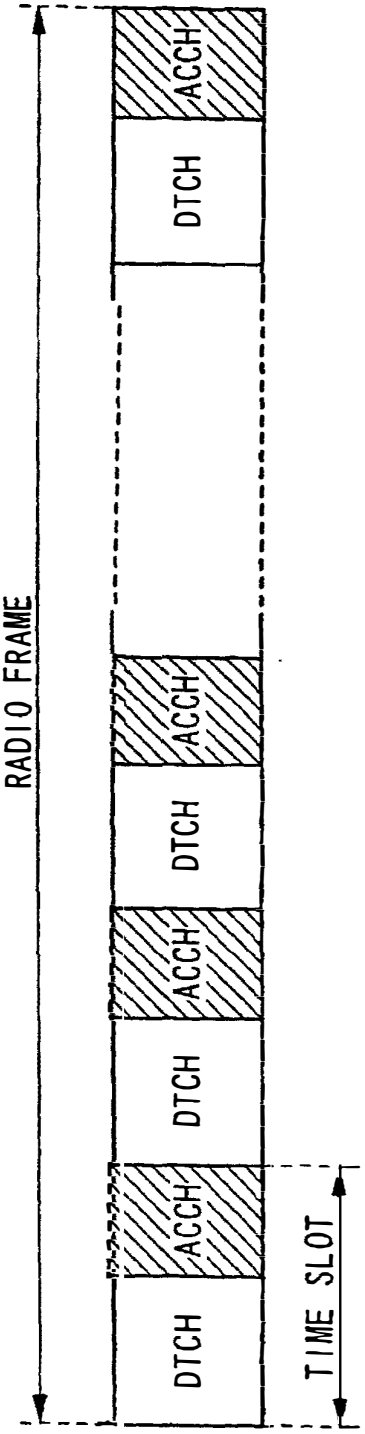
IPR2023-01270 Page 534

FIG. 13



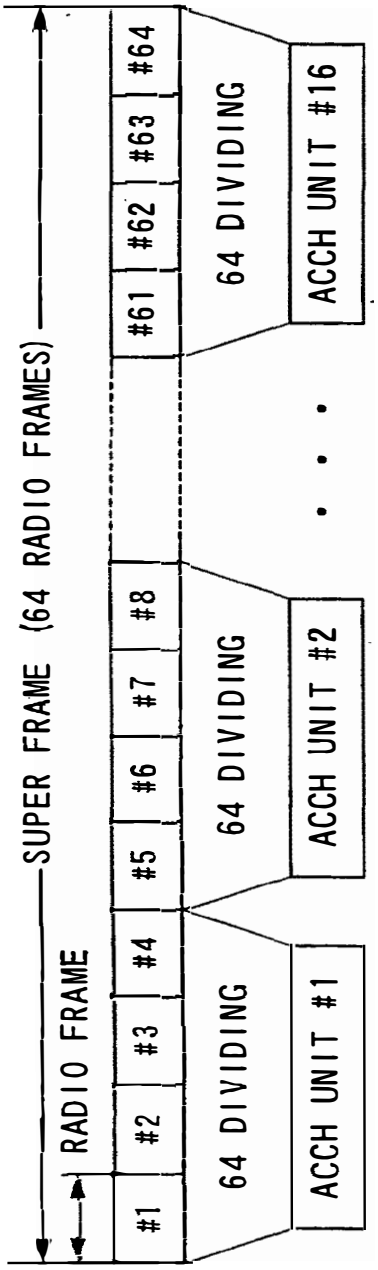
IPR2023-01270 Page 535

FIG. 14

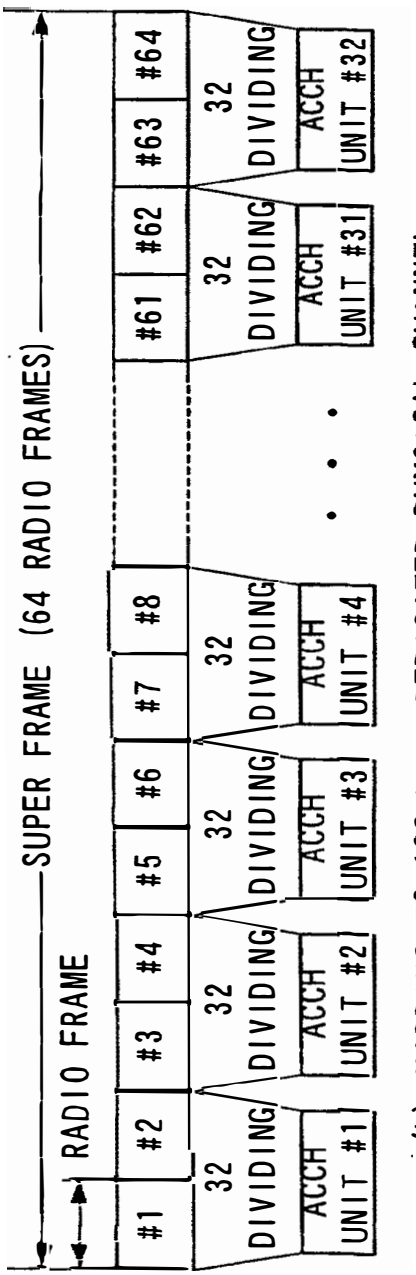


IPR2023-01270 Page 536

FIG. 15



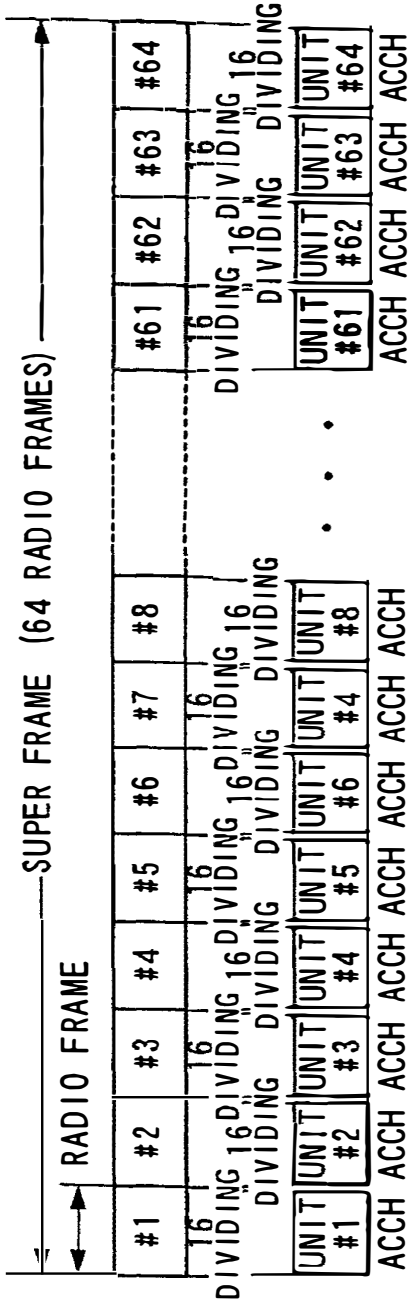
(a) MAPPING TO 32, 64 ksps DEDICATED PHYSICAL CHANNEL



(b) MAPPING TO 128 ksps DEDICATED PHYSICAL CHANNEL

IPR2023-01270 Page 537

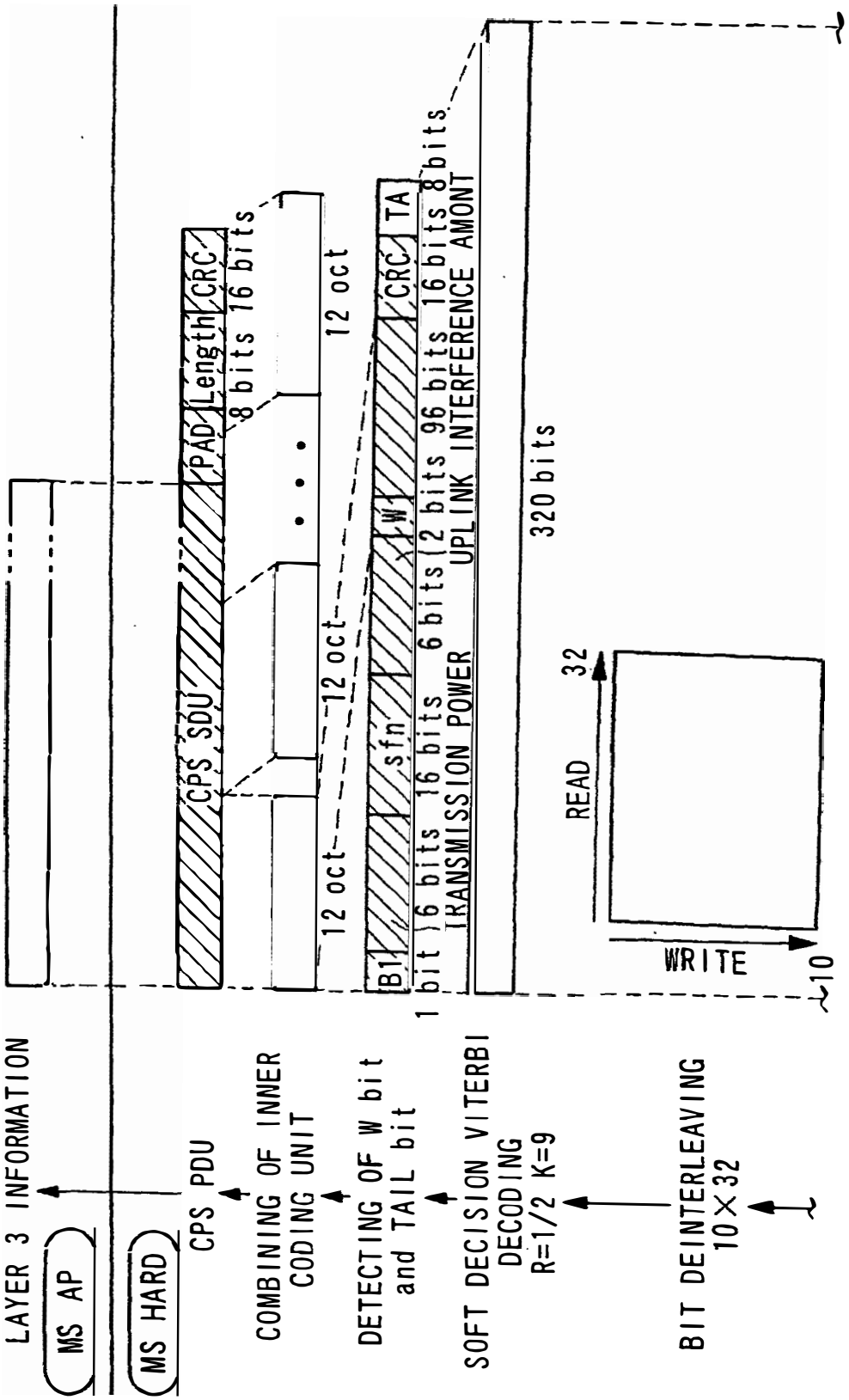
ONTINUANCE OF FIG. 15



(c) MAPPING TO 256 ksps DEDICATED PHYSICAL CHANNEL

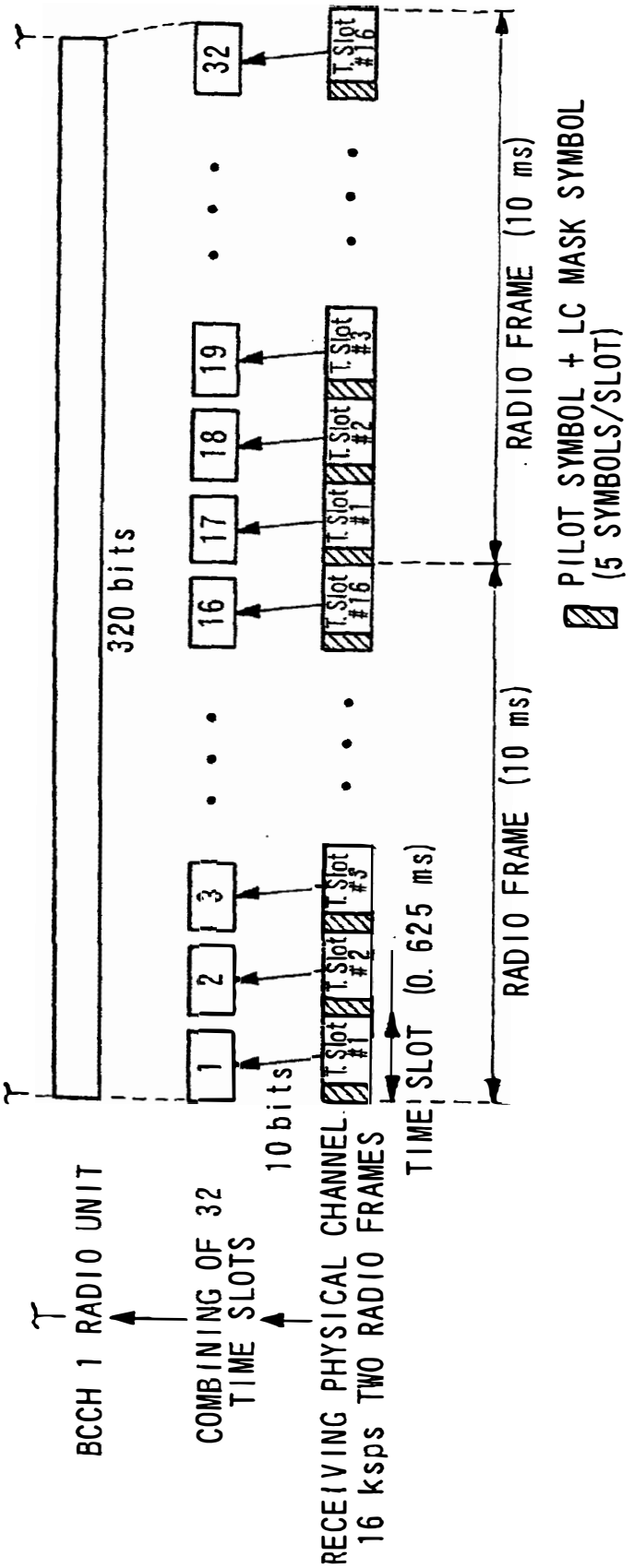
IPR2023-01270 Page 538

FIG. 16



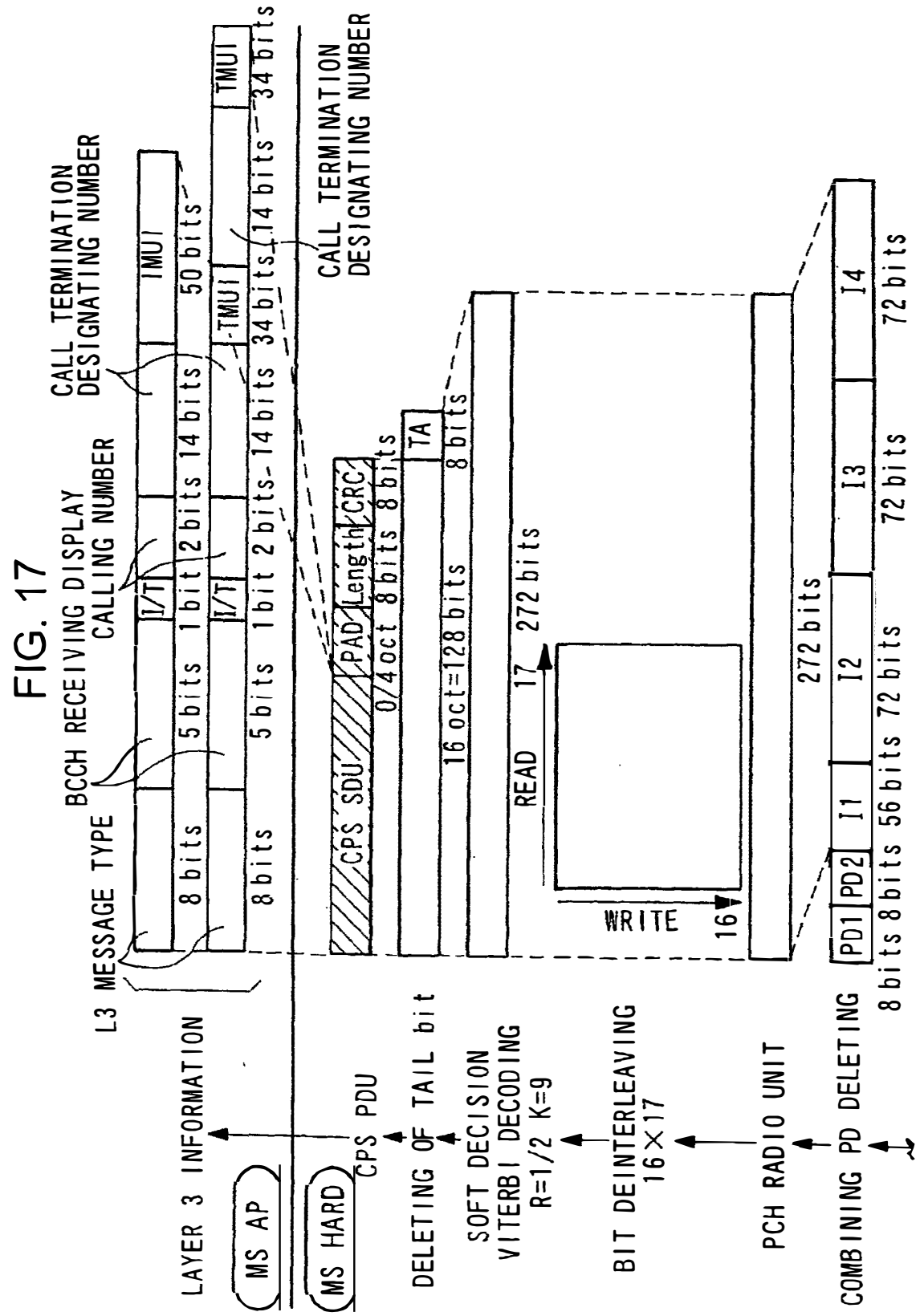
IPR2023-01270 Page 539

CONTINUANCE OF FIG. 16



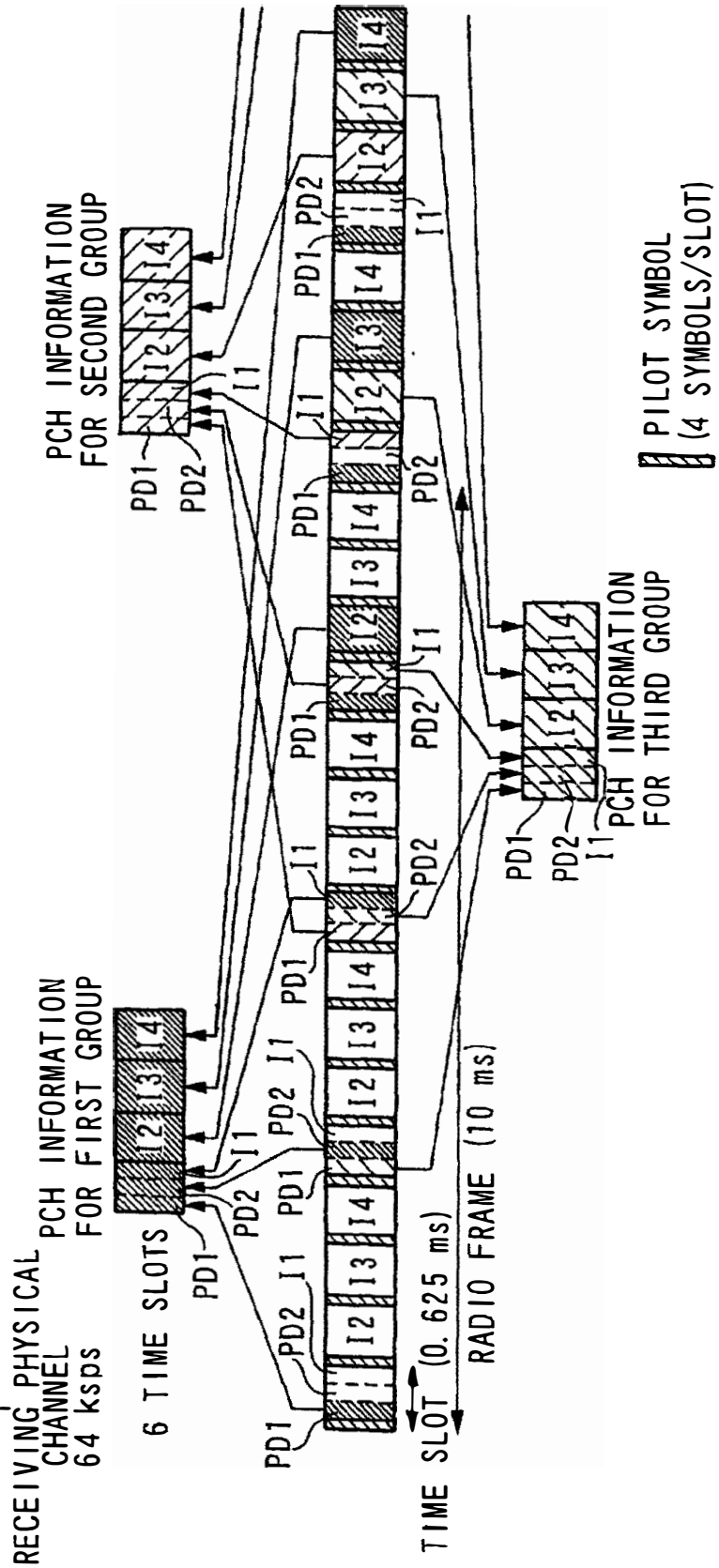
IPR2023-01270 Page 540

FIG. 17



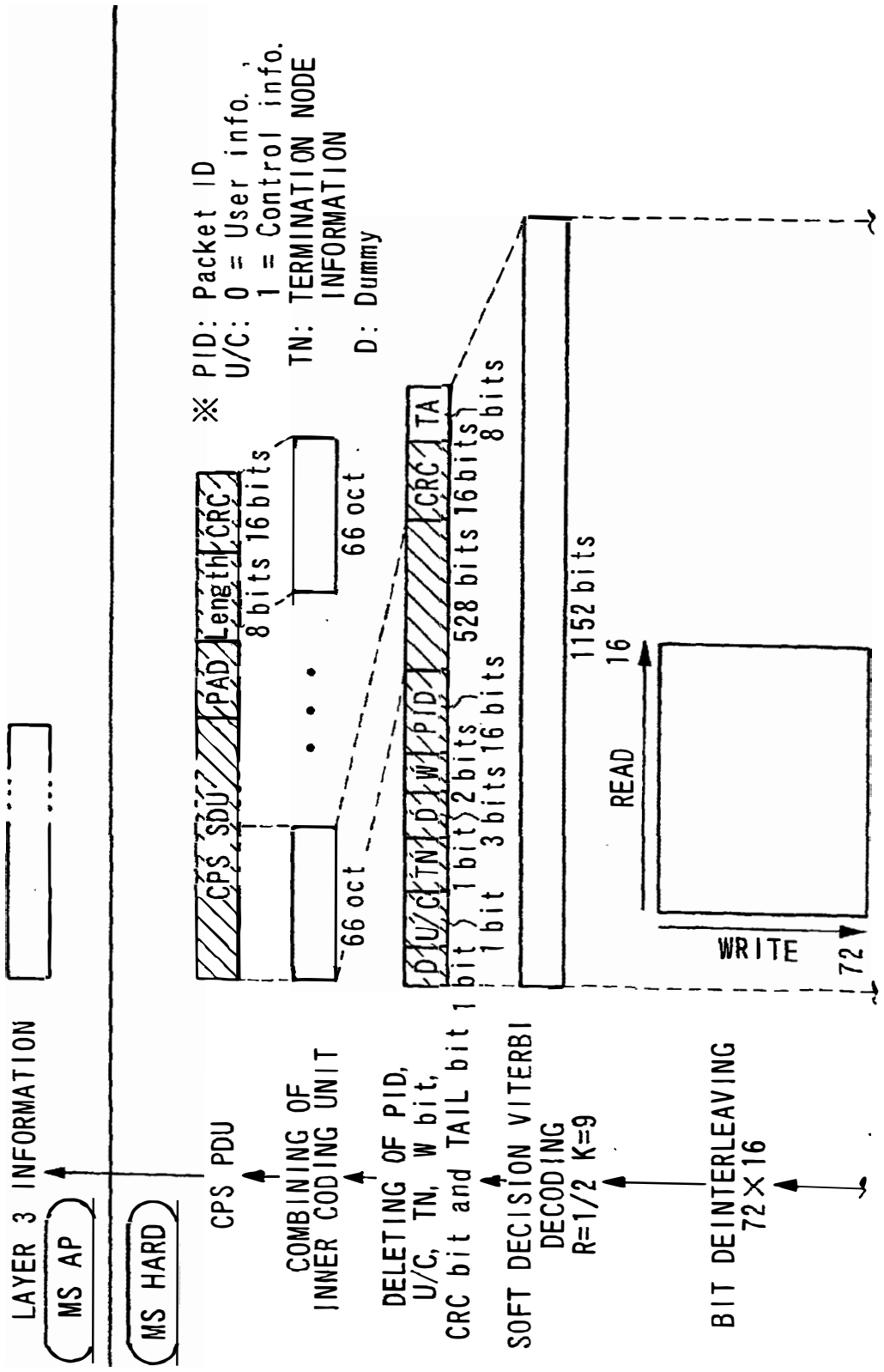
IPR2023-01270 Page 541

CONTINUANCE OF FIG. 17



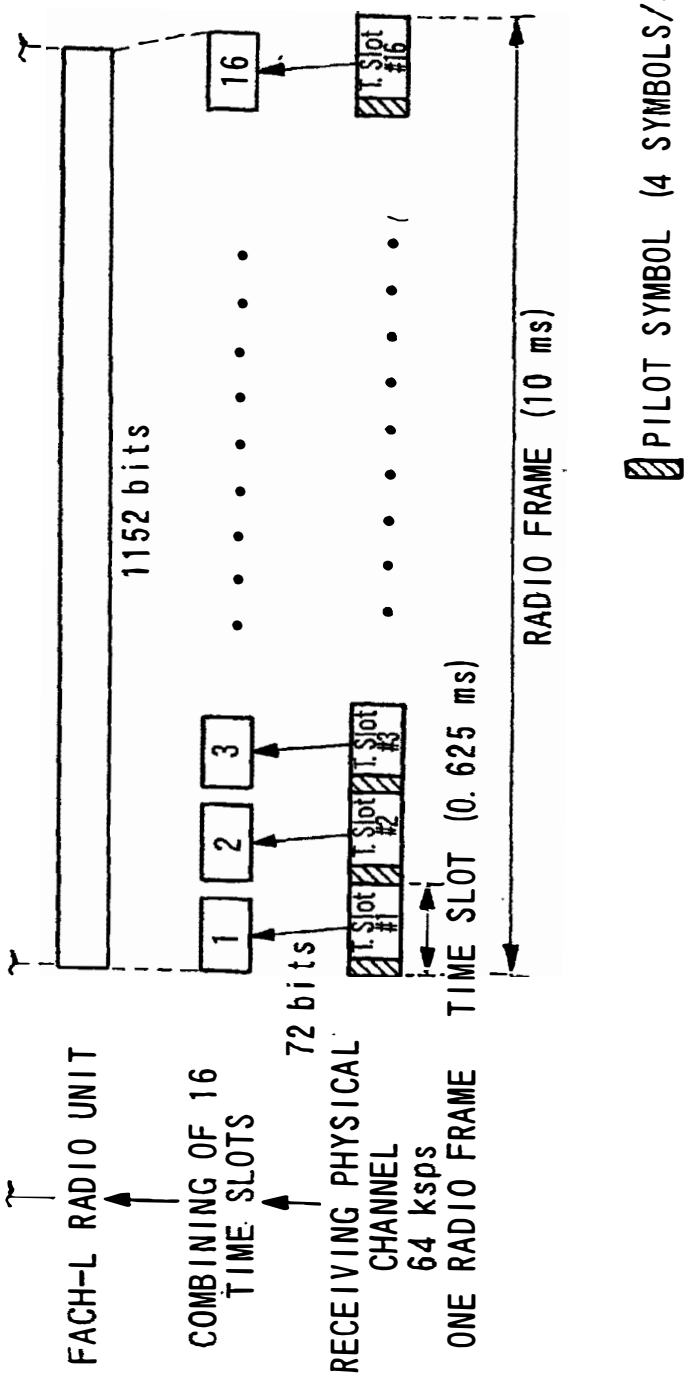
IPR2023-01270 Page 542

FIG. 18



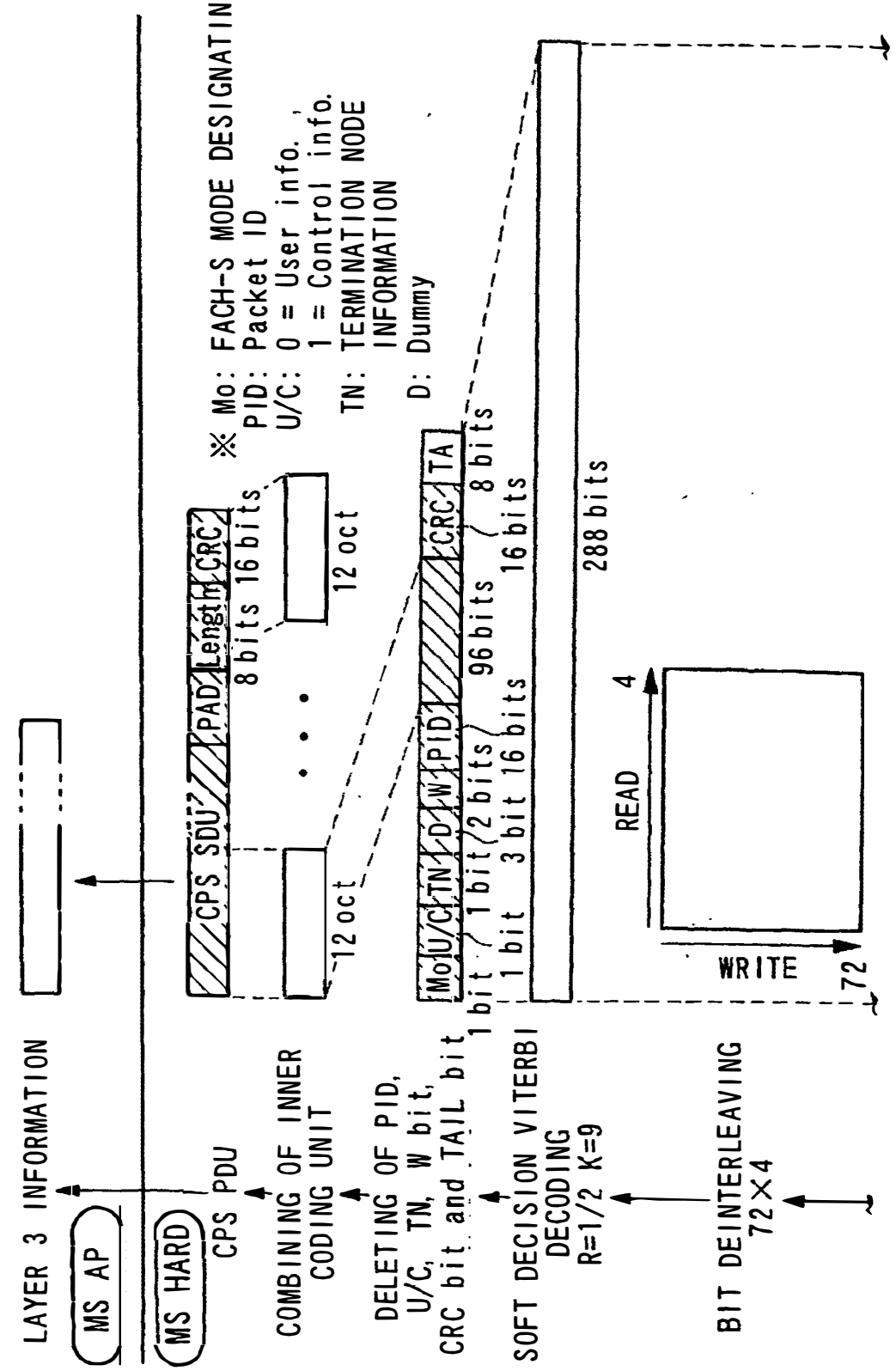
IPR2023-01270 Page 543

CONTINUANCE OF FIG. 18



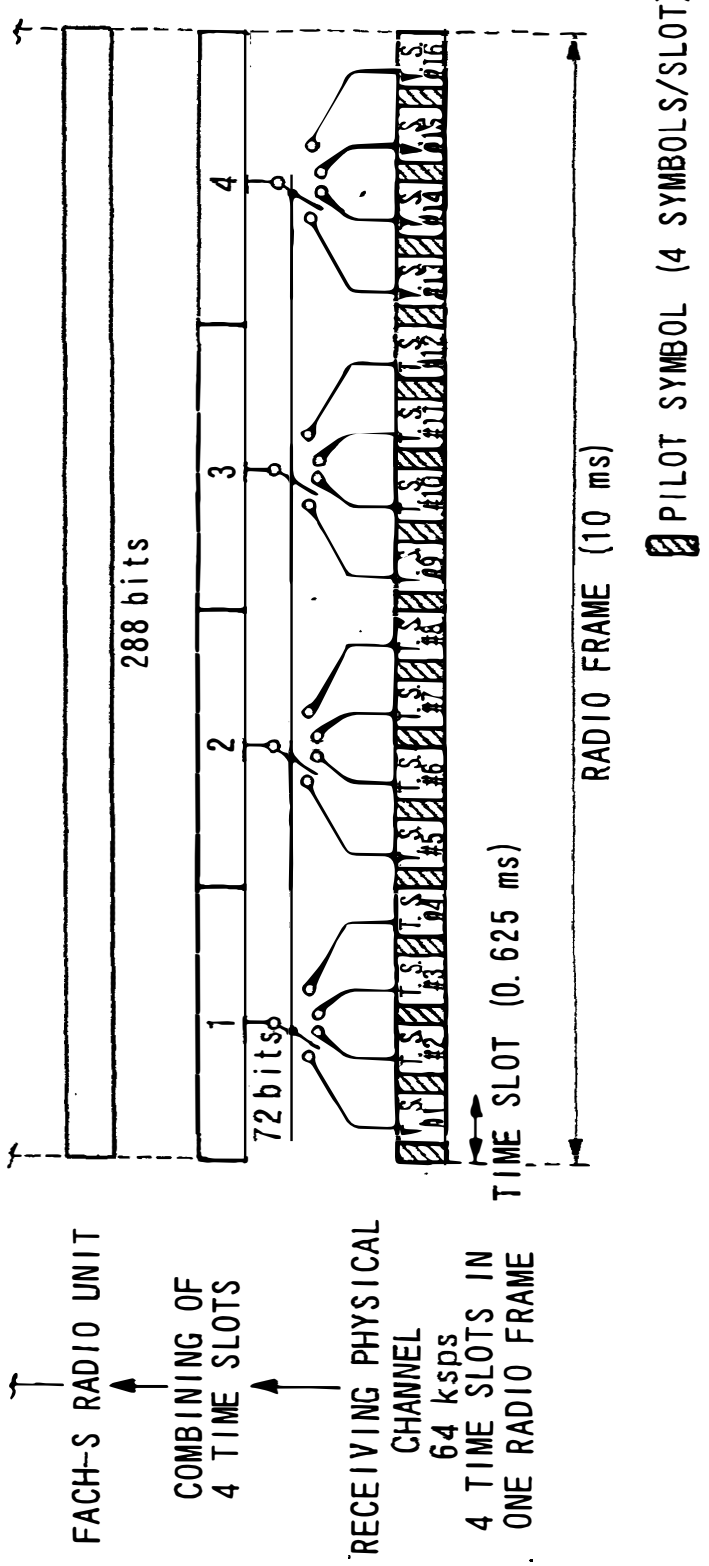
IPR2023-01270 Page 544

FIG. 19



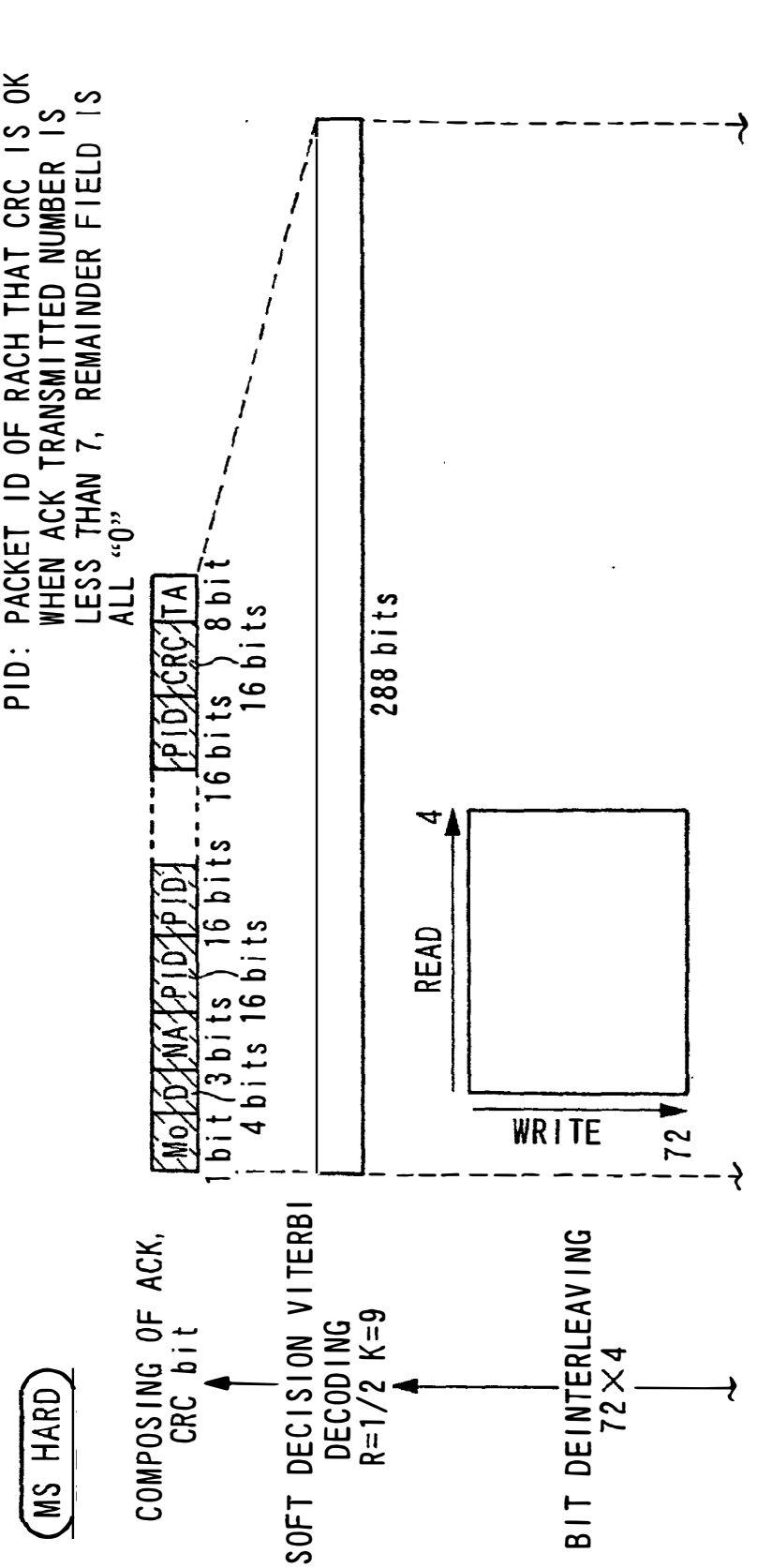
IPR2023-01270 Page 545

CONTINUANCE OF FIG. 19



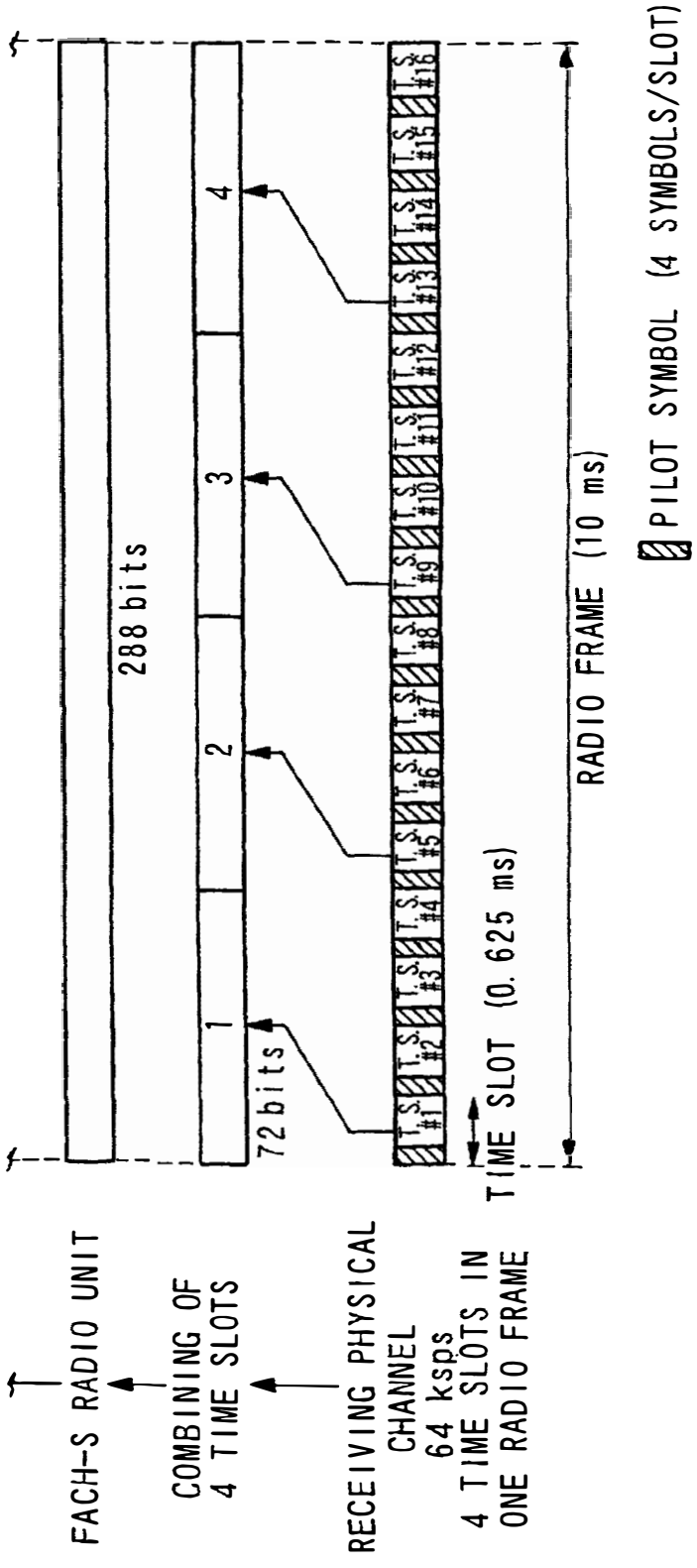
IPR2023-01270 Page 546

FIG. 20



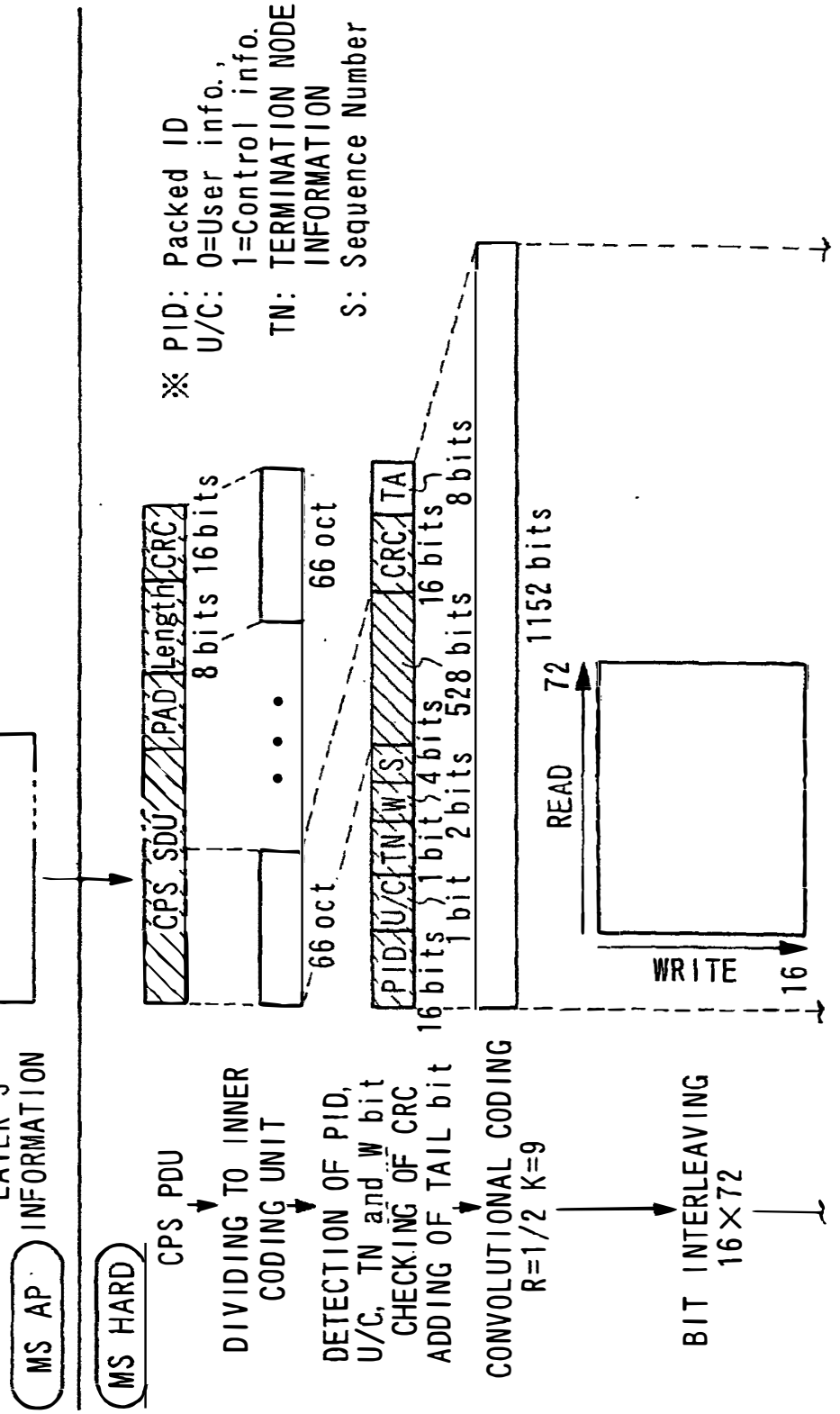
IPR2023-01270 Page 547

CONTINUANCE OF FIG. 20



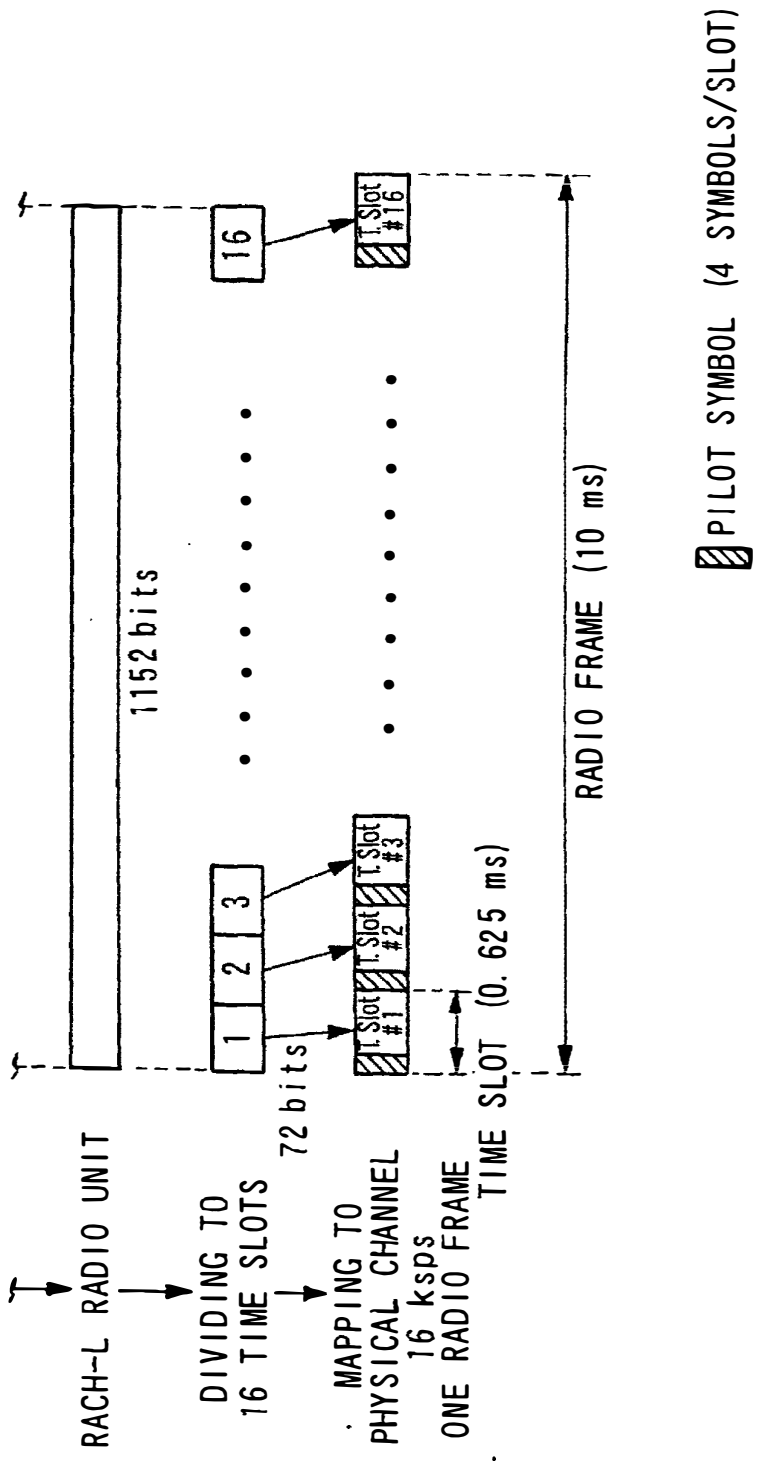
IPR2023-01270 Page 548

FIG. 21



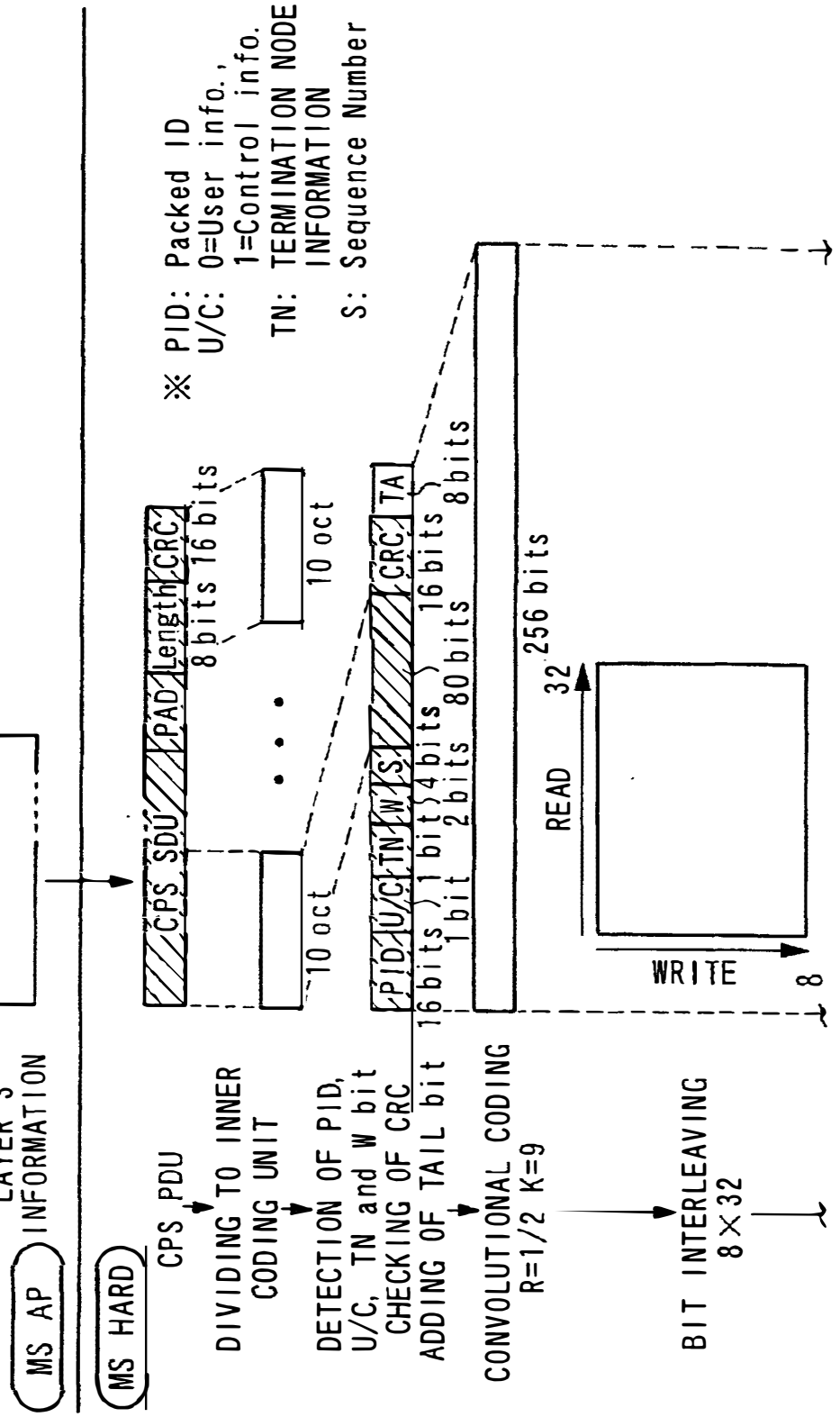
IPR2023-01270 Page 549

CONTINUANCE OF FIG. 21



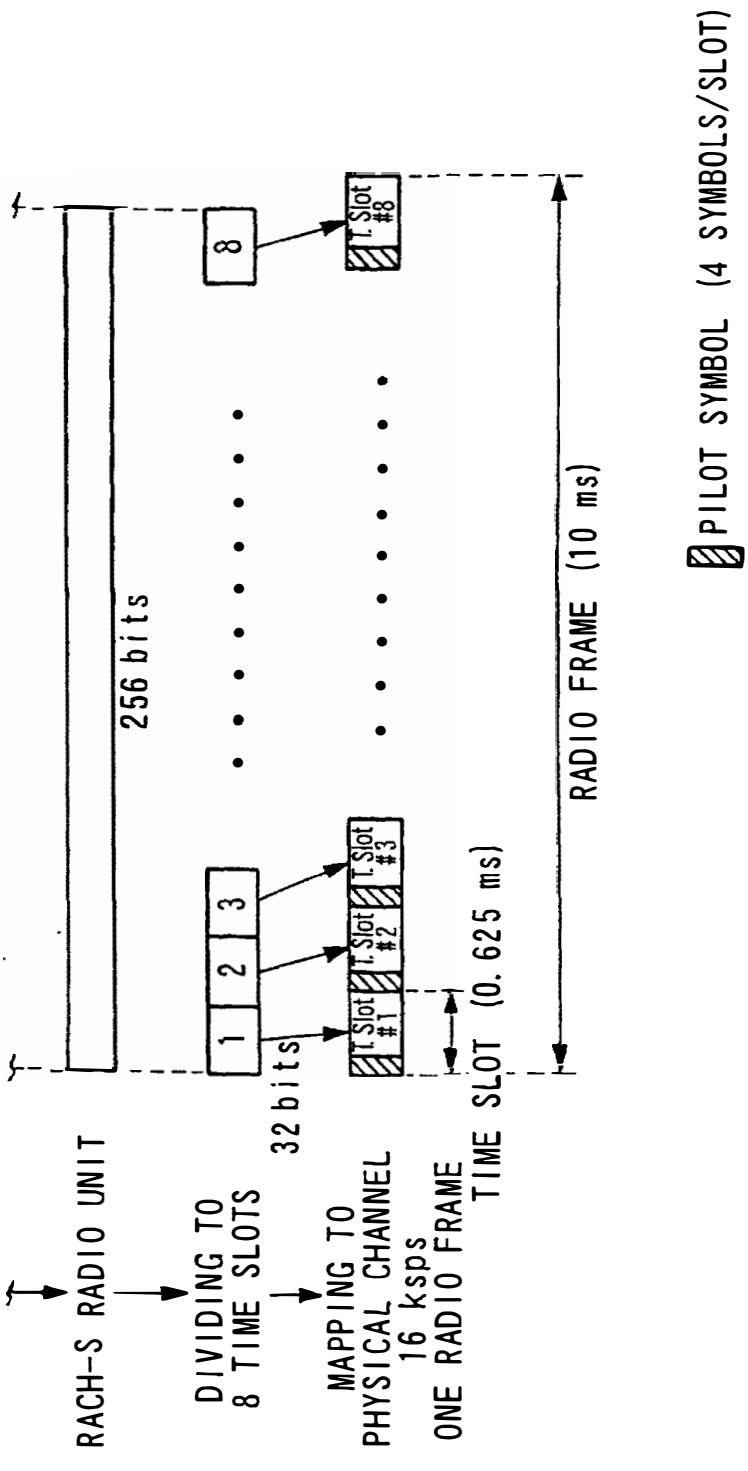
IPR2023-01270 Page 550

FIG. 22



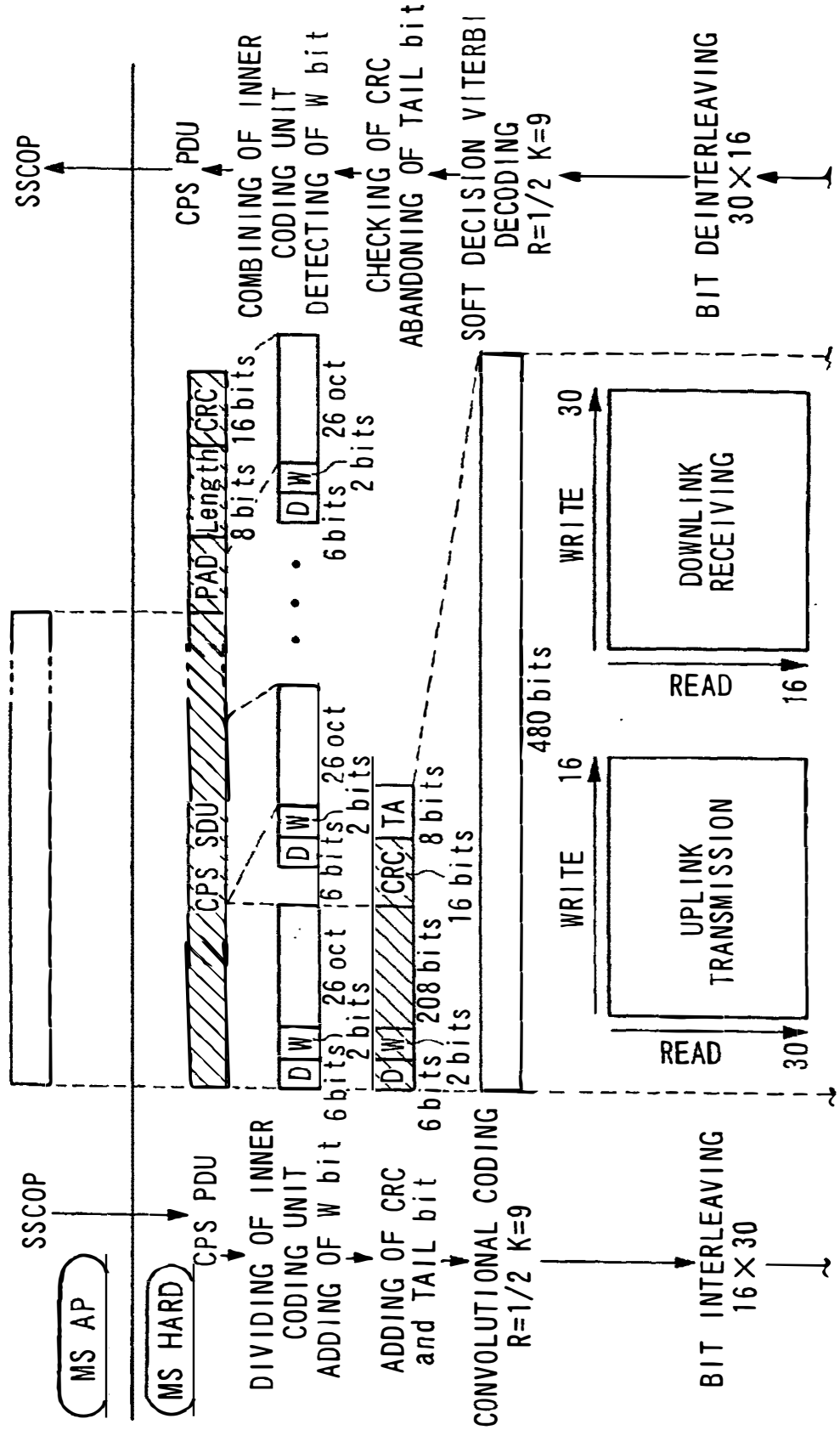
IPR2023-01270 Page 551

CONTINUANCE OF FIG. 22



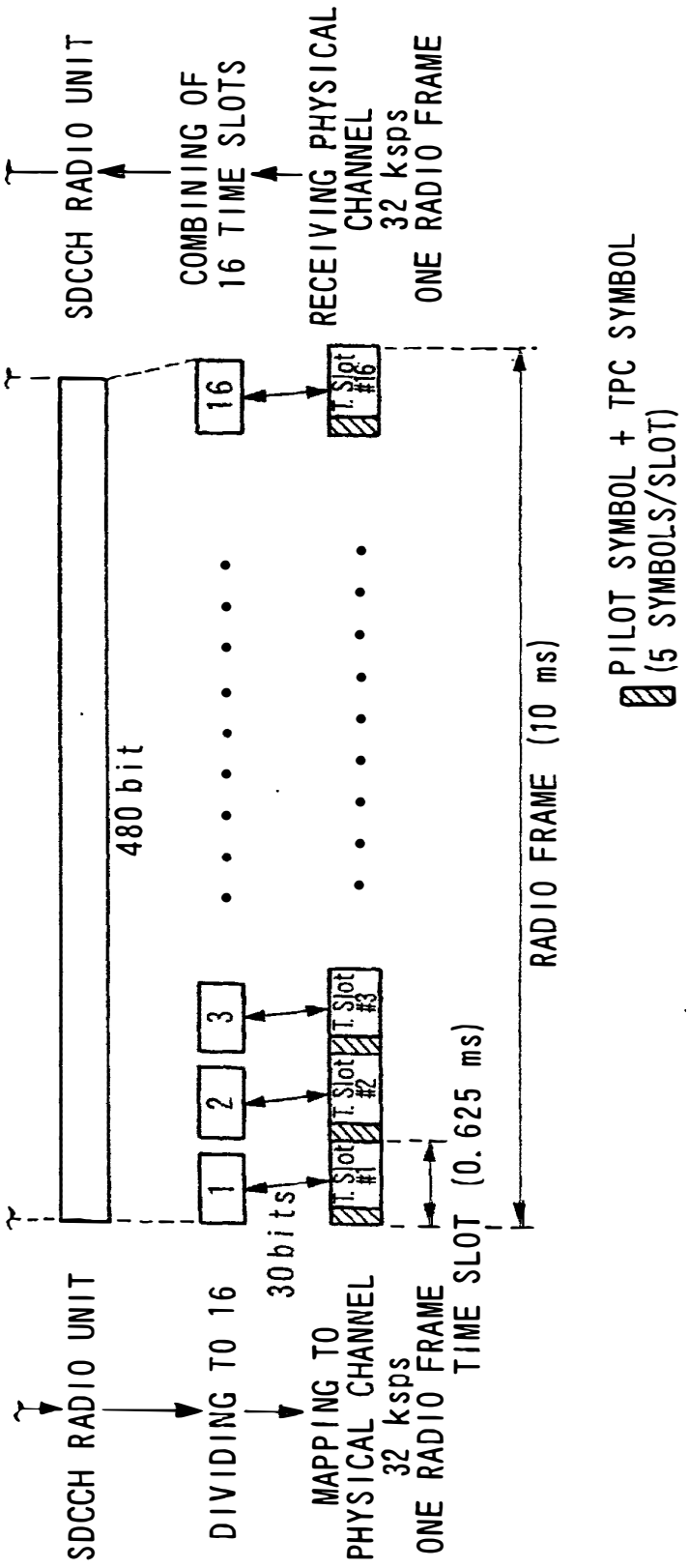
IPR2023-01270 Page 552

FIG. 23



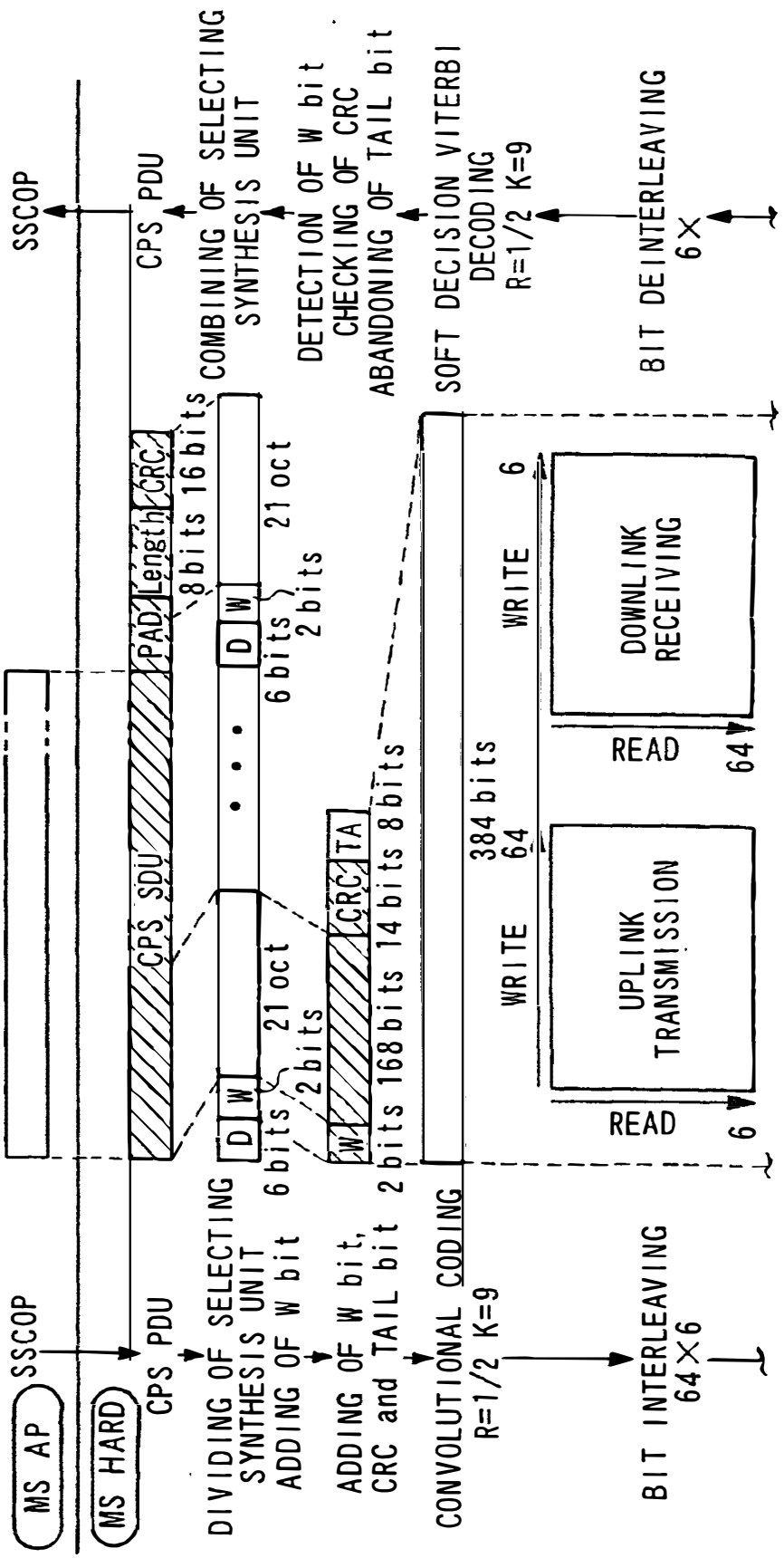
IPR2023-01270 Page 553

CONTINUANCE OF FIG. 23



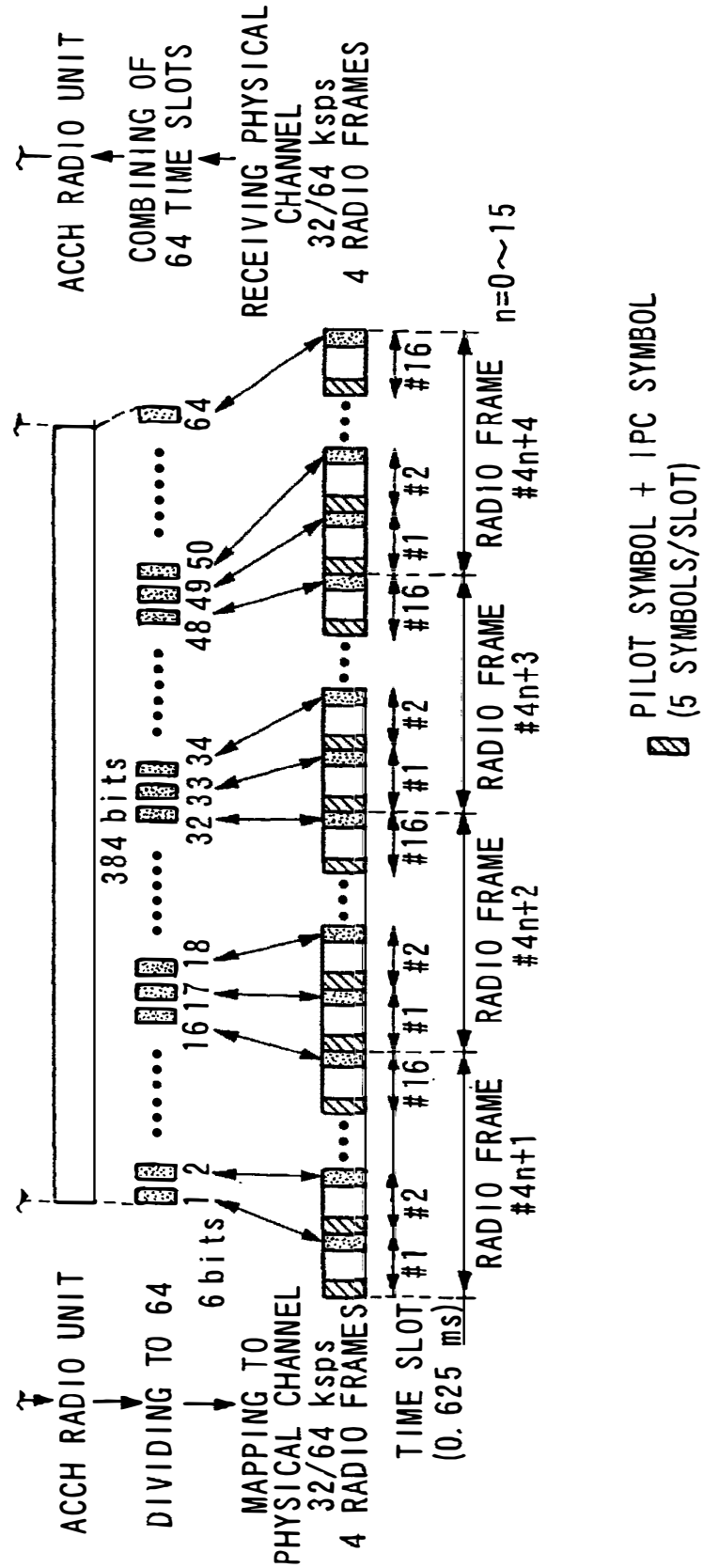
IPR2023-01270 Page 554

FIG. 24



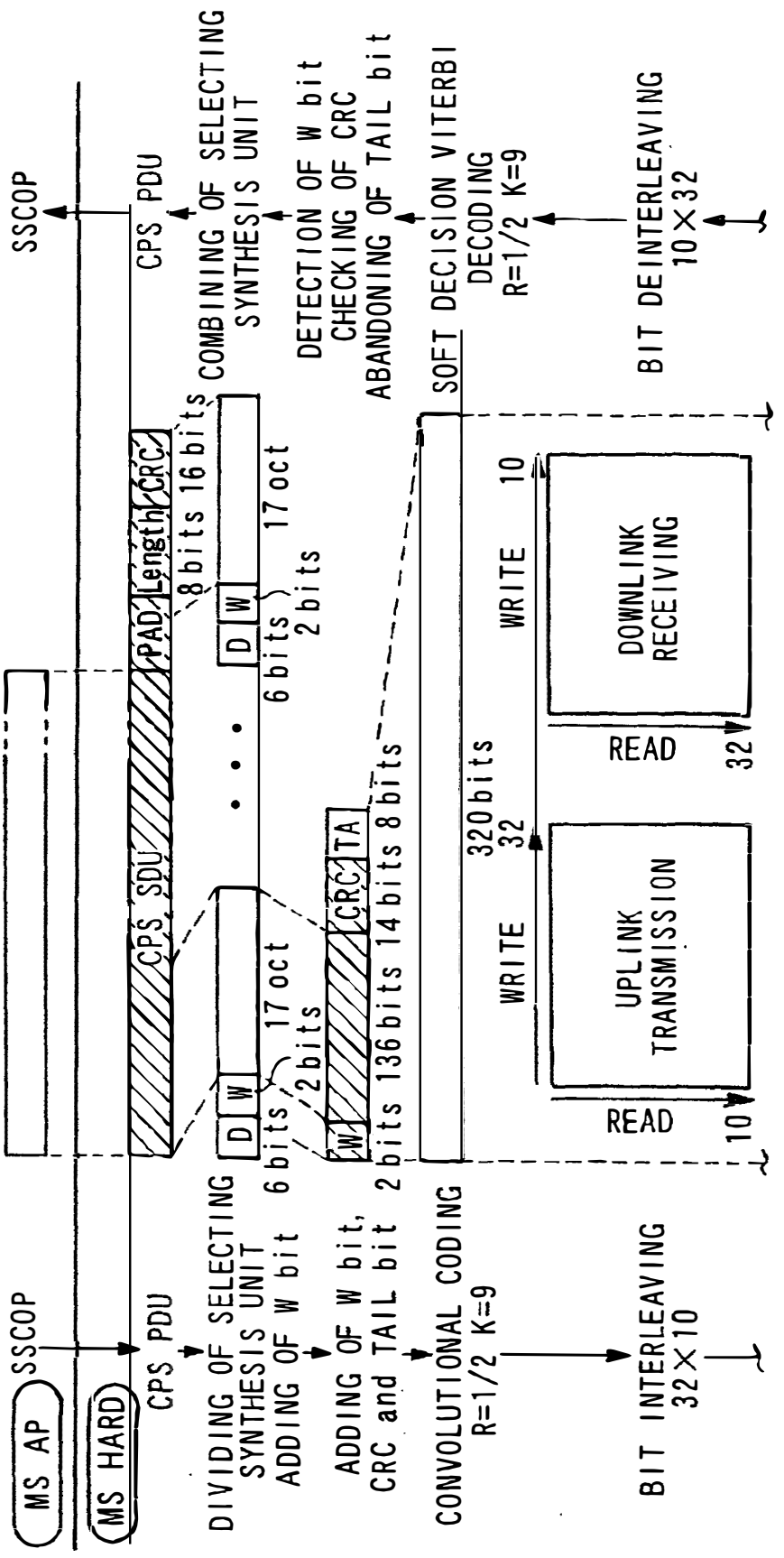
IPR2023-01270 Page 555

CONTINUANCE OF FIG. 24



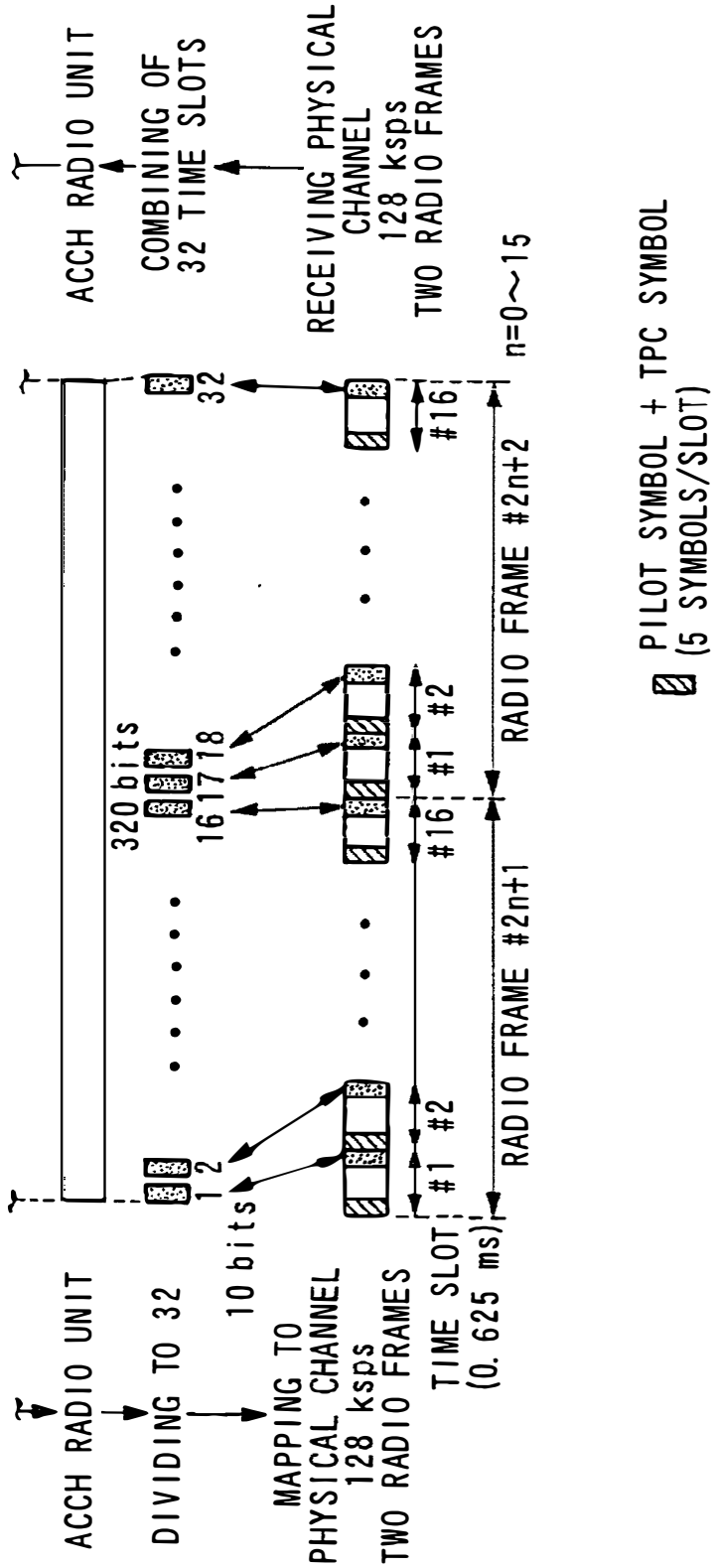
IPR2023-01270 Page 556

FIG. 25



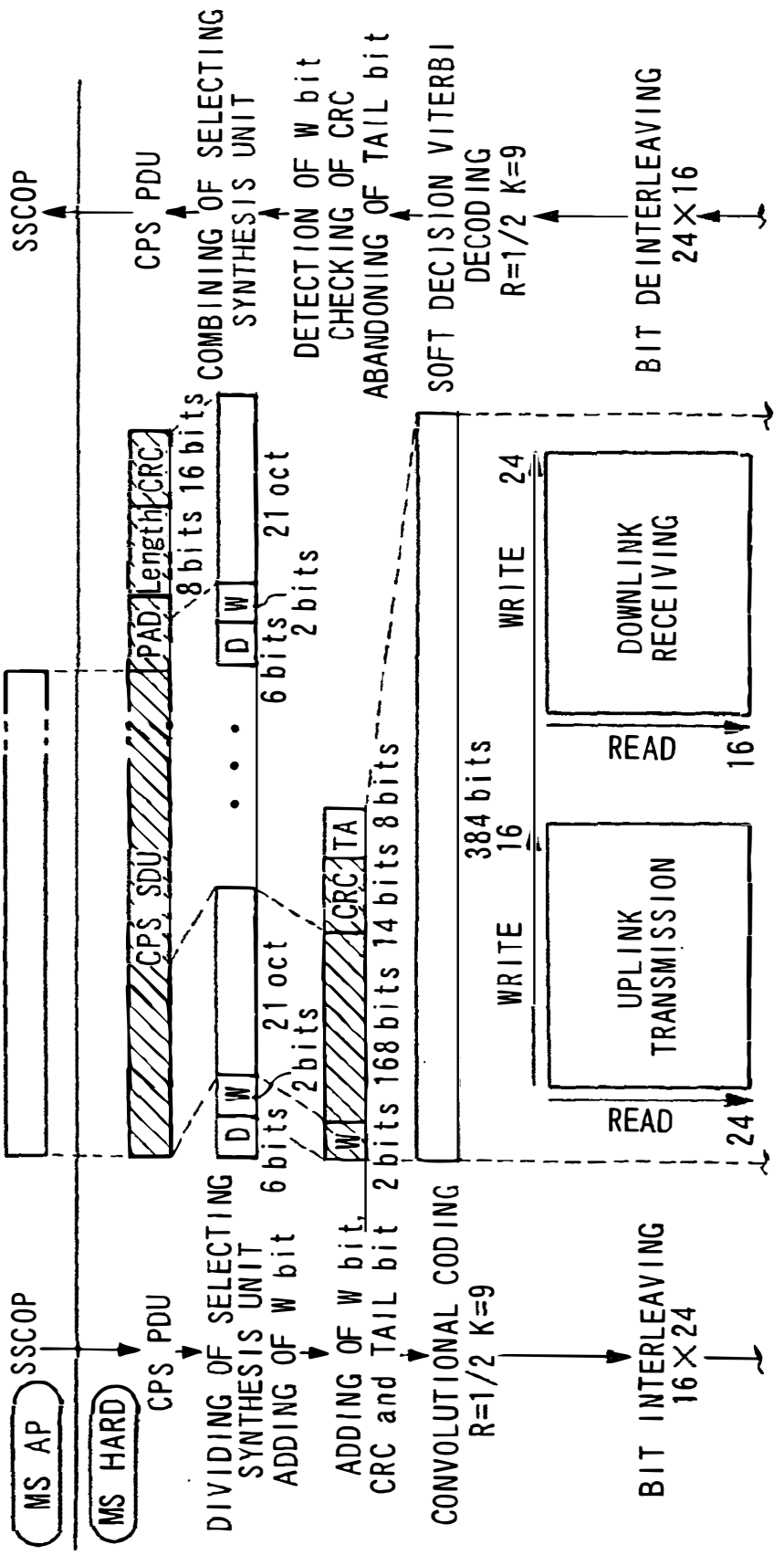
IPR2023-01270 Page 557

CONTINUANCE OF FIG. 25



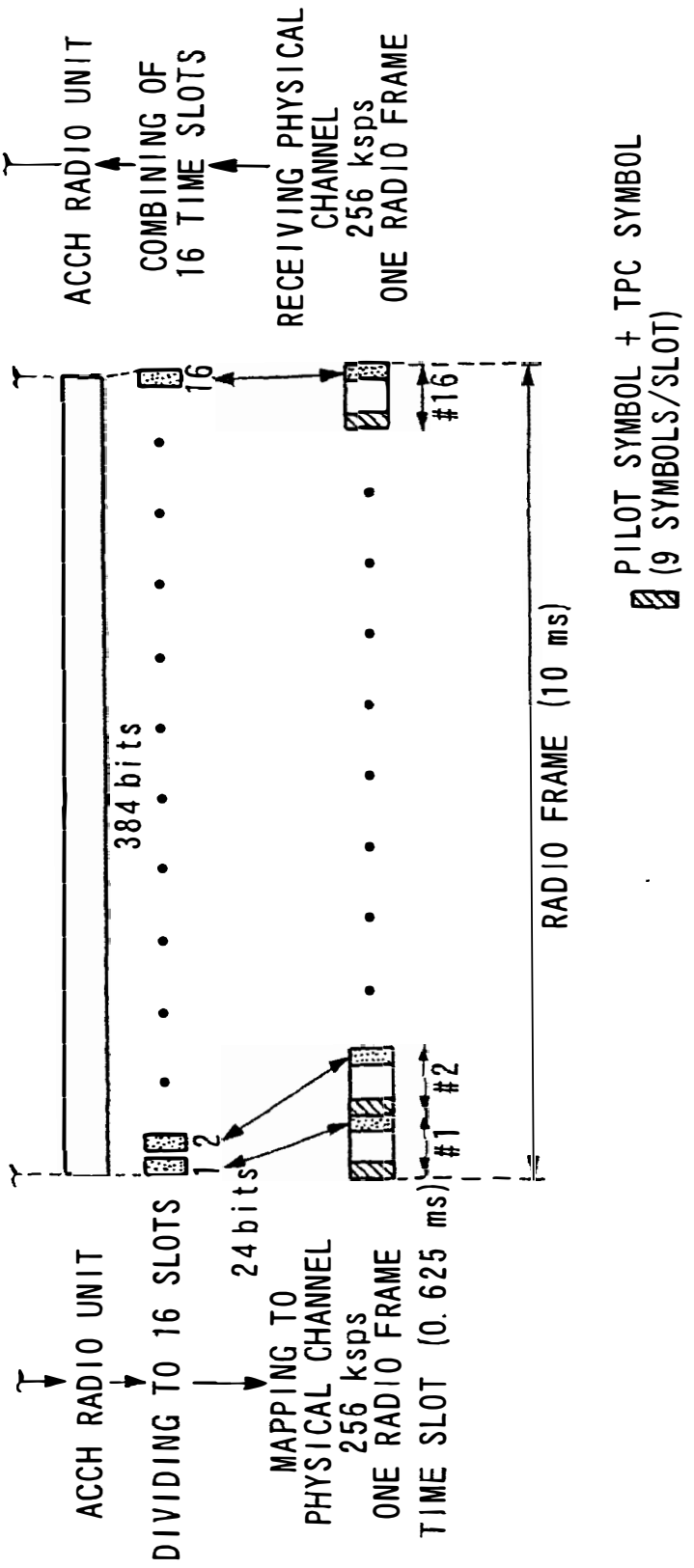
IPR2023-01270 Page 558

FIG. 26



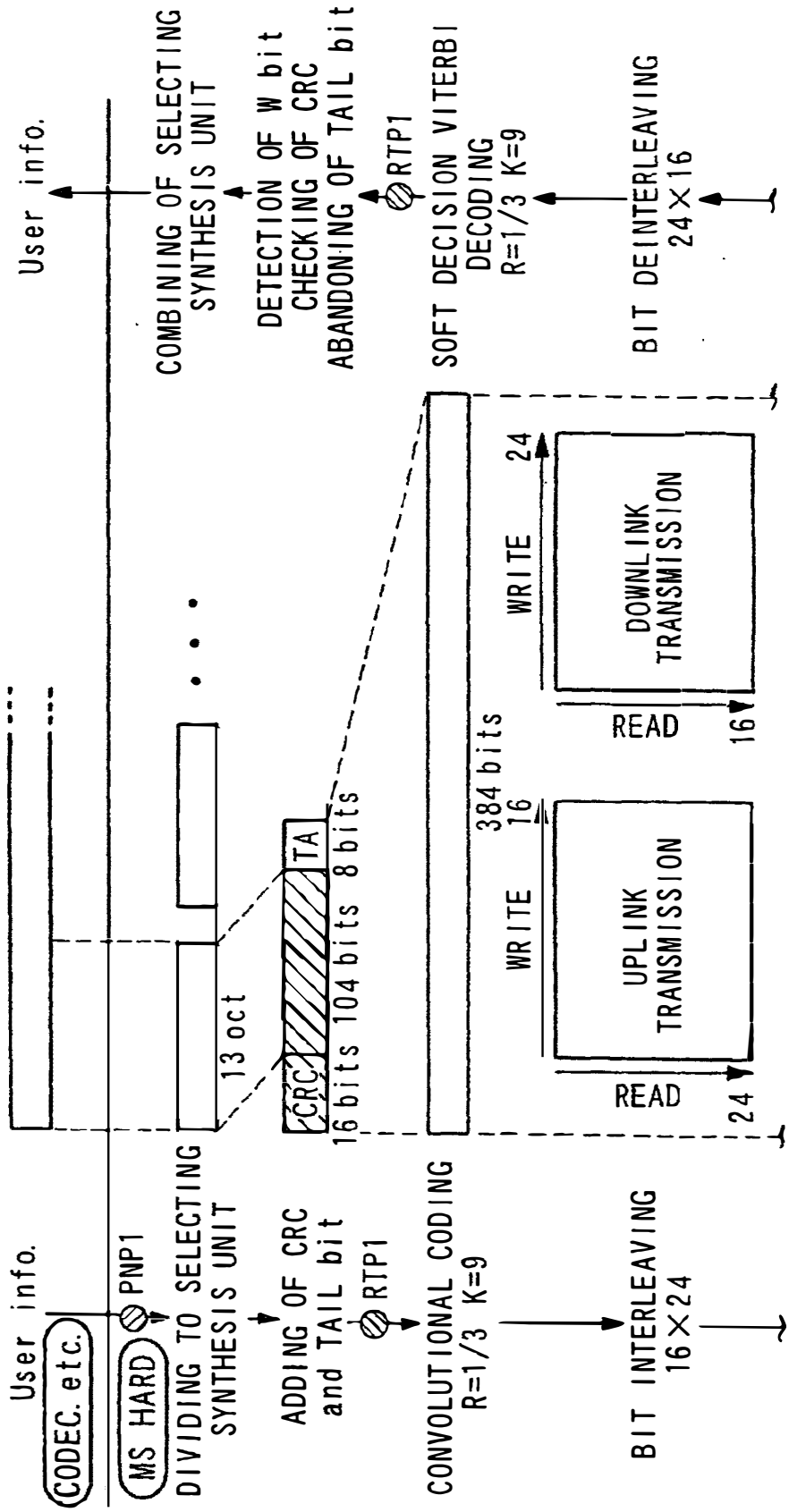
IPR2023-01270 Page 559

CONTINUANCE OF FIG. 26



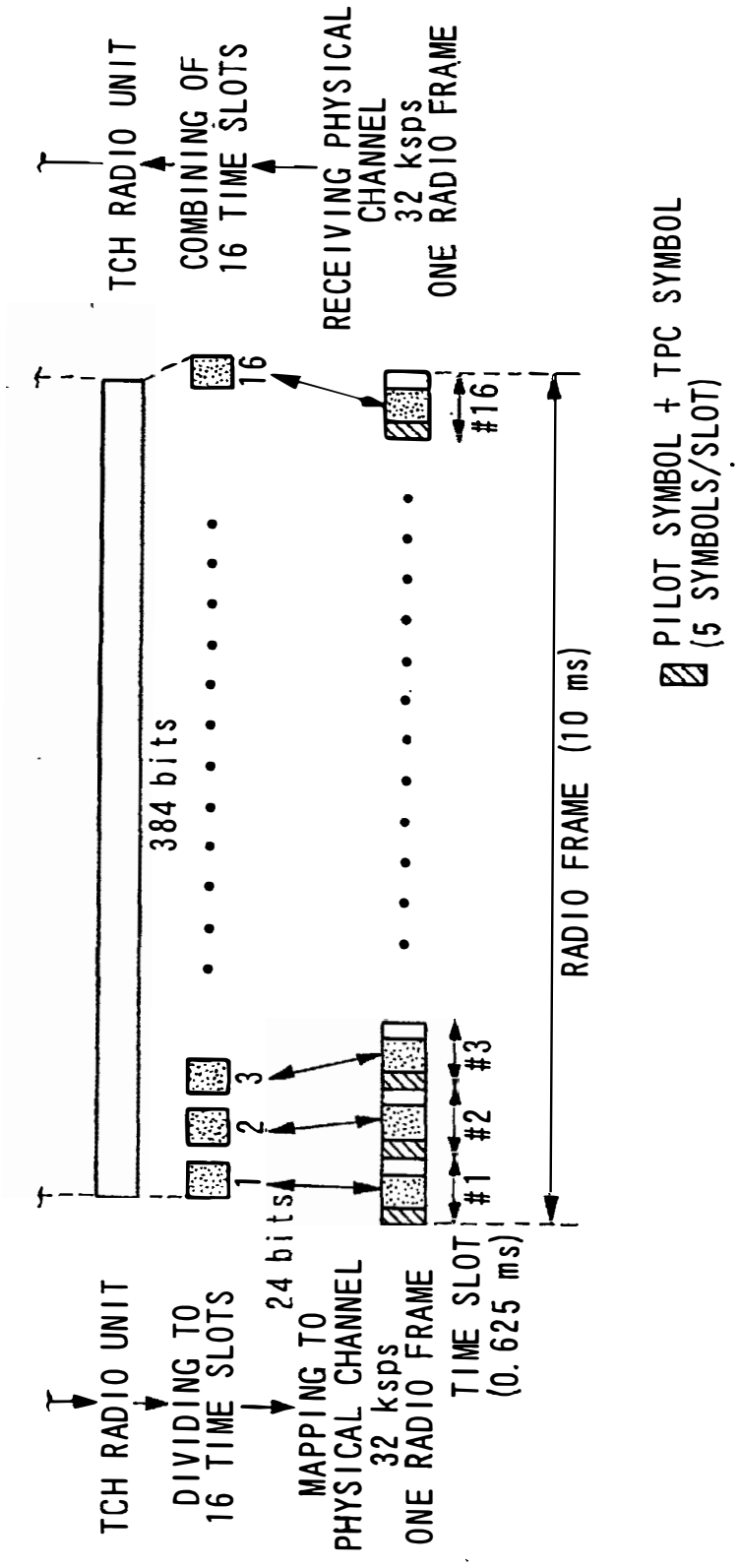
IPR2023-01270 Page 560

FIG. 27



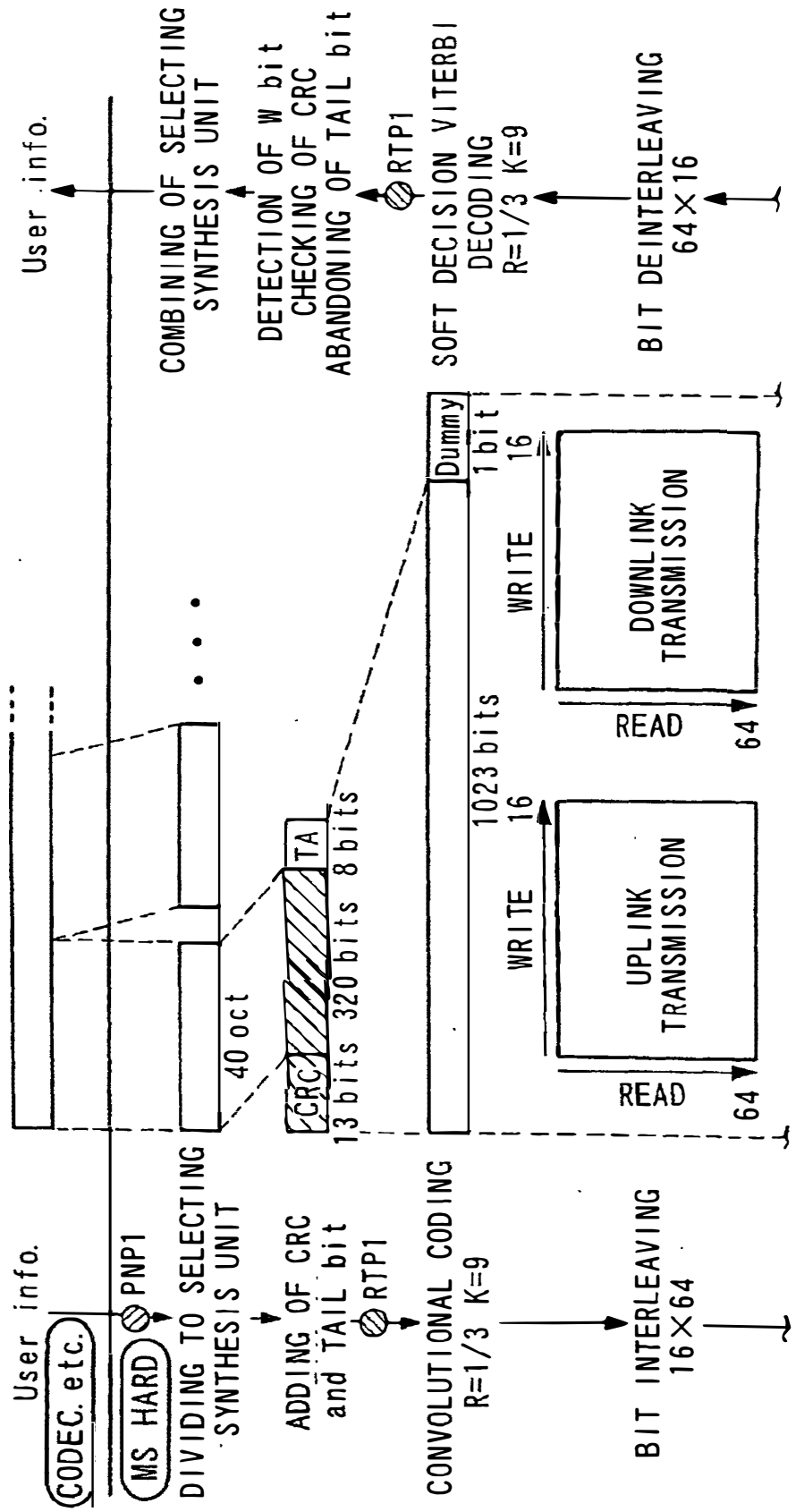
IPR2023-01270 Page 561

CONTINUANCE OF FIG. 27



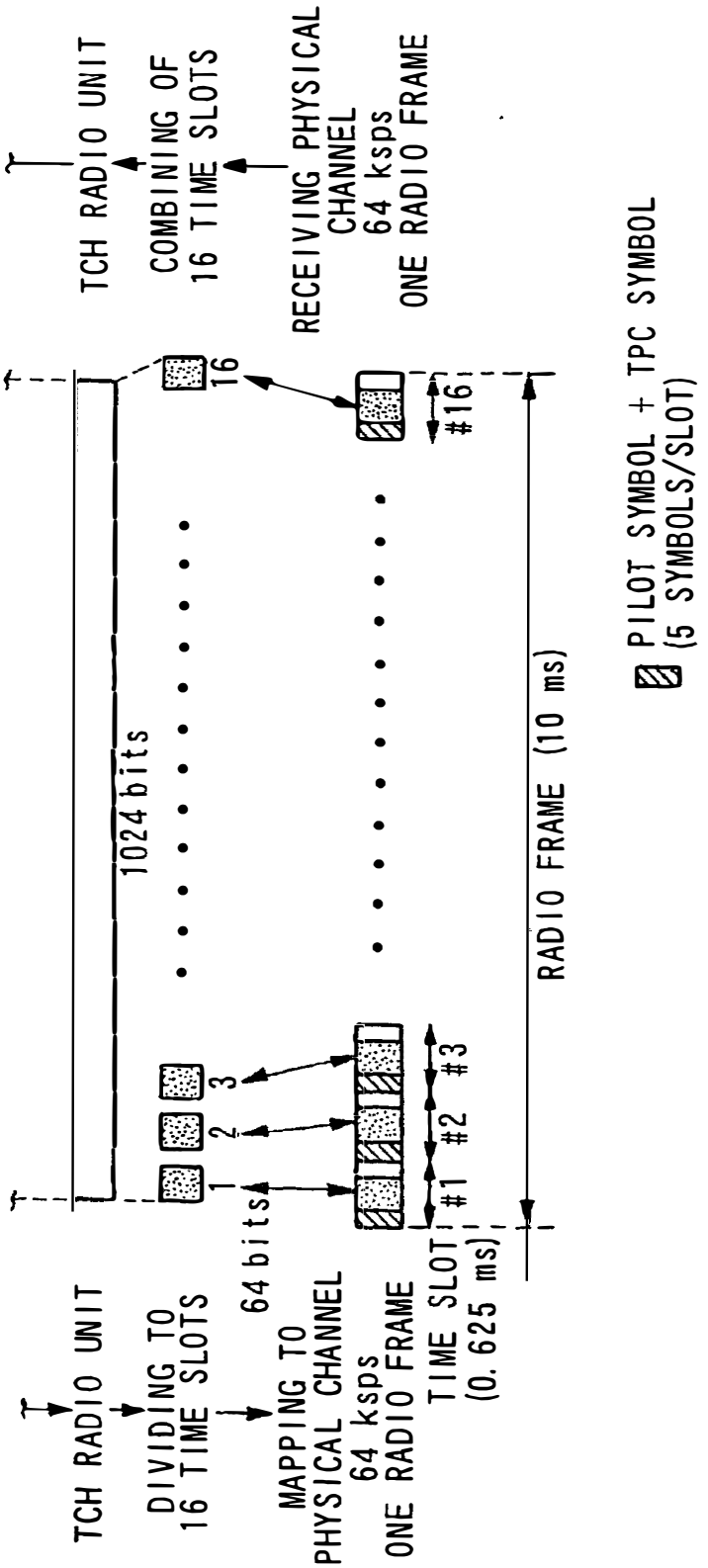
IPR2023-01270 Page 562

FIG. 28



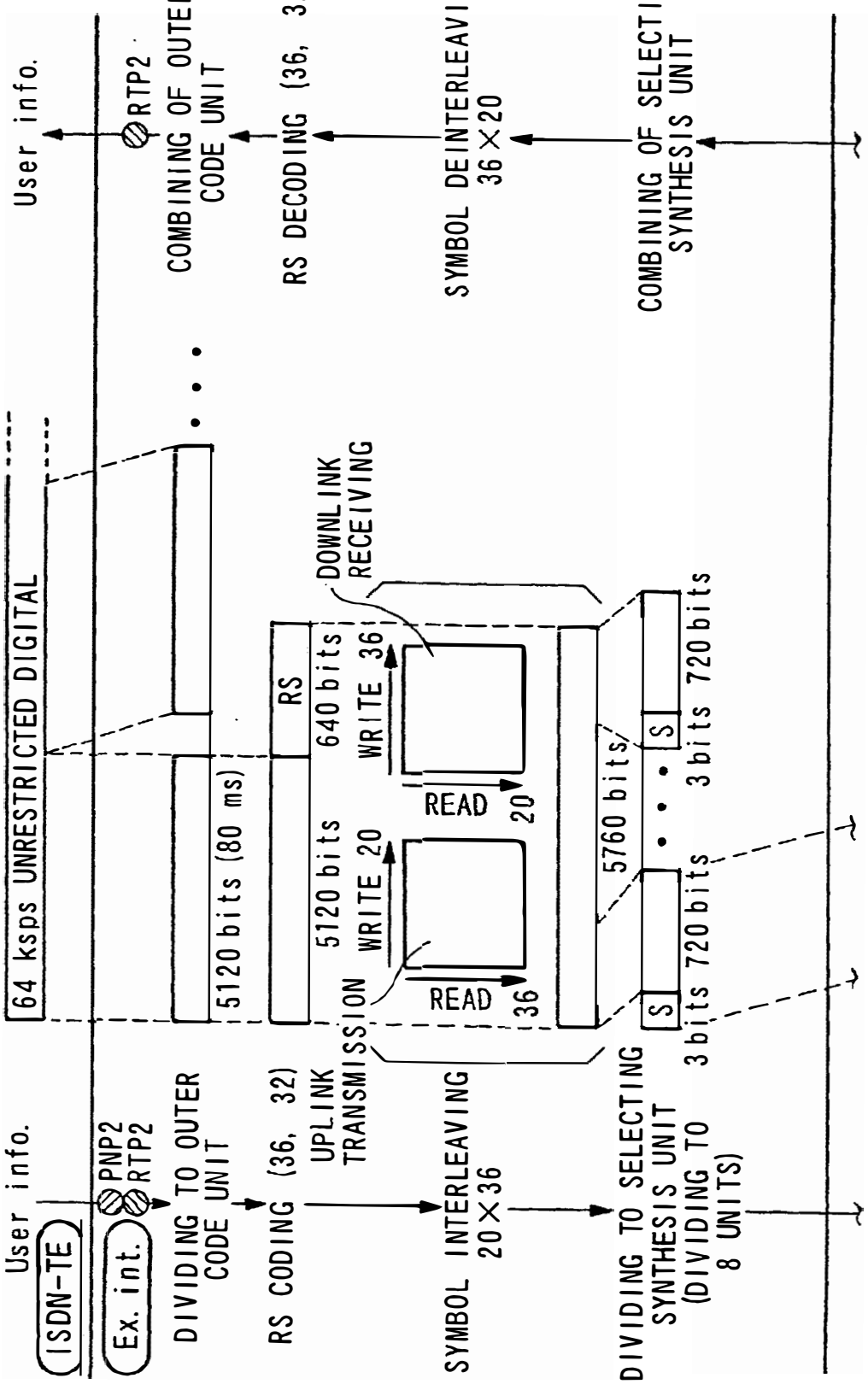
IPR2023-01270 Page 563

CONTINUANCE OF FIG. 28



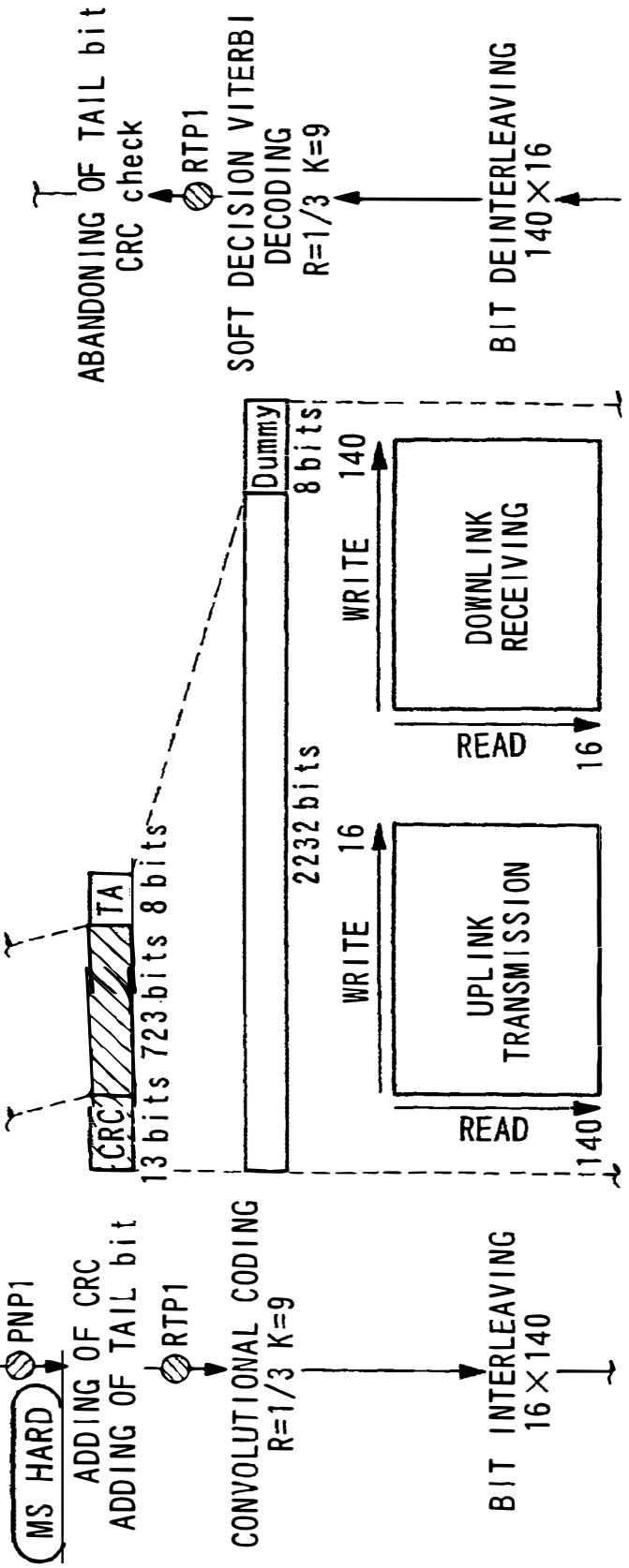
IPR2023-01270 Page 564

FIG. 29



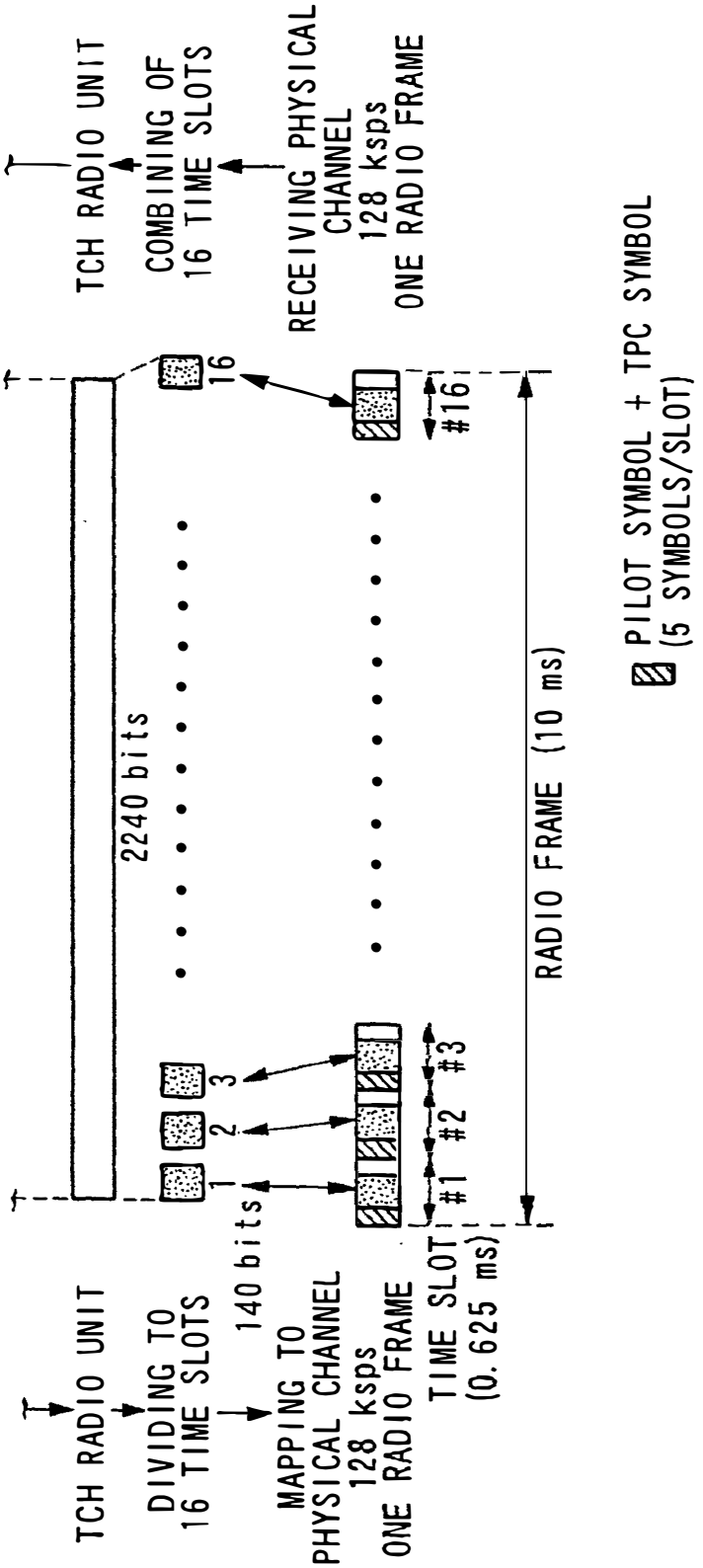
IPR2023-01270 Page 565

CONTINUANCE OF FIG. 29



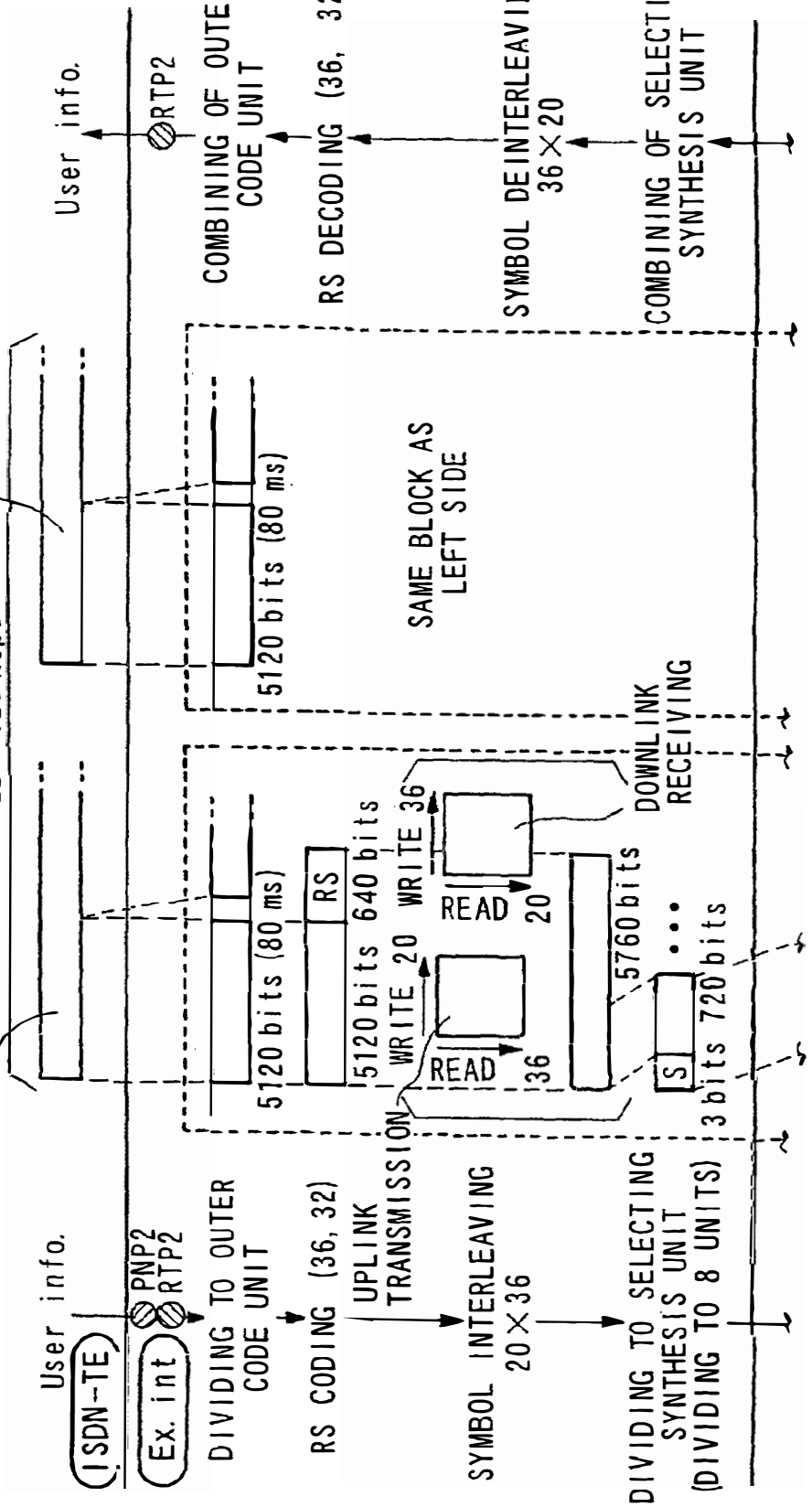
IPR2023-01270 Page 566

CONTINUANCE OF FIG. 29



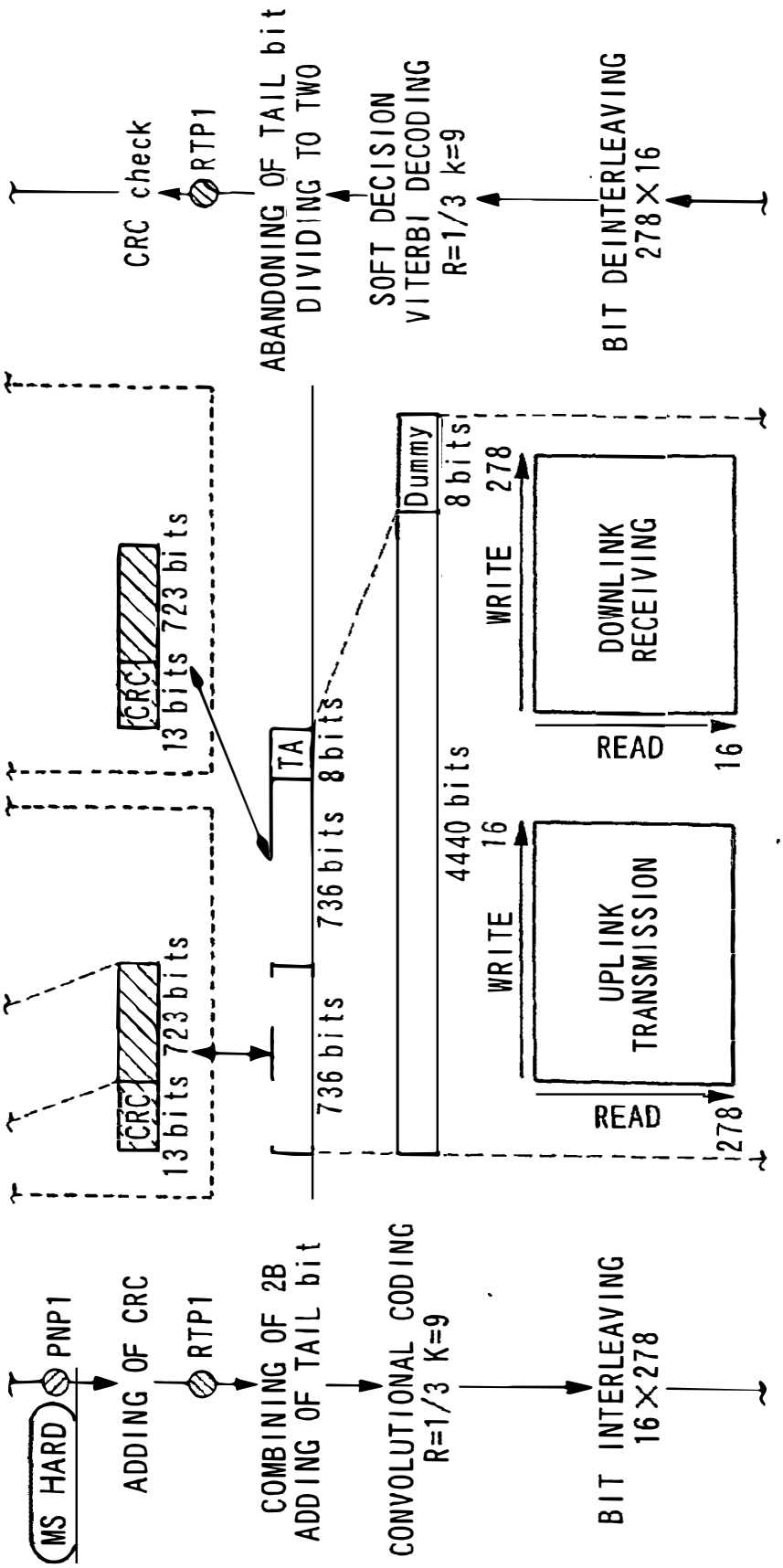
IPR2023-01270 Page 567

FIG. 30



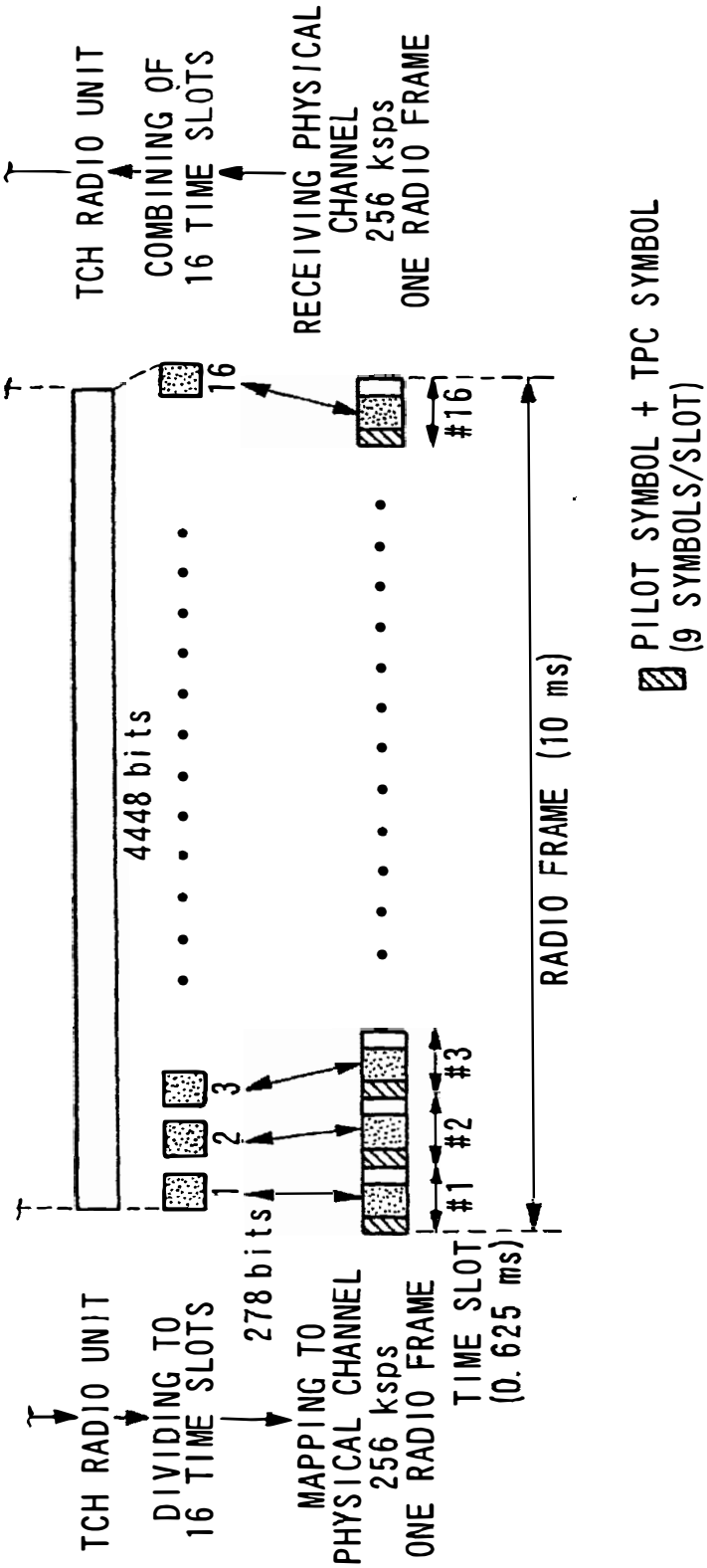
IPR2023-01270 Page 568

CONTINUANCE OF FIG. 30



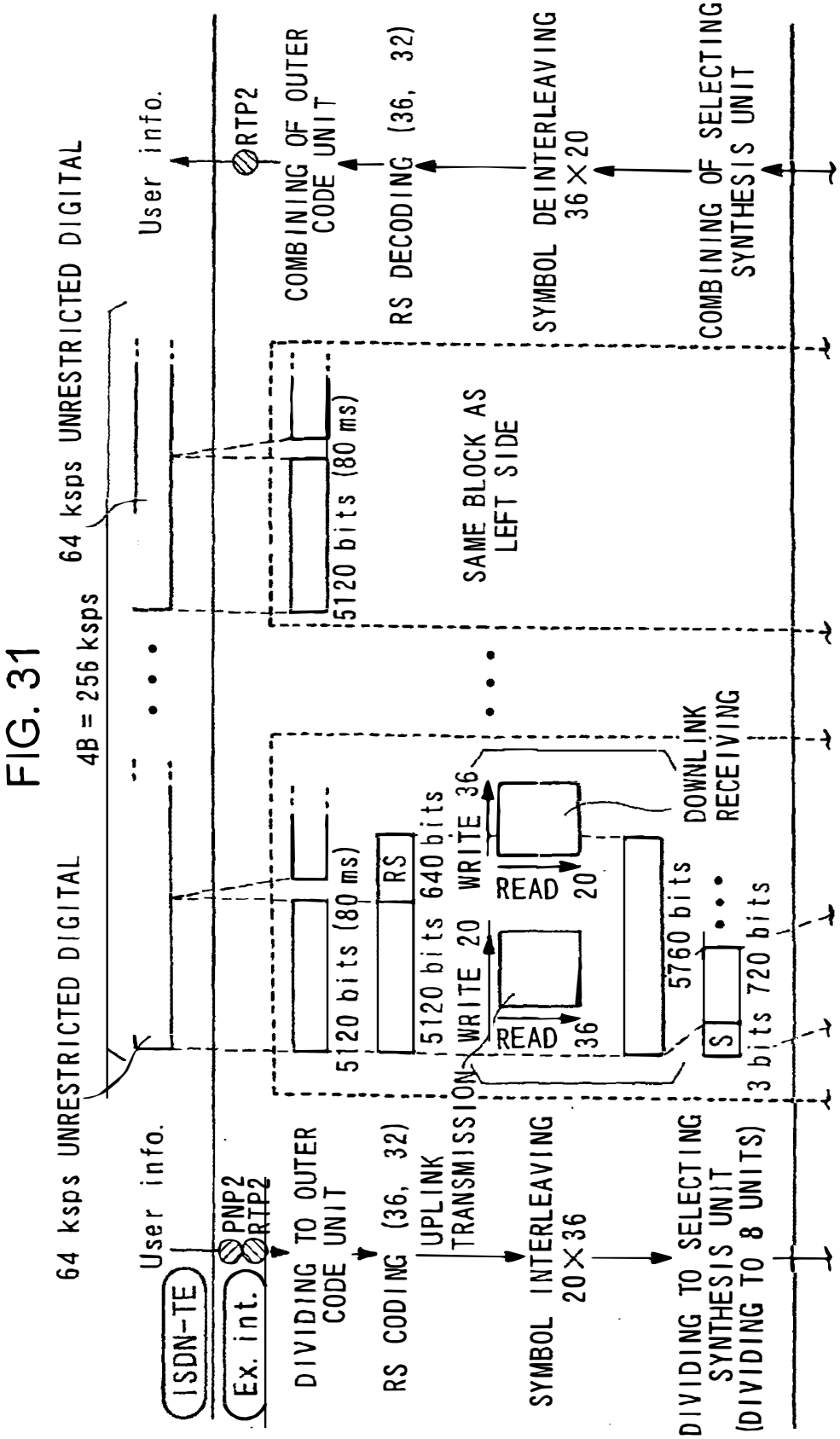
IPR2023-01270 Page 569

CONTINUANCE OF FIG. 30



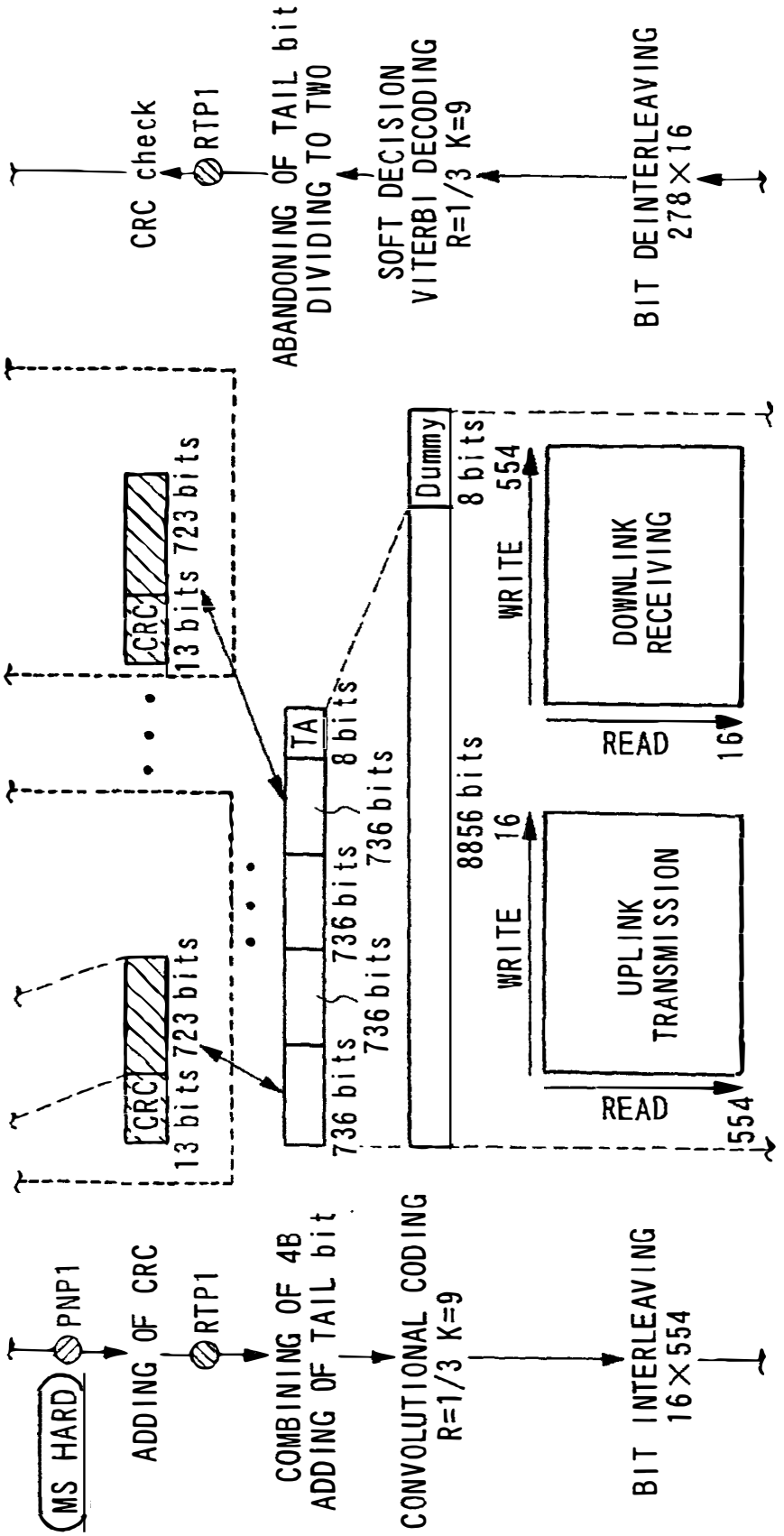
IPR2023-01270 Page 570

FIG. 31



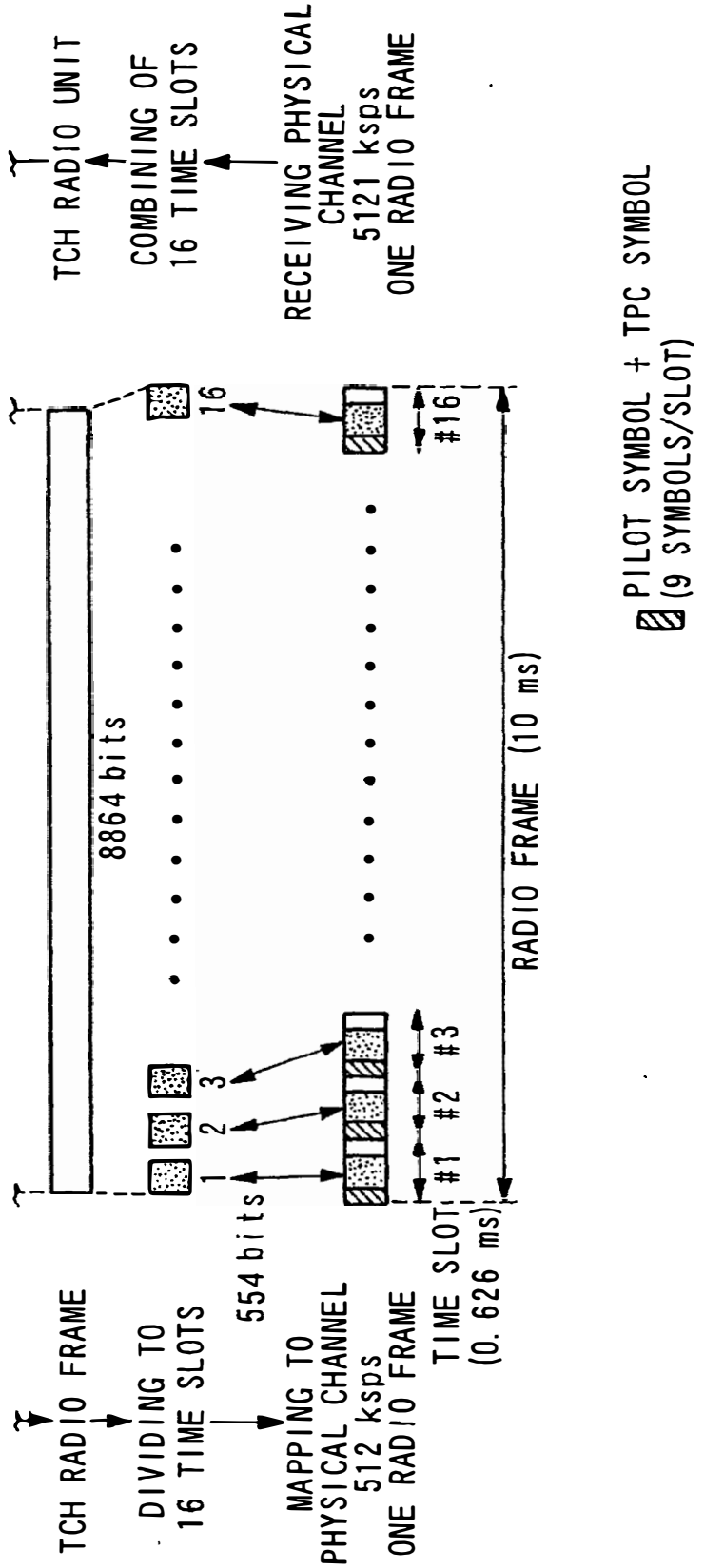
IPR2023-01270 Page 571

CONTINUANCE OF FIG. 31



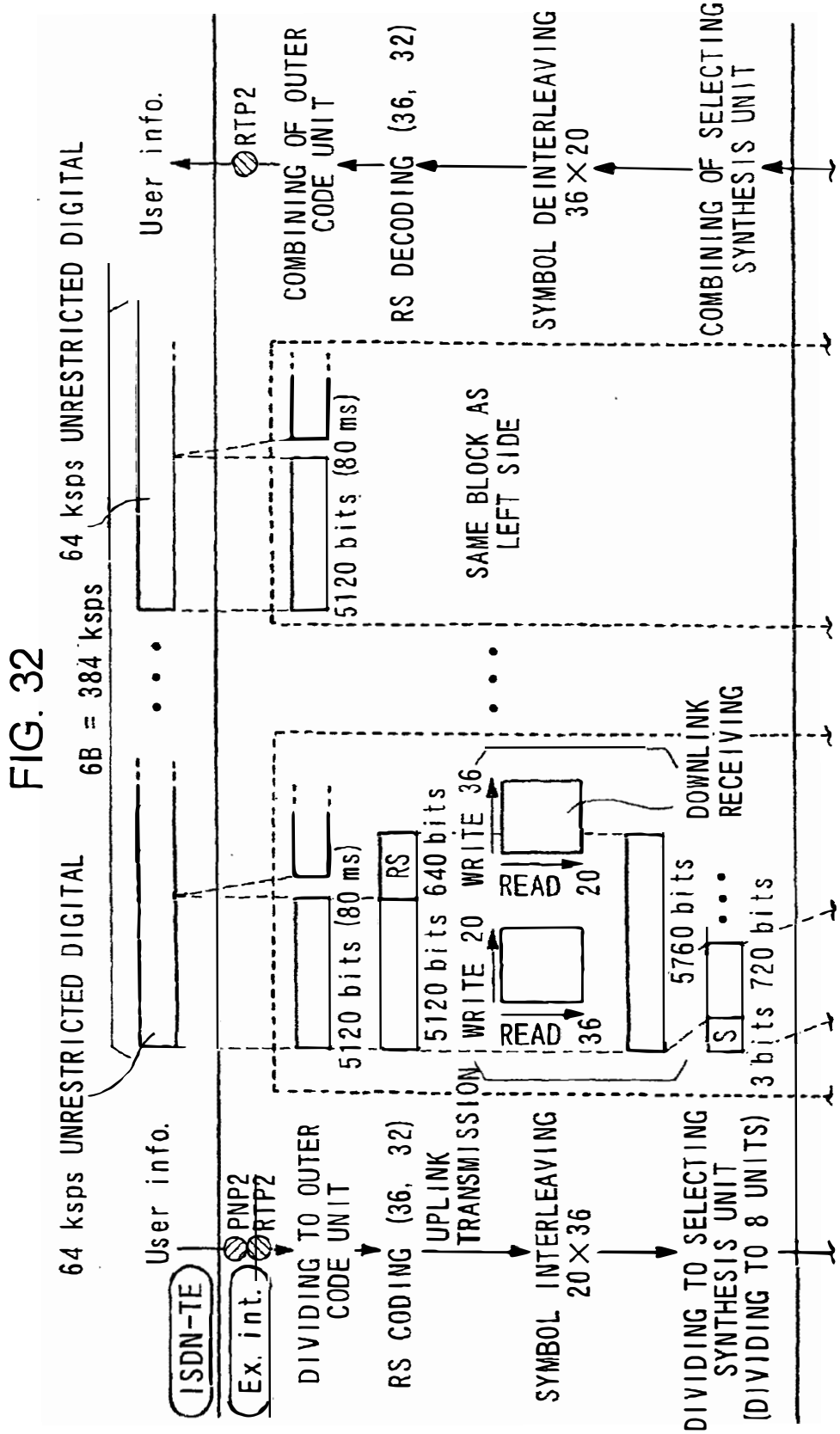
IPR2023-01270 Page 572

CONTINUANCE OF FIG. 31



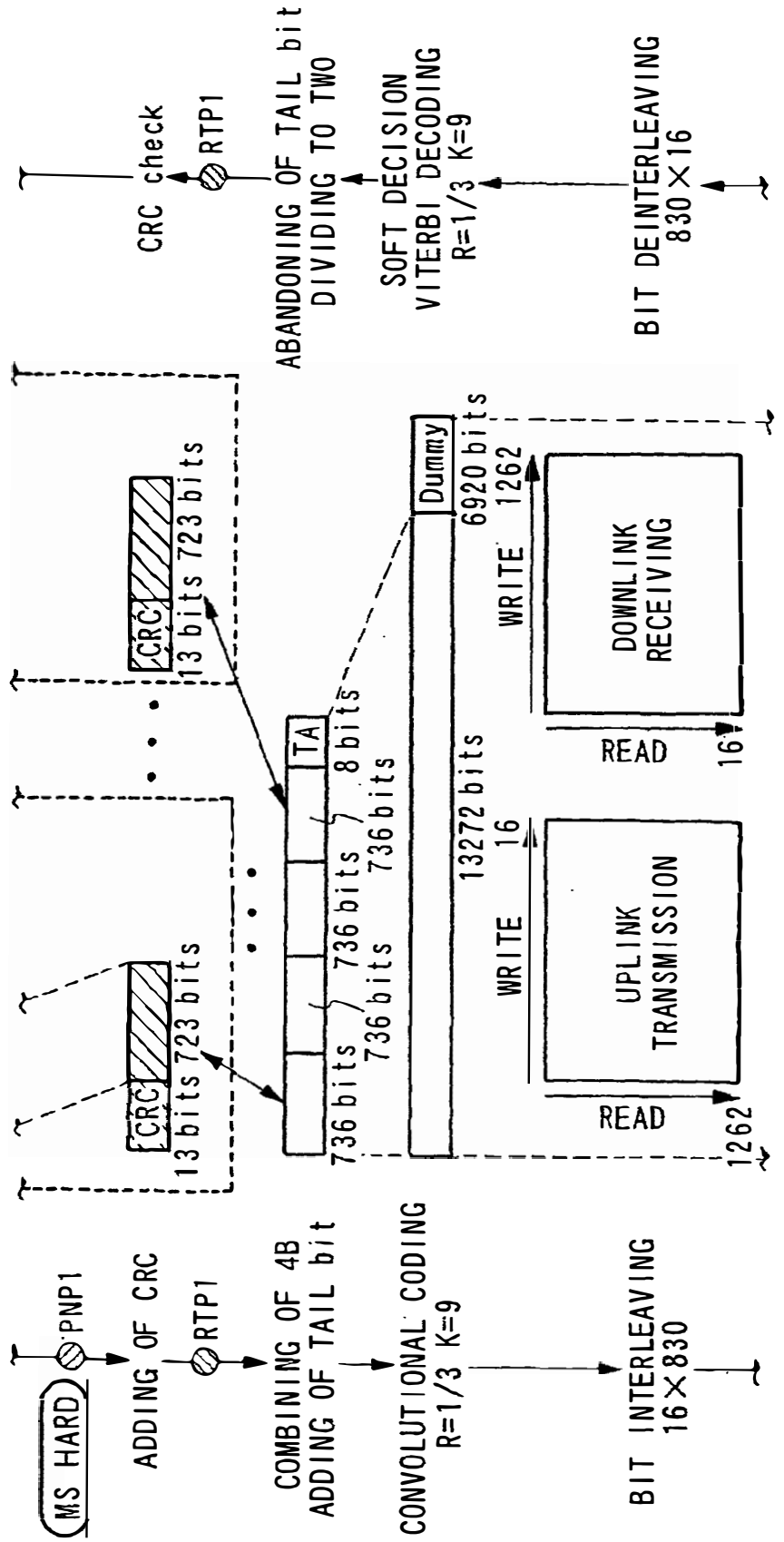
IPR2023-01270 Page 573

FIG. 32



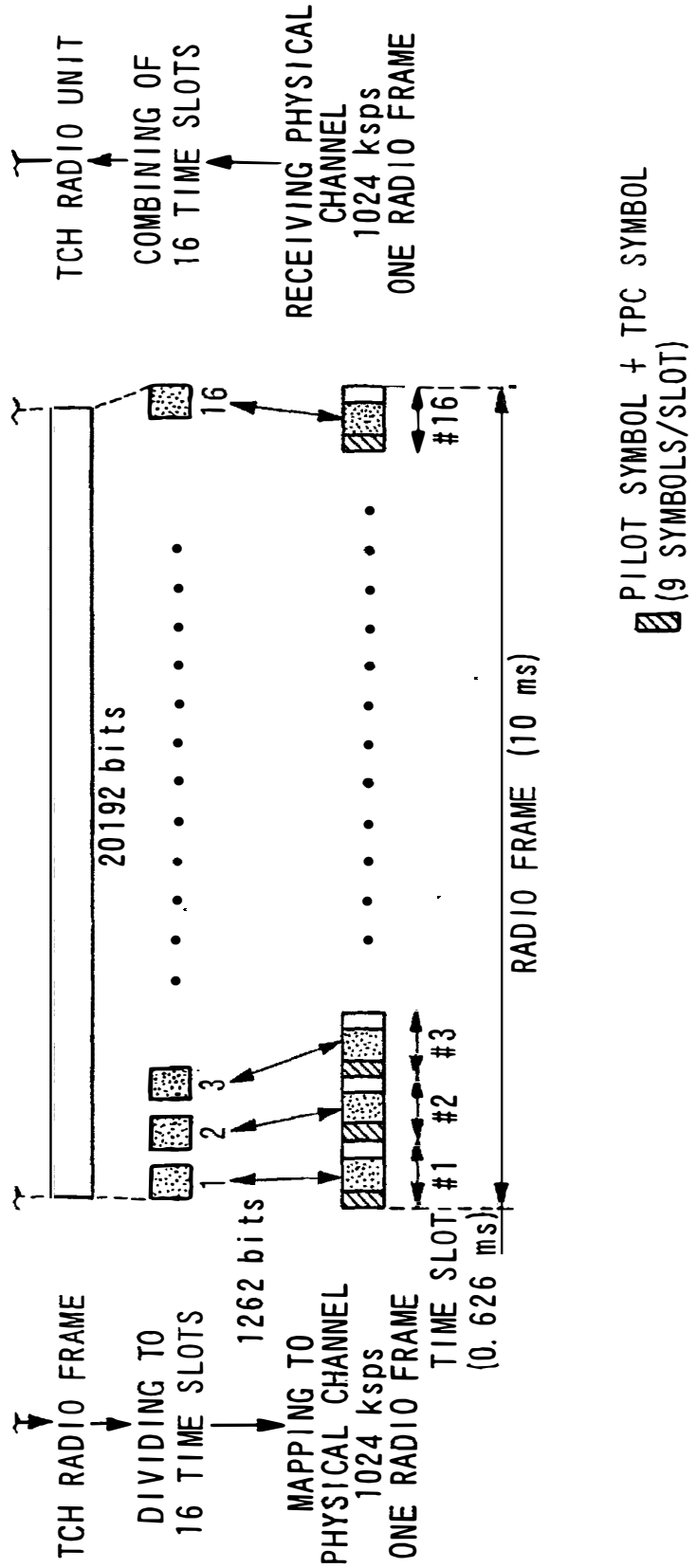
IPR2023-01270 Page 574

CONTINUANCE OF FIG. 32



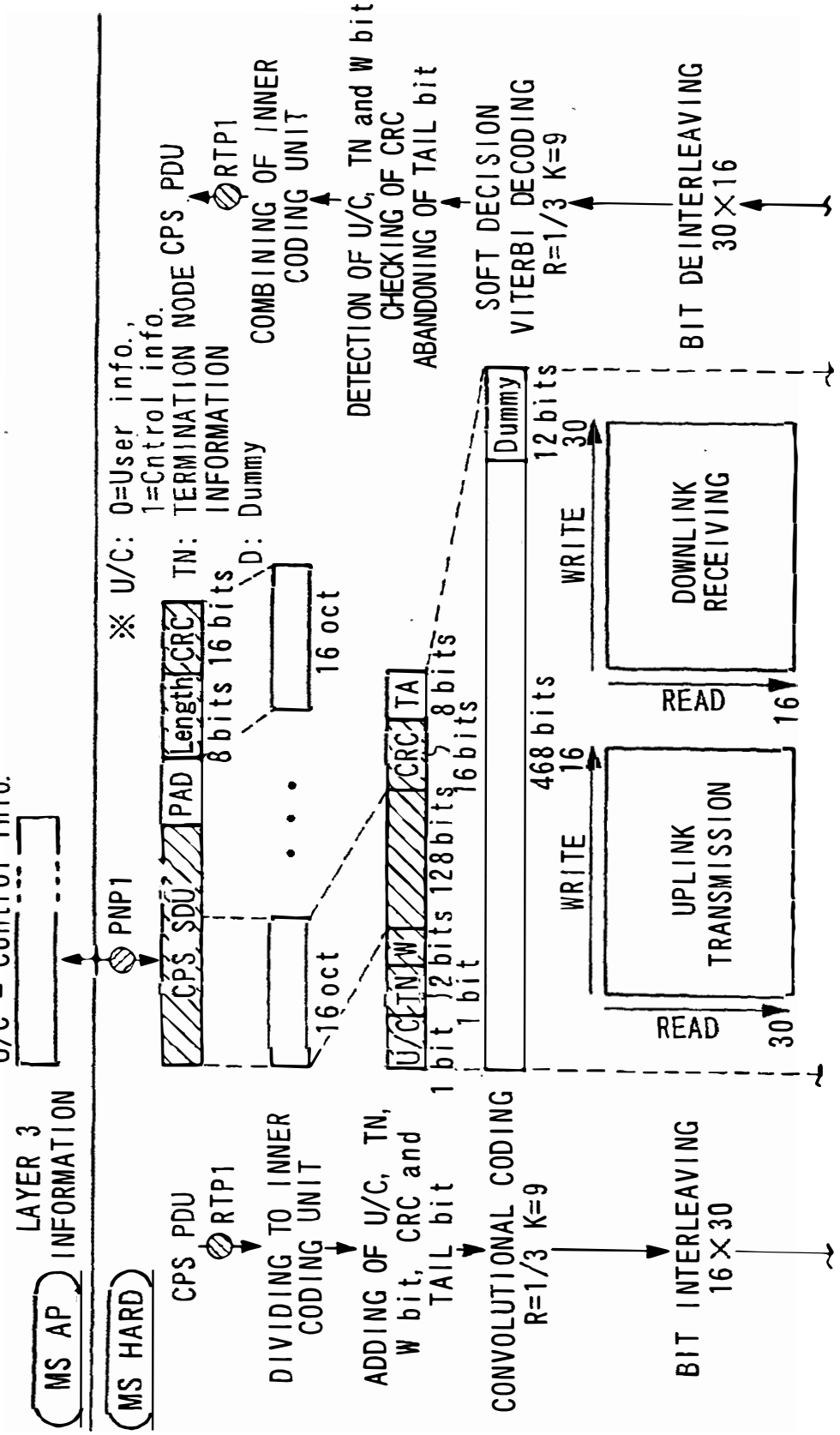
IPR2023-01270 Page 575

CONTINUANCE OF FIG. 32



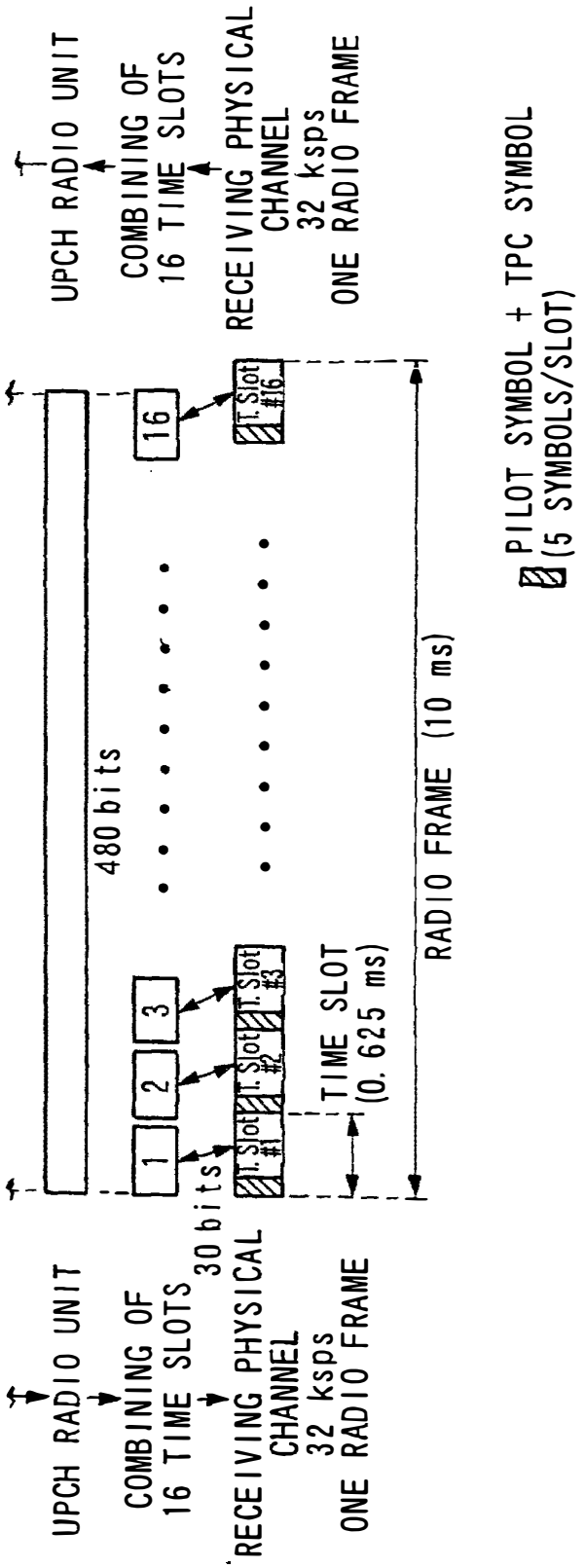
IPR2023-01270 Page 576

FIG. 33



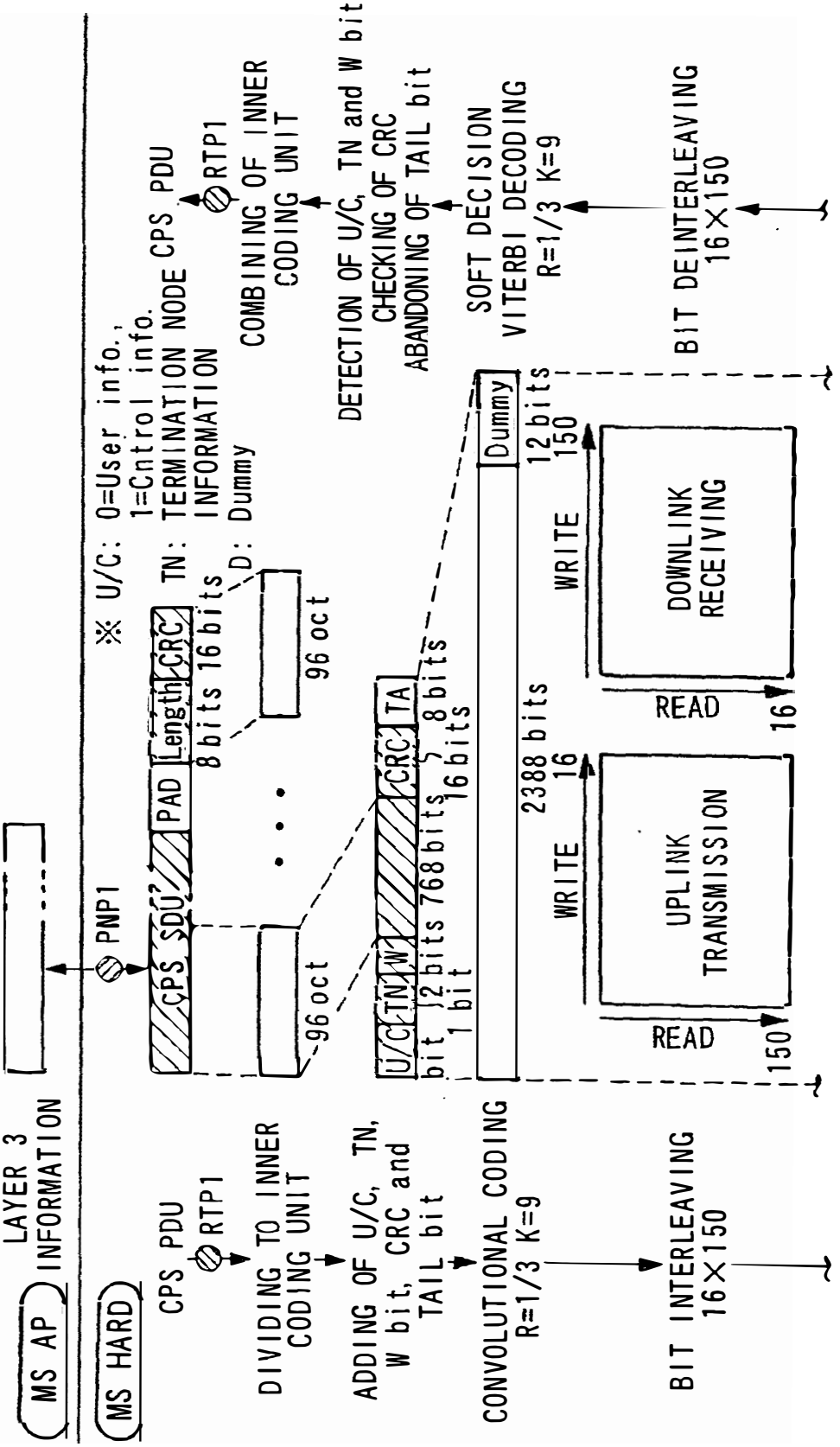
IPR2023-01270 Page 577

CONTINUANCE OF FIG. 33



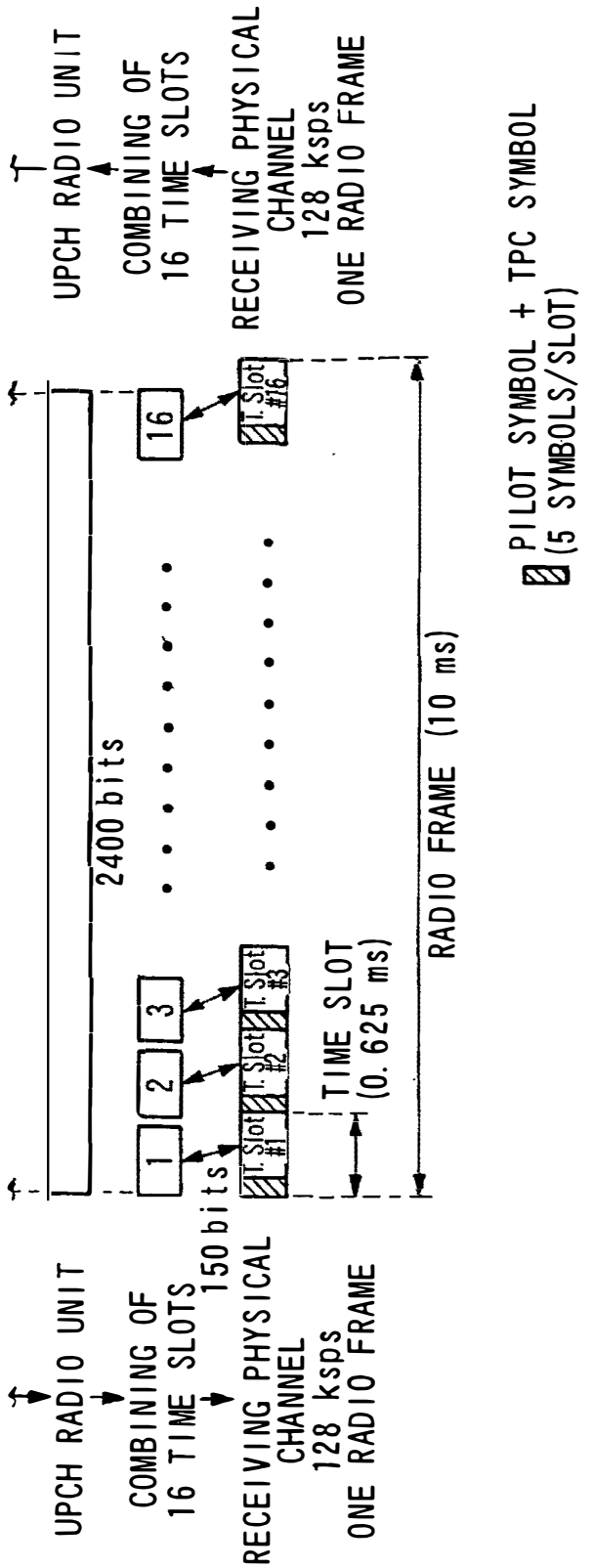
IPR2023-01270 Page 578

FIG. 34



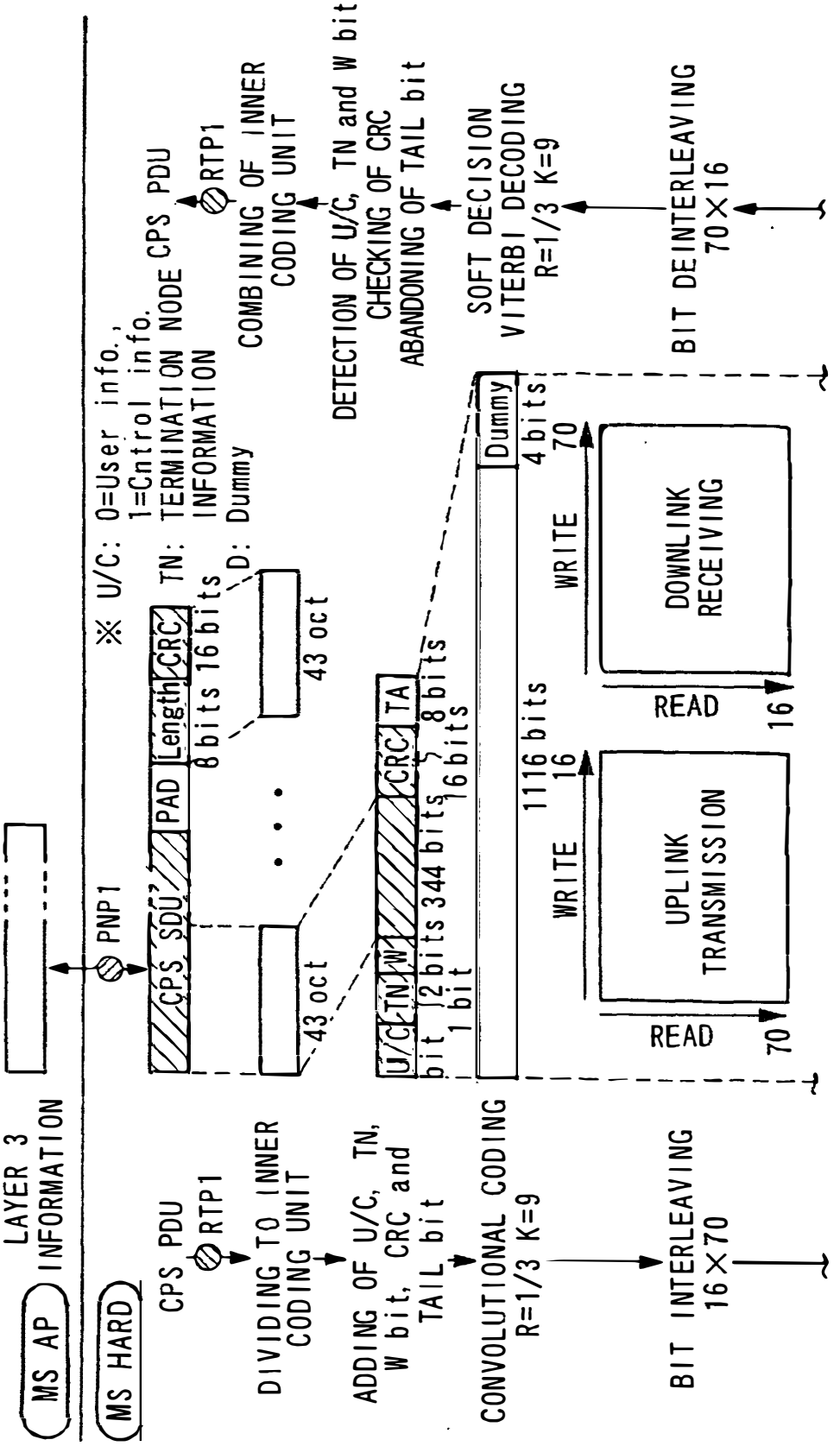
IPR2023-01270 Page 579

CONTINUANCE OF FIG. 34



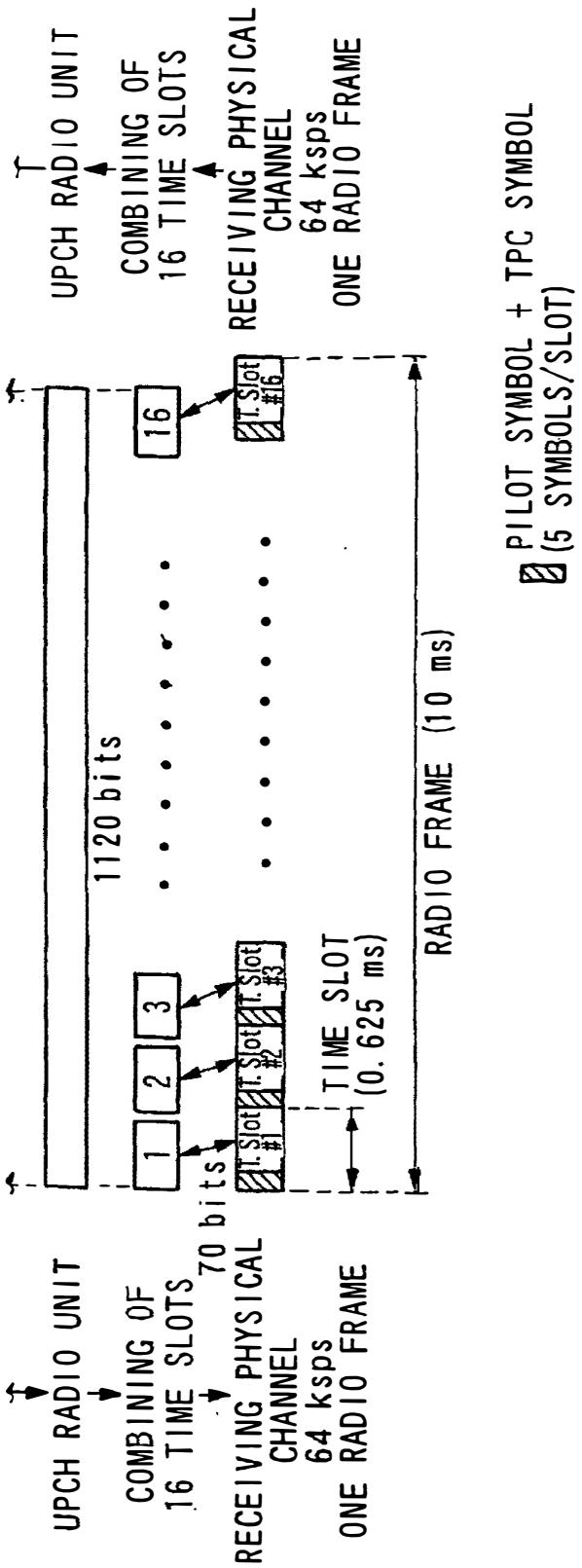
IPR2023-01270 Page 580

FIG. 35



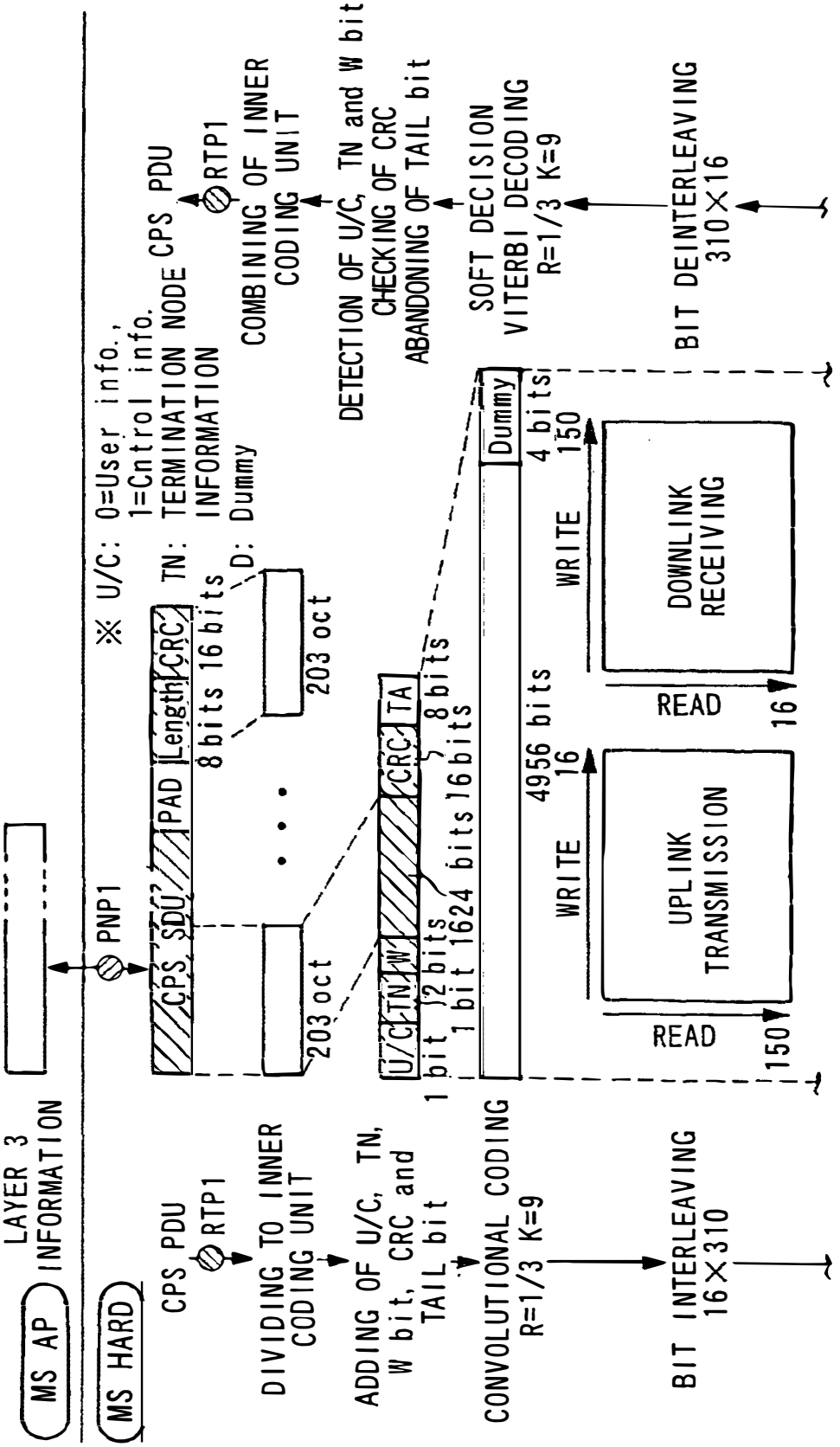
IPR2023-01270 Page 581

CONTINUANCE OF FIG. 35



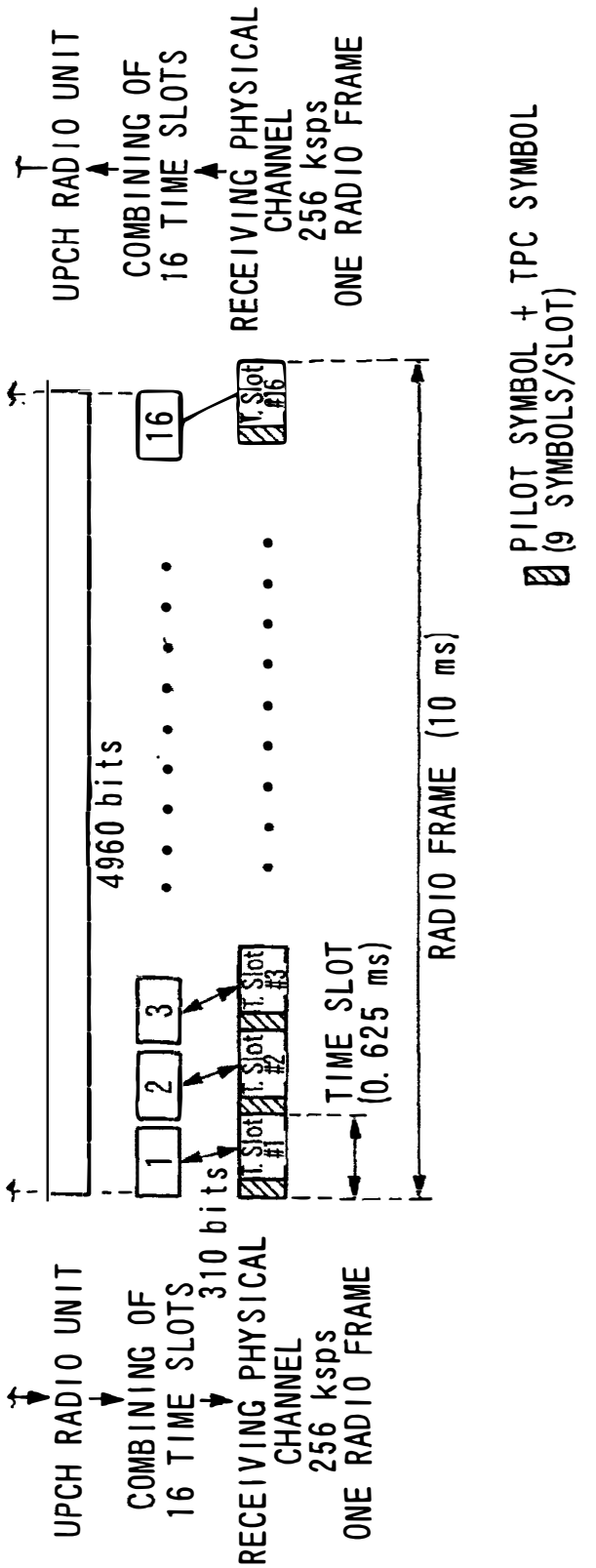
IPR2023-01270 Page 582

FIG. 36



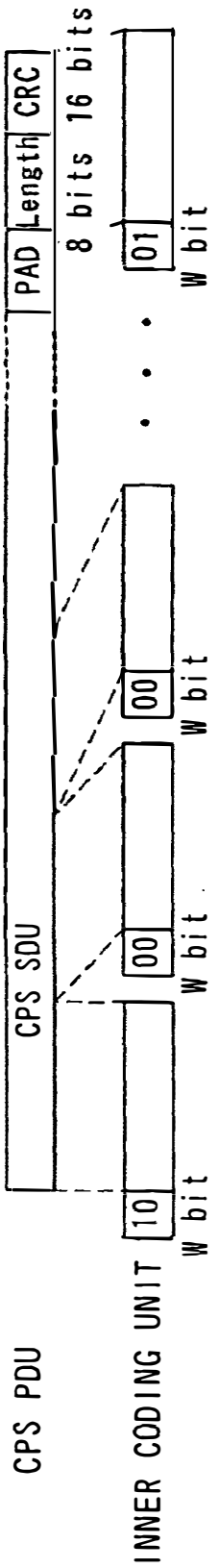
IPR2023-01270 Page 583

CONTINUANCE OF FIG. 36



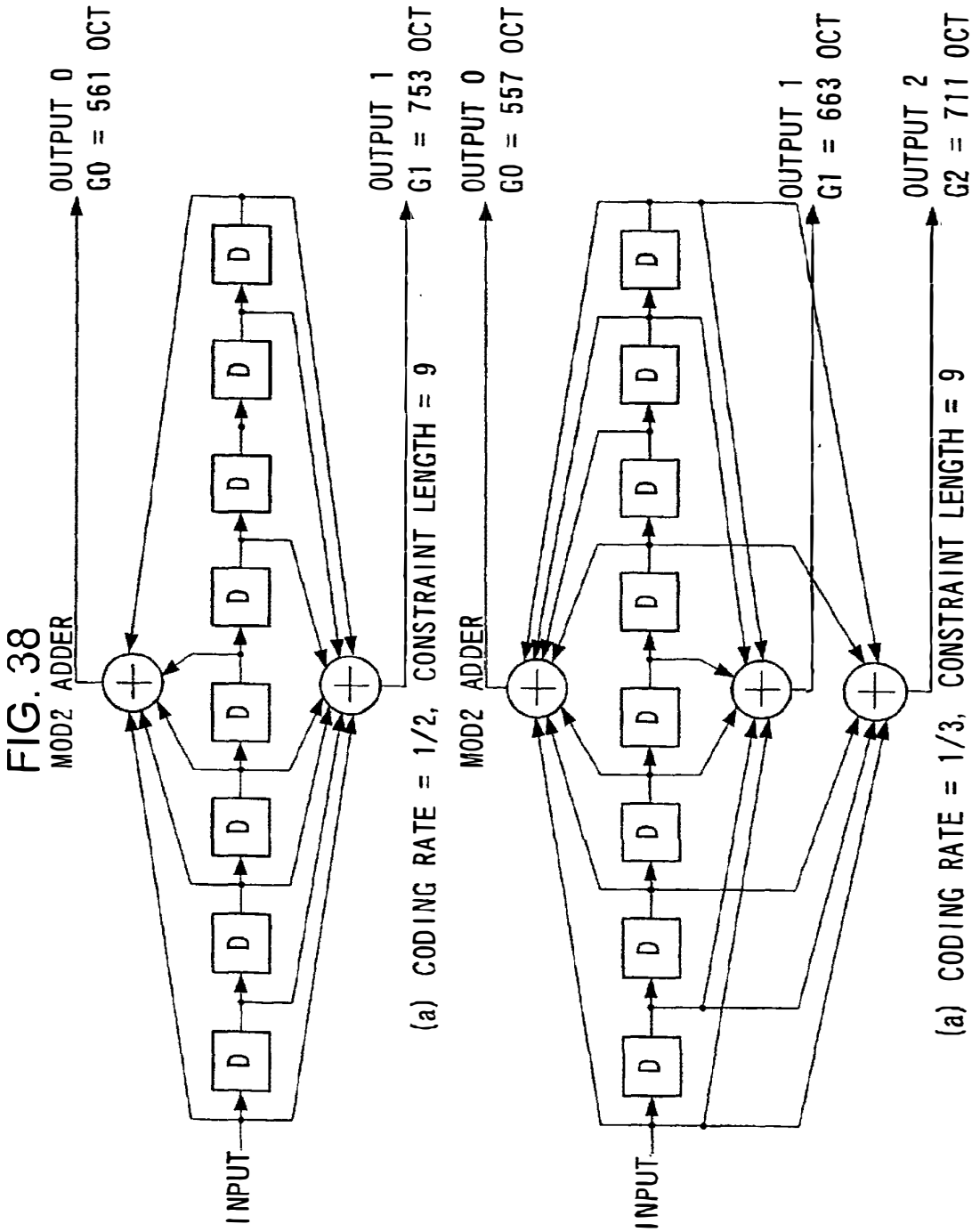
IPR2023-01270 Page 584

FIG. 37



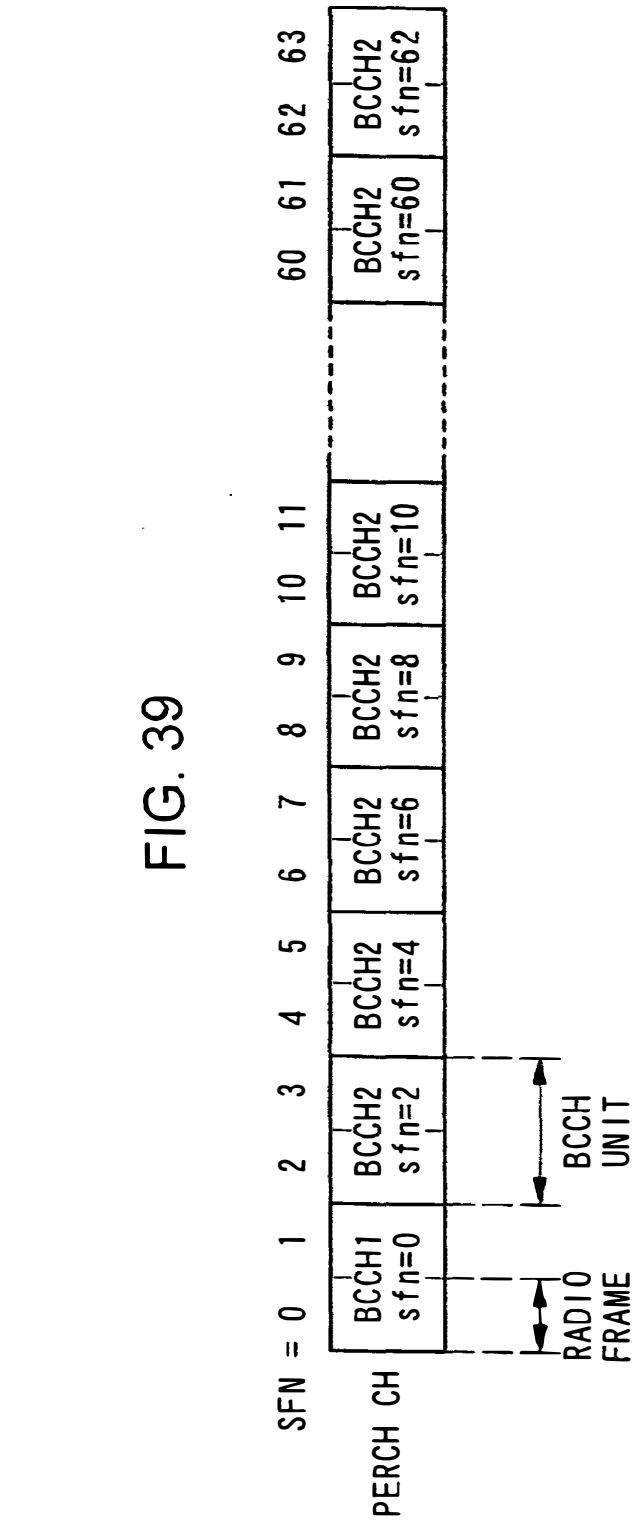
IPR2023-01270 Page 585

FIG. 38



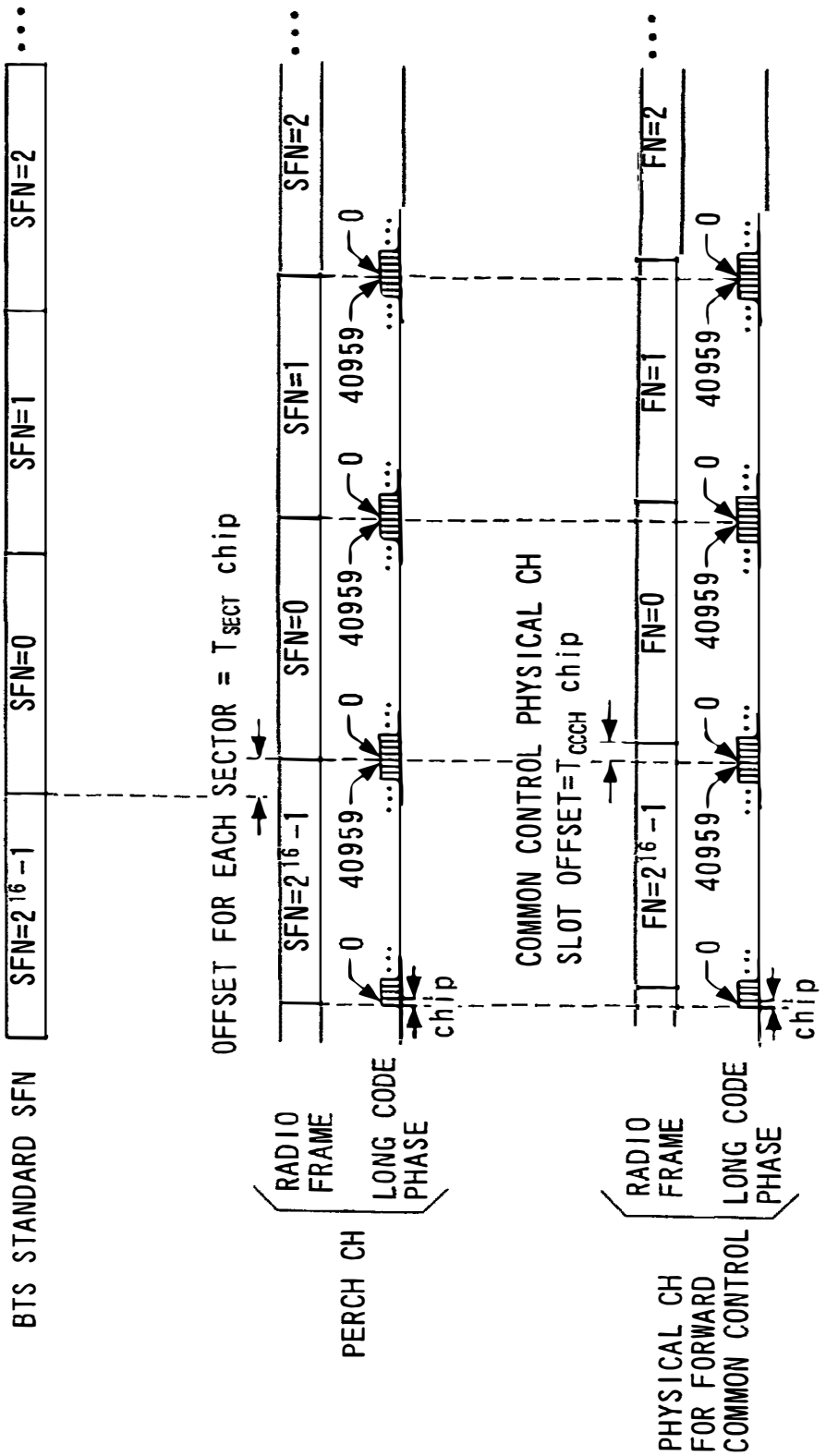
IPR2023-01270 Page 586

FIG. 39



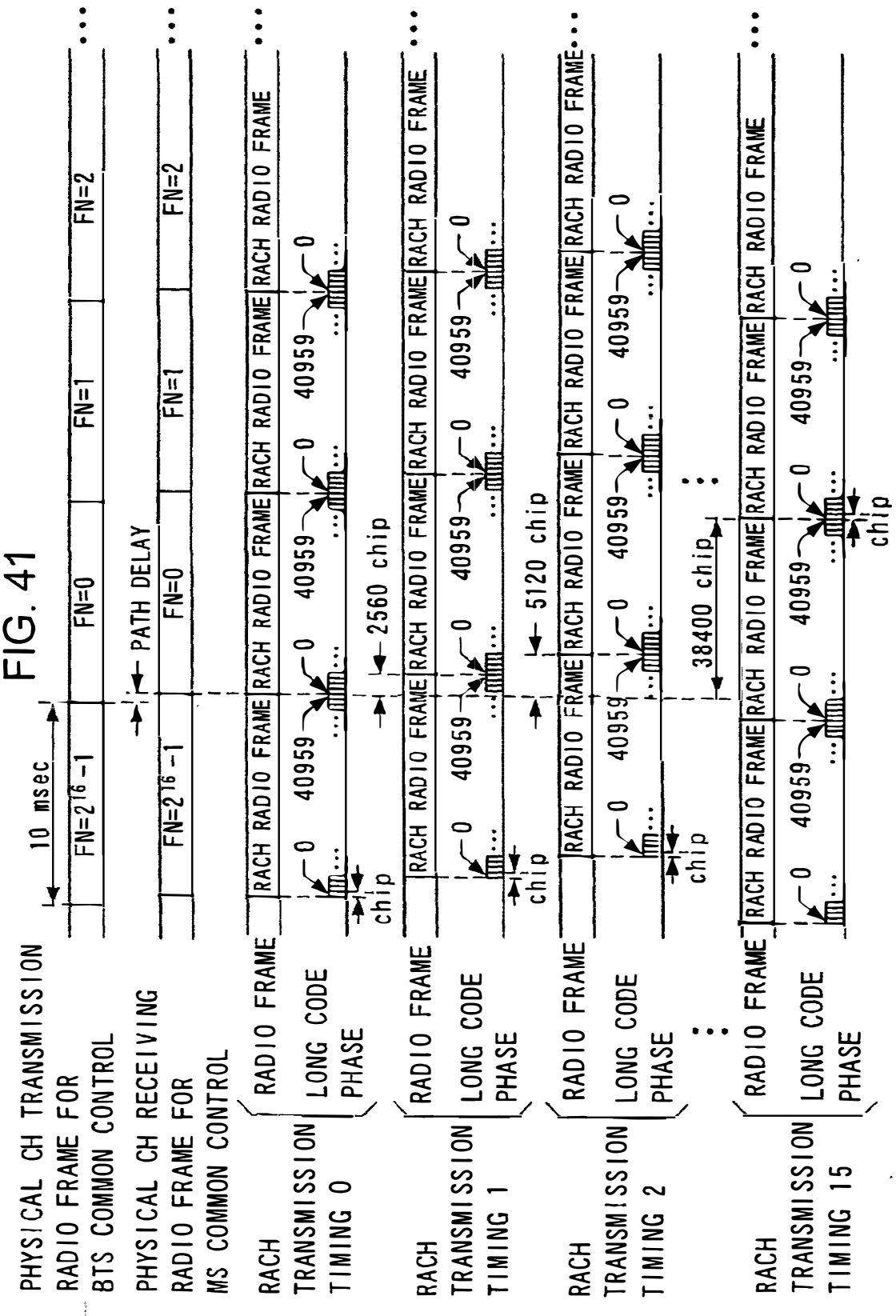
IPR2023-01270 Page 587

FIG. 40



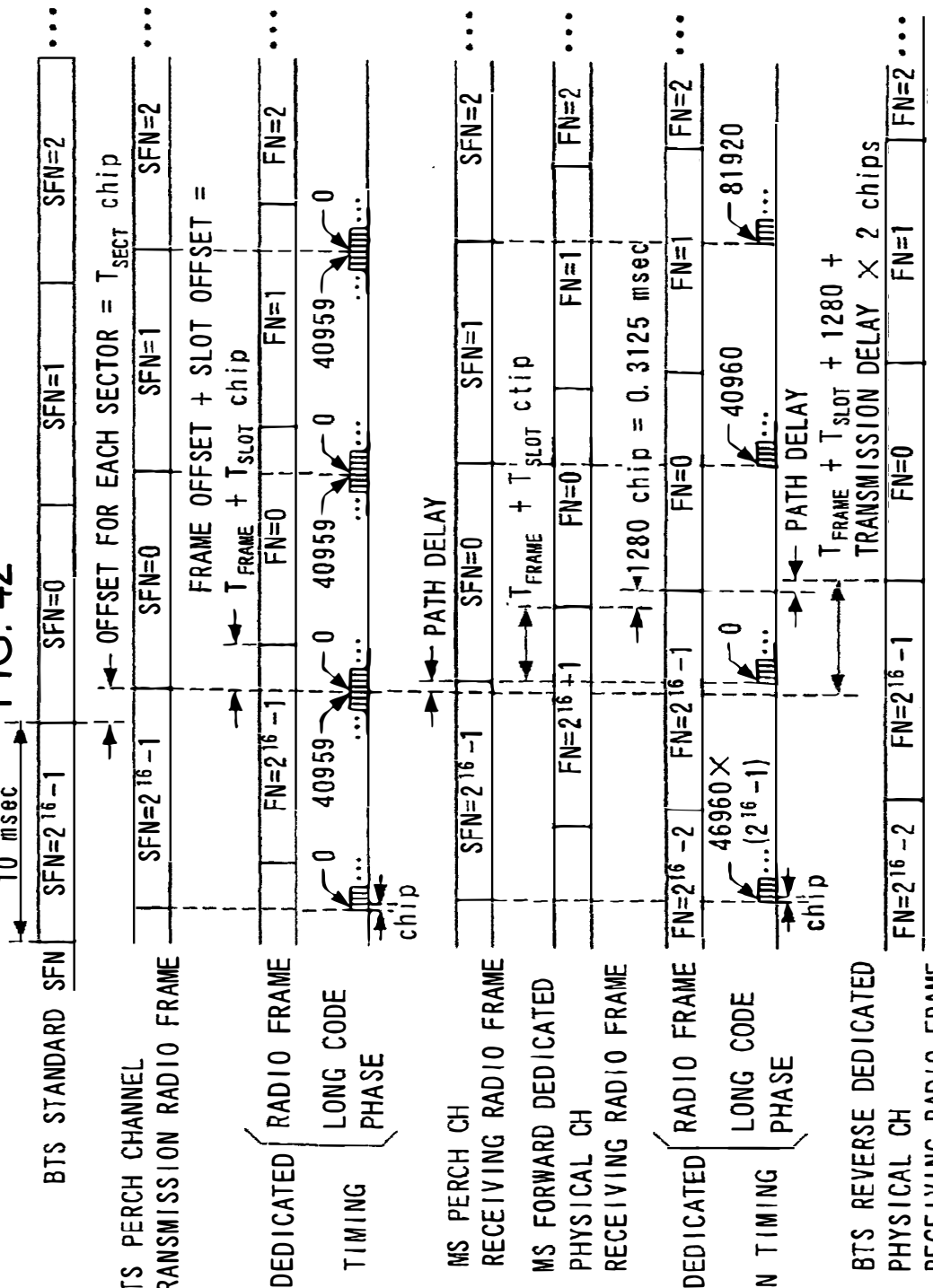
IPR2023-01270 Page 588

FIG. 41



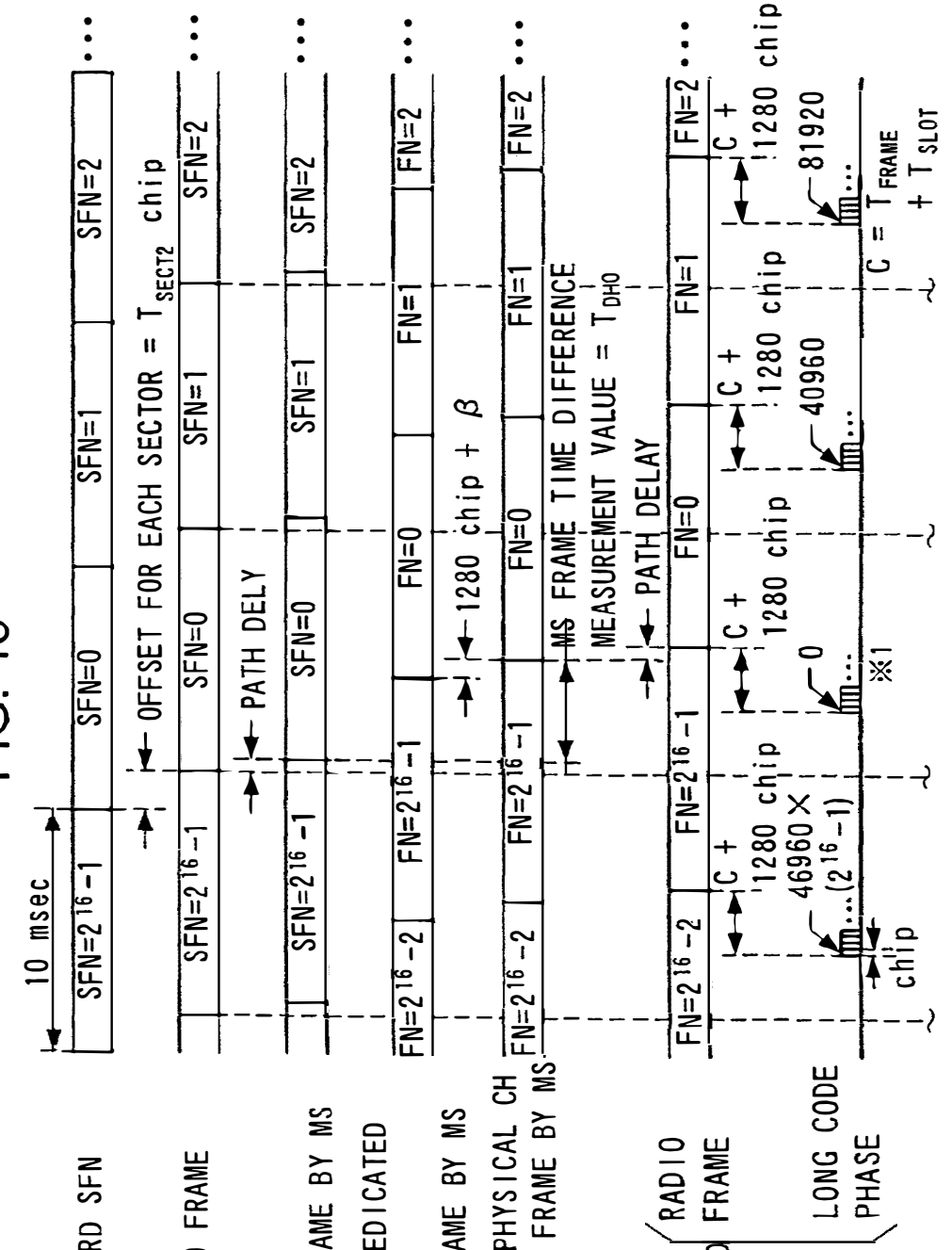
IPR2023-01270 Page 589

FIG. 42



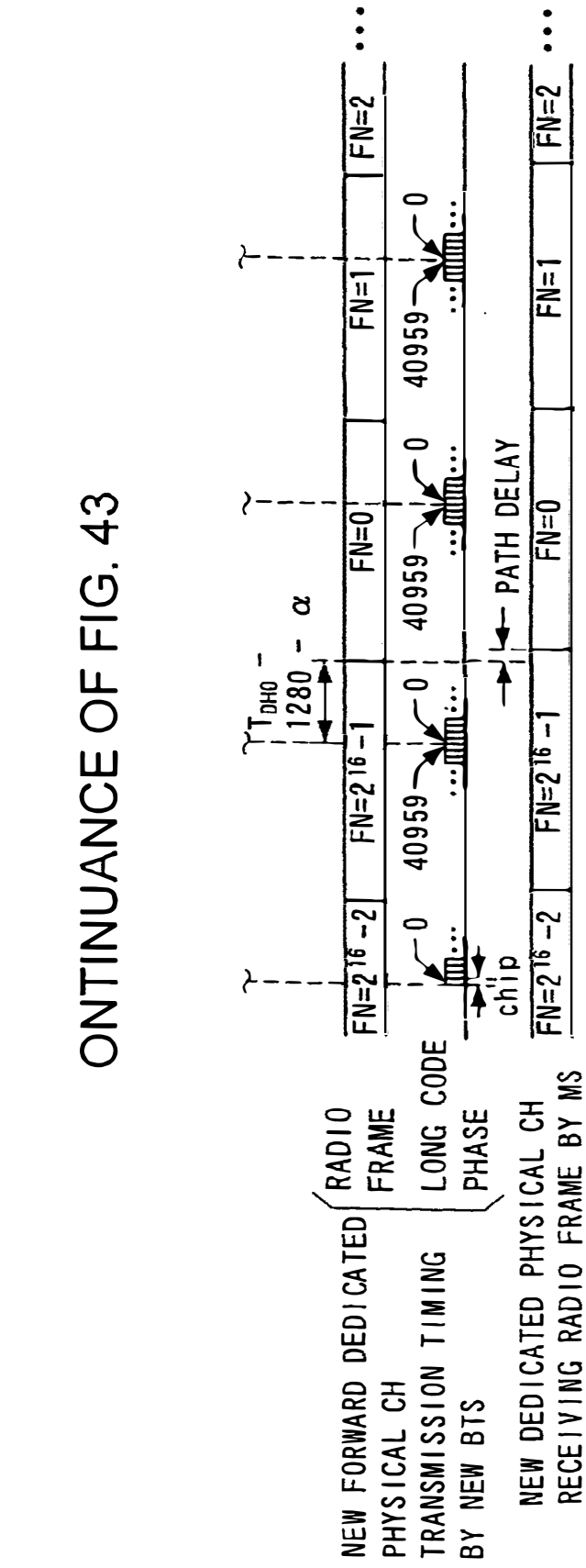
IPR2023-01270 Page 590

FIG. 43



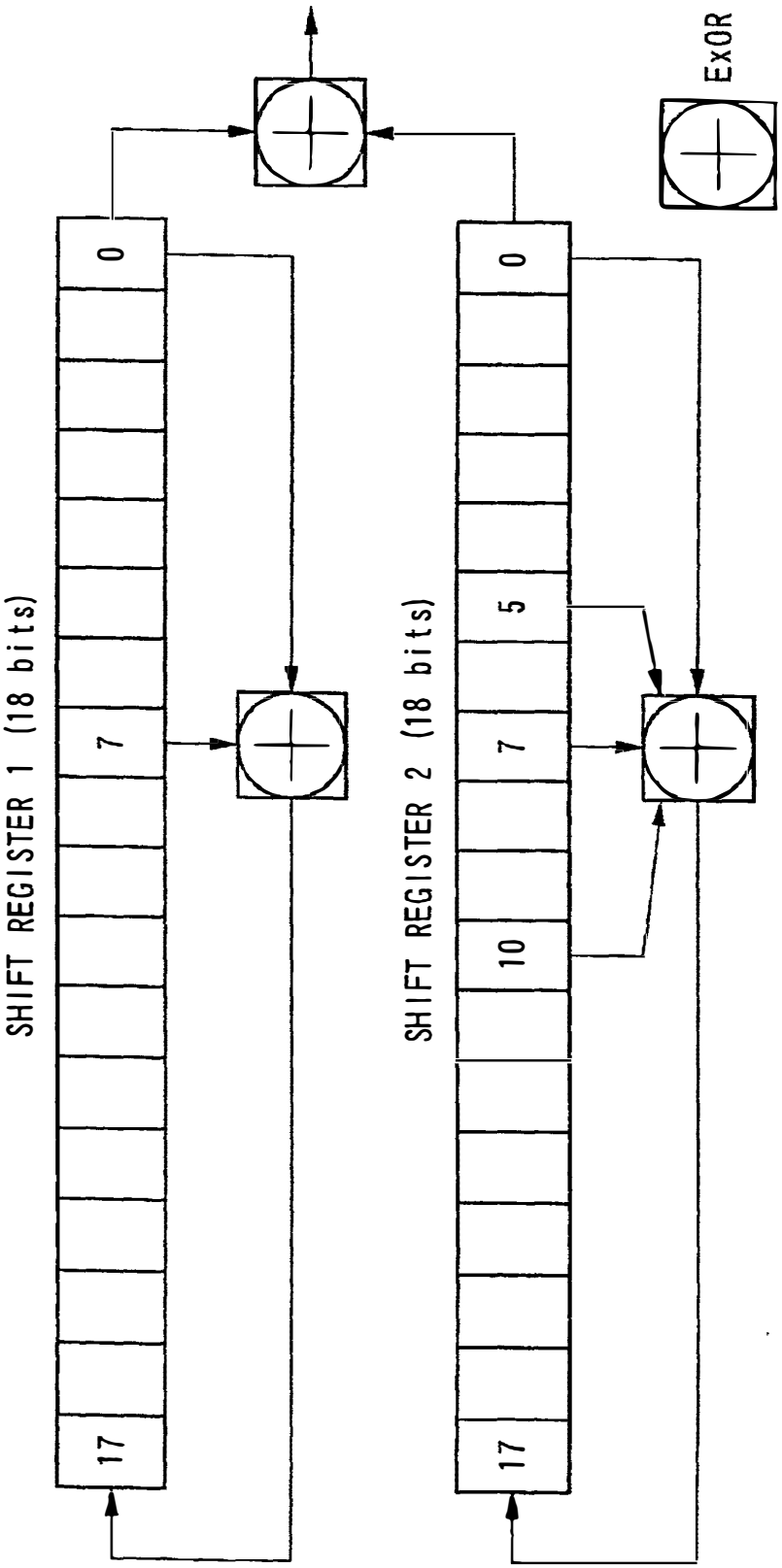
IPR2023-01270 Page 591

ONTINUANCE OF FIG. 43



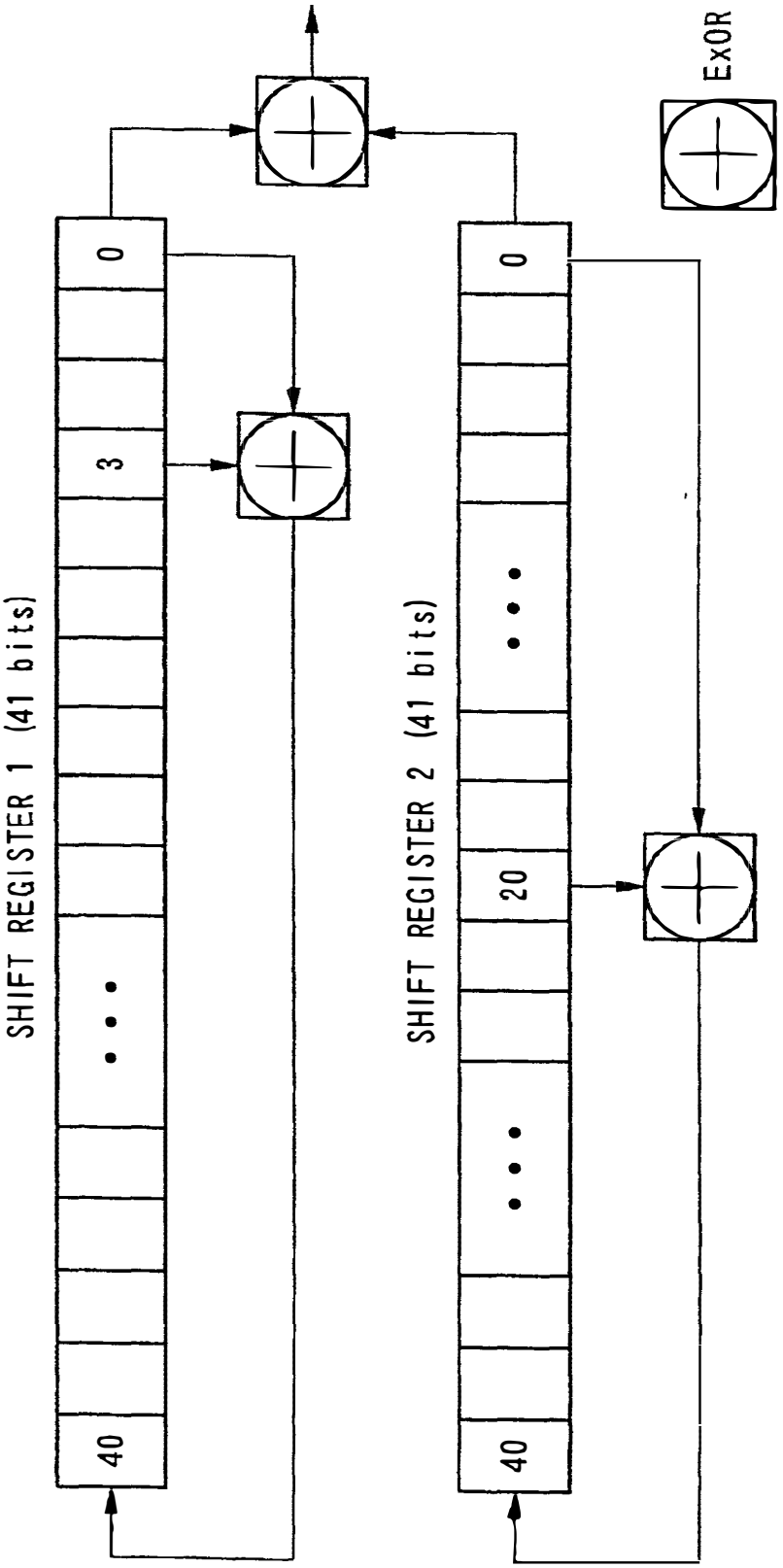
IPR2023-01270 Page 592

FIG. 44



IPR2023-01270 Page 593

FIG. 45



IPR2023-01270 Page 594

FIG. 46

$$C_0(0) = 1$$

$$\begin{bmatrix} C_1(0) \\ C_1(1) \end{bmatrix} = \begin{bmatrix} C_0(0) & C_0(0) \\ C_0(0) & \overline{C_0(0)} \end{bmatrix} = \begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix}$$

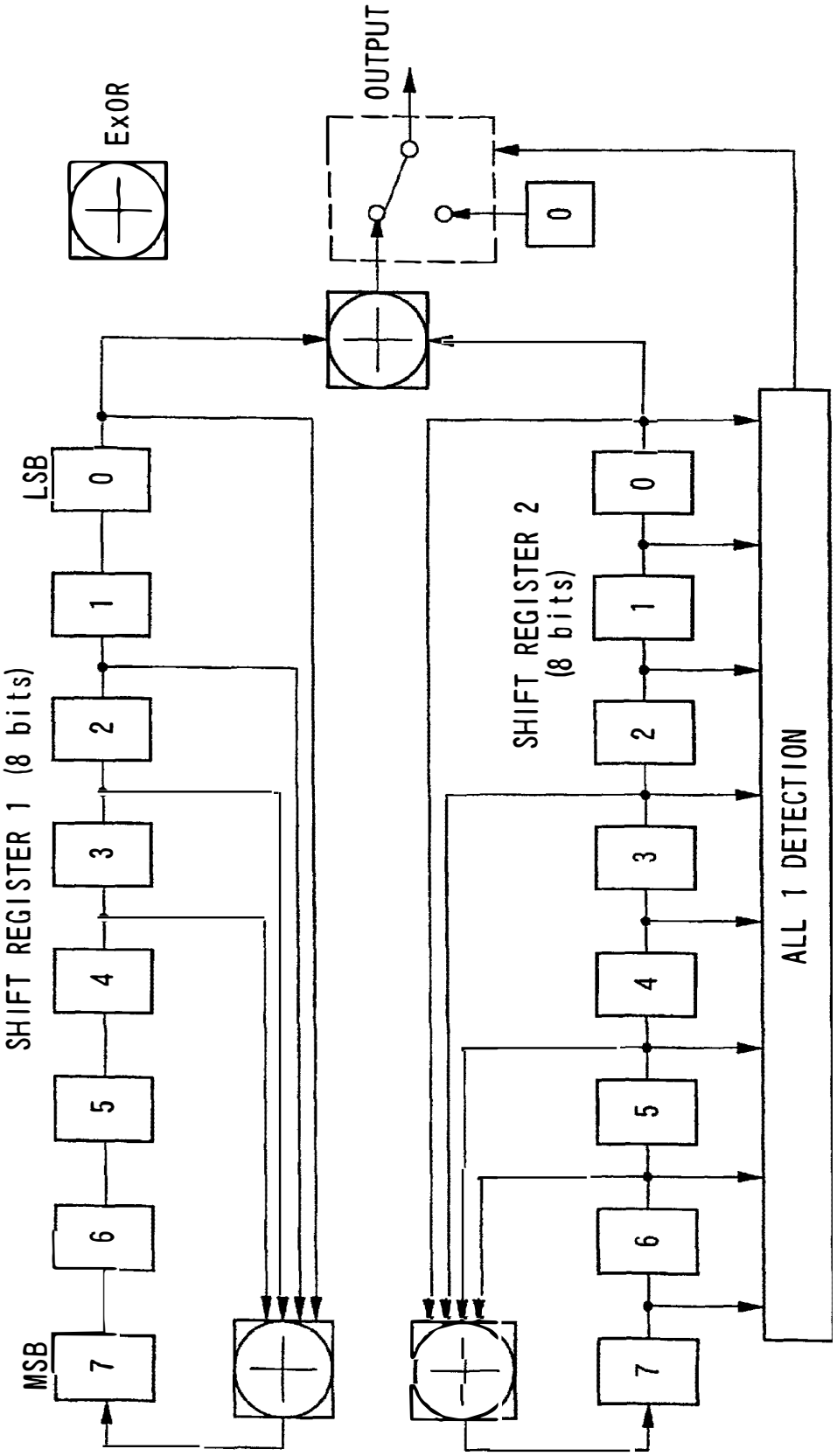
$$\begin{bmatrix} C_2(0) \\ C_2(1) \\ C_2(2) \\ C_2(3) \end{bmatrix} = \begin{bmatrix} C_1(0) & C_1(0) \\ C_1(0) & \overline{C_1(0)} \\ C_1(1) & C_1(1) \\ C_1(1) & \overline{C_1(1)} \end{bmatrix} = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & 1 & 0 & 0 \\ 1 & 0 & 1 & 0 \\ 1 & 0 & 1 & 1 \end{bmatrix}$$

$$\vdots$$

$$\begin{bmatrix} C_{n+1}(0) \\ C_{n+1}(1) \\ C_{n+1}(2) \\ C_{n+1}(3) \\ \vdots \\ C_{n+1}(2^{n+1}-2) \\ C_{n+1}(2^{n+1}-1) \end{bmatrix} = \begin{bmatrix} C_n(0) & C_n(0) \\ C_n(0) & \overline{C_n(0)} \\ C_n(1) & C_n(1) \\ C_n(1) & \overline{C_n(1)} \\ \vdots & \vdots \\ C_n(2^n-1) & C_n(2^n-1) \\ C_n(2^n-1) & \overline{C_n(2^n-1)} \end{bmatrix}$$

IPR2023-01270 Page 595

FIG. 47



IPR2023-01270 Page 596

FIG. 48

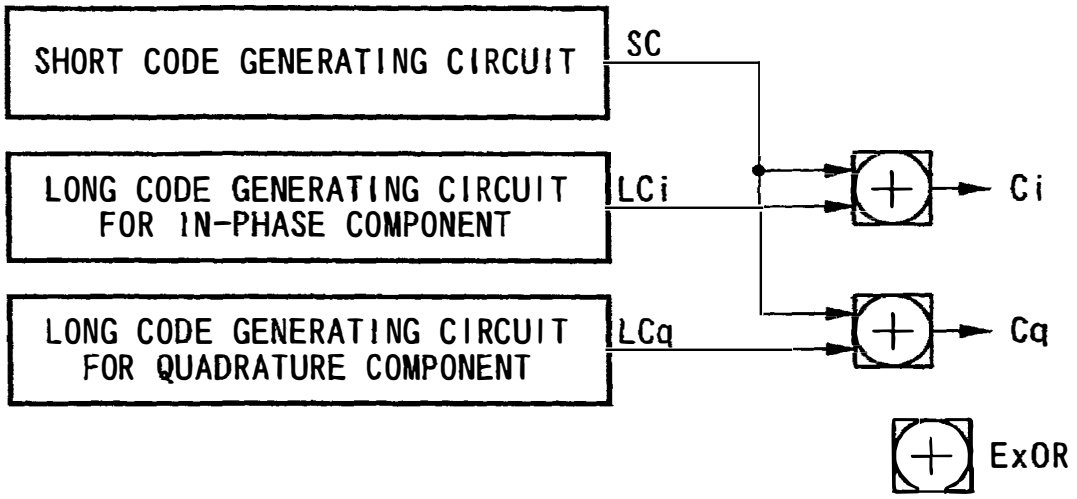
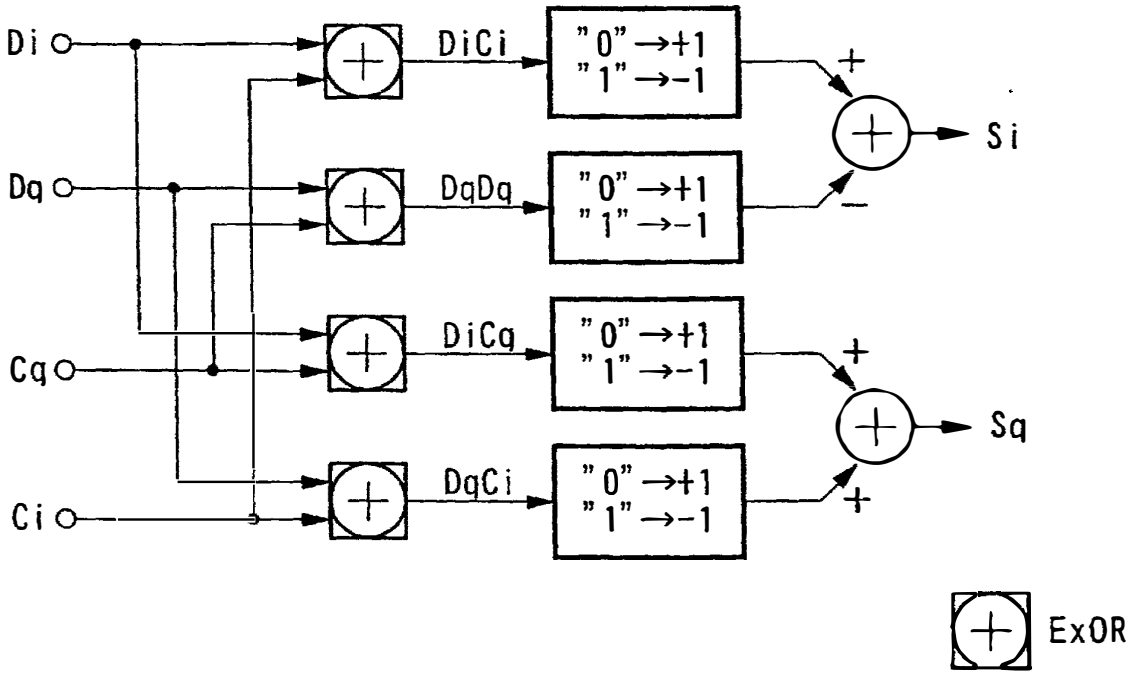
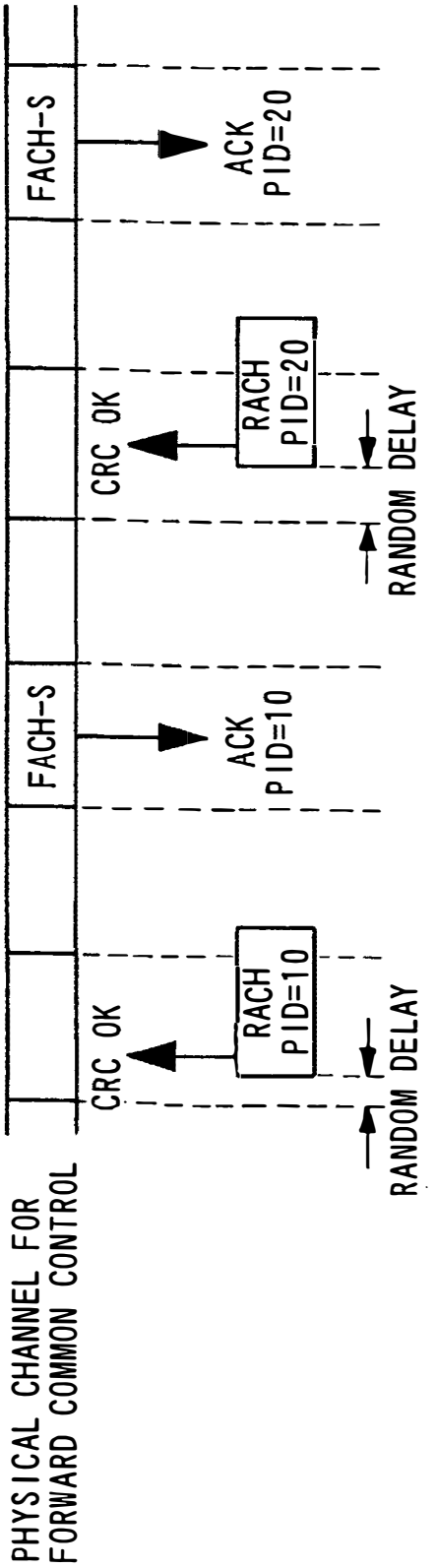


FIG. 49



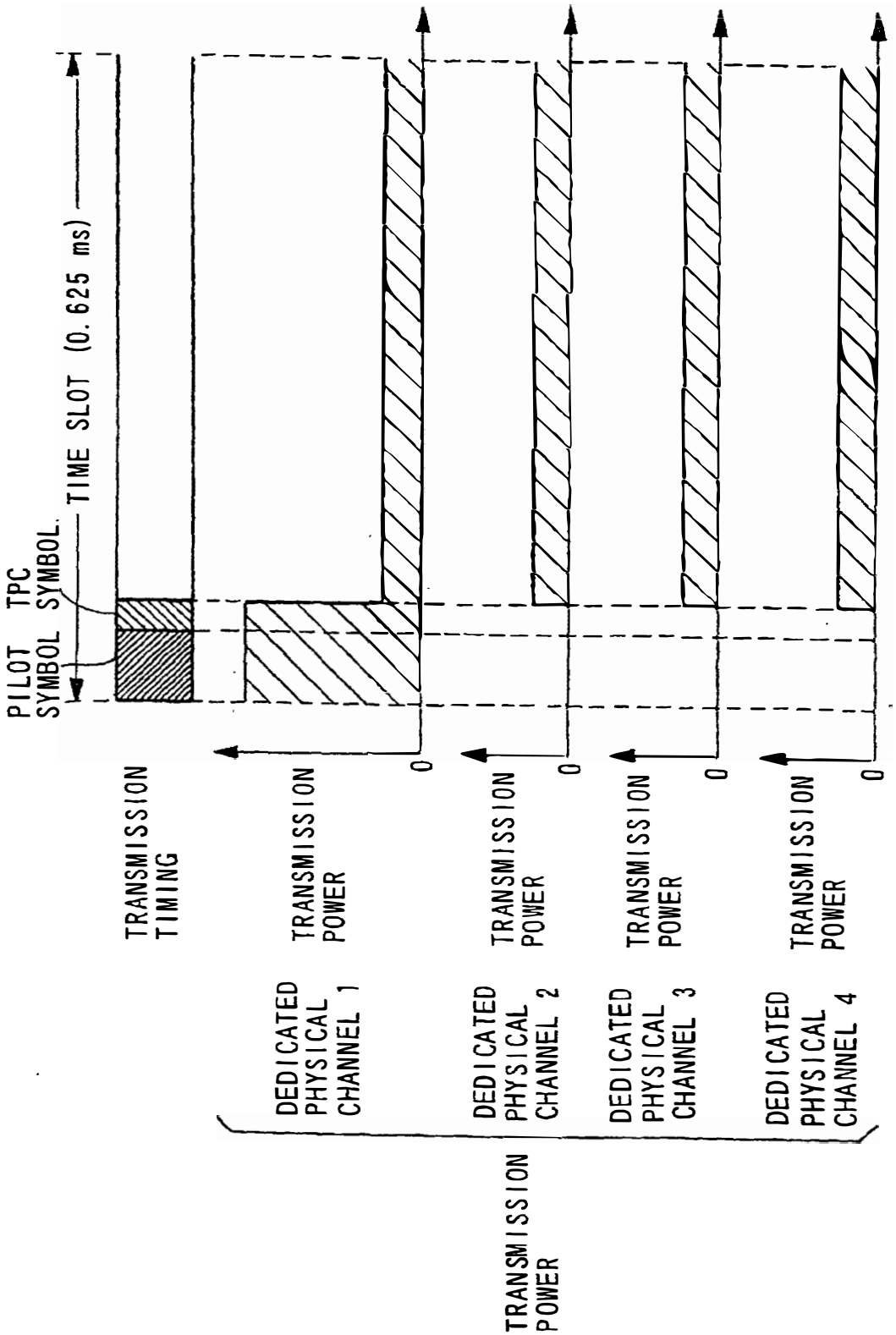
IPR2023-01270 Page 597

FIG. 50



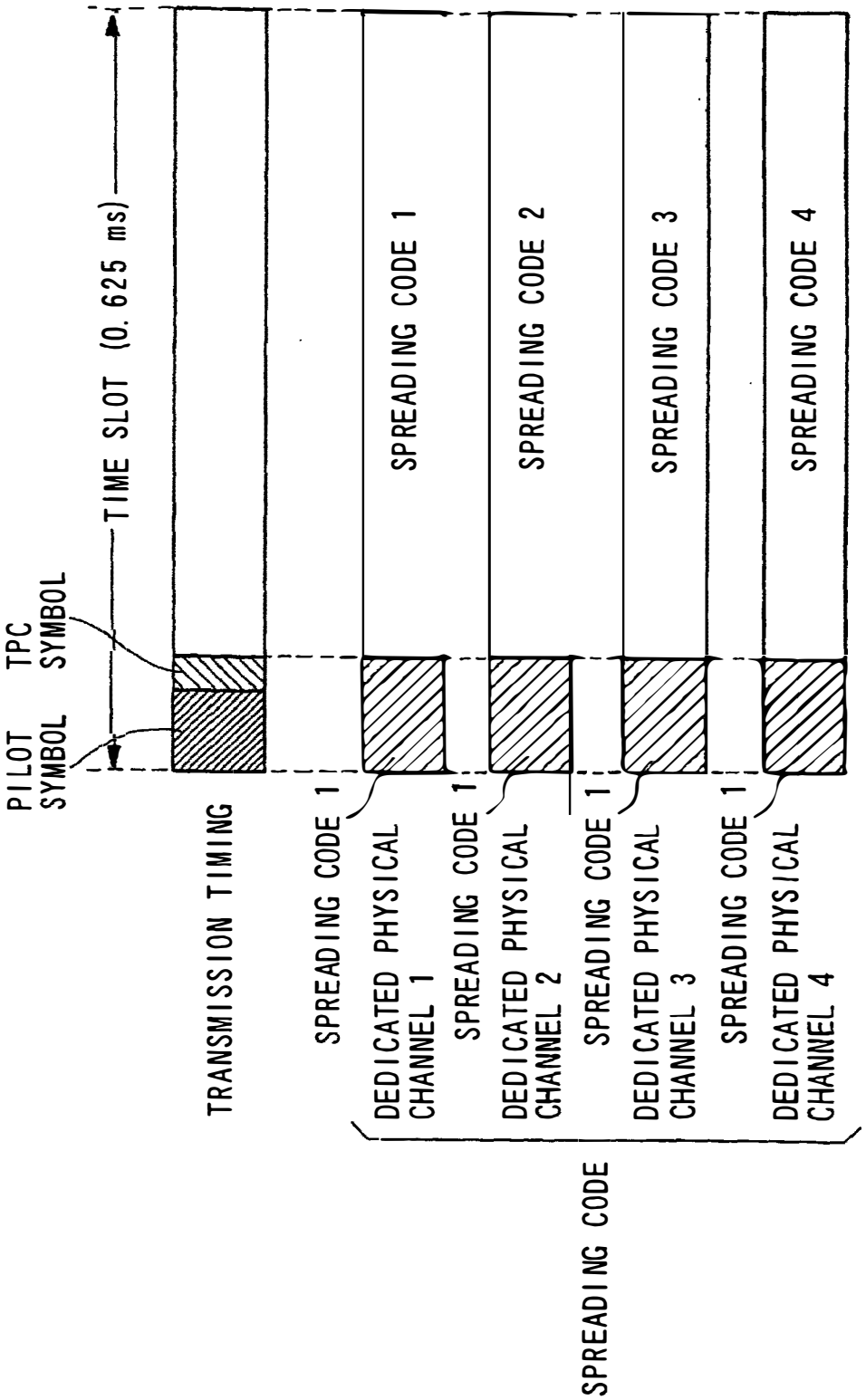
IPR2023-01270 Page 598

FIG. 51



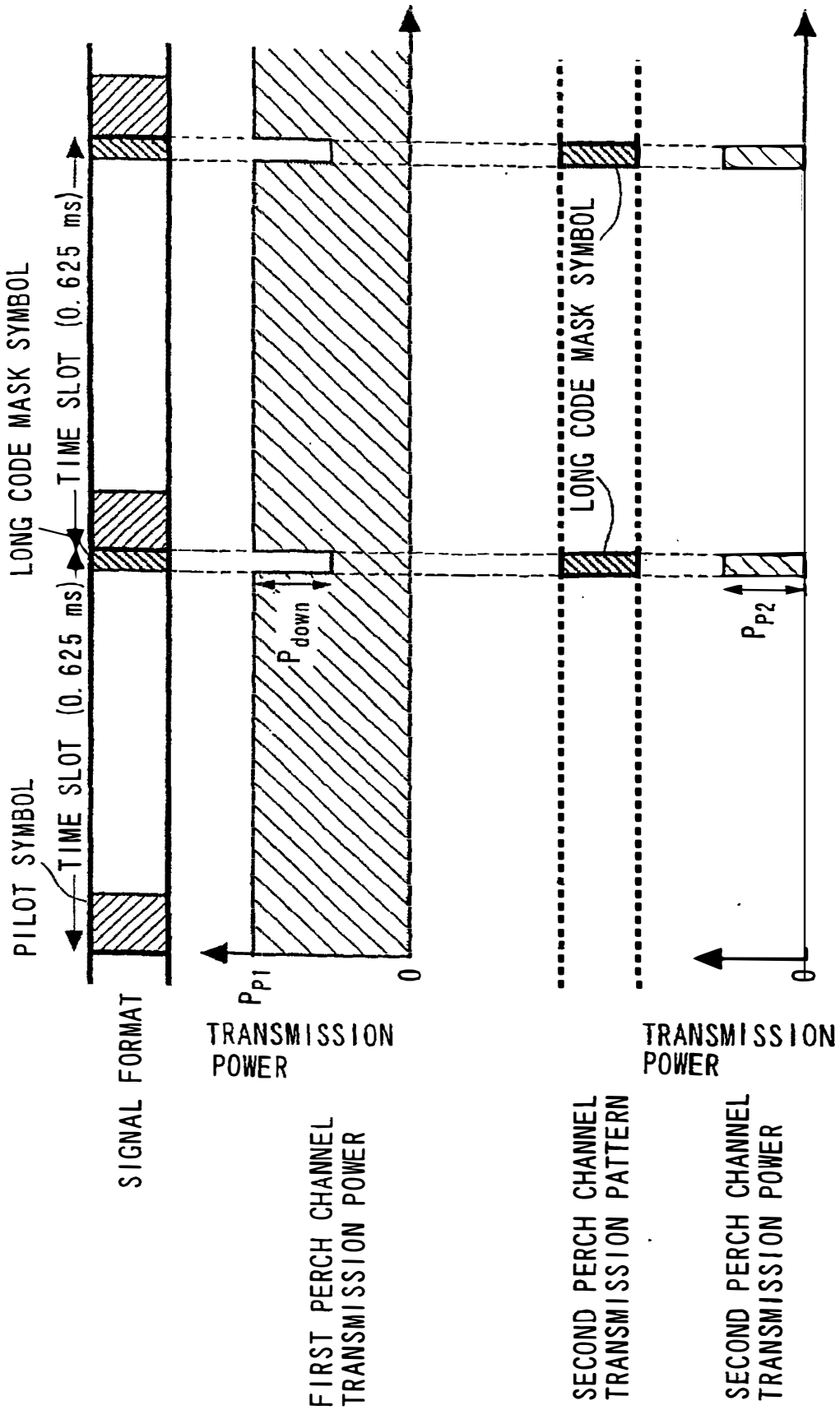
IPR2023-01270 Page 599

FIG. 52



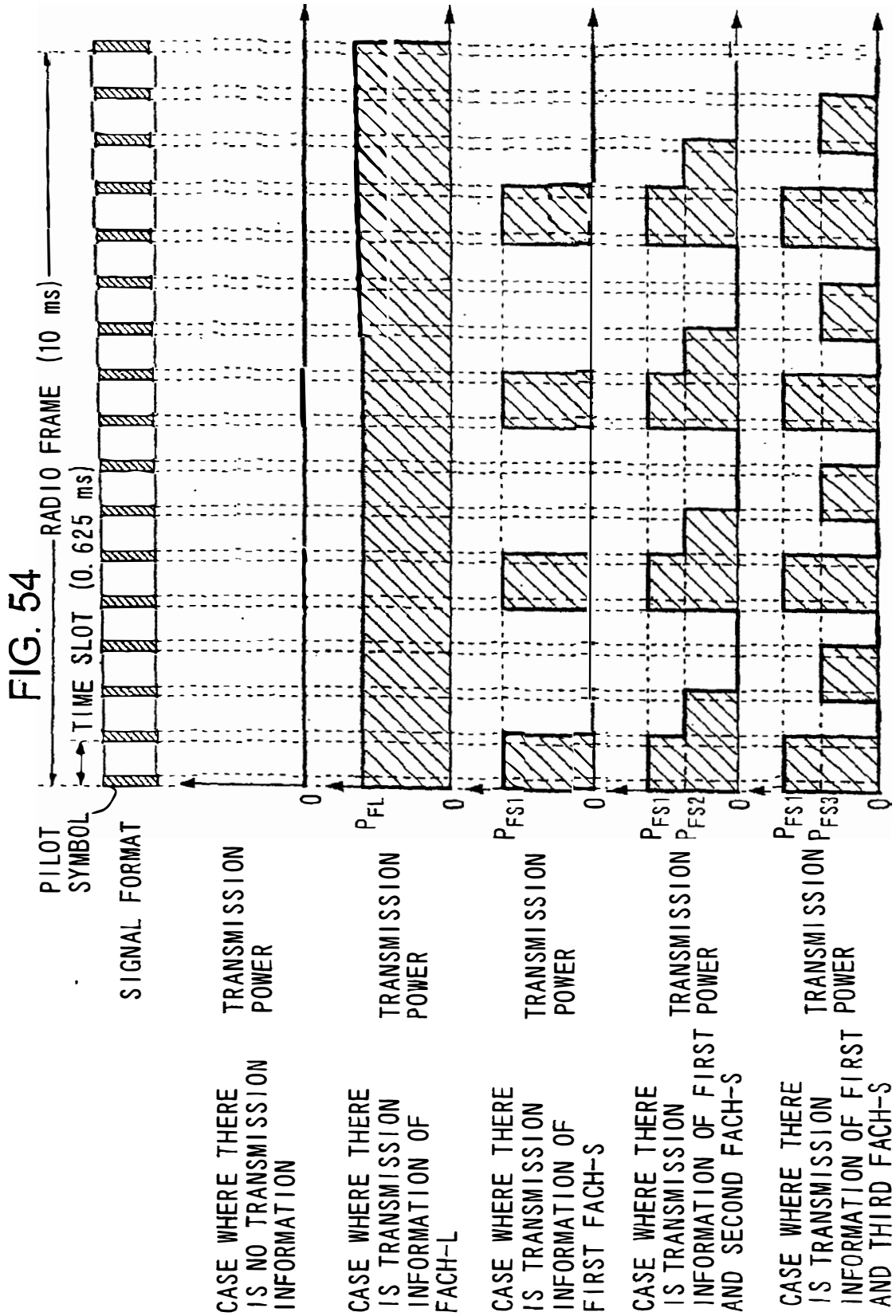
IPR2023-01270 Page 600

FIG. 53



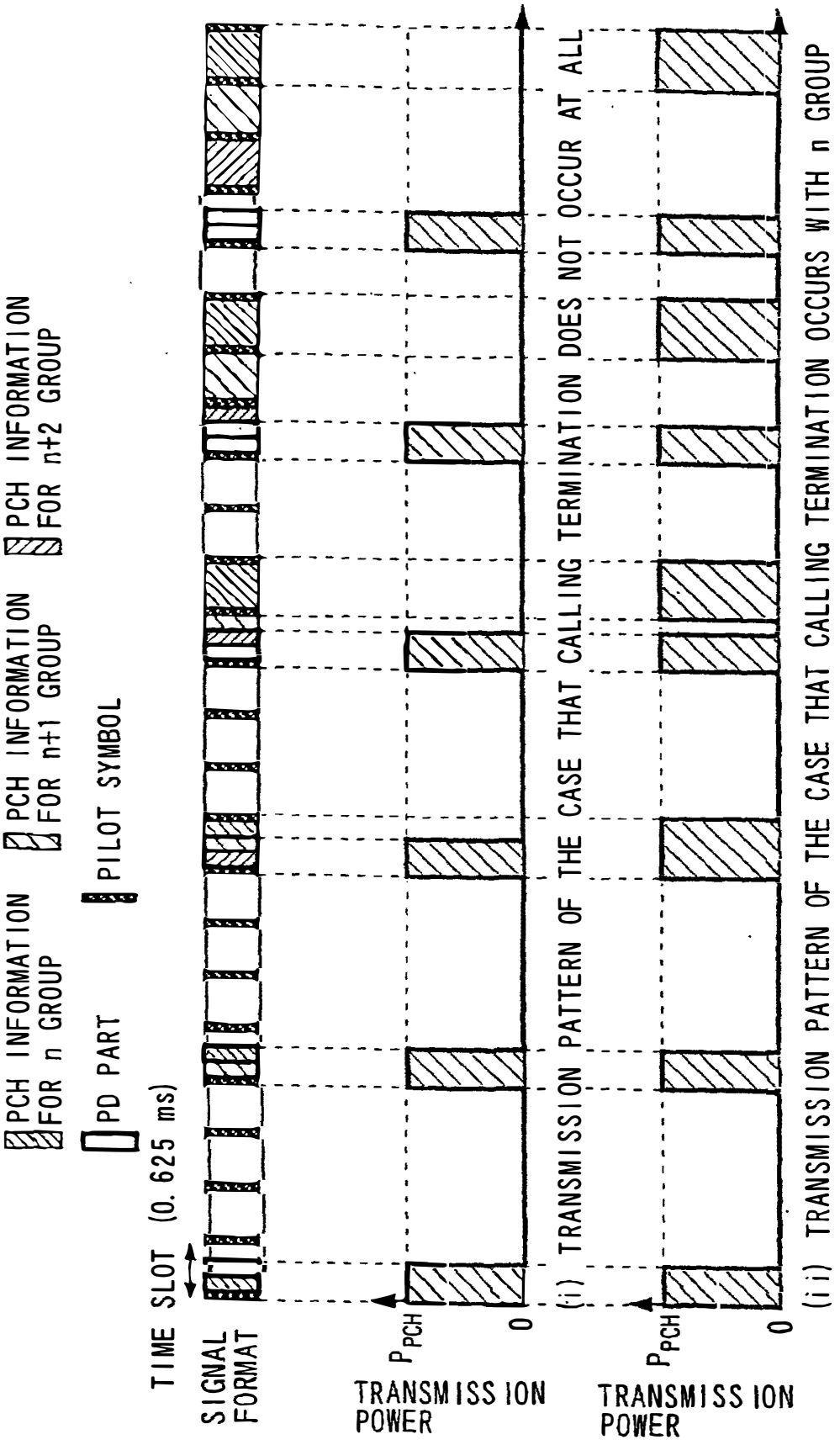
IPR2023-01270 Page 601

FIG. 54



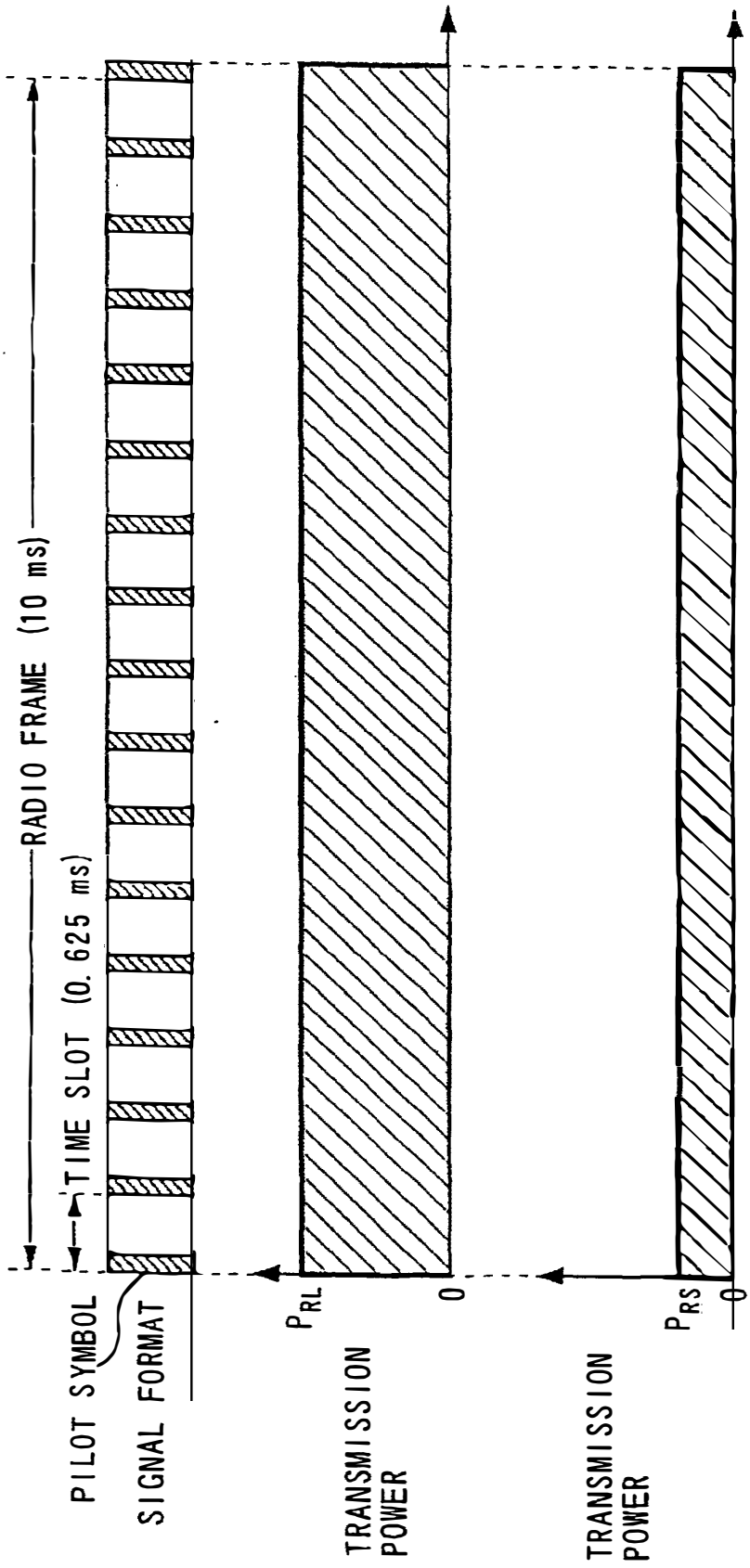
IPR2023-01270 Page 602

FIG. 55



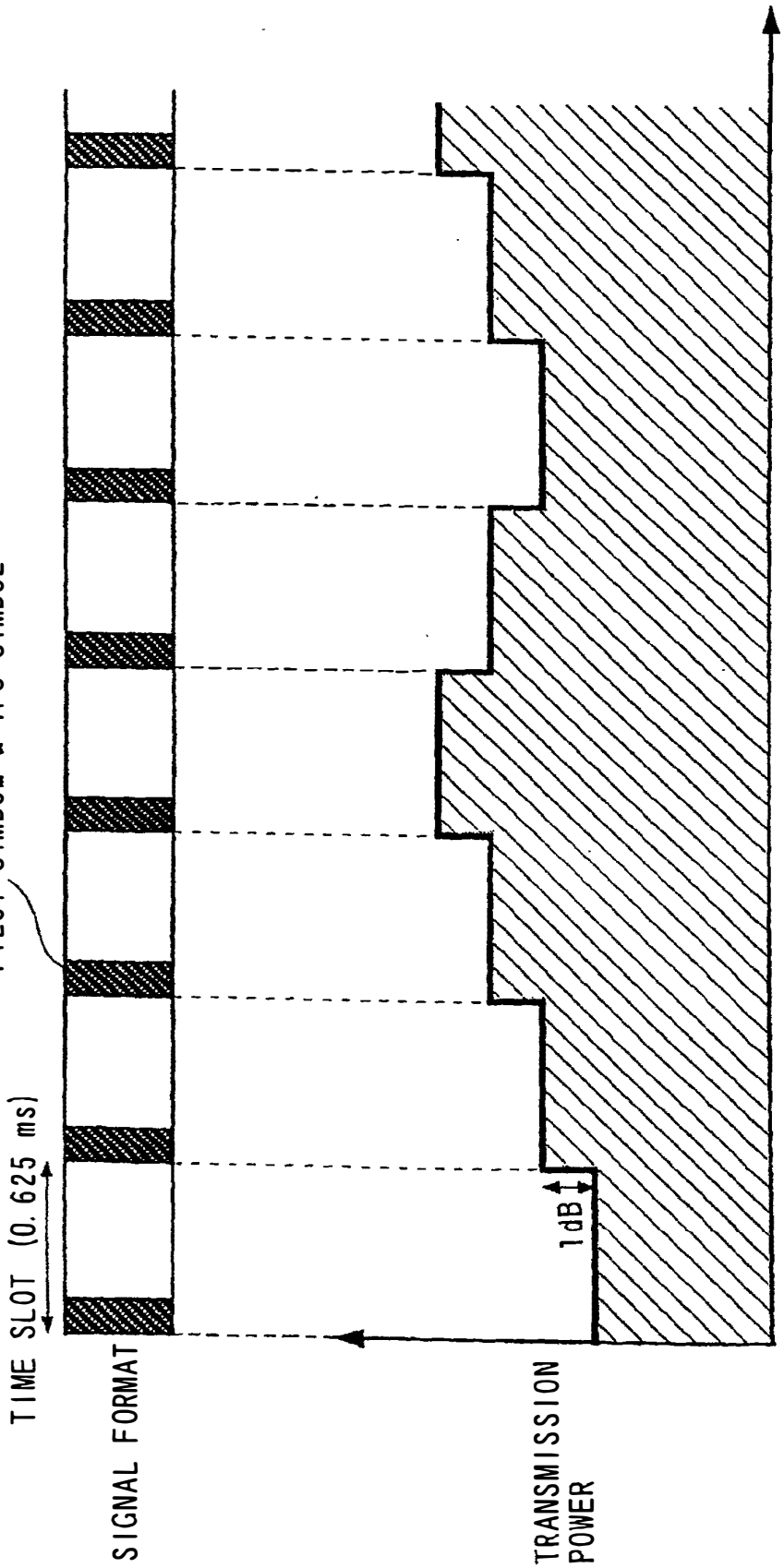
IPR2023-01270 Page 603

FIG. 56



IPR2023-01270 Page 604

FIG. 57



IPR2023-01270 Page 605

FIG. 58

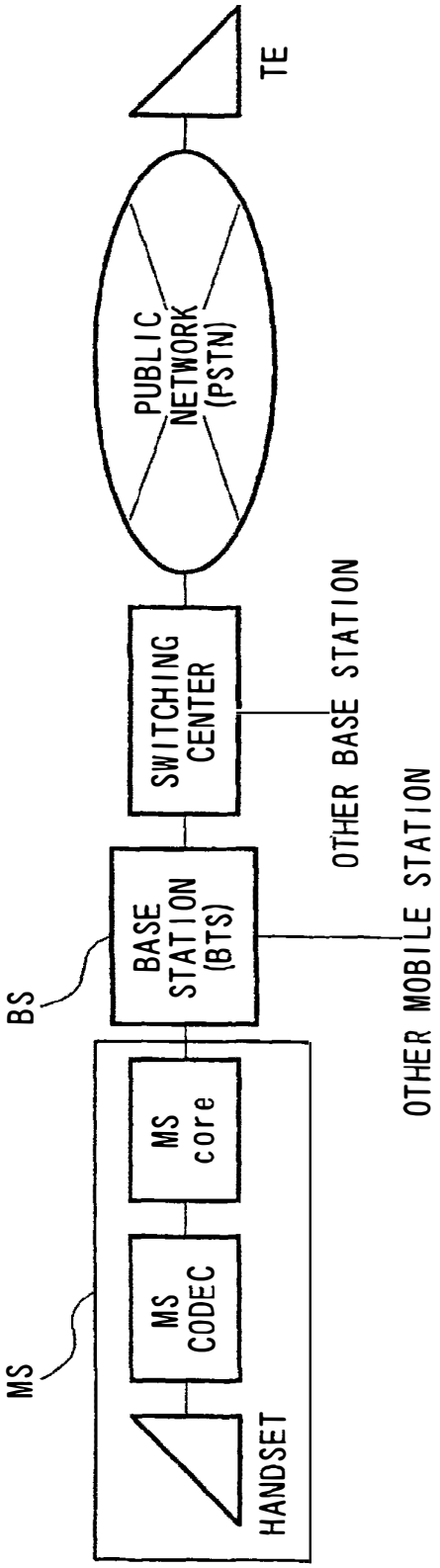
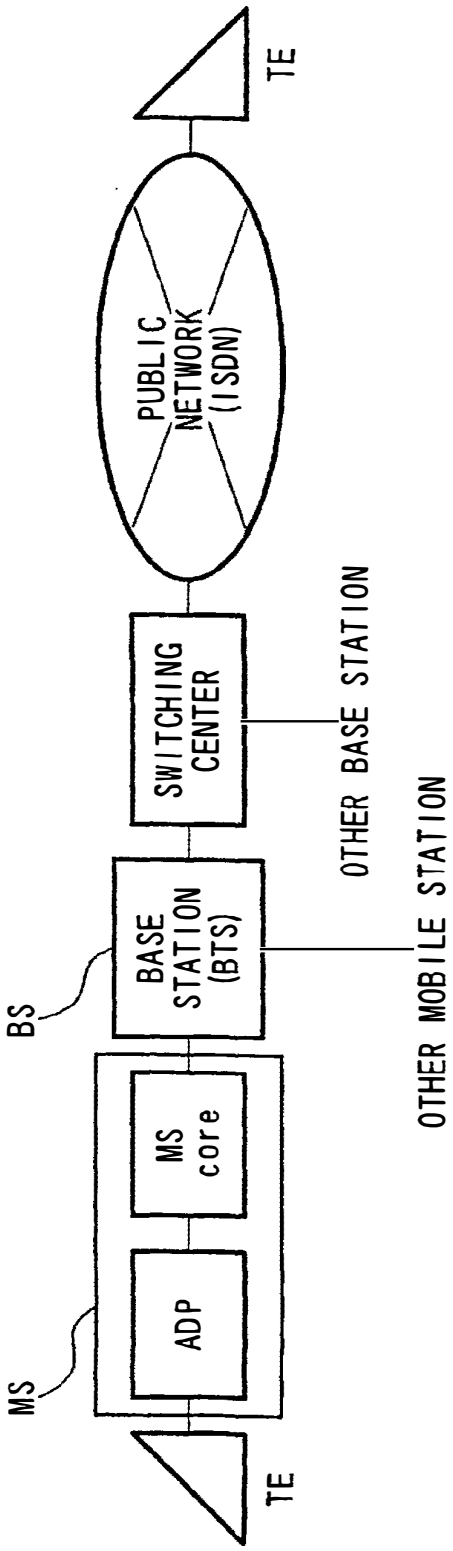
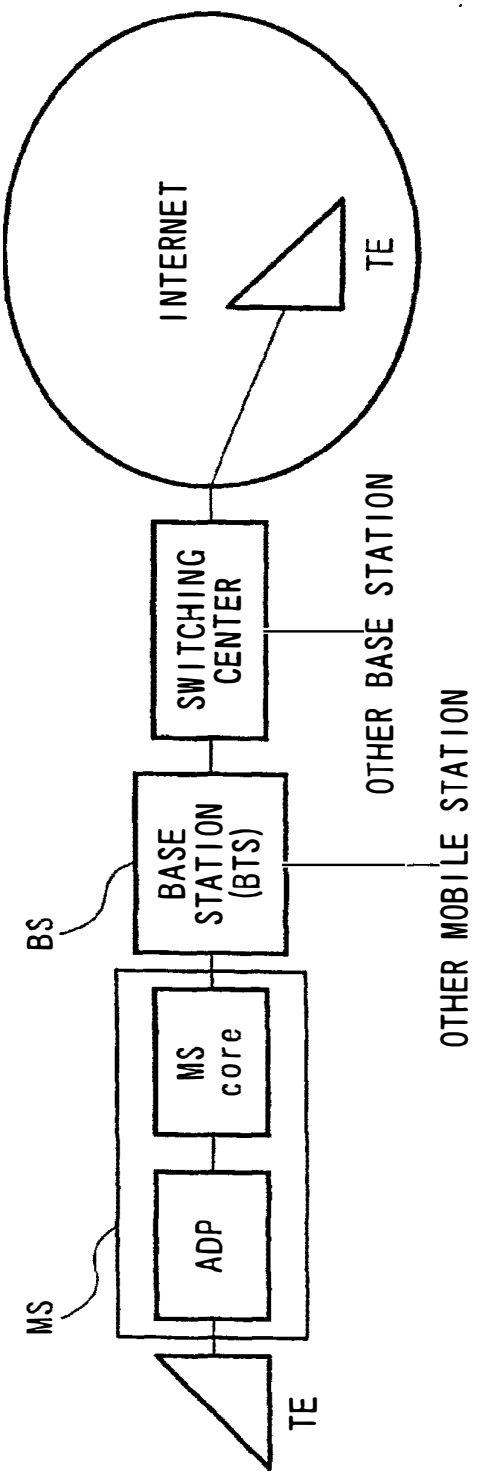


FIG. 59



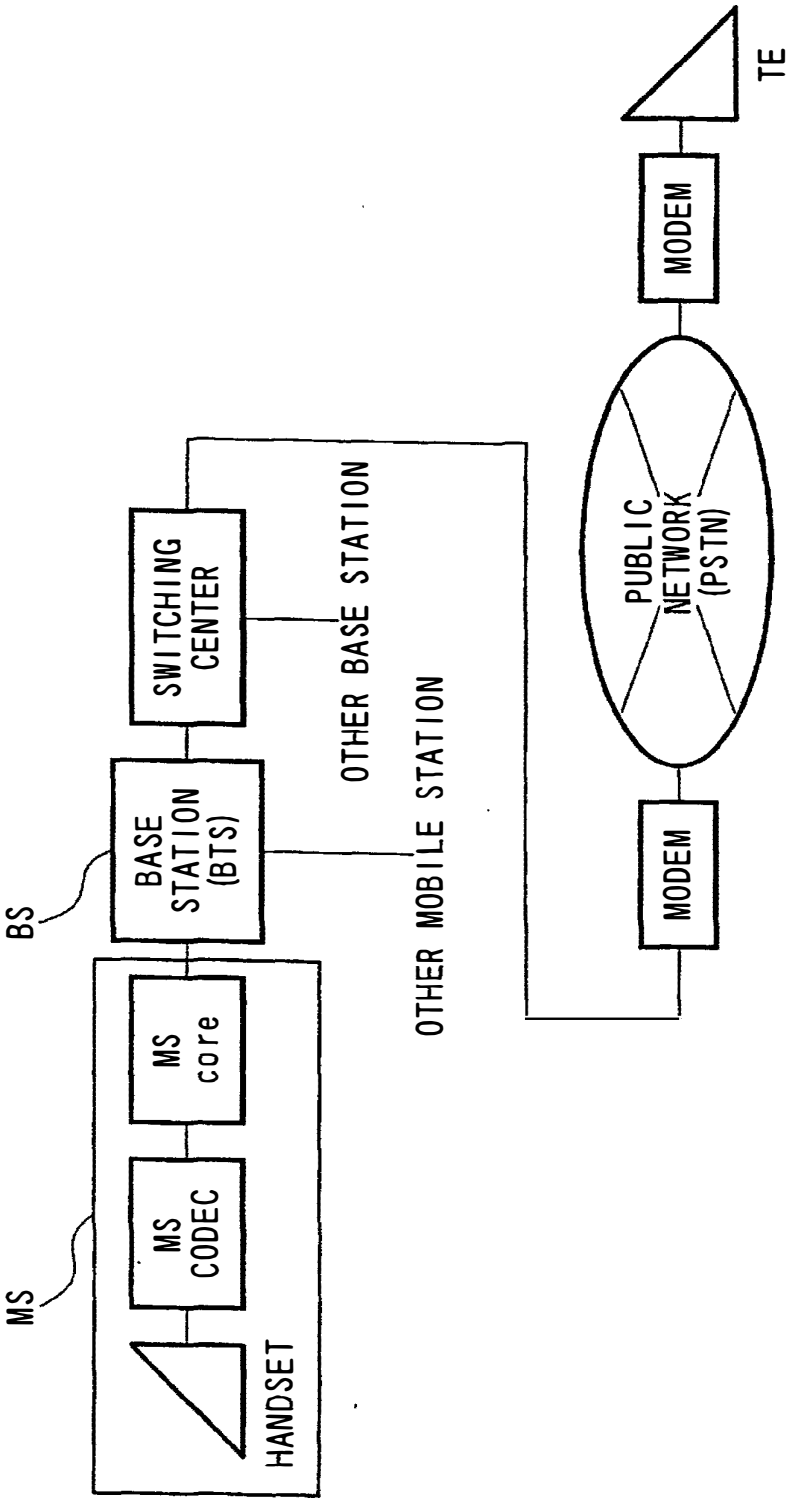
IPR2023-01270 Page 606

FIG. 60



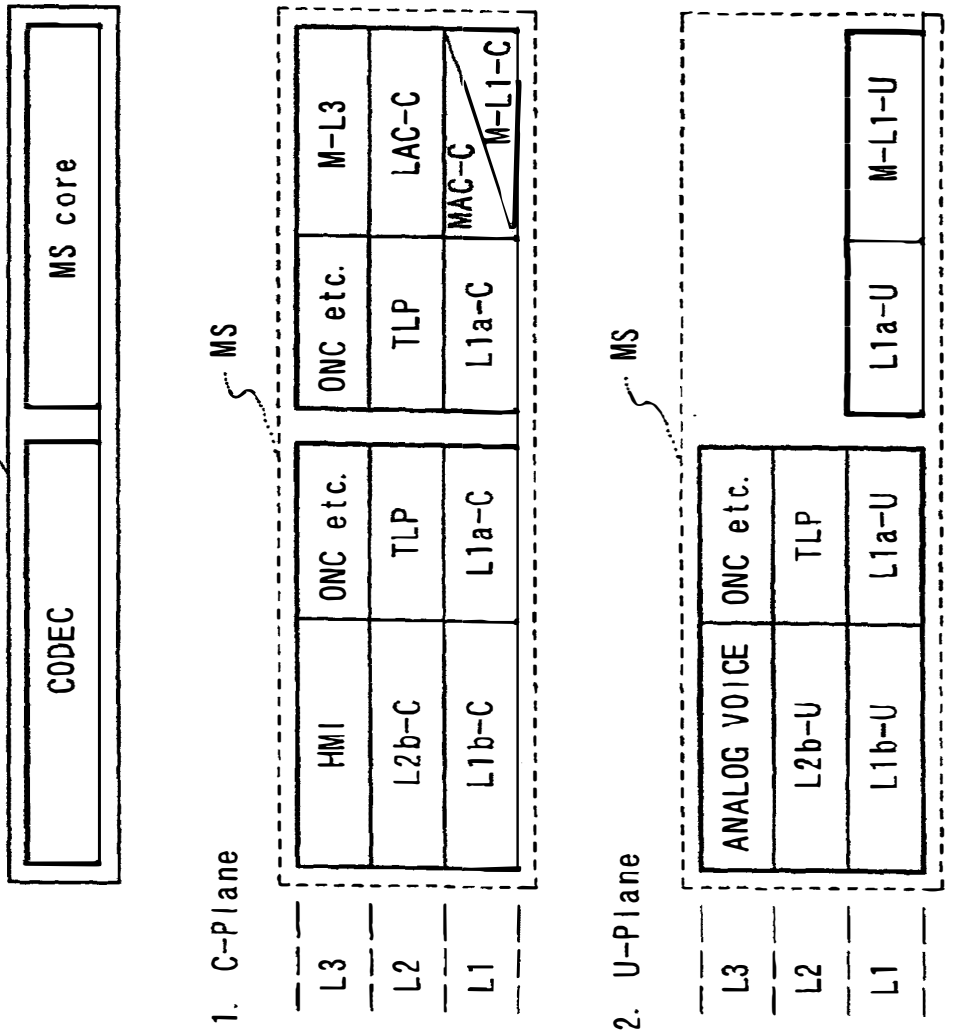
IPR2023-01270 Page 607

FIG. 61



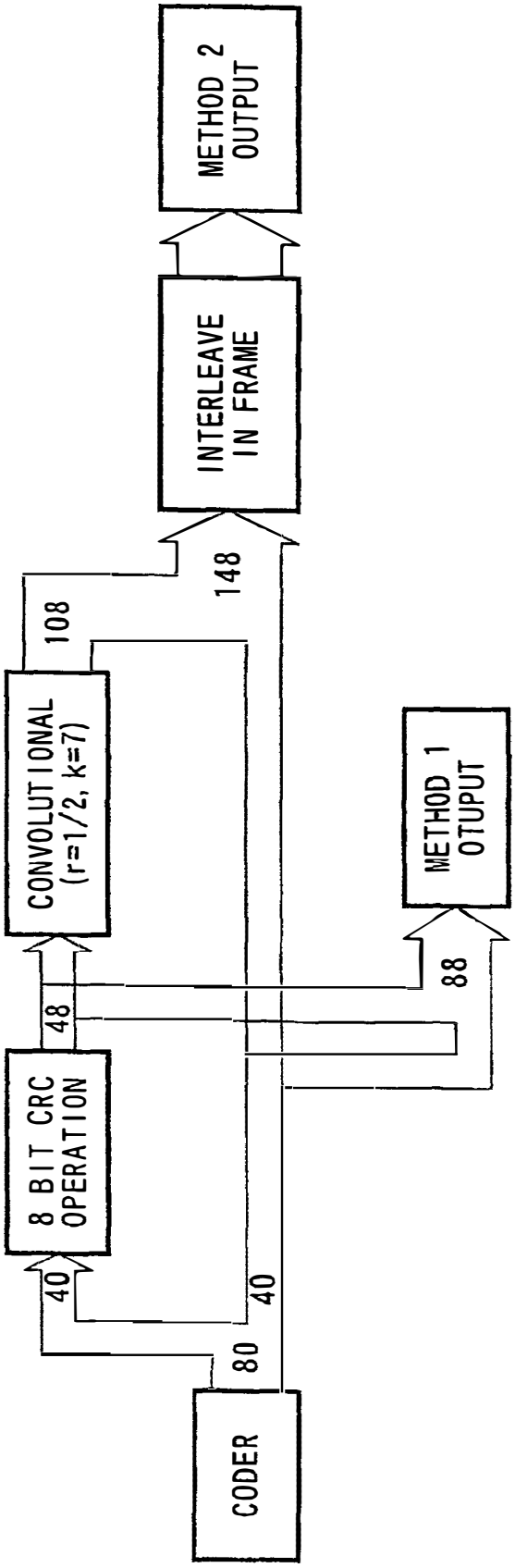
IPR2023-01270 Page 608

FIG. 62



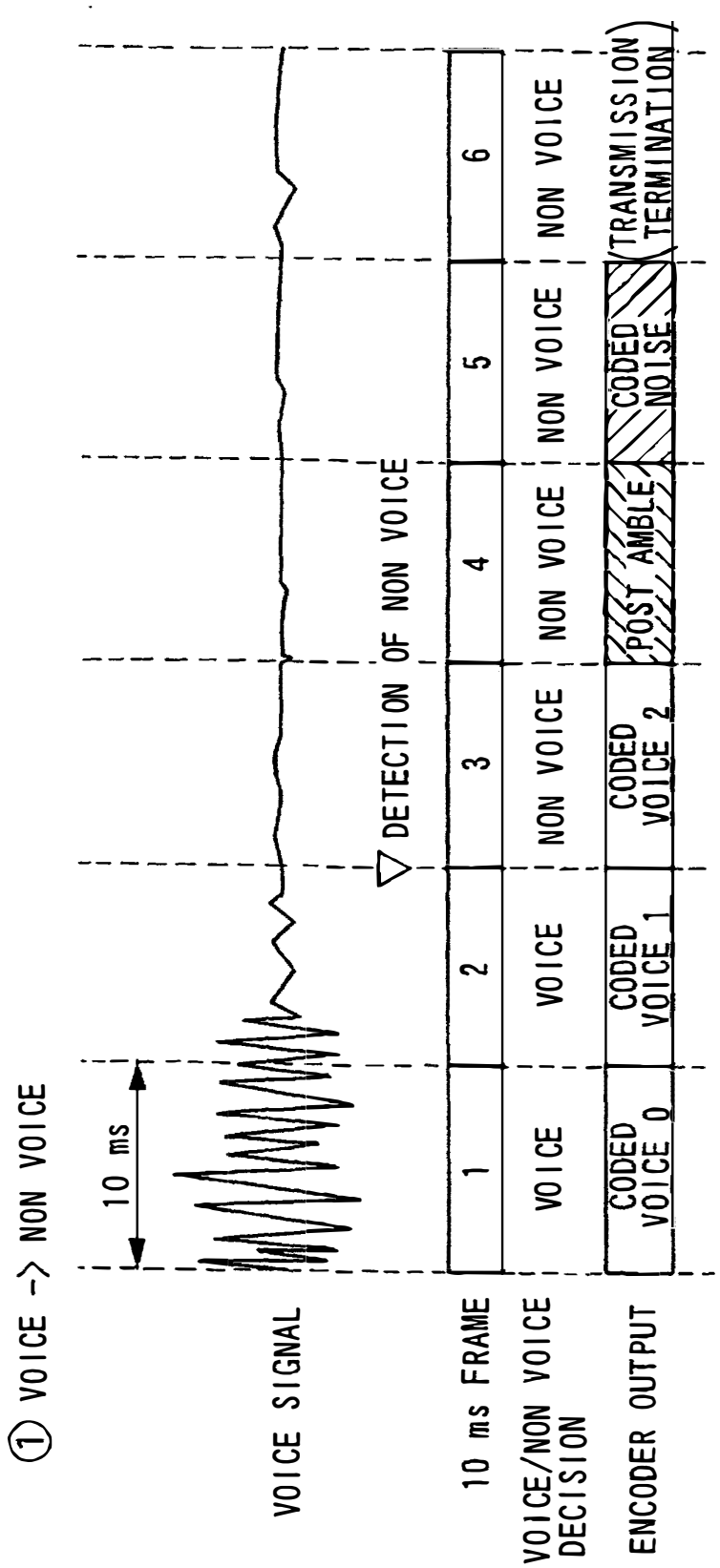
IPR2023-01270 Page 609

FIG. 63



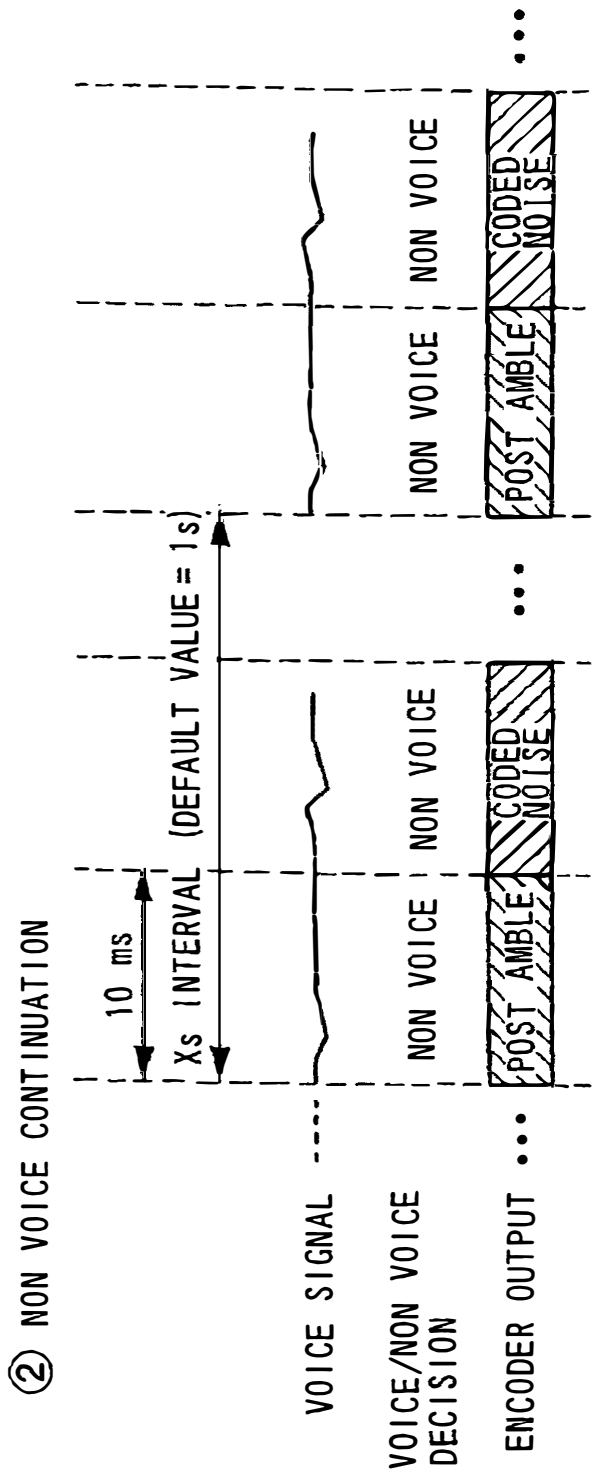
IPR2023-01270 Page 610

FIG. 64



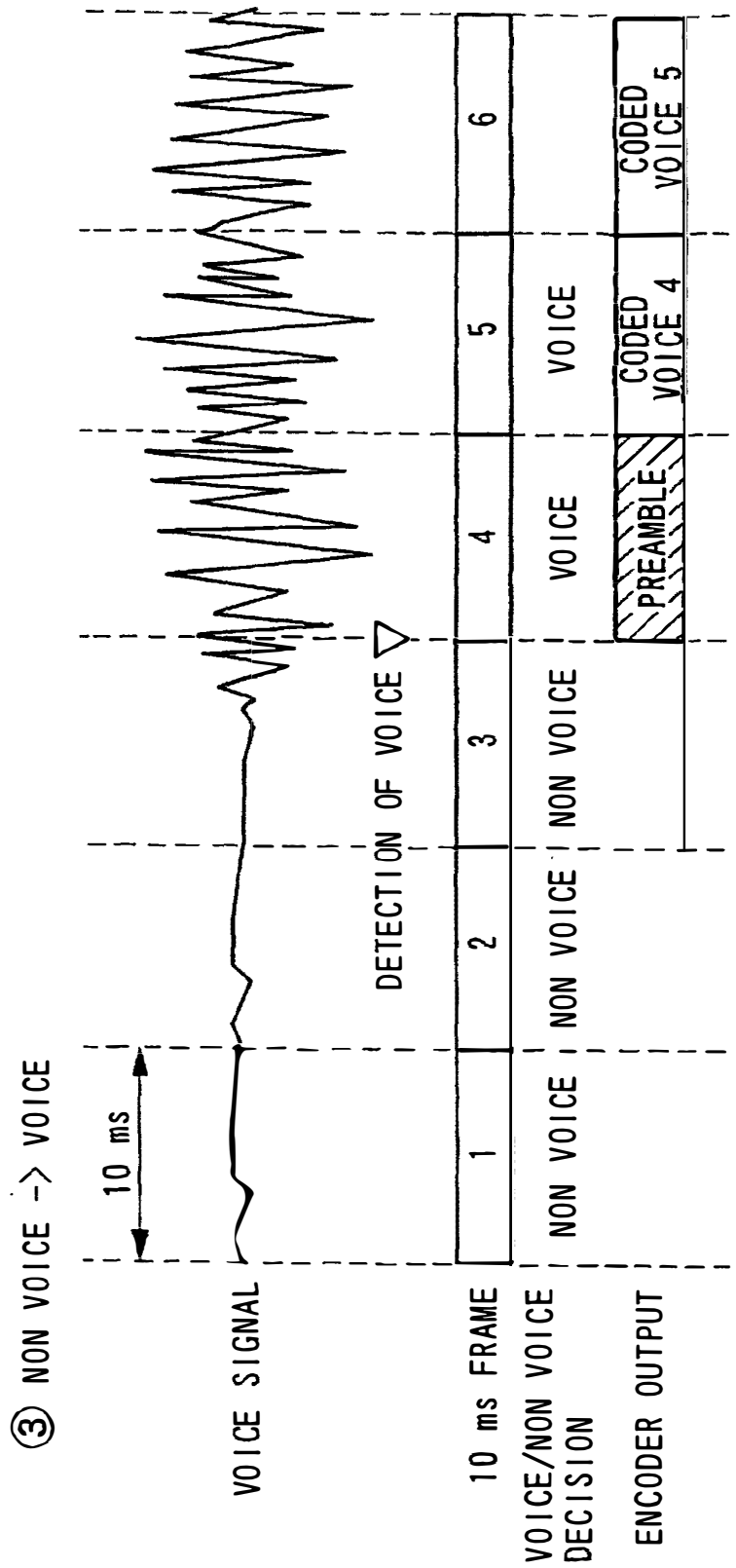
IPR2023-01270 Page 611

CONTINUANCE OF FIG. 64



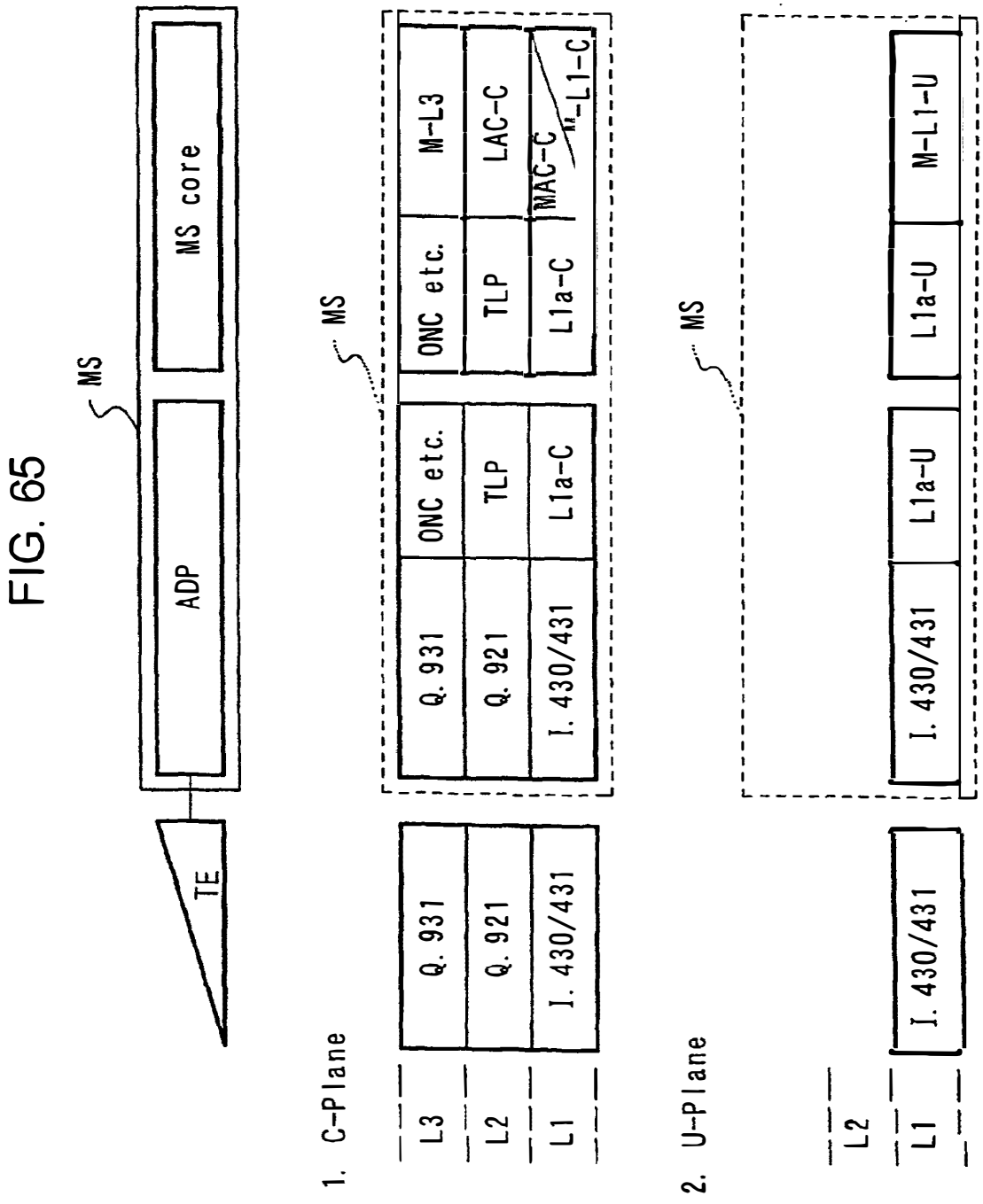
IPR2023-01270 Page 612

CONTINUANCE OF FIG. 64



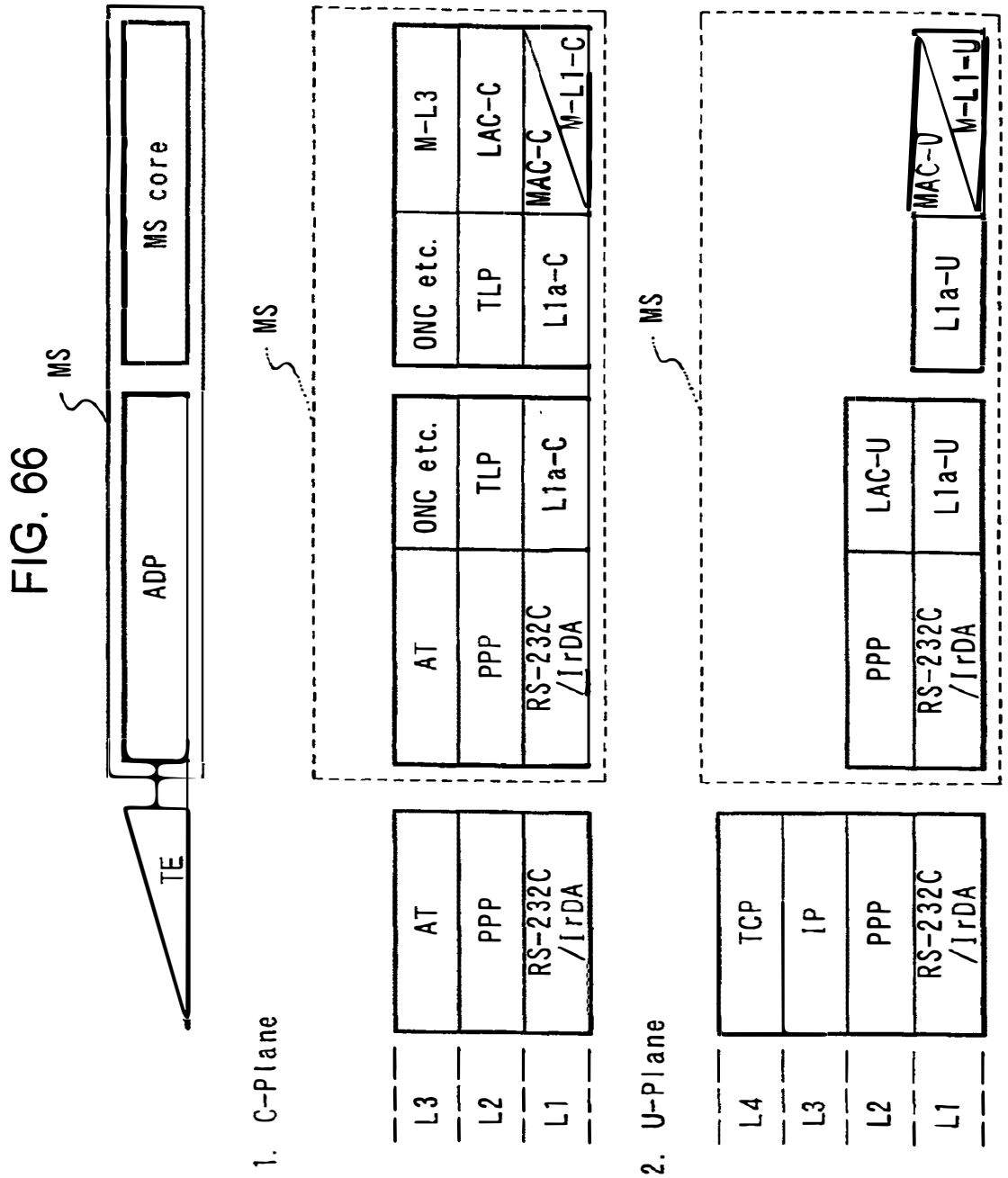
IPR2023-01270 Page 613

FIG. 65



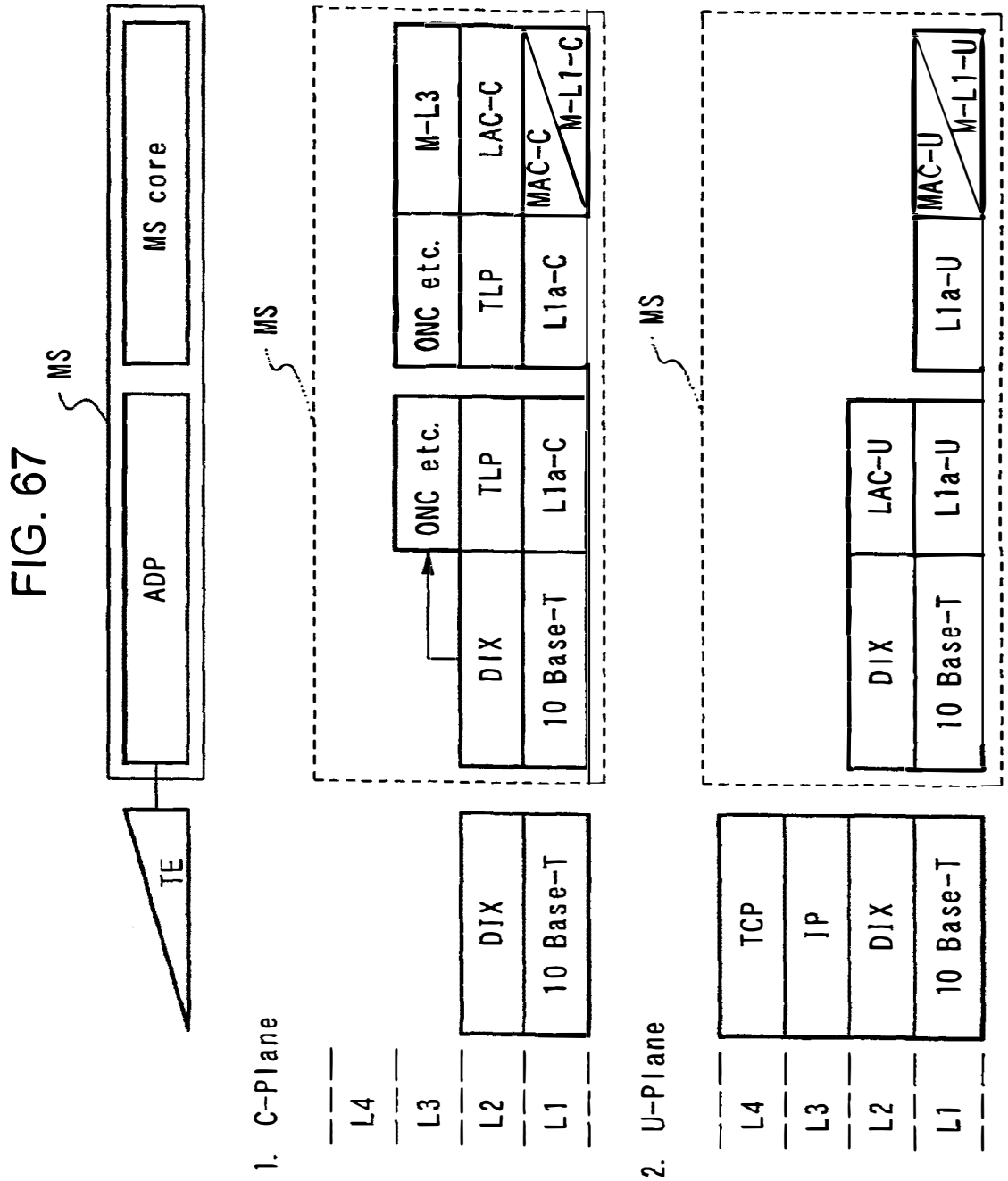
IPR2023-01270 Page 614

FIG. 66



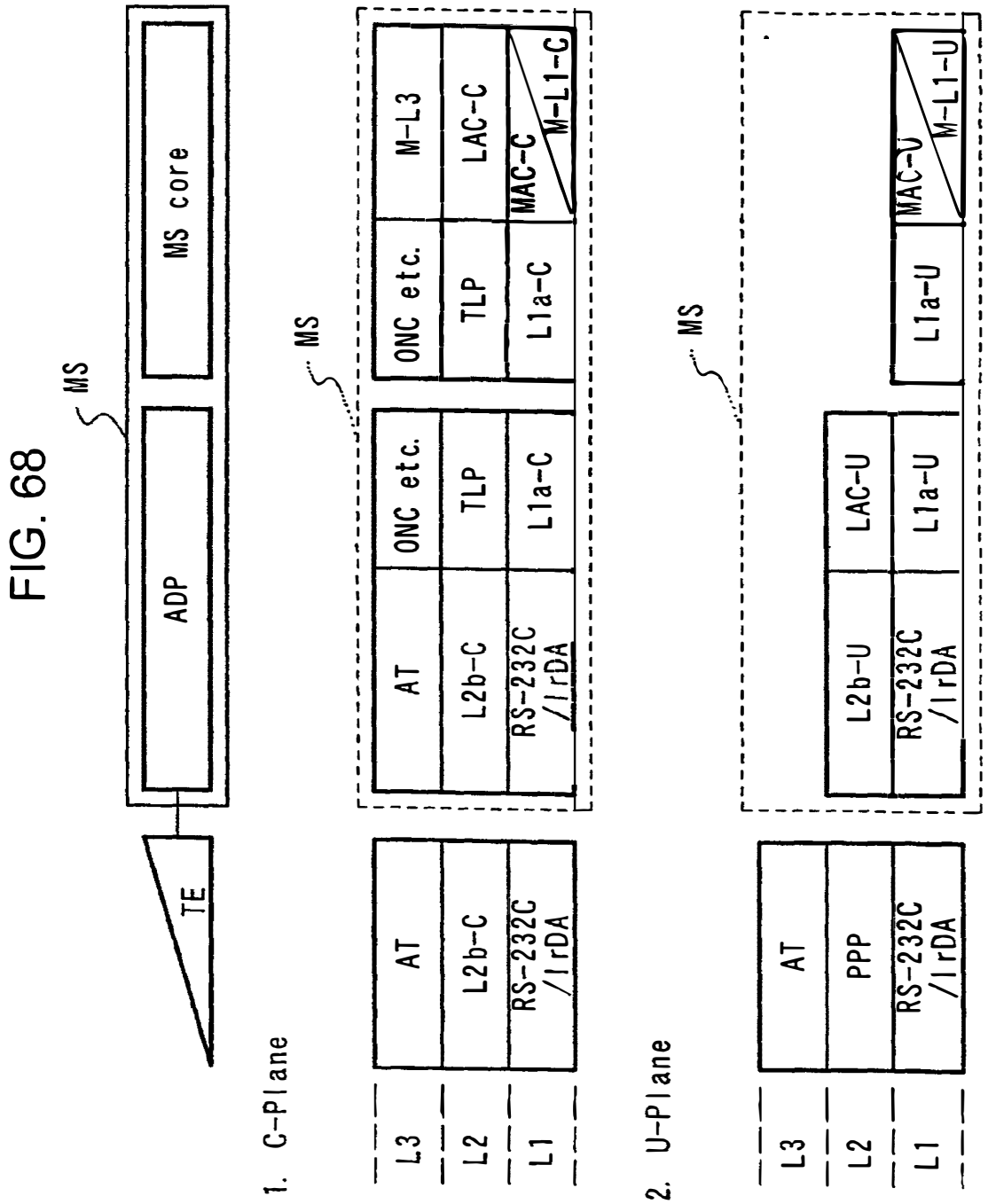
IPR2023-01270 Page 615

FIG. 67



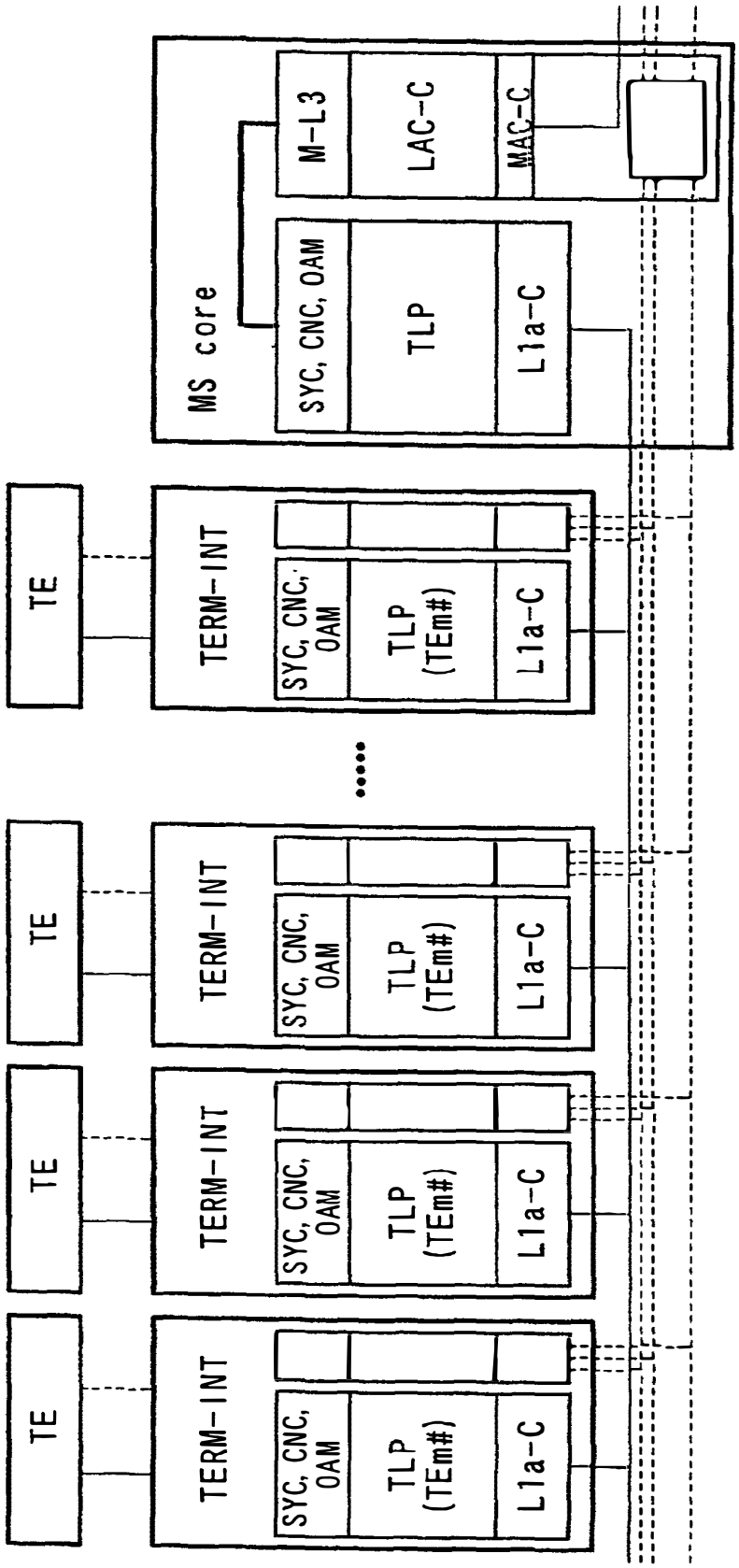
IPR2023-01270 Page 616

FIG. 68



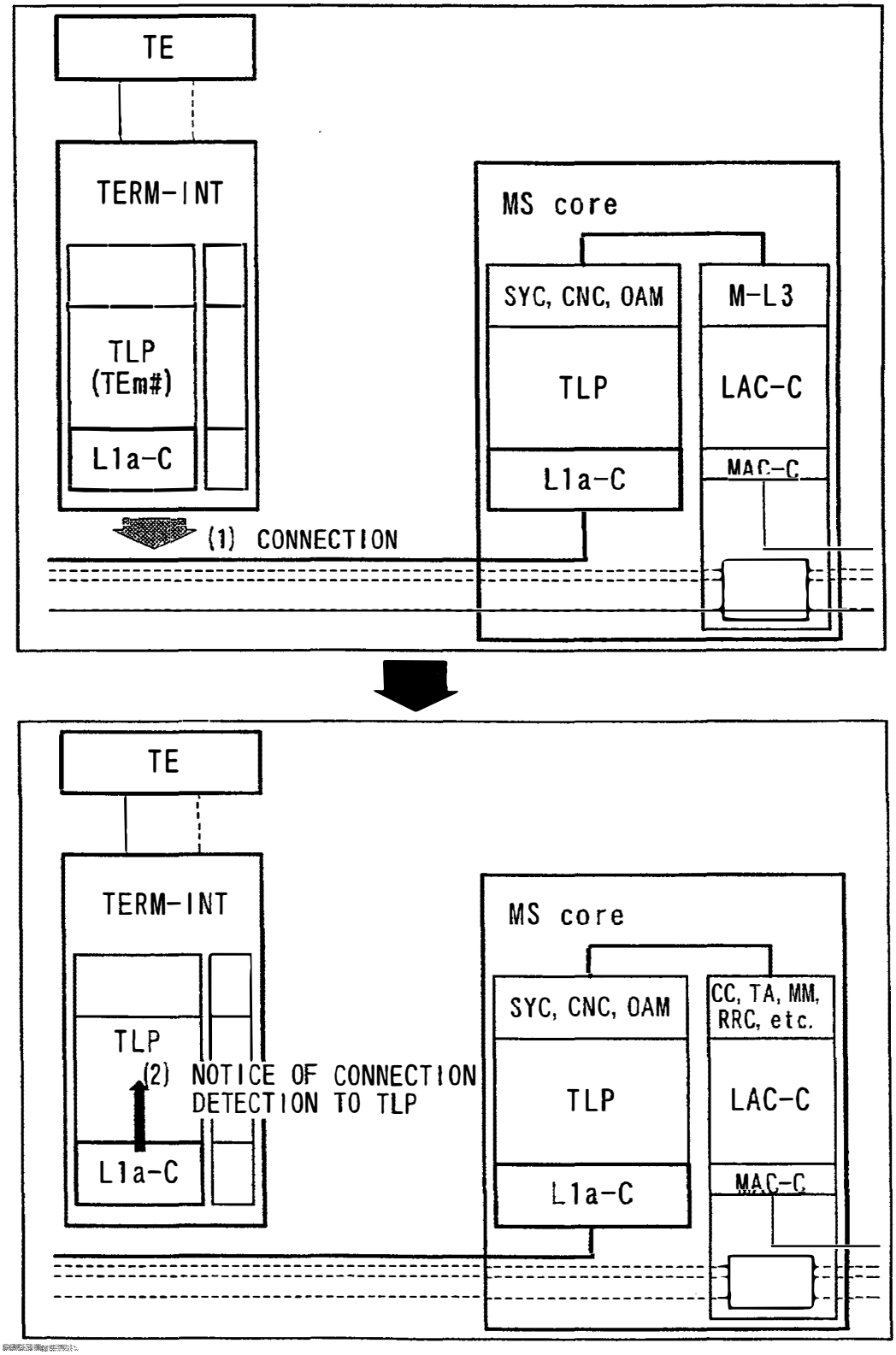
IPR2023-01270 Page 617

FIG. 69



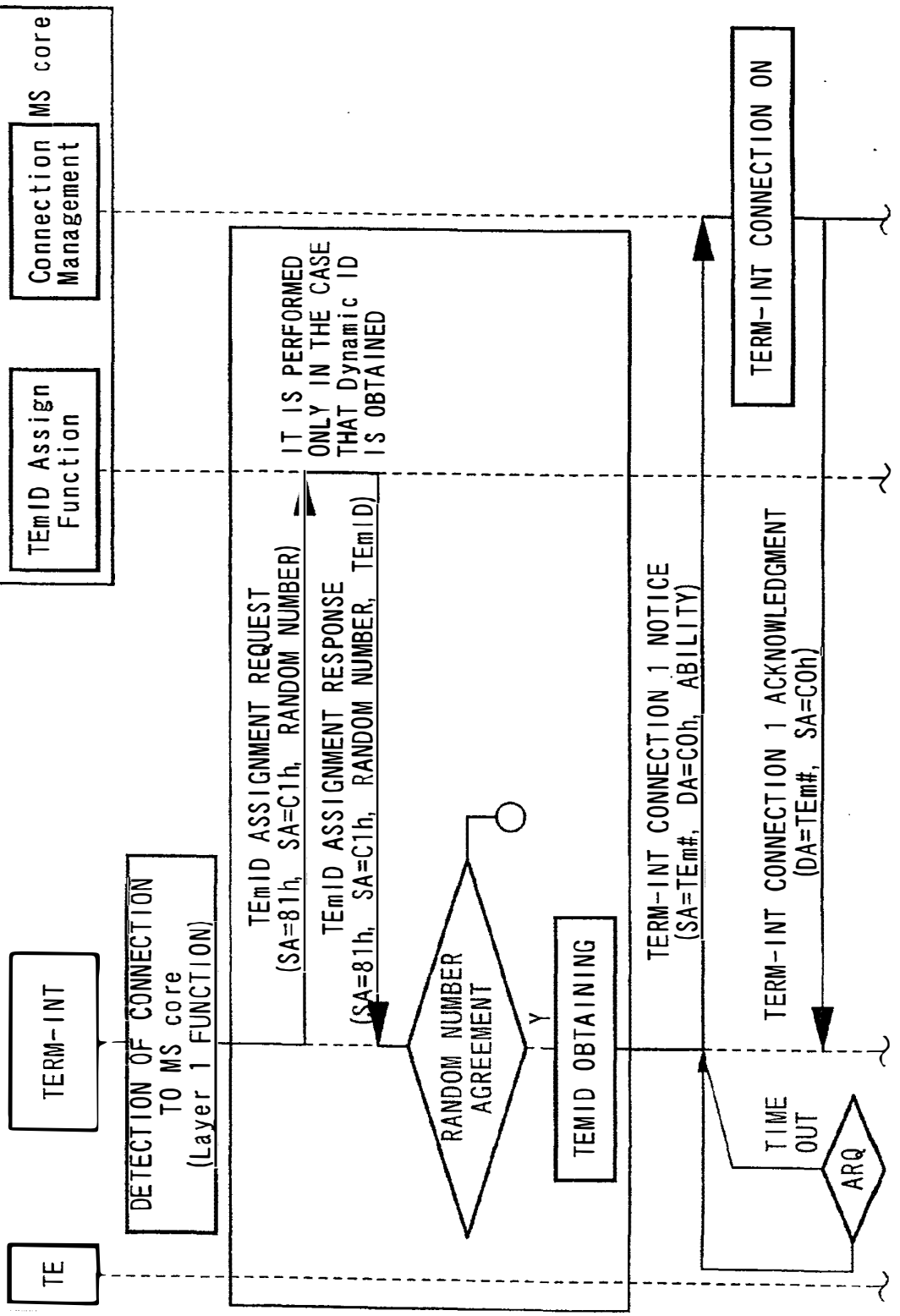
IPR2023-01270 Page 618

FIG. 70



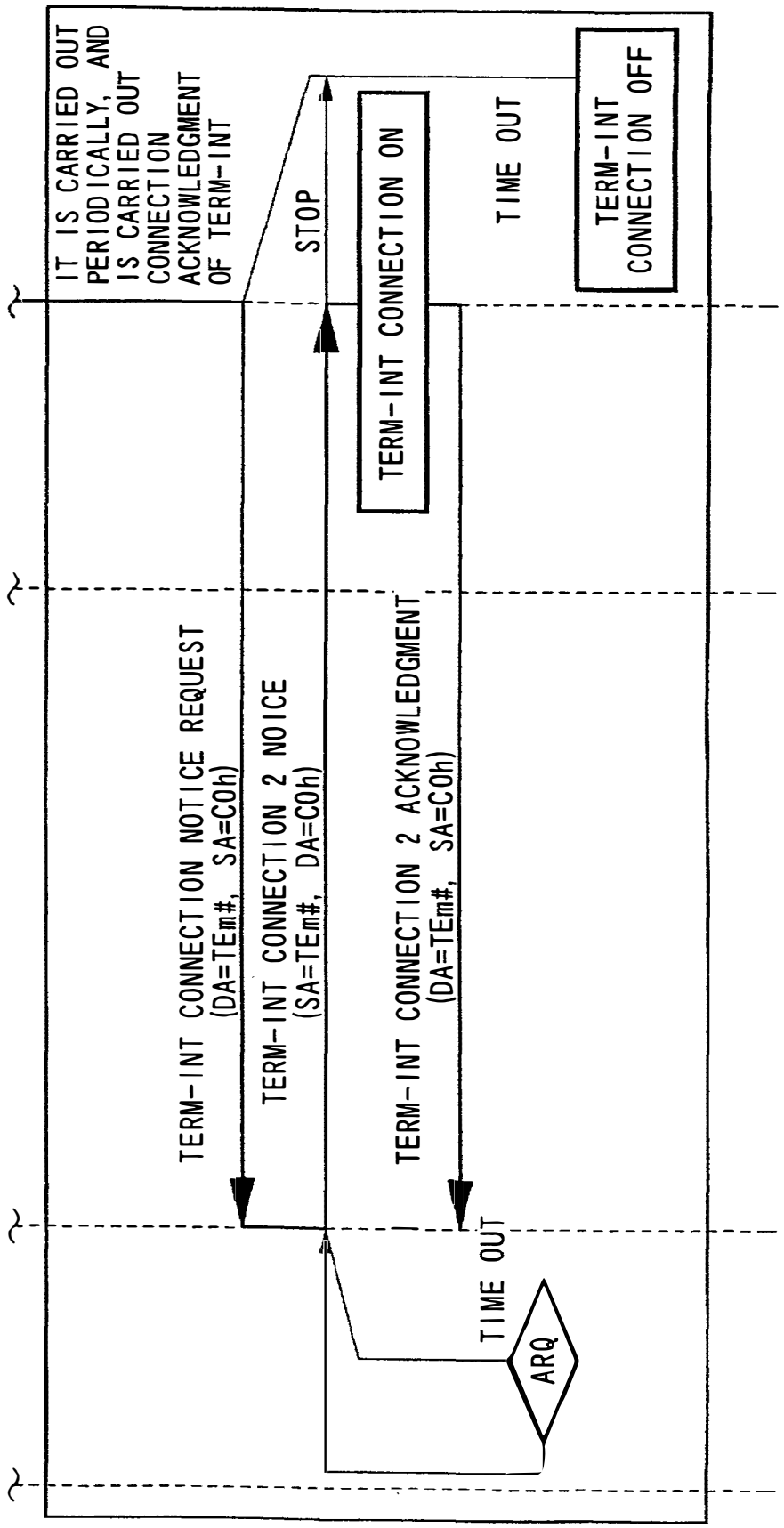
IPR2023-01270 Page 619

FIG. 71



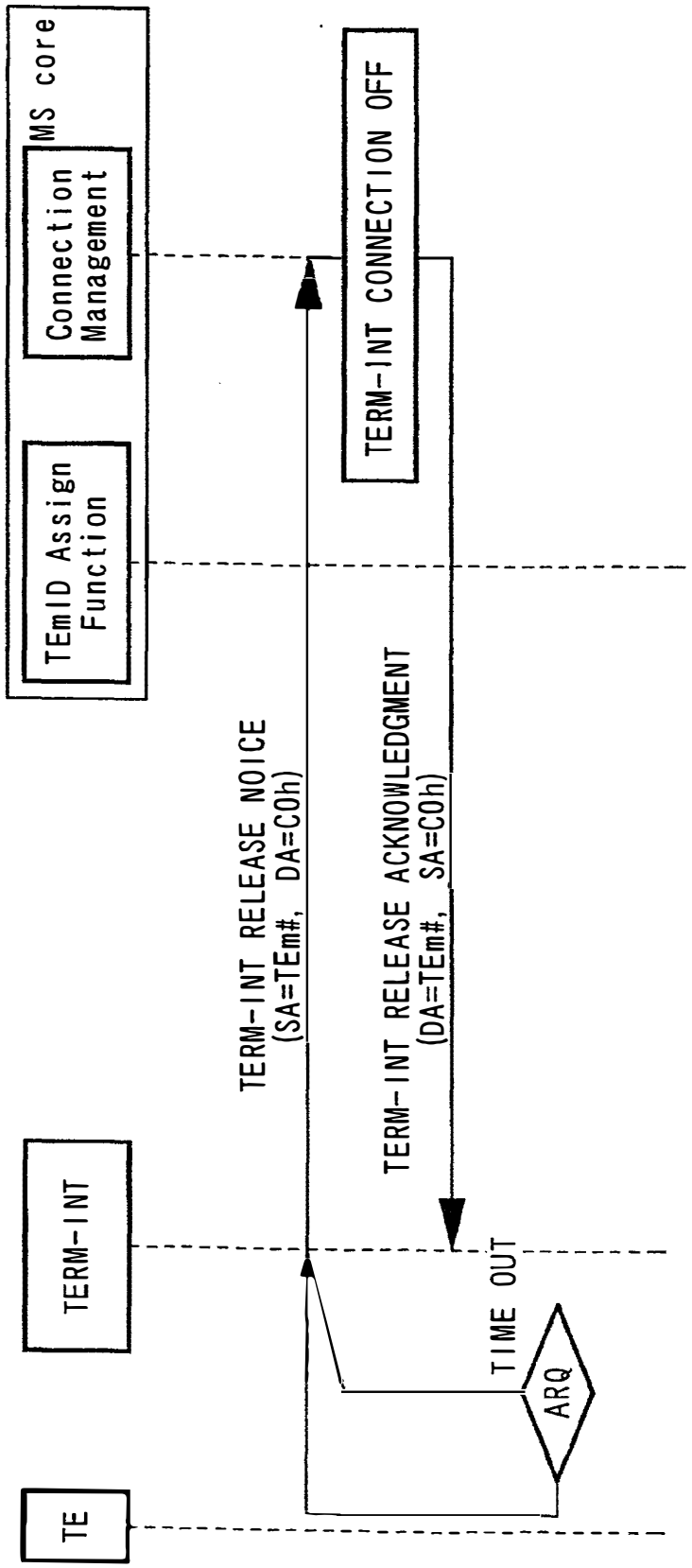
IPR2023-01270 Page 620

CONTINUANCE OF FIG. 71



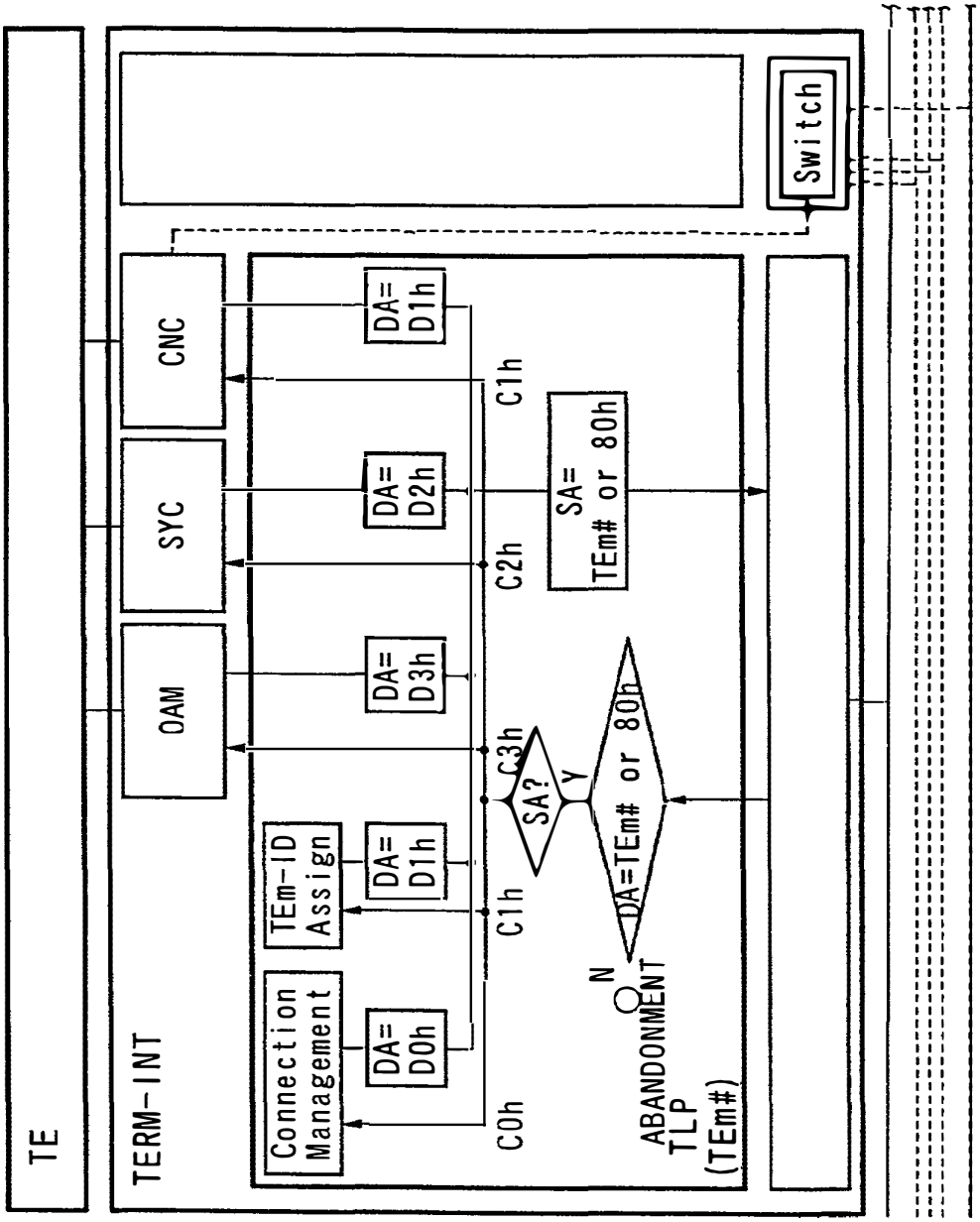
IPR2023-01270 Page 621

FIG. 72



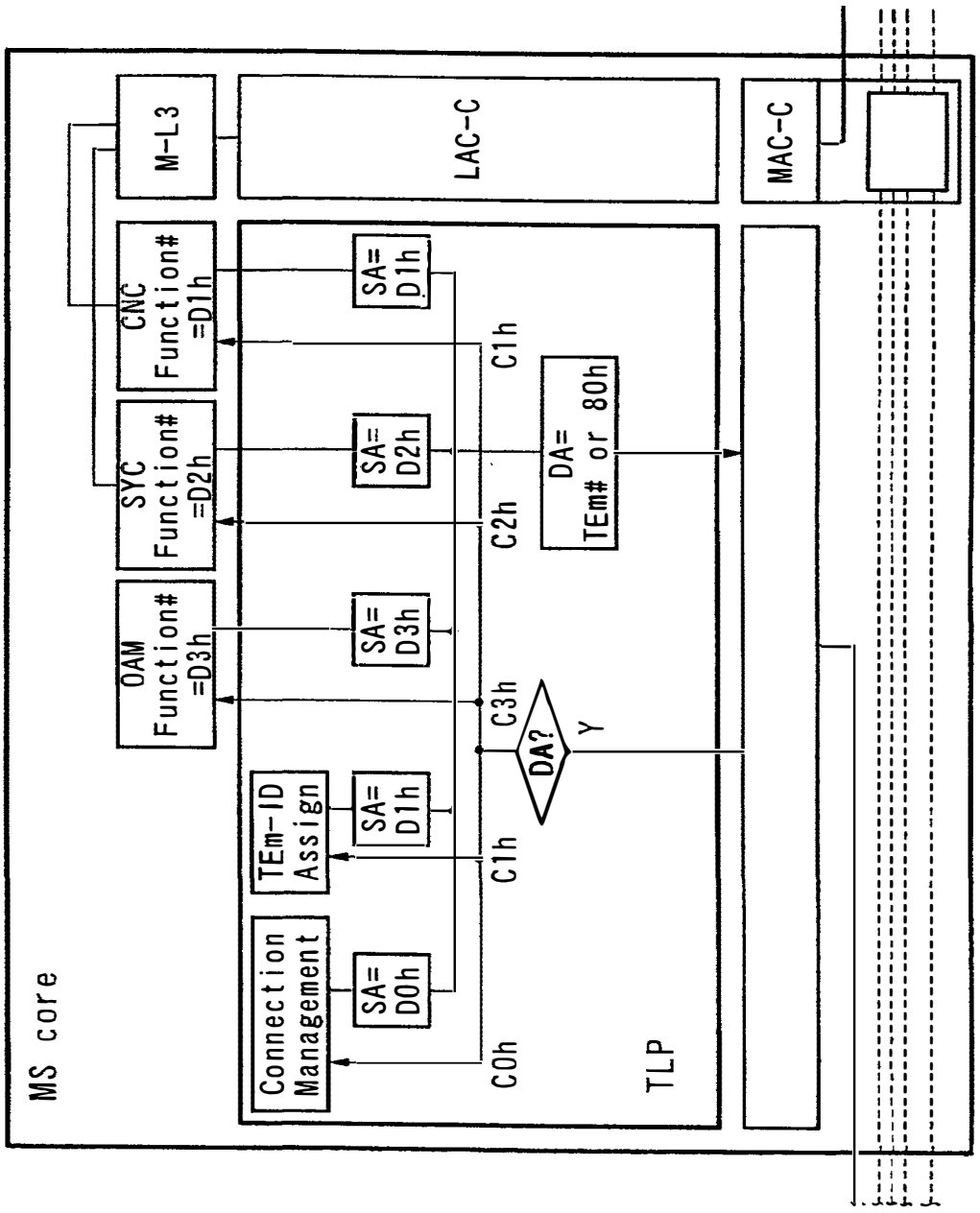
IPR2023-01270 Page 622

FIG. 73



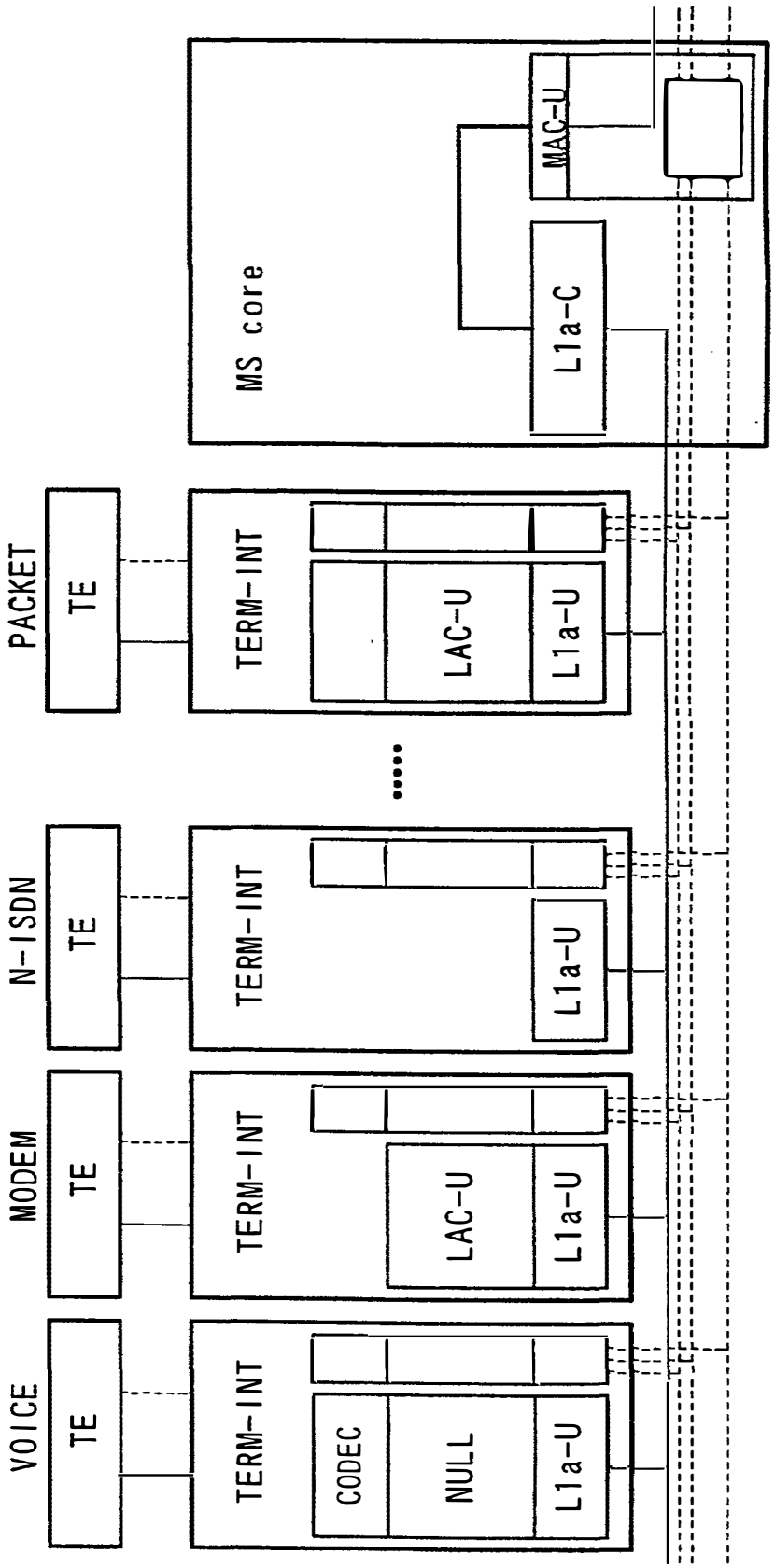
IPR2023-01270 Page 623

CONTINUANCE OF FIG. 73



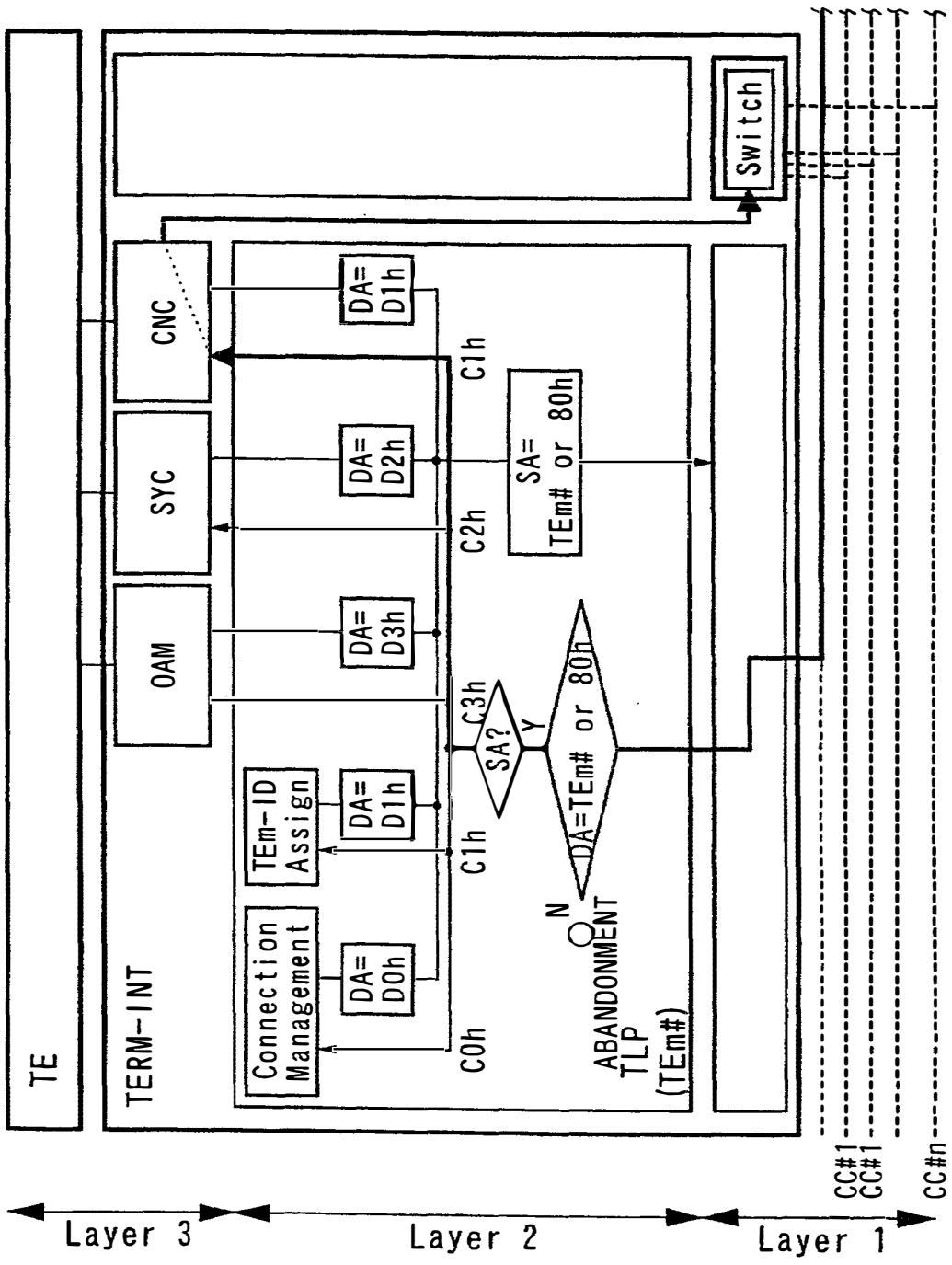
IPR2023-01270 Page 624

FIG. 74



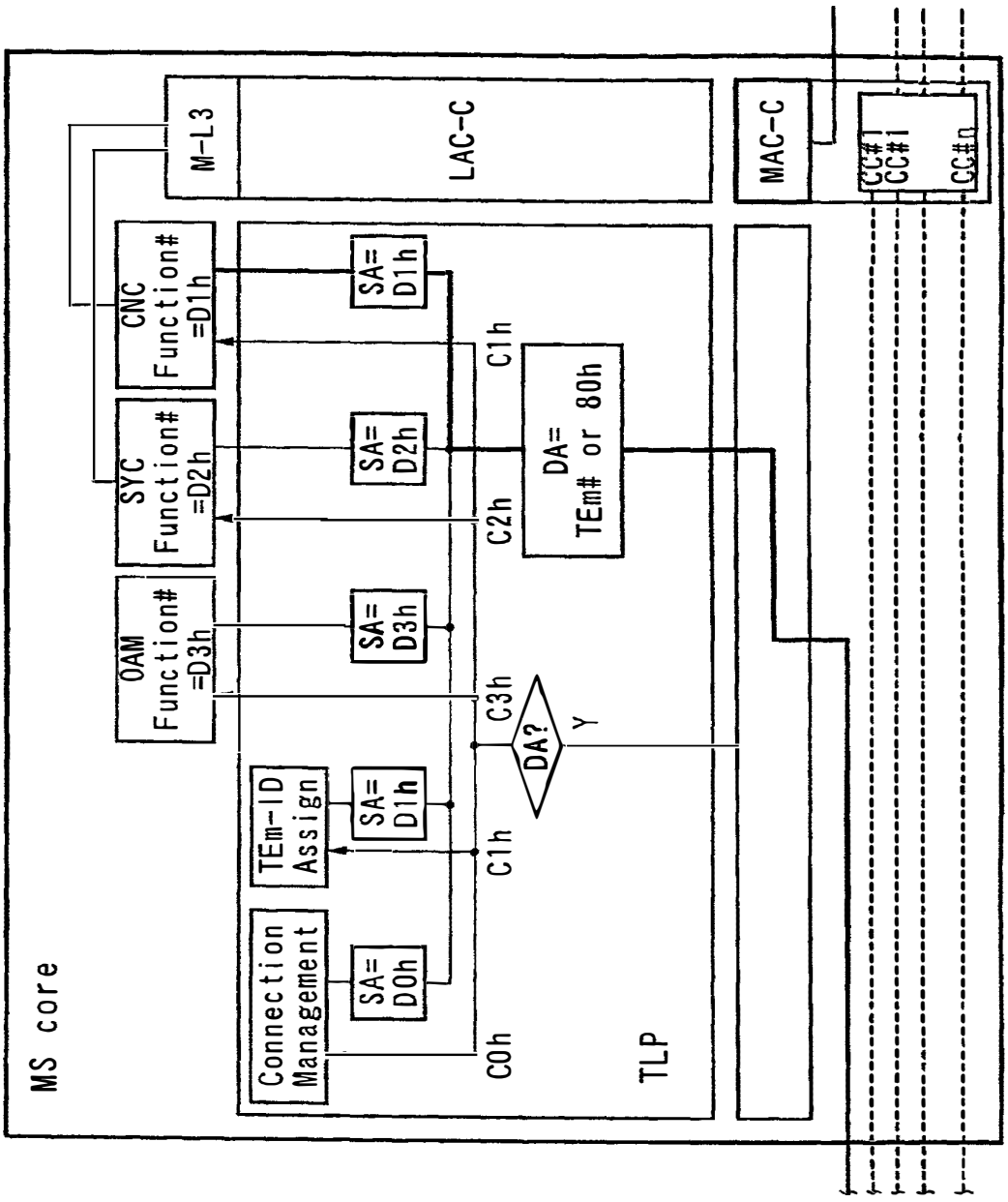
IPR2023-01270 Page 625

FIG. 75



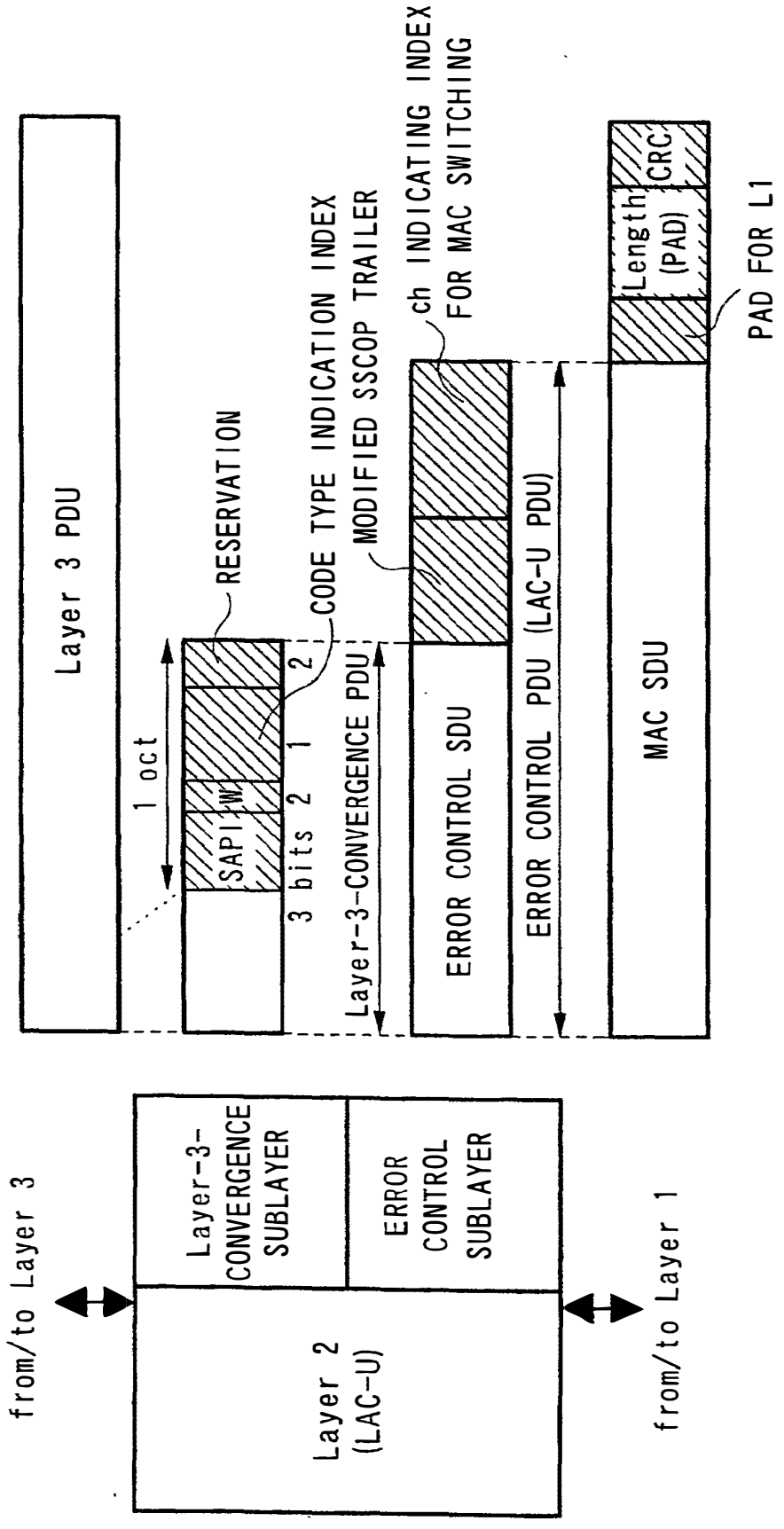
IPR2023-01270 Page 626

CONTINUANCE OF FIG. 75



IPR2023-01270 Page 627

FIG. 76



IPR2023-01270 Page 628

FIG. 77

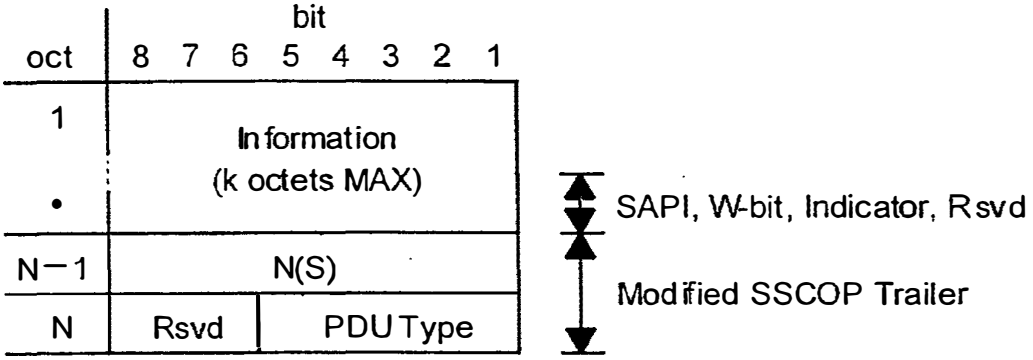


FIG. 78

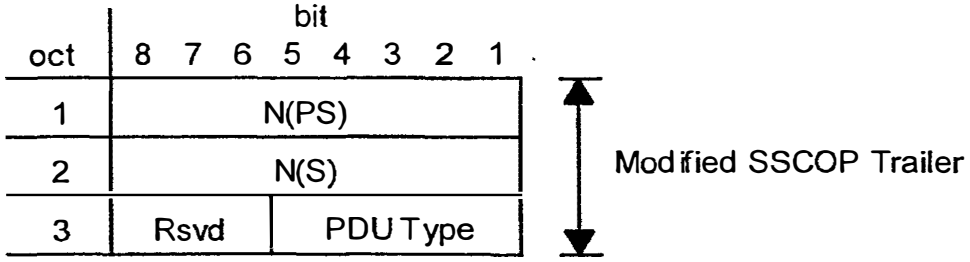
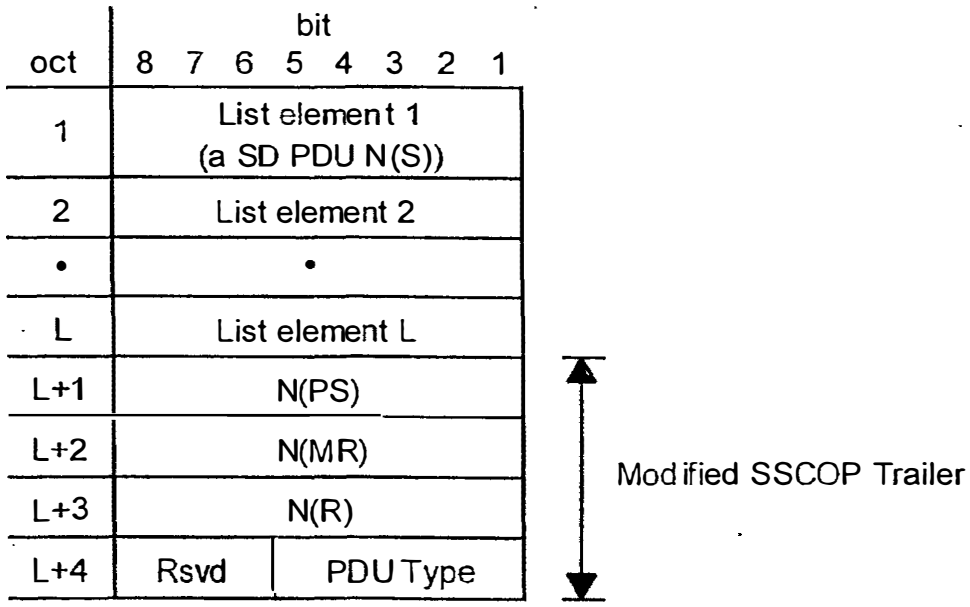


FIG. 79



IPR2023-01270 Page 629

FIG. 80

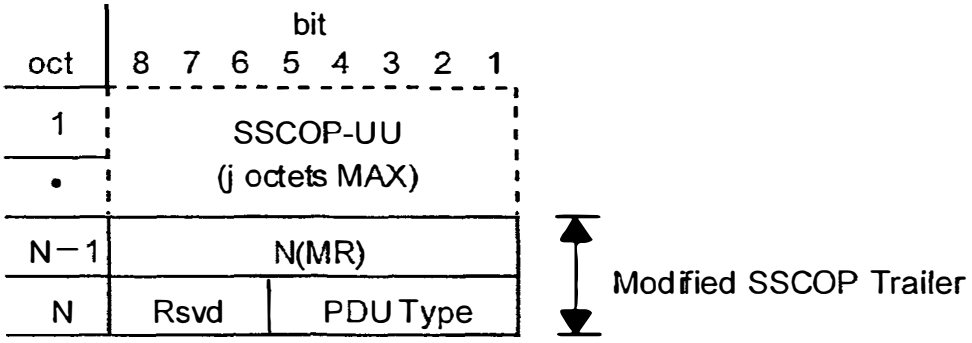


FIG. 81

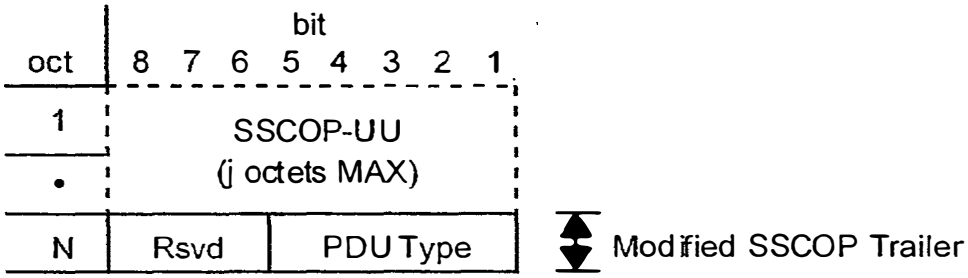


FIG. 82

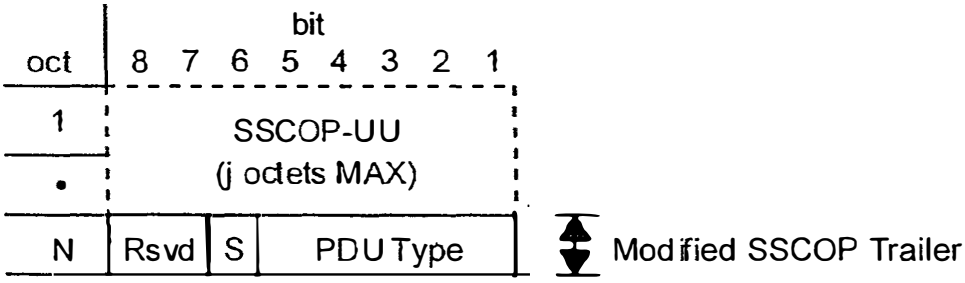
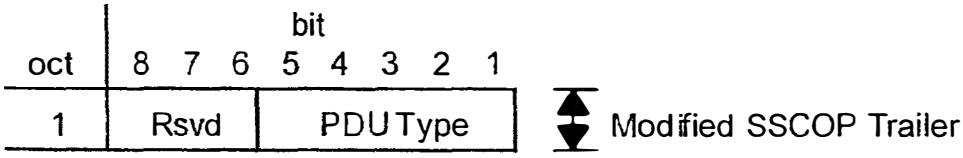


FIG. 83



IPR2023-01270 Page 630

FIG. 84

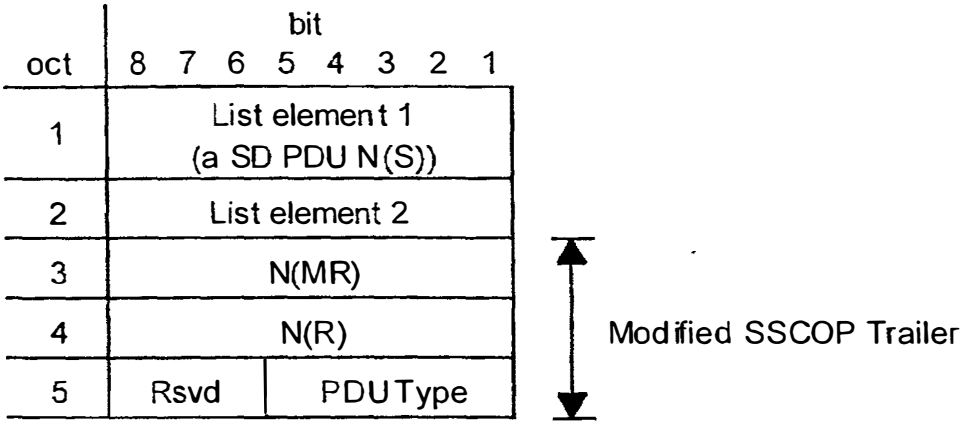


FIG. 85

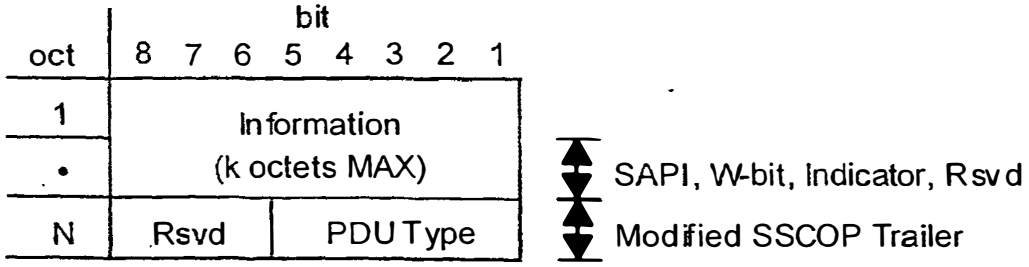
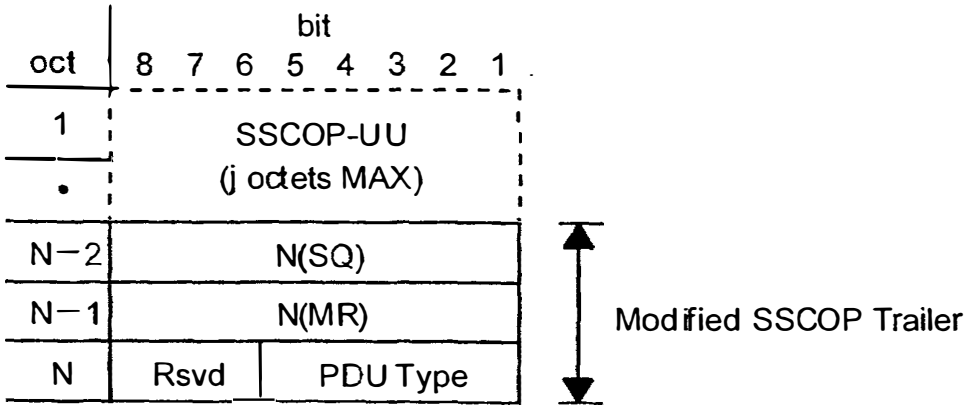


FIG. 86



IPR2023-01270 Page 631

FIG. 87

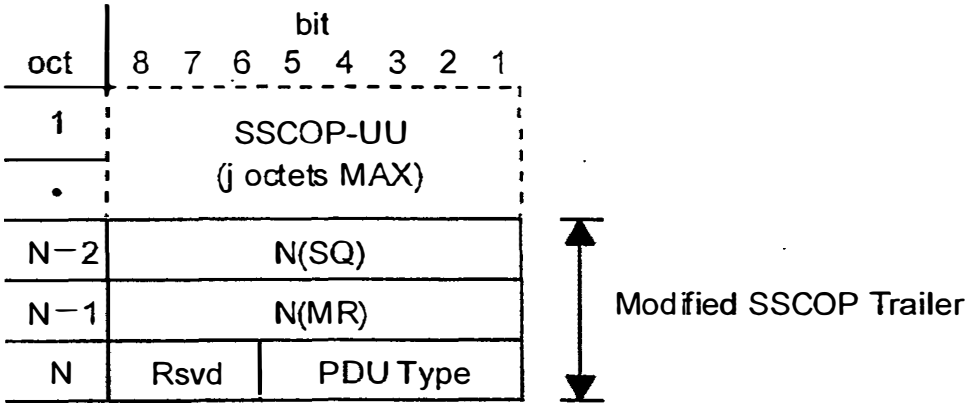


FIG. 88

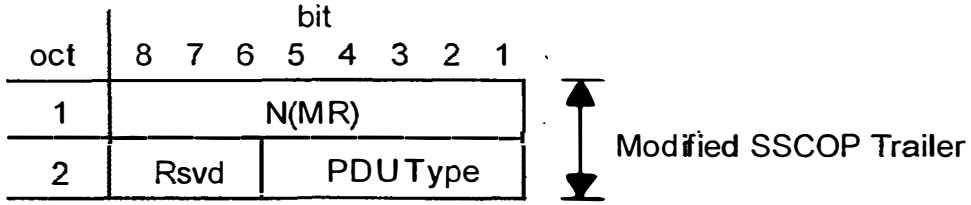


FIG. 89

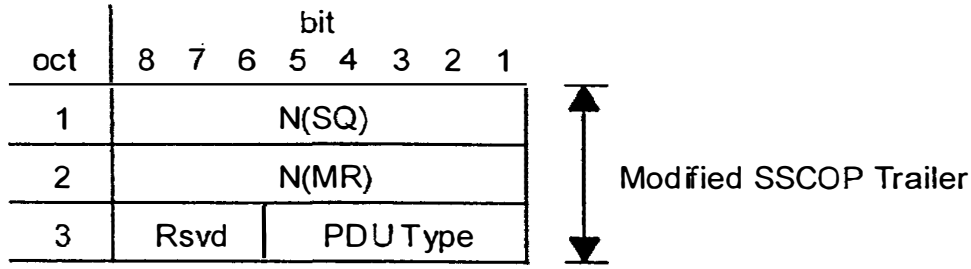
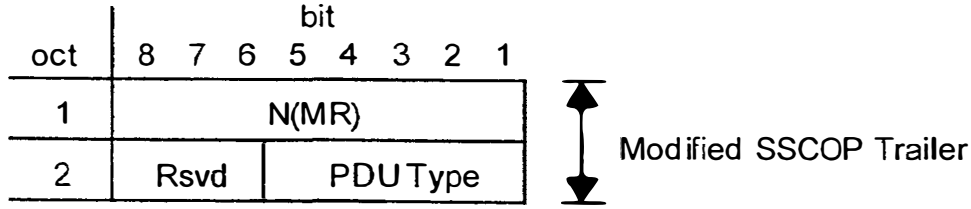
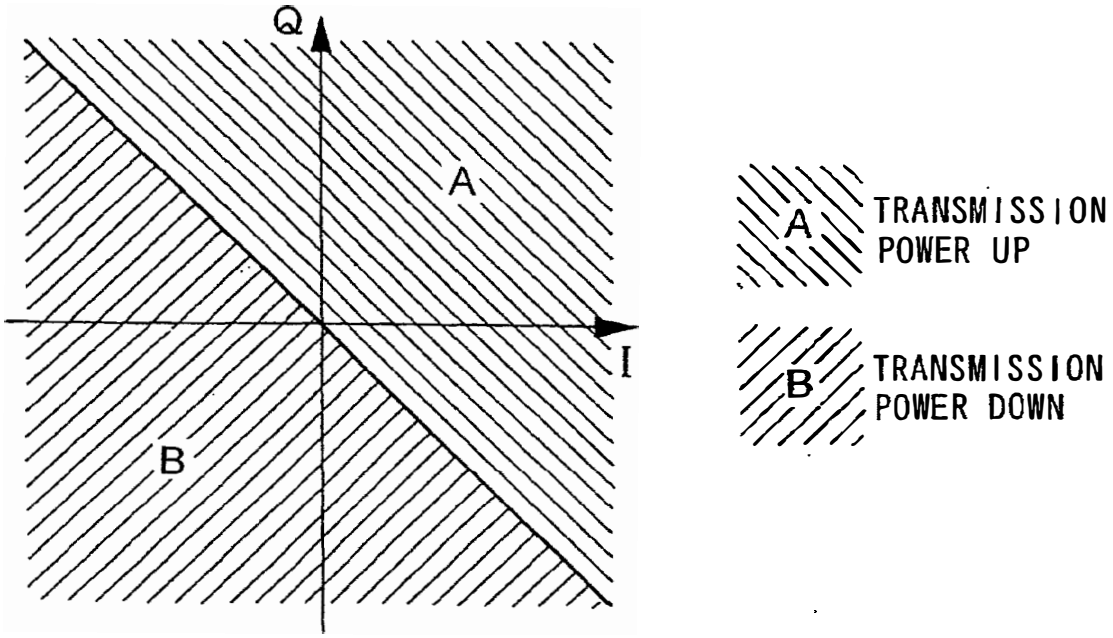


FIG. 90



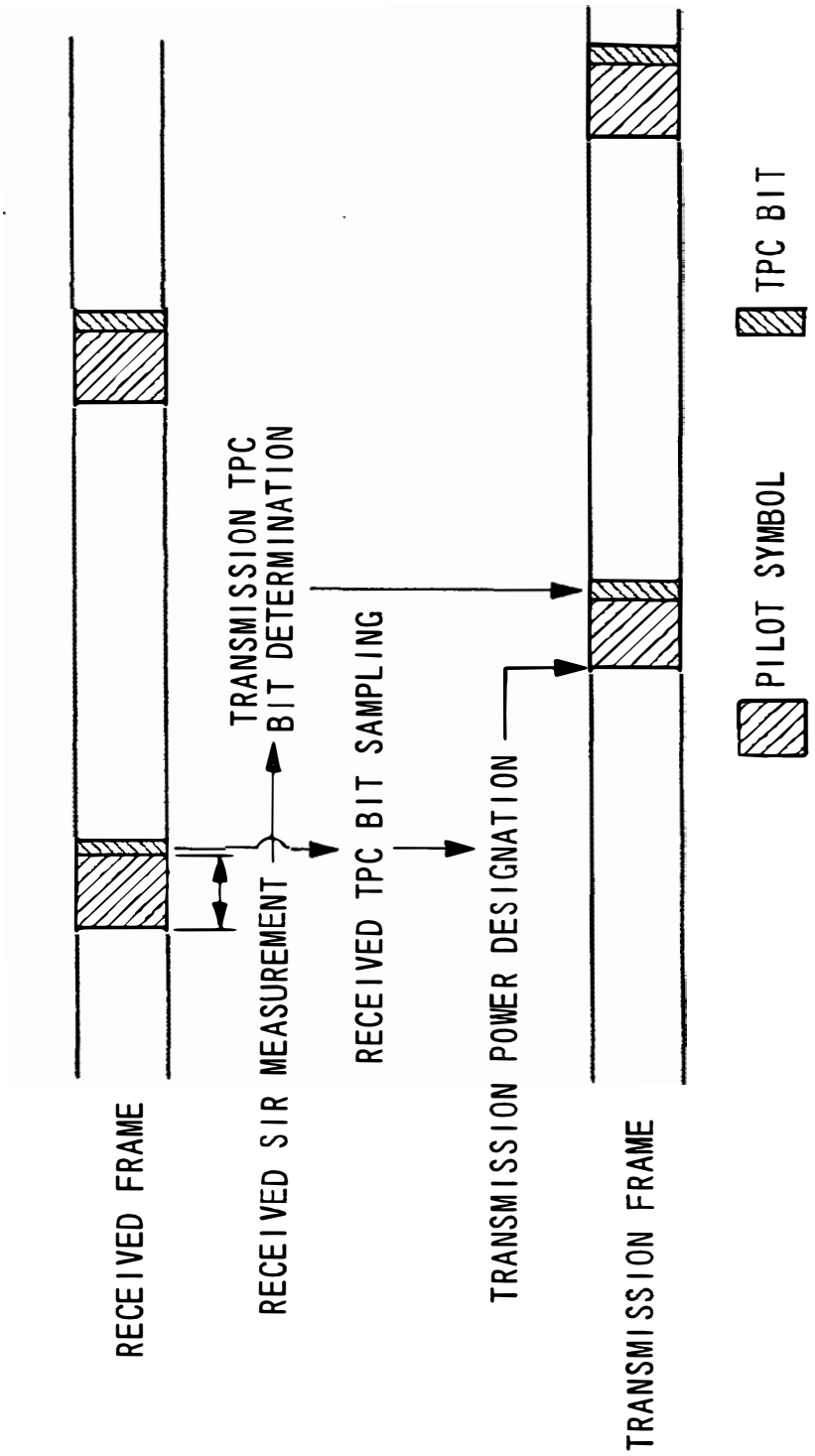
IPR2023-01270 Page 632

FIG. 91



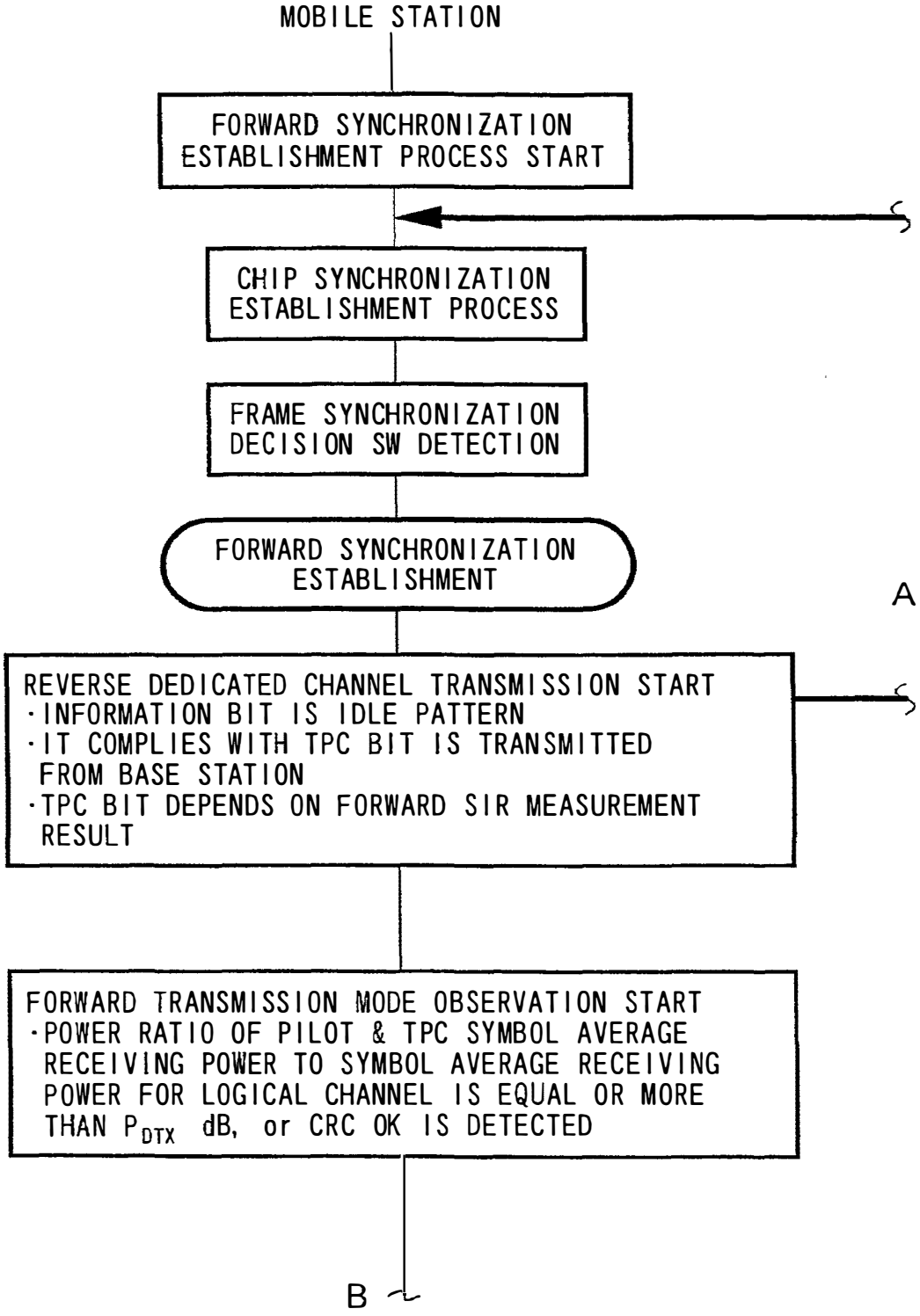
IPR2023-01270 Page 633

FIG. 92



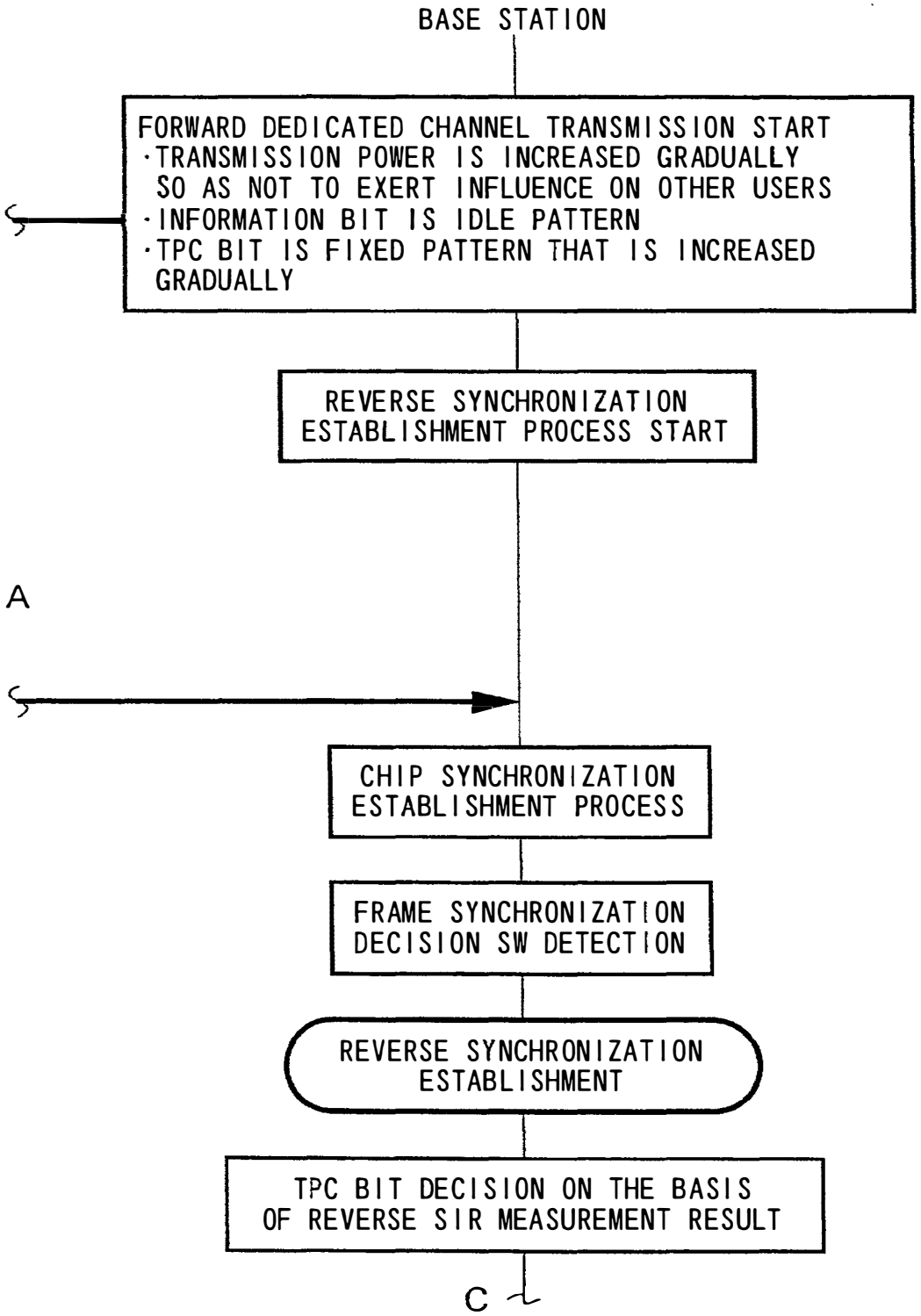
IPR2023-01270 Page 634

FIG. 93



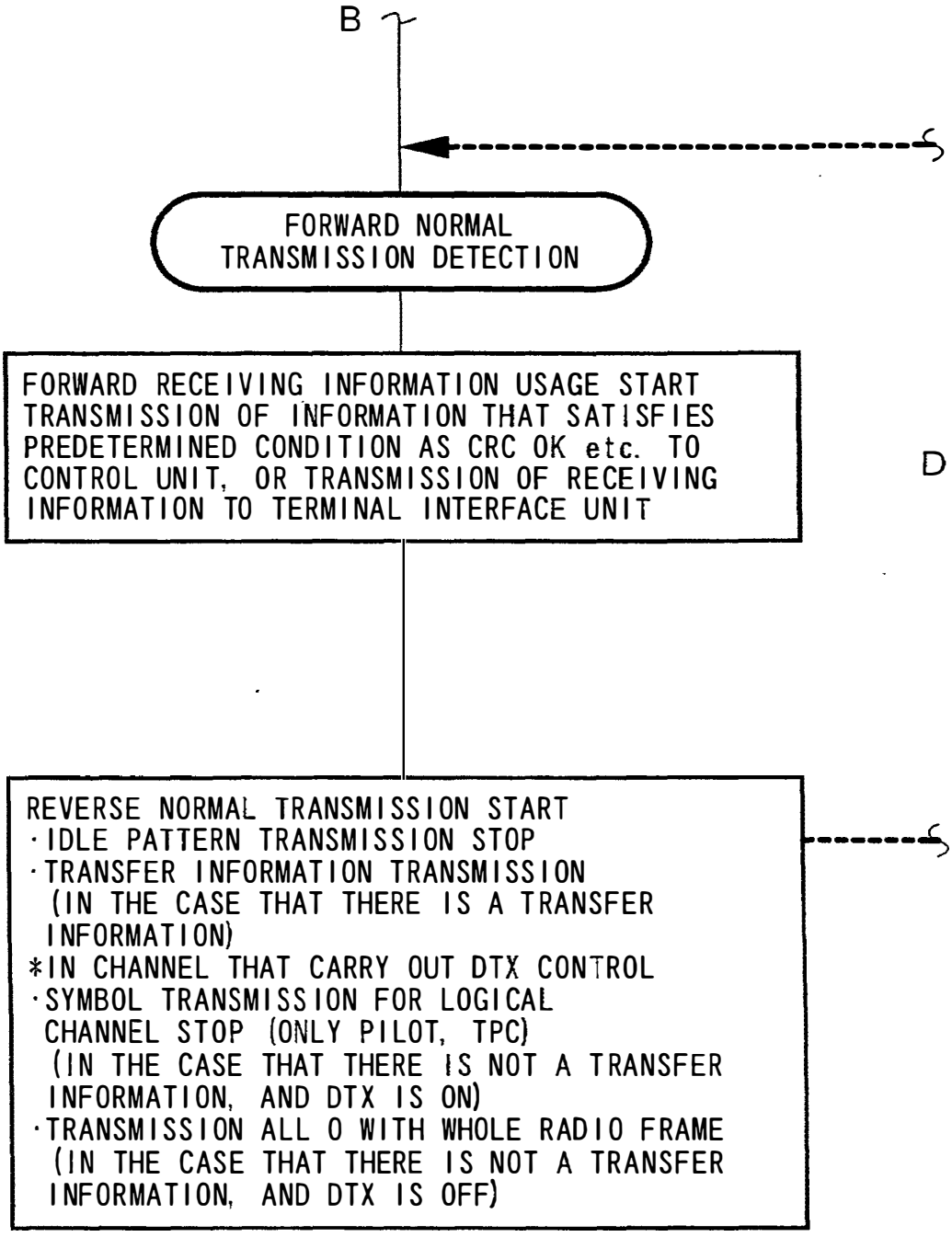
IPR2023-01270 Page 635

CONTINUANCE OF FIG. 93



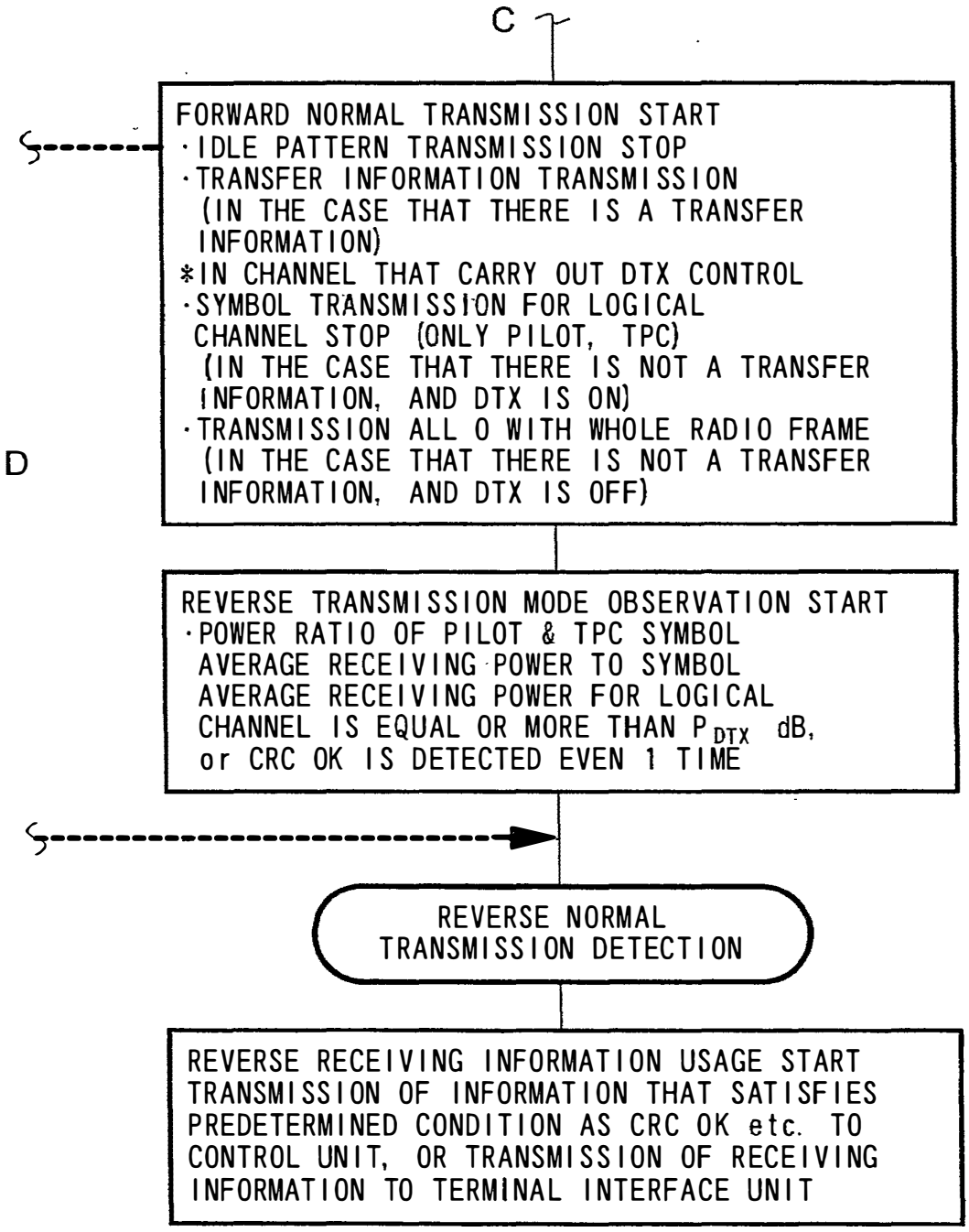
IPR2023-01270 Page 636

CONTINUANCE OF FIG. 93



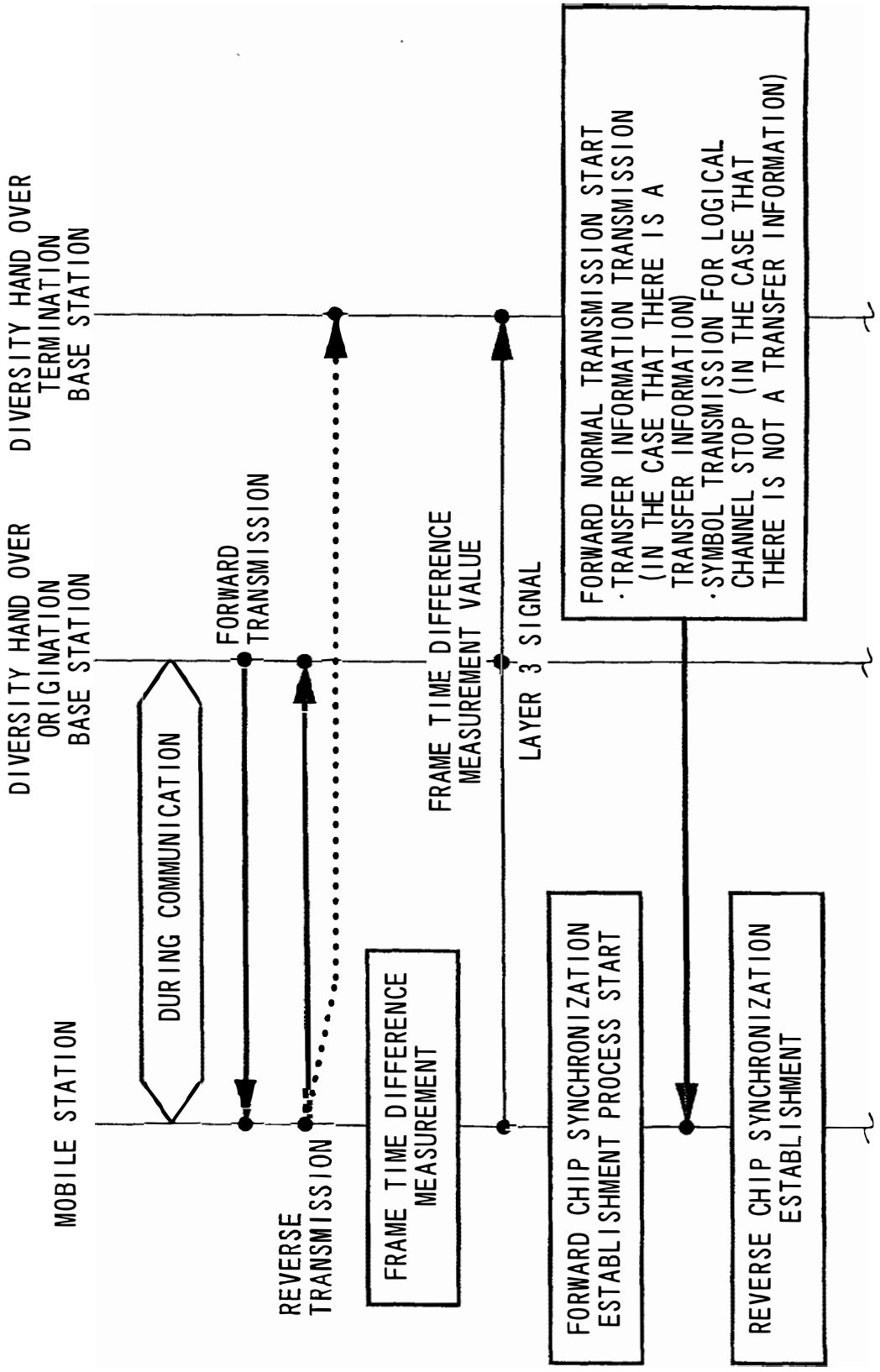
IPR2023-01270 Page 637

CONTINUANCE OF FIG. 93



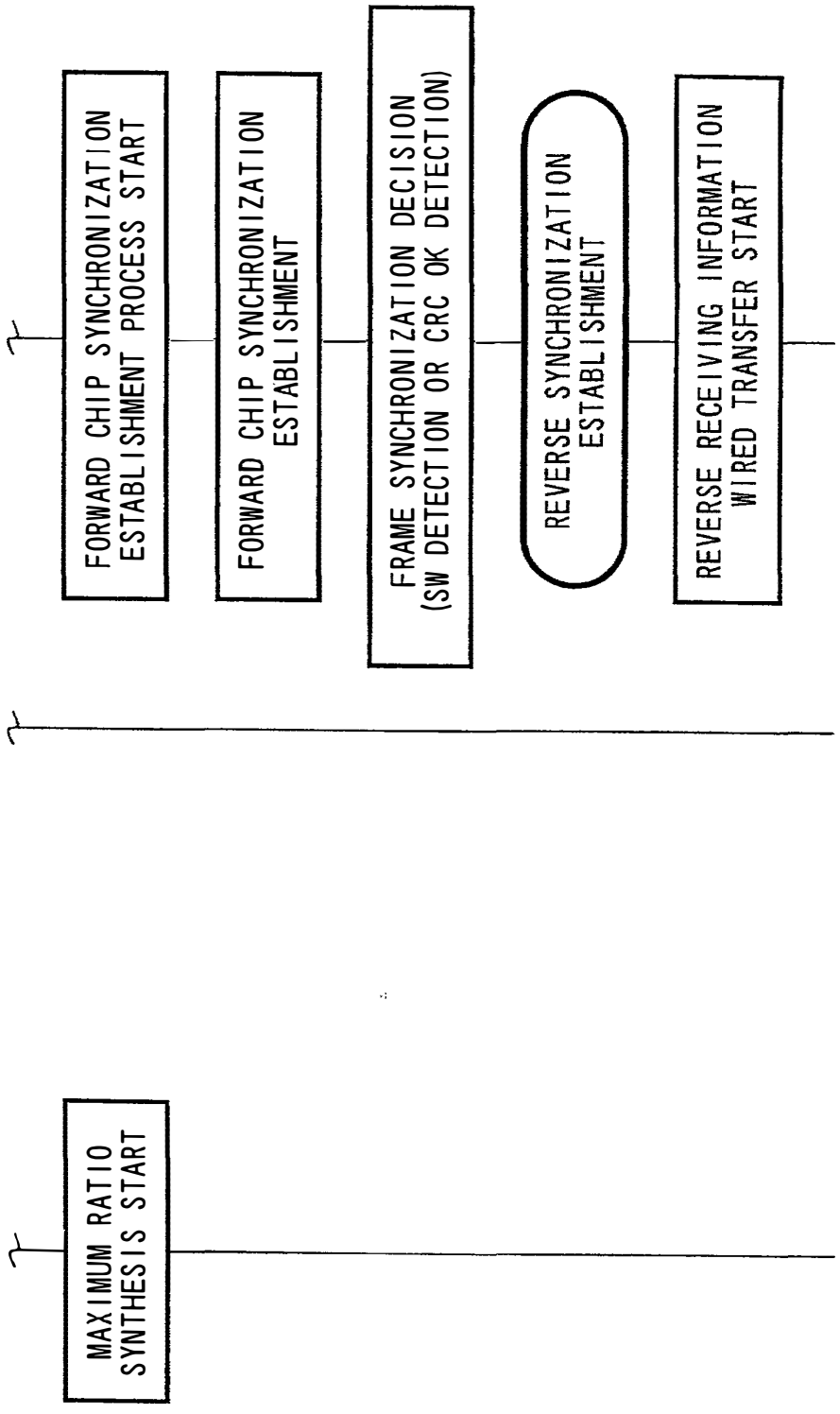
IPR2023-01270 Page 638

FIG. 94



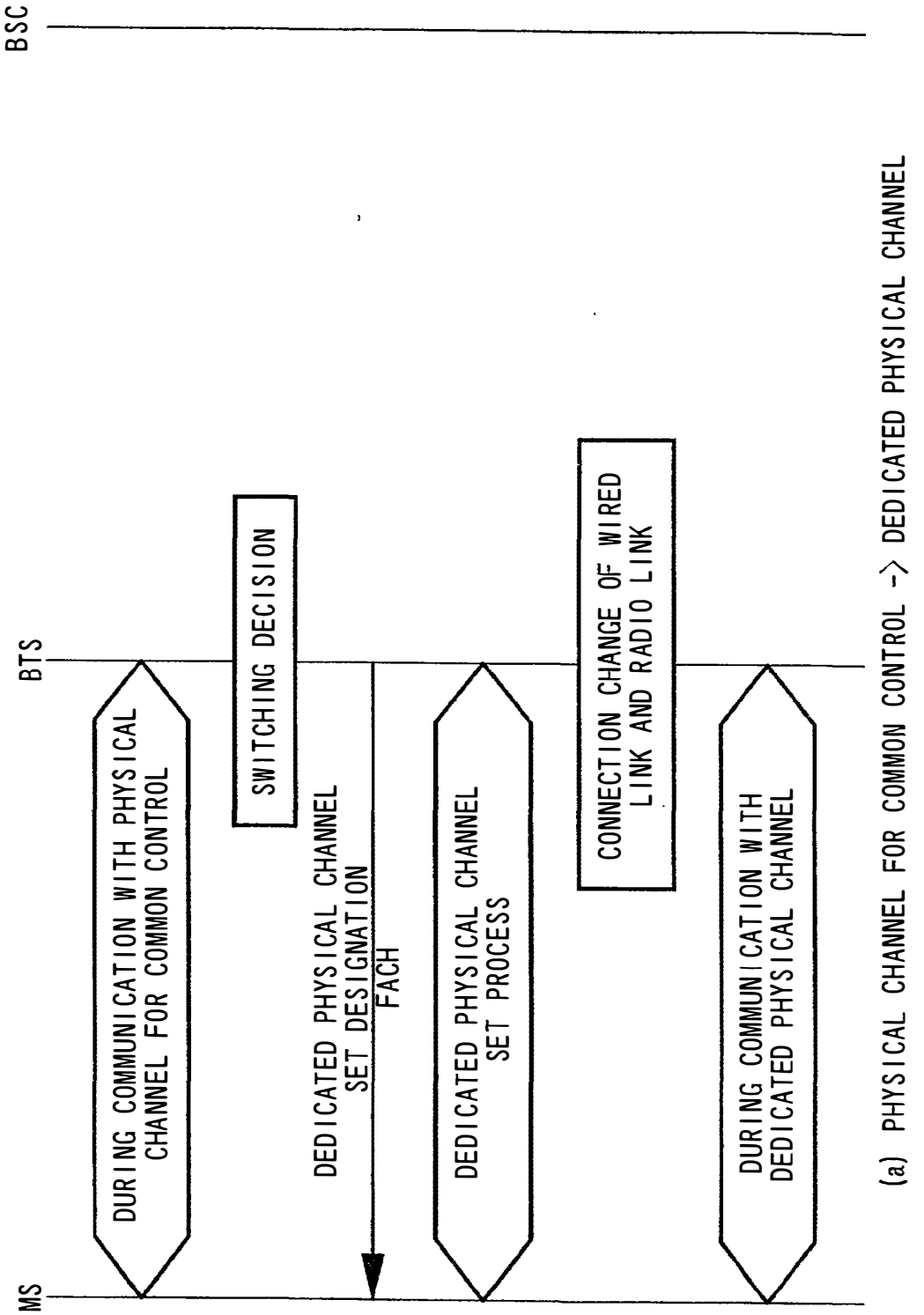
IPR2023-01270 Page 639

CONTINUANCE OF FIG. 94



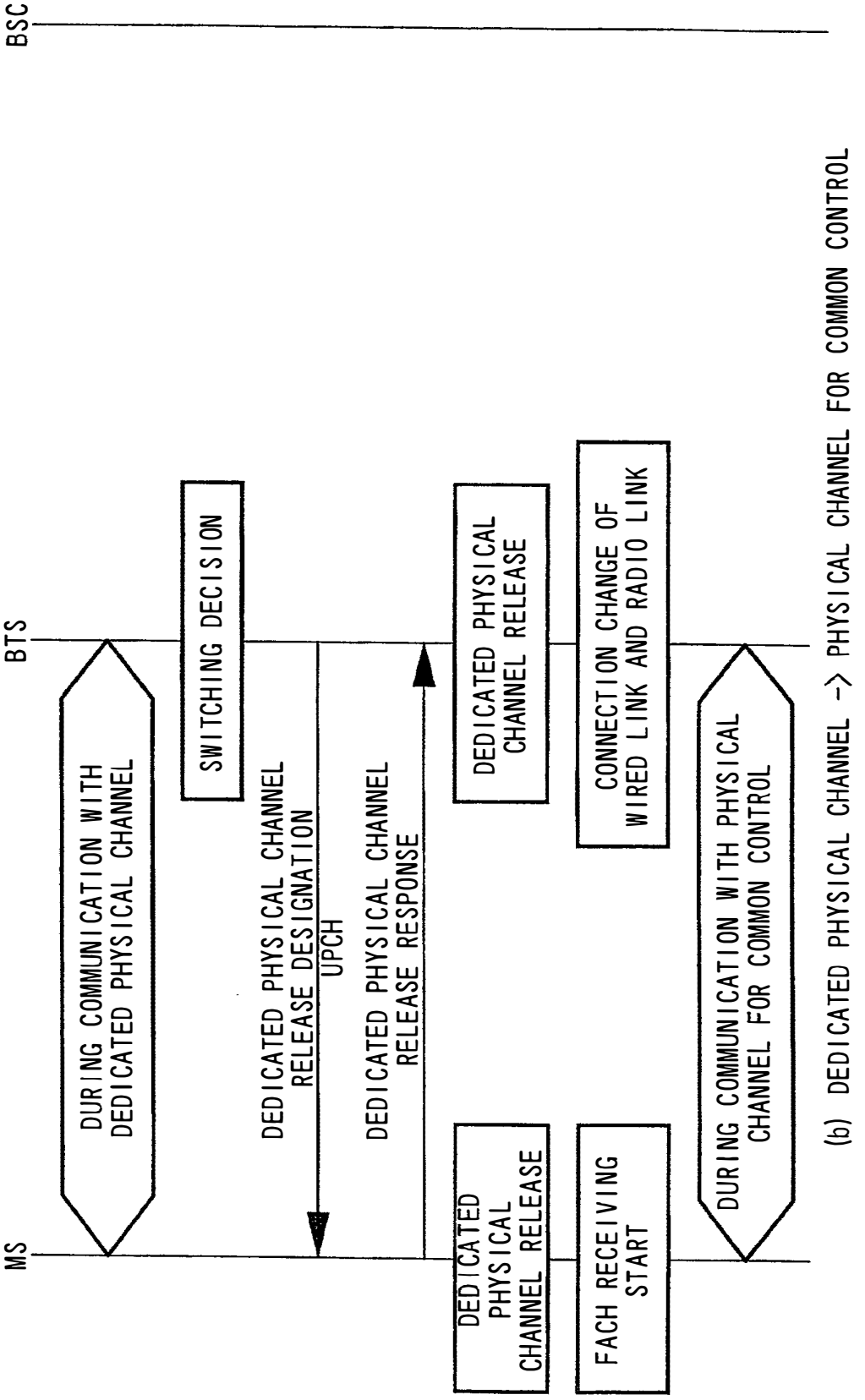
IPR2023-01270 Page 640

FIG. 95



IPR2023-01270 Page 641

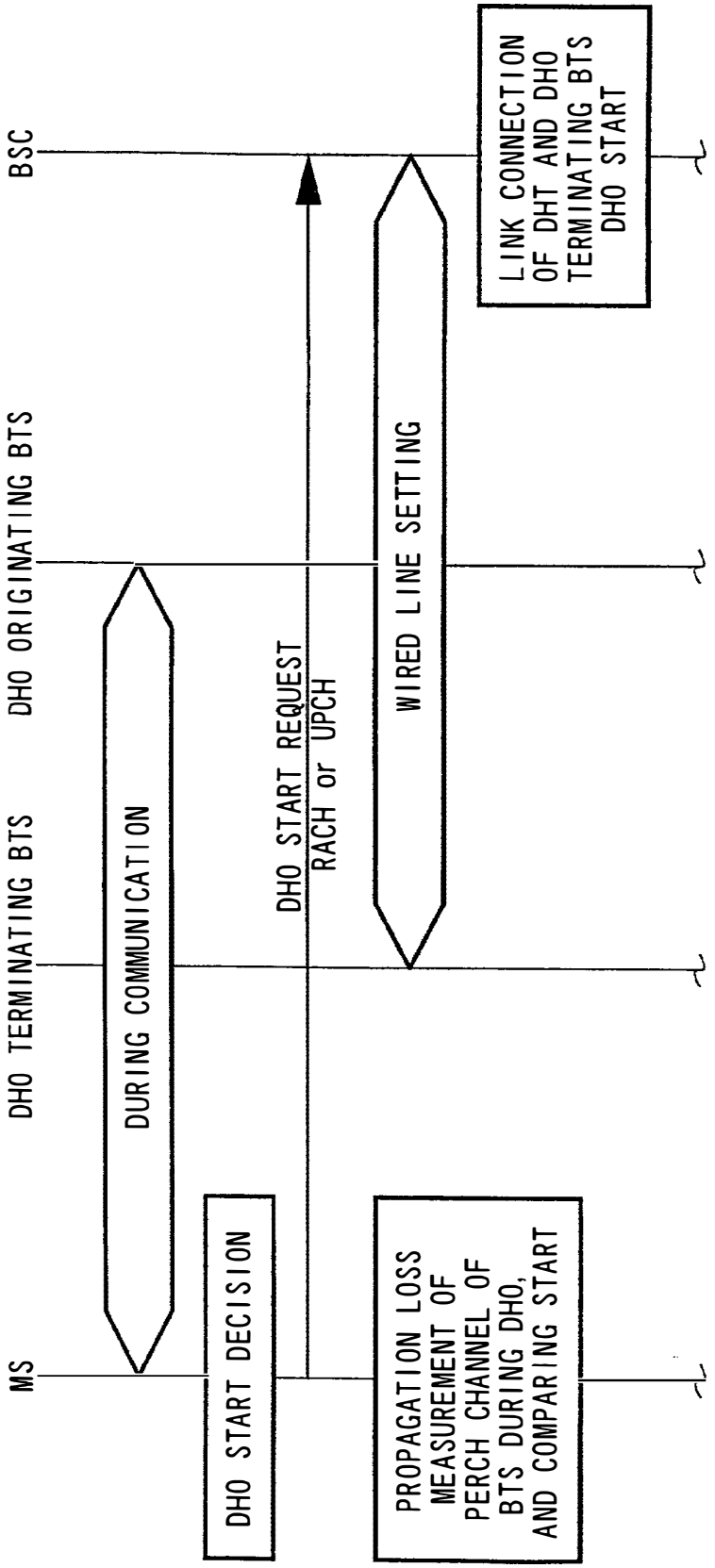
CONTINUANCE OF FIG. 95



(b) DEDICATED PHYSICAL CHANNEL -> PHYSICAL CHANNEL FOR COMMON CONTROL

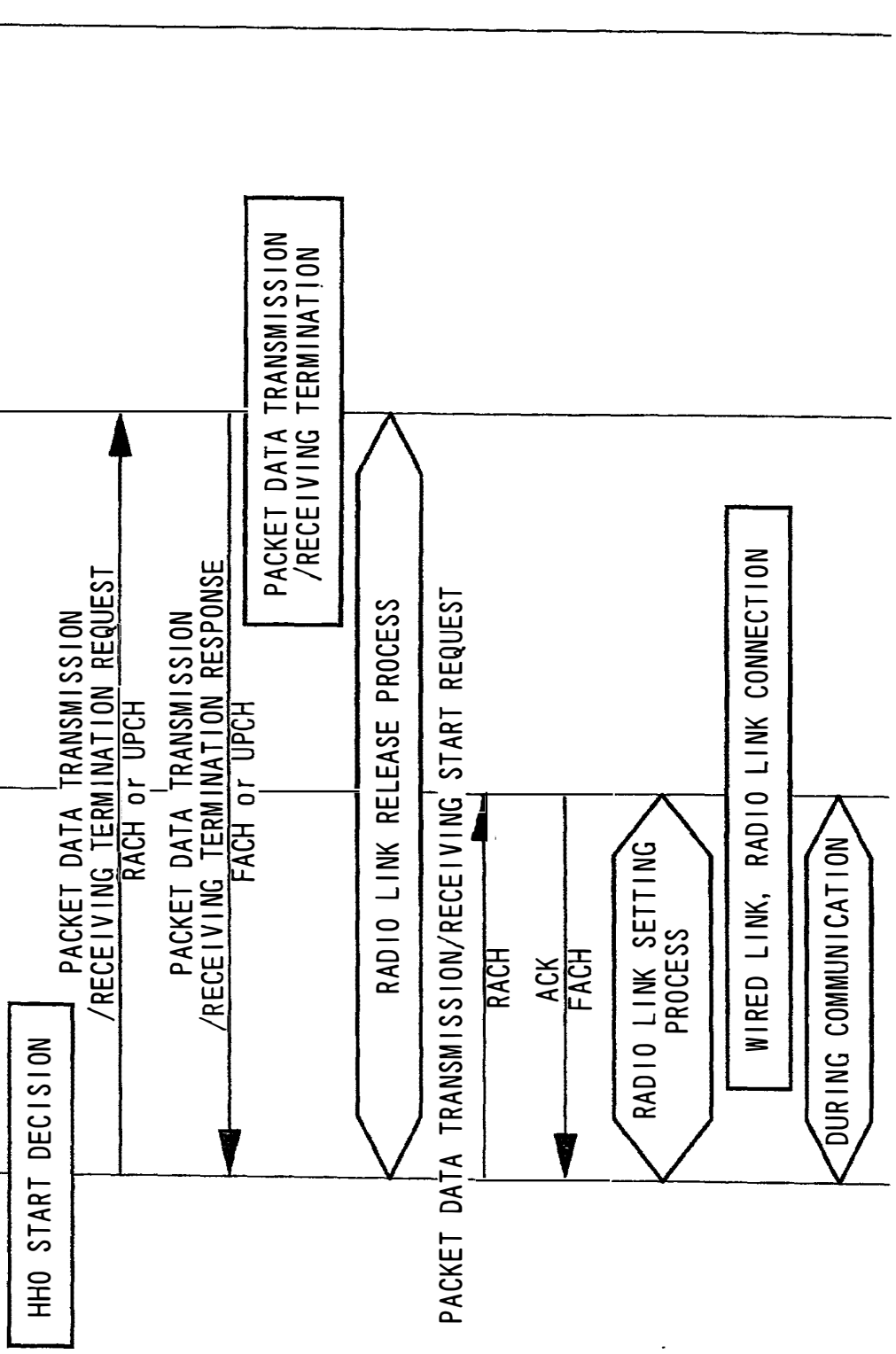
IPR2023-01270 Page 642

FIG. 96



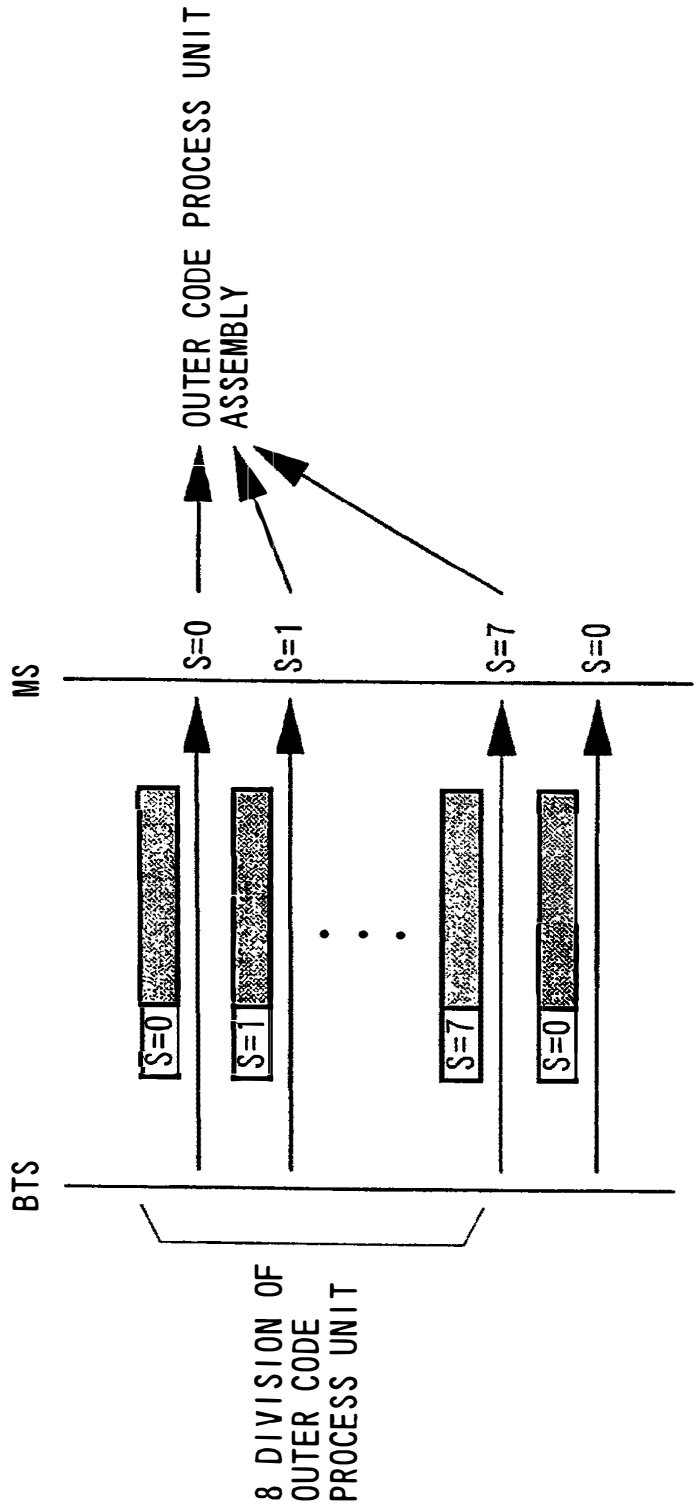
IPR2023-01270 Page 643

CONTINUANCE OF FIG. 96



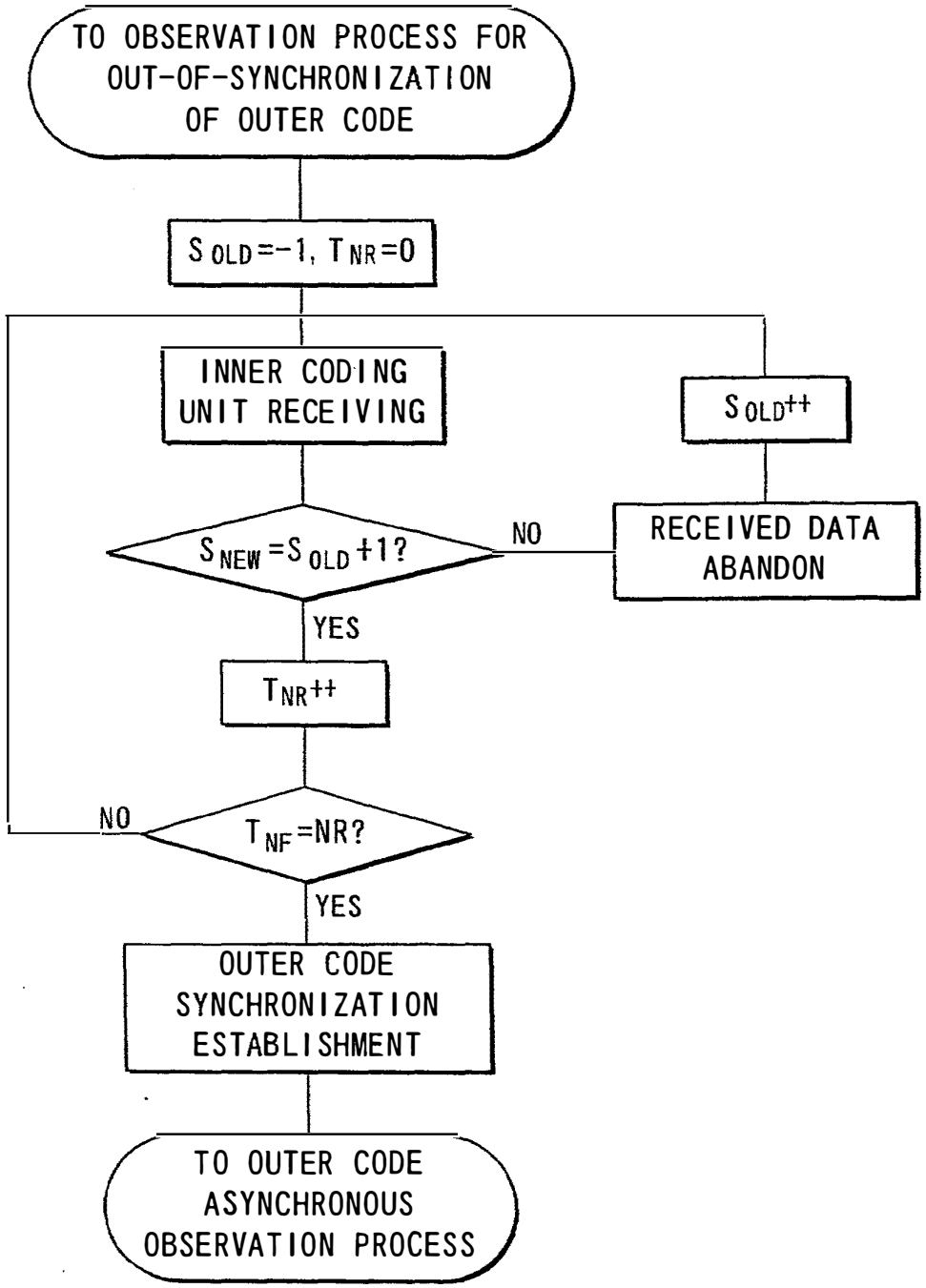
IPR2023-01270 Page 644

FIG. 97



IPR2023-01270 Page 645

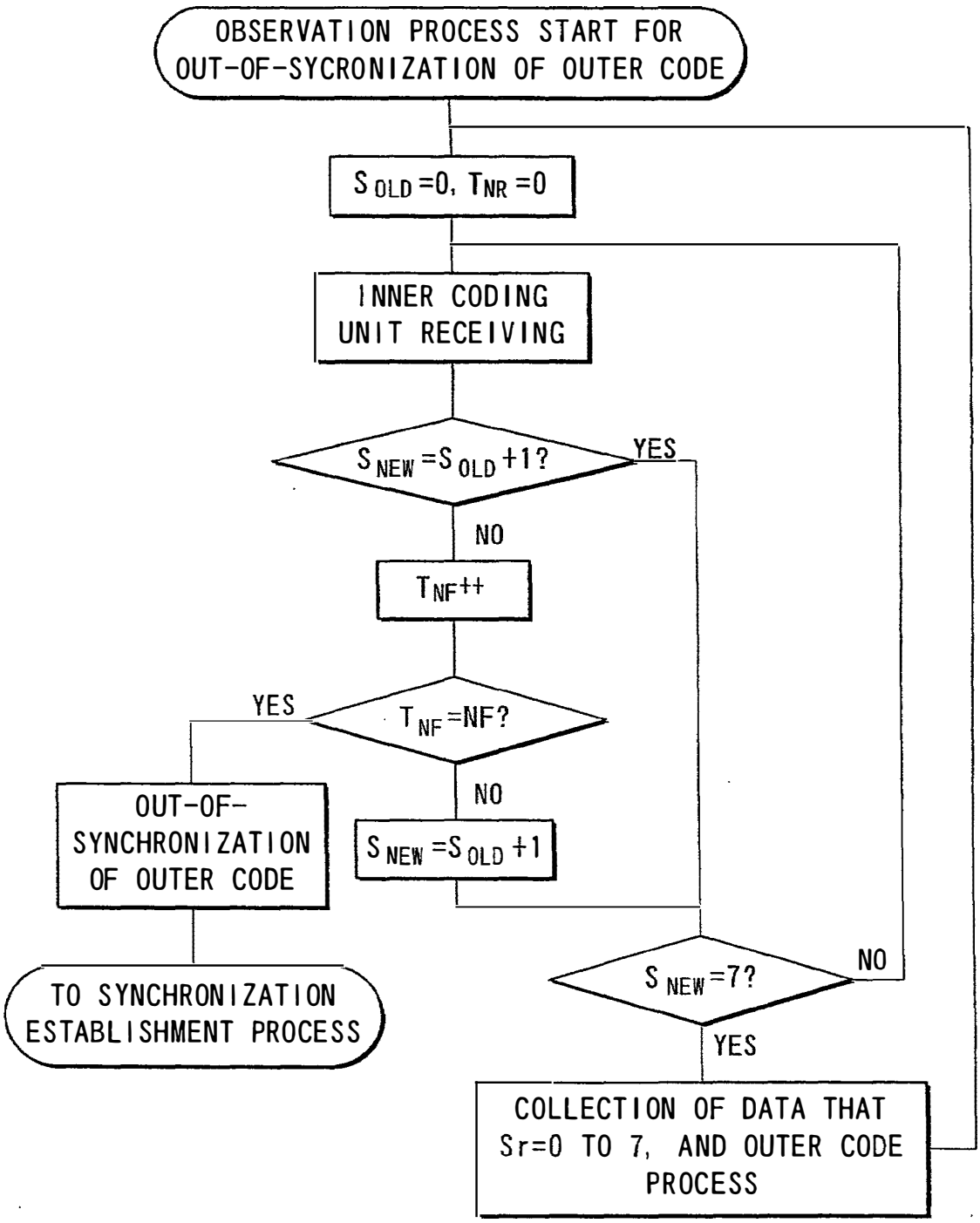
FIG. 98



S_{OLD}: S THAT RECEIVED AT LAST TIME
S_{NEW}: S THAT RECEIVED AT THIS TIME
T_{NR} : OBSERVATION COUNTER FOR SYNCHRONIZATION ESTABLISHMENT
NR: BACKWARD PROTECTION STEP

IPR2023-01270 Page 646

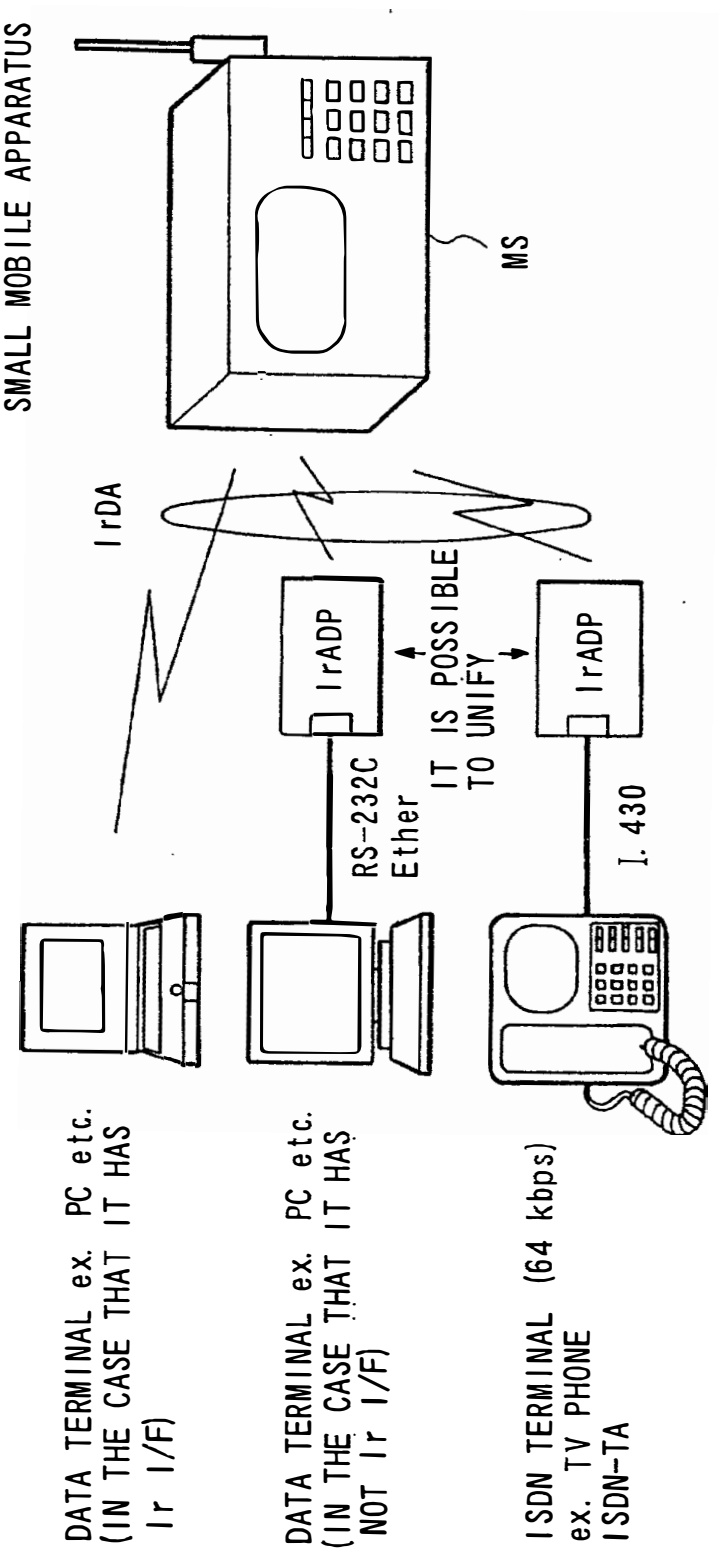
FIG. 99



S_{OLD} : S THAT RECEIVED AT LAST TIME
S_{NEW} : S THAT RECEIVED AT THIS TIME
T_{NF} : OBSERVATION COUNTER FOR OUT-OF-SYNCHRONIZATION
NF: FORWARD PROTECTION STEP

IPR2023-01270 Page 647

FIG. 100



IPR2023-01270 Page 648

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP98/01717

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl[6] H04J13/00

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)
Int.Cl[6] H04J13/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho (Y1, Y2) 1926-1998 Toroku Jitsuyo Shinan Koho (U) 1994-1998
Kokai Jitsuyo Shinan Koho (U) 1971-1998 Jitsuyo Shinan Toroku Koho (Y2) 1996-1998

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP, 6-501349, A (Qualcomm Inc.), February 10, 1994 (10. 02. 94), Fig. 4a, 4b & WO, 92/00639, A1	1, 2
X	JP, 6-204980, A (Hitachi, Ltd.), July 22, 1994 (22. 07. 94), Fig. 1 (Family: none)	4, 5, 6
A	JP, 7-312783, A (NTT Mobile Communications Network Inc.), November 28, 1995 (28. 11. 95), Fig. 1 & US, 5,586,113, A	1-7

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
July 6, 1998 (06. 07. 98)	July 14, 1998 (14. 07. 98)
Name and mailing address of the ISA/ Japanese Patent Office	Authorized officer
Facsimile No.	Telephone No.

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

IPR2023-01270 Page 649

Electronic Acknowledgement Receipt

EFS ID:	10375912
Application Number:	11434330
International Application Number:	
Confirmation Number:	5166
Title of Invention:	Supporting enhanced uplink transmission during soft handover
First Named Inventor/Applicant Name:	Guodong Zhang
Customer Number:	24374
Filer:	Donald J. Cox/Carey Kulp
Filer Authorized By:	Donald J. Cox
Attorney Docket Number:	I-2-0674.2US
Receipt Date:	23-JUN-2011
Filing Date:	15-MAY-2006
Time Stamp:	17:15:12
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	ids.pdf	51840 abeaf3c076e473787780087b8ca697ed ac78d556	no	2
Warnings:					
Information:					

2	Information Disclosure Statement (IDS) Form (SB08)	PTO1449.pdf	59549 10a26949c6e663b6c5b886f34178d3a6c63a1be2	no	4
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Foreign Reference	EP0977393.PDF	7303600 dc6c03288a0452ff30b55926f4945530af124469	no	200
Warnings:					
Information:					
4	Non Patent Literature	25_212_V3_11_0.pdf	755525 6ead541265123bf3cca4fe5007949e4bde1b481d	no	62
Warnings:					
Information:					
5	Non Patent Literature	25_212_V4_6_0.pdf	752154 cc4b50e4d7e36c8a1494d8ffb6ac5ab10ca872bc	no	62
Warnings:					
Information:					
6	Non Patent Literature	25_212_V5_6_0.pdf	899898 7773c95a26fdcff04e1ff7fce8b8377e08fe51ef	no	75
Warnings:					
Information:					
7	Non Patent Literature	25_212_V5_9_0.pdf	893155 8d15c8c680d75844fa2f3b769e5283e4e66ce000	no	76
Warnings:					
Information:					
8	Non Patent Literature	25_212_V6_2_0.pdf	893532 fce17779b0f9fade8e9a38dd97d721910a0fbe6e	no	76
Warnings:					
Information:					
9	Non Patent Literature	25_321_V3_16_0.pdf	491043 6e75a33fee76ba7cf33c470bafc19d6456033a15	no	41
Warnings:					
Information:					
10	Non Patent Literature	25_321_V3_17_0.pdf	491608 92be26aa84660121ee4fc8aa4b11f8fb73f036d1	no	41

Warnings:					
Information:					
11	Non Patent Literature	25_321_V4_10_0.pdf	502736 50daf8954b35f455854e83f96ca26e0d6afd22a9	no	43
Warnings:					
Information:					
12	Non Patent Literature	25_321_V5_9_0.pdf	646224 7b80500d55a6f3b4b1fb30dca2949633394 61b5a	no	61
Warnings:					
Information:					
13	Non Patent Literature	25_321_V6_2_0.pdf	646759 a80ed51f78ef87b6396d45cf2d6f36d0157e635a	no	61
Warnings:					
Information:					
14	Non Patent Literature	25_896_v1_0_2.pdf	2737198 ad57c20a99bf513823da8fc593bc3104ace7462e	no	85
Warnings:					
Information:					
15	Non Patent Literature	25_896_v6_0_0.pdf	8266683 aa9df1aece516208ded83292e0fa13b8c01ecfa71	no	179
Warnings:					
Information:					
16	Non Patent Literature	25321v490.pdf	502195 5a7cbdd304df5d7ed00f31b57aa0b18f35c7cbd8	no	43
Warnings:					
Information:					
17	Non Patent Literature	25321V560.pdf	604605 a7771c99f619c1af06e14396530eabb54752ab93	no	55
Warnings:					
Information:					
		Total Files Size (in bytes):	26498304		

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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the PATENT APPLICATION of:	
	Zhang et al.
Application No.:	11/434,330
Confirmation No.:	5166
Filed:	May 15, 2006
For:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
Group:	2466
Examiner:	Brian S. Roberts

Our File:	I-2-0674.2US
Date:	June 23, 2011

INFORMATION DISCLOSURE STATEMENT

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

Sir:

Further to Applicants' Duty of Disclosure pursuant to 37 C.F.R. §1.56, Applicants wish to bring to the Examiner's attention the material cited on the enclosed Form PTO-1449.

The listed references include references previously cited in this application. Newly cited documents are indicated by an asterisk (*) on the enclosed Form PTO-1449. Copies of the newly cited documents are enclosed.

This Application is a continuation of Non-Provisional Application No. 10/962,720, filed on October 12, 2004, which issued on May 16, 2006 as U.S. Patent No.

7,046,648, which claims priority from Provisional Application No. 60/578,674, which was filed on June 10, 2004, Provisional Application No. 60/520,692, which was filed on November 17, 2003, Provisional Application No. 60/519,990, which was filed on November 14, 2003, and Provisional Application No. 60/517,656, which was filed on November 5, 2003.

It is respectfully requested that the Examiner consider these documents and return an initialed copy of the Form PTO-1449 indicating his consideration of the cited materials.

Respectfully submitted,

Zhang et al.

By__/Melissa D. Doogan/_____
Melissa D. Doogan
Registration No. 63,025
(215) 568-6400

Volpe and Koenig, P.C.
United Plaza, Suite 1600
30 South 17th Street
Philadelphia, PA 19103

MDD/pck
Enclosures (16)

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

24374 7590 08/02/2011

VOLPE AND KOENIG, P.C.
DEPT. ICC
UNITED PLAZA
30 SOUTH 17TH STREET
PHILADELPHIA, PA 19103

EXAMINER
ROBERTS, BRIAN S

ART UNIT	PAPER NUMBER
2466	

DATE MAILED: 08/02/2011

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/434,330	05/15/2006	Guodong Zhang	I-2-0674.2US	5166

TITLE OF INVENTION: SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1510	$300	$0	$1810	11/02/2011

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.

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)

24374 7590 08/02/2011

VOLPE AND KOENIG, P.C.
DEPT. ICC
UNITED PLAZA
30 SOUTH 17TH STREET
PHILADELPHIA, PA 19103

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

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being 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.
11/434,330	05/15/2006	Guodong Zhang	I-2-0674.2US	5166

TITLE OF INVENTION: SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1510	$300	$0	$1810	11/02/2011

EXAMINER	ART UNIT	CLASS-SUBCLASS
ROBERTS, BRIAN S	2466	370-331000

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.

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.
11/434,330	05/15/2006	Guodong Zhang	I-2-0674.2US	5166

24374 7590 08/02/2011

VOLPE AND KOENIG, P.C.
DEPT. ICC
UNITED PLAZA
30 SOUTH 17TH STREET
PHILADELPHIA, PA 19103

EXAMINER	
ROBERTS, BRIAN S	

ART UNIT	PAPER NUMBER
2466	

DATE MAILED: 08/02/2011

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 80 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 80 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.

Privacy Act Statement

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

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

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

Notice of Allowability	Application No.	Applicant(s)	
	11/434,330	ZHANG ET AL.	
	Examiner	Art Unit	
	BRIAN ROBERTS	2466	

-- 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 *the RCE filed on 04/21/2011.*

2. ☒ The allowed claim(s) is/are *9-10,14; renumbered 1,3,2 respectively.*

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 ____.

/Brian Roberts/
Examiner, Art Unit 2466

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0674.2US	SERIAL NO. 11/434,330
	APPLICANT Zhang et al.	
	FILING DATE May 15, 2006	GROUP 2466

U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
		6,678,249	01/2004	Toskala et al.[4]			
		6,778,830	08/2004	Oizumi et al.			
		6,892,071	05/2005	Park et al.			
		7,013,143	03/2006	Love et al.			
		7,346,035	03/2008	Lee et al.			
		7,414,989	08/2002	Kuchibhotla et al.			
		2002/0095635	07/2002	Wager et al.			
		2002/0191544	12/2002	Cheng et al.			
		2003/0007480	01/2003	Kim et al.			
		2003/0054824	03/2003	Choi et al.			
		2003/0081692	05/2003	Kwan et al.			
		2003/0161284	08/2003	Chen			
		2003/0210668	11/2003	Malladi et al.			
		2004/0004954	01/2004	Terry et al.			
		2004/0072567	04/2004	Cao et al.			
		2004/0085934	05/2004	Balachandran et la.			
		2004/0120306	06/2004	Wigard et al.			
		2004/0160925	08/2004	Heo et al.[1]			
		2004/0202129	10/2004	Kolding et al.			
		2004/0203991	10/2004	Chen et al.			
		2004/0219917	11/2004	Love et al.			
		2004/0219919	11/2004	Whinnett et al.			
		2004/0219920	11/2004	Love et al.			
		2004/0228313	11/2004	Cheng et al.			
		2005/0041694	02/2005	Liu			

EXAMINER	DATE CONSIDERED
/Brian Roberts/	07/25/2011

EXAMINER: Initial if citation 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.

1624815_1 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.R./

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0674.2US	SERIAL NO. 11/434,330
	APPLICANT Zhang et al.	
	FILING DATE May 15, 2006	GROUP 2466

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
		2005/0047354	03/2005	Zeira et al.			
		2005/0048920	03/2005	Liu			
		2005/0083888	04/2005	Smee et al.			
		2007/0047501	03/2007	Usuda et al.[2]			

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	TRANSLATION NO
	*	0 977 393	02/2000	EP [5]				
		2 353 439	02/2001	GB				
		2001-128209	05/2001	JP			X**	
		02/01893	01/2002	WO				
		03/053087	06/2003	WO				
		03/067953	08/2003	WO				
		03/088545	10/2003	WO				
		2003112283	12/2005	RU			X**	
		2005110767	10/2006	RU			X**	
		00/074263	12/2000	WO[3]				

OTHER DOCUMENTS

EXAMINER INITIAL		DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Feasibility Study for Enhanced Uplink for UTRA FDD; (Release 6)," 3GPP TR 25.896 V1.0.2 (October 2003).
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Feasibility Study for Enhanced Uplink for UTRA FDD (Release 6)," 3GPP TR 25.896 V6.0.0 (March 2004).

EXAMINER	DATE CONSIDERED
/Brian Roberts/	07/25/2011

EXAMINER: Initial if citation 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.

1624815v1 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.R./

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0674.2US	SERIAL NO. 11/434,330
	APPLICANT Zhang et al.	
	FILING DATE May 15, 2006	GROUP 2466

EXAMINER INITIAL		DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 1999)," 3GPP TS 25.212 V3.11.0 (September 2002).
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 1999)." 3GPP TS 25.321 V3.16.0 (September 2003).
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 4)," 3GPP TS 25.212 V4.6.0 (September 2002).
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 5)," 3GPP TS 25.212 V5.6.0 (September 2003).
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 5)," 3GPP TS 25.212 V5.9.0 (June 2004).
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 6)," 3GPP TS 25.212 V6.2.0 (June 2004).
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 1999)," 3GPP TS 25.321 V3.17.0 (June 2004).
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 6)," 3GPP TS 25.321 V6.2.0 (June 2004).
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 4)," 3GPP TS 25.321 V4.9.0 (September 2003).
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 5)," 3GPP TS 25.321 V5.9.0 (June 2004).
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 4)," 3GPP TS 25.321 V4.10.0 (June 2004).
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 5)," 3GPP TS 25.321 V5.6.0 (September 2003).

EXAMINER	DATE CONSIDERED
/Brian Roberts/	07/25/2011

EXAMINER: Initial if citation 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.

1624815_1 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.R./

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0674.2US	SERIAL NO. 11/434,330
	APPLICANT Zhang et al.	
	FILING DATE May 15, 2006	GROUP 2466

EXAMINER INITIAL		DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
		3GPP, "Third Generation Partnership Project; Technical Specification Group Radio Access Network; FDD Enhanced Uplink; Overall Description; Stage 2 (Release 6)," 3GPP TS 25.309 V6.0.0 (September 2004).
		3GPP2 C.20003-C, "Medium Access Control (MAC) Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Release C, August 2004.
		3GPP2 C.S0004-C, "Signaling Link Access Control (LAC) Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Revision C, July 23, 2004.
		3GPP2 C.S0005-C, "Upper Layer (Layer 3) Signaling Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Revision c, July 23, 2004.
		GPP2 C.S0002-C, "Physical Layer Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Revision C, July 23, 2004.

X** Abstract only

[1] Corresponds to RU2004104196; [2] Corresponds to RU 2006130462; [3] Corresponds to RU 2001135846; [4] Corresponds to WO 03/067953; [5] Corresponds to WO 98/47253.

EXAMINER	DATE CONSIDERED
/Brian Roberts/	07/25/2011

EXAMINER: Initial if citation 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.

1624815_1 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.R./

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11434330	ZHANG ET AL.
	Examiner	Art Unit
	BRIAN ROBERTS	2466

✓	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	07/25/2011								
	1	-								
	2	-								
	3	-								
	4	-								
	5	-								
	6	-								
	7	-								
	8	-								
1	9	=								
3	10	=								
	11	-								
	12	-								
	13	-								
2	14	=								

Issue Classification

Application/Control No.	Applicant(s)/Patent Under Reexamination
11434330	ZHANG ET AL.
Examiner	**Art Unit**
BRIAN ROBERTS	2466

ORIGINAL		INTERNATIONAL CLASSIFICATION									
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED				
370	331	H	0	4	W	4 / 00 (2009.01.01)					

CROSS REFERENCE(S)					
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
455	442	561			

☐ 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														
1	9														
3	10														
	11														
	12														
	13														
2	14														

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	3	
/BRIAN ROBERTS/ Examiner.Art Unit 2466	07/25/2011	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	3

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11434330	ZHANG ET AL.
	Examiner	Art Unit
	BRIAN ROBERTS	2466

SEARCHED

Class	Subclass	Date	Examiner

SEARCH NOTES

Search Notes	Date	Examiner
PALM inventor search	7/25/2011	BSR
Search focused on: 370/310,328-334,389,392,400,401,410,427-428,431,442,443,458,462,464,469-478,498 455/403,422.1,436,442,450,451,452.1,452.2507,509,510,514,517-519,524,550.1,561,68,70 714/100,699,709,746-752,758,776,799,819-821,	7/25/2011	BSR
EAST text search: see search history printout	7/25/2011	BSR

INTERFERENCE SEARCH

Class	Subclass	Date	Examiner
Interference search	See search history printout	7/25/2011	BSR

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S339	349	((enhanced near2 uplink) or EU) and ((radio near network near control$3) or RNC) with power	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/22 16:00
S340	1991	((radio near network near control$3) or RNC) with power	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/22 17:52
S343	374	((enhanced near2 uplink) or (EUDCH)) and soft near2 (handover$4 or handoff$4)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 13:31
S344	21	((enhanced near2 uplink) or EU).clm. and ((radio near network near control $3) or RNC) with power.clm.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:05
S345	2072	high near speed near uplink near packet near access	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:06
S346	19	455/550.1.ccls. and (enhanced near2 uplink or S345)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:06
S347	24	455/561.ccls. and ~~(enhanced near~~2 uplink or S345)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:06
S348	178	chase near combin$3 and (ACK or NACK) with((cyclic near redundan$3 near check) or CRC)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:08

S349	35	RNC with primary near2 ((base near station) or (basestation) or bs or (node near b) or "node-b" or (access near point))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:10
S350	351	455/442.ccls. and ((universal near mobile near telecommunication near system) or UMTS)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:10
S351	37	Node-B with (H-ARQ or HARQ) and ACK and NACK and MCS and time	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:11
S352	445	enhanced near uplink near dedicat$3 near channel	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:11
S353	471	enhanced near2 uplink near dedicat$3 near channel	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:12
S354	2072	high near speed near uplink near packet near access	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:13
S355	1640	enhanced near uplink	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:14
S356	57	370/310.ccls. and (enhanc $3 near2 uplink or S354 or EUDCH)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:14
S357	592	370/328-334.ccls. and (enhanc$3 near2 uplink or S354 or EUDCH)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:15
S358	19	370/389.ccls. and (enhanc $3 near2 uplink or S354 or EUDCH)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:16

S359	6	370/392.ccls. and (enhanc $3 near2 uplink or S354 or EUDCH)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:17
S360	22	370/400-401.ccls. and (enhanc$3 near2 uplink or S354 or EUDCH)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:17
S361	0	370/410.ccls. and (enhanc $3 near2 uplink or S354 or EUDCH)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:17
S362	8	370/427-428.ccls. and (enhanc$3 near2 uplink or S354 or EUDCH)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:17
S363	8	370/431.ccls. and (enhanc $3 near2 uplink or S354 or EUDCH)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:17
S364	0	370/4442.ccls. and (enhanc $3 near2 uplink or S354 or EUDCH)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:17
S365	7	370/442.ccls. and (enhanc $3 near2 uplink or S354 or EUDCH)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:17
S366	2	370/443.ccls. and (enhanc $3 near2 uplink or S354 or EUDCH)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:18
S367	2	370/458.ccls. and (enhanc $3 near2 uplink or S354 or EUDCH)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:18
S368	2	370/462.ccls. and (enhanc $3 near2 uplink or S354 or EUDCH)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:18

S369	8	370/464.ccls. and (enhanc $3 near2 uplink or S354 or EUDCH)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:18
S370	56	370/469-478.ccls. and (enhanc$3 near2 uplink or S354 or EUDCH)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:18
S371	66	370/469-498.ccls. and (enhanc$3 near2 uplink or S354 or EUDCH)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:18
S372	17	455/403.ccls. and (enhanc $3 near2 uplink or S354 or EUDCH)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:24
S373	35	455/422.1.ccls. and (enhanc$3 near2 uplink or S354 or EUDCH)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:25
S374	64	455/436.ccls. and (enhanc $3 near2 uplink or S354 or EUDCH)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:26
S375	52	455/442.ccls. and (enhanc $3 near2 uplink or S354 or EUDCH)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:29
S376	112	455/450.ccls. and (enhanc $3 near2 uplink or S354 or EUDCH)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:29
S377	11	455/451.ccls. and (enhanc $3 near2 uplink or S354 or EUDCH)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:34
S378	47	455/452.1.ccls. and (enhanc$3 near2 uplink or S354 or EUDCH)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:35

S379	45	455/452.2.ccls. and (enhanc$3 near2 uplink or S354 or EUDCH)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:42
S380	48	455/507-509.ccls. and (enhanc$3 near2 uplink or S354 or EUDCH)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:42
S381	1	455/510.ccls. and (enhanc $3 near2 uplink or S354 or EUDCH)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:43
S382	0	455/514.ccls. and (enhanc $3 near2 uplink or S354 or EUDCH)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:44
S383	202	455/517-524.ccls. and (enhanc$3 near2 uplink or S354 or EUDCH)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:44
S384	78	455/68-70.ccls. and (enhanc$3 near2 uplink or S354 or EUDCH)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:45
S385	127	"714"/$.ccls. and (enhanc $3 near2 uplink or S354 or EUDCH)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/07/25 15:45

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S386	22	((enhanced near2 uplink) or (EUDCH)) and soft near2 (handover$4 or handoff $4).clm.	USPAT; UPAD	OR	ON	2011/07/25 15:03
S387	7	((enhanced near2 uplink) or (EUDCH)). clm. and soft near2 (handover$4 or handoff $4).clm.	USPAT; UPAD	OR	ON	2011/07/25 15:03

S388	34	((enhanced near2 uplink) or (EUDCH)). clm. and power.clm.	USPAT; UPAD	OR	ON	2011/07/25 15:03
S389	2	((enhanced near2 uplink) or (EUDCH)). clm. and power.clm. and ACK.clm. and NACK. clm.	USPAT; UPAD	OR	ON	2011/07/25 15:03
S390	8	((enhanced near2 uplink) or (EUDCH)). clm. and power.clm. and (ACK or acknowledg $5).clm.	USPAT; UPAD	OR	ON	2011/07/25 15:04
S391	6	primary near2 (node near b).clm.	USPAT; UPAD	OR	ON	2011/07/25 15:04
S392	1	non near primary near2 (node near b).clm.	USPAT; UPAD	OR	ON	2011/07/25 15:04
S393	8	((enhanced near2 uplink) or EU).clm. and ((radio near network near control$3) or RNC) with power.clm.	USPAT; UPAD	OR	ON	2011/07/25 15:05

7/26/2011 4:41:33 PM
C:\Documents and Settings\broberts\My Documents\EAST\Workspaces\11434330c.wsp

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0674.2US	SERIAL NO. 11/434,330
	APPLICANT Zhang et al.	
	FILING DATE May 15, 2006	GROUP 2466

U.S. PATENT DOCUMENTS							
EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
		6,678,249	01/2004	Toskala et al.[4]			
		6,778,830	08/2004	Oizumi et al.			
		6,892,071	05/2005	Park et al.			
		7,013,143	03/2006	Love et al.			
		7,346,035	03/2008	Lee et al.			
		7,414,989	08/2002	Kuchibhotla et al.			
		2002/0095635	07/2002	Wager et al.			
		2002/0191544	12/2002	Cheng et al.			
		2003/0007480	01/2003	Kim et al.			
		2003/0054824	03/2003	Choi et al.			
		2003/0081692	05/2003	Kwan et al.			
		2003/0161284	08/2003	Chen			
		2003/0210668	11/2003	Malladi et al.			
		2004/0004954	01/2004	Terry et al.			
		2004/0072567	04/2004	Cao et al.			
		2004/0085934	05/2004	Balachandran et la.			
		2004/0120306	06/2004	Wigard et al.			
		2004/0160925	08/2004	Heo et al.[1]			
		2004/0202129	10/2004	Kolding et al.			
		2004/0203991	10/2004	Chen et al.			
		2004/0219917	11/2004	Love et al.			
		2004/0219919	11/2004	Whinnett et al.			
		2004/0219920	11/2004	Love et al.			
		2004/0228313	11/2004	Cheng et al.			
		2005/0041694	02/2005	Liu			

EXAMINER	DATE CONSIDERED

EXAMINER: Initial if citation 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.

1717716-1

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0674.2US	SERIAL NO. 11/434,330
	APPLICANT Zhang et al.	
	FILING DATE May 15, 2006	GROUP 2466

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
		2005/0047354	03/2005	Zeira et al.			
		2005/0048920	03/2005	Liu			
		2005/0083888	04/2005	Smee et al.			
		2007/0047501	03/2007	Usuda et al.[2]			

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	TRANSLATION NO
		0 977 393	02/2000	EP [5]				
		2 353 439	02/2001	GB				
		2001-128209	05/2001	JP			X**	
		02/01893	01/2002	WO				
		03/053087	06/2003	WO				
		03/067953	08/2003	WO				
		03/088545	10/2003	WO				
		2003112283	12/2005	RU			X**	
		2005110767	10/2006	RU			X**	
		00/074263	12/2000	WO[3]				

OTHER DOCUMENTS

EXAMINER INITIAL		DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Feasibility Study for Enhanced Uplink for UTRA FDD; (Release 6)," 3GPP TR 25.896 V1.0.2 (October 2003).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Feasibility Study for Enhanced Uplink for UTRA FDD (Release 6)," 3GPP TR 25.896 V6.0.0 (March 2004).

EXAMINER	DATE CONSIDERED

EXAMINER: Initial if citation 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.

1717716-1

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0674.2US	SERIAL NO. 11/434,330
	APPLICANT Zhang et al.	
	FILING DATE May 15, 2006	GROUP 2466

EXAMINER INITIAL		DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 1999)," 3GPP TS 25.212 V3.11.0 (September 2002).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 1999)." 3GPP TS 25.321 V3.16.0 (September 2003).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 4)," 3GPP TS 25.212 V4.6.0 (September 2002).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 5)," 3GPP TS 25.212 V5.6.0 (September 2003).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 5)," 3GPP TS 25.212 V5.9.0 (June 2004).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 6)," 3GPP TS 25.212 V6.2.0 (June 2004).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 1999)," 3GPP TS 25.321 V3.17.0 (June 2004).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 6)," 3GPP TS 25.321 V6.2.0 (June 2004).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 4)," 3GPP TS 25.321 V4.9.0 (September 2003).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 5)," 3GPP TS 25.321 V5.9.0 (June 2004).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 4)," 3GPP TS 25.321 V4.10.0 (June 2004).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 5)," 3GPP TS 25.321 V5.6.0 (September 2003).

EXAMINER	DATE CONSIDERED

EXAMINER: Initial if citation 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.

1717716-1

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0674.2US	SERIAL NO. 11/434,330
	APPLICANT Zhang et al.	
	FILING DATE May 15, 2006	GROUP 2466

EXAMINER INITIAL		DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Feasibility Study for Enhanced Uplink for UTRA FDD; (Release 6)," 3GPP TR 25.896 V1.0.1 (October 2003).
		3GPP, "Third Generation Partnership Project; Technical Specification Group Radio Access Network; FDD Enhanced Uplink; Overall Description; Stage 2 (Release 6)," 3GPP TS 25.309 V6.0.0 (September 2004).
		3GPP2 C.20003-C, "Medium Access Control (MAC) Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Release C, August 2004.
		3GPP2 C.S0004-C, "Signaling Link Access Control (LAC) Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Revision C, July 23, 2004.
		3GPP2 C.S0005-C, "Upper Layer (Layer 3) Signaling Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Revision c, July 23, 2004.
		GPP2 C.S0002-C, "Physical Layer Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Revision C, July 23, 2004.

X** Abstract only

[1] Corresponds to RU2004104196; [2] Corresponds to RU 2006130462; [3] Corresponds to RU 2001135846; [4] Corresponds to WO 03/067953; [5] Corresponds to WO 98/47253.

EXAMINER	DATE CONSIDERED

EXAMINER: Initial if citation 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.

1717716-1

Electronic Patent Application Fee Transmittal

Application Number:	11434330
Filing Date:	15-May-2006
Title of Invention:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
First Named Inventor/Applicant Name:	Guodong Zhang
Filer:	Donald J. Cox/Carey Kulp
Attorney Docket Number:	I-2-0674.2US

Filed as Large 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:	11081315
Application Number:	11434330
International Application Number:	
Confirmation Number:	5166
Title of Invention:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
First Named Inventor/Applicant Name:	Guodong Zhang
Customer Number:	24374
Filer:	Donald J. Cox/Carey Kulp
Filer Authorized By:	Donald J. Cox
Attorney Docket Number:	I-2-0674.2US
Receipt Date:	29-SEP-2011
Filing Date:	15-MAY-2006
Time Stamp:	17:37:38
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	4481
Deposit Account	090435
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Non Patent Literature	25_896_V1_0_1.pdf	2071827 33f199491a6ae66219a9b7d97fbe388516fd d1b2	no	70
Warnings:					
Information:					
2	Transmittal Letter	IDS.pdf	52777 45ff1b7631ef7fae0bdf3958560a7e8739a57 48a	no	3
Warnings:					
Information:					
3	Information Disclosure Statement (IDS) Form (SB08)	PTO1449.pdf	58621 771a1a658289c464006c406939b6a7113c8 31155	no	4
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
4	Fee Worksheet (SB06)	fee-info.pdf	30529 360f98dfa16a8dba0cb5d3c5d50f8a2073cf 70de	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	2213754		

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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the PATENT APPLICATION of:	
	Zhang et al.
Application No.:	11/434,330
Confirmation No.:	5166
Filed:	May 15, 2006
For:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
Group:	2466
Examiner:	Brian S. Roberts

Our File:	I-2-0674.2US
Date:	September 29, 2011

INFORMATION DISCLOSURE STATEMENT

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

Sir:

Further to Applicants' Duty of Disclosure pursuant to 37 C.F.R. §1.56, Applicants wish to bring to the Examiner's attention the material cited on the enclosed Form PTO-1449.

The listed references include references previously cited in this application. Newly cited documents are indicated by an asterisk (*) on the enclosed Form PTO-1449. Copies of the newly cited documents are enclosed.

This Application is a continuation of Non-Provisional Application No. 10/962,720, filed on October 12, 2004, which issued on May 16, 2006 as U.S. Patent No.

7,046,648, which claims priority from Provisional Application No. 60/578,674, which was filed on June 10, 2004, Provisional Application No. 60/520,692, which was filed on November 17, 2003, Provisional Application No. 60/519,990, which was filed on November 14, 2003, and Provisional Application No. 60/517,656, which was filed on November 5, 2003.

Pursuant to 37 C.F.R. § 1.97(e)(1), the undersigned certifies that each new item of information contained in this Information Disclosure Statement 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 Information Disclosure Statement.

This Information Disclosure Statement is being filed with the fee required by 37 C.F.R. § 1.17(p).

It is respectfully requested that the Examiner consider these documents and return an initialed copy of the Form PTO-1449 indicating his consideration of the cited materials.

Respectfully submitted,

Zhang et al.

By__/Melissa D. Doogan/_____
Melissa D. Doogan
Registration No. 63,025
(215) 568-6400

Volpe and Koenig, P.C.
United Plaza, Suite 1600
30 South 17th Street
Philadelphia, PA 19103

MDD/pck
Enclosures (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.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/434,330	05/15/2006	Guodong Zhang	I-2-0674.2US	5166

24374 7590 10/13/2011

VOLPE AND KOENIG, P.C.
DEPT. ICC
UNITED PLAZA
30 SOUTH 17TH STREET
PHILADELPHIA, PA 19103

EXAMINER	
ROBERTS, BRIAN S	

ART UNIT	PAPER NUMBER
2466	

NOTIFICATION DATE	DELIVERY MODE
10/13/2011	ELECTRONIC

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

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

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

eoffice@volpe-koenig.com

UNITED STATES DEPARTMENT OF COMMERCE
U.S. Patent and Trademark Office
Address : COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450

APPLICATION NO./ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR / PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.
11/434,330	15 May 2006	ZHANG ET AL.	I-2-0674.2US

VOLPE AND KOENIG, P.C.
DEPT. ICC
UNITED PLAZA
30 SOUTH 17TH STREET
PHILADELPHIA, PA 19103

EXAMINER	
BRIAN ROBERTS	
ART UNIT	**PAPER**
2466	20111004

DATE MAILED:

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

Commissioner for Patents

The information disclosure statement (IDS) submitted on 09/29/2011 was filed after the mailing date of the Notice of Allowance on 08/02/2011. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement has been considered by the examiner.

/Brian Roberts/
Examiner, Art Unit 2466

PTO-90C (Rev.04-03)

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0674.2US	SERIAL NO. 11/434,330
	APPLICANT Zhang et al.	
	FILING DATE May 15, 2006	GROUP 2466

U.S. PATENT DOCUMENTS							
EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
		6,678,249	01/2004	Toskala et al.[4]			
		6,778,830	08/2004	Oizumi et al.			
		6,892,071	05/2005	Park et al.			
		7,013,143	03/2006	Love et al.			
		7,346,035	03/2008	Lee et al.			
		7,414,989	08/2002	Kuchibhotla et al.			
		2002/0095635	07/2002	Wager et al.			
		2002/0191544	12/2002	Cheng et al.			
		2003/0007480	01/2003	Kim et al.			
		2003/0054824	03/2003	Choi et al.			
		2003/0081692	05/2003	Kwan et al.			
		2003/0161284	08/2003	Chen			
		2003/0210668	11/2003	Malladi et al.			
		2004/0004954	01/2004	Terry et al.			
		2004/0072567	04/2004	Cao et al.			
		2004/0085934	05/2004	Balachandran et la.			
		2004/0120306	06/2004	Wigard et al.			
		2004/0160925	08/2004	Heo et al.[1]			
		2004/0202129	10/2004	Kolding et al.			
		2004/0203991	10/2004	Chen et al.			
		2004/0219917	11/2004	Love et al.			
		2004/0219919	11/2004	Whinnett et al.			
		2004/0219920	11/2004	Love et al.			
		2004/0228313	11/2004	Cheng et al.			
		2005/0041694	02/2005	Liu			

EXAMINER	DATE CONSIDERED
/Brian Roberts/	10/04/2011

EXAMINER: Initial if citation 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.

1717716_1 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.R./

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0674.2US	SERIAL NO. 11/434,330
	APPLICANT Zhang et al.	
	FILING DATE May 15, 2006	GROUP 2466

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
		2005/0047354	03/2005	Zeira et al.			
		2005/0048920	03/2005	Liu			
		2005/0083888	04/2005	Smee et al.			
		2007/0047501	03/2007	Usuda et al.[2]			

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	TRANSLATION NO
		0 977 393	02/2000	EP [5]				
		2 353 439	02/2001	GB				
		2001-128209	05/2001	JP			X**	
		02/01893	01/2002	WO				
		03/053087	06/2003	WO				
		03/067953	08/2003	WO				
		03/088545	10/2003	WO				
		2003112283	12/2005	RU			X**	
		2005110767	10/2006	RU			X**	
		00/074263	12/2000	WO[3]				

OTHER DOCUMENTS

EXAMINER INITIAL		DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Feasibility Study for Enhanced Uplink for UTRA FDD; (Release 6)," 3GPP TR 25.896 V1.0.2 (October 2003).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Feasibility Study for Enhanced Uplink for UTRA FDD (Release 6)," 3GPP TR 25.896 V6.0.0 (March 2004).

EXAMINER	DATE CONSIDERED
/Brian Roberts/	10/04/2011

EXAMINER: Initial if citation 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.

1717716_1 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.R./

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0674.2US	SERIAL NO. 11/434,330
	APPLICANT Zhang et al.	
	FILING DATE May 15, 2006	GROUP 2466

EXAMINER INITIAL		DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 1999)," 3GPP TS 25.212 V3.11.0 (September 2002).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 1999)." 3GPP TS 25.321 V3.16.0 (September 2003).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 4)," 3GPP TS 25.212 V4.6.0 (September 2002).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 5)," 3GPP TS 25.212 V5.6.0 (September 2003).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 5)," 3GPP TS 25.212 V5.9.0 (June 2004).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 6)," 3GPP TS 25.212 V6.2.0 (June 2004).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 1999)," 3GPP TS 25.321 V3.17.0 (June 2004).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 6)," 3GPP TS 25.321 V6.2.0 (June 2004).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 4)," 3GPP TS 25.321 V4.9.0 (September 2003).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 5)," 3GPP TS 25.321 V5.9.0 (June 2004).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 4)," 3GPP TS 25.321 V4.10.0 (June 2004).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 5)," 3GPP TS 25.321 V5.6.0 (September 2003).

EXAMINER	DATE CONSIDERED
/Brian Roberts/	10/04/2011

EXAMINER: Initial if citation 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.

1717716.1 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.R./

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0674.2US	SERIAL NO. 11/434,330
	APPLICANT Zhang et al.	
	FILING DATE May 15, 2006	GROUP 2466

EXAMINER INITIAL		DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Feasibility Study for Enhanced Uplink for UTRA FDD; (Release 6)," 3GPP TR 25.896 V1.0.1 (October 2003).
		3GPP, "Third Generation Partnership Project; Technical Specification Group Radio Access Network; FDD Enhanced Uplink; Overall Description; Stage 2 (Release 6)," 3GPP TS 25.309 V6.0.0 (September 2004).
		3GPP2 C.20003-C, "Medium Access Control (MAC) Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Release C, August 2004.
		3GPP2 C.S0004-C, "Signaling Link Access Control (LAC) Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Revision C, July 23, 2004.
		3GPP2 C.S0005-C, "Upper Layer (Layer 3) Signaling Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Revision c, July 23, 2004.
		GPP2 C.S0002-C, "Physical Layer Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Revision C, July 23, 2004.

X** Abstract only

[1] Corresponds to RU2004104196; [2] Corresponds to RU 2006130462; [3] Corresponds to RU 2001135846; [4] Corresponds to WO 03/067953; [5] Corresponds to WO 98/47253.

EXAMINER	DATE CONSIDERED
/Brian Roberts/	10/04/2011

EXAMINER: Initial if citation 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.

1717716_1 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.R./

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0674.2US	SERIAL NO. 11/434,330
	APPLICANT Zhang et al.	
	FILING DATE May 15, 2006	GROUP 2466

U.S. PATENT DOCUMENTS							
EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
		6,678,249	01/2004	Toskala et al.[4]			
		6,778,830	08/2004	Oizumi et al.			
		6,892,071	05/2005	Park et al.			
		7,013,143	03/2006	Love et al.			
		7,346,035	03/2008	Lee et al.			
		7,414,989	08/2002	Kuchibhotla et al.			
		2002/0095635	07/2002	Wager et al.			
		2002/0191544	12/2002	Cheng et al.			
		2003/0007480	01/2003	Kim et al.			
	*	2003/0043786	03/2003	Kall et al.			
		2003/0054824	03/2003	Choi et al.			
		2003/0081692	05/2003	Kwan et al.			
		2003/0161284	08/2003	Chen			
		2003/0210668	11/2003	Malladi et al.			
		2004/0004954	01/2004	Terry et al.			
		2004/0072567	04/2004	Cao et al.			
		2004/0085934	05/2004	Balachandran et la.			
		2004/0120306	06/2004	Wigard et al.			
		2004/0160925	08/2004	Heo et al.[1]			
		2004/0202129	10/2004	Kolding et al.			
		2004/0203991	10/2004	Chen et al.			
		2004/0219917	11/2004	Love et al.			
		2004/0219919	11/2004	Whinnett et al.			
		2004/0219920	11/2004	Love et al.			
		2004/0228313	11/2004	Cheng et al.			

EXAMINER	DATE CONSIDERED

EXAMINER: Initial if citation 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.

1743768-1

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0674.2US	SERIAL NO. 11/434,330
	APPLICANT Zhang et al.	
	FILING DATE May 15, 2006	GROUP 2466

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
		2005/0041694	02/2005	Liu			
		2005/0047354	03/2005	Zeira et al.			
		2005/0048920	03/2005	Liu			
		2005/0083888	04/2005	Smee et al.			
		2007/0047501	03/2007	Usuda et al.[2]			

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	TRANSLATION NO
		0 977 393	02/2000	EP[5]				
		2 353 439	02/2001	GB				
		2001-128209	05/2001	JP			X**	
		2003112283	12/2005	RU			X**	
		2005110767	10/2006	RU			X**	
		00/074263	12/2000	WO[3]				
		02/01893	01/2002	WO				
	*	03/003643	01/2003	WO				
	*	03/026231	03/2003	WO				
		03/053087	06/2003	WO				
		03/067953	08/2003	WO				
		03/088545	10/2003	WO				

OTHER DOCUMENTS

EXAMINER INITIAL		DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Feasibility Study for Enhanced Uplink for UTRA FDD; (Release 6)," 3GPP TR 25.896 V1.0.2 (October 2003).

EXAMINER	DATE CONSIDERED

EXAMINER: Initial if citation 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.

1743768-1

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0674.2US	SERIAL NO. 11/434,330
	APPLICANT Zhang et al.	
	FILING DATE May 15, 2006	GROUP 2466

EXAMINER INITIAL		DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Feasibility Study for Enhanced Uplink for UTRA FDD (Release 6)," 3GPP TR 25.896 V6.0.0 (March 2004).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 1999)," 3GPP TS 25.212 V3.11.0 (September 2002).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 1999)." 3GPP TS 25.321 V3.16.0 (September 2003).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 4)," 3GPP TS 25.212 V4.6.0 (September 2002).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 5)," 3GPP TS 25.212 V5.6.0 (September 2003).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 5)," 3GPP TS 25.212 V5.9.0 (June 2004).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 6)," 3GPP TS 25.212 V6.2.0 (June 2004).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 1999)," 3GPP TS 25.321 V3.17.0 (June 2004).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 6)," 3GPP TS 25.321 V6.2.0 (June 2004).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 4)," 3GPP TS 25.321 V4.9.0 (September 2003).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 5)," 3GPP TS 25.321 V5.9.0 (June 2004).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 4)," 3GPP TS 25.321 V4.10.0 (June 2004).

EXAMINER	DATE CONSIDERED

EXAMINER: Initial if citation 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.

1743768-1

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0674.2US	SERIAL NO. 11/434,330
	APPLICANT Zhang et al.	
	FILING DATE May 15, 2006	GROUP 2466

EXAMINER INITIAL		DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 5)," 3GPP TS 25.321 V5.6.0 (September 2003).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Feasibility Study for Enhanced Uplink for UTRA FDD; (Release 6)," 3GPP TR 25.896 V1.0.1 (October 2003).
		3GPP, "Third Generation Partnership Project; Technical Specification Group Radio Access Network; FDD Enhanced Uplink; Overall Description; Stage 2 (Release 6)," 3GPP TS 25.309 V6.0.0 (September 2004).
		3GPP2 C.20003-C, "Medium Access Control (MAC) Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Release C, August 2004.
		3GPP2 C.S0004-C, "Signaling Link Access Control (LAC) Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Revision C, July 23, 2004.
		3GPP2 C.S0005-C, "Upper Layer (Layer 3) Signaling Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Revision c, July 23, 2004.
		GPP2 C.S0002-C, "Physical Layer Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Revision C, July 23, 2004.

X** Abstract only

[1] Corresponds to RU2004104196; [2] Corresponds to RU 2006130462; [3] Corresponds to RU 2001135846; [4] Corresponds to WO 03/067953; [5] Corresponds to WO 98/47253.

EXAMINER	DATE CONSIDERED

EXAMINER: Initial if citation 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.

1743768-1

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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
27 March 2003 (27.03.2003)

PCT

(10) International Publication Number
WO 03/026231 A1

(51) International Patent Classification[7]: H04L 12/56

(21) International Application Number: PCT/EP02/05829

(22) International Filing Date: 27 May 2002 (27.05.2002)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
01402371.7 14 September 2001 (14.09.2001) EP

(71) Applicant *(for all designated States except US)*: **MOTOROLA INC** [US/US]; 1303 E.Algonquin Road, Schaumburg, IL 60196 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **GARANI, Pradeep** [FR/FR]; Residence Agora, 2 Chem Henri Bosco, F-31000 Toulouse (FR). **VILLION, Mathieu** [FR/FR]; 5 rue Mirepoix, F-31000 Toulouse (FR). **KOTZIN, Michael** [US/US]; 321 Fox Hill Drive, Bufflo Grove, IL 60089 (US). **OWEN, Ray** [GB/GB]; Flat 3, 11 Station Road, Bath, Somerset BA1 3DY (GB).

(74) Agent: **MCCORMACK, Derek**; Motorola European Intellectual, Property Operations, Midpoint, Alencon Link, Basingstoke, Hampshire RG21 7PL (GB).

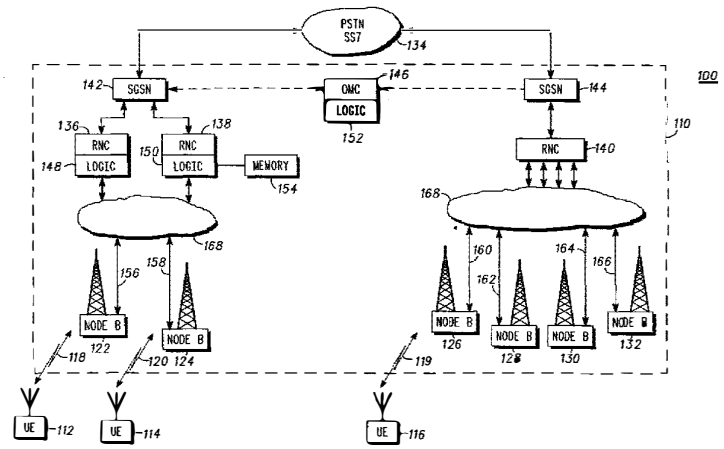
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, 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, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

[Continued on next page]

(54) Title: METHOD FOR ENHANCING THE COMMUNICATION CAPABILITY IN A WIRELESS TELECOMMUNICATION SYSTEM



(57) Abstract: A method of enchancing a communication capability of a communication unit (112), operating in a communication system (100) that facilitates communiction to and/or from a plurality of communication units, is described. The method includes the step of operably coupling a first communication unit (112) to one or more neighbouring communication units (114, 116) such that said communication unit is able to utilise at least one operational capability of one or more of its neighbouring communication units to enchance communication to and/or from said first comunication unit.This provides the advantage that a collective use of neighbouring communication units, for example formed in an aggregate group, provide a more reliable uplink and/or downlink communication link without using more network resources. In particular, the transmitting/receiving communication unit is able to utilise functionality in neighbouring communication units to which it can be operably connected. Furthermore, the wireless or wired communication link efficiency is improved and higher data rate throughput can be realized.

WO 03/026231 A1

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

LINKING OF MULTIPLE COMMUNICATION UNITS

Field of the Invention

This invention relates to using multiple subscriber units to create several architecture and subscriber unit enhancing functions, enhanced data rates and improved reliability in existing or future wireless, or integrated wireless and fixed, communication systems.

Background of the Invention

Wireless communication systems, for example cellular telephony or private mobile radio communication systems, typically provide for radio telecommunication links to be arranged between a plurality of base transceiver stations (BTSs) and a plurality of subscriber units, often termed mobile stations (MSs).

The communication link from a BTS to a MS is generally referred to as a down-link communication channel. Conversely, the communication link from a MS to a BTS is generally referred to as an up-link communication channel.

In a wireless communication system, each BTS has associated with it a particular geographical coverage area (or cell). The coverage area is defined by a particular range where the BTS can maintain acceptable

communications with MSs operating within its serving cell. Often these cells combine to produce an extensive coverage area.

Wireless communication systems are distinguished over fixed communication systems, such as the public switched telephone network (PSTN), principally in that mobile stations move between coverage areas served by different BTS (and/or different service providers) and, in doing so, encounter varying radio propagation environments.

In such wireless communication systems, methods for communicating information simultaneously exist where communication resources in a communication network are shared by a number of users. Such methods are termed multiple access techniques. A number of multiple access techniques exist, whereby a finite communication resource is divided into any number of physical parameters, such as:

(i) frequency division multiple access (FDMA) whereby frequencies used in the communication system are shared,

(ii) time division multiple access (TDMA) whereby each frequency used in the communication system, is shared amongst users by dividing the communication resource (each frequency) into a number of distinct time periods (time-slots, frames, etc.), and

(iii) code division multiple access (CDMA) whereby communication is performed by using all of the respective frequencies, in all of the time periods, and the resource is shared by allocating each communication a particular code, to differentiate desired signals from undesired signals.

Within such multiple access techniques, different duplex (substantially simultaneous two-way communication) paths are arranged. Such paths can be arranged in a frequency division duplex (FDD) configuration, whereby a frequency is dedicated for up-link communication and a second frequency is dedicated for down-link communication. Alternatively, the paths can be arranged in a time division duplex (TDD) configuration, whereby a first time period is dedicated for up-link communication and a second time period is dedicated for down-link communication.

In the field of this invention it is known that a wireless cellular/mobile radio system's performance, capability, and coverage is highly dependent on a number of factors. For example, the subscriber data rate demand and the location of a subscriber may play a crucial role in determining the efficiency and availability of communication to/from the unit itself as well as to/from neighbouring users. In addition, these factors are known to be very time-dependent, i.e. the factors vary widely over time. This is particularly the case in mixed voice and data wireless communication systems with users frequently switching between being active and

inactivestates in , as well as being geographically widely dispersed within, the wireless communciation system.

In the context of one-to-one or one-to-many wireless communications, for example in the field of private mobile radio (PMR), it is known that a MS may operate outside a dedicated network coverage area by communicating in a direct communication link with at least one other MS. Such a communication mode is generally referred to as either direct-mode operation (DMO) (when used in a conjunction with a system supporting trunked mode), conventional, two-way, or back-to-back communication.

Hence, when a MS operates in a direct mode, there is no system controller and therefore no centralised timing synchronisation or infrastructure-controlled power control to help set up calls, organise communication resource to minimise interference, etc.

In direct-mode, communication links are established in a similar manner as to the direct-mode operation of conventional half duplex radio schemes used by many existing private mobile radio systems such as that of the emergency services. Such calls are set up by a direct-mode (calling) communication unit selecting an address (e.g. 5-tone signalling sequence or digital selective calling) of a receiving (called) communication unit. The called communication unit then is directly contacted to set up a communication link.

Furthermore, as open communication systems are designed to share a finite communication resource, amongst a large number of subscriber devices, the subscriber devices are designed with operation and functionality limitations, such as a maximum data rate that they can transmit. Alternatively, they are designed to include all features possible, without any regard to whether the user will actually use them. This leads to inefficiency, as perceived by the user as well as with regard to the operation of the system.

In a wireless communication network, it is well known that radio transmissions are subjected to rayleigh fading, multipath and other noise-inducing effects. Therefore there is a need to provide some form of error protection and/or error correction to most transmissions. As particular transmissions require increased reliability, such as emergency calls, these transmissions are provided with increased amounts of error protection and thereby redundancy. Again, this is an inefficient use of what is always a limited resource.

In the context of linking wireless communication units, it is also known that linking cellular communication units directly together, using for example the Opportunity Driven Multiple Access (ODMA) mode proposed in UMTS (TDD mode), may provide enhanced data rates. In this mode of operation, some of the overall time-frequency resource of the system is used to enable mobiles to relay signals to other users.

As defined in 3GPP release 99 specification for UMTS TDD, OMDA can allocate a part of its resources to allow mobiles to relay information between themselves such that a mobile can 'connect' to a network through another mobile. Since the TDD system works on time-slots, it is possible to allocate part of the system resources for mobile to mobile communication. This type of system, can increase coverage at the cost of bandwidth.

As a consequence, in order to resolve such problems in a general sense, it would be helpful if the communication solution could be standardized. However, a major disadvantage with ODMA is that it is complex. Furthermore, ODMA requires a substantial amount of signalling resource, to facilitate the relaying of communications between the directly coupled cellular units. Therefore, due to the above difficulties with ODMA, it is unlikely that such a complex and resource-hungry solution would be acceptable in an open communication standard.

Thus, there exists a need in the field of the present invention to provide linking of multiple communication units wherein the abovementioned disadvantages may be alleviated.

Statement of Invention

In accordance with a first aspect of the present invention, there is provided a method of enhancing a communication capability of a communication unit, as claimed in claim 1.

In accordance with a second aspect of the present invention, there is provided a storage medium storing processor-implementable instructions, as claimed in claim 33.

In accordance with a third aspect of the present invention, there is provided a communication system, as claimed in claim 34.

In accordance with a fourth aspect of the present invention, there is provided a communication unit, as claimed in claim 36.

In accordance with a fifth aspect of the present invention, there is provided a portable communication unit, as claimed in claim 38.

In accordance with a sixth aspect of the present invention, there is provided a portable communication unit, as claimed in claim 40.

In accordance with a seventh aspect of the present invention, there is provided a portable communication unit, as claimed in claim 42.

In accordance with an eighth aspect of the present invention, there is provided a portable communication unit, as claimed in claim 45.

Further aspects of the present invention are as claimed in the dependent claims.

In summary, in accordance with the preferred embodiment of the present invention, a concept of utilising multiple communication units (or user equipment (UE)) to increase the operational capabilities of a particular UE, or indeed the communication system, is described.

The basic architectural provisions support a discovery and coordination protocol where wireless devices discover a proximal user on a short-range system or wired bus and coordinate amongst themselves to achieve, for example enhanced functionality when compared with the functionality available with the particular UE alone.

Brief Description of the Drawings

Exemplary embodiments of the present invention will now be described, with reference to the accompanying drawings, in which:

FIG. 1 shows a block diagram of a communication system that can be adapted to support the various inventive concepts of a preferred embodiment of the present invention.

FIG. 2 shows a functional block diagram of an uplink communication arrangement in accordance with various inventive concepts of a preferred embodiment of the present invention.

FIG. 3 shows a functional block diagram of an downlink communication arrangement in accordance with various inventive concepts of a preferred embodiment of the present invention.

FIG. 4 shows a block diagram of a communication unit that can be adapted to support the various inventive concepts of a preferred embodiment of the present invention.

FIGs 5a to 5c show block diagrams of various baseband processing arrangements of a communication unit adapted to support the various inventive concepts of a preferred embodiment of the present invention.

Description of Preferred Embodiments

Referring now to FIG. 1, a cellular-based telephone communication system 100 is shown in outline, in accordance with a preferred embodiment of the invention. In the preferred embodiment of the invention, the cellular-based telephone communication system 100 is compliant with, and contains network elements capable of operating over, a UMTS air-interface. In particular, the invention relates to the Third Generation Partnership

Project (3GPP) specification for wide-band code-division multiple access (WCDMA) standard relating to the UTRAN radio Interface (described in the 3G TS 25.xxx series of specifications).

A plurality of subscriber terminals (or user equipment (UE) in UMTS nomenclature) 112, 114, 116 communicate over radio links 118, 119, 120 with a plurality of base transceiver stations, referred to under UMTS terminology as Node-Bs, 122, 124, 126, 128, 130, 132. The system comprises many other UEs and Node Bs, which for clarity purposes are not shown.

The wireless communication system, sometimes referred to as a Network Operator's Network Domain, is connected to an external network 134, for example the Internet. The Network Operator's Network Domain (described with reference to both a 3rd generation UMTS and a 2nd generation GSM system) includes:

(i) A core network, namely at least one Gateway GPRS Support Node (GGSN) 144 and or at least one Serving GPRS Support Nodes (SGSN); and

(ii) An access network, namely:

(ai) a GPRS (or UMTS) Radio network controller (RNC) 136-140; or

(aii) Base Site Controller (BSC) in a GSM system and/or

(bi) a GPRS (or UMTS) Node B 122-132; or

(bii) a Base Transceiver Station (BTS) in a GSM system.

The GGSN/SGSN 144 is responsible for GPRS (or UMTS) interfacing with a Public Switched Data Network (PSDN) such as the Internet 134 or a Public Switched Telephone Network (PSTN) 134. A SGSN 144 performs a routing and tunnelling function for traffic within say, a GPRS core network, whilst a GGSN 144 links to external packet networks, in this case ones accessing the GPRS mode of the system

The Node-Bs 122-132 are connected to external networks, through base station controllers, referred to under UMTS terminology as Radio Network Controller stations (RNC), including the RNCs 136, 138, 140 and mobile switching centres (MSCs), such as MSC 142 (the others are, for clarity purposes, not shown) and SGSN 144 (the others are, for clarity purposes, not shown).

Each Node-B 122-132 contains one or more transceiver units and communicates with the rest of the cell-based system infrastructure via an I_{ub} interface, as defined in the UMTS specification.

Each RNC 136-140 may control one or more Node-Bs 122-132. Each MSC 142 provides a gateway to the external network 134. The Operations and Management Centre (OMC) 146 is operably connected to RNCs 136-140 and Node-Bs 122-132 (shown only with respect to Node-B 126 for clarity). The OMC 146 administers and manages sections of the cellular telephone communication system 100, as is understood by those skilled in the art.

In the preferred embodiment of the invention, a number of UEs 112-116 and in certain embodiments at least one Node-B 122-132 have been adapted, to offer, and provide for, transmission, reception and processing of information to and/or from multiple UEs to enhance a UE's particular functionality.

More particularly, in this embodiment the above elements have been adapted to implement the present invention in either or both transmitting and receiving modes of operation, such that in this embodiment the invention may be applied to both down-link and up-link transmissions.

It is also within the contemplation of the invention that such adaptation of the physical layer (air-interface) elements may be alternatively controlled, implemented in full or implemented in part by adapting any other suitable part of the communication system 100. For example, equivalent elements such as intermediate fixed communication units in other types of systems may, in appropriate circumstances, be adapted to provide or facilitate the multiple UE utilisation arrangement as described herein.

Although the preferred embodiment of the invention is described with reference to a wireless communication system employing a UMTS air-interface, it is within the contemplation of the invention that the inventive concepts described herein can be applied to any fixed or wireless communication system. In particular, the

preferred embodiments of the present invention are described with reference to a bluetooth short-range radio connection between wireless subscriber units that ordinarily operate on the UMTS system. Bluetooth offers a high date rate, fast response protocol that is suited to some of the embodiments described.

Embodiment 1:

Referring now to FIG. 2, a diagram of an uplink communication configuration 200, for example a configuration of a plurality of user equipment (UE) of FIG. 1 is shown, the configuration being adapted to support the inventive concepts of a first embodiment of the present invention. In accordance with the first embodiment of the present invention, a UE, say UE-1 112 wishes to initiate an enhanced functionality mode of operation. Such enhanced functionalities may include a desire to send a large amount of data, or high priority data such as an emergency call that is needed to be received in a short period of time, or poor signal quality conditions. Such a transmission will occur on uplink channels.

In order to initiate the enhanced functionality mode of operation, UE-1 112 sets itself up as the 'master' communication unit in the first embodiment, in order to control the communication with the other UEs (UEs 2-11) that it uses for its uplink communication.

As shown in FIG. 2, geographically near (in a wireless communication system, such as Bluetooth) or interconnectd (in a fixed communication system) UEs 2-11 receive a communication 212-221 from the master unit UE-1 112. Once UE-1 112 has initiated a master-slave transmission mode of operation, each of the communicating UEs 2-11 are configured as slave units, being responsive to the control exerted by UE-1 112, using a master-slave protocol.

Each device is capable of, and configured to offer (in response to the request from UE-1 112), routing of received data 272-281 from the master device UE-1 112 to a central unit or serving unit. In a wireless UMTS domain, such a serving unit would comprise one or mode Node Bs 122-132. FIG. 2 shows all of the UEs within geographic coverage of a particular cell 210 served by a particular Node B.

However, it is within the contemplation of the invention that such transmissions may be effected to one or more Node Bs if a master device UE-1 112 is on an edge of a cell and one or more neighbouring (slave) UEs are geographically proximal to UE-1 112 but operational on one or more adjacent cells. As such, the received data from UEs 2-11, via a number of Node Bs is re-configured into the originally transmitted data stream in the higher layers of the network, for example the RNC 136, 138, 140 or GGSN/SGSN 144.

The master UE-1 112 controls the data transacted with each terminal. In this way, multiple units can be drafted in as additional slave units to assist the communication and thereby create larger data throughput and enable throughput sharing. It also creates the opportunity of multiplexing many users to one phone and, when extended thoughout the communication system, many phones to many users.

As an alternate embodiment of FIG.2, it is within the contemplation of the invention that each of the UEs may interface to a non-UE terminal, for example a centrally located computer terminal that serves as the master.

Embodiment 2:

In accordance with a second embodiment of the present invention, a group of independent wireless devices are identified and coordinated (aggregated) using, for example in a wireless domain a short-range wireless system such as provided in the adjunct Bluetooth system.

By forming a 'dynamic' group based on proximal location via a short-range adjunct bluetooth system, any of the users UEs 1-11 may then benefit from using the capabilities of one or more of the other subscriber units within the group. This is in contrast to the first embodiment where a particular UE dynamically sets up a group to operate in a master-slave configuration for one or more specific tasks.

The provision, in the second embodiment, of such a larger communication "pipe" for use by any of the UEs in a group leads to, inter-alia, increased efficiency, for example, using a higher peak data-rate over the air interface for a packet data transmission.

A group of proximal users can co-operate for a high data-rate service and communicate over the short-range system before accessing the shared channel of the system. In this manner, they are able to resolve amongst themselves, an access procedure. Collectively, they reduce the total number of collisions on the system shared channel, thereby increasing system utilisation.

The proximal group of users are preferably selected/co-ordinated using a discovery and coordination protocol such as that described with regard to the first embodiment. It is envisaged that such a protocol would preferably use the short-range, say Bluetooth, adjunct channel. The adjunct channel is preferably dedicated for such use, where the various user groups are able to dynamically form or join an aggregated group that can be used for the enhanced communication mode.

One example of the enhanced operation is where a UE is limited to a maximum number of received or transmitted bursts per unit period of time - as is always the case. To increase the received or transmitted data rate above the imposed limit, the UE could ask one or more inactive mobiles in the group to initiate calls or assist in communications, for this resource-limited user.

Using a discovery and coordination protocol on a short-range adjunct channel, these users become part of an aggregated group that can be used for such increased data rate transmissions. For example, in FIG. 2, UE-1 112 may decide to upload a very large file to the network. In normal circumstances, UE-1 112 would be limited to its maximum transmission rate of say, 64 kbps. Instead, utilising the inventive concepts herein described, UE-1 112 forms a dynamic group of idle UEs 2-11 and distributes the information for transmission to all the users of the aggregated group using the adjunct Bluetooth channel. Such a distribution of information may take place during UE-1 112's periods of inactivity on its primary-communciation UMTS system.

It is also within the contemplation of the invention that each member of the group may carry different amounts of data based on the link conditions or the UEs particular configuration or capabilities. However, if we assume for simplicity that each member is also limited to a maximum transmission rate of 64 kbps, the effective maximum is 640kbps. It is also within the contemplation of the invention that UE-1 112 may also transmit information in a substantially simultaneous manner to the network increasing the effective maximum data-rate to 704 kbps.

This method uses protocols supported at both the UEs and the central unit/serving unit to provide the multiplexed data service, whilst substantially avoiding any signalling impact to the main wireless UMTS system.

Furthermore, the protocol and control scheme preferably supports the distribution of the data to the independent members of the aggregated group, as well as the re-configuration of the information in the network. It is envisaged that each of the respective transmissions from the group members will carry a data field signifying that the transmission is one part of a larger transmission. The data field would also contain an indication of where the respective transmission is to be located in the larger transmission.

It is further within the contemplation of the invention that the participating UEs 1-11 might be working on different systems such as GSM, UMTS, as further described in embodiment 9. In such a scenario, it is possible to exchange link quality information between the aggregate members and the networks for improved network efficiency.

It is noteworthy that each UE may not experience the same quality of communication within the network, for example in a wireless domain, a particular UE may be subject to rayleigh fading or multipath conditions. Also, some users might generate less interference and/or experience better link quality. Hence, it is also within the contemplation of the invention that this fact is beneficially exploited. For example, a UE located in a more optimal location, for example near a window, might be able to carry a larger burden of the traffic for the group. Alternatively, better-positioned UEs may not need to error protect the transmitted data to the same degree, thereby increasing traffic throughput.

This information might be determined by the network or by the UEs themselves. This invention anticipates sharing such link quality information not only with the network but also with the other members of the aggregated group. This would allow altering how communication is carried out within the network to increase efficiency whilst maintaining a particular quality of service.

In summary, the second embodiment advantageously provides at least the following new concepts: a wireless UE with Bluetooth adjuncts, a protocol for establishing an aggregated group of proximal users, protocol support in both the UEs and the network to beneficially exploit communication between UEs and the network using the distributed radio resources of the proximal users, and optionally, taking advantage of the different quality, etc. of the different subscribers' links to the infrastructure.

Embodiment 3 - Alternative emergency call

In a yet further embodiment of the present invention, a further enhanced uplink application is provided. A large number of remote communication units now offer emergency call facilities, namely the ability to make a high priority call to a central receiving station. Examples of emergency calls include a call to the Emergency services in the case of say a cellular phone, or a call to the dispatcher in the case of a mobile radio.

The inventors of the present invention have recognised a further functionality enhancing operation in the re-use of selected (or random) neighbouring UEs for emergency calls. As an exmple, let us consider the case when the user of the UE wishes to make an emergency call. However, the UE may not be within coverage range, say, of its serving Node B, and therefore it is unable to contact the network.

The inventors of the present invention have envisaged that the user/UE could request other selected or random neighboring UEs to set up the emergency call or indeed forward the emergency call information. The emergency call information may be submitted to neighbouring UEs using, for example, a short-range bluetooth, infra-red, wireless local loop or similar communication medium.

Embodiment 4:

Referring now to FIG. 3, a block diagram of a communication configuration, for example a configuration of the user equipment (UE) of FIG. 1 adapted to support the inventive concepts of the present invention, is shown. The first and second embodiments are described with reference to a UE wishing to transmit large amounts of data in an uplink direction. However, it is within the contemplation of the invention that the dynamic utilisation of neighbouring UE resources is equally applicable in a downlink scenario.

Initially, a subscriber unit UE-1 112 performs a device discovery 312-321 polling operation with other nearby subscriber units UEs 2-11. For available and suitable UEs, for example UEs 2-6, UE-1 112 negotiates with the selected neighbouring UEs to determine how they are able to assist UE-1 112 in receiving downlink data 372-376 intended for UE-1 112.

It is within the contemplation of embodiment 4 that the a polling operation can also be registration based, with participating devices registering with each other in response to a poll or when they detect activity on the adjunt channel.

In the preferred arrangement of embodiment 4 of the present invention, UEs also attempt to receive wireless data transmissions to UE-1 112 from the network. If UE-1 112 fails to decode his data, UE-1 112 asks any of the selected neighbouring UEs whether the data they accurately received such data. If the data is available from one or more selected neighbouring UEs, UE-1 112 receives the intended transmission from the network via the alternate communication path 312-316.

In an alternative mode of operation of embodiment 4, as shown in FIG.3, a subscriber such as UE-1 112 may always receive augmenting data from nearby selected neighbouring UEs. In this permanent repeater mode of operation, described in greater detail with regard to embodiment 10, it is envisaged that UE-1 112 utilises the received

augmenting data to increase its decoding probability, as further described in embodiments 6, 7 and 8.

It is envisaged that if UE-1 112 is not able to receive the augmenting data even by combining (or selecting) from all the available inputs, a negative-acknoweldgement message (nack) may be sent. Similarly, if the UE-1 112 is successful at decoding, it is envisaged that an acknowledgement message (ack) is sent, as per the protocol UE-1 112 is obliged to support in connection with the network.

It is also within the contemplation of the invention that the inventive concepts described herein are not limited to the use of UEs in a UMTS system, but can be applied to any wireless communication device. Embodiment 4 is therefore applicable for use with all kinds of personal wireless communications devices, such as a cellular phone, a portable or mobile radio, a personal digital assistant, a laptop computer or a wirelessly networked PC.

In summary, embodiment 4 provides for an adjunct short-range system to enhance communication to a particular UE to utilise the capabilities or features of one or more selected neighbouring UEs. The communication enhancement preferably follows a discovery and feature negotiation protocol. It is noteworthy that embodiment 4 provides a means to augment reception of information intended for a particular communication unit, in contrast to a means to

route information using intermediate links, which is known in the art.

Embodiment 5:

As a particular case of embodiment 4, embodiment 5 provides a further means of assisting a UE, say UE-1 112, in downlink communication. To better explain the features of embodiment 5, let us consider the scenario where people having cellular phones gather at meetings. Current cellular phones are only used in an independent manner. This means that each user is limited to the radio performance capabilities of his/her particular cellular phone. Furthermore, typical implementation-specific limitations designed into the cellular system mean using a single omnidirectional antenna, a single branch receiver (since diversity is difficult to provide in small units) and a single branch transmission system are used.

Such limitations are resolved with embodiment 5 by provision of a group of independent wireless devices that are identified and coordinated (aggregated) using a short-range system (e.g. Bluetooth). Each user receives information from the conventional communication system, for example the UMTS cellular system of FIG. 1. Each user then forwards the received information to at least one other UE. The subscriber then beneficially combines the multiple received copies to improve reliability of detection (diversity combining).

As an example, utilising the arrangement of FIG. 3, a proximal group of users are identified using say, the aforementioned discovery and coordination protocol using the short-range adjunct channel. As before, these users become part of an aggregated group that can be used for enhanced communication purposes. In FIG. 3, UEs 2-6 receive information from the UMTS cellular system and forward the received information 312-316 using the short-range system, to UE-1 112. UE-1 112 optimally combines this multiple-received information to improve its reliability of detection. It is envisaged that appropriate synchronisation mechanisms may be used in order to co-ordinate the timing and processing of the multiple received signals.

In summary, embodiment 5 provides, in the downlink context, the following new features: a subscriber combining multiple sets of information to obtain a diversity benefit; provisions for certain network support for certain modes of use (eg. multiple transmit codes); a Node B beneficially combining multiple subscribers' information sent on different codes to obtain a diversity benefit.

Referring now to FIG. 4, a block diagram of a communication unit, for example user equipment (UE) 112, adapted to support the various inventive concepts of the embodiments of the present invention, is shown. It is within the contemplation of the invention that a similar block diagram would apply to a Node B element, say Node B

122. Therefore the foregoing description of FIG. 4 is described such that it also encompasses an implementation of a Node B baseband processing circuit, as would be appreciated by a person skilled in the art.

The UE 112 contains an antenna 402 preferably coupled to a duplex filter or circulator 404 that provides isolation between receive and transmit chains within UE 112.

The receiver chain includes scanning receiver front-end circuitry 406 (effectively providing reception, filtering and intermediate or baseband frequency conversion). The scanning front-end circuit 406 scans signal transmissions from its associated Node B. The scanning front-end circuit 406 is serially coupled to a signal processing function (processor, generally realised by a DSP) 408. The final receiver circuits are a baseband back-end circuit 409 operably coupled to a display unit 410, if the communication unit is a subscriber unit.

Alternatively, if the communication unit is a Node B, the final receiver circuits are a baseband back-end circuit 409 operably coupled to an interface port 410, in order to forward the demodulated received signal to, say, a radio network controller (RNC).

In accordance with the downlink embodiments of the invention, the receiver chain 410, in particular the signal processing function 408, coupled to the baseband back-end circuit 409, has been adapted for a receiving communication unit to receive and process multiple

signals from neighbouring UEs. Furthermore, the processing circuit has been adapted to receive and process the transmissions from neighbouring UEs during the discovery and negotiation processes.

A controller 414 is operably coupled to the scanning front-end circuitry 406 so that the receiver can calculate receive bit-error-rate (BER) or frame-error-rate (FER) or similar link-quality measurement data from recovered information via a received signal strength indication (RSSI) 412 function. The RSSI 412 function is operably coupled to the scanning front-end circuit 406. In a similar manner to the adaptation of the signal processing function 408 above, the controller has been adapted to control transmission and reception of signals from the UE 112 to facilitate use of neighbouring UEs.

The memory device 416 stores a wide array of UE-specific data, such as decoding/encoding functions, timing details, neighbour and serving cell information relating to timing, channels, power control and the like. In addition, the memory unit 416 has now been adapted to store neighbouring UE information for use with the functionality enhancing embodiments described herein.

A timer 418 is operably coupled to the controller 414 to control the timing of operations, namely the transmission or reception of time-dependent signals, within the UE 112.

In the context of the preferred embodiment of the present invention, timer 418 is used to synchronize the timing of

the receiving and or transmitting portions of the UE 112 to be able to handle transmissions to and/or from the selected neighbouring UEs.

For completeness, in broad terms, the transmit chain of the communication unit (either a UE or Node B) essentially includes an input device 420, such as a microphone, coupled in series through a processor 408, transmitter/modulation circuitry 422 and a power amplifier 424. The processor 408, transmitter/modulation circuitry 422 and the power amplifier 424 are operationally responsive to the controller, with an output from the power amplifier coupled to the duplex filter or circulator 404, as known in the art.

In a similar manner to that described above for the downlink embodiments, adaptation of the signal processing function 408, controller 414, timer 418 and memory device 416 has been performed to effect uplink transmissions to selected neighbouring UEs, as would be appreciated by those skilled in the art.

The signal processor function 408 in the transmit chain may be implemented as distinct from the processor in the receive chain. Alternatively, a single processor 408 may be used to implement processing of both transmit and receive signals, as shown in FIG. 4.

Of course, the various components within the communication unit 400 can be realised in discrete or

integrated component form, with an ultimate structure therefore being merely an arbitrary selection.

More generally, any communication enhancement mode/UE utilisation associated with the preferred embodiment of the present invention may be implemented in a respective communication unit in any suitable manner. For example, new apparatus may be added to a conventional communication unit (for example UE 112, or Node B 122), or alternatively existing parts of a conventional communication unit may be adapted, for example by reprogramming one or more processors therein. As such the required adaptation may be implemented in the form of processor-implementable instructions stored on a storage medium, such as a floppy disk, hard disk, PROM, RAM or any combination of these or other storage multimedia.

In the preferred embodiments of the present invention, the UEs communicate to exchange capabilities and negotiate which functions of the individual UE(s) will be realised.

It is envisaged that one or more of the following functions may be used within a receiving UE to assist in the functionality enhancing processes:

a) Joint decoding
b) Joint demodulation
c) Joint equalization
d) Multi-mode operation

e) Multiplexing and de-multiplexing data for higher throughput

Embodiment 6 - Joint Decoding

When the UEs are of the same architecture and type, they are operably coupled to a receiving (intended) UE to allow joint decoding or joint equalization of received information so that the effective throughput and/or reliability of the received signal(s) is increased. A number of joint decoding possibilities are described in more detail with reference to FIGs 5a-5c. The UMTS transmitter/UE receiver arrangements of FIGs 5a-5c are described with reference to a downlink functionality enhancement mode of operation.

Referring now to FIG. 5a, a UMTS transmitter/UE receiver arrangement 500 is shown in accordance with the preferred embodiments of the present invention. A transmitter 510, for example a transmitter of a Node B, transmits on first and second communication channels 520, 525 to two UE receivers 550. During the transmission, the signals would be subjected to noise 530, 535, 540, multipath and rayleigh fading effects as is known in the art.

In either the case of transmitting a sequence of data blocks to individual UEs for subsequent combining at a single UE, or the case of transmitting the same data blocks to all UEs for increased reliability a number of independent receivers 550 are used (with two being shown for clarity purposes only).

In the case of joint decoding, the UE 112 (master unit) that is to receive demodulated samples from each of the selected neighbour UEs (slave units) may decode the information in a number of ways. FIG. 5a shows a first manner of decoding whereby each UE receiver performs its own demodulation 560 and channel decoding 570 on its received data, prior to UE 112 combining the forwarded decoded results 580. Such a combining operation may encompass, for example, a simple decision process of accepting a block that passes a cyclic redundancy check (CRC). In this case, the two received signals are configured to be on the same physical channel (or time-slot in GSM/TDMA systems). The physical channels cannot be heterogeneous, in that each unit experiences a different channel propagation conditions.

FIG. 5b shows a second manner of decoding whereby each UE receiver performs its own demodulation 560 and the independently demodulated data is forward, in each case, to a joint channel decoding function 572 in the UE 112. In this manner, UE-1 112 is able to perform its own channel decoding for each received demodulated signal, thereby saving the computational effort in its neighbouring UEs of providing channel decoded information.

Embodiment 7 - Joint Equalization

However, given that the channels are normally non-correlated, the combination of information can also be

performed before channel equalization as well, as shown in FIG. 5c. FIG. 5c therefore shows a third manner of decoding whereby each receiver provides its received signal to the UE 112, and the UE 112 then performs joint demodulation 562 prior to joint channel equalization and joint channel decoding 570.

In the manners detailed above in embodiment 6 and 7, the invention exploits spatial diversity. Each of the members in, say an aggregate embodiment, is used as a separate antenna element together with various levels of receiver ciruitry. This type of beneficial combination, using multiple received signals, improves reliability of the received signal(s).

Embodiment 8 - Rake combining:

In yet a further receiver decoding embodiment, for example when applied to a UMTS-FDD (CDMA) system, the multiple selected neighbouring UEs may use different codes or the same code. If the same code is used, the UE-1 receiver in a downlink embodiment (or Node B receiver in an uplink embodiment) would perceive the various received information signals as multipath effects. Hence, the different signals could be combined in a RAKE receiver.

In the alternative, if the information were sent using different codes, the output of the two or more different RAKE receivers could be combined. As before with embodiments 6 and 7, the RAKE receiver embodiment

effectively realizes diversity improvement. Naturally, in this case a signalling protocol message would be necessary to inform a Node B that multiple codes were in use, as known to those skilled in the art.

Embodiment 9 - Multi-mode operation

The inventors of the present invention further envisage applying the aforementioned functionality enhancement capability to multi-mode communication units and/or multiple of single (but different) mode communication units. In the latter case, two communication units supporting two different multiple access schemes would be combined to provide a single multi-mode communication service for the duration of the time that they are combined.

In the preferred configuration of embodiment 9, it is assumed that one user employs, for example a GSM phone and another user a UMTS phone (or a software definable radio (SDR)). It is envisaged that the GSM user can utilise the capabilities of the UMTS communication unit to obtain higher throughput and/or a better quality of service.

Furthermore, particularly when re-using a communication unit that is in an idle mode, redundancy and cost savings an be achieved. For example, it is envisaged that a wideband CDMA (WCDMA) cellular communication unit can work in non-compressed mode even with just one receive

path whilst exchanging neighbour cell information with a GSM phone.

As an example let us assume that the configuration of the communication link will be:

(i) UE-A is a GSM-only unit;
(ii) UE-B is UMTS unit; and
(iii) X is a UMTS Node B.

In idle mode, for example, UE-B is requested by UE-A (or the network) to create a UMTS radio link with its serving node B-X. UE-B then waits for transmissions from UE-A, say via a bluetooth connection, and forwards such uplink information to its serving node B-X. In effect, UE-B is used as a communication translator, as UE-A does not have the capabilities/functionality to communicate on the UMTS system. However, UE-A and UE-B are both Bluetooth-capable.

It is within the contemplation of the above communication enhancement could be applioed to a downlink scenario, for example forwarding information to a GSM communication unit that is temporarily out of the coverage range of the GSM system.

In all of the above architectures, the inventors of the present invention have envisaged that at least two modes of operation can be considered:

(i) Permanent transmission mode: where the selected neighbouring UEs always, and substantially

immediately, echo the signals that they receive intended for an alternative UE; or

(ii) On-Request transmission mode: where selected neighbouring UEs receive signals intended for an alternative UE and store them in memory. Stored and received signals are then re-transmitted to the UE 112, upon receipt of a request from UE-1 112, through say, the short-range bluetooth interface or a wired bus.

Let us now consider these two modes of operation in more detail.

Embodiment 10 - Permanent transmission mode:

In a permanent transmission mode of operation, the selected neighbouring UEs are configured effectively as repeater units, i.e. they are configured to re-transmit the data blocks as soon as they are received. This mode of operation is therefore particularly applicable to the RAKE receiver configuration of embodiment 7, where simultaneous receipt of numerous signals can be handled with ease. Furthermore, the permanent transmission mode is also well suited to the emergency call arrangement of embodiment 3, where immediate transmission of the emergency call data is desired.

Embodiment 11 - On-Request transmission mode:

As an alternative to the permanent transmission mode of operation of embodiment 10, the inventors of the present invention also envisage opportunities for transmission on

request. On-request transmission mode of operation requires the selected neighbouring UEs to receive signals and store them in memory. Stored signals are then re-transmitted upon receipt of a UE 112 request it through say, the short-range bluetooth interface of wired bus.

As an example, a down-link transmission from a Node B-X to a UE-A operably coupled to another UE-B, say via a short-range Bluetooth link, could be made, for example using the On-request transmission mode of embodiment 11 and, say, the joint Decoding arrangement of embodiment 6.

Such a down-link transmission may be described through the following events:

(i) Node B-X transmits a signal to UE-A. It is assumed that UE-A and UE-B receive the same signal, albeit modified by the two different channel propagation conditions. Both UE-A and UE-B store these signals.

(ii) UE-A performs some processing on its stored signals to demodulate and decode its received signal. If we assume that the final CRC determined by UE-A is incorrect, UE-A transmits a request, via the bluetooth short-range radio link (or wired bus) asking for a repeat transmission of the signal from Node B-X.

(iii) UE-B receives this request. In response to the request, UE-B retrieves the received signal from its memory, performs a demodulation operation on the received signal and then transmits the demodulated signal

via the same bluetooth short-range radio link (or wired bus) to UE-A.

In the alternative, if we assume that UE-B does not, at that time, have the processing resource to perform the necessary demodulation, it is within the contemplation of the invention that UE-B could echo the raw received signal to UE-A. UE-A could then choose to process joint decoding or to switch to joint equalization, as described above with respect to embodiment 6 or 7.

(iv) When UE-A receives a positive answer from UE-B, namley the provision of a demodulated signal intended for UE-A, UE-A is able to perform a joint decoding operation according to the arrangement of FIG. 5a.

(v) UE-A may then determine, after the final CRC, that the signal burst from Node B-X is properly decoded. Consequently, UE-A would not request a re-transmission of the burst using the communication standard's protocol, thereby leaving more resource to Node B-X and the cellular system.

If the UE 112, which requests assistance from its selected neighbouring UEs, fails to receive a positive answer to the request, it is within the contemplation of the invention that UE 112 can still use any available re-transmission protocol, as typically provided in most communication standards.

It is within the contemplation of the invention that the aforementioned method can be used in both the uplink and the downlink direction. For example, a user that wishes to transmit information to the cellular system might send that information to at least one member of the aggregated group, which subsequently transmits the information to the network.

Embodiment 12:

Private area networks typically consist of two or more users in a local network that use a local wireless access technique and a single connection through one or more gateway communication units to an external network. An example of such a network would be the BlueTooth standard where an ISM band private area network is formed within a very small radius (say 50 metres).

The local area network is thus very small and to a certain extent a communication unit will have reasonable line-of-sight connections to neighbouring communication units, with low propagation loss and low delays. It is known that the weak link in such a private area network is (if it is a wireless network) the external wireless connection to the local area network. Furthermore, this weakest link to the external area network will, of course, become the bottleneck for all other user communications. Usually one communication unit acts as the gateway to the external network and all other local private area UEs communicate to the external network

(this could be an inter or intra-net) via this gateway communication unit (or UE).

In accordance with a preferred aspect of embodiment 12 of this invention, it is assumed that two or more users in the private area network are likely to be spatially separated. As such, they are also assumed to provide a degree of spatial diversity to the external network link. This could be in the form of a beam to the external network using each of the UEs in the private area network as one 'antenna element' of the beam, in the classical sense. Alternatively it could be of the form of switching each of the 'primary' links in a regular fashion to give a degree of spatial diversity.

In accordance with the preferred aspect of embodiment 12 the external network link is not reliant upon one gateway communication unit (or gateway UE). Advantageously, the external network link is now distributed amongst a number of users in the private area network. Switching may occur in the uplink and downlink or in the downlink through maximal ratio combining the signals from all users in the private area network to provide a composite reliable external link.

The above solution has the advantage that the larger the private area network, the better the diversity gains and the more reliable the external link. A significant benefit of this is that the larger private area networks would have a higher data throughput to the external network.

Consequently, embodiment 12 provides the novel features of applying antenna diversity principles to a wireless private area network with a wireless external internet or intranet connection. Furthermore, the collective use of UE members of a wireless private network, to provide the most reliable uplink and downlink connection without using more external network resources is of substantial benefit.

In addition, the collective use of members in a private area network to provide redundancy in the external network connection is believed to be both novel and attractive to private network manufacturers and operators. Also, as the number of users in the private area network increases, so does the diversity gain in the external link. This is advantageous because the higher the number of users in the private area network the higher the external bandwidth requirement is likely to be.

In summary, the inventive concepts described herein provide, with respect to the known prior art, greater throughput by using multiple detection. Furthermore, new functions and applications such as a more-effective multi-mode operation, where each individual unit is capable of being separated and used as a UE. When together, they can be configured to work co-operatively. Furthermore, a new alternate emergency call function is realised, in contrast to known multi-mode/multiple-terminal pack units.

It will be understood that the linking of multiple communication units described above provides the following advantages:

(i) The improvement to a single subscriber communication unit in a downlink reception mode is substantially equal to an improvement provided by having multiple receiving antennas.

(ii) The collective use of communication units to form an aggregate group, provides each user with a more reliable uplink and downlink communication channel without using more network resources.

(iii) Assuming that the antenna of each of the communication units is not correlated, the combined block error rate (BLER) of the multiple receivers assisting in a downlink communication link enhancement mode is multiplied. If the BLER of first receiver was 0.3 and that of a second was 0.2, the combined receiver operates at 0.06 which corresponds to a gain of a few dB that is hard to realise on a single receiver.

(iv) The cost of the combined system is much less, as each subscriber communication unit does not need to be designed to have maximum functionality - the units can utilise the functionality or higher-tier capabilities of

neighbouring communication units, as and when required.

(v) New functions may be realised, with the functionality re-use/enhancement provisions.

(vi) The radio link efficiency is improved and the reliability of communication is increased.

(vii) Substantially higher data rates for downlink and/or uplink communications are realised.

Whilst the specific, and preferred implementations of the embodiments of the present ivention are described above, it is clear that variations and modifications of such invnetive concepts could be readily applied by one skilled in the art.

Claims

1. A method of enhancing a communication capability of a communication unit operating in a communication system that facilitates communication to and/or from a plurality of communication units, the method comprising the step of:

operably coupling a first communication unit to one or more neighbouring communication units such that said communication unit is able to utilise at least one operational capability of one or more of its neighbouring communication units to enhance communication to and/or from said first communication unit.

2. The method of enhancing a communication capability of a communication unit according to Claim 1, the method further comprising the step of:

performing a polling operation, by said first communication unit, of said neighbouring communication units to discover one or more neighbouring communication units that are able to enhance communication to and/or from said first communication unit.

3. The method of enhancing a communication capability of a communication unit according to Claim 1, the method further comprising the step of:

performing a polling operation, by a central unit in said communication system, to discover one or more neighbouring communication units of said first communication unit to use in enhancing communications from said central unit to said first communication unit.

4. The method of enhancing a communication capability of a communication unit according to Claim 2 or Claim 3, wherein said step of operably coupling or said step of polling is performed using a short-range wireless connection or a wired bus.

5. The method of enhancing a communication capability of a communication unit according to Claim 4, wherein said short-range wireless connection is a bluetooth adjunct to the communication system.

6. The method of enhancing a communication capability of a communication unit according to any of the preceding Claims, the method further comprising the step of:

utilising a first neighbouring communication unit, to enhance communication to and/or from said first communication unit based on a determined geographical location of said first neighbouring communication unit.

7. The method of enhancing a communication capability of a communication unit according to any of the preceding Claims, wherein a number of the one or more neighbouring communication units carry different amounts of data, for example based on individual link conditions.

8. The method of enhancing a communication capability of a communication unit according to any of the preceding Claims, the method further comprising the step of:

coordinating by a number of said plurality of said communication units to form an aggregated group of communication units for achieving enhanced communication functionality as a group.

9. The method of enhancing a communication capability of a communication unit according to Claim 8, wherein a number of said aggregated group of communication units transmit link condition information to a central unit in said communication system.

10. The method of enhancing a communication capability of a communication unit according to any of preceding Claims 7 to 9, the method further comprising the step of:

establishing a number of said communication units of said aggregated group of communication units to enhance communication to and/or from other members of the group when said number are inactive.

11. The method of enhancing a communication capability of a communication unit according to any of the preceding Claims, wherein said first communication unit is arranged as a master communication unit coordinating larger data throughput communication to and/or from said neighbouring communication units operating as slave communication units.

12. The method of enhancing a communication capability of a communication unit according to any of the preceding Claims, wherein said operable coupling of

said communication units is arranged to enhance uplink communication.

13. The method of enhancing a communication capability of a communication unit according to Claim 12, wherein said neighbouring communication units are used by said first communication unit for an emergency call.

14. The method of enhancing a communication capability of a communication unit according to Claim 12, when dependent upon any of Claims 7 to 11, wherein said first communication unit distributes the information for transmission to all of the communication units of the aggregated group to perform the uplink communication.

15. The method of enhancing a communication capability of a communication unit according to any of preceding Claims 1 to 11, wherein said operably coupling of said communication units is arranged to enhance downlink communication.

16. The method of enhancing a communication capability of a communication unit according to Claim 15, the method further comprising the steps of:

failing to decode, by said first communication unit, information sent to said first communication unit; and, in response to said step of failing

requesting by said first communication unit whether any of said one or more selected neighbouring communication units received such information; and

receiving said information, forwarded in response to said request, from said one or more selected neighbouring communication units.

17. The method of enhancing a communication capability of a communication unit according to Claim 15, the method further comprising the steps of:

forwarding automatically to said first communication unit, from any of said selected neighbouring communication units, any communication intended for said first communication unit that is received by any of said selected neighbouring communication units.

18. The method of enhancing a communication capability of a communication unit according to Claim 16 or Claim 17, the method further comprising the steps of:

combining, in said first communication unit, one or more received copies of said information forwarded by any of said selected neighbouring communication units.

19. The method of enhancing a communication capability of a communication unit according to Claim 18, wherein the step of combining includes the step of:

performing in a number of receivers of said selected neighbouring communication units demodulation (560) of information intended for said first communication unit;

performing in a number of receivers of said selected neighbouring communication units, channel decoding (570) of said demodulated information; and

combining said channel decoded information from said number of receivers of said selected neighbouring communication units in said first communication unit.

20. The method of enhancing a communication capability of a communication unit according to Claim 18, wherein the step of combining includes the step of:

performing in a number of receivers of said selected neighbouring communication units demodulation (560) of information intended for said first communication unit; and

combining said demodulated information from said number of receivers of said selected neighbouring communication units in said first communication unit.

21. The method of enhancing a communication capability of a communication unit according to Claim 20, wherein the step of combining said demodulated information further includes the step of:

performing joint channel decoding (572) in said first communication unit.

22. The method of enhancing a communication capability of a communication unit according to Claim 18, wherein the step of combining includes the step of:

forwarding received information from said number of receivers of said selected neighbouring communication units to said first communication unit;

combining said forwarded received information in said first communication unit; and

33. A storage medium storing processor-implementable instructions adapted to control a processor to carry out the method of any of claims 1 to 32.

34. A communication system adapted to facilitate the performance of any of the method steps of claims 1 to 32.

35. The communication system according to claim 34, wherein the communication system is one of a UMTS communication system, a GSM communication system, a bluetooth communication system.

36. A communication unit adapted to facilitate the performance of any of the method steps of claims 1 to 32.

37. The communication unit according to claim 36, wherein the communication unit is one of a wireless portable communication product or a Base Station/Node B facilitating wireless communication.

38. A portable communication unit having a memory unit wherein the communication unit is adapted to store transmissions intended for an alternative portable communication unit.

39. The portable communication unit according to claim 38, further comprising:

a receiver receiving a request from said intended portable communication unit to forward said stored trasmission;

a processor operably coupled to said receiver, processing said request from said intended portable communication unit; and

a transmitter, operably coupled to said processor, said transmitter transmitting said stored transmissions to said intended portable communication unit in response to said processed request.

40. A portable communication unit comprising a transmitter operably coupled to a processor to perform a polling operation of neighbouring communication units to discover one or more neighbouring communication units that are able to enhance communication to and/or from said portable communication unit.

41. The portable communication unit according to claim 40, wherein said portable communication unit is capable of operating on a short-range wireless system, for example a bluetooth system, for the purposes of the polling operation.

42. A portable communication unit having communications means adapted to communicate to one or more neighbouring units to form an aggregated group of communication units to achieve enhanced communication functionality as a group.

43. The portable communication unit according to claim 42, wherein said portable communication unit transmits link condition information to said one or more neighbouring units of said aggregated group of communication units.

44. The portable communication unit according to any of preceding Claims 40 to 43, wherein said one or more neighbouring communication units are used by said portable communication unit for an emergency call.

45. A portable communication unit having a receiver comprising a baseband processing circuit, wherein the baseband processing circuit receives transmissions from one or more neighbouring portable communication units, said baseband processing circuit including at least one of the following to recover information intended for said portable communication unit:

a combining circuit combining channel decoded information from said one or neighbouring portable communication units;

a joint channel decoding (572) circuit for combining received demodulated information from said one or neighbouring portable communication units; and

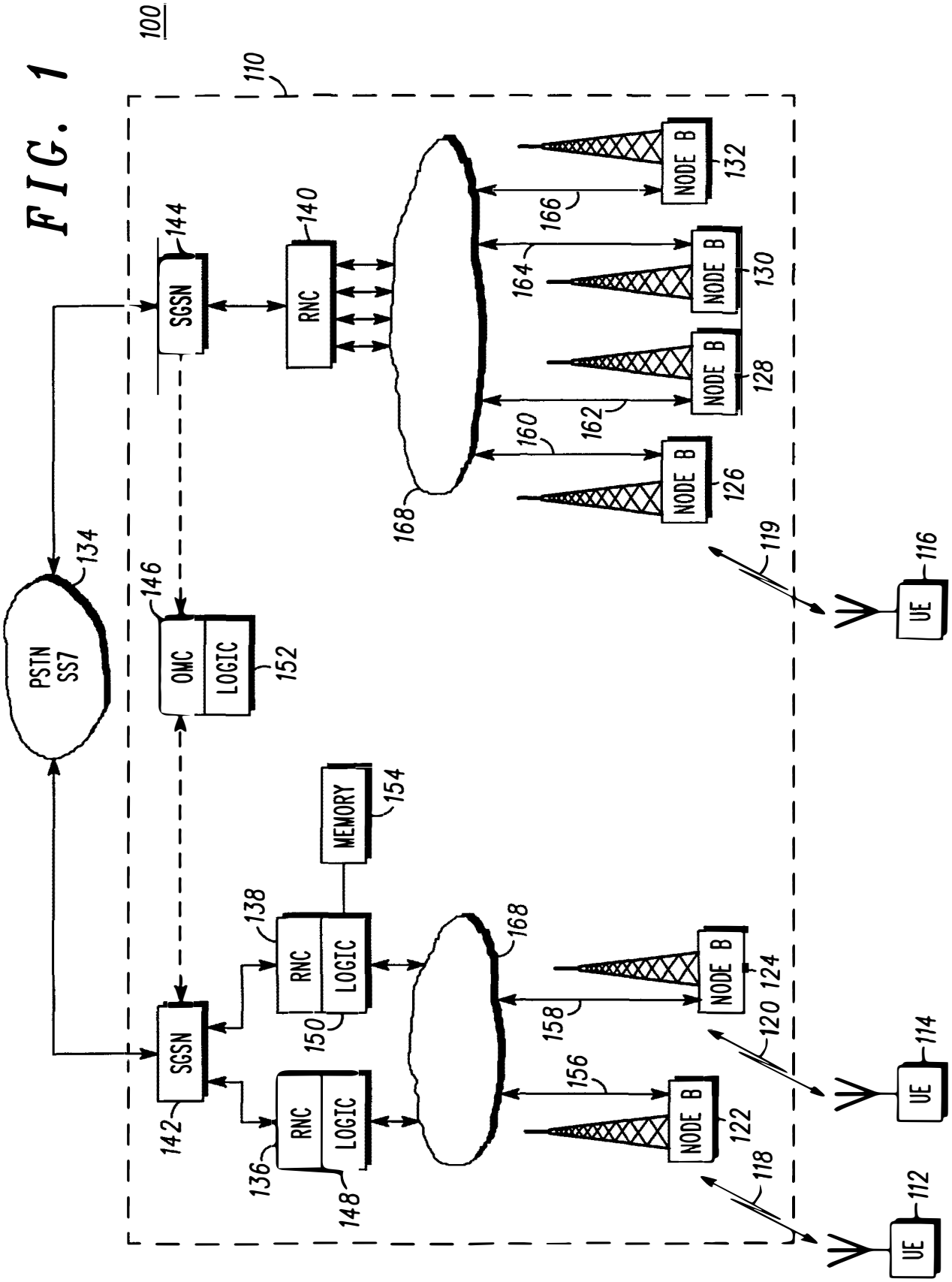
a joint demodulator circuit to combine and demodulate information received from said one or neighbouring portable communication units.

46. The portable communication unit according to any of claims 36 to 45, wherein the portable communication product is one of: a cellular phone, a portable or mobile radio, a personal digital assistant, a laptop computer or a wirelessly networked PC.

47. A method of enhancing a functionality of a communication unit substantially as hereinbefore described with reference to, and/or as illustrated by FIG. 1, FIG. 2 or FIG. 3 of, the accompanying drawings.

48. A communication unit substantially as hereinbefore described with reference to, and/or as illustrated by, FIG. 4, FIG. 5 or FIG. 6 of the accompanying drawings.

FIG. 1


100
110
PSTN SS7
134
SGSN
144
SGSN
142
RNC
140
RNC
LOGIC
138
RNC
LOGIC
136
OMC
LOGIC
146
152
MEMORY
154
150
148
NODE B
132
NODE B
130
NODE B
128
NODE B
126
NODE B
124
NODE B
122
166
164
162
160
158
156
168
168
120
118
119
UE
116
UE
114
UE
112

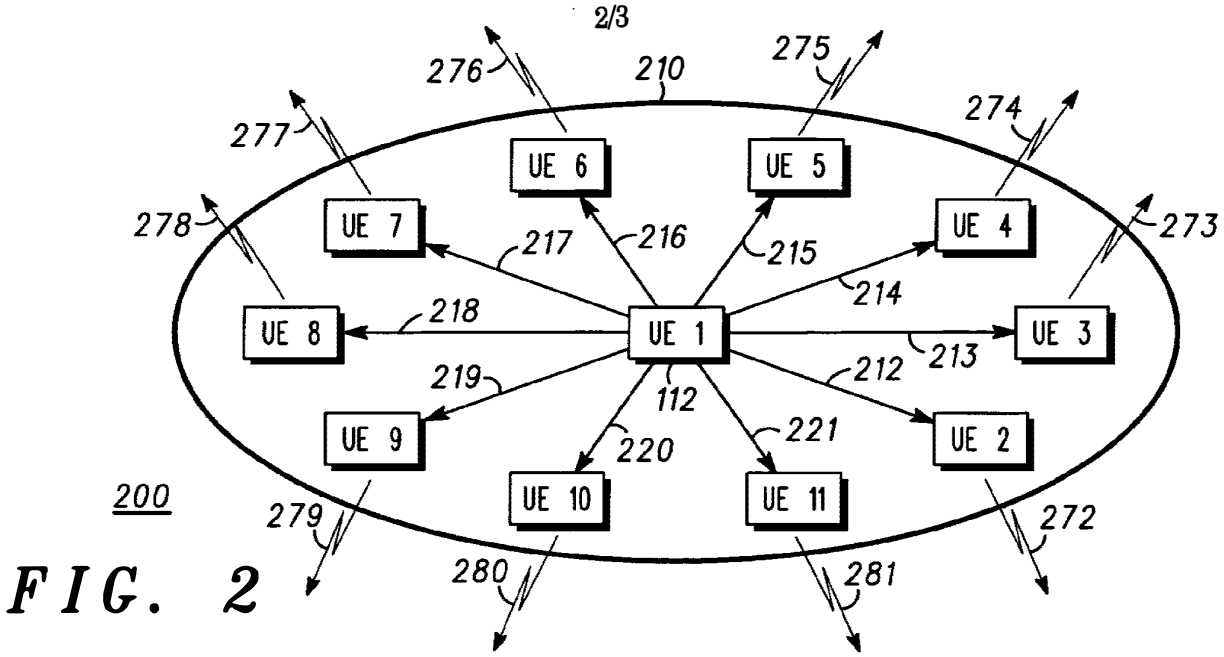


FIG. 2

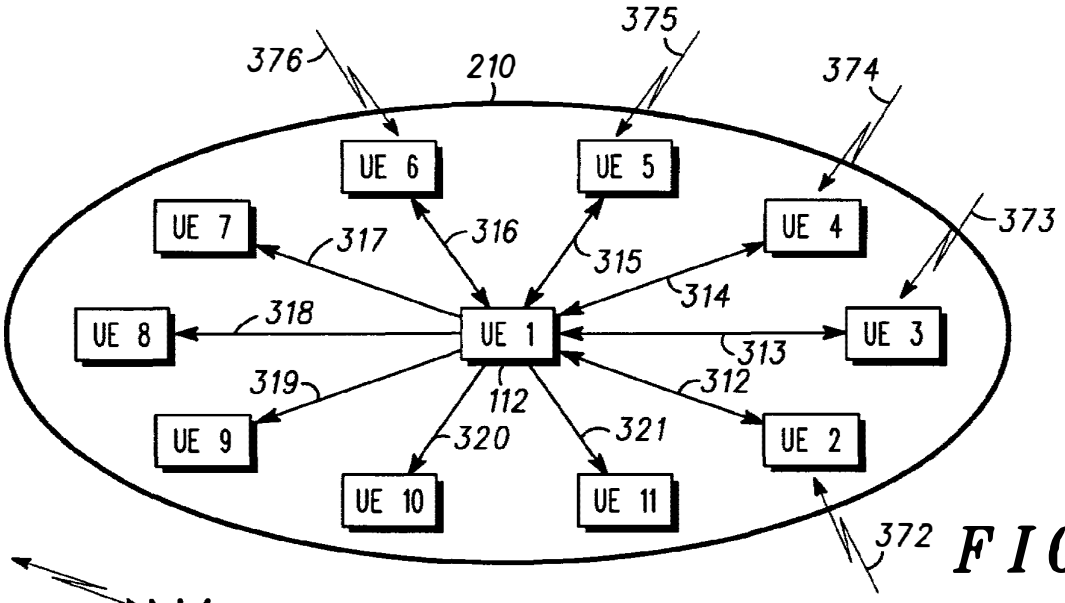


FIG. 3

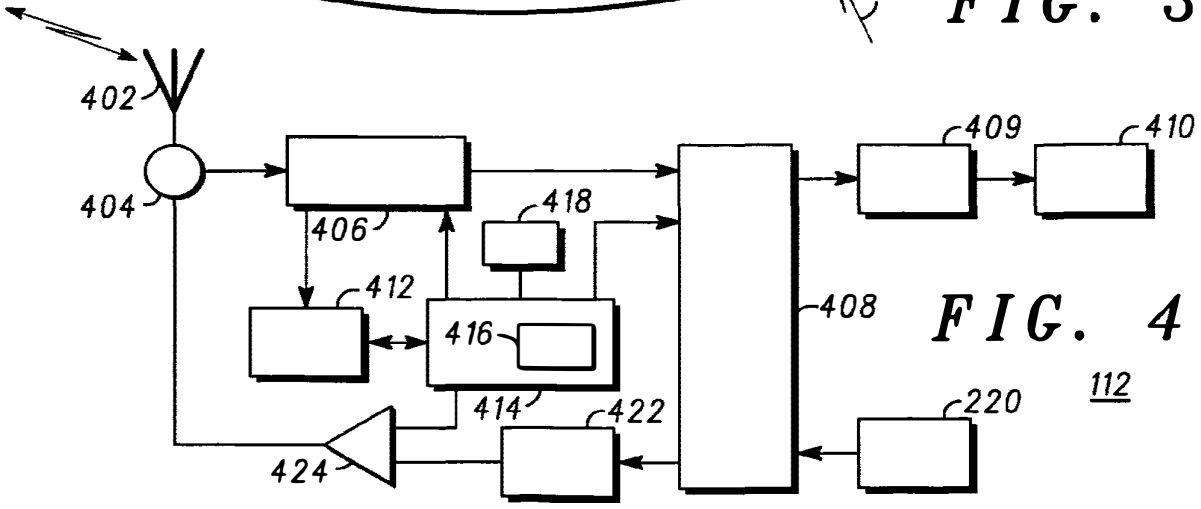


FIG. 4

FIG. 5a

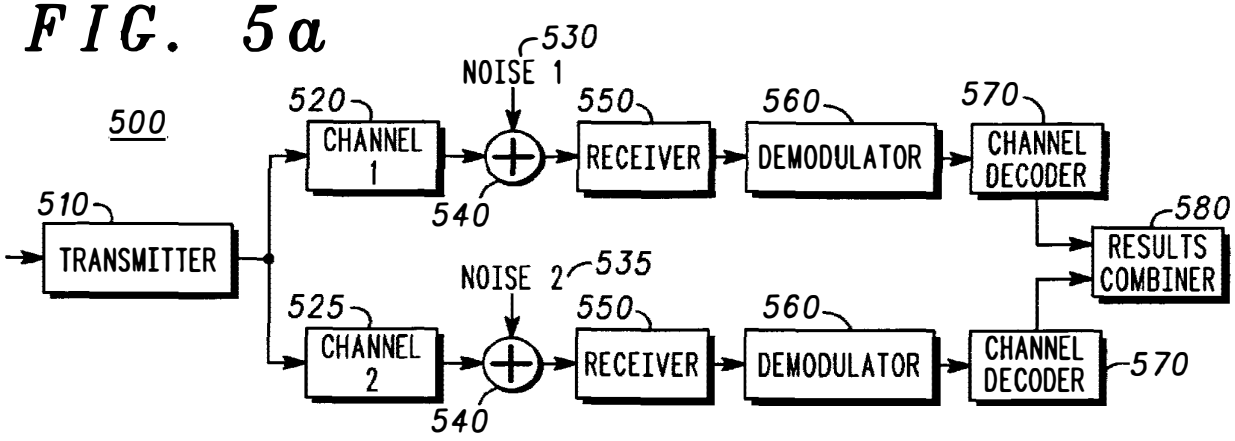


FIG. 5b

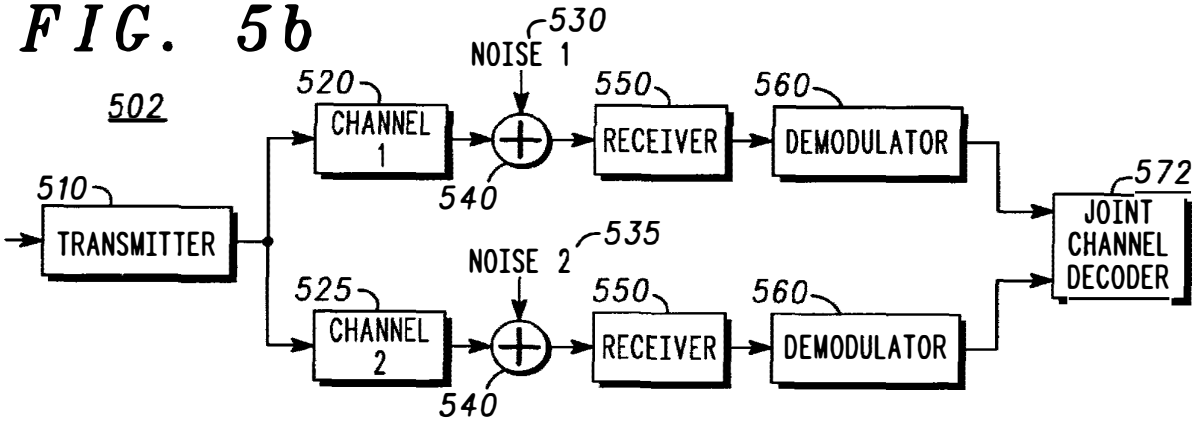
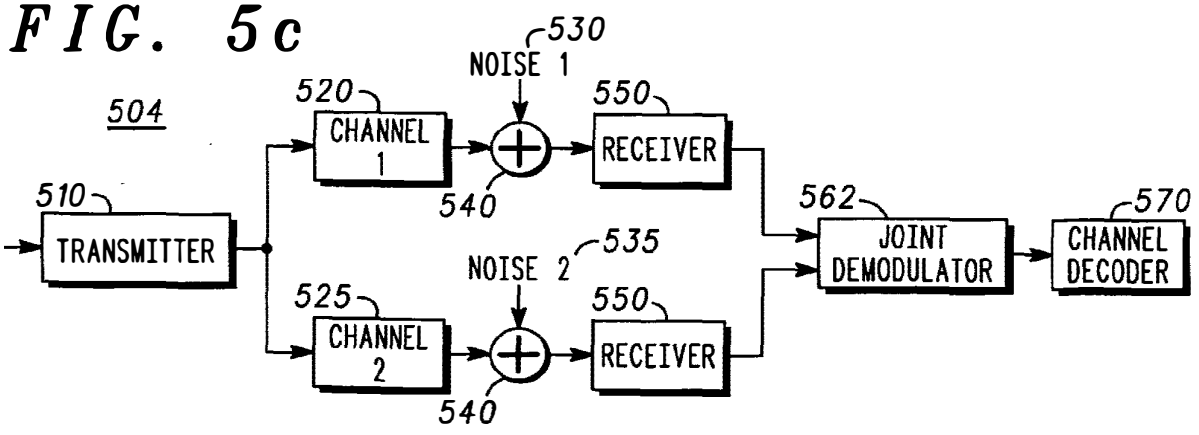


FIG. 5c



INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 02/05829

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04L12/56

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04L H04B

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

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

EPO-Internal, INSPEC, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 00 54539 A (LARSEN JAMES DAVID ;SALBU RESEARCH AND DEV LAB PRO (ZA)) 14 September 2000 (2000-09-14) page 5, line 26 -page 7, line 25 page 17, line 13 - line 27 page 20, line 1 - line 3 page 20, line 19 -page 21, line 5 figure 2	1-3,6,8, 10-12, 15,17, 38-44
A		16, 18-27, 45-48

-/--

[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
30 September 2002	07/10/2002

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	Larcinese, A

1

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

IPR2023-01270 Page 752

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 02/05829

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 689 303 A (ALCATEL BELL SDT SA) 27 December 1995 (1995-12-27) column 3, line 35 -column 4, line 52 column 5, line 34 - line 45 column 6, line 48 -column 7, line 1 figure 1	1,6,8, 12-15, 42-44
X	DE 199 50 005 A (WALKE BERNHARD ;ESSELING NORBERT (DE)) 19 April 2001 (2001-04-19) column 4, line 42 - line 63	1

1

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

IPR2023-01270 Page 753

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-15,17,28-44

   A method and devices for coupling a first communication unit to neighbours communication units to enhance system capability,i.e. to give wider coverage area.

2. Claims: 16,18-27,45-48

   Method and devices for correcting a failed transmission from neighbour communication units towards a first communication unit and for using an alternative communication unit to enhance system capability.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP 02/05829

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/EP 02/05829

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 0054539 A	14-09-2000	AU 2934300 A	28-09-2000
		EP 1080596 A1	07-03-2001
		WO 0054539 A1	14-09-2000
EP 0689303 A	27-12-1995	EP 0689303 A1	27-12-1995
DE 19950005 A	19-04-2001	DE 19950005 A1	19-04-2001
		AU 1024801 A	30-04-2001
		WO 0130024 A2	26-04-2001
		EP 1208680 A2	29-05-2002

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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
9 January 2003 (09.01.2003)

PCT

(10) International Publication Number
WO 03/003643 A1

(51) International Patent Classification[7]: H04L 1/00

(21) International Application Number: PCT/EP01/07340

(22) International Filing Date: 27 June 2001 (27.06.2001)

(25) Filing Language: English

(26) Publication Language: English

(71) Applicant *(for all designated States except US)*: **NOKIA CORPORATION** [FI/FI]; Keilalahdentie 4, FIN-02150 Espoo (FI).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **WANG, Yan** [CN/CN]; Room 901, Building 1, Zhi Chun Li, Beijing 100086 (CN). **ZHAO, Suli** [CN/CN]; No. 11, He-ping-li-dong-jie, Beijing 100013 (CN). **GUAN, Hao** [CN/CN]; No. 9-103, Building 310, Dong-ba-li-zhuang, Beijing 100000 (CN).

(74) Agent: **KURIG, Thomas**; Becker, Kurig, Straus, Bavariastr. 7, 80336 München (DE).

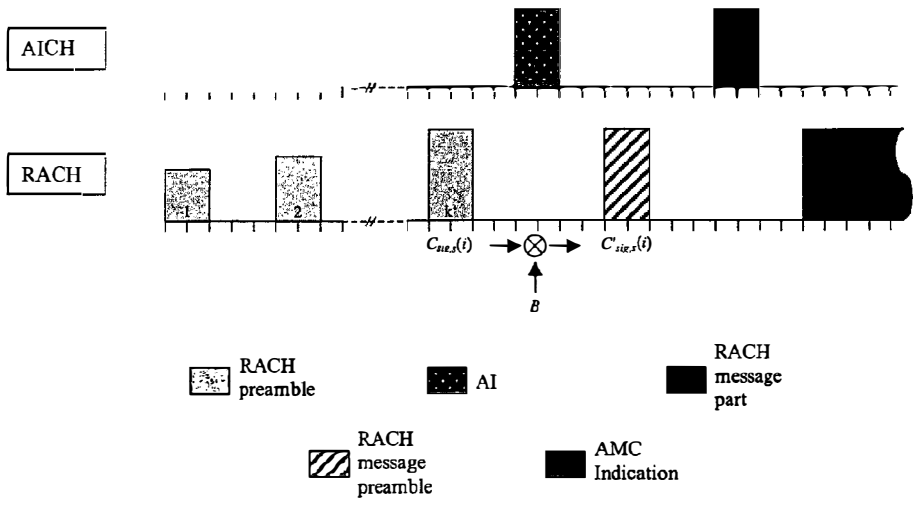
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, 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, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
with international search report

[Continued on next page]

(54) Title: METHOD FOR ADAPTIVELY SETTING TRANSMISSION PARAMETERS FOR A RANDOM ACCESS CHANNEL TRANSMISSION UPLINK PROCEDURE IN A WIRELESS COMMUNICATION SYSTEM



(57) Abstract: The present invention provides a method to enhance the RACH message transmission of a wireless communication systems. Therefore the known RACH procedure for uplink transmission is extended by additional steps in order to allow the usage of adaptive transmission parameters for uplink transmissions, preferably the usage of adaptive modulation and coding (AMC). This is advantageous because studies in high-speed downlink packet access showed the possibility to increase the data rate of a downlink shared channel. The method according to the invention introduces a new RACH message preamble and enables the base station to estimate a suitable adaptive transmission parameters like AMC setting according to the current transmission conditions which is used during the RACH message transmission.

WO 03/003643 A1

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Method for adaptively setting transmission parameters for a random access channel transmission uplink procedure in a wireless communication system

The present invention relates to a method of transmitting user data from a mobile device to a wireless communication system using adaptive transmission parameters in order to enhance the total data rate of the uplink transmission. The present invention also relates to a mobile device using the method of enhanced uplink transmission. More specifically the invention relates to a method for using adaptive modulation and coding for a random access channel transmission uplink procedure in a code division multiple access device.

The benefit of adapting the transmission parameters in a wireless system to the changing channel conditions is well known. In fact, fast power control is an example of a technique implemented to enable reliable communications while simultaneously improving system capacity. The process of modifying the transmission parameters to compensate for the variations in channel conditions is known as link adaptation.
An implicit link adaptation technique is hybrid automatic repeat request (H-ARQ). There are many schemes for implementing H-ARQ, standardized as H-ARQ, H-AQR type II, H-ARQ type III and subtypes used for retransmitting erroneous data wherein retransmission is adapted to the transmission conditions depending on the ARQ scheme used for retransmitting.
Another technique related to the category of link adaptation is explicit adaptive modulation and coding (AMC) which requires explicit transmission condition measurements or similar measurements to select the fitting transmission parameters.
Link adaptation is also achievable using adaptive selection of antenna which is for example implemented as multiple input multiple output antenna processing.

Adaptive modulation and coding (AMC) is part of the techniques behind the concept of high-speed downlink packet access and is one of the main features introduced by code division multiple access communication services.

The main benefits of AMC are higher data rates which are available for users in favorable positions which in turn increases the average throughput of the cell and reduces interference

variations due to link adaptation based on variations in the modulation and/or coding scheme instead of variations in transmission of power. Up to now, AMC is only applied in downlink shared channel (DSCH) to enhance transmission data rates.

Since large data amounts are not only transmitted from a base station to a mobile device designated as downlink transmission but also from a mobile device to a base station designated as uplink transmission it is necessary to apply adaptive transmission parameters to the mobile device. User data are transmitted from the mobile device to the base station using random access channel (RACH) including fixed modulation. Up to now there is no transmission method or procedure known, respectively, to enhance data rate provided by the RACH for users in favorable positions.

The usage of adaptive transmission parameters requires the measurement of the current transmission conditions. Therefor, the measurement has to be performed in a way which ensures obtaining transmission condition data reflecting the conditions during transmission enhanced by the usage of adaptive transmission parameters.

The object of the present invention is to enhance the total data rate in random access channel uplink transmissions by extending the procedure of a random access channel user data uplink transmission.

The known procedure of a random access channel user data uplink transmission is extended to employ transmission parameters for the transmission of the random access channel message part. Therefore, the procedure has to implement a method to determine the transmission conditions just before the random access channel message part is transmitted.

According to this aspect of the present invention the random access channel procedure is performed as follows: the mobile device selects randomly one of the RACH sub-channels from the group its access class allows it to use and the signature is also selected randomly from among the available signatures, the downlink power level is measured and the initial RACH power level is set with proper margin due to open loop inaccuracy, a RACH preamble (e.g. a 1 ms RACH preamble) is sent including the selected signature, the mobile device decodes acquisition indicator channel (AICH) to determine whether or not the base station has

detected the preamble and in case no acquisition indicator (AI) is detected on the AICH the mobile device increases the preamble transmission power by a power ramp step given by the base station (BS), e.g. as multiple of 1 dB, and the preamble is retransmitted in the next available access slot.

The method of the present invention is characterized by the following additional steps. In case an AI transmission is detected on the AICH form the base station the mobile device transmits a RACH message preamble including transmission conditions related data to enable the use of adaptive transmission parameters for the RACH message part. The RACH message preamble is decoded by the base station and allows the base station to estimate the transmission conditions based on the message preamble. In combination with the current network load and the estimated transmission conditions, the base station is able to determine suitable adaptive transmission parameters allowed for the mobile device. This adaptive transmission parameter setting is transmitted as an indication message to the mobile device via the AICH. The indication message is received by the mobile device and decoded. The mobile device is now able to transmit the RACH message part using the transmitted adaptive transmission parameter setting to increase the total transmission rate.

Preferably, the RACH message preamble includes the data necessary for the transmission parameter setting. Conveniently, the RACH message preamble includes a number for indicating how many transmissions of the RACH preamble are transmitted to the base station before an AI is detected on the AICH. Additionally, the RACH message preamble includes a power ramp step used for transmitting the RACH preambles before the AI is detected on the AICH.

Besides the above described transmission condition data additional information like antenna system information, speed information of the mobile device and so on are possible. The conditions data which have to be transmitted by mobile device to the base station to estimate the transmission conditions and to determine according adaptive transmission parameters result from the method or procedure of the estimation and determination process.

The way of coding the transmission related data is not limited. The realization of the RACH message preamble can be done in several ways. A certain realization is explained below, wherein the transmission condition related data are coded in a common vector and spread

with a RACH preamble signature. This is one possible way. It is also possible to transmit the data in another way. The way of coding the condition related data has to meet the requirement to be decodable by the base station.

More preferably, the RACH message preamble includes the number of RACH preambles transmitted to the base station until an AI is detected on the AICH and the power ramp step used for transmitting the RACH preambles before the AI is detected on the AICH. A possible way to co-code these transmission condition data is modifying the known RACH preamble. The RACH preamble is a complex value sequence including a preamble signature. The preamble signature is chosen to include the transmission condition data and consists of 256 repetitions of a length 16 signature $P_s(n)$, n = 0 ... 15, defined as followed:

$$C_{sig,s}(i) = P_s(i \text{ modulo } 16), \quad i = 0,1,\text{K } 4095$$

The signature $P_s(n)$ is chosen from the set of 16 Hadamard codes of length 16.
The number of RACH preambles transmitted to the base station and the power level used for transmission are coded in a value vector B, defined as follows:

$$B = (b_m, \text{K}, b_0), \quad m \in N, m > 2$$

A certain number of sub-values b_i are reserved for the coding of the number of RACH preamble transmissions, the remaining sub-values are reserved accordingly for the coding of the power level of the transmission. The value vector B is spread with the signature $C_{sig,s}(i)$. The resulting value shall be worded as new signature $C'_{sig,s}(i)$. The base station knows $C_{sig,s}(i)$ from the transmission of the last preamble. Therefore, the value vector B can be decoded from the base station and the data regarding the number of RACH preamble transmissions of the mobile device and the power ramp step for transmission of the RACH preambles are available for determining the adaptive transmission parameter setting. All other necessary data like current network load are always available from and by the base station.

As an example, according to the maximal RACH preamble transmissions it is assumed to code a maximal number of 32 RACH preamble transmissions needing 5 bits to be reserved for coding and 3 bits to code the power ramp step. Overall 8 bits will be enough to code both values and the value vector B will be denoted as follows:

$$B = (b_7, b_6, b_5, b_4, b_3, b_2, b_1, b_0)$$

number of transmissions power level

The representation $(b_7, b_6, b_5, b_4, b_3) = (0,0,0,0,0)$ means that the RACH preamble was transmitted once, the representation $(b_7, b_6, b_5, b_4, b_3) = (0,0,0,0,1)$ means that the RACH preamble was transmitted twice and so on. Accordingly, the representation of the transmission power level is performed in the same way. The 3 bits enable the representation of 8 different power ramp steps. If the necessity appears to code a larger number of transmissions or more different power ramp steps the value vector B is easily expandable to serve necessity according to the example above.

More Preferably, the adaptive transmission parameters are parameters to enable the employment of adaptive modulation and coding (AMC) for RACH uplink transmissions.

According to another aspect of the present invention, a computer program for carrying out the method for adaptively setting transmission parameters for a random access channel transmission uplink procedure in a wireless communication system is provided, which comprises program code means for performing all of the steps of the preceding method description when said program is run on a computer, a network device, a mobile terminal, or an application specific integrated circuit.

According to yet another aspect of the invention, a computer program product is provided comprising program code means stored on a computer readable medium for carrying out the method for adaptively setting transmission parameters of the preceding description when said program product is run on a computer, a network device, a mobile terminal, or an application specific integrated circuit.

According to yet another additional aspect of the present invention, a mobile electronic device is provided, which is adapted to perform a method as described in the foregoing description. The electronic device can be a computer, or a network device such as mobile terminal.

In the following, the invention will be described in detail by referring to the enclosed drawings in which:

Figure 1 shows schematically the important steps according to a RACH procedure in 3GPP (3rd Generation Partner Project), and

Figure 2 shows schematically the important steps according to the method of the present invention.

Fig. 1 illustrates the important steps of a standard RACH procedure. Both the RACH and the AICH are shown to illustrate the timely sequence of the transmissions. The procedure is explained in an exemplary way according to the current UMTS standard performed as follows:

1. Available uplink access slots in a next access slot set are derived for a set of available RACH sub-channels within the given access slot class (ASC). One access slot is selected randomly among the ones previously determined. In case of no available access slot an uplink access slot is selected randomly corresponding to the set of available RACH sub-channels within the given ASC from the next access slot set.
2. A signature is selected randomly from the set of available signatures within the given ASC.
3. A preamble retransmission counter is set to a preamble retransmission maximum.
4. A commanded or desired preamble power is set to the initial preamble power level.
5. In case of exceeding the maximum allowed value of the commanded preamble power the preamble transmission power is set to the maximum allowed power. Otherwise the preamble transmission power is set to the commanded transmission power. It is possible that the commanded transmission power is too low in certain situations so that the preamble transmission power has to be set above the commanded transmission power.
   The preamble is transmitted a first time using the selected uplink slot, signature and preamble transmission power.
6. In case no positive or negative AI corresponding to the selected signature is detected on the AICH downlink access slot corresponding to the selected uplink access slot:
   6.1. a next available access slot in the set of available RACH sub-channels within the given ASC is selected.
   6.2. a new signature is selected randomly from the set of available signatures within the given ASC.
   6.3. The commanded preamble power is increased by a power ramp step. If the commanded preamble power exceeds the maximum allowed power by 6 dB the mobile device passes an error message and exits the random access procedure.
   6.4. The preamble retransmission counter is decreased by one.

6.5. The steps are beginning with step 5 repeatedly if the preamble transmission power is greater than zero. Otherwise the mobile device passes an error message and exits the random access procedure.

7. In case of detecting a negative AI corresponding to the selected signature in the AICH downlink access slot to the selected uplink access slot the mobile device passes an error message and exits the random access procedure.
8. The random access message is transmitted three or four uplink access slots after the uplink access slot of the last transmitted preamble. The transmission power of the message is chosen according to the transmission power under consideration of further parameters of the transmitted preamble.
9. The mobile device passes a confirmation message and exits the random access procedure.

Fig. 2 illustrates the steps according to one aspect of the method of the present invention. The procedure is similar or analog to the procedure described in Fig. 1 up to the point of receiving the AI by the mobile device (see step 7). As a next step the new signature is derived from the signature $C_{sig,s}(i)$ included in the last transmitted RACH preamble and the value vector B which includes the necessary transmission related data used for determining the AMC setting. Preferably, the value vector B is spread with the RACH preamble signature $C_{sig,s}(i)$ in order to gain the new signature $C'_{sig,s}(i)$.The new signature is included in the RACH message preamble and transmitted to the base station. The base station decodes the message preamble to extract the value vector B and determines in combination with base station internal data related to the channel conditions the AMC setting. This setting is transmitted in form of an AMC indication via the AICH. The mobile device accepts the AMC settings and transmits the RACH message part using the current AMC to improve the data rate and reduce transmission errors.

The scheme is not limited to CDMA. It can be also used in other systems, like TDMA. In other systems, the value vector B can also be sent in a way without spreading. The contents of value vector B will not be limited to the number of transmission, power ramp step, etc. It can contain any transmission related information. Also here only adaptive modulation and coding for message part is mentioned. However, other adaptive transmission parameters for message part can also be used.

The scheme keeps the merits of AMC, which means users in favorable positions e.g. users close to the cell site are typically assigned higher order modulation with higher code rates,

while users in unfavorable positions e.g. users close to the cell boundary, are assigned lower order modulation with lower code rates.

Furthermore, the scheme is an adaptive fast access scheme, it can use system margin as much as possible and as soon as possible, thus increase system throughput.

Claims

1. A method according to claim 1, comprising the steps of:
   - selecting randomly one of available RACH sub-channels,
   - selecting randomly an available signature,
   - setting an initial RACH power level, estimated by a downlink power level, with a proper margin,
   - transmitting a RACH preamble with said RACH power level including said selected signature,
   - decoding an acquisition indicator (AI) on an acquisition indicator channel (AICH) to determine whether or not a base station has detected said RACH preamble,
   - in case no AI on said AICH is detected increasing said power level and retransmitting said RACH preamble with a new RACH power level increased at a power ramp step,

   characterized by the additional steps of:
   - in case said AI on said AICH is detected transmitting a RACH message preamble including transmission conditions related data to enable the usage of adaptive transmission parameters for the RACH message part transmission,
   - receiving and decoding said RACH message preamble to get the said transmission conditions related data,
   - using the transmission conditions related data to determine adaptive transmission parameter setting, and
   - using said adaptive transmission parameter setting for transmitting said message part of said RACH transmission.

2. A method according to claim 1, wherein said RACH message preamble includes channel condition related data.

3. A method according to anyone of the preceding claims, wherein said RACH message preamble includes a number for indicating how many transmissions of said RACH preambles are transmitted until said AI on said AICH is detected.

4. A method according to anyone of the preceding claims, wherein said RACH message preamble includes said power ramp step level used for transmitting said RACH preambles.

5. A method according to anyone of the preceding claims, wherein said RACH message preamble consists of 256 repetitions of a length 16 signature $P_s(n)$, n = 0 ... 15, defined as follows:

$$C_{sig,s}(i) = P_s(i \text{ modulo } 16), \quad i = 0,1,\text{K } 4095$$

and spread by a value vector B, defined as followed:

$$B = (b_m,\text{K },b_0), \quad m \in N, m > 2,$$

wherein said signature $P_s(n)$ is chosen from a set of 16 Hadamard codes of length 16 and said value vector B codes the number of RACH preamble transmissions until said AI is detected on said AICH and said power ramp step is used for transmitting said RACH preambles.

6. A method according to anyone of the preceding claims, wherein said adaptive transmission parameter setting includes an adaptive modulation and coding setting.

7. Computer program for executing method for using adaptive transmission parameters for an random access channel (RACH) transmission uplink, comprising program code means for carrying out the steps of anyone of claims 1 to 6 when said program is run on a computer, a network device, a mobile device, or an application specific integrated circuit.

8. Computer program product comprising program code means stored on a computer readable medium for carrying out the method of anyone of claims 1 to 6 when said program product is run on a computer, a network device, a mobile device, or an application specific integrated circuit.

9. Electronic device for wireless communication systems, comprising means adapted to perform a method according to anyone of the claims 1 to 6.

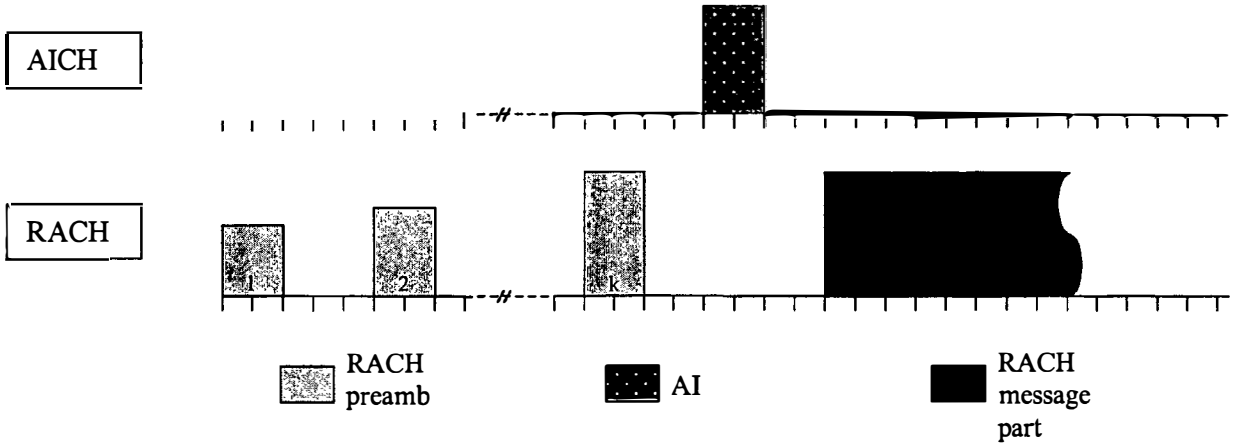

AICH
RACH
1
2
k
RACH preamb
AI
RACH message part

Fig. 1

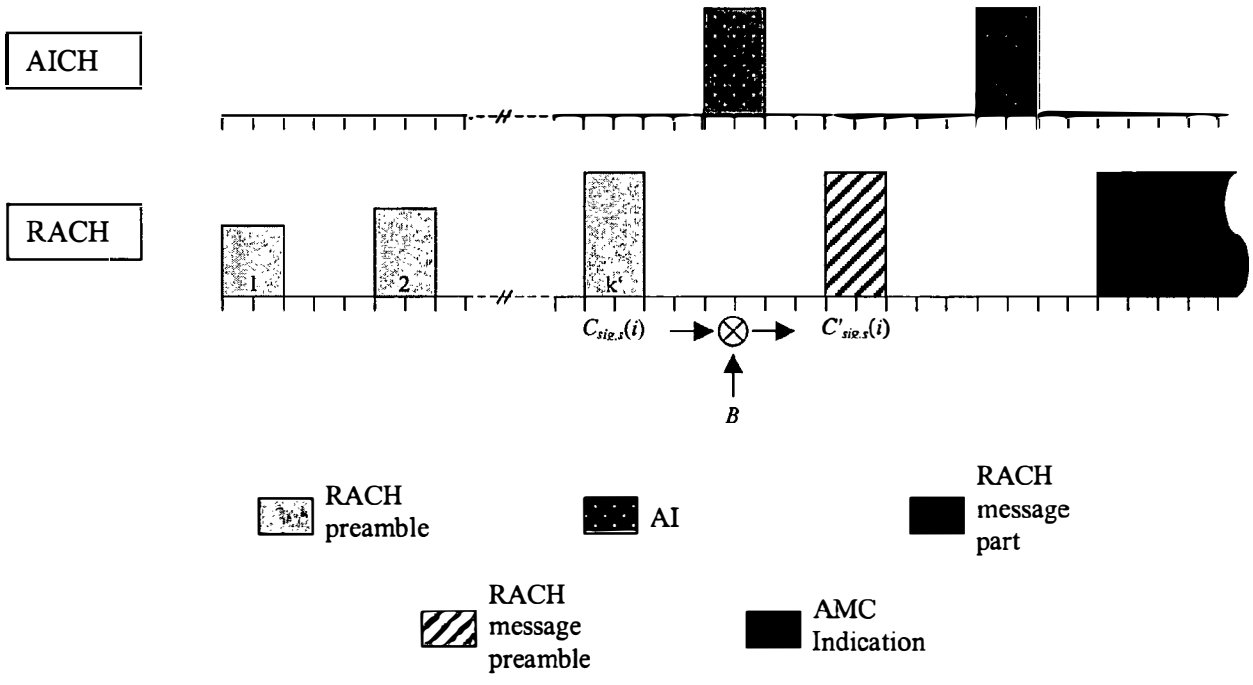

AICH
RACH
1
2
k
$C_{sig,s}(i)$
$C'_{sig,s}(i)$
B
RACH preamble
AI
RACH message part
RACH message preamble
AMC Indication

Fig. 2

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 01/07340

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04L1/00

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04L H04B

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

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6 181 686 B1 (JOKINEN HARRI ET AL) 30 January 2001 (2001-01-30) column 3, line 17 -column 4, line 39 figures 2,3	1-9
Y	WO 98 18280 A (ERICSSON TELEFON AB L M) 30 April 1998 (1998-04-30) abstract claims 1-13 figures 1-7	1-9
A	US 6 094 576 A (RINNE MIKKO ET AL) 25 July 2000 (2000-07-25) abstract	1-9

☐ Further documents are listed in the continuation of box C.

☒ 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
21 February 2002	28/02/2002
Name and mailing address of the ISA 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	**Authorized officer** Yang, Y

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

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/EP 01/07340

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6181686 B1	30-01-2001	FI 962834 A	13-01-1998
		AU 3445397 A	09-02-1998
		EP 0976282 A1	02-02-2000
		WO 9803030 A1	22-01-1998
		JP 2000514624 T	31-10-2000
WO 9818280 A	30-04-1998	US 6259724 B1	10-07-2001
		AU 720313 B2	25-05-2000
		AU 4732397 A	15-05-1998
		BR 9711928 A	24-08-1999
		CN 1234169 A	03-11-1999
		EP 0932996 A2	04-08-1999
		JP 2001502866 T	27-02-2001
		WO 9818280 A2	30-04-1998
US 6094576 A	25-07-2000	FI 962216 A	28-11-1997
		AU 721690 B2	13-07-2000
		AU 2901497 A	05-01-1998
		EP 0840988 A2	13-05-1998
		WO 9746041 A2	04-12-1997
		JP 11510667 T	14-09-1999
		NO 980328 A	26-01-1998

Electronic Patent Application Fee Transmittal

Application Number:	11434330
Filing Date:	15-May-2006
Title of Invention:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
First Named Inventor/Applicant Name:	Guodong Zhang
Filer:	Donald J. Cox/Carey Kulp
Attorney Docket Number:	I-2-0674.2US

Filed as Large 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:	11273826
Application Number:	11434330
International Application Number:	
Confirmation Number:	5166
Title of Invention:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
First Named Inventor/Applicant Name:	Guodong Zhang
Customer Number:	24374
Filer:	Donald J. Cox/Carey Kulp
Filer Authorized By:	Donald J. Cox
Attorney Docket Number:	I-2-0674.2US
Receipt Date:	26-OCT-2011
Filing Date:	15-MAY-2006
Time Stamp:	17:41:14
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	4712
Deposit Account	090435
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Transmittal Letter	ids.pdf	52880 e6666721412bb437f9071d141fd1e28625d83718	no	3
Warnings:					
Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	pto1449.pdf	60023 b01758bac109b0c5eb3fd120453bf7f72b6205b8	no	4
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Foreign Reference	WO03026231.PDF	1940207 16797957aa4831bb221e9794ab7172895f35f147	no	62
Warnings:					
Information:					
4	Foreign Reference	WOPat.pdf	611505 ba75dde02e0239fe05bb5d75a290513a7f110cf9	no	15
Warnings:					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	30528 203f1ebda144487a12fe8503fa0d065fdb2bfcff	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	2695143		

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

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

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

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

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the PATENT APPLICATION of:	
	Zhang et al.
Application No.:	11/434,330
Confirmation No.:	5166
Filed:	May 15, 2006
For:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
Group:	2466
Examiner:	Brian S. Roberts

Our File: I-2-0674.2US

Date: October 26, 2011

INFORMATION DISCLOSURE STATEMENT

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

Sir:

Further to Applicants' Duty of Disclosure pursuant to 37 C.F.R. §1.56, Applicants wish to bring to the Examiner's attention the material cited on the enclosed Form PTO-1449.

The listed references include references previously cited in this application. Newly cited documents are indicated by an asterisk (*) on the enclosed Form PTO-1449. Copies of the newly cited documents are enclosed. Pursuant to 37 C.F.R. §1.98(a)(2)(ii), copies of the newly cited U.S. publications and/or patent documents have not been included.

This Application is a continuation of Non-Provisional Application No. 10/962,720, filed on October 12, 2004, which issued on May 16, 2006 as U.S. Patent No. 7,046,648, which claims priority from Provisional Application No. 60/578,674, which was filed on June 10, 2004, Provisional Application No. 60/520,692, which was filed on November 17, 2003, Provisional Application No. 60/519,990, which was filed on November 14, 2003, and Provisional Application No. 60/517,656, which was filed on November 5, 2003.

Pursuant to 37 C.F.R. § 1.97(e)(1), the undersigned certifies that each new item of information contained in this Information Disclosure Statement 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 Information Disclosure Statement.

This Information Disclosure Statement is being filed with the fee required by 37 C.F.R. § 1.17(p).

It is respectfully requested that the Examiner consider these documents and return an initialed copy of the Form PTO-1449 indicating his consideration of the cited materials.

Respectfully submitted,

Zhang et al.

By__/Melissa D. Doogan/_____
Melissa D. Doogan
Registration No. 63,025
(215) 568-6400

Volpe and Koenig, P.C.
United Plaza, Suite 1600
30 South 17th Street
Philadelphia, PA 19103

MDD/pck
Enclosures (3)

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)

24374 7590 08/02/2011
VOLPE AND KOENIG, P.C.
DEPT. ICC
UNITED PLAZA
30 SOUTH 17TH STREET
PHILADELPHIA, PA 19103

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

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being 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.
11/434,330	05/15/2006	Guodong Zhang	I-2-0674.2US	5166

TITLE OF INVENTION: SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1510 1740	$300	$0	$1810 2040	11/02/2011

EXAMINER	ART UNIT	CLASS-SUBCLASS
ROBERTS, BRIAN S	2466	370-331000

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 Volpe and Koenig, P.C.
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: InterDigital Technology Corporation

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Wilmington, DE

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

4a. 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 090435 (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 /Melissa D. Doogan/ Date October 31, 2011

Typed or printed name Melissa D. Doogan Registration No. 63,025

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.

Electronic Patent Application Fee Transmittal

Application Number:	11434330
Filing Date:	15-May-2006
Title of Invention:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
First Named Inventor/Applicant Name:	Guodong Zhang
Filer:	Ryan W. O Donnell/Dawn Casalvera
Attorney Docket Number:	I-2-0674.2US

Filed as Large 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	1501	1	1740	1740
Publ. Fee- early, voluntary, or normal	1504	1	300	300

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**2040**

Electronic Acknowledgement Receipt

EFS ID:	11297389
Application Number:	11434330
International Application Number:	
Confirmation Number:	5166
Title of Invention:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
First Named Inventor/Applicant Name:	Guodong Zhang
Customer Number:	24374
Filer:	Ryan W. O Donnell/Dawn Casalvera
Filer Authorized By:	Ryan W. O Donnell
Attorney Docket Number:	I-2-0674.2US
Receipt Date:	31-OCT-2011
Filing Date:	15-MAY-2006
Time Stamp:	11:26:42
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$2040
RAM confirmation Number	8881
Deposit Account	090435
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 1.17 (Patent application and reexamination processing fees)	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	20111011_I_2_0674_2US_IssueFeeTransmittal.PDF	129512 b14ee53ede4db753ff55bde6a137558ed487b51f	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	31963 fc6f2f6a5ed258f2bf7137492056c78e9163b4b4	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	161475		

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

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

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

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

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/434,330	05/15/2006	Guodong Zhang	I-2-0674.2US	5166

24374 7590 11/03/2011

VOLPE AND KOENIG, P.C.
DEPT. ICC
UNITED PLAZA
30 SOUTH 17TH STREET
PHILADELPHIA, PA 19103

EXAMINER	
ROBERTS, BRIAN S	

ART UNIT	PAPER NUMBER
2466	

NOTIFICATION DATE	DELIVERY MODE
11/03/2011	ELECTRONIC

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

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

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

eoffice@volpe-koenig.com

UNITED STATES DEPARTMENT OF COMMERCE
U.S. Patent and Trademark Office
Address : COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450

APPLICATION NO./ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR / PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.
11/434,330	15 May 2006	ZHANG ET AL.	I-2-0674.2US

VOLPE AND KOENIG, P.C.
DEPT. ICC
UNITED PLAZA
30 SOUTH 17TH STREET
PHILADELPHIA, PA 19103

EXAMINER	
BRIAN ROBERTS	
ART UNIT	**PAPER**
2466	20111028

DATE MAILED:

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

Commissioner for Patents

The information disclosure statement (IDS) submitted on 10/26/2011 was filed after the mailing date of the Notice of Allowance on 08/02/2011. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement has been considered by the examiner.

/Brian Roberts/
Examiner, Art Unit 2466

PTO-90C (Rev.04-03)

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0674.2US	SERIAL NO. 11/434,330
	APPLICANT Zhang et al.	
	FILING DATE May 15, 2006	GROUP 2466

U.S. PATENT DOCUMENTS							
EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
		6,678,249	01/2004	Toskala et al.[4]			
		6,778,830	08/2004	Oizumi et al.			
		6,892,071	05/2005	Park et al.			
		7,013,143	03/2006	Love et al.			
		7,346,035	03/2008	Lee et al.			
		7,414,989	08/2002	Kuchibhotla et al.			
		2002/0095635	07/2002	Wager et al.			
		2002/0191544	12/2002	Cheng et al.			
		2003/0007480	01/2003	Kim et al.			
	*	2003/0043786	03/2003	Kall et al.			
		2003/0054824	03/2003	Choi et al.			
		2003/0081692	05/2003	Kwan et al.			
		2003/0161284	08/2003	Chen			
		2003/0210668	11/2003	Malladi et al.			
		2004/0004954	01/2004	Terry et al.			
		2004/0072567	04/2004	Cao et al.			
		2004/0085934	05/2004	Balachandran et la.			
		2004/0120306	06/2004	Wigard et al.			
		2004/0160925	08/2004	Heo et al.[1]			
		2004/0202129	10/2004	Kolding et al.			
		2004/0203991	10/2004	Chen et al.			
		2004/0219917	11/2004	Love et al.			
		2004/0219919	11/2004	Whinnett et al.			
		2004/0219920	11/2004	Love et al.			
		2004/0228313	11/2004	Cheng et al.			

EXAMINER	DATE CONSIDERED
/Brian Roberts/	10/28/2011

EXAMINER: Initial if citation 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.

1743768.1 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.R./

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0674.2US	SERIAL NO. 11/434,330
	APPLICANT Zhang et al.	
	FILING DATE May 15, 2006	GROUP 2466

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
		2005/0041694	02/2005	Liu			
		2005/0047354	03/2005	Zeira et al.			
		2005/0048920	03/2005	Liu			
		2005/0083888	04/2005	Smee et al.			
		2007/0047501	03/2007	Usuda et al.[2]			

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	TRANSLATION NO
		0 977 393	02/2000	EP[5]				
		2 353 439	02/2001	GB				
		2001-128209	05/2001	JP			X**	
		2003112283	12/2005	RU			X**	
		2005110767	10/2006	RU			X**	
		00/074263	12/2000	WO[3]				
		02/01893	01/2002	WO				
	*	03/003643	01/2003	WO				
	*	03/026231	03/2003	WO				
		03/053087	06/2003	WO				
		03/067953	08/2003	WO				
		03/088545	10/2003	WO				

OTHER DOCUMENTS

EXAMINER INITIAL		DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Feasibility Study for Enhanced Uplink for UTRA FDD; (Release 6)," 3GPP TR 25.896 V1.0.2 (October 2003).

EXAMINER	DATE CONSIDERED
/Brian Roberts/	10/26/2011

EXAMINER: Initial if citation 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.

1743768.1 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.R./

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0674.2US	SERIAL NO. 11/434,330
	APPLICANT Zhang et al.	
	FILING DATE May 15, 2006	GROUP 2466

EXAMINER INITIAL		DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Feasibility Study for Enhanced Uplink for UTRA FDD (Release 6)," 3GPP TR 25.896 V6.0.0 (March 2004).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 1999)," 3GPP TS 25.212 V3.11.0 (September 2002).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 1999)." 3GPP TS 25.321 V3.16.0 (September 2003).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 4)," 3GPP TS 25.212 V4.6.0 (September 2002).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 5)," 3GPP TS 25.212 V5.6.0 (September 2003).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 5)," 3GPP TS 25.212 V5.9.0 (June 2004).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 6)," 3GPP TS 25.212 V6.2.0 (June 2004).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 1999)," 3GPP TS 25.321 V3.17.0 (June 2004).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 6)," 3GPP TS 25.321 V6.2.0 (June 2004).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 4)," 3GPP TS 25.321 V4.9.0 (September 2003).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 5)," 3GPP TS 25.321 V5.9.0 (June 2004).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 4)," 3GPP TS 25.321 V4.10.0 (June 2004).

EXAMINER	DATE CONSIDERED
/Brian Roberts/	10/28/2011

EXAMINER: Initial if citation 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.

1743768_1 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.R./

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0674.2US	SERIAL NO. 11/434,330
	APPLICANT Zhang et al.	
	FILING DATE May 15, 2006	GROUP 2466

EXAMINER INITIAL		DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 5)," 3GPP TS 25.321 V5.6.0 (September 2003).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Feasibility Study for Enhanced Uplink for UTRA FDD; (Release 6)," 3GPP TR 25.896 V1.0.1 (October 2003).
		3GPP, "Third Generation Partnership Project; Technical Specification Group Radio Access Network; FDD Enhanced Uplink; Overall Description; Stage 2 (Release 6)," 3GPP TS 25.309 V6.0.0 (September 2004).
		3GPP2 C.20003-C, "Medium Access Control (MAC) Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Release C, August 2004.
		3GPP2 C.S0004-C, "Signaling Link Access Control (LAC) Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Revision C, July 23, 2004.
		3GPP2 C.S0005-C, "Upper Layer (Layer 3) Signaling Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Revision c, July 23, 2004.
		GPP2 C.S0002-C, "Physical Layer Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Revision C, July 23, 2004.

X** Abstract only

[1] Corresponds to RU2004104196; [2] Corresponds to RU 2006130462; [3] Corresponds to RU 2001135846; [4] Corresponds to WO 03/067953; [5] Corresponds to WO 98/47253.

EXAMINER	DATE CONSIDERED
/Brian Roberts/	10/28/2011

EXAMINER: Initial if citation 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.

1743768.1 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.R./

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.
11/434,330	03/06/2012	8130720	I-2-0674.2US	5166

24374 7590 02/15/2012

VOLPE AND KOENIG, P.C.
DEPT. ICC
UNITED PLAZA
30 SOUTH 17TH STREET
PHILADELPHIA, PA 19103

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

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

The Patent Term Adjustment is 62 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):

Guodong Zhang, Farmingdale, NY;
Sung-Hyuk Shin, Northvale, NJ;
Stephen E. Terry, Northport, NY;
James M. Miller, Verona, NJ;
Stephen G. Dick, Nesconset, NY;

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the PATENT APPLICATION of:	
	Zhang et al.
Patent No.:	8,130,720
Issued:	March 6, 2012
Application No.:	11/434,330
Confirmation No.:	5166
Filed:	May 15, 2006
For: SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER	

Our File:	I-2-0674.2US
Date:	June 15, 2012

REQUEST FOR CERTIFICATE OF CORRECTION

Certificate of Corrections Branch
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

A Certificate of Correction under 35 U.S.C. § 254 and 37 C.F.R. §1.322 is requested for U.S. Patent No. 8,130,720. The following errors were made during printing by the United States Patent and Trademark Office.

ON THE TITLE PAGE

At Section (56) U.S. PATENT DOCUMENTS, page 2, left column, before "2003/0054824 A1 3/2003 Choi et al.", insert --2003/0043786 3/2003 Kall et al.--.

At Section (56) FOREIGN PATENT DOCUMENTS, page 2, left column, after "WO 02/10893 3/2002", insert

--WO 03/003643 1/2003
WO 03/026231 3/2003--.

REMARKS

Patentees believe that the above errors are of such a nature as to justify the issuance of a Certificate of Correction. Patentees have enclosed a completed Certificate of Correction Form PTO/SB/44.

Patentees respectfully request that the Certificate of Correction be issued.

Respectfully submitted,

Zhang et al.

By /Dawn C. Kerner/
Dawn C. Kerner
Registration No. 67,743
(215) 568-6400

Volpe and Koenig, P.C.
United Plaza, Suite 1600
30 South 17th Street
Philadelphia, PA 19103

DCK/dcb

PTO/SB/44 (09-07)
Approved for use through 08/31/2013. OMB 0651-0033
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.
(Also Form PTO-1050)

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 8,130,720

APPLICATION NO.: 11/434,330

ISSUE DATE : March 6, 2012

INVENTOR(S) : Zhang et al.

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

ON THE TITLE PAGE

At Section (56) U.S. PATENT DOCUMENTS, page 2, left column, before "2003/0054824 A1 3/2003 Choi et al.", insert --2003/0043786 3/2003 Kall et al.--.

At Section (56) FOREIGN PATENT DOCUMENTS, page 2, left column, after "WO 02/10893 3/2002", insert

--WO 03/003643 1/2003
WO 03/026231 3/2003--.

MAILING ADDRESS OF SENDER (Please do not use customer number below):

Volpe and Koenig, P.C.
United Plaza, 18th Floor
Philadelphia, PA 19103

This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. 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 1.0 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: Attention Certificate of Corrections Branch, 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.

Electronic Acknowledgement Receipt

EFS ID:	13026844
Application Number:	11434330
International Application Number:	
Confirmation Number:	5166
Title of Invention:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
First Named Inventor/Applicant Name:	Guodong Zhang
Customer Number:	24374
Filer:	Christina R. Walsh/(DCK) Denise Ballantyne
Filer Authorized By:	Christina R. Walsh
Attorney Docket Number:	I-2-0674.2US
Receipt Date:	15-JUN-2012
Filing Date:	15-MAY-2006
Time Stamp:	14:41:00
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Certificate of Correction	I_2_0674_2US_ReqCertofCorrec.pdf	61389 2b0f1ea17a769391b406f[illegible]29524299ba72[illegible]40b	no	3

Warnings:	
Information:	

2	Request for Certificate of Correction	I_2_0674_2US_SB44.PDF	385647 c1d07bd645172585c7f4746cf7bfa46e01d3c4b7	no	1

Warnings:

Information:

Total Files Size (in bytes):	447036

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

CERTIFICATE OF CORRECTION

PATENT NO. : 8,130,720 B2
APPLICATION NO. : 11/434330
DATED : March 6, 2012
INVENTOR(S) : Zhang et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

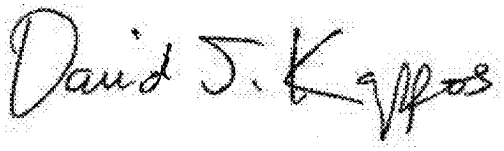
ON THE TITLE PAGE

At Section (56) U.S. PATENT DOCUMENTS, page 2, left column, before "2003/0054824 Al 3/2003 Choi et al.", insert --2003/0043786 3/2003 Kall et al.--.

At Section (56) FOREIGN PATENT DOCUMENTS, page 2, left column, after "WO 02/10893 3/2002", insert

--WO 03/003643 1/2003
WO 03/026231 3/2003--.

Signed and Sealed this
Twenty-fourth Day of July, 2012



David J. Kappos
Director of the United States Patent and Trademark Office