

10/089605

FILED UNDER 35 U.S.C. 371

JUL 06 2004

U.S. UTILITY Patent Application

6760590

PATENT NUMBER and  
ISSUE DATE  
6760590

APPL NUM	FILING DATE	CLASS	SUBCLASS	GAU	EXAMINER
10089605	04/01/2002	455	452	2684	Danh C. Le

**\*\*APPLICANTS:** Miyoshi Kenichi; Kato Osamu; Alzawa Junichi;

**\*\*CONTINUING DATA VERIFIED:**  
THIS APPLICATION IS A 371 OF PCT/JP01/06654 09/02/2001

**\*\* FOREIGN APPLICATIONS VERIFIED:**  
JAPAN 2000-234420 08/02/2000

PG-PUB	DO NOT PUBLISH <input type="checkbox"/>	RESCIND <input type="checkbox"/>
Foreign priority claimed <input checked="" type="checkbox"/> yes <input type="checkbox"/> no		ATTORNEY DOCKET NO
35 USC 119 conditions met <input checked="" type="checkbox"/> yes <input type="checkbox"/> no		L928902149
Verified and Acknowledged Examiners's initials		
TITLE : Communication terminal, base station device and radio communication method		

U.S. DEPT. OF COMMERCE/PAT. & TM-PTO-436L (Rev. 12-94)

6-304 Formal Drawings 17 sheets 1 4-102

<b>NOTICE OF ALLOWANCE MAILED</b>		<b>CLAIMS ALLOWED</b>	
12/24/03		Total Claims 8	Print Claim for O.G. 1
<b>ISSUE FEE</b>		<b>DRAWING</b>	
Amount Due \$1330	Date Paid 2-27-04	Sheets Drwg. 17	Flgs. Drwg. 17
WILLIAM TROST SUPERVISORY PATENT EXAMINER TECHNOLOGY CENTER 2600		Print Fig. 6	
<input type="checkbox"/> TERMINAL <b>ISSUE FEE IN FILE</b>		Application Examiner 12/22/03	
<b>PREPARED FOR ISSUE</b>			
<b>WARNING:</b> The information disclosed herein may be restricted. Unauthorized disclosure may be prohibited by the United States Code Title 35, Sections 122, 181 and 368, Possession outside the U.S. Patent & Trademark Office is restricted to authorized employees and contractors only.			

FILED WITH:

☐ DISK (CRF)☐ CD-ROM

(Attached in pocket on right inside flap)

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JP01/06654

INITIALS \_\_\_\_\_

## CONTENTS

Date  
Received  
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Date MailedDate  
Received  
(Incl. C. of M.)  
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Date Mailed1. Application 1795 papers.

31. \_\_\_\_\_

2. U.S. 4/11/02 32. \_\_\_\_\_3. PCT DATED 903 21 JUN 2002 33. \_\_\_\_\_4. C.F.R. 7-8-02 34. \_\_\_\_\_5. Re-And. A. 12-11-02 35. \_\_\_\_\_6. IDS 02/09/03 36. \_\_\_\_\_7. TDS 03-28-03 37. \_\_\_\_\_8. Petition/Special 2-4-03 38. \_\_\_\_\_9. DECISION-GRANTED 11-26-03 39. \_\_\_\_\_10. Notice Allowance 12/24/03 40. \_\_\_\_\_

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ISSUE SLIP STAPLE AREA (for additional cross-references)

ISSUING CLASSIFICATION									
ORIGINAL		CROSS REFERENCE(S)							
CLASS	SUBCLASS	CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)						
455	452.1	455	452.2	450	517				
INTERNATIONAL CLASSIFICATION		370	320	330	335				
		375	344	246					
H	O	4	Q	7	1	20			
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^ Continued on Issue Slip Inside File Jacket

INDEX OF CLAIMS

✓ ..... Rejected    -- (Through numeral) ... Canceled    N ..... Non-elected    A ..... Appeal  
 = ..... Allowed    + ..... Restricted    I ..... Interference    O ..... Objected

Claim	Date
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If more than 150 claims or 9 actions staple additional sheet here

SEARCH			
Class	Sub.	Date	Exmr.
455	452.1	12/10/03	DCL
	450		
	452.2		
	517		
	422.1		
	423		
	464		
370	329		
	330		
	335		
	342		
	341		
375	244		
	246		

INTERFERENCE SEARCHED			
Class	Sub.	Date	Exmr.
455	452.1	12/11/03	DCL
	452.2		
370	342		
	341		

SEARCH NOTES		
(List databases searched. Attach search strategy inside.)		
	Date	Exmr.
Vo Nguyen	12/10/03	DCL
455		
EAST Search	12/11/03	DCL
William Trost	12/12/03	DCL
455		



PATENT APPLICATION SERIAL NO. \_\_\_\_\_

U.S. DEPARTMENT OF COMMERCE  
PATENT AND TRADEMARK OFFICE  
FEE RECORD SHEET

04/08/2002 MNGUYEN 00000036 10089605

01 FC:970 890.00 OP

PTO-1556  
(5/87)



## UNITED STATES PATENT AND TRADEMARK OFFICE

COMMISSIONER FOR PATENTS  
UNITED STATES PATENT AND TRADEMARK OFFICE  
WASHINGTON, D.C. 20231  
www.uspto.gov



Bib Data Sheet

CONFIRMATION NO. 3013

<b>SERIAL NUMBER</b> 10/089,605	<b>FILING DATE</b> 04/01/2002 <b>RULE</b>	<b>CLASS</b> 455	<b>GROUP ART UNIT</b> 2684	<b>ATTORNEY DOCKET NO.</b> L928902149
<b>APPLICANTS</b> Kenichi Miyoshi, Yokohama-shi, JAPAN; Osamu Kato, Yokusuka-shi, JAPAN; Junichi Aizawa, Yokohama-shi, JAPAN;				
<b>** CONTINUING DATA *****</b> THIS APPLICATION IS A 371 OF PCT/JP01/06654 08/02/2001 YES				
<b>** FOREIGN APPLICATIONS *****</b> JAPAN 2000-234420 08/02/2000 Japan 2000-285405 9/20/2000 YES				
Foreign Priority claimed <input checked="" type="checkbox"/> yes <input type="checkbox"/> no 35 USC 119 (a-d) conditions met <input checked="" type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> Met after Allowance		<b>STATE OR COUNTRY</b> JAPAN	<b>SHEETS DRAWING</b> 17	<b>TOTAL CLAIMS</b> 20
Verified and Acknowledged Examiner's Signature: [Signature] Initials: [Initials]		<b>INDEPENDENT CLAIMS</b> 2		
<b>ADDRESS</b> Stevens Davis Miller & Mosher 1615 L Street N W Suite 850 Washington ,DC 20036				
<b>TITLE</b> COMMUNICATION TERMINAL APPARATUS BASE STATION APPARATUS AND RADIO COMMUNICATION METHOD				
<b>FILING FEE RECEIVED</b> 890	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:		<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees ( Filing ) <input type="checkbox"/> 1.17 Fees ( Processing Ext. of time ) <input type="checkbox"/> 1.18 Fees ( Issue ) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit	



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Bib Data Sheet

CONFIRMATION NO. 3013

<b>SERIAL NUMBER</b> 10/089,605	<b>FILING DATE</b> 04/01/2002 <b>RULE</b>	<b>CLASS</b> 455	<b>GROUP ART UNIT</b> 2681	<b>ATTORNEY DOCKET NO.</b> L928902149
<b>APPLICANTS</b> Kenichi Miyoshi, Yokohama-shi, JAPAN; Osamu Kato, Yokusuka-shi, JAPAN; Junichi Aizawa, Yokohama-shi, JAPAN;				
<b>** CONTINUING DATA *****</b> THIS APPLICATION IS A 371 OF PCT/JP01/06654 08/02/2001				
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Foreign Priority claimed <input type="checkbox"/> yes <input type="checkbox"/> no 35 USC 119 (a-d) conditions <input type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> Met after Allowance Verified and Acknowledged _____ Examiner's Signature _____ Initials _____		<b>STATE OR COUNTRY</b> JAPAN	<b>SHEETS DRAWING</b> 17	<b>TOTAL CLAIMS</b> 20
			<b>INDEPENDENT CLAIMS</b> 2	
<b>ADDRESS</b> Stevens Davis Miller & Mosher 1615 L Street N W Suite 850 Washington ,DC 20036				
<b>TITLE</b> Communication terminal, base station device and radio communication method				
<b>FILING FEE RECEIVED</b> 890	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:		<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees ( Filing ) <input type="checkbox"/> 1.17 Fees ( Processing Ext. of time ) <input type="checkbox"/> 1.18 Fees ( Issue ) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit	

TRANSMITTAL LETTER TO THE UNITED STATES  
DESIGNATED/ELECTED OFFICE (DO/EO/US)  
CONCERNING A FILING UNDER 35 U.S.C. 371

L9269.02149

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR

10/089605

INTERNATIONAL APPLICATION NO.  
PCT/JP01/06654INTERNATIONAL FILING DATE  
August 2, 2001PRIORITY DATE CLAIMED  
August 2, 2000 and September 20, 2000

## TITLE OF INVENTION

COMMUNICATION TERMINAL APPARATUS, BASE STATION APPARATUS, AND RADIO  
COMMUNICATION METHOD

## APPLICANT(S) FOR DO/EO/US

Kenichi MIYOSHI, Osamu KATO and Junichi AIZAWA

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

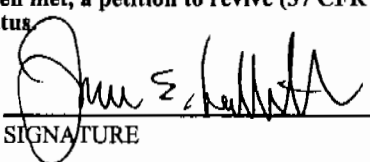
1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (24) indicated below.
4. ☐ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
  - a. ☐ is attached hereto (required only if not communicated by the International Bureau).
  - b. ☒ has been communicated by the International Bureau.
  - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
  - a. ☒ is attached hereto.
  - b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
  - a. ☐ are attached hereto (required only if not communicated by the International Bureau).
  - b. ☐ have been communicated by the International Bureau.
  - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
  - d. ☐ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
10. ☐ An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).
11. ☐ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☒ A copy of the International Search Report (PCT/ISA/210).

## Items 13 to 20 below concern document(s) or information included:

13. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☐ A **FIRST** preliminary amendment.
16. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
17. ☐ A substitute specification.
18. ☐ A change of power of attorney and/or address letter.
19. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.
20. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4).
21. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
22. ☐ Certificate of Mailing by Express Mail
23. ☒ Other items or information:

Claim for Priority with PCCT/IB/304  
PCT/IB/308  
PCT/RO/101

RECEIVED PTO 01 APR 2002

U.S. APPLICATION NO. (IF KNOWN,)		INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NUMBER	
10,089,655		PCT/JP01/06654	L9289.02149	
24. The following fees are submitted:			CALCULATIONS PTO USE ONLY	
BASIC NATIONAL FEE ( 37 CFR 1.492 (a) (1) - (5) ) :				
<input type="checkbox"/> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO . . . . .			\$1040.00	
<input checked="" type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO . . . . .			\$890.00	
<input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO . . . . .			\$740.00	
<input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) . . . . .			\$710.00	
<input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) . . . . .			\$100.00	
ENTER APPROPRIATE BASIC FEE AMOUNT =			\$890.00	
Surcharge of \$130.00 for furnishing the oath or declaration later than months from the earliest claimed priority date (37 CFR 1.492 (e)).			\$0.00	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	
Total claims	20 - 20 =	0	x \$18.00	\$0.00
Independent claims	2 - 3 =	0	x \$84.00	\$0.00
Multiple Dependent Claims (check if applicable).				\$0.00
TOTAL OF ABOVE CALCULATIONS =			\$890.00	
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27). The fees indicated above are reduced by 1/2.			\$0.00	
SUBTOTAL =			\$890.00	
Processing fee of \$130.00 for furnishing the English translation later than months from the earliest claimed priority date (37 CFR 1.492 (f)).			\$0.00	
TOTAL NATIONAL FEE =			\$890.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (check if applicable).			\$40.00	
TOTAL FEES ENCLOSED =			\$930.00	
			Amount to be: refunded	\$
			charged	\$
a. <input checked="" type="checkbox"/> A check in the amount of \$930.00 to cover the above fees is enclosed.				
b. <input type="checkbox"/> Please charge my Deposit Account No. in the amount of to cover the above fees. A duplicate copy of this sheet is enclosed.				
c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 19-4375 A duplicate copy of this sheet is enclosed.				
d. <input type="checkbox"/> Fees are to be charged to a credit card. WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.				
NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.				
SEND ALL CORRESPONDENCE TO:				
<div>James E. Ledbetter, Esq. STEVENS, DAVIS, MILLER &amp; MOSHER, LLP 1615 L Street, NW, Suite 850 Washington, DC 20036 Tel: (202) 785-0100 Fax: (202) 408-5200</div> <div> SIGNATURE James E. Ledbetter NAME 28,732 REGISTRATION NUMBER April 1, 2002 DATE</div>				

JC02 Rec'd PCT/PTO 01 APR 2002

PTO-135  
11-2000)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

TRANSMITTAL LETTER TO THE UNITED STATES  
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CONCERNING A FILING UNDER 35 U.S.C. 371

L9289 19

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR

10/089605

INTERNATIONAL APPLICATION NO.  
PCT/JP01/06654

INTERNATIONAL FILING DATE  
August 2, 2001

PRIORITY DATE CLAIMED  
August 2, 2000 and September 20, 2000

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23. ☒ Other items or information:

Claim for Priority with PCCT/IB/304  
PCT/IB/308  
PCT/RO/101

10/089605  
 IC10 Rec'd PCT/PTO 01 APR 2002

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR 1.53) **10/089605** INTERNATIONAL APPLICATION NO. **PCT/JP01/06654** ATTORNEY'S DOCKET NUMBER **L9289.02149**

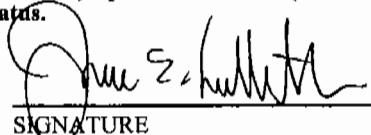
24. The following fees are submitted:				CALCULATIONS PTO USE ONLY	
<b>BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :</b> <input type="checkbox"/> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO ..... <b>\$1040.00</b> <input checked="" type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO ..... <b>\$890.00</b> <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO ..... <b>\$740.00</b> <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) ..... <b>\$710.00</b> <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) ..... <b>\$100.00</b> <b>ENTER APPROPRIATE BASIC FEE AMOUNT =</b>					
Surcharge of <b>\$130.00</b> for furnishing the oath or declaration later than months from the earliest claimed priority date (37 CFR 1.492 (e)). <input type="checkbox"/> 20 <input type="checkbox"/> 30				<b>\$0.00</b>	
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Multiple Dependent Claims (check if applicable). <input type="checkbox"/>				<b>\$0.00</b>	
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<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.				<b>\$0.00</b>	
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Processing fee of <b>\$130.00</b> for furnishing the English translation later than months from the earliest claimed priority date (37 CFR 1.492 (f)). <input type="checkbox"/> 20 <input type="checkbox"/> 30				<b>\$0.00</b>	
<b>TOTAL NATIONAL FEE =</b>				<b>\$890.00</b>	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (check if applicable). <input checked="" type="checkbox"/>				<b>\$40.00</b>	
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- a. ☒ A check in the amount of **\$930.00** to cover the above fees is enclosed.
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**NOTE:** Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

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REGISTRATION NUMBER

April 1, 2002

DATE

10,089605

17/PATS

1

IC10 Rec'd PCT/PTO 01 APR 2002

DESCRIPTION

COMMUNICATION TERMINAL APPARATUS, BASE STATION APPARATUS,  
AND RADIO COMMUNICATION METHOD

5 THIS APPLICATION IS A 371 OF PCT/JP01/06654 08/02/01  
Technical Field

The present invention relates to a communication  
terminal apparatus, base station apparatus, and  
radio communication method to be used in a cellular  
10 communication system.

Background Art

In a cellular communication system, one base station  
performs radio communication with a plurality of  
15 communication terminals simultaneously, and therefore,  
as demand has increased in recent years, so has the need  
for higher transmission efficiency.

One technology that has been proposed for increasing  
the transmission efficiency of a downlink from a base  
20 station to a communication terminal is HDR (High Data  
Rate). HDR is a communication method whereby a base  
station performs scheduling for allocating communication  
resources to communication terminals by time division,  
and also sets a transmission rate for each communication  
25 terminal according to the downlink channel quality.

The operations by which a base station and  
communication terminals perform radio communication with  
HDR are described below. First, the base station



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transmits a pilot signal to each communication terminal. Each communication terminal estimates the downlink channel quality using a CIR (desired carrier to interference ratio) based on the pilot signal, etc., and  
5 finds a transmission rate at which communication is possible. Then, based on the transmission rate at which communication is possible, each communication terminal selects a communication mode, which is a combination of packet length, coding method, and modulation method, and  
10 transmits a data rate control (hereinafter referred to as "DRC") signal indicating the communication mode to the base station.

The type of modulation method that can be used in each system is predetermined as BPSK, QPSK, 16QAM, 64QAM,  
15 and so forth. Also, the type of coding that can be used in each system is predetermined as 1/2 turbo code, 1/3 turbo code, 3/4 turbo code, and so forth. Further, a plurality of transmission rates that can be used in each system are predetermined according to a combination of  
20 packet length, modulation method, and coding method. Each communication terminal selects a combination whereby communication can be performed most efficiently with the current downlink channel quality, and transmits a DRC signal indicating the selected communication mode to the  
25 base station. Generally, DRC signals are represented by numbers from 1 to N, with a higher number indicating a proportionally better downlink channel quality.

Based on the DRC signal transmitted from each

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communication terminal, the base station sets a transmission rate for each communication terminal, and sends a signal to each communication terminal via a control channel indicating communication resource allocation to each communication terminal. Generally, taking improvement of system transmission efficiency into consideration, communication resources are allocated with priority to the communication terminal that has the best downlink channel quality—that is to say, the communication terminal that transmits the highest-numbered DRC signal.

The base station then transmits data only to the relevant communication terminal in its allocated time. For example, if time  $t_1$  has been allocated to communication terminal A, in time  $t_1$  the base station transmits data only to communication terminal A, and does not transmit data to a communication terminal other than communication terminal A.

In this way, data transmission efficiency has conventionally been increased for the overall system by setting a transmission rate for each communication terminal according to channel quality by means of HDR, and performing communication resource allocation with priority to a communication terminal with a high transmission rate at which communication is possible.

However, if the communication mode determined by a communication terminal is received erroneously by the base station due to deterioration of the channel

conditions on the uplink from the communication terminal to the base station, or the like, the base station will transmit data using that erroneous mode. As the determined communication mode and the communication mode of data transmitted to the communication terminal are different, the communication terminal cannot demodulate or decode the data.

Also, when a base station such as that described above has allocated time t1 to communication terminal A, in time t1 the base station transmits data only to communication terminal A, and does not transmit data to a communication terminal other than communication terminal A.

Due to the above, a problem arises in that, if the communication mode determined by a communication terminal is received erroneously by the base station, there will be an interval during which time-divided communication resources are not used, and downlink throughput falls.

## Disclosure of Invention

It is an object of the present invention to provide a communication terminal apparatus, base station apparatus, and radio communication method that make it possible to prevent a fall in downlink throughput in a communication system in which communication resources are allocated to communication terminals based on downlink channel quality.

In order to achieve the above-described object, in

the present invention, with respect to information, among information indicative of downlink channel quality, which has a possibility of decreasing the downlink throughput when the information is received erroneously in a base station, a communication terminal provides such information with less susceptibility to errors in the propagation path to transmit. It is thereby possible to prevent the downlink throughput from decreasing.

10 Brief Description of Drawings

FIG. 1 is a graph illustrating DRC signal selection frequency in a base station;

FIG. 2 is a block diagram showing a configuration of a base station according to Embodiment 1 of the present invention;

FIG. 3 is a block diagram showing the configuration of a communication terminal according to Embodiment 1 of the present invention;

FIG. 4 is a drawing showing the contents of the transmission power table provided in a communication terminal according to Embodiment 1 of the present invention;

FIG. 5 is a block diagram showing another configuration of a base station according to Embodiment 1 of the present invention;

FIG. 6 is a block diagram showing the configuration of a communication terminal according to Embodiment 2 of the present invention;

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FIG.7 is a drawing showing the contents of the code word table provided in a communication terminal according to Embodiment 2 of the present invention;

FIG.8 is a block diagram showing the configuration of a base station according to Embodiment 3 of the present invention;

FIG.9 is a block diagram showing the configuration of a communication terminal according to Embodiment 3 of the present invention;

FIG.10 is a block diagram showing a configuration of a base station according to Embodiment 4 of the present invention;

FIG.11 is a block diagram showing the configuration of a communication terminal according to Embodiment 4 of the present invention;

FIG.12 is a block diagram showing another configuration of a base station according to Embodiment 4 of the present invention;

FIG.13 is a block diagram showing the configuration of a communication terminal according to Embodiment 5 of the present invention;

FIG.14 is a block diagram showing the configuration of a communication terminal according to Embodiment 6 of the present invention;

FIG.15 is a block diagram showing the configuration of the CIR signal creation section of a communication terminal according to Embodiment 6 of the present invention;

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FIG.16 is a block diagram showing the configuration of the CIR signal creation section of a communication terminal according to Embodiment 7 of the present invention; and

5        FIG.17 is a block diagram showing the configuration of the CIR signal creation section of a communication terminal according to Embodiment 8 of the present invention.

#### 10    Best Mode for Carrying out the Invention

With reference now to the accompanying drawings, embodiments of the present invention will be explained in detail below.

(Embodiment 1)

15        As stated above, a base station allocates communication resources with priority to the communication terminal with the best downlink channel quality. In other words, a base station selects the highest-numbered DRC signal, and allocates communication  
20 resources with priority to the communication terminal that transmitted that selected DRC signal. Thus, DRC signal selection frequency is as shown in FIG.1. FIG.1 is a graph illustrating DRC signal selection frequency in a base station. In this figure, numbers 1 to 5 are  
25 used as DRC numbers, with a higher number representing a proportionally better channel quality.

As shown in FIG.1, the higher the number of a DRC signal, the greater is the frequency of its selection

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by the base station. That is to say, the better the downlink channel quality of a communication terminal, the higher is the frequency with which communication resources are allocated to that communication terminal.

5 This kind of relationship arises from the fact that there are many communication terminals, and there is an increased probability of there being a communication terminal with good downlink channel quality.

Thus, the selection frequency of each DRC signal  
10 differs according to channel quality. That is to say, since a DRC signal indicating that downlink channel quality is good tends to be selected with greater frequency, there is a high probability that downlink throughput will fall if a DRC signal indicating that downlink channel  
15 quality is good is received erroneously. Also, since a DRC signal indicating that downlink channel quality is poor tends to be selected with lower frequency, there is little effect of producing a fall in downlink throughput if a DRC signal indicating that downlink channel quality  
20 is poor is received erroneously.

Thus, a communication terminal according to Embodiment 1 of the present invention transmits at proportionally higher transmission power a DRC signal indicating that downlink channel quality is good. Also,  
25 a base station according to Embodiment 1 of the present invention excludes DRC signals with reception power lower than a predetermined threshold value in performing communication resource allocation.

FIG.2 is a block diagram showing a configuration of a base station according to Embodiment 1 of the present invention.

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In FIG.2, an allocation section 101 determines  
5 communication resource allocation to each communication terminal based on DRC signals excluding DRC signals detected by unused DRC detection sections 116 described later herein from among DRC signals extracted by demodulators 114 described later herein. Then, based on  
10 the determined communication resource allocation, the allocation section 101 notifies a buffer 102 for output of downlink transmit data, indicates the downlink transmit data coding method to an adaptive coding section 103, and indicates the downlink transmit data modulation  
15 method to an adaptive modulator 104.

The buffer 102 holds downlink transmit data, and outputs downlink transmit data for a predetermined communication terminal to the adaptive coding section 103 in accordance with the directions of the allocation  
20 section 101. The adaptive coding section 103 codes the output signal from the buffer 102 in accordance with the directions of the allocation section 101, and outputs the resulting signal to the adaptive modulator 104. The adaptive modulator 104 modulates the output signal from  
25 the adaptive coding section 103 in accordance with the directions of the allocation section 101, and outputs the resulting signal to a spreading section 105. Spreading section 105 spreads the output signal from the



adaptive modulator 104, and outputs the resulting signal to a multiplexer 108.

A modulator 106 modulates a pilot signal and outputs it to a spreading section 107. Spreading section 107  
5 spreads the output signal from the modulator 106, and outputs the resulting signal to the multiplexer 108.

The multiplexer 108 performs time multiplexing of the spread pilot signal with the spread downlink transmit data at predetermined intervals, and outputs the  
10 resulting signal to a transmit RF section 109. The transmit RF section 109 converts the frequency of the output signal from the multiplexer 108 to radio frequency, and outputs the resulting signal to a duplexer 110.

The duplexer 110 transmits the output signal from  
15 the transmit RF section 109 as a radio signal from an antenna 111 to a communication terminal. Moreover, the duplexer 110 outputs the signals transmitted from each communication terminal and received by antenna 111 to receive RF section 112.

20 A receive RF section 112 converts the frequency of a radio frequency signal output from the duplexer 110 to baseband, and outputs the resulting signal to a despreding section 113. The despreding section 113 despreads the baseband signal using the spreading code  
25 used to spread the DRC signal, and outputs the resulting signal to the demodulator 114 and a reception power calculation section 115.

The demodulator 114 demodulates the output signal

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from the despreading section 113 and extracts the DRC signal, and outputs this signal to the allocation section 101.

The reception power calculation section 115  
 5 measures the reception power of the despread DRC signal, which is output to the unused DRC detection section 116. In the unused DRC detection section 116 is set a predetermined threshold value, as described later herein, and a DRC signal of reception power lower than this  
 10 threshold value is detected, and the result of the detection is output to the allocation section 101.

A despreading section 113, demodulator 114, reception power calculation section 115, and unused DRC detection section 116 are provided for each communication  
 15 terminal. From each demodulator 114 a DRC signal for the corresponding communication terminal is output, and from each unused DRC detection section 116 a detection result for the corresponding communication terminal is output.

FIG.3 is a block diagram showing the configuration  
 20 of a communication terminal according to Embodiment 1 of the present invention. In FIG.3, a communication mode determination section 201 determines a communication mode indicating a combination of modulation method and coding method based on a CIR measured by a CIR measurement section  
 25 219 described later herein, and outputs the result to a DRC signal creation section 202. The communication mode determination section 201 also indicates the downlink receive data demodulation method to an adaptive

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demodulator 216, and indicates the downlink receive data decoding method to an adaptive decoding section 217, based on the determined communication mode.

The DRC signal creation section 202 creates a DRC  
5 signal with a number corresponding to the communication mode output from the communication mode determination section 201, and outputs this DRC signal to a modulator 203 and DRC power controller 205.

Modulator 203 modulates the DRC signal and outputs  
10 the resulting signal to a spreading section 204. spreading section 204 spreads the output signal from modulator 203 and outputs the resulting signal to the DRC power controller 205. The DRC power controller 205 refers to a transmission power table 206 that shows the  
15 correspondence between DRC numbers and transmission power, controls the DRC signal transmission power based on the transmission power of a pilot signal output from a pilot power controller 209 described later herein, and outputs the DRC signal that has undergone transmission power  
20 control to a multiplexer 210. The actual method of controlling DRC signal transmission power will be described later herein.

A modulator 207 modulates the pilot signal and  
outputs the resulting signal to a spreading section 208.  
25 Spreading section 208 spreads the output signal from modulator 207 and outputs the resulting signal to the pilot power controller 209. The pilot power controller 209 controls the transmission power of the pilot signal,

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and outputs the pilot signal that has undergone transmission power control to the multiplexer 210. The pilot power controller 209 also outputs the pilot signal transmission power to the DRC power controller 205.

5        The multiplexer 210 performs time multiplexing of the DRC signal that has undergone transmission power control and the pilot signal that has undergone transmission power control at predetermined intervals, and outputs the resulting signal to a transmit RF section 10 211. The transmit RF section 211 converts the frequency of the output signal from the multiplexer 210 to radio frequency, and outputs the resulting signal to a duplexer 212.

15        The duplexer 212 transmits the output signal from the transmit RF section 211 as a radio signal from an antenna 213 to the base station. Also, a signal transmitted as a radio signal by the base station and received as a radio signal by the antenna 213 is output by the duplexer 212 to a receive RF section 214.

20        The receive RF section 214 converts the frequency of the radio frequency signal output from the duplexer 212 to baseband, and outputs the resulting signal to a despreading section 215 and a despreading section 218.

25        Despreading section 215 despreads the data component of the baseband signal and outputs the resulting signal to the adaptive demodulator 216. The adaptive demodulator 216 demodulates the output signal from despreading section 215 in accordance with the directions

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of the communication mode determination section 201, and outputs the resulting signal to the adaptive decoding section 217. The adaptive decoding section 217 decodes the output signal from the adaptive demodulator 216 in accordance with the directions of the communication mode determination section 201, and obtains receive data.

Despreading section 218 despreads the pilot signal component of the baseband signal and outputs the resulting signal to a CIR measurement section 219. The CIR measurement section 219 measures the CIR of the pilot signal output from despreading section 218, and outputs the result to the communication mode determination section 201.

Next, the procedure for transmission/reception of signals between the base station shown in FIG.2 and the communication terminal shown in FIG.3 will be described.

First, at the start of communication, a pilot signal is modulated by the modulator 106 in the base station, is spread by spreading section 107, and is output to the multiplexer 108. Only the spread pilot signal is output from the multiplexer 108 to the transmit RF section 109. The spread pilot signal is frequency-converted to radio frequency by the transmit RF section 109, and transmitted to communication terminals as a radio signal from the antenna 111 via the duplexer 110.

A radio signal of only the pilot signal component transmitted as a radio signal from the base station is received by the antenna 213 of the communication terminal,

passes through the duplexer 212, and is frequency-converted to baseband by the receive RF section 214. The pilot signal component of the baseband signal is despread by despreding section 218, and output to the CIR measurement section 219.

Next, in the CIR measurement section 219, the CIR of the pilot signal output from despreding section 218 is measured, and based on the CIR, the communication mode is determined by the communication mode determination section 201. Then a DRC signal with a number corresponding to the communication mode is created by the DRC signal creation section 202.

The DRC signal is modulated by modulator 203, spread by spreading section 204, and output to the DRC power controller 205. In the DRC power controller 205, the DRC signal transmission power is controlled based on the transmission power of the pilot signal output from the pilot power controller 209, and the ratios of pilot signal transmission power to DRC signal transmission power set beforehand in the transmission power table 206.

The contents set in the transmission power table 206 will be described below. FIG.4 is a drawing showing the contents of the transmission power table provided in a communication terminal according to Embodiment 1 of the present invention.

The transmission power table 206 shows the correspondence between DRC numbers and DRC signal transmission power, set so that the higher the DRC number,

the higher is the transmission power. Here, numbers 1 to 5 are used as DRC numbers, with a higher number representing a proportionally better downlink channel quality. That is to say, in the settings in the transmission power table 206, the better the downlink channel quality indicated by a DRC signal, the higher is the transmission power.

As explained above, the frequency of selection by the base station tends to be proportional to the downlink channel quality indicated by a DRC signal, and therefore in this embodiment, transmission power is higher, and susceptibility to errors lower, the better the downlink channel quality indicated by a DRC signal. As a result, the probability of a DRC signal that indicates that downlink channel quality is good being received erroneously can be made lower than the probability of a DRC signal that indicates that downlink channel quality is poor being received erroneously. In other words, the probability of a DRC signal with a high frequency of selection by the base station being received erroneously can be made lower than the probability of a DRC signal with a low frequency of selection by the base station being received erroneously.

The DRC signal transmission power values set in the transmission power table 206 are expressed as a ratio to the pilot signal transmission power. Here, as shown in FIG.4, the settings are arranged so that DRC number 3 in the middle of DRC numbers 1 to 5 is taken as a reference,

and DRC signals indicating a lower number than DRC number 3 are transmitted at lower transmission power than the pilot signal transmission power, while DRC signals indicating a higher number than DRC number 3 are transmitted at higher transmission power than the pilot signal transmission power. That is to say, the settings are arranged so that DRC signals indicating a poorer channel quality than a predetermined channel quality (here, the channel quality corresponding to a DRC signal with DRC number 3) are transmitted at lower transmission power than the pilot signal transmission power, while DRC signals indicating a better channel quality than the predetermined channel quality are transmitted at higher transmission power than the pilot signal transmission power.

Thus, with this embodiment, by setting DRC signals for which transmission power is increased and DRC signals for which transmission power is decreased in comparison with conventional DRC signal transmission power (here, that is, pilot signal transmission power), and making the total of DRC signal transmission power increases and decreases  $\pm 0$  dB, it is possible to make DRC signals indicating that downlink channel quality is good proportionally less susceptible to errors while keeping average DRC signal transmission power constant compared with a conventional system. That is to say, it is possible to proportionally reduce susceptibility to errors of DRC signals indicating that downlink channel quality is good

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without reducing uplink capacity compared with a conventional system.

Also, since, in this way, DRC signals indicating that downlink channel quality is poor (DRC signals with  
5 DRC numbers 1 and 2 in FIG.4) are transmitted at lower transmission power than in a conventional system, it is possible to reduce power consumption in a communication terminal that is located far from the base station and for which there is a high probability of transmitting  
10 a DRC signal indicating that downlink channel quality is poor. That is to say, in the case of a communication terminal that transmits a DRC signal indicating that downlink channel quality is poor, whereas the DRC signal was previously transmitted at transmission power that  
15 was high to begin with, according to this embodiment the DRC signal transmission power can be made lower than that high transmission power, enabling communication terminal power consumption to be greatly reduced.

As the frequency of selection by a base station is  
20 low to begin with for a DRC signal indicating that downlink channel quality is poor, there is almost no effect of producing a fall in throughput due to transmitting a DRC signal indicating that downlink channel quality is poor at lower transmission power than previously in this way.

Also, with this embodiment, DRC signals indicating that uplink channel quality is good (DRC signals with  
25 DRC numbers 4 and 5 in FIG.4) are transmitted at higher transmission power than in a conventional system.

However, there is a high possibility of a DRC signal indicating that uplink channel quality is good being transmitted from a communication terminal located comparatively near the base station. Also, due to pilot  
 5 signal transmission power control that is performed constantly on an uplink, the transmission power of a pilot signal transmitted from a communication terminal located comparatively near the base station (that is, the conventional DRC signal transmission power) is low to  
 10 begin with. Therefore, in the case of a communication terminal that transmits a DRC signal indicating that uplink channel quality is good, DRC signal transmission power remains low and power consumption remains low even though the previously originally low DRC signal  
 15 transmission power increases, and so there is almost no effect on power consumption.

In the DRC power controller 205, the DRC signal transmission power is obtained by having the transmission power of the pilot signal output from the pilot power  
 20 controller 209 adjusted in accordance with the ratios set in the transmission power table 206. Then, in the DRC power controller 205, the transmission power of the DRC signal output from spreading section 204 is adjusted to this obtained transmission power, and a DRC signal  
 25 that has been subjected to transmission power control is output to the multiplexer 210. To give a specific example, if the number of the DRC signal output from the DRC signal creation section 202 to the DRC power controller

205 is 5, the transmission power of the DRC signal output from spreading section 204 is adjusted to a transmission power 2 dB lower than the transmission power of the pilot signal output from the pilot power controller 209.

5        The DRC signal that has undergone transmission power control is multiplexed with the pilot signal by the multiplexer 210, frequency-converted to radio frequency by the transmit RF section 211, and transmitted to the base station as a radio signal from the antenna 213 via  
10    the duplexer 212.

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15        The radio signal transmitted from the communication terminal is received by the antenna 111 of the base station, and input to the receive RF section 112 via the duplexer 110. The signal input to the receive RF section 112 is  
15    frequency-converted to baseband, despread by the despread section 113 using the spreading code used to spread the DRC signal, and output to the demodulator 114 and reception power calculation section 115.

20        In the demodulator 114 the output signal from the despread section 113 is demodulated, and the DRC signal is extracted and output to the allocation section 101.

25        Here, since a DRC signal indicating that downlink channel quality is poor is transmitted by a communication terminal at lower transmission power than in a conventional system, the probability of a DRC signal indicating that downlink channel quality is poor being received erroneously by the base station is increased. Also, as stated above, if communication resource

allocation is performed based on an erroneously received DRC signal, downlink throughput will fall.

Thus, in the reception power calculation section 115, the reception power of the despread DRC signal is measured, and is output to the unused DRC detection section 116. The lowest reception power at which an error does not occur in a DRC signal indicating that downlink channel quality is poorest (a DRC signal with DRC number 1 in FIG.4) has been set beforehand in the unused DRC detection section 116 as a threshold value. Then, in the unused DRC detection section 116, a DRC signal of reception power lower than this threshold value is detected, and the detection result is output to the allocation section 101. A DRC signal detected by the unused DRC detection section 116 is a DRC signal that is not used by the allocation section 101 in determining communication resource allocation.

In the allocation section 101, communication resource allocation to each communication terminal is determined based on the DRC signals remaining after DRC signals detected by the unused DRC detection section 116 have been excluded from the DRC signals extracted by the demodulator 114.

Thus, in a base station according to this embodiment, a DRC signal of reception power lower than the lowest reception power at which a DRC signal indicating that downlink channel quality is poorest is not received erroneously is excluded. That is to say, in a base station

according to this embodiment, a notification signal susceptible to errors is excluded in determining downlink communication resource allocation. Therefore, according to a base station of this embodiment, even though  
5 a DRC signal indicating that downlink channel quality is poor is transmitted at lower transmission power than in a conventional system, it is possible to prevent communication resource allocation from being determined based on an erroneous DRC signal.

10 Thus, according to this embodiment, the better the downlink channel quality indicated by a DRC signal, the higher is the transmission power at which transmission is performed, and therefore it is possible to make DRC signals indicating that downlink channel quality is good  
15 proportionally less susceptible to errors, and to reduce the error occurrence rate of DRC signals for which the probability of selection by a base station is high. By this means it is possible to reduce the possibility of communication resource allocation being determined based  
20 on an erroneous DRC signal, and so to prevent a fall in downlink throughput.

A base station according to this embodiment may also be configured as shown in FIG.5. FIG.5 is a block diagram showing another configuration of a base station according  
25 to Embodiment 1 of the present invention. That is to say, a base station may be configured in such a way that the reception power calculation section 115 and unused DRC detection section 116 shown in FIG.2 are replaced by a

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likelihood calculation section 301 and unused DRC  
detection section 302. In the following description,  
parts identical to those in FIG.2 are assigned the same  
reference numerals as in FIG.2 and their detailed  
5 explanations are omitted.

In FIG.5, the likelihood calculation section 301  
calculates a likelihood that indicates the probable  
degree of certainty of a DRC signal, and outputs the  
calculation result to the unused DRC detection section  
10 302. The lowest likelihood at which an error does not  
occur in a DRC signal indicating that downlink channel  
quality is poorest has been set beforehand in the unused  
DRC detection section 302 as a threshold value. Then,  
in the unused DRC detection section 302, a DRC signal  
15 with a likelihood lower than this threshold value is  
detected, and the detection result is output to the  
allocation section 101.

In this way the same kind of effect as described  
above is also obtained when a base station according to  
20 this embodiment is configured as shown in FIG.5.

(Embodiment 2)

In a communication terminal according to Embodiment  
2 of the present invention, the better the downlink channel  
25 quality indicated by a DRC signal, the larger is the code  
word minimum distance of the code word to which that DRC  
signal is converted with respect to other DRC signal code  
words before being transmitted.

FIG.6 is a block diagram showing the configuration of a communication terminal according to Embodiment 2 of the present invention. As shown in this figure, a communication terminal according to this embodiment is configured in such a way that the modulator 203, spreading section 204, DRC power controller 205, and transmission power table 206 shown in FIG.3 are replaced by a code word selector 401, code word table 402, modulator 403, and spreading section 404. In the following description, parts identical to those in FIG.3 are assigned the same reference numerals as in FIG.3 and their detailed explanations are omitted.

The code word selector 401 refers to the code word table 402, converts a DRC signal created by the DRC signal creation section 202 to a predetermined code word, and outputs the code word to modulator 403. Modulator 403 modulates the code word and outputs it to spreading section 404. Spreading section 404 spreads the output signal from modulator 403 and outputs the resulting signal to a multiplexer 210.

Next, the operation of a communication terminal according to this embodiment will be described.

First, the contents set in the code word table 402 will be described. FIG.7 is a drawing showing the contents of the code word table provided in a communication terminal according to Embodiment 2 of the present invention.

The code word table 402 shows the correspondence

between DRC numbers and code words after DRC signal conversion, set so that the higher the DRC number, the larger is the code word minimum distance of the code word to which the DRC signal is converted. Here, numbers 1 to 5 are used as DRC numbers, with a higher number representing a proportionally better downlink channel quality. That is to say, in the settings in the code word table 402, the better the downlink channel quality indicated by a DRC signal, the larger is the code word minimum distance of the code word to which the DRC signal is converted.

Here, "code word distance" is the number of bits that differ between code words, and "code word minimum distance" is the minimum number of bits by which a particular code word differs with respect to all other code words. To be specific, the code word for a DRC signal with DRC number 5 is "11111111", and this code word "11111111" differs by a minimum of 6 bits when compared with any of the code words corresponding to DRC signals with DRC numbers 1 to 4. Therefore, the code word minimum distance of the code word for a DRC signal with DRC number 5 is 6. Similarly, the code word minimum distance of the code word for a DRC signal with DRC number 4 is 3.

Thus, the code word for a DRC signal with DRC number 5 is less likely to be mistaken for another code word than the code word for a DRC signal with DRC number 4. That is to say, the larger code word minimum distance of a code word, the less likely it is to be mistaken for

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another code word.

In the code word selector 401, a DRC signal output from the DRC signal creation section 202 is converted to a code word set in the code word table 402, and output  
5 to modulator 403. To give a specific example, if the DRC signal output from the DRC signal creation section 202 is a number 5 DRC signal, it is converted to code word "111111111".

Following conversion, the code word is modulated  
10 by modulator 403 and spread by spreading section 404. The spread code word is multiplexed with a pilot signal by a multiplexer 210, frequency-converted to radio frequency by a transmit RF section 211, and transmitted to the base station as a radio signal from an antenna  
15 213 via a duplexer 212.

Thus, according to this embodiment, the better the downlink channel quality indicated by a DRC signal, the larger is the code word minimum distance of the code word to which that DRC signal is converted with respect to  
20 other DRC signal code words before being transmitted, and therefore it is possible to make DRC signals indicating that downlink channel quality is good proportionally less susceptible to errors, and to reduce the error occurrence rate of DRC signals for which the probability of selection  
25 by a base station is high. By this means it is possible to reduce the possibility of communication resource allocation being determined based on an erroneous DRC signal, and so to prevent a fall in downlink throughput.

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Also, according to this embodiment, it is possible to reduce the error occurrence rate of DRC signals for which the probability of selection by a base station is high without increasing DRC signal transmission power, thereby making it possible to reduce the possibility of communication resource allocation being determined based on an erroneous DRC signal without increasing communication terminal power consumption.

Moreover, according to this embodiment, it is possible to change the degree of insusceptibility to errors of code words corresponding to DRC signals while keeping the code length of code words constant, and therefore it is not necessary to provide a plurality of demodulation systems in accordance with different code lengths in a base station, thus enabling the apparatus configuration of a base station to be simplified.

(Embodiment 3)

A base station according to Embodiment 3 of the present invention transmits to a communication terminal a control signal for table rewriting based on the rate of occurrence of DRC signals that are excluded when communication resource allocation is determined, and a communication terminal according to Embodiment 3 of the present invention rewrites the contents of a transmission power table or code word table based on a control signal transmitted from the base station.

FIG.8 is a block diagram showing the configuration

of a base station according to Embodiment 3 of the present invention. As shown in this figure, a base station according to this embodiment is configured by further providing the configuration shown in FIG.2 with a  
 5 detection rate calculation section 501, control signal creation section 502, modulator 503, and spreading section 504. In the following description, parts identical to those in FIG.2 are assigned the same reference numerals as in FIG.2 and their detailed explanations are  
 10 omitted.

In FIG.8, the detection rate calculation section 501 calculates the rate of detection by the unused DRC detection section 116 and outputs the result to the control signal creation section 502. That is to say, the  
 15 detection rate calculation section 501 calculates the rate of occurrence of DRC signals that are excluded when communication resource allocation is determined. Based on the detection rate, the control signal creation section 502 creates a control signal for table rewriting  
 20 (hereinafter referred to as "table rewrite signal"), which is output to modulator 503. Modulator 503 modulates the table rewrite signal and outputs it to spreading section 504. Spreading section 504 spreads the output signal from modulator 503 and outputs the resulting signal  
 25 to the multiplexer 108.

FIG.9 is a block diagram showing the configuration of a communication terminal according to Embodiment 3 of the present invention. As shown in this figure, a

communication terminal according to this embodiment is configured by further providing the configuration shown in FIG.3 with a despreading section 601, demodulator 602, and table rewriting section 603. In the following  
 5 description, parts identical to those in FIG.3 are assigned the same reference numerals as in FIG.3 and their detailed explanations are omitted.

In FIG.9, despreading section 601 despreads a baseband signal using the spreading code used to spread  
 10 the table rewrite signal, and outputs the resulting signal to the demodulator 602. The demodulator 602 demodulates the output signal from despreading section 601 and extracts the table rewrite signal, which is output to the table rewriting section 603. The table rewriting  
 15 section 603 rewrites the contents of the transmission power table in accordance with the table rewrite signal.

Next, the procedure for transmission/reception of signals between the base station shown in FIG.8 and the communication terminal shown in FIG.9 will be described.

20 First, in the detection rate calculation section 501 of the base station, the detection rate of the unused DRC detection section 116 is calculated and is output to the control signal creation section 502. The detection rate can be calculated, for example, from the number of  
 25 detections in a predetermined time.

A predetermined threshold value for the detection rate has been set in the control signal creation section 502, and this threshold value is compared with the

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detection rate calculated by the detection rate calculation section 501. If the detection rate calculated by the detection rate calculation section 501 is greater than or equal to the threshold value, a table  
5 rewrite signal ordering all transmission power values set in the transmission power table 206 to be increased is created, and is output to modulator 503. That is to say, if the rate of occurrence of DRC signals that are excluded when communication resource allocation is  
10 determined is greater than or equal to the predetermined threshold value, the control signal creation section 502 creates a table rewrite signal that orders all DRC signal transmission power values to be increased simultaneously from their current values.

15 The table rewrite signal is modulated by modulator 503, spread by spreading section 504, and output to the multiplexer 108. The spread table rewrite signal is multiplexed with transmit data and the pilot signal in the multiplexer 108, frequency-converted to radio  
20 frequency by the transmit RF section 109, and transmitted to communication terminals as a radio signal from the antenna 111 via the duplexer 110.

The radio signal transmitted from the base station is received by the antenna 213 of the communication  
25 terminal, passes through the duplexer 212, and is frequency-converted to baseband by the receive RF section 214. The baseband signal is despread by despreading section 601 and demodulated by the demodulator 602, and

the table rewrite signal is extracted. The extracted table rewrite signal is output to the table rewriting section 603.

The contents of the transmission power table 206 are then rewritten by the table rewriting section 603 in accordance with the table rewrite signal. That is to say, the table rewriting section 603 increases all the transmission power values set in the transmission power table 206.

In the above description, the configuration is such that the table rewriting section 603 rewrites the contents of the transmission power table 206, but this embodiment may also be applied to a communication terminal according to Embodiment 2, and a configuration may be used whereby the table rewriting section 603 rewrites the contents of the code word table 402 shown in FIG.6.

In this case, if the detection rate calculated by the detection rate calculation section 501 is greater than or equal to the threshold value, the control signal creation section 502 of a base station according to this embodiment creates a table rewrite signal ordering all code word minimum distances set in the code word table 402 to be increased. That is to say, if the rate of occurrence of DRC signals that are excluded when communication resource allocation is determined is greater than or equal to the predetermined threshold value, the control signal creation section 502 creates a table rewrite signal that orders all code word minimum distances

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of code words corresponding to DRC signals to be increased simultaneously from their current values. Then the table rewriting section 603 rewrites the contents of the code word table 402 in accordance with the table rewrite signal.

- 5 That is to say, the table rewriting section 603 rewrites the code words set in the code word table 402 with code words all of whose code word minimum distances are larger than at present.

Thus, according to this embodiment, the contents  
 10 of the transmission power table or code word table are rewritten based on the rate of occurrence of DRC signals that are excluded when communication resource allocation is determined. In other words, in this embodiment, transmission power table or code word table contents are  
 15 rewritten adaptively in accordance with variations in the communication environment. That is to say, according to this embodiment, when the communication environment deteriorates and the rate of occurrence of DRC signals that are excluded when communication resource allocation  
 20 is determined reaches or exceeds a predetermined threshold value, the transmission power of each DRC signal is increased, or the code word minimum distance of the code word corresponding to each DRC signal is increased, thereby enabling the DRC signal error occurrence rate  
 25 to be held down even when the communication environment deteriorates.

In this embodiment, the predetermined detection rate threshold value is decided upon considering

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appropriately the environment in which the communication system is used.

Moreover, with this embodiment, it is also possible to further set a second predetermined threshold value in the control signal creation section 502 to create a table rewrite signal ordering all transmission power values set in the transmission power table 206 to be decreased when the detection rate calculated by the detection rate calculation section 501 falls below this second threshold value. By this means, it is possible to reduce DRC signal transmission power when DRC signal reception quality becomes excessive, thereby enabling communication terminal power consumption to be decreased.

Furthermore, in this embodiment, table rewriting is performed based on the rate of detection by the unused DRC detection section 116, but it is also possible to rewrite a table based on the distribution of DRC signals used in determining communication resource allocation from among DRC signals transmitted from mobile stations, so that that distribution is optimized. In this case, the base station shown in FIG.8 is configured with the detection rate calculation section replaced by a used DRC distribution determination section, which determines the distribution of DRC signals used in communication resource allocation determination based on DRC signals output from the demodulator 114 and detection results output from the unused DRC detection section 116, and outputs a signal indicating that distribution to the

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control signal creation section 502. The control signal creation section 502 then creates a table rewrite signal based on the signal indicating the distribution output from the used DRC distribution determination section.

5

(Embodiment 4)

A communication terminal according to Embodiment 4 of the present invention transmits at higher transmission power in proportion to CIR information that indicates that downlink channel quality is good. A base station according to Embodiment 4 of the present invention excludes CIR information for which the reception power is lower than a predetermined threshold value in performing communication resource allocation.

10 In above-described Embodiment 1, a communication terminal determines the communication mode based on the CIR and transmits a DRC signal corresponding to that determined communication mode to the base station at predetermined transmission power, and the base station  
15 determines communication resource allocation to each communication terminal based on the DRC signals. DRC signal can be represented with far fewer bits than other information indicating downlink channel quality (such as a downlink CIR, for example), and therefore use of  
20 a DRC signal has the advantage of enabling the downlink channel utilization efficiency to be increased. On the other hand, since a communication terminal must be provided with a table for communication mode  
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determination, a table for DRC signal creation, and so forth to determine the communication mode and create a DRC signal, there are the disadvantages of increased communication terminal power consumption and apparatus size.

Thus, in this embodiment, a communication terminal transmits CIR information to the base station at predetermined transmission power, and the base station determines the communication mode based on the CIR information and then determines communication resource allocation to each communication terminal. As a result, although there is the disadvantage of a slight decrease in the uplink channel utilization efficiency, the fact that communication terminals do not have to determine the communication mode and create a DRC signal, and do not need to be provided with a communication mode determination table, DRC signal creation table, and so forth, offers the major advantage of enabling communication terminal power consumption and apparatus size to be reduced. Also, in this embodiment, it is possible for CIR information for a plurality of terminals to be compared in the base station, and the correct communication mode to be determined with certainty, making this embodiment particularly useful in cases such as those where it is not possible for the communication mode to be determined simply from the CIR in each communication terminal.

A base station according to this embodiment and a

communication terminal according to this embodiment will be described below. FIG.10 is a block diagram showing a configuration of a base station according to Embodiment 4 of the present invention. In the following description, parts identical to those in FIG.2 are assigned the same reference numerals as in FIG.2 and their detailed explanations are omitted.

In FIG.10, a demodulator 701 demodulates the output signal from a despreading section 113, and extracts a signal that contains CIR information (hereinafter referred to as "CIR signal"), which is output to an allocation section 704.

A reception power calculation section 702 measures the reception power of the despread CIR signal, which is output to an unused CIR detection section 703. In the unused CIR detection section 703 is set a predetermined threshold value in the same way as in Embodiment 1, and a CIR signal of reception power lower than this threshold value is detected, and the result of the detection is output to the allocation section 704.

A despreading section 113, demodulator 701, reception power calculation section 702, and unused CIR detection section 703 are provided for each communication terminal. From each demodulator 701 a CIR signal for the corresponding communication terminal is output, and from each unused CIR detection section 703 a detection result for the corresponding communication terminal is output.

The allocation section 704 determines communication

resource allocation to each communication terminal based on CIR information indicated by CIR signals excluding CIR signals detected by the unused CIR detection sections 703 from among the CIR signals extracted by the demodulators 701. Then, based on the determined communication resource allocation, the allocation section 704 notifies a buffer 102 for output of downlink transmit data, and outputs the CIR information to a communication mode determination section 705.

Based on the CIR information output from the allocation section 704, the communication mode determination section 705 determines the communication mode, which indicates a combination of modulation method and coding method, and outputs a signal indicating this communication mode to a modulator 706. In addition, based on the determined communication mode, the communication mode determination section 705 indicates the downlink transmit data coding method to an adaptive coding section 103, and indicates the downlink transmit data modulation method to an adaptive modulator 104. Modulator 706 modulates the signal indicating the communication mode and outputs it to a spreading section 707. Spreading section 707 spreads the output signal from modulator 706 and outputs the resulting signal to a multiplexer 108.

FIG.11 is a block diagram showing the configuration of a communication terminal according to Embodiment 4 of the present invention. In the following description, parts identical to those in FIG.3 are assigned the same

reference numerals as in FIG.3 and their detailed explanations are omitted.

In FIG.11, a CIR information creation section 801 creates a CIR signal indicating a CIR measured by a CIR measurement section 219, and outputs it to a modulator 802 and CIR information power controller 804. Modulator 802 modulates the CIR signal and outputs it to a spreading section 803. Spreading section 803 spreads the output signal from modulator 802 and outputs the spread signal to the CIR information power controller 804. The CIR information power controller 804 refers to a transmission power table 805 that shows the correspondence between CIR level and transmission power, and controls the CIR signal transmission power based on the transmission power of a pilot signal output from a pilot power controller 209, and outputs the CIR signal that has undergone transmission power control to a multiplexer 210.

A despreading section 807 despreads the baseband signal using the spreading code used to spread the signal indicating the communication mode, and outputs the despread signal to a communication mode detection section 808. The communication mode detection section 808 demodulates the output signal from despreading section 807 and detects the communication mode. Then, based on the detected communication mode, the communication mode detection section 808 indicates the downlink receive data demodulation method to an adaptive demodulator 216 and indicates the downlink receive data decoding method to

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an adaptive decoding section 217.

Next, the procedure for transmission/reception of signals between the base station shown in FIG.10 and the communication terminal shown in FIG.11 will be described.

5 First, in the communication terminal shown in FIG.11, the CIR of the pilot signal output from despread section 218 is measured by the CIR measurement section 219, and a CIR signal is created by the CIR information creation section 801.

10 The CIR signal is modulated by modulator 802, spread by spreading section 803, and output to the CIR information power controller 804. In the transmission power table 805, the correspondence between CIR level and CIR signal transmission power is shown in the same way as in Embodiment 1, set so that the CIR signal transmission power increases  
15 in proportion to the level of the CIR. That is to say, in the settings in transmission power table 805, as in Embodiment 1, the better the downlink channel quality indicated by a CIR signal, the higher is the transmission  
20 power. Also, as in Embodiment 1, the CIR signal transmission power values set in the transmission power table 805 are expressed as a ratio to the pilot signal transmission power.

In the CIR information power controller 804, the  
25 CIR signal transmission power is obtained by having the transmission power of the pilot signal output from the pilot power controller 209 adjusted in accordance with the ratios set in the transmission power table 805. Then,

in the CIR information power controller 804, the transmission power of the CIR signal output from spreading section 803 is adjusted to this obtained transmission power, and a CIR signal that has been subjected to transmission power control is output to the multiplexer 210.

The CIR signal that has undergone transmission power control is multiplexed with the pilot signal by the multiplexer 210, frequency-converted to radio frequency by a transmit RF section 211, and transmitted to the base station as a radio signal from an antenna 213 via a duplexer 212.

In the base station shown in FIG.10, the output signal from the despreading section 113 is demodulated by demodulator 701, and the demodulated CIR signal is extracted and output to the allocation section 704. In the reception power calculation section 702, the reception power of the despread CIR signal is measured, and is output to the unused CIR detection section 703. The lowest reception power at which an error does not occur in a CIR signal indicating that downlink channel quality is poorest has been set beforehand in the unused CIR detection section 703 as a threshold value, as in Embodiment 1. Then, in the unused CIR detection section 703, a CIR signal of reception power lower than this threshold value is detected, and the detection result is output to the allocation section 704. A CIR signal detected by the unused CIR detection section 703 is a

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CIR signal that is not used by the allocation section 704 in determining communication resource allocation.

In the allocation section 704, communication resource allocation to each communication terminal is  
5 determined based on the CIR shown by CIR signals remaining after CIR signals detected by the unused CIR detection section 703 have been excluded from the CIR signals extracted by the demodulator 701, and CIR information is output to the communication mode determination section  
10 705.

In the communication mode determination section 705, the communication mode is determined based on CIR information output from the allocation section 704, and a signal indicating this communication mode is output  
15 to modulator 706. The signal indicating the communication mode is modulated by modulator 706, spread by spreading section 707, multiplexed with transmit data and the pilot signal in the multiplexer 108, frequency-converted to radio frequency by the transmit  
20 RF section 109, and transmitted to the communication terminal as a radio signal from an antenna 111 via a duplexer 110.

In the communication terminal shown in FIG.11, a baseband signal is despread by despreding section 807,  
25 and the despread signal is output to the communication mode detection section 808. In the communication mode detection section 808, the output signal from despreding section 807 is demodulated and the communication mode

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is detected, and based on the detected communication mode, the downlink receive data demodulation method is indicated to the adaptive demodulator 216 and the downlink receive data decoding method is indicated to the adaptive decoding section 217.

Thus, according to this embodiment, as in Embodiment 1, the better the downlink channel quality indicated by a CIR signal, the higher is the transmission power at which transmission is performed, and therefore it is possible to reduce the error occurrence rate of CIR information for which the probability of use by a base station is high. By this means it is possible to reduce the possibility of communication resource allocation being determined based on erroneous CIR information, and so to prevent a fall in downlink throughput.

Also, according to this embodiment, as in Embodiment 1, a CIR signal of reception power lower than the lowest reception power at which a CIR signal indicating that downlink channel quality is poorest is not received erroneously is excluded, and therefore, even though a CIR signal indicating that downlink channel quality is poor is transmitted at lower transmission power than in a conventional system, it is possible to prevent communication resource allocation from being determined based on erroneous CIR information.

A base station according to this embodiment may also be configured as shown in FIG.12. FIG.12 is a block diagram showing another configuration of a base station

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according to Embodiment 4 of the present invention. That is to say, a base station may be configured in such a way that the reception power calculation section 702 and unused CIR detection section 703 shown in FIG.10 are replaced by a likelihood calculation section 901 and unused CIR detection section 902. In the following description, parts identical to those in FIG.10 are assigned the same reference numerals as in FIG.10 and their detailed explanations are omitted.

10 In FIG.12, the likelihood calculation section 901 calculates a likelihood that indicates the probable degree of certainty of a CIR signal, and outputs the calculation result to the unused CIR detection section 902. The lowest likelihood at which an error does not  
15 occur in a CIR signal indicating that downlink channel quality is poorest has been set beforehand in the unused CIR detection section 902 as a threshold value. Then, in the unused CIR detection section 902, a CIR signal with a likelihood lower than this threshold value is  
20 detected, and the detection result is output to the allocation section 704.

In this way the same effect as described above is also obtained when a base station according to this embodiment is configured as shown in FIG.12.

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(Embodiment 5)

In a communication terminal according to Embodiment 5 of the present invention, the better the downlink channel

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quality indicated by a CIR signal, the larger is the code word minimum distance of the code word to which that CIR signal is converted with respect to other CIR signal code words before being transmitted.

5           FIG.13 is a block diagram showing the configuration of a communication terminal according to Embodiment 5 of the present invention. As shown in this figure, a communication terminal according to this embodiment is configured in such a way that the modulator 802, spreading  
10   section 803, CIR information power controller 804, and transmission power table 805 shown in FIG.11 are replaced by a code word selector 1001, code word table 1002, modulator 1003, and spreading section 1004. In the following description, parts identical to those in FIG.11  
15   are assigned the same reference numerals as in FIG.11 and their detailed explanations are omitted.

          The code word selector 1001 refers to the code word table 1002, converts a CIR signal created by the CIR information creation section 801 to a predetermined code  
20   word, and outputs it to modulator 1003. Modulator 1003 modulates the code word and outputs it to spreading section 1004. Spreading section 1004 spreads the output signal from modulator 1003 and outputs the resulting signal to a multiplexer 210.

25           Next, the operation of a communication terminal according to this embodiment will be described.

          In the same way as in above-described Embodiment 2, the code word table 1002 shows the correspondence

between CIR level and code words after CIR signal conversion, set so that the higher the CIR level, the larger is the code word minimum distance of the code word to which the CIR signal is converted. That is to say, 5 in the settings in the code word table 1002, the better the downlink channel quality indicated by a CIR signal, the larger is the code word minimum distance of the code word to which the CIR signal is converted.

10 In the code word selector 1001, a CIR signal output from the CIR information creation section 801 is converted to a code word set in the code word table 1002, and output to modulator 1003. Following conversion, the code word is modulated by modulator 1003 and spread by spreading section 1004. The spread code word is multiplexed with 15 a pilot signal by a multiplexer 210, frequency-converted to radio frequency by a transmit RF section 211, and transmitted to the base station as a radio signal from an antenna 213 via a duplexer 212.

20 Thus, according to this embodiment, as in Embodiment 2, the better the downlink channel quality indicated by a CIR signal, the larger is the code word minimum distance of the code word to which that CIR signal is converted with respect to other CIR signal code words before being transmitted, and therefore it is possible to reduce the 25 error occurrence rate of CIR information for which the probability of use by a base station is high. By this means it is possible to reduce the possibility of communication resource allocation being determined based

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on erroneous CIR information, and so to prevent a fall in downlink throughput.

Also, according to this embodiment, as in Embodiment 2, it is possible to reduce the error occurrence rate of CIR information for which the probability of use by a base station is high without increasing CIR signal transmission power, thereby making it possible to reduce the possibility of communication resource allocation being determined based on erroneous CIR information without increasing communication terminal power consumption.

Moreover, according to this embodiment, as in Embodiment 2, it is possible to change the degree of insusceptibility to errors of code words corresponding to CIR signals while keeping the code length of code words constant, and therefore it is not necessary to provide a plurality of demodulation systems in accordance with different code lengths in a base station, thus enabling the apparatus configuration of a base station to be simplified.

(Embodiment 6)

A communication terminal according to Embodiments 6 to 8 of the present invention transmits with less susceptibility to errors in the propagation path in proportion to information for which the amount of change is large within CIR information. In other words, a communication terminal according to Embodiments 6 to 8

of the present invention transmits with less susceptibility to errors in the propagation path in proportion to information that indicates a broad value within CIR information.

- 5           The meaning of "information for which the amount of change is large" and "information that indicates a broad value" here can be illustrated by a specific example. If a CIR value is indicated by a value with a decimal fraction (such as 8.7 dB), then the above-mentioned
- 10   information refers to the integer part (here, "8"). In this case, since the amount of change per unit of the integer part is 1 dB, while the amount of change per unit of the fractional part is 0.1 dB, the integer part is "information for which the amount of change is large".
- 15   Therefore, if an integer part is received erroneously by a base station, the degree of error is large compared with the case where a fractional part is received erroneously, and the probability of an erroneous communication mode being determined is higher—that is
- 20   to say, the probability of downlink throughput falling is higher.

Also, CIR information is normally converted to a code word with a limited number of bits before being transmitted to a base station, and there are also limits

25   on the transmission power and spreading code spreading factor that can be used in transmitting CIR information. There are thus limits to making CIR information overall insusceptible to errors, and it is difficult to do so.

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Thus, in Embodiments 6 to 8 of the present invention, within the above-described limitations on transmission of CIR information, transmission is performed with insusceptibility to errors in the propagation path made proportional to "information for which the amount of change is large" within the above limitations so that, at least "information for which the amount of change is large" (that is, "information that indicates a broad value") of CIR information is received correctly.

10 A communication terminal according to Embodiment 6 of the present invention is described below. A communication terminal according to Embodiment 6 of the present invention performs conversion to, and transmits, a code word with a code length proportional to the value  
15 of the upper digit in a CIR value.

FIG.14 is a block diagram showing the configuration of a communication terminal according to Embodiment 6 of the present invention. In the following description, parts identical to those in FIG.11 are assigned the same reference numerals as in FIG.11 and their detailed  
20 explanations are omitted.

In FIG.14, a CIR signal creation section 1101 converts a CIR value measured by a CIR measurement section 219 to a code word and creates a CIR signal, and outputs  
25 the created CIR signal to a multiplexer 210. At this time, the CIR signal creation section 1101 creates a CIR signal by performing conversion to a code word with a code length proportional to the value of the upper digit in the CIR

value.

Next, the configuration of the CIR signal creation section 1101 will be described. FIG.15 is a block diagram showing the configuration of the CIR signal creation section of a communication terminal according to Embodiment 6 of the present invention.

In FIG.15, an upper digit information generation section 1201 outputs the value of the upper digit in the CIR value output from the CIR measurement section 219 to a 6-bit coding section 1203. A lower digit information generation section 1202 outputs the value of the lower digit in the CIR value output from the CIR measurement section 219 to a 4-bit coding section 1204. To give a specific example, if the CIR value output from the CIR measurement section 219 is 8.7 dB, the upper digit information generation section 1201 outputs the value of the integer part, "8", to the 6-bit coding section 1203, and the lower digit information generation section 1202 outputs the value of the fractional part, "7", to the 4-bit coding section 1204.

The 6-bit coding section 1203 converts the value output from the upper digit information generation section 1201 (here, "8") to a 6-bit code word, and outputs the 6-bit code word to a time multiplexer 1205. The 4-bit coding section 1204 converts the value output from the lower digit information generation section 1202 (here, "7") to a 4-bit code word, and outputs the 4-bit code word to the time multiplexer 1205. It is herein assumed



that the number of bits that can be used to indicate a CIR value is ten.

The time multiplexer 1205, by storing the 6-bit code word in the first half of a slot and storing the 4-bit  
 5 codeword in the following latter half of the slot, performs time multiplexing of the code word for the integer part of the CIR value (that is, the code word corresponding to the value of the upper digit) and the code word for the fractional part of the CIR value (that is, the code  
 10 word corresponding to the value of the lower digit). The time multiplexer 1205 then outputs the time-multiplexed 10-bit code word to a modulator 1206 as a CIR signal. It is herein assumed that one slot is composed of 10 bits, with the integer part of a CIR value represented by the  
 15 preceding 6 bits and the fractional part of a CIR value represented by the succeeding 4 bits.

The modulator 1206 modulates the CIR signal and outputs it to the spreading section 1207. The spreading  
 section 1207 spreads the output signal from the modulator  
 20 1206 and outputs the resulting signal to the multiplexer 210.

Next, the operation of a communication terminal with the above configuration will be described.

In the 6-bit coding section 1203, the value of the  
 25 upper digit in the CIR value (here, "8") is converted to a 6-bit code word, and the value of the lower digit in the CIR value (here, "7") is converted to a 4-bit code word.

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As the number of different code words that can be represented by 6 bits is  $2^6$ , and the number of different code words that can be represented by 4 bits is  $2^4$ , the code word minimum distance between code words can be made  
 5 larger for code words represented by 6 bits. Therefore, a code word represented by 6 bits is less susceptible to being mistaken for another code word than a code word represented by 4 bits. That is to say, in this embodiment, the value of the upper digit of a CIR value is less  
 10 susceptible to errors.

Thus, with a communication terminal according to this embodiment, within the limitation of 10 bits available to indicate a CIR value, by performing conversion to a code word of a code length proportional  
 15 to the value of the upper digit in a CIR value, it is possible to perform transmission with insusceptibility to errors made proportional to the value of the upper digit for which the amount of change is large. By this means, even if an error should occur in a CIR signal in  
 20 the propagation path, the probability of being able to perform reception correctly at the base station is proportionally higher according to the value of the upper digit in a CIR value, and the degree of error in CIR values can be kept low. Thus, it is possible to reduce the  
 25 possibility of an erroneous communication mode being determined in the base station.

In this embodiment, a case has been described where the upper digit value is converted to a 6-bit code word

and the lower digit value is converted to a 4-bit code word. However, as long as the number of bits of the code word corresponding to the upper digit value is greater than the number of bits of the code word corresponding to the lower digit value, there are no particular limitations on these numbers of bits.

(Embodiment 7)

10 A communication terminal according to Embodiment 7 of the present invention transmits with transmission power increased in proportion to the value of the upper digit in a CIR value.

15 A communication terminal according to this embodiment differs from a communication terminal according to Embodiment 6 only in the internal configuration of the CIR signal creation section 1101, and therefore only the CIR signal creation section 1101 will be described in the following description.

20 FIG.16 is a block diagram showing the configuration of the CIR signal creation section of a communication terminal according to Embodiment 7 of the present invention. In the following description, parts identical to those in FIG.15 are assigned the same reference numerals as in FIG.15 and their detailed explanations are omitted.

The CIR signal creation section 1101 shown in FIG.16 converts a CIR value measured by a CIR measurement section 219 to a code word, and then creates a CIR signal,

increasing transmission power in proportion to the value of the upper digit.

In FIG.16, a 5-bit coding section 1301 converts the value output from an upper digit information generation section 1201 to a 5-bit code word and outputs the 5-bit code word to a modulator 1303, and a 5-bit coding section 1302 converts the value output from a lower digit information generation section 1202 to a 5-bit code word and outputs the 5-bit code word to a modulator 1304. Thus, in this embodiment, both the upper digit value and the lower digit value are converted to 5-bit code words, and therefore there is no difference between them in insusceptibility to errors from a code word standpoint.

Modulator 1303 modulates the code word output from 5-bit coding section 1301, and outputs it to an upper digit spreading section 1305. Modulator 1304 modulates the code word output from 5-bit coding section 1302, and outputs it to a lower digit spreading section 1306.

The upper digit spreading section 1305 spreads the output signal from modulator 1303, and outputs the spread signal to an upper digit power controller 1307. The lower digit spreading section 1306 spreads the output signal from modulator 1304, and outputs the spread signal to a lower digit power controller 1308. At this time, the upper digit spreading section 1305 and lower digit spreading section 1306 perform their respective spreading processing using different spreading codes of the same spreading factor. That is to say, the upper digit value

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of the CIR value and the lower digit value of the CIR value are spread using different spreading codes that have the same spreading factor.

Based on the transmission power of a pilot signal output from a pilot power controller 209, the upper digit power controller 1307 controls the transmission power of the signal indicating the upper digit value of the CIR value, and outputs the signal that has undergone transmission power control to a code multiplexer 1309. Similarly, based on the transmission power of the pilot signal output from the pilot power controller 209, the lower digit power controller 1308 controls the transmission power of the signal indicating the lower digit value of the CIR value, and outputs the signal that has undergone transmission power control to the code multiplexer 1309. The actual transmission power control method will be described later herein.

The code multiplexer 1309 multiplexes the signal indicating the upper digit value of the CIR value and the signal indicating the lower digit value of the CIR value in the same time slot. That is to say, the code multiplexer 1309 performs code multiplexing of the signal indicating the upper digit value and the signal indicating the lower digit value.

Next, the operation of a communication terminal with the above configuration will be described.

In the upper digit power controller 1307, a signal indicating the upper digit value of a CIR value is adjusted

to a transmission power whose only predetermined value is higher than the pilot signal transmission power. In the lower digit power controller 1308, a signal indicating the lower digit value of the CIR value is adjusted to  
 5 a transmission power whose only predetermined value is lower than the pilot signal transmission power. That is to say, the transmission power is increased in proportion to the value of the upper digit in the CIR value.

Thus, a communication terminal according to this  
 10 embodiment can transmit with insusceptibility to errors made proportional to the upper digit value for which the amount of change is large by transmitting with transmission power increased in proportion to the upper digit value of a CIR value. By this means, even if an  
 15 error should occur in a CIR signal in the propagation path, the probability of being able to perform reception correctly at the base station is proportionally higher according to the value of the upper digit in a CIR value, and the degree of error in CIR values can be kept low.  
 20 Thus, it is possible to reduce the possibility of an erroneous communication mode being determined in the base station.

Also, in this embodiment, by increasing  
 transmission power of the upper digit value compared with  
 25 conventional CIR signal transmission power (here, the pilot signal transmission power), and decreasing transmission power of the lower digit value by the amount by which it is increased for the upper digit value, giving

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a total transmission power increase/decrease value of  $\pm 0$  dB, the overall CIR signal transmission power is kept the same as conventional CIR signal transmission power. Thus, according to this embodiment, it is possible to perform transmission with insusceptibility to errors made proportional to the upper digit value while keeping CIR signal transmission power the same as in a conventional system. That is to say, it is possible to perform transmission with insusceptibility to errors made proportional to the upper digit value without reducing uplink capacity compared with a conventional system.

(Embodiment 8)

A communication terminal according to Embodiment 8 of the present invention transmits with spreading performed using a spreading code with a higher spreading factor in proportion to the value of the upper digit in a CIR value.

A communication terminal according to this embodiment differs from a communication terminal according to Embodiment 6 or 7 only in the internal configuration of the CIR signal creation section 1101, and therefore only the CIR signal creation section 1101 will be described in the following description.

FIG.17 is a block diagram showing the configuration of the CIR signal creation section of a communication terminal according to Embodiment 8 of the present invention. In the following description, parts

identical to those in FIG.15 or FIG.16 are assigned the same reference numerals as in FIG.15 or FIG.16 and their detailed explanations are omitted.

The CIR signal creation section 1101 shown in FIG.17 converts a CIR value measured by a CIR measurement section 219 to a code word, and then creates a CIR signal, with spreading performed using a spreading code with a higher spreading factor in proportion to the value of the upper digit.

In FIG.17, an upper digit spreading section 1401 spreads the output signal from modulator 1303 and outputs the resulting signal to a time multiplexer 1205, and a lower digit spreading section 1402 spreads the output signal from modulator 1304 and outputs the spread signal to the time multiplexer 1205. At this time, the upper digit spreading section 1401 performs spreading processing with a spreading code of the same kind as used by the lower digit spreading section 1402 and with a higher spreading factor than that of the lower digit spreading section 1402. That is to say, the upper digit value of the CIR value is spread with a higher spreading factor than the lower digit value. As a result, insusceptibility to errors in the propagation path is proportional to the upper digit value.

Thus, a communication terminal according to this embodiment can transmit with insusceptibility to errors made proportional to the upper digit value for which the amount of change is large by transmitting with spreading

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performed using a spreading code with a higher spreading factor in proportion to the value of the upper digit in a CIR value. By this means, even if an error should occur in a CIR signal in the propagation path, the probability of being able to perform reception correctly at the base station is proportionally higher according to the value of the upper digit in a CIR value, and the degree of error in CIR values can be kept low. Thus, it is possible to reduce the possibility of an erroneous communication mode being determined in the base station.

Also, in this embodiment, the spreading factor for the upper digit value is increased compared with a conventional CIR signal spreading factor, and the spreading factor for the lower digit value is decreased by the amount by which it is increased for the upper digit value. By this means, the amount of data sent in one slot is kept the same as for a conventional CIR signal. Thus, according to this embodiment, it is possible to perform transmission with insusceptibility to errors made proportional to the upper digit value without reducing the amount of data sent in one slot.

It is also possible to implement the present invention by combining a communication terminal according to above-described Embodiment 1 and a communication terminal according to above-described Embodiment 2. Moreover, it is also possible to implement the present invention by combining a communication terminal according to above-described Embodiment 4 and a communication

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terminal according to above-described Embodiment 5. Furthermore, it is also possible to implement the present invention by combining the respective communication terminals according to above-described Embodiments 6 to 5 8. In addition, it is also possible for the transmission power table provided in a communication terminal according to above-described Embodiment 4 and the code word table provided in a communication terminal according to above-described Embodiment 5 to be rewritten as 10 appropriate based on a control signal from the base station, in the same way as in above-described Embodiment 3.

Also, in above-described Embodiments 1 to 8, a case has been described where a pilot signal is time-multiplexed, but above-described Embodiments 1 to 15 8 are not limited to this, and can also be applied to a case where a pilot signal is code-multiplexed.

Moreover, in above-described Embodiments 1 to 8, a CIR has been used as a value that indicates pilot signal reception quality, but this is not a limitation, and any 20 value may be used as long as it is a value that indicates reception quality.

Furthermore, in above-described Embodiments 1 to 5, the predetermined threshold value set in the unused DRC detection section or the unused CIR detection section 25 is assumed to be a fixed value, but a configuration may also be used whereby the threshold value is varied adaptively in accordance with the DRC signal error rate or CIR signal error rate.

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In addition, in above-described Embodiments 6 to 8, either time multiplexing or code multiplexing may be used when multiplexing code words.

Also, in above-described Embodiments 6 to 8, an example has been given in which a CIR value is represented by one integer-part digit and one fractional-part digit. However, this is not a limitation, and above-described Embodiments 6 to 8 may all be implemented for CIR values represented by a plurality of digits.

Moreover, in above-described Embodiments 6 to 8, the value of the upper digit of a CIR value has been described as "information for which the amount of change is large". However, "information for which the amount of change is large" does not necessarily correspond to the size of a digit. For example, if a method is used whereby a CIR value is represented by an integer by first indicating a broad value of 0 dB, 2 dB, 4 dB, 6 dB ... changing by 2 dB at a time, and adding information indicating the presence or absence of an increment of 1 dB for that broad value, a value changing by 2 dB at a time is "information for which the amount of change is large". With this method, to represent a CIR value of 7 dB, for example, CIR information that includes information indicating 6 dB and information indicating that there is an increment of 1 dB is transmitted to the base station. At this time, the communication terminal apparatus transmits the information indicating 6 dB with greater insusceptibility to errors than the information indicating that there is

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an increment of 1 dB, in the same way as in above-described Embodiments 6 to 8.

As described above, according to the present invention it is possible to prevent a fall in downlink throughput in a communication system in which  
5 communication resources are allocated to communication terminals based on downlink channel quality.

This application is based on Japanese Patent Application No.2000-234420 filed on August 2, 2000, and  
10 Japanese Patent Application No.2000-285405 filed on September 20, 2000, entire content of which is expressly incorporated by reference herein.

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## CLAIMS

1. A communication terminal apparatus used in a communication system in which communication resources  
5 are allocated to each communication terminal apparatus based on downlink channel quality, said communication terminal apparatus comprising:

a measuring device that measures downlink channel quality; and

10 a transmitter that transmits a notification signal to notify a base station apparatus of information that indicates channel quality;

wherein said transmitter transmits a notification signal having information made less susceptible to errors  
15 in a propagation path, the information, among information indicative of channel quality, having a possibility of decreasing the downlink throughput when the information is received erroneously in said base station apparatus.

2. The communication terminal apparatus according to  
20 claim 1, wherein said transmitter transmits with less susceptibility to errors in a propagation path in proportion to a notification signal that indicates that channel quality is good.

3. The communication terminal apparatus according to  
25 claim 2, wherein said transmitter transmits with transmission power increased in proportion to a notification signal that indicates that channel quality ~~is good.~~

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4. The communication terminal apparatus according to claim 3, further comprising a controller that controls transmission power of a pilot signal;

wherein said transmitter transmits with a notification signal that indicates channel quality better than a predetermined channel quality set to higher transmission power than pilot signal transmission power, and a notification signal that indicates channel quality poorer than a predetermined channel quality set to lower transmission power than pilot signal transmission power.

5. The communication terminal apparatus according to claim 3, further comprising:

a table that indicates a correspondence between a notification signal and transmission power; and

a rewriting device that rewrites contents of said table in accordance with a control signal from a base station apparatus;

wherein said transmitter adjusts a notification signal to predetermined transmission power based on said table.

6. The communication terminal apparatus according to claim 2, wherein said transmitter transmits after performing conversion to a code word with a size of a code word minimum distance proportional to a notification signal that indicates that channel quality is good.

7. The communication terminal apparatus according to claim 6, further comprising:

a table that indicates a correspondence between a

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notification signal and a code word; and

a rewriting device that rewrites contents of said table in accordance with a control signal from a base station apparatus;

5 wherein said transmitter converts a notification signal to a predetermined code word based on said table.

8. The communication terminal apparatus according to claim 2, further comprising a determination device that determines a communication mode indicated by a  
10 combination of modulation method and coding method based on channel quality;

wherein said transmitter makes a notification signal a signal that indicates a communication mode.

9. The communication terminal apparatus according to  
15 claim 2, wherein:

said measurement device measures pilot signal reception quality; and

said transmitter makes a notification signal a  
20 signal that indicates a pilot signal reception quality value.

10. The communication terminal apparatus according to claim 1, wherein:

said measurement device measures pilot signal reception quality; and

25 said transmitter transmits a notification signal made less susceptible to errors in a propagation path in proportion to information for which an amount of change is large within information used to indicate a pilot signal

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reception quality value.

11. The communication terminal apparatus according to claim 10, wherein said transmitter transmits a notification signal converted to a code word whose code length is proportional to a value of an upper digit.

12. The communication terminal apparatus according to claim 10, wherein said transmitter transmits a notification signal with transmission power increased in proportion to a value of an upper digit.

10 13. The communication terminal apparatus according to claim 10, wherein said transmitter transmits a notification signal spread with a spreading code whose spreading factor is higher in proportion to a value of an upper digit.

15 14. A base station apparatus comprising:

a receiver that receives a notification signal transmitted from the communication terminal apparatus according to claim 1;

20 a measurement device that measures reception power of a notification signal;

a detector that detects a notification signal whose reception power is less than a predetermined threshold value; and

25 a determination device that determines downlink communication resource allocation using a notification signal excluding a detected notification signal from a received plurality of notification signals.

15. The base station apparatus according to claim 14,



further comprising:

a calculator that calculates a rate of detection by said detector; and

a transmitter that transmits a control signal  
 5 instructing a communication terminal apparatus to rewrite said table based on a result of comparison of a rate of detection and a predetermined threshold value.

16. A base station apparatus comprising:

a receiver that receives a notification signal  
 10 transmitted from the communication terminal apparatus according to claim 1;

a measurement device that measures likelihood of a notification signal;

a detector that detects a notification signal whose  
 15 likelihood is less than a predetermined threshold value; and

a determination device that determines downlink communication resource allocation using a notification signal excluding a detected notification signal from a  
 20 received plurality of notification signals.

17. The base station apparatus according to claim 16, further comprising:

a calculator that calculates a rate of detection by said detector; and

a transmitter that transmits a control signal  
 25 instructing a communication terminal apparatus to rewrite said table based on a result of comparison of a rate of detection and a predetermined threshold value.

18. A radio communication method, wherein:

a communication terminal apparatus, when transmitting a notification signal to notify a base station apparatus of information that indicates downlink channel quality, transmits a notification signal having information made less susceptible to errors in a propagation path, the information, among information indicative of channel quality, having a possibility of decreasing the downlink throughput when the information is received erroneously in said base station apparatus; and

said base station determines downlink communication resource allocation in accordance with a notification signal.

19. The radio communication method according to claim 18, wherein said communication terminal apparatus transmits with less susceptibility to errors in a propagation path in proportion to a notification signal that indicates that channel quality is good.

20

20. The radio communication method according to claim 18, wherein said communication terminal apparatus measures pilot signal reception quality, and transmits a notification signal made less susceptible to errors in a propagation path in proportion to information for which an amount of change is large within information used to indicate a reception quality value.

*Added H1*

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## ABSTRACT

A communication mode determination section 201 determines the communication mode based on the CIR measured by a CIR measurement section 219; a DRC signal creation section 202 creates a DRC signal with a number corresponding to the communication mode; and a DRC power controller 205 refers to a transmission power table 206 showing the correspondence between DRC numbers and transmission power, and, based on the transmission power of the pilot signal output from a pilot power controller 209, increases transmission power in proportion as the DRC signal indicates that downlink channel quality is good.

# APPLICATION FOR UNITED STATES PATENT

## Declaration for Patent Application

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on

the invention entitled: COMMUNICATION TERMINAL APPARATUS, BASE STATION APPARATUS, AND RADIO

the specification of which 2 (file no \_\_\_\_\_) COMMUNICATION METHOD

(check at least one)

3 ☒ is attached hereto

4 ☐ was filed on \_\_\_\_\_ as (5) U.S. Application Serial No. \_\_\_\_\_

6 ☐ and was amended \_\_\_\_\_  
(if applicable)

Use this portion only if you are entering the U.S. National phase based on a PCT International Application designating the U.S.	7 [ x ]	was filed as PCT international application		
	8	Number	<u>PCT/JP01/06654</u>	
	9	on	<u>2/August/2001</u>	
		and was amended under PCT Article(s) 19 and/or 34		
	10	on	_____ (if applicable).	
	11	priority date claimed in PCT International Application		
		<u>JAPAN</u>	<u>2000-234420</u>	<u>2/August/2000</u>
		(Country)	(Number)	(Day/Month/Year Filed)
		<u>JAPAN</u>	<u>2000-285405</u>	<u>20/September/2000</u>
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I hereby declare that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended, by any amendment referred to above.

 I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me which is material to patentability in accordance with Title 37, Code of Federal Regulations, §1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application (s) for patent or inventor's certificate listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date earlier than that of the application(s) on which priority is claimed.

**Prior (Foreign) Application(s) any Priority Claims Under 35 U.S.C. 119**

Priority Claimed

12a

(Country)	(Number)	(Day/Month/Year Filed)	<input type="checkbox"/>	<input type="checkbox"/>
			Yes	No
(Country)	(Number)	(Day/Month/Year Filed)	<input type="checkbox"/>	<input type="checkbox"/>
			Yes	No

Priority Claim(s) from U.S. Provisional Application(s) – I hereby claim the benefit under Title 35, United States Code, §119(e) of any United States provisional application(s) listed below:

12b

Application No.	Day/Month/Year Filed	Application No.	Day/Month/Year Filed
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<p>13</p>	<p><u>(U.S. Application Number)</u></p>	<p><u>(U.S. Filing Date)</u></p>	<p><u>Status (patented, pending, abandoned)</u></p>

I hereby appoint the following attorneys of the firm of Stevens, Davis, Miller & Mosher, L.L.P. as my attorneys of record with full power of substitution and revocation to prosecute this application and to transact all business in the Patent and Trademark Office:

James E. Ledbetter, Reg. No. 28732; Thomas P. Pavelko, Reg. No. 31689; and Anthony P. Venturino, Reg. No. 31674.  
ALL CORRESPONDENCE IN CONNECTION WITH THIS APPLICATION SHOULD BE SENT TO  
STEVENS, DAVIS, MILLER & MOSHER, L.L.P., 1615 L Street, N.W., Suite 850, Washington, D.C. 20036,  
TELEPHONE (202) 408-5100. FACSIMILE (202) 408-5200.

See page 2 for signature lines IPR2018-1557

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other side for instructions for completing this form

## INSTRUCTIONS FOR COMPLETION OF THIS FORM

line 1 Insert the same title as is used on the specification and in the assignment.

line 2 Is optional but is provided so that you can use it to identify more readily an application prior to the time that the Patent Office application serial number is assigned. We suggest that the specification, drawings and declaration always bear a file number since it can help to get the papers together in case they become inadvertently separated. In instances where the specification is filed without a signed declaration form (under 37 CFR §1.53) a file number on a later-received separate form will assist us in associating it with the correct case.

line 3 Check this box if the specification, claims and drawing (if any) are attached to this declaration form, e.g., when filing a new patent application.

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line 6 Is used in conjunction with line 5 but only when there have been one or more amendments to the specification or claims. Line 6 is also used when the Examiner requires a new declaration because claims inserted by amendment cover subject matter not originally claimed (37 CFR §1.67).

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line 12a Is used in the following instances:

- (i) If a single priority is being claimed from a foreign application you need to list only the first-filed application; you do not need to list other countries if all applications were filed within one year of the U.S. filing.
- (ii) If multiple priorities are being claimed, from a plurality of applications filed in one or more countries, you must list the first filed application for each aspect of the invention. Example: if aspect A of the invention was disclosed in an application filed 11 months earlier in country X and aspect B was disclosed 9 months earlier in an application filed in country Y, then the applications in both countries X and Y must be identified. Only the first application for each aspect of the invention needs to be identified provided all applications on that aspect were filed within one year prior to the U.S. filing.
- (iii) If a non-priority application is being filed you must list all applications in all countries where corresponding foreign applications were filed more than one year prior to the U.S. filing. This is so the Examiner can check to see if any of those applications were published or patented early enough to be prior art against the U.S. application.
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line 14 Type the inventor's proper legal name in the order specified, e.g., "John B. JONES" or "J. Bob JONES" if the inventor so prefers. It is not acceptable to use only initials such as "J. B. JONES."

line 15 The inventor's "signature" may be his (or her) usual manner of signing but it is preferable that the inventor simply write his (or her) name in his (or her) own cursive handwriting in the same order as on line 14, e.g., given name, middle initial and Family name.

line 16 Insert the actual date of signature.

line 17 Insert simply the city and state or country, e.g., "Paris, France", of the inventor's residence, not citizenship. No street address or postal code is required on this line.

line 18 Insert the inventor's citizenship. The statement of citizenship (or subject of) is a statutory requirement (35 USC §115). Simply the name of the country of citizenship, e.g., "Japan" is sufficient.

line 19 Insert the inventor's mailing address. The purpose of requiring the post office address is to enable the Patent Office to communicate directly with the inventor if desired, such as in the case of death of the U.S. attorney. It should be the address where the inventor customarily receives his (or her) mail and should include the postal code. If applicable it can be the inventor's business address or address at place of employment.

Applicants are reminded that the U.S. Patent and Trademark Office has very strict requirements as to proper execution of an application. The applicant should make sure that he reviews the declaration, prior to signing to make sure the declaration properly identifies the application and all relevant information; and should review the specification and claims (including drawings, if any) before signing the declaration. Failure to do so will require the filing of a supplemental declaration --- 37 CFR §1.67(c).

Any handwritten changes to the specification, claims or drawings must be in ink personally by all of the inventors prior to signing the declaration and the adjacent left margin must be initialed and dated by all of the inventors, e.g., "JBJ 6-9-91".

Please let us know if there are any questions regarding proper completion of this form. Thank you.

An assignment, a separate document requiring separate signature and dating may be enclosed. Please look for it and sign and date it in the same manner as in lines 15 and 16 above.

STEVENS, DAVIS, MILLER & MOSHER, L.L.P.

I hereby declare that all statements made herein of my knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that such false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful statements may jeopardize the validity of the application or any patent issuing thereon.

PAGE 2 OF U.S.A. DECLARATION FORM

14a Typewritten Full Name of Sole or First Inventor 1-00 Kenichi MIYOSHI  
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 15a Inventor's Signature Kenichi Miyoshi  
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 15c Inventor's Signature Junichi Aizawa  
 16c Date of Signature March 3 2002  
 Month Day Year  
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 City State or Province Country  
 18c Citizenship JAPAN JPX  
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 15d Inventor's Signature  
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 17d Residence  
 City State or Province Country  
 18d Citizenship  
 19d Post Office Address  
 (Insert complete mailing address, including country)

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APPROVED	DATE	FIG. 6
BY	CLASS	SUBCLASS
	455	452.1

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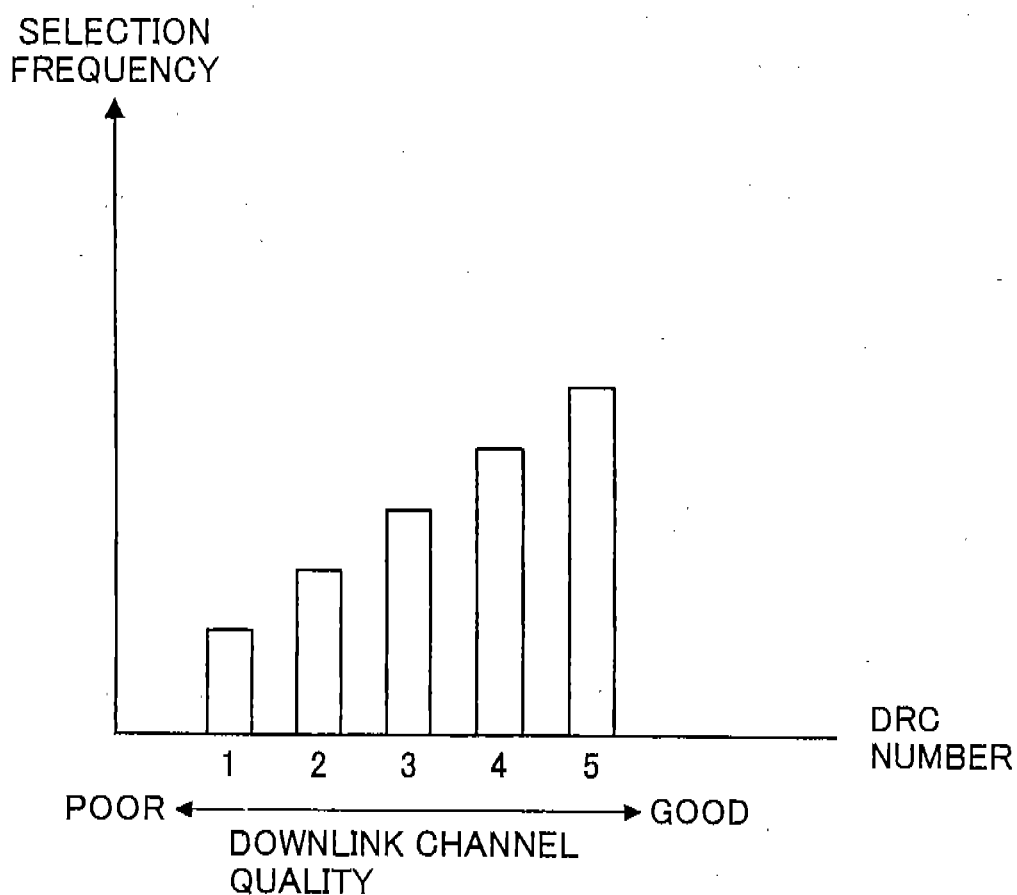


FIG.1

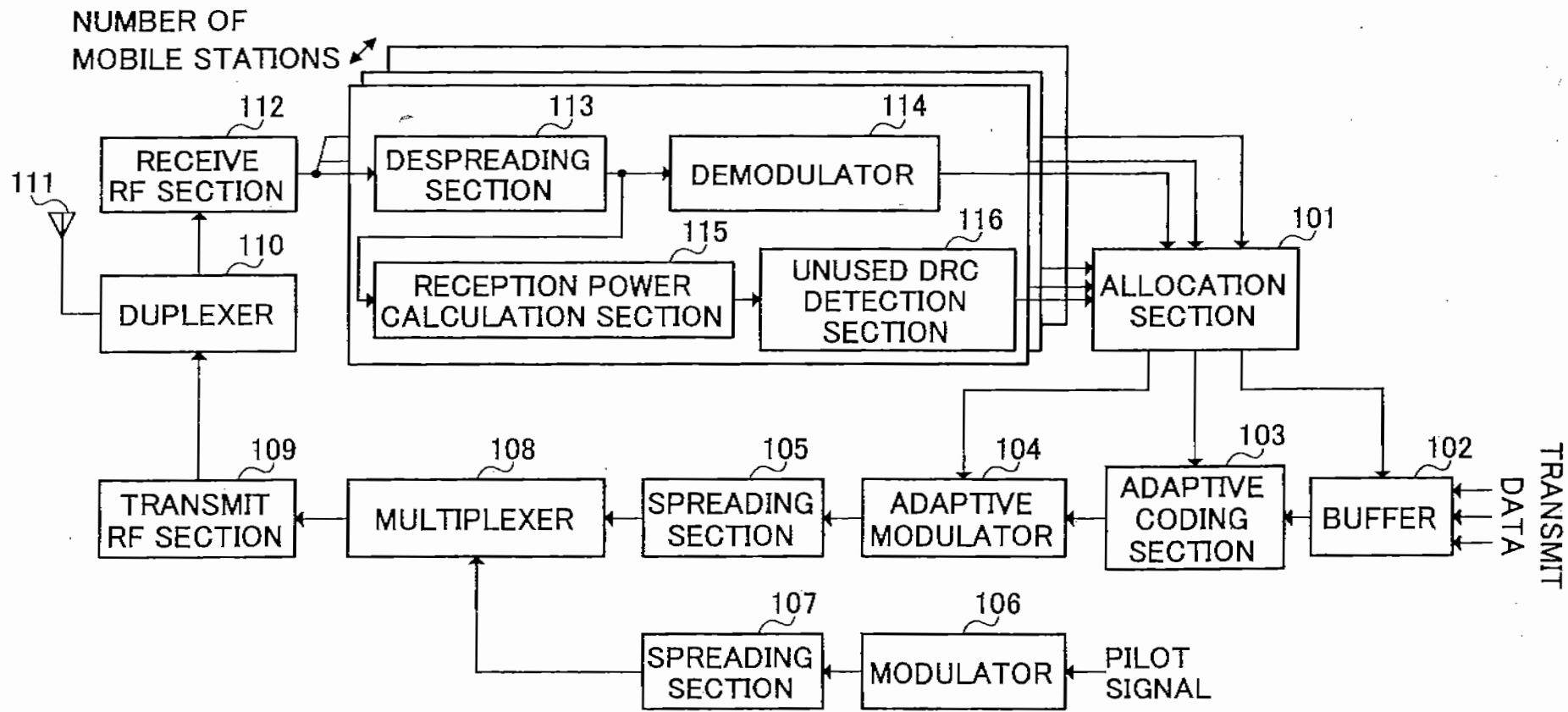
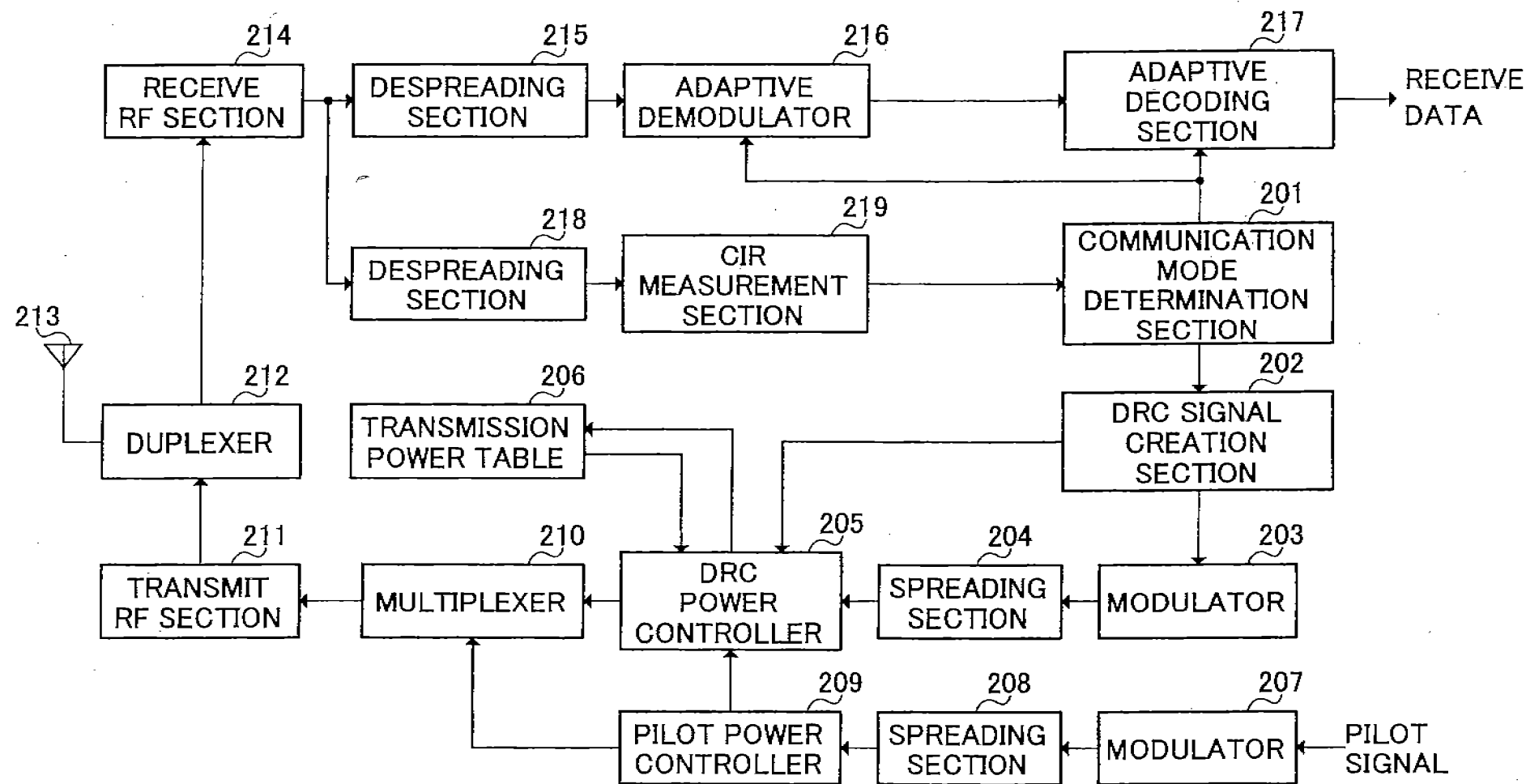


FIG.2

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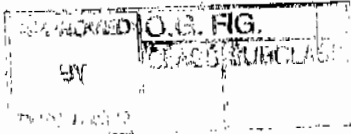




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FIG.3

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DRC NUMBER	TRANSMISSION POWER (RATIO TO PILOT SIGNAL TRANSMISSION POWER)
1	-2dB
2	-1dB
3	0dB
4	+1dB
5	+2dB

FIG.4

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FIG. 5

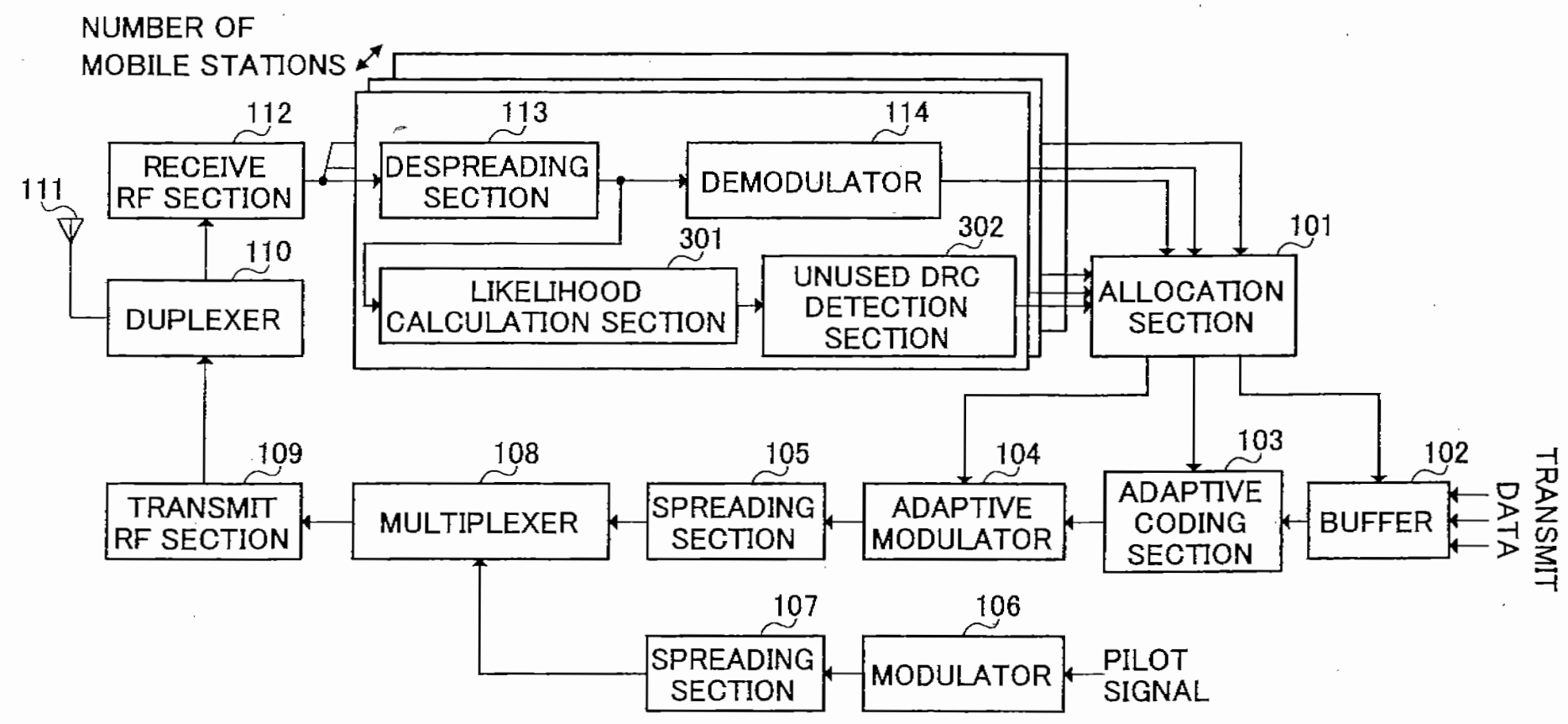
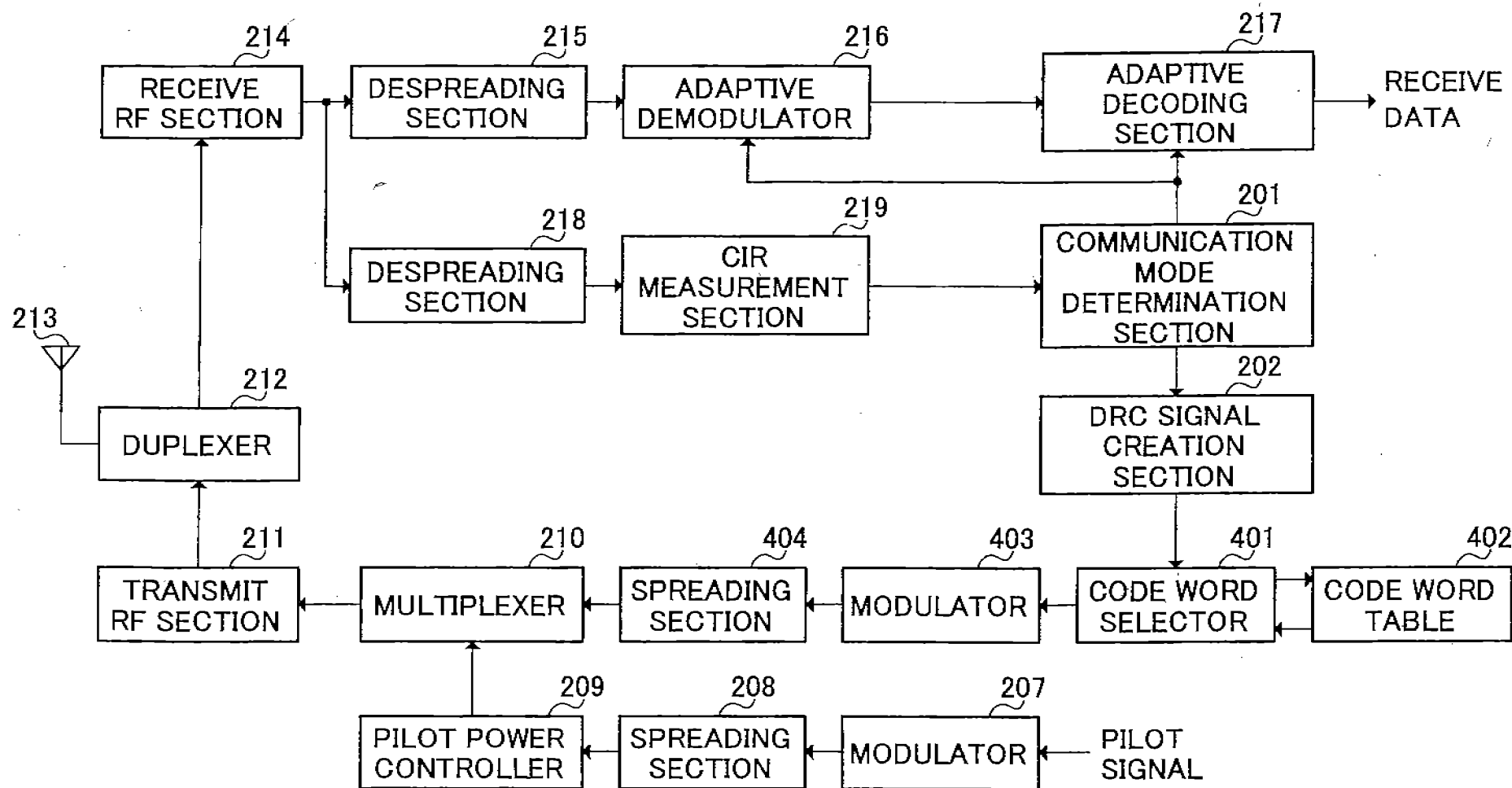


FIG.5

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FIG.6

10/069605

APPROVED O.G. FIG.  
BY [signature]  
DATE 10/08/05

10/089605

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DRC NUMBER	CODE WORD	CODE WORD MINIMUM DISTANCE
1	000000000	1
2	000000001	1
3	000000110	2
4	000111000	3
5	111111111	6

FIG.7

10089605-040102

201040\* 5096800T

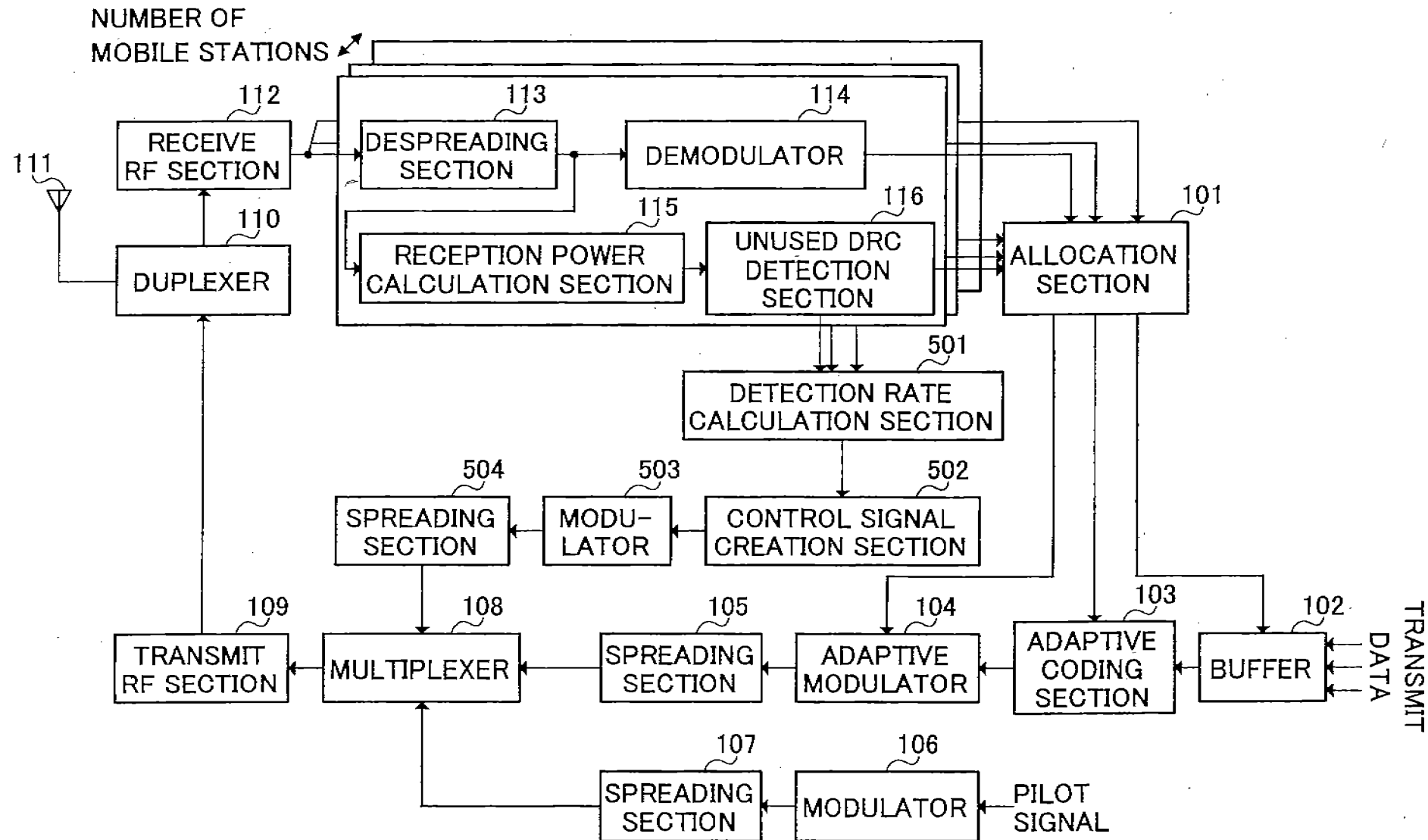
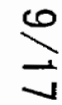


FIG.8

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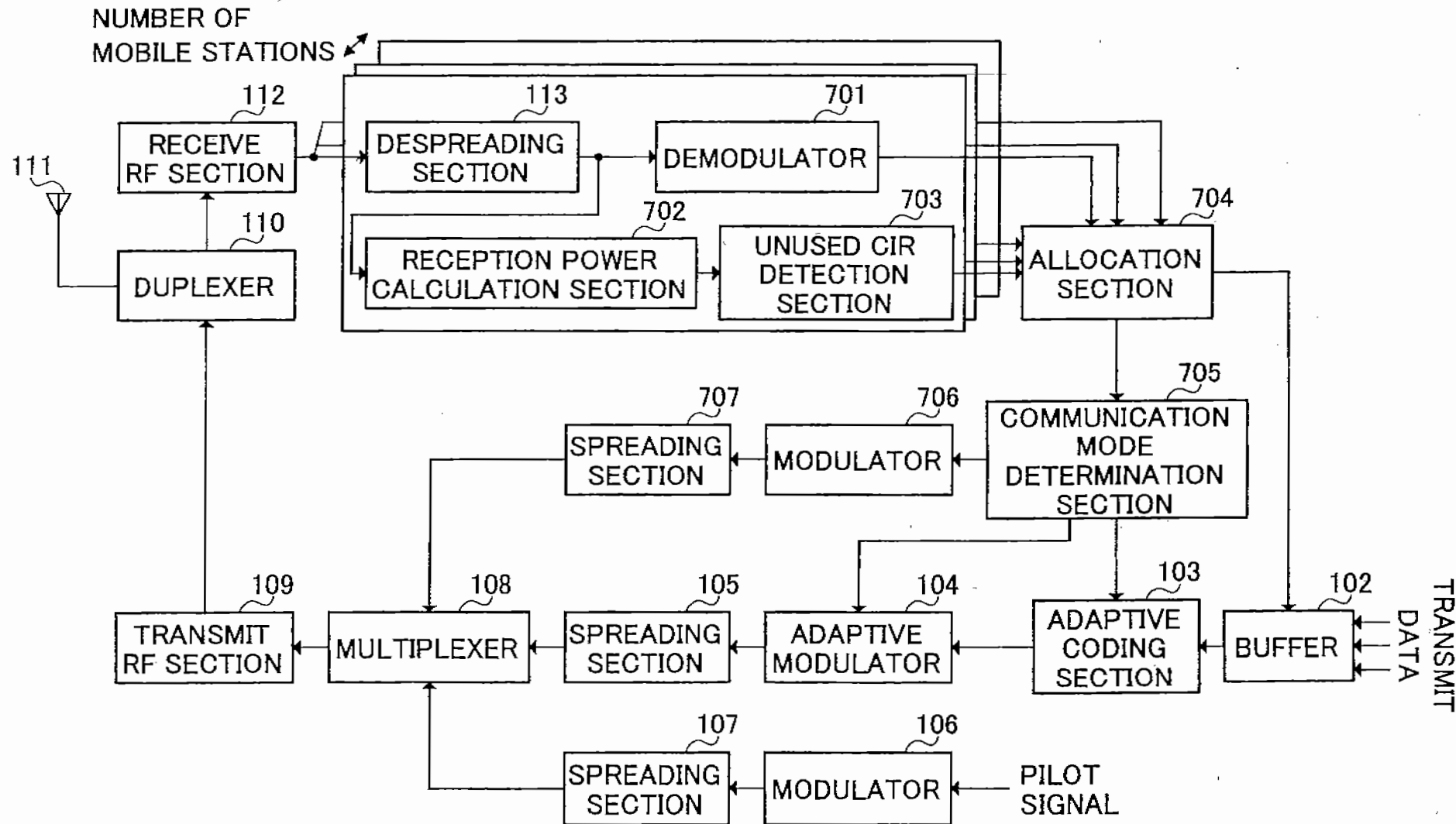


FIG.10



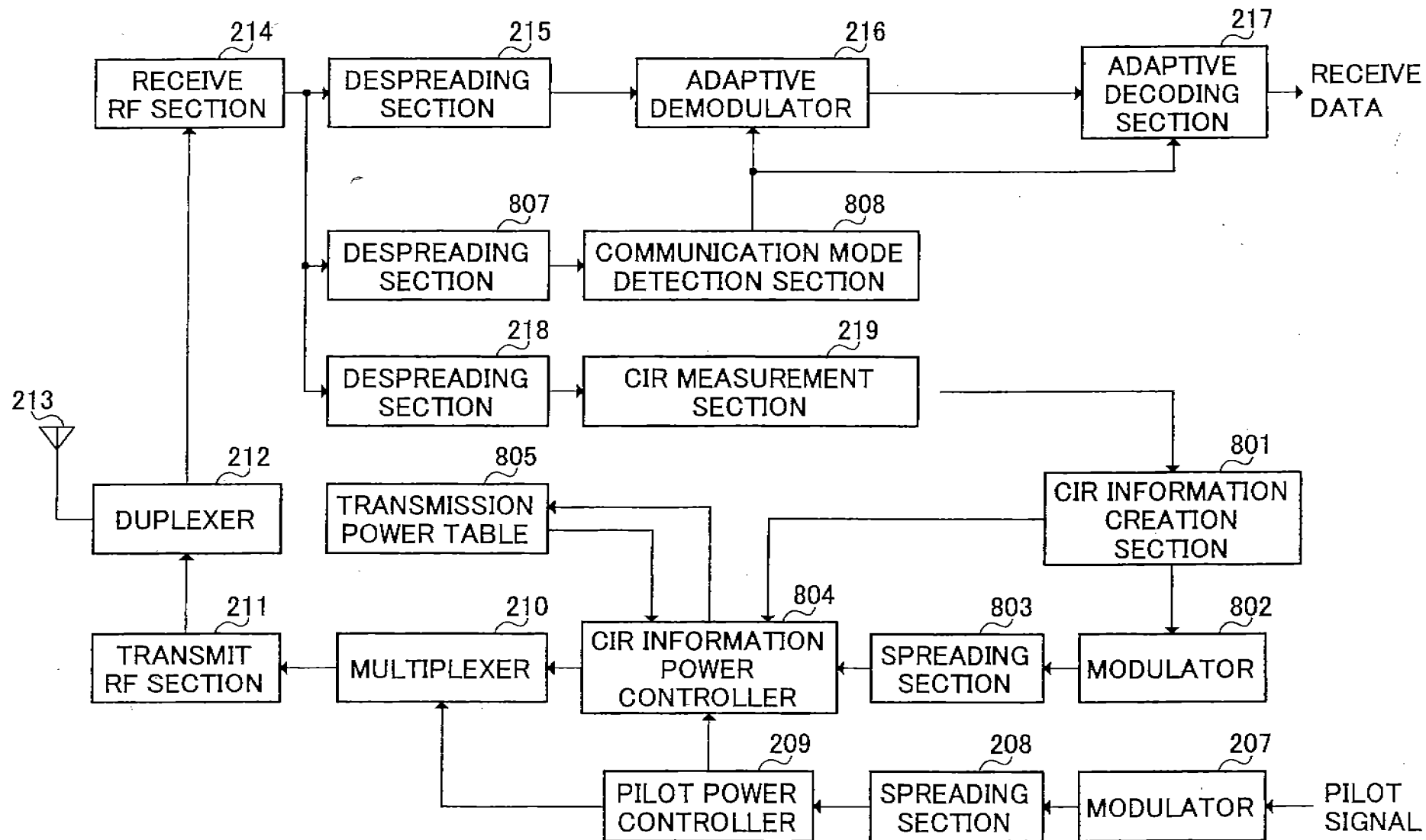


FIG.11

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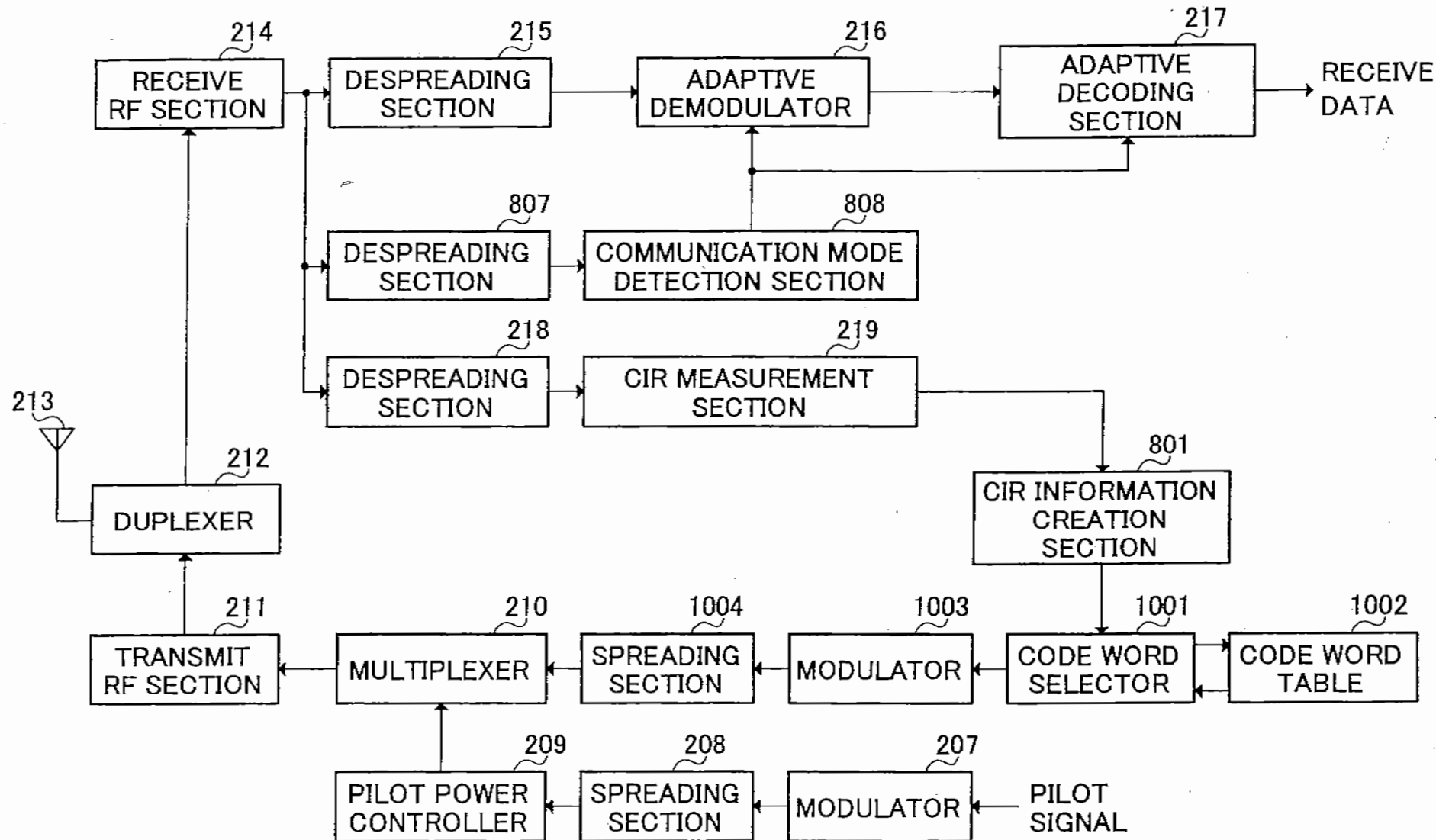
10/089605

CONFIDENTIAL



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201040-5096800F



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FIG.13

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201040-5096800T

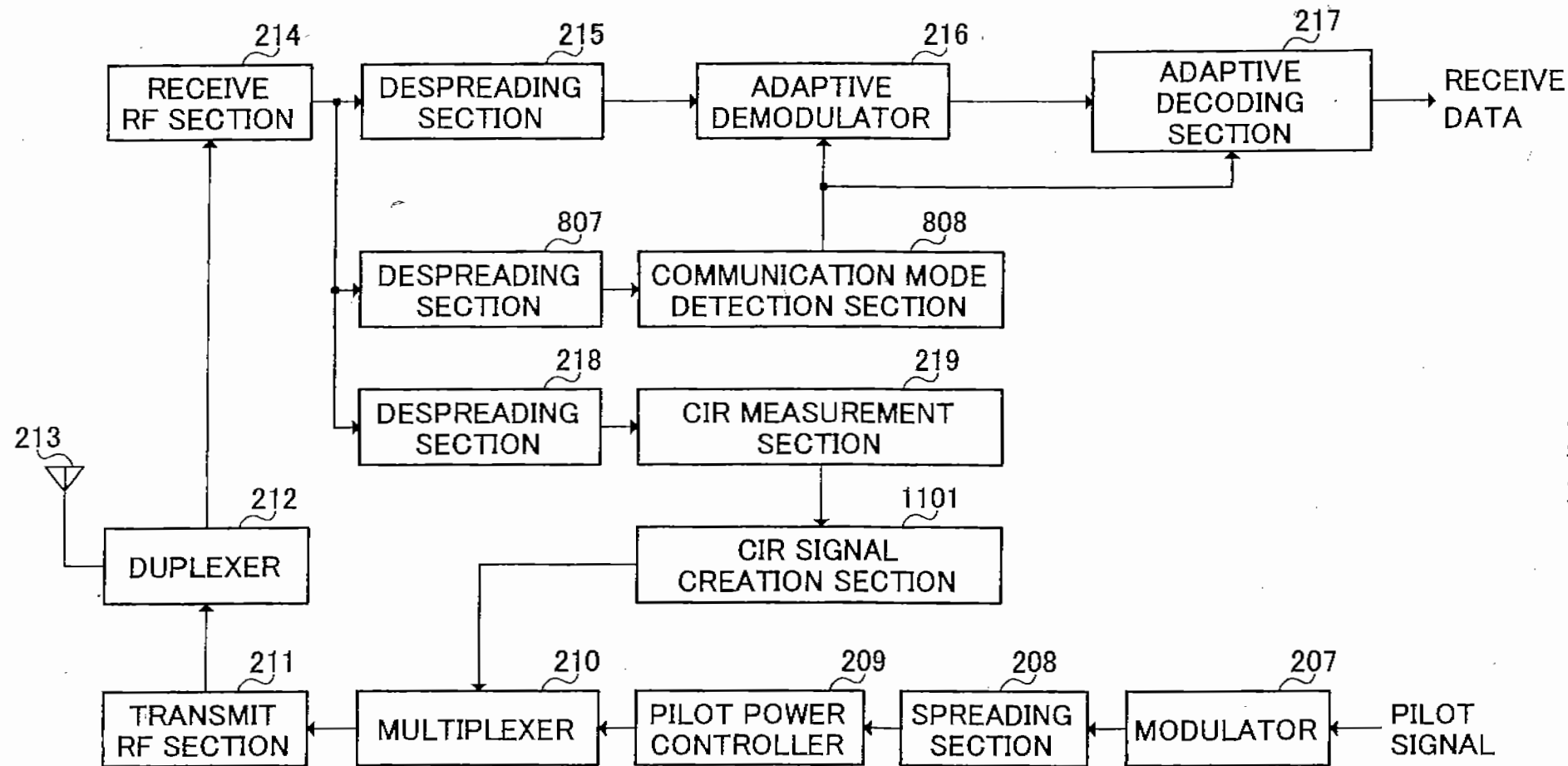


FIG.14

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201040-5096800T

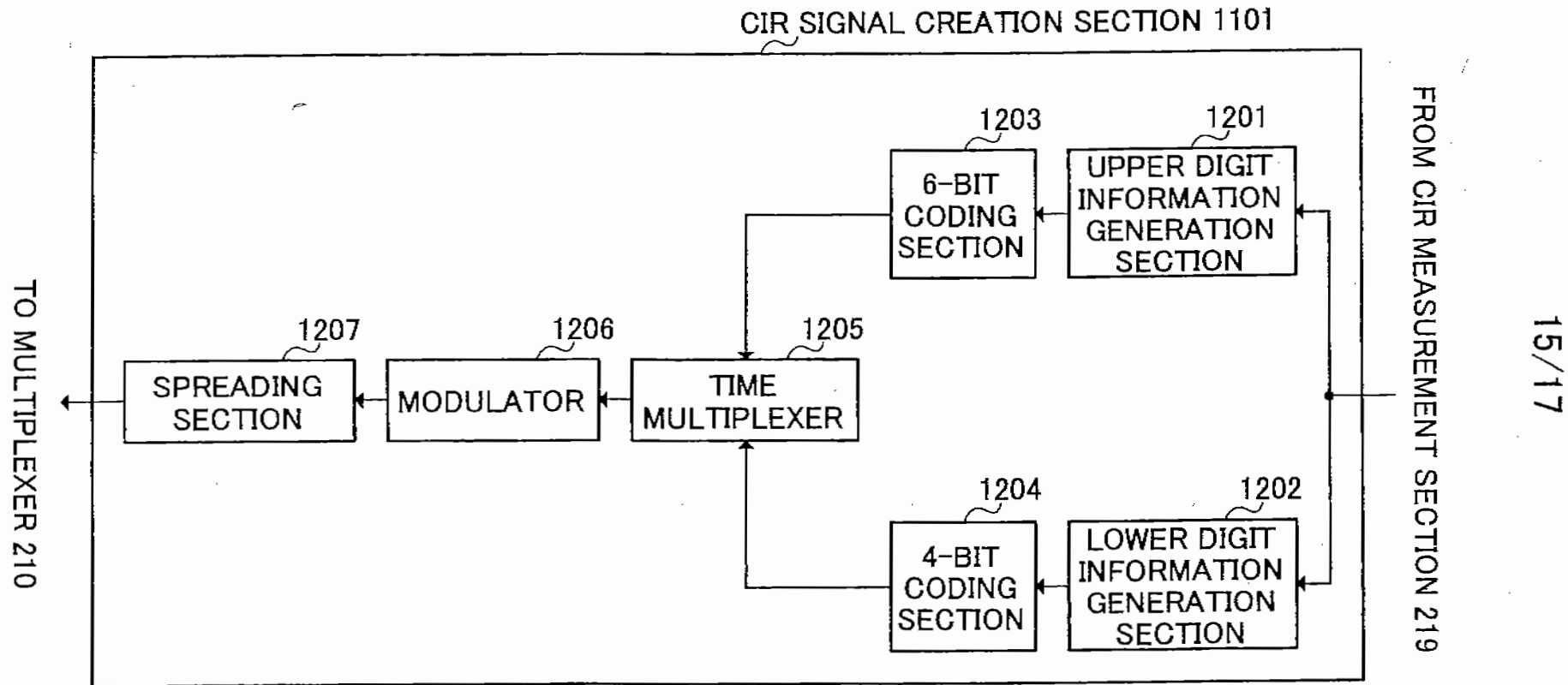


FIG.15

201040-5096800T

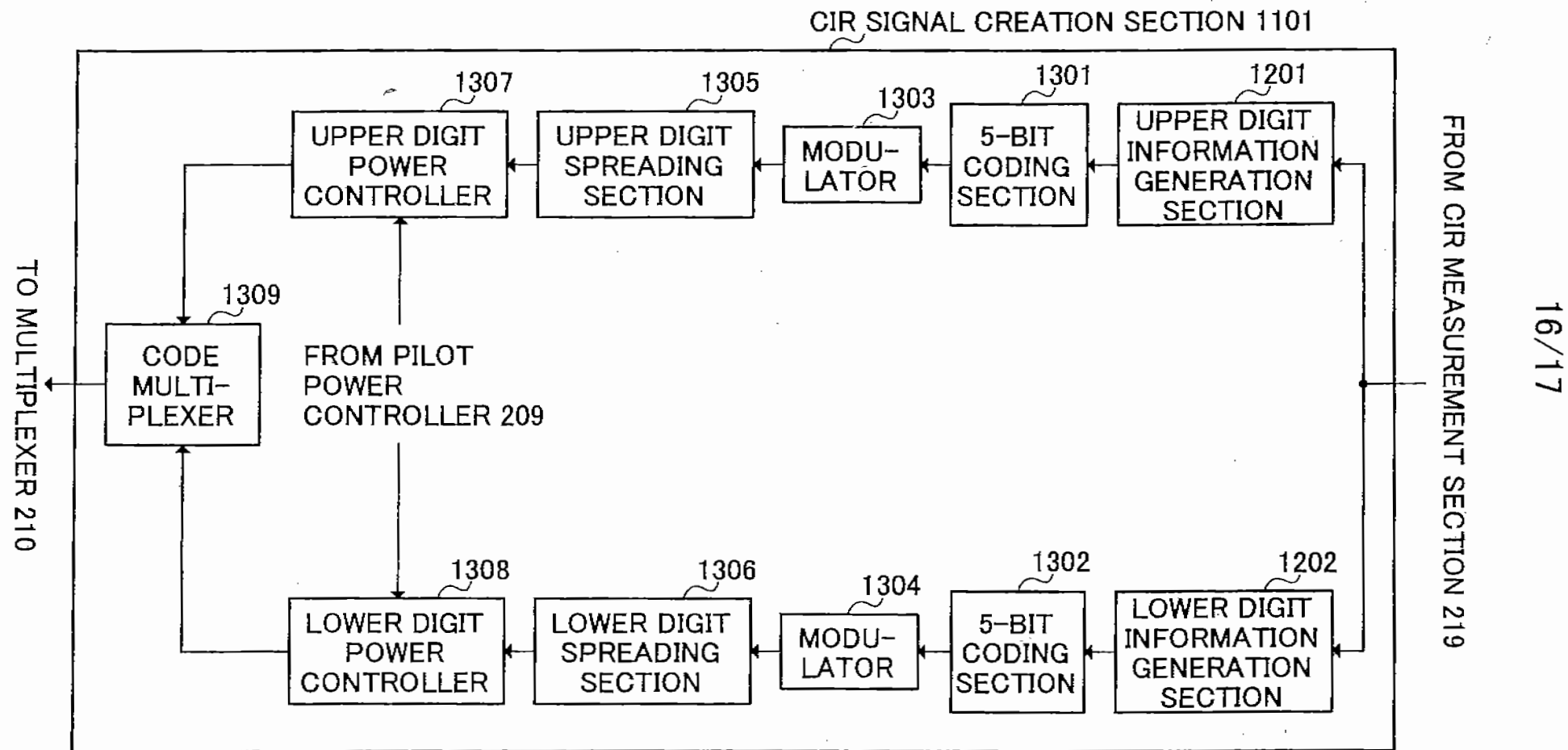


FIG.16

10/089605

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201040-5096800T

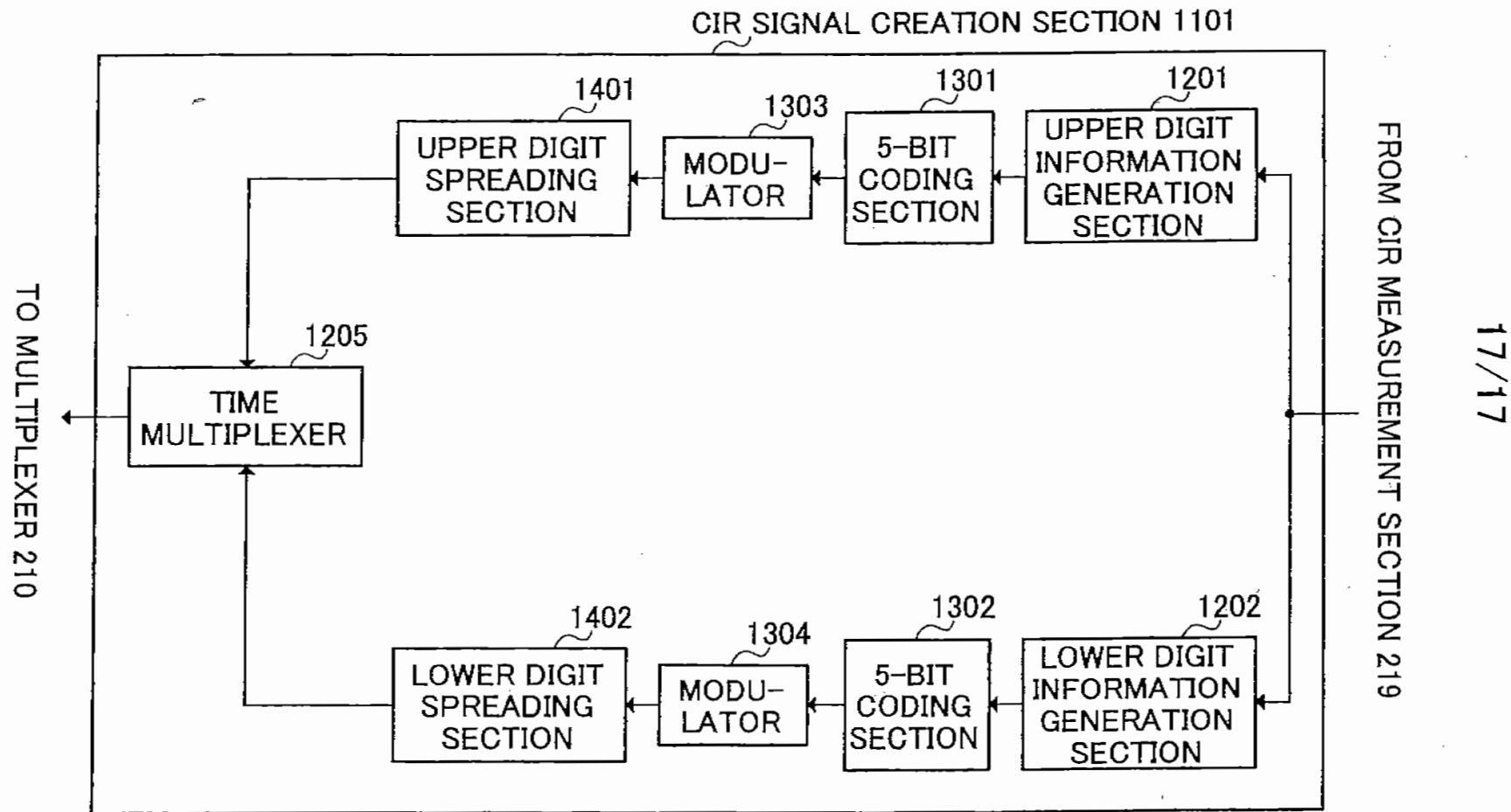
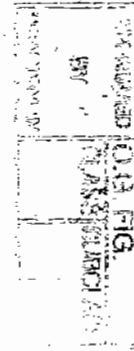


FIG.17

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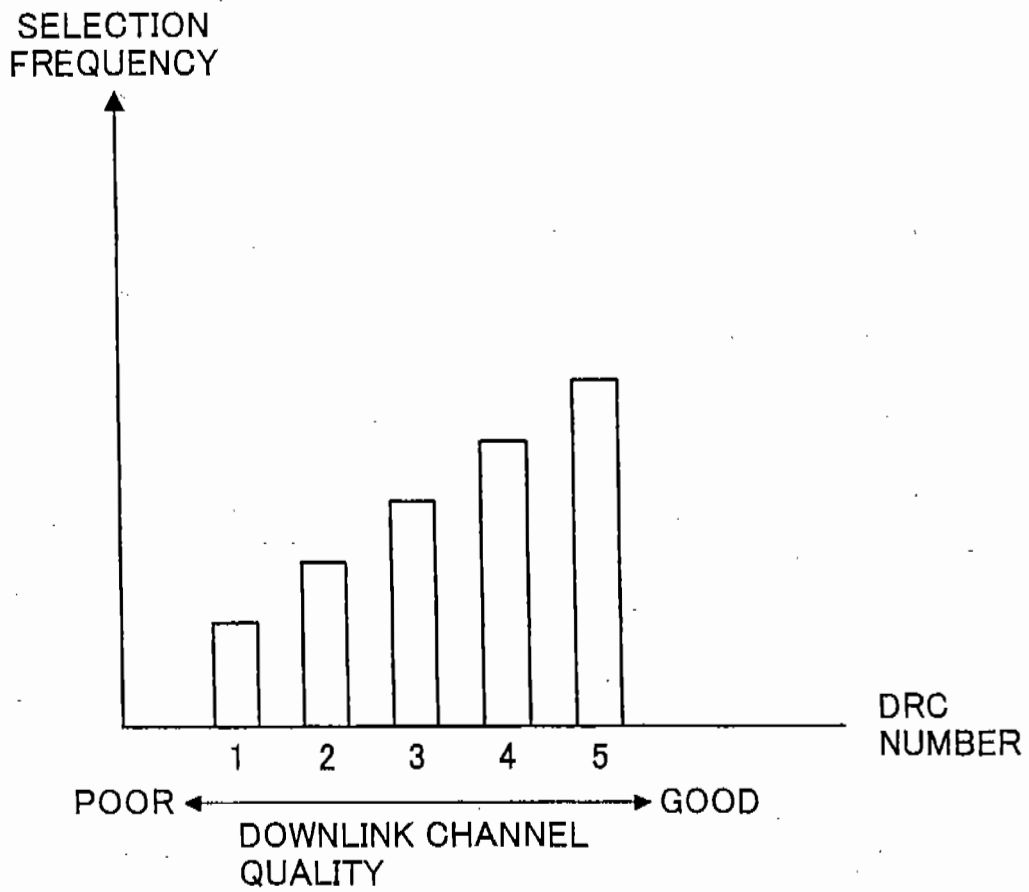


FIG.1

10089605-040102



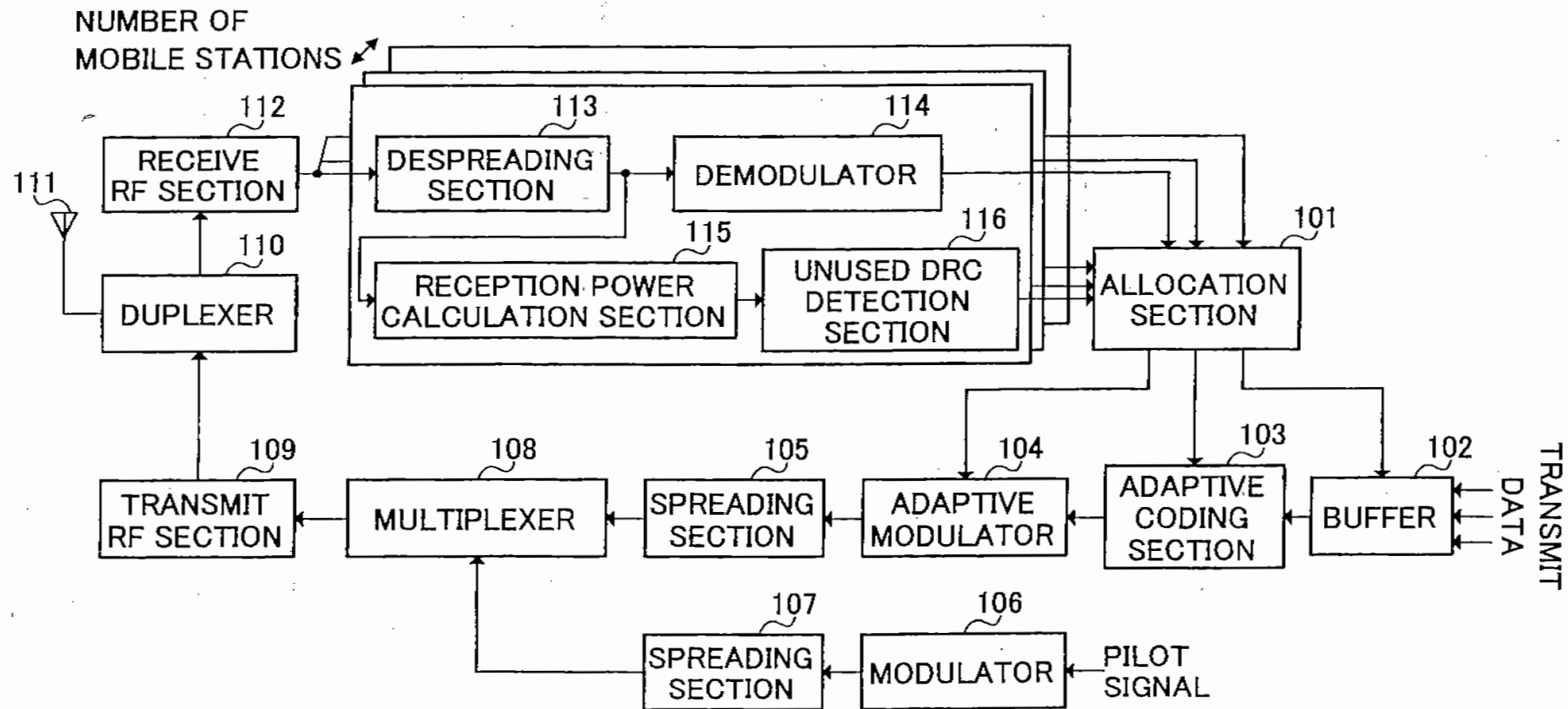
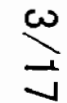


FIG.2

PRINT OF DRAWING ;  
AS ORIGINALLY FILED



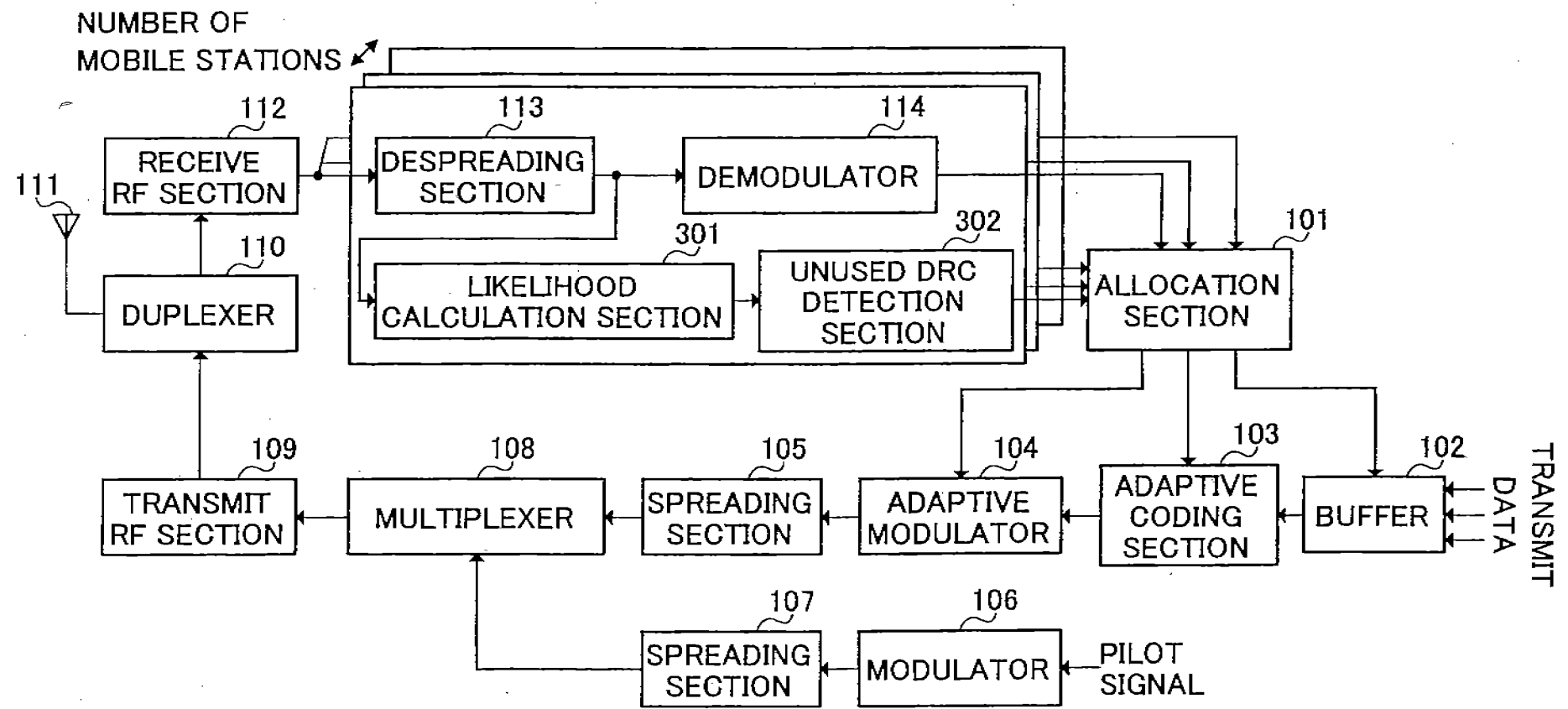
10000

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DRC NUMBER	TRANSMISSION POWER (RATIO TO PILOT SIGNAL TRANSMISSION POWER)
1	-2dB
2	-1dB
3	0dB
4	+1dB
5	+2dB

FIG.4

10089605-040102



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FIG.5

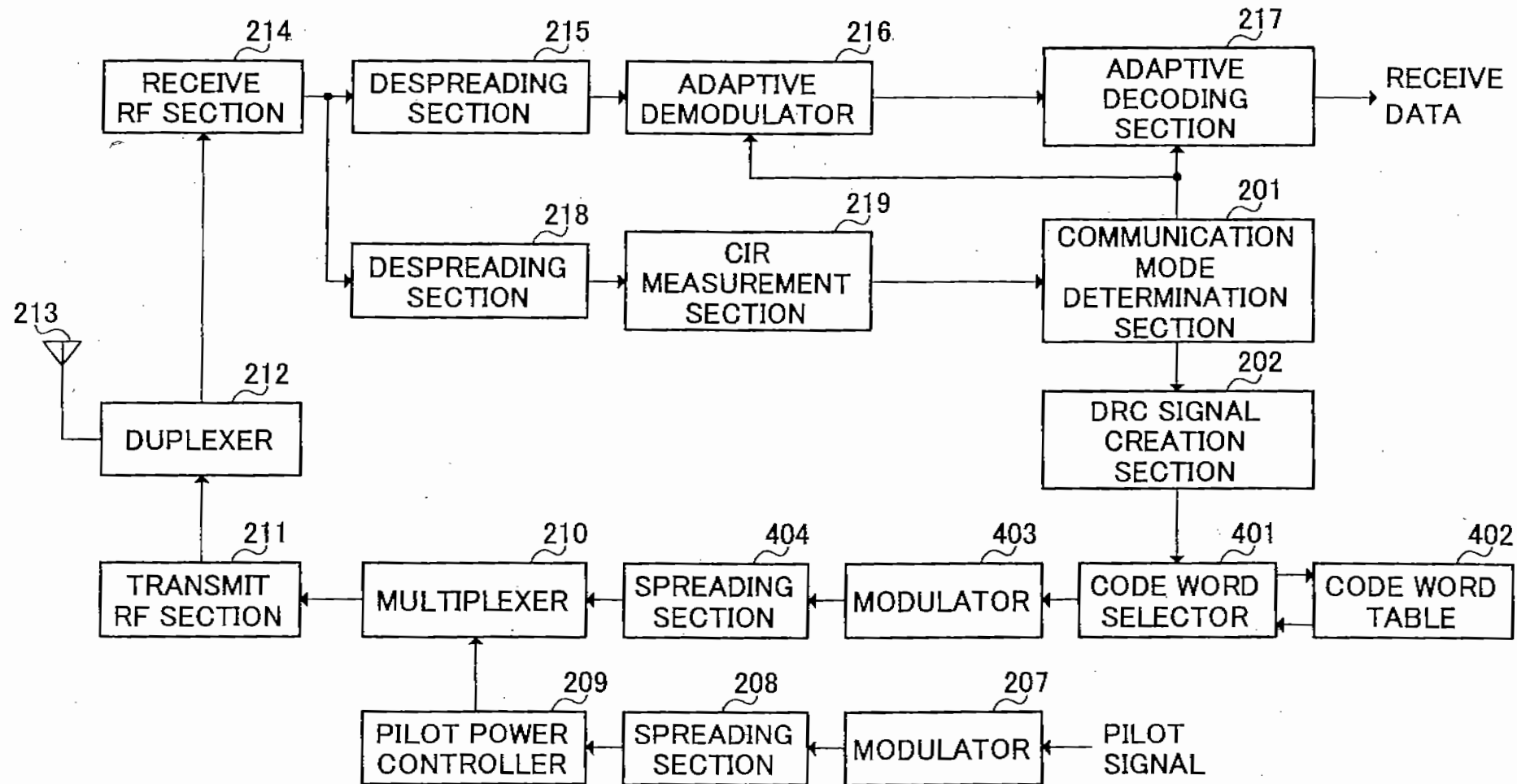


FIG.6

10/004805

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DRC NUMBER	CODE WORD	CODE WORD MINIMUM DISTANCE
1	000000000	1
2	000000001	1
3	000000110	2
4	000111000	3
5	111111111	6

FIG.7

10039605-040102

207040-5096800T

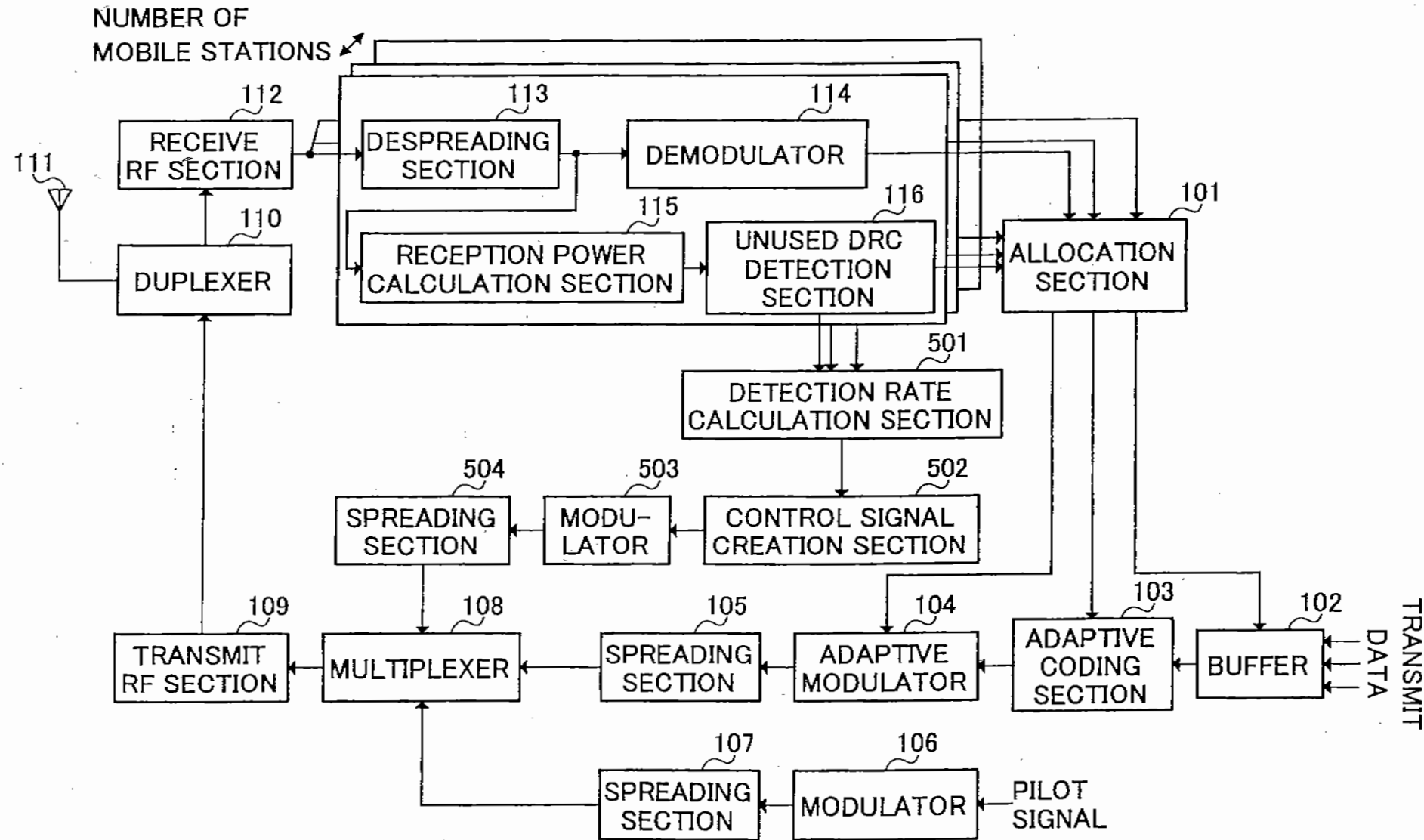


FIG.8

PRINT OF DRAWINGS  
AS ORIGINALLY FILED

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207040 5096800T

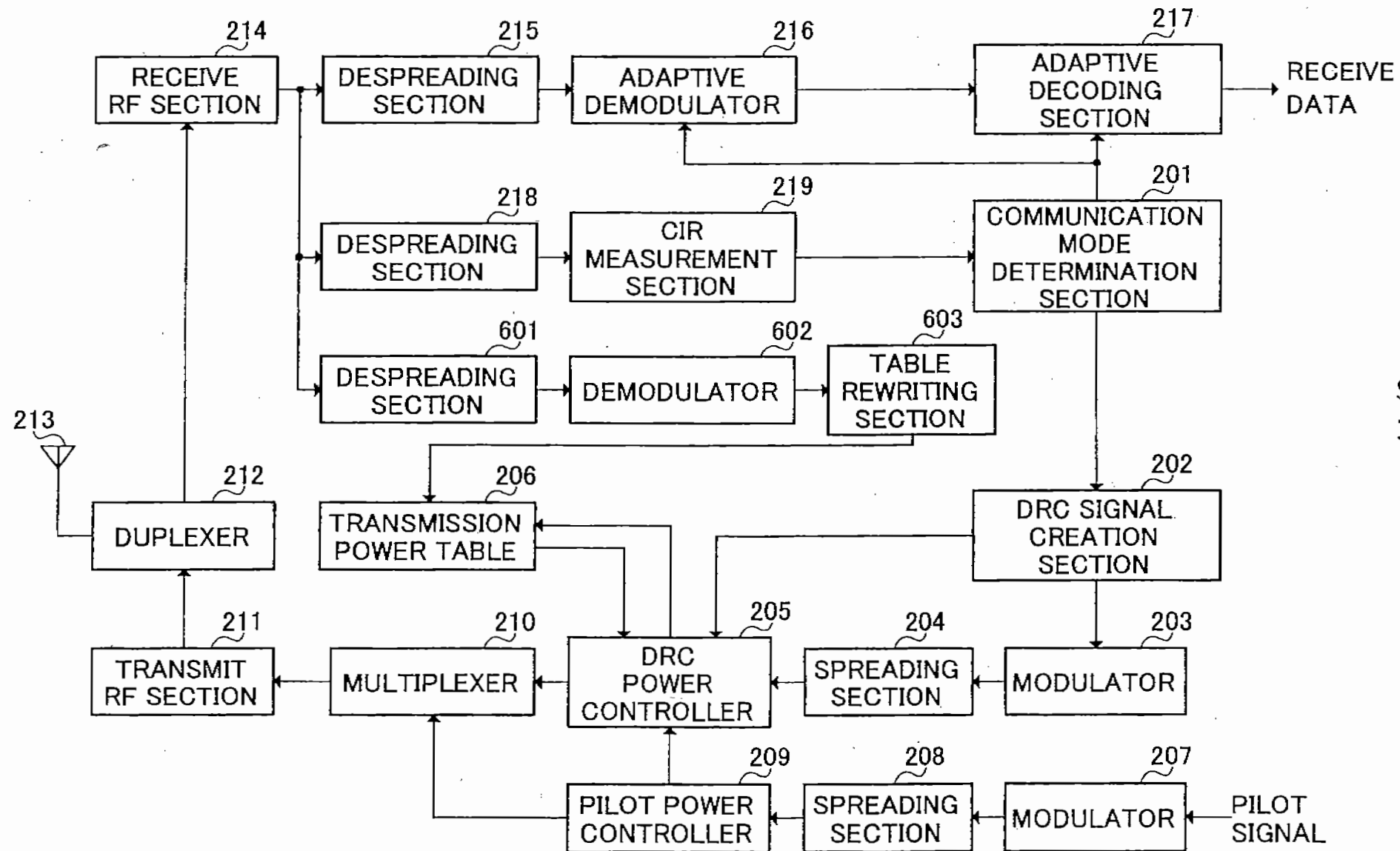
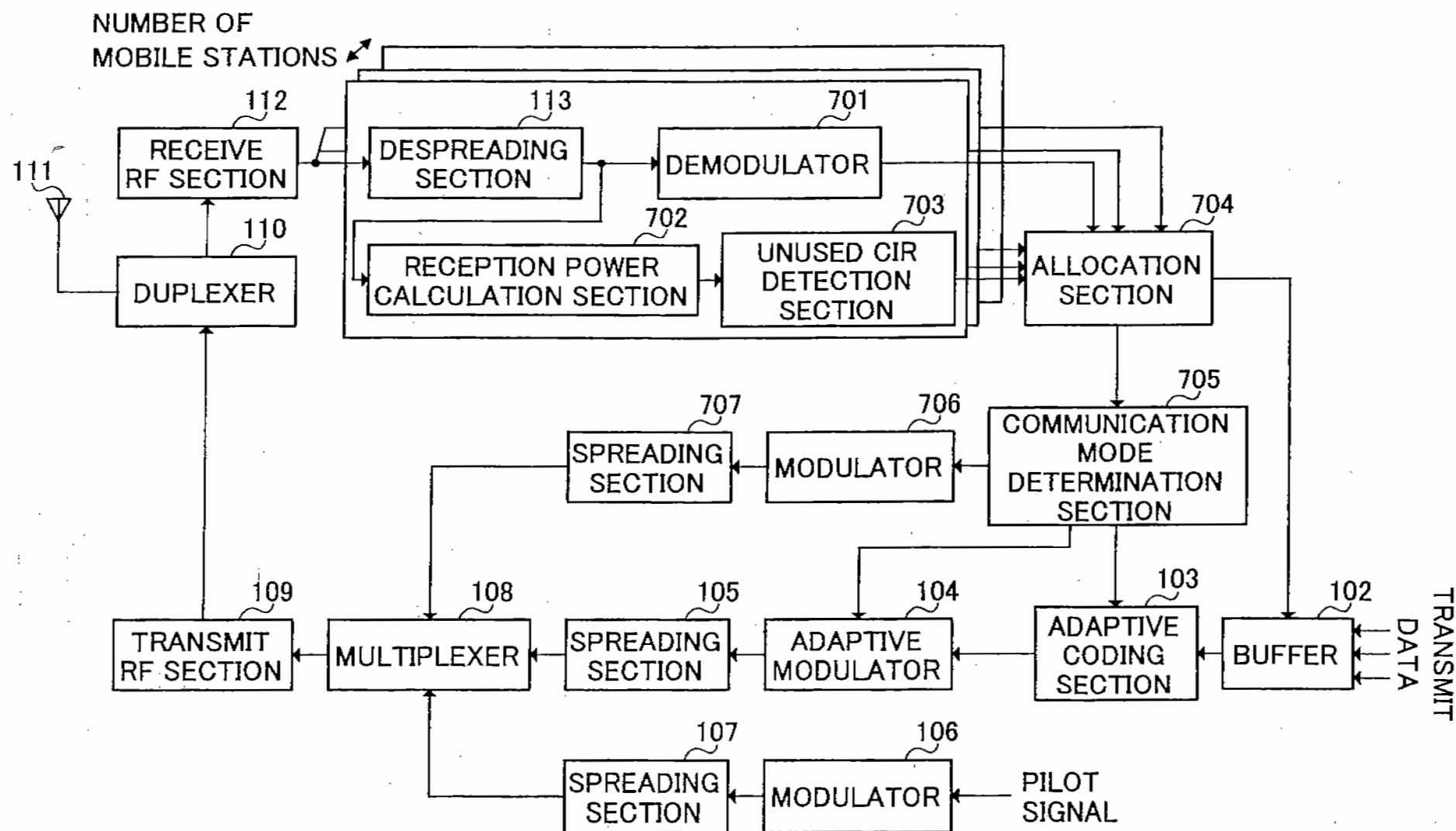


FIG.9





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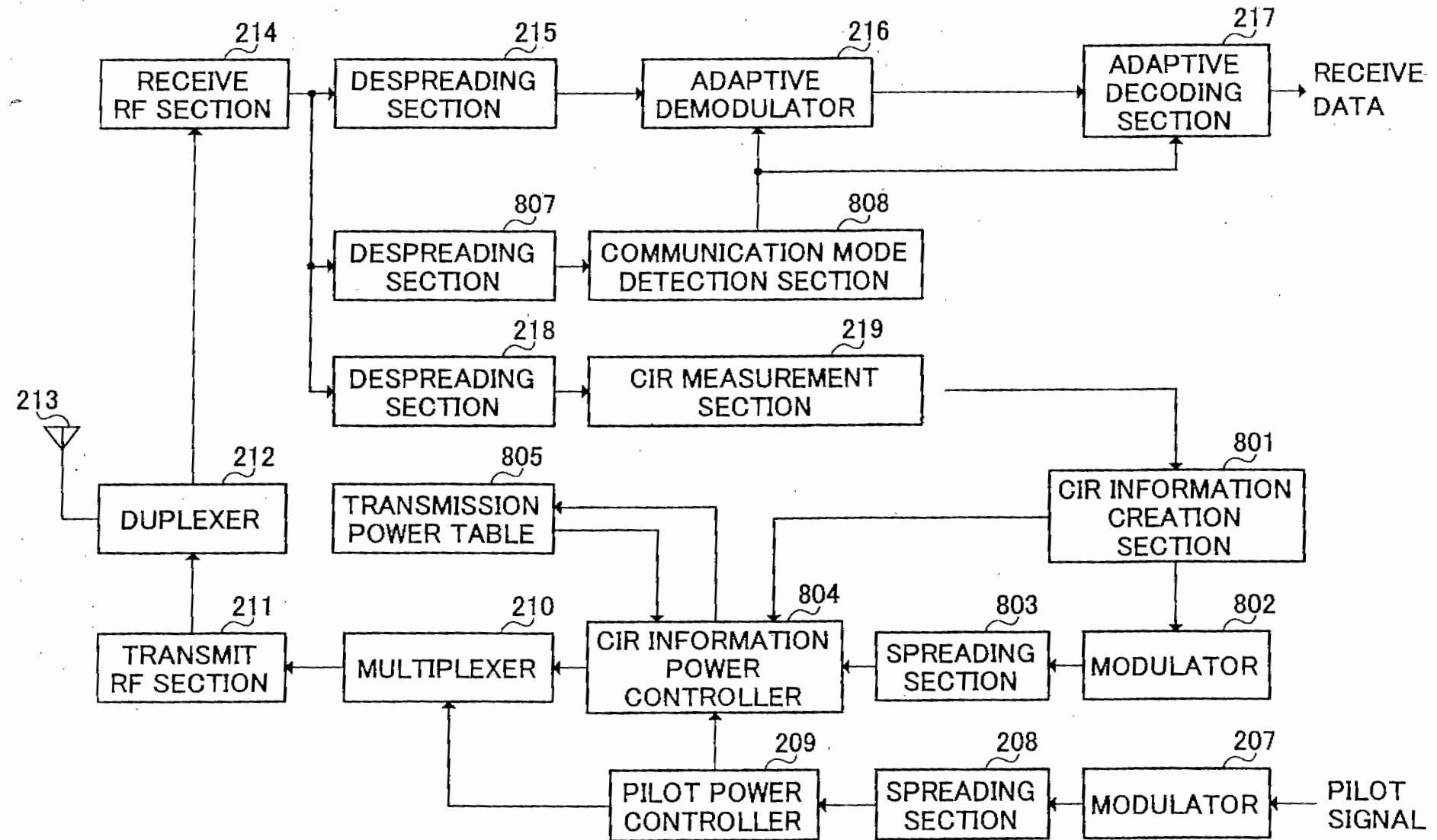


FIG.11



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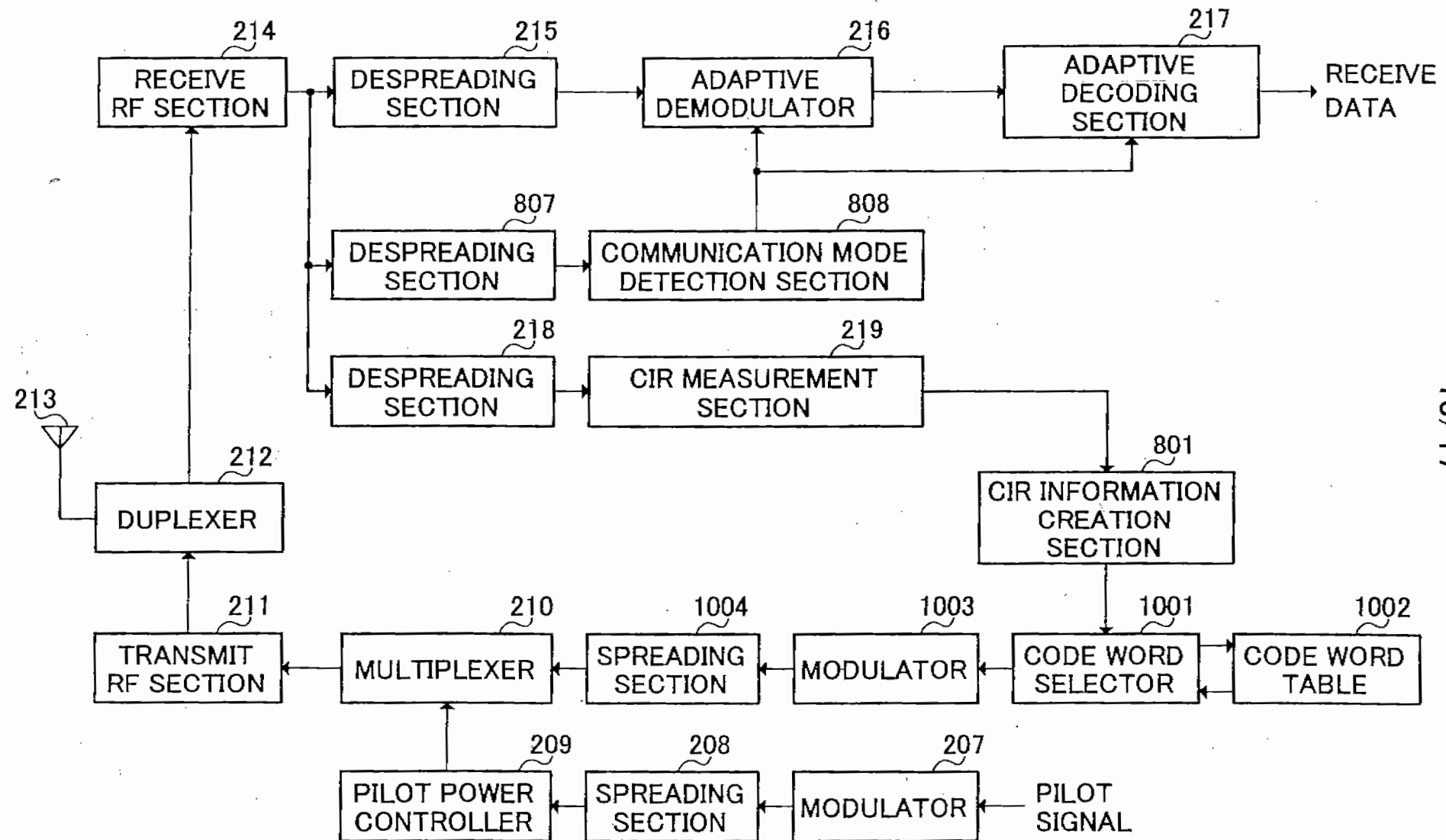


FIG.13

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PRINT OF DRAWINGS  
AS ORIGINALLY

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207040 50968007

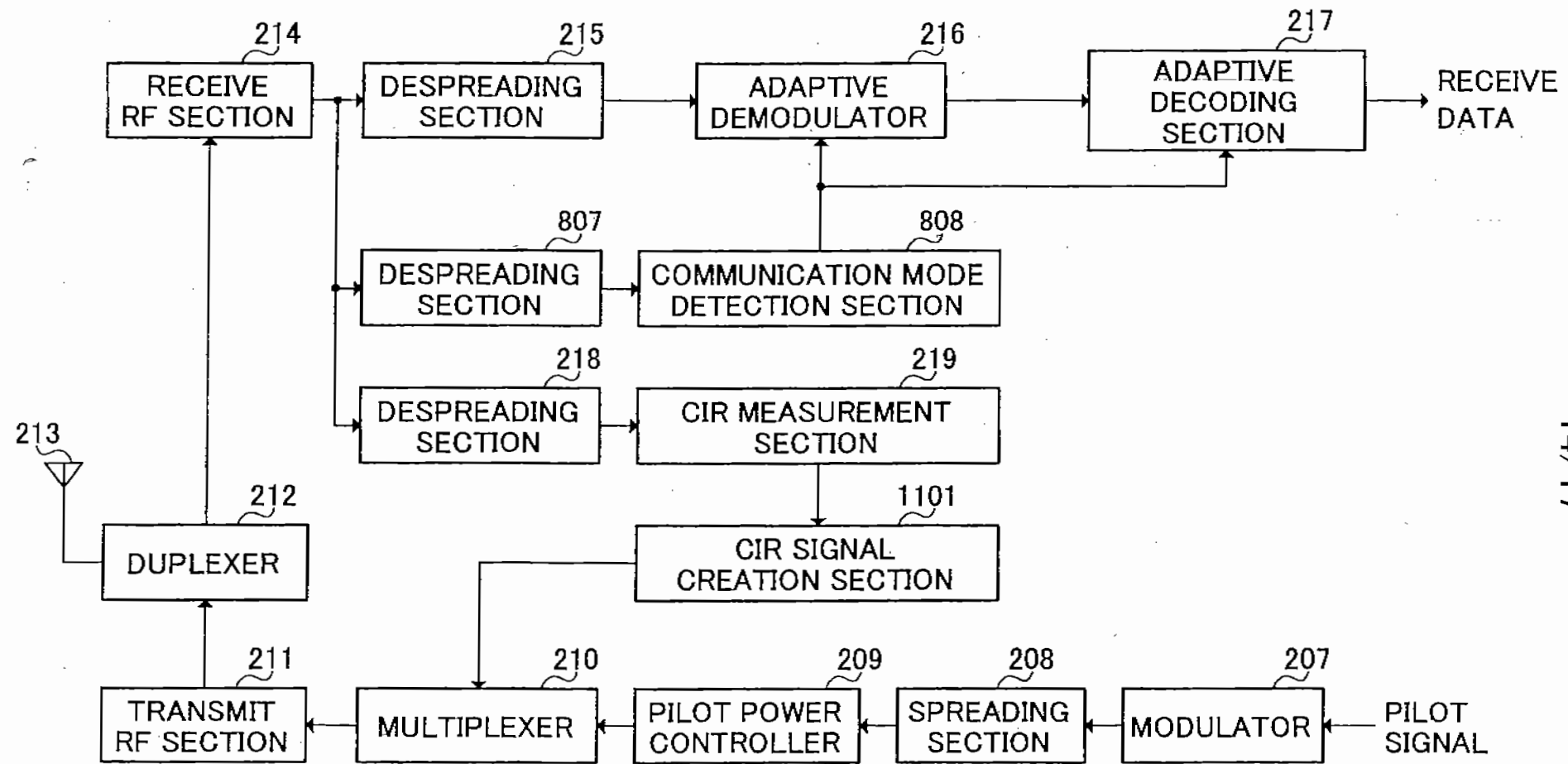


FIG.14

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AS ORIGINALLY  
ID

FROM CIR MEASUREMENT SECTION 219

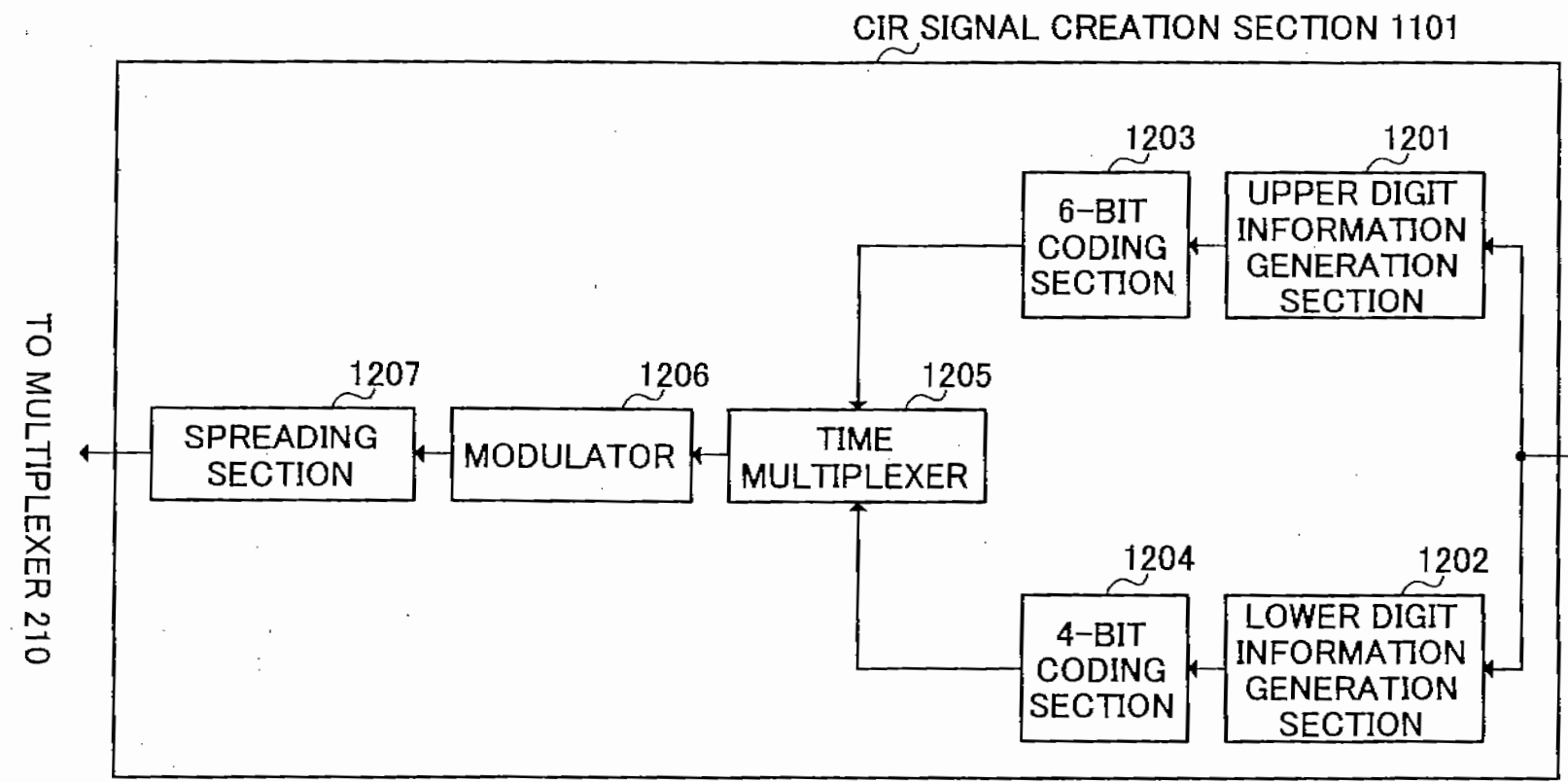
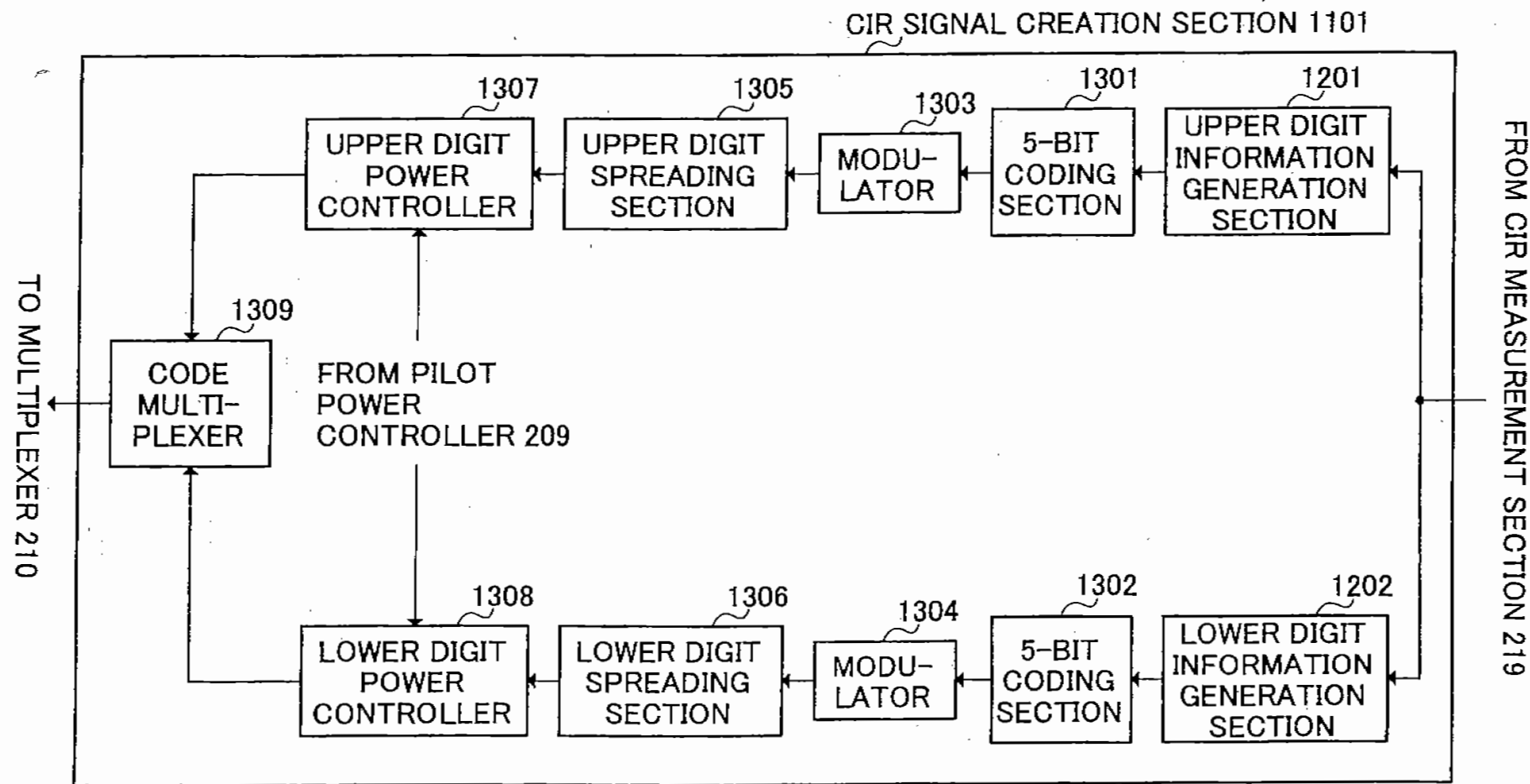


FIG.15

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AS ORIGINALLY  
TD



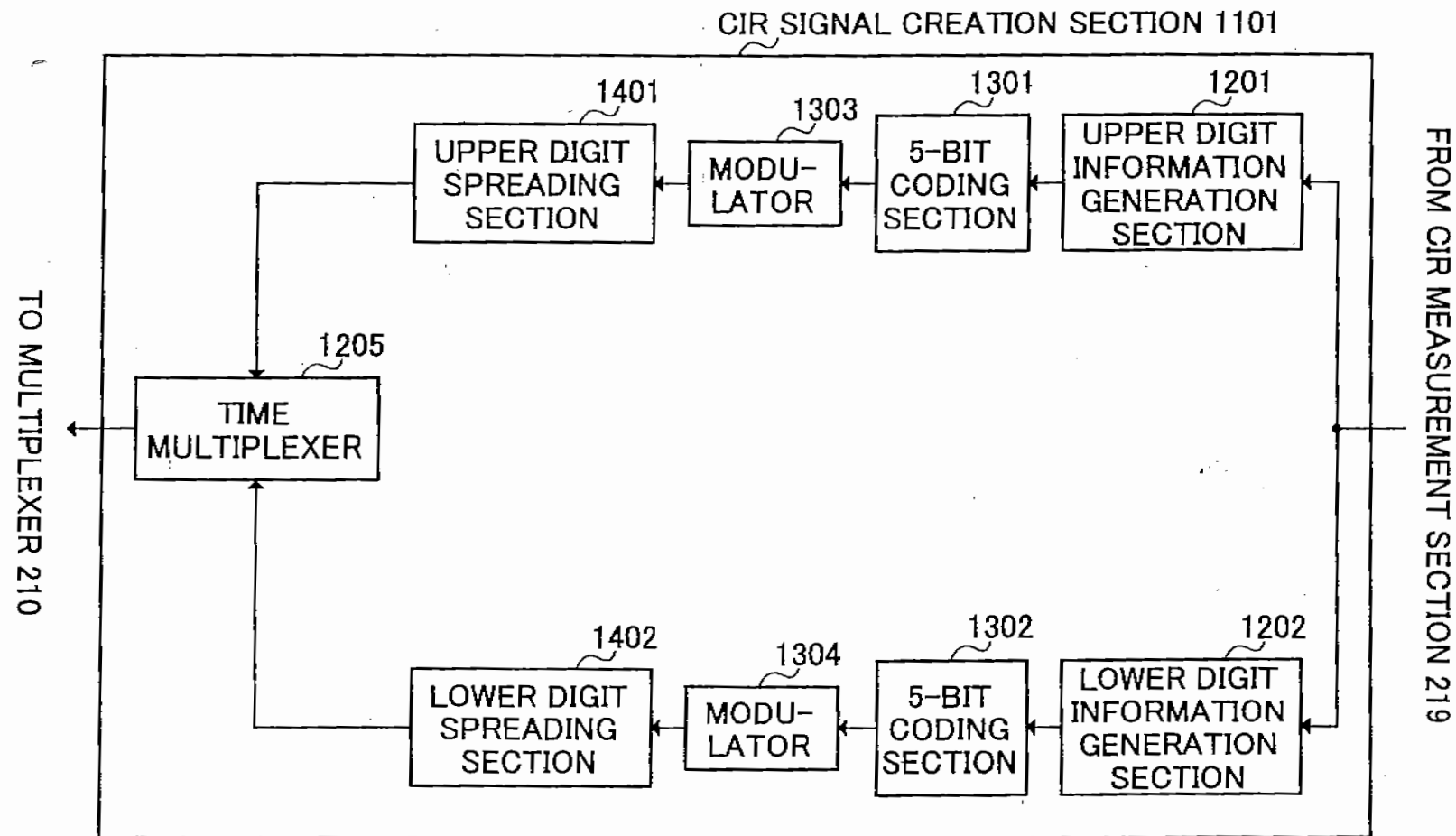
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FIG.16

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201040\* 5096800T

PRINT OF DRAWINGS  
AS ORIGINALLY  
FD



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FIG.17



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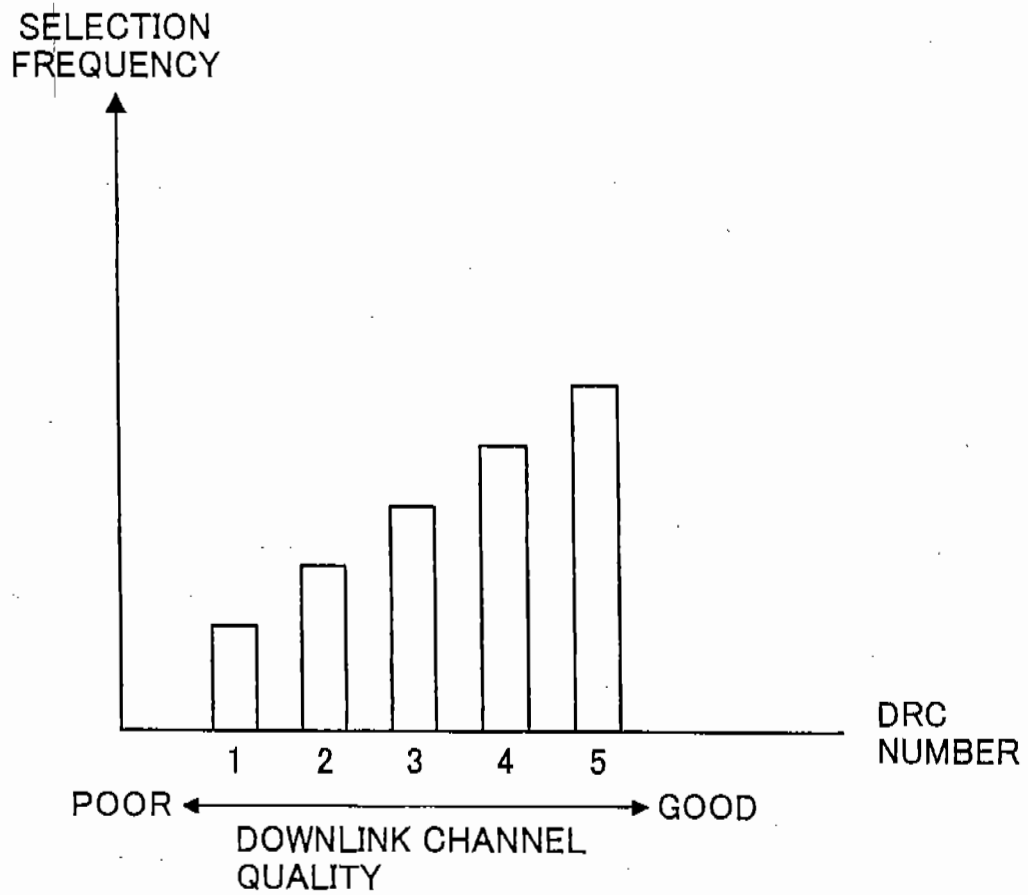
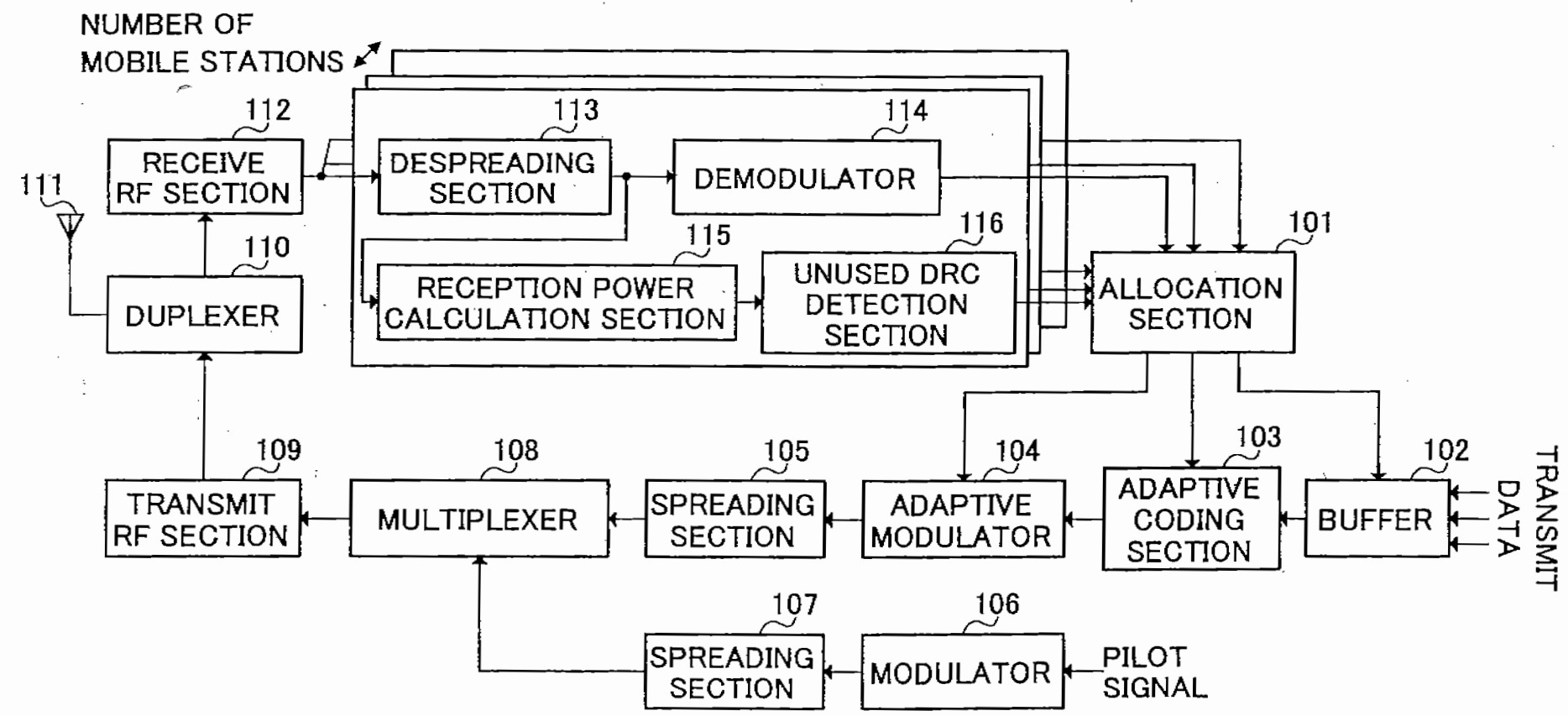


FIG.1

10089605-040102

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PRINT OF DRAWINGS  
AS ORIGINALLY



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FIG.2

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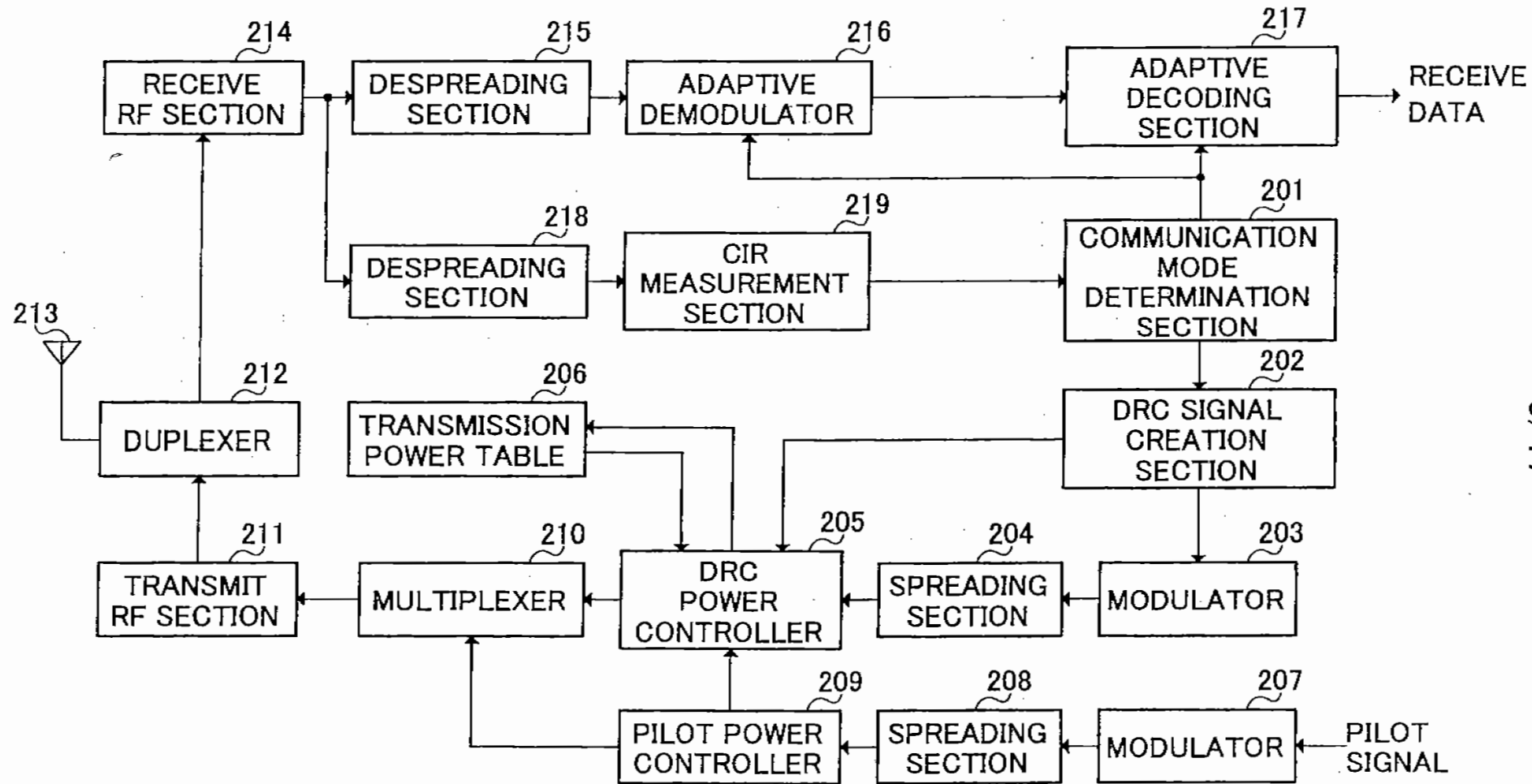


FIG.3

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DRC NUMBER	TRANSMISSION POWER (RATIO TO PILOT SIGNAL TRANSMISSION POWER)
1	-2dB
2	-1dB
3	0dB
4	+1dB
5	+2dB

FIG.4

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FIG.5

201040\* 5096800T

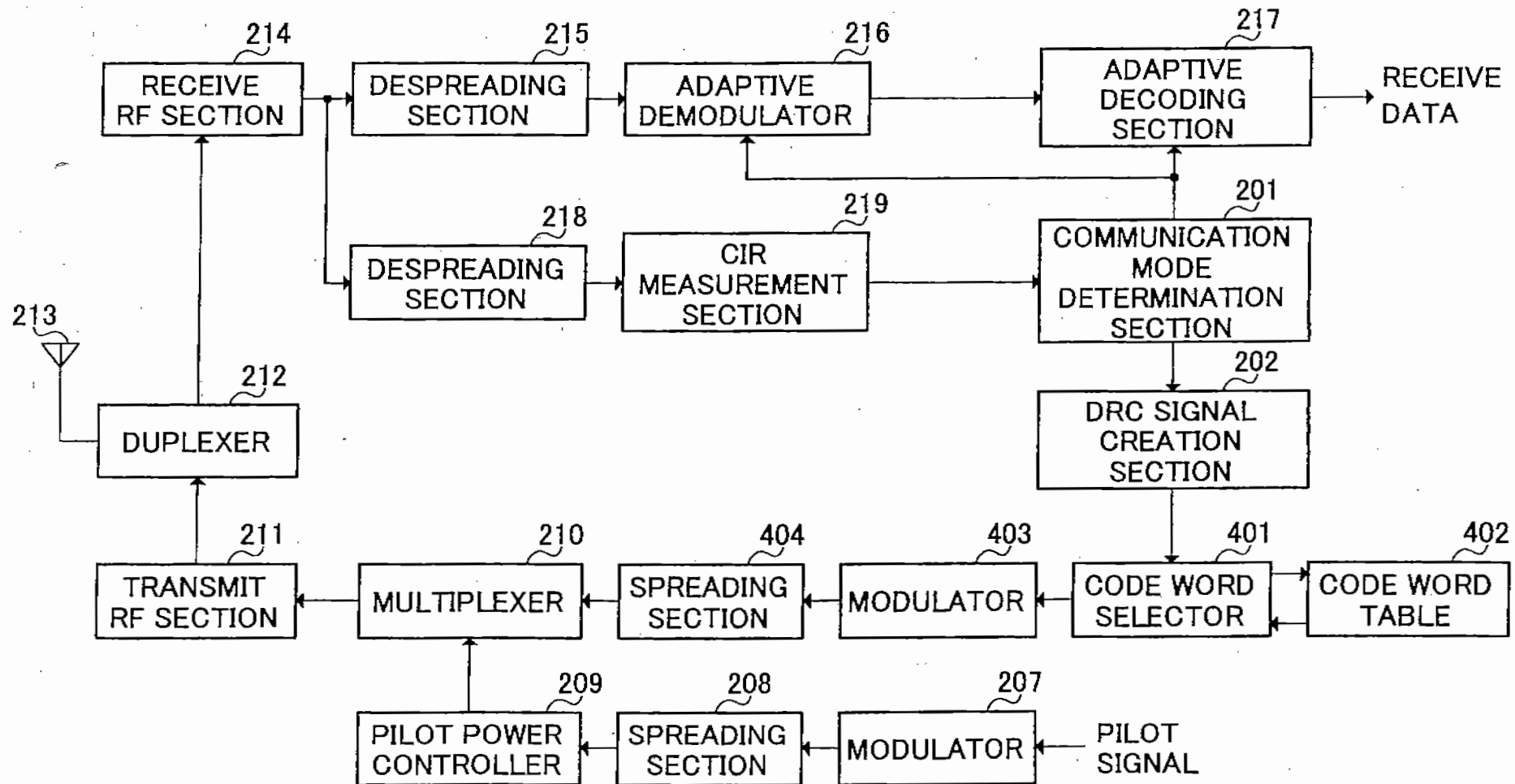


FIG.6

PRINT OF DRAWINGS  
AS ORIGINALLY  
ED

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10/08960

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DRC NUMBER	CODE WORD	CODE WORD MINIMUM DISTANCE
1	000000000	1
2	000000001	1
3	000000110	2
4	000111000	3
5	111111111	6

FIG.7

10089605-040102

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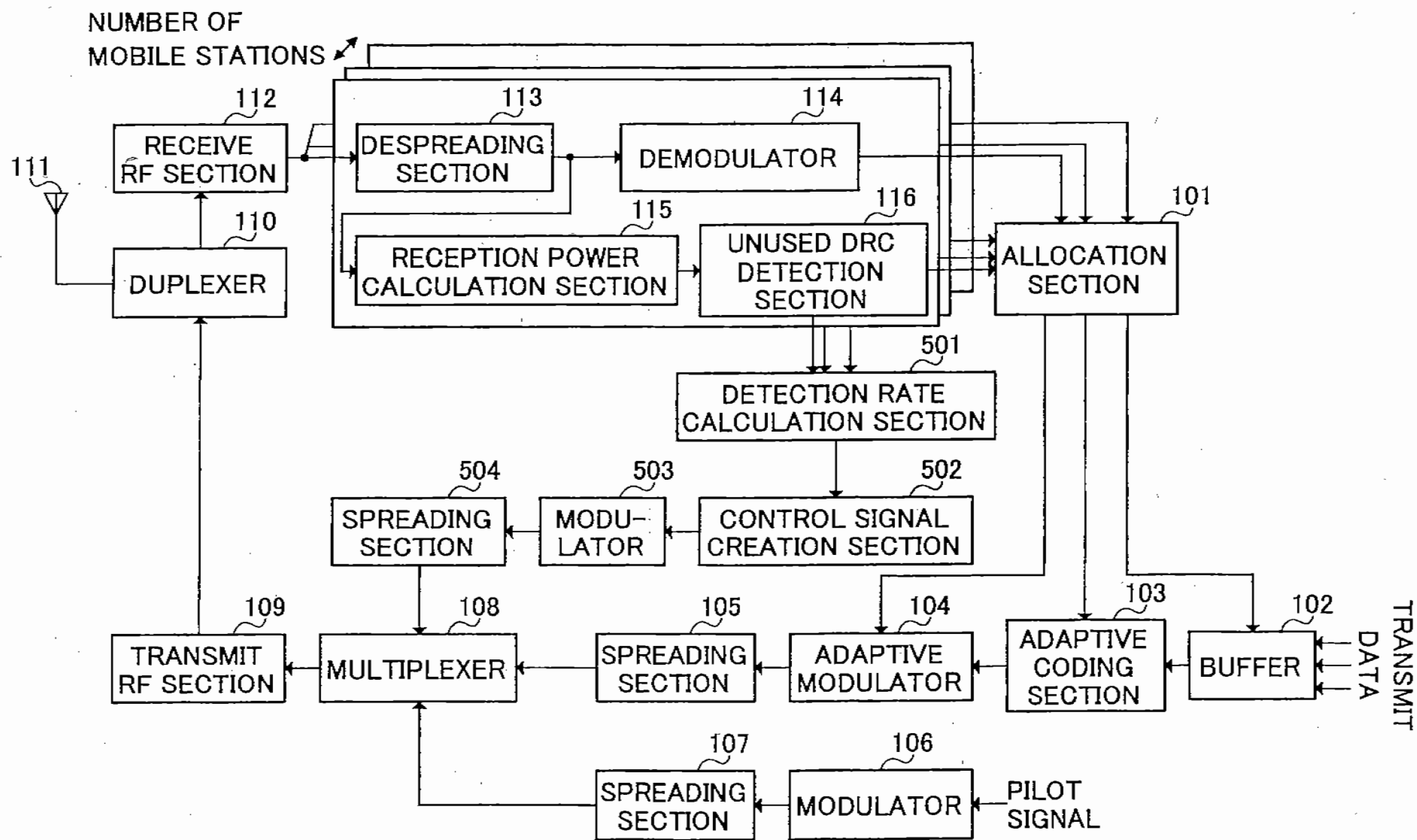


FIG.8



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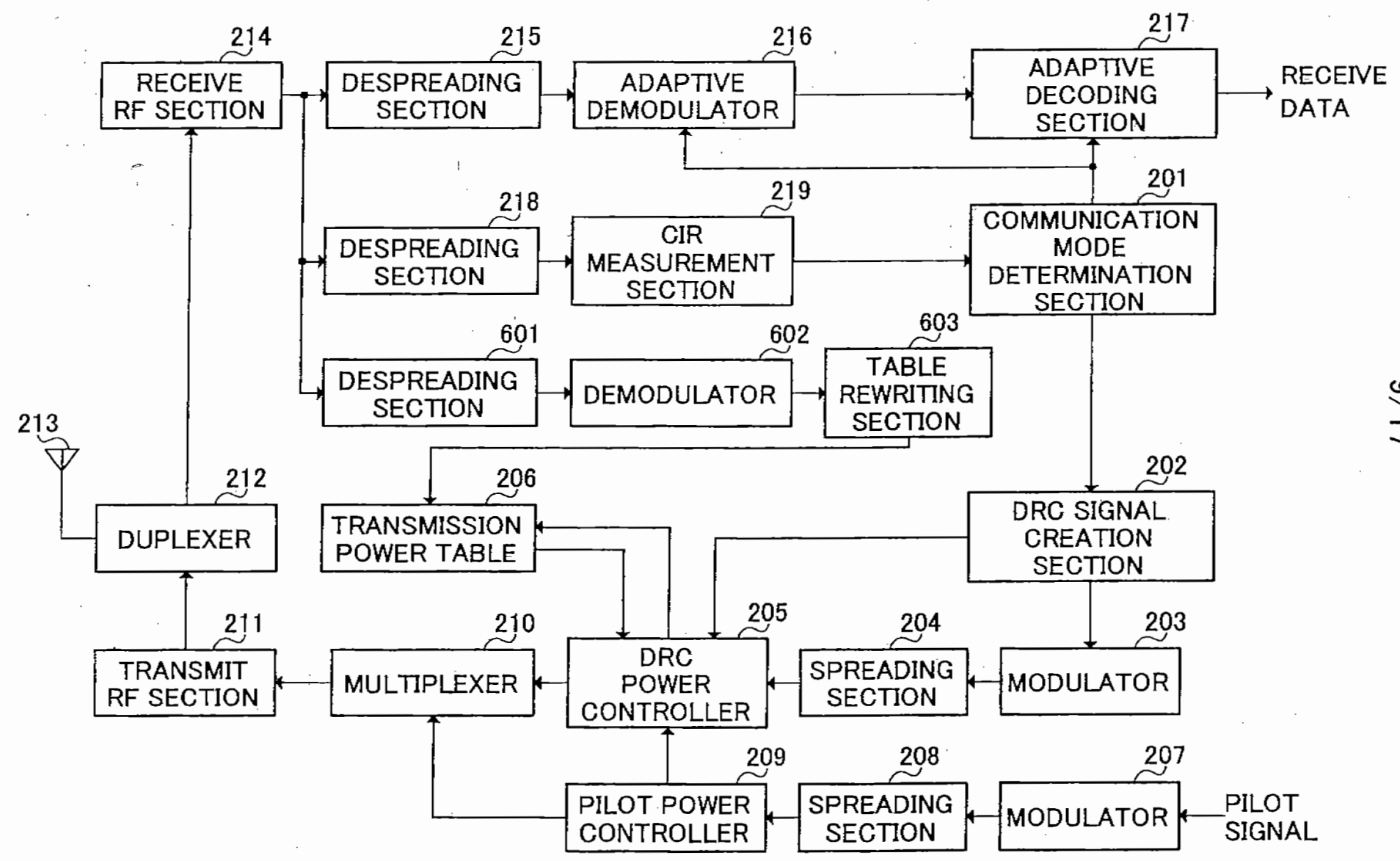


FIG.9

PRINT OF DRAWINGS  
AS ORIGINALLY  
FD

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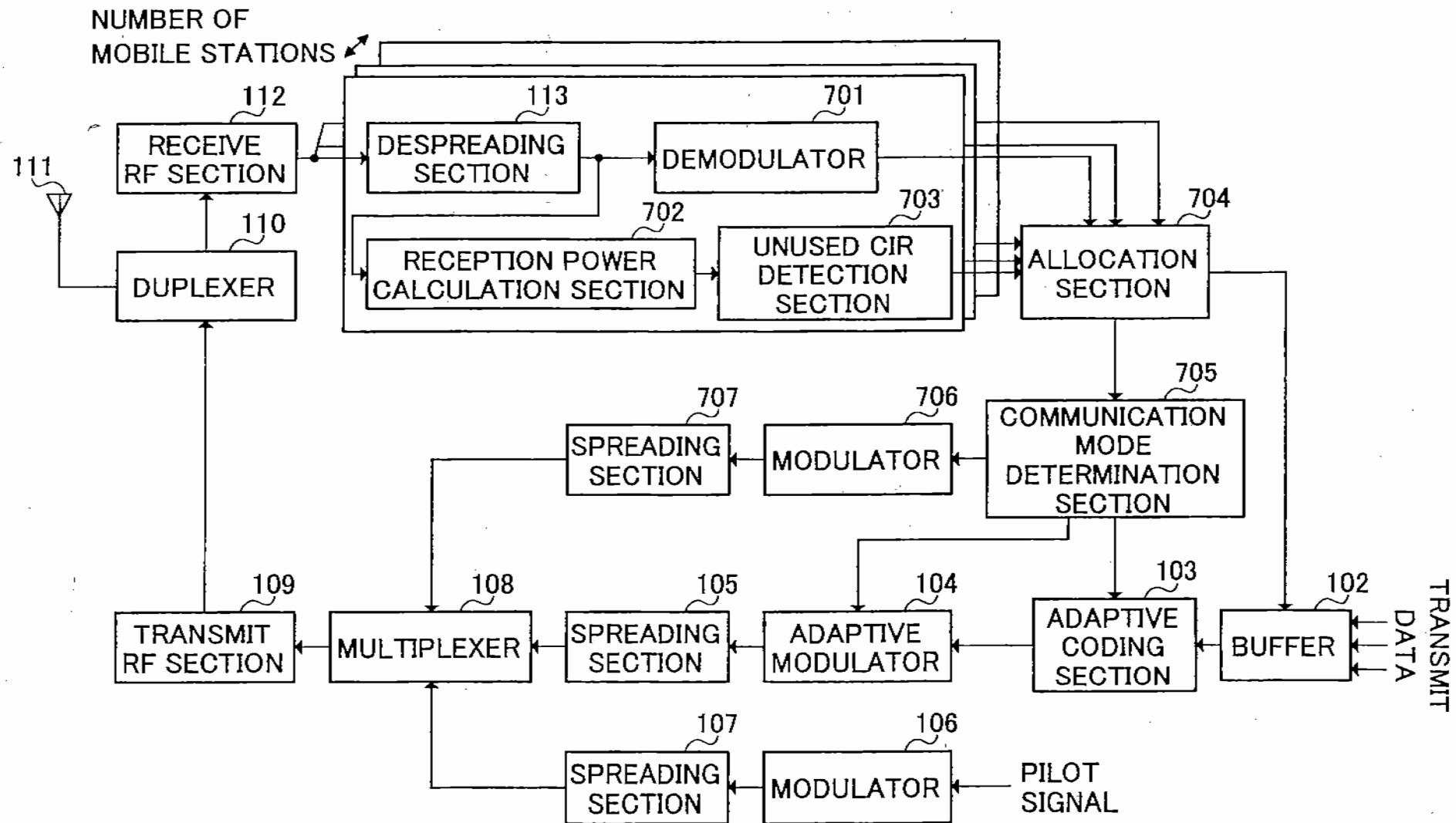


FIG.10

20101101 5096800T

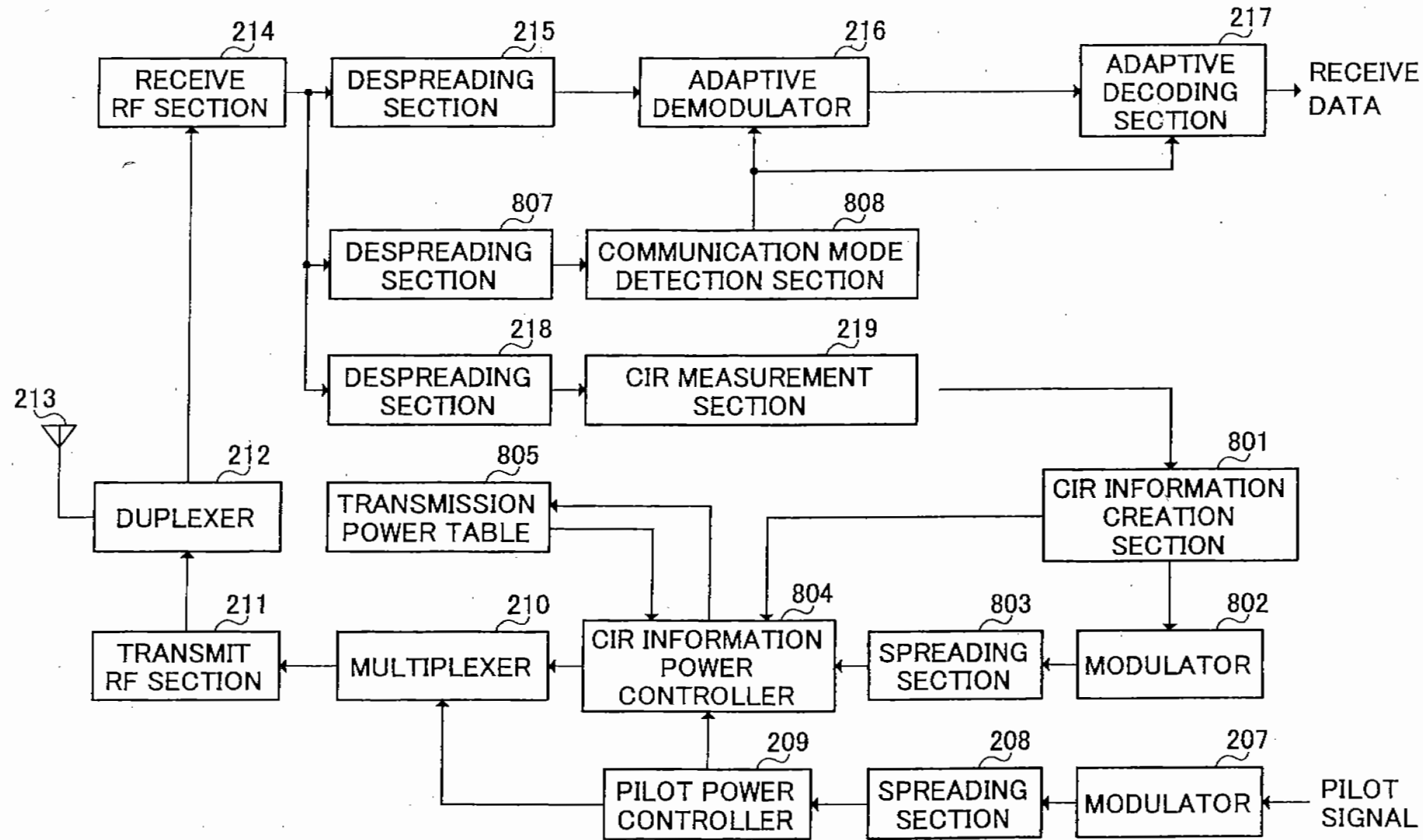


FIG.11

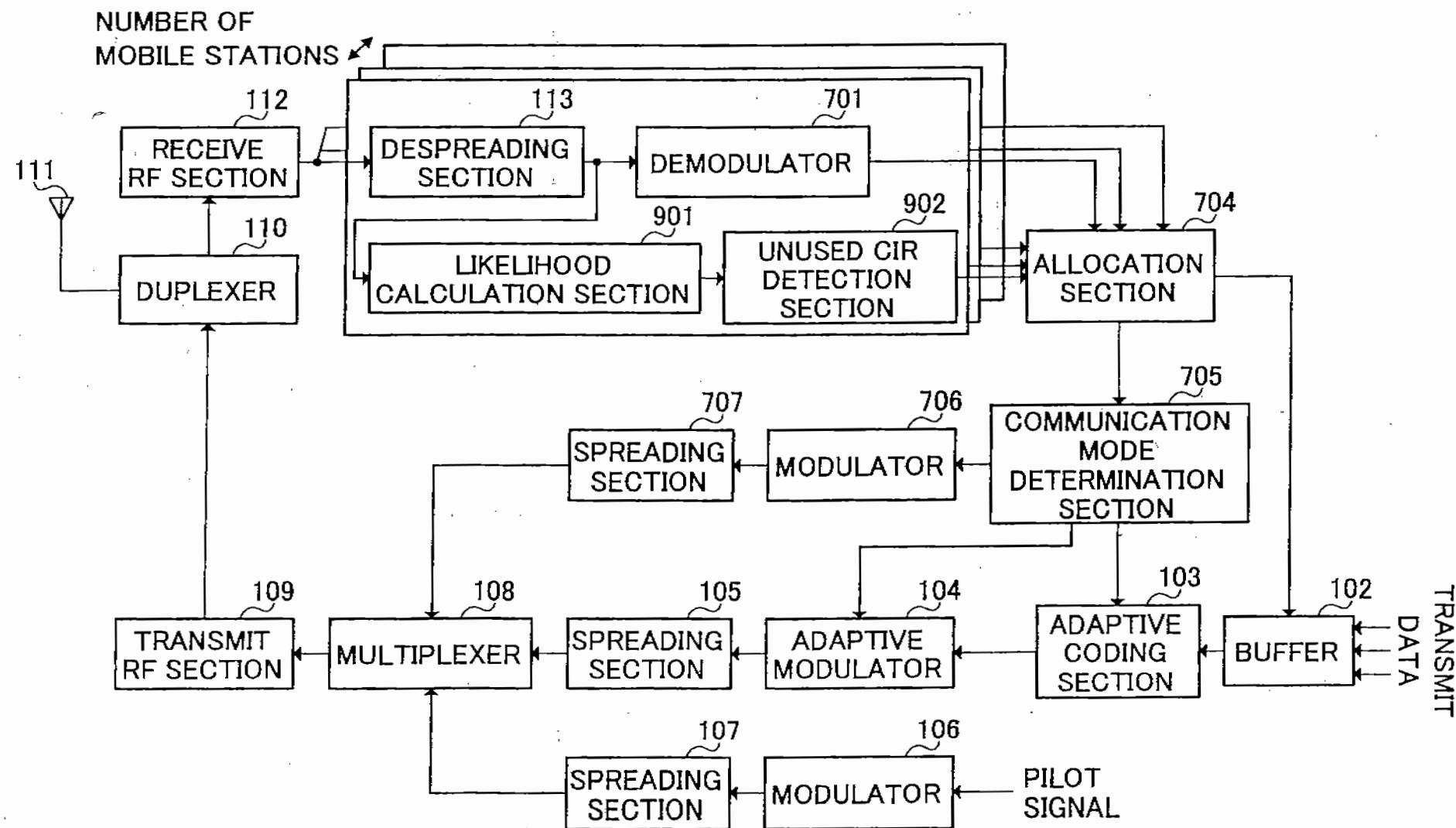


FIG. 12

201040-5096800T

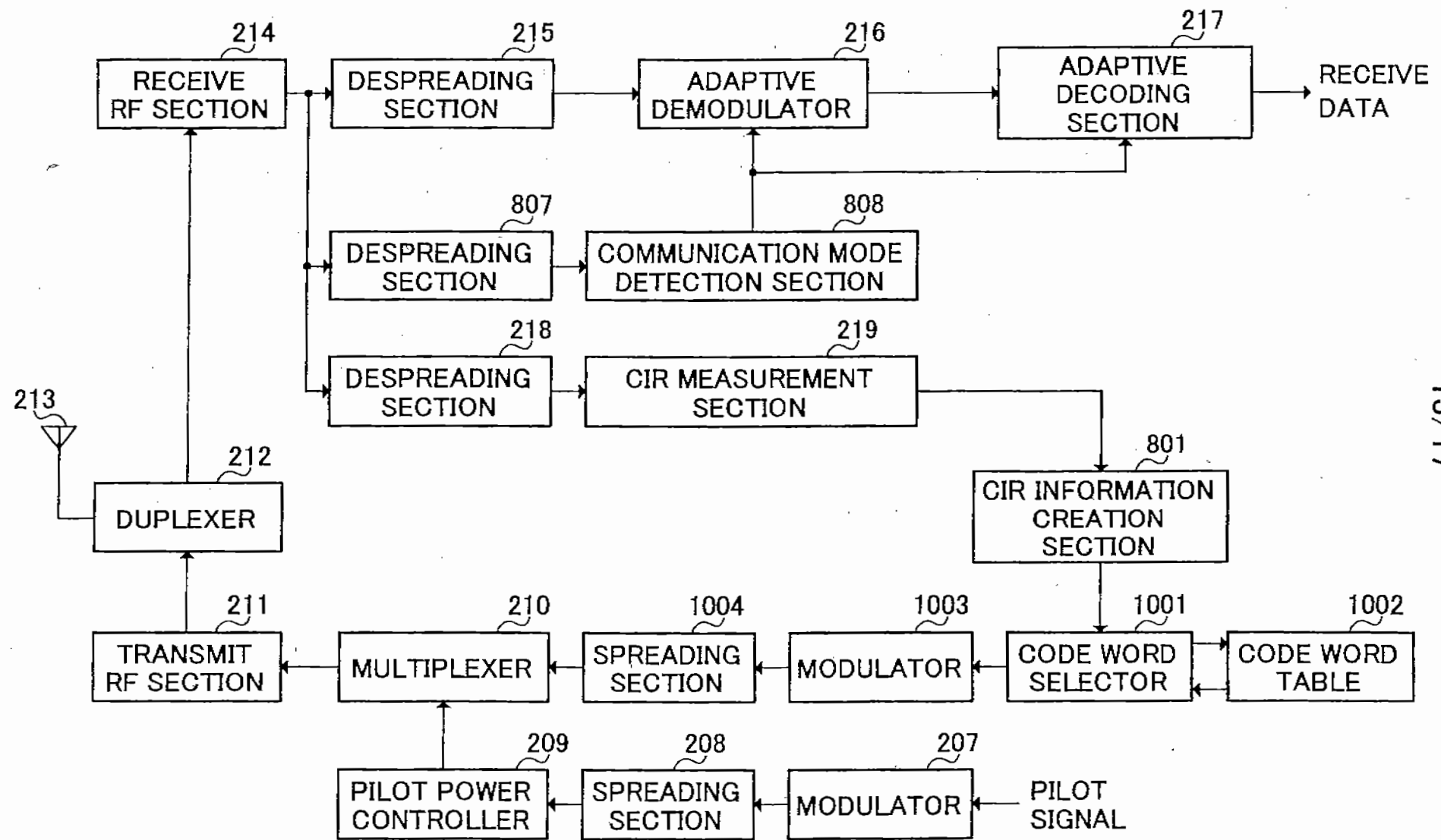


FIG.13

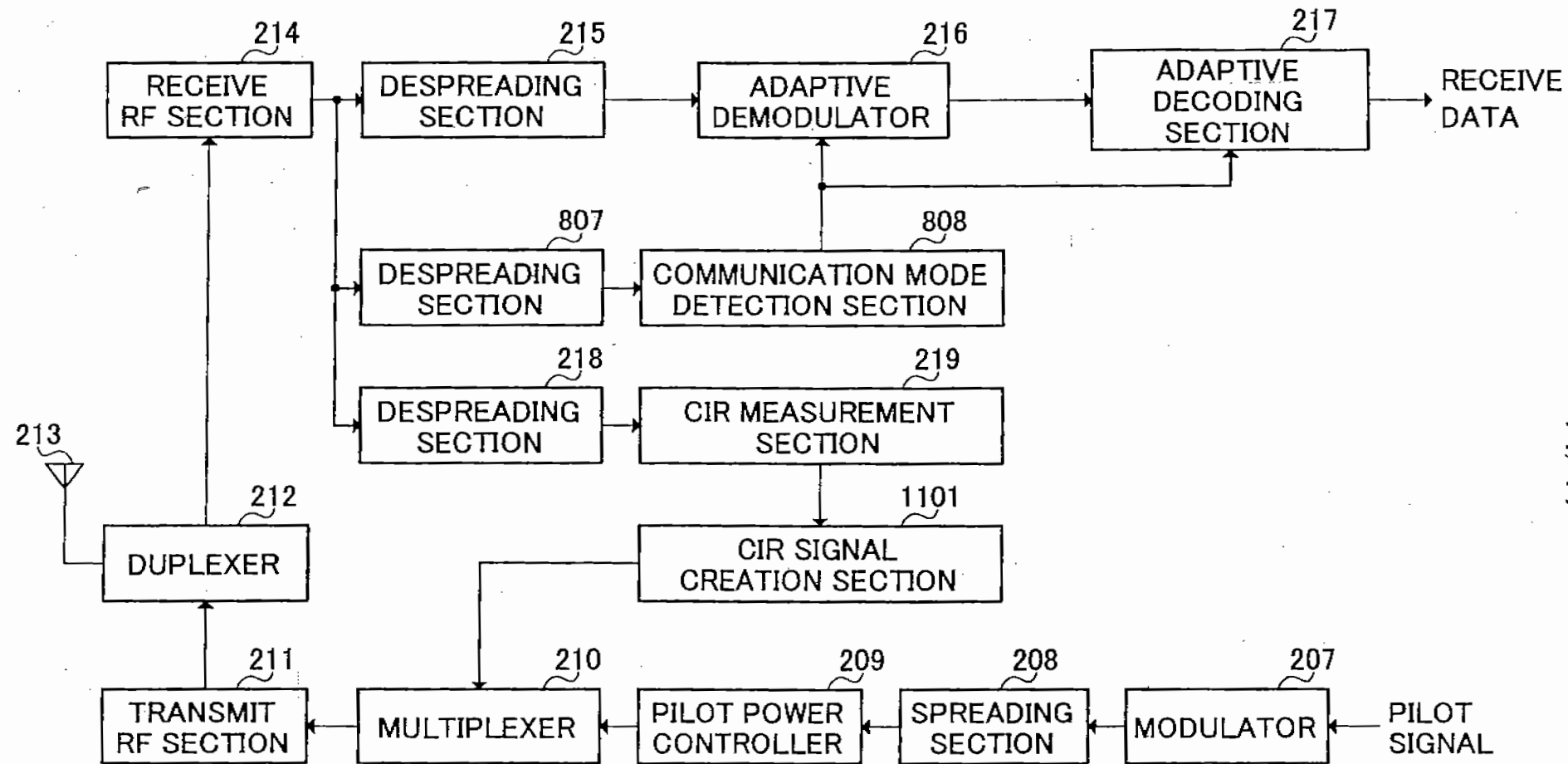


FIG.14

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PRINT OF DRAWINGS  
AS ORIGINALLY  
FD

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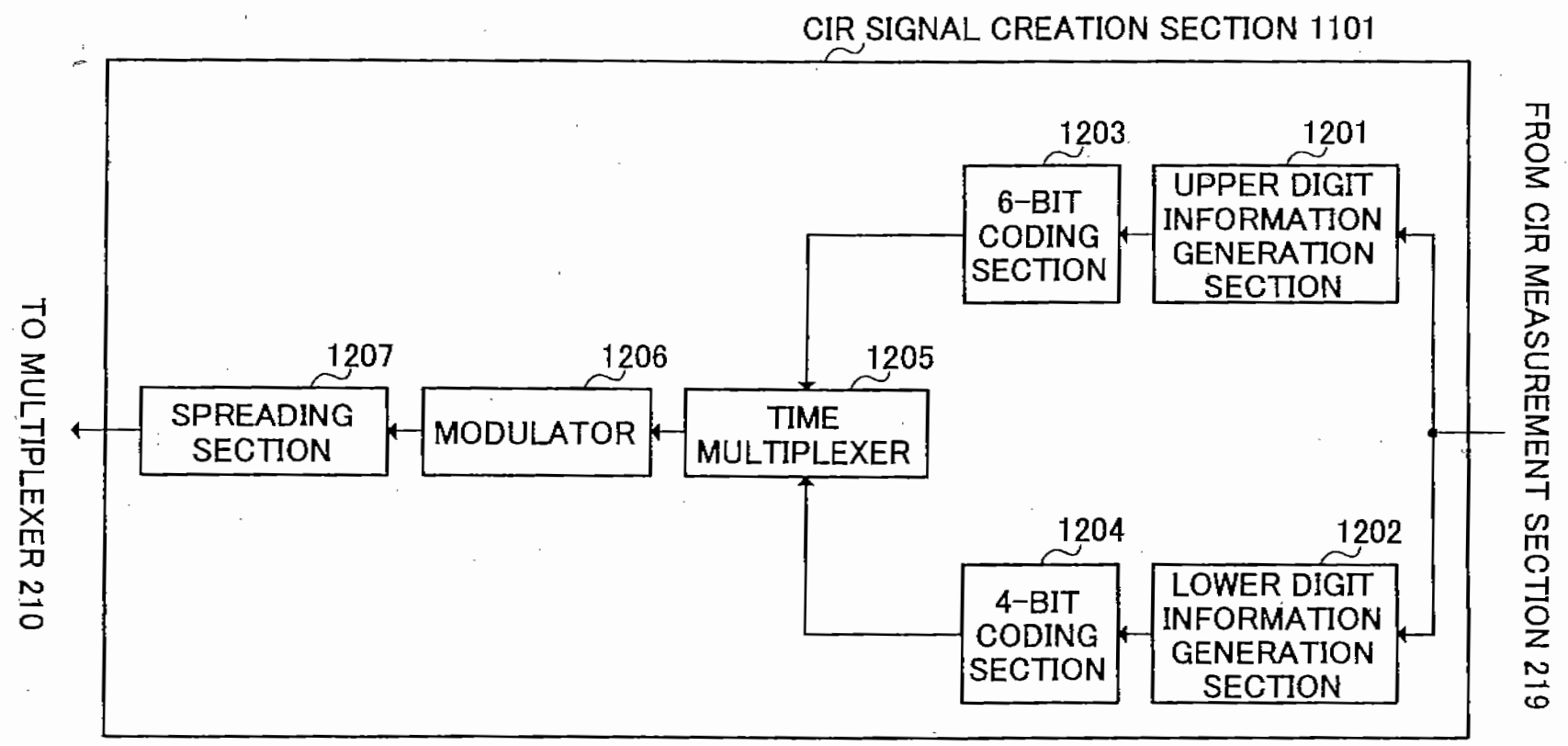


FIG.15

201040-5096800T

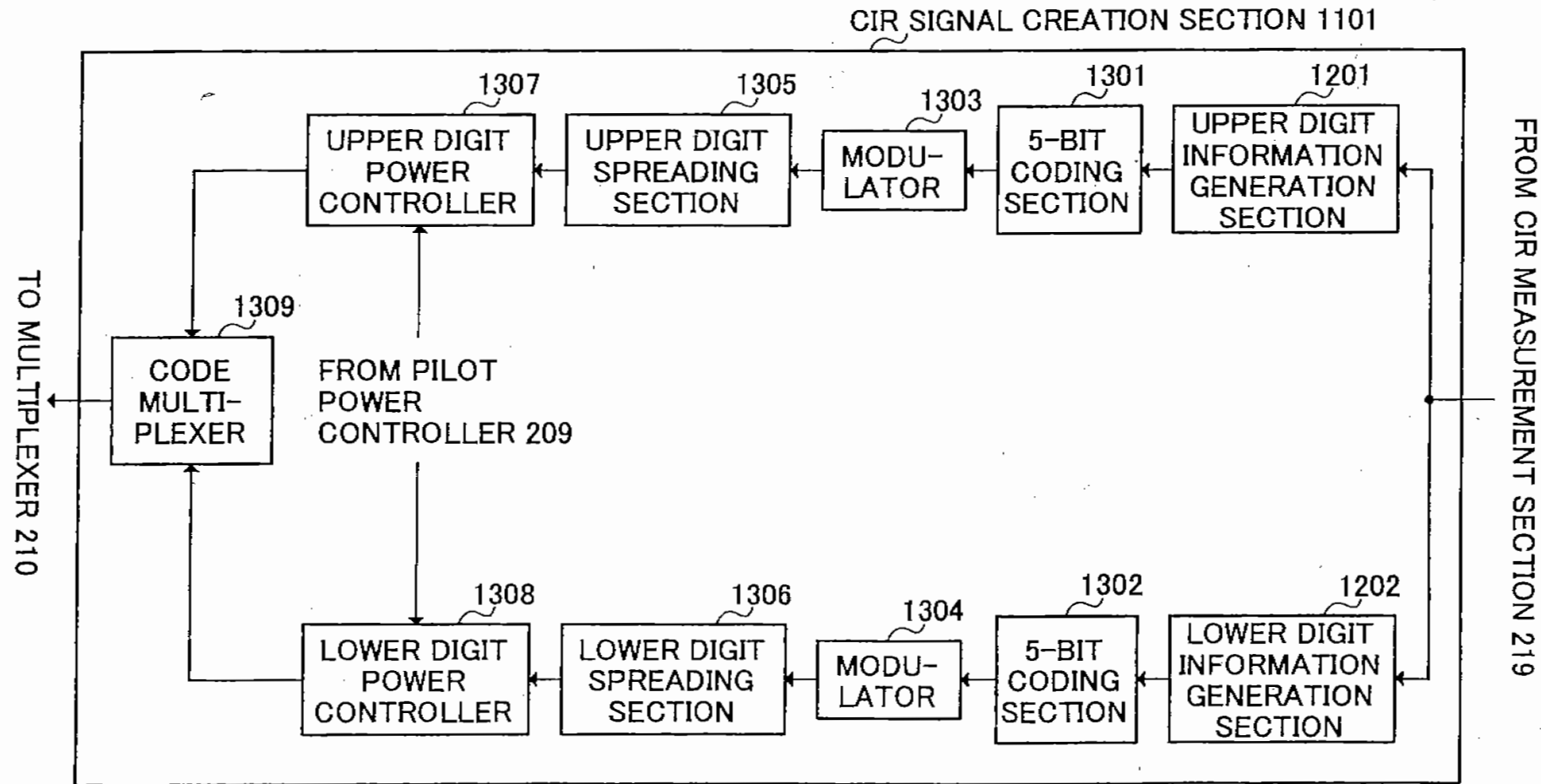


FIG.16

PRINT OF DRAWINGS  
AS ORIGINALLY  
3D

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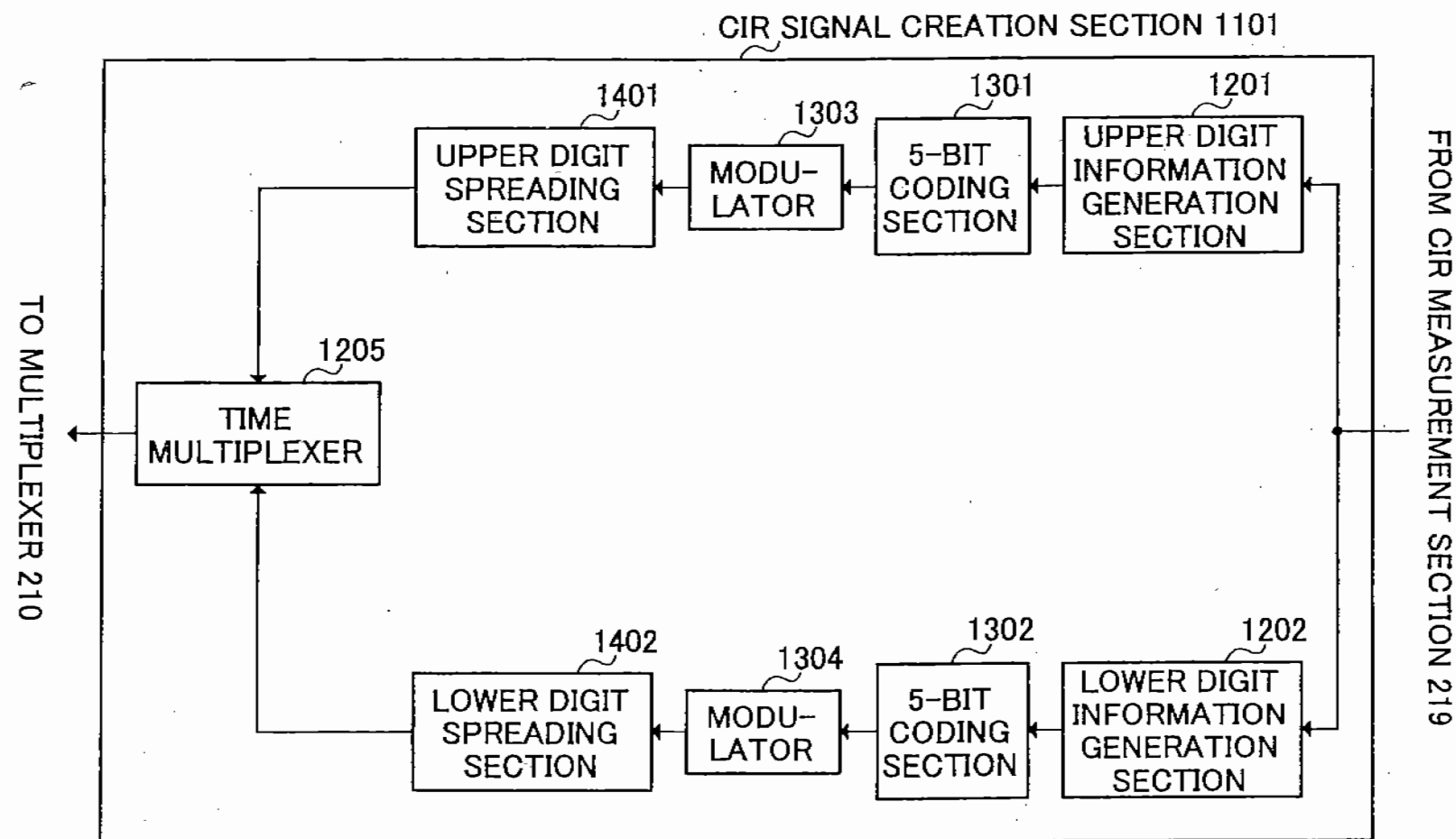


FIG.17

201040\* 5096800T

10/089605

JPCT/PTO 01 APR 2002

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Inventors: Kenichi MIYOSHI, et al.

Application No.: New PCT Application

Filed: April 1, 2002

For: COMMUNICATION TERMINAL APPARATUS, BASE STATION  
APPARATUS, AND RADIO COMMUNICATION METHOD

CLAIM FOR PRIORITY

Assistant Commissioner of Patents  
Washington, D.C. 20231

Dear Sir:

The benefit of the filing date of the following prior foreign application filed in the following foreign country is hereby requested for the above-identified application and the priority provided in 35 USC 119 is hereby claimed:

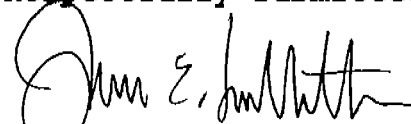
Japanese Appln. No. 2000-234420, filed August 2, 2000;

Japanese Appln. No. 2000-285405, filed September 20, 2000.

The International Bureau received the priority document within the time limit, as evidenced by the attached copy of the PCT/IB/304.

It is requested that the file of this application be marked to indicate that the requirements of 35 USC 119 have been fulfilled and that the Patent and Trademark Office kindly acknowledge receipt of this document.

Respectfully submitted,



James E. Ledbetter  
Registration No. 28,732

Date: April 1, 2002

JEL/tc

Attorney Docket No. L9289.02149

STEVENS DAVIS, MILLER & MOSHER, L.L.P.  
1615 L STREET, NW, Suite 850  
P.O. Box 34387  
WASHINGTON, DC 20043-4387  
Telephone: (202) 785-0100  
Facsimile: (202) 408-5200

EP · US

PCT

特 許 協 力 条 約

国際調査報告

(法8条、法施行規則第40、41条)  
〔PCT18条、PCT規則43、44〕

出願人又は代理人 の書類記号 2F01102-PCT	今後の手続きについては、国際調査報告の送付通知様式(PCT/ISA/220) 及び下記5を参照すること。		
国際出願番号 PCT/JPO1/06654	国際出願日 (日.月.年) 02.08.01	優先日 (日.月.年) 02.08.00	
出願人(氏名又は名称) 松下電器産業株式会社			

国際調査機関が作成したこの国際調査報告を法施行規則第41条(PCT18条)の規定に従い出願人に送付する。  
この写しは国際事務局にも送付される。

この国際調査報告は、全部で 2 ページである。

☐ この調査報告に引用された先行技術文献の写しも添付されている。

1. 国際調査報告の基礎

a. 言語は、下記に示す場合を除くほか、この国際出願がされたものに基づき国際調査を行った。

☐ この国際調査機関に提出された国際出願の翻訳文に基づき国際調査を行った。

b. この国際出願は、ヌクレオチド又はアミノ酸配列を含んでおり、次の配列表に基づき国際調査を行った。

☐ この国際出願に含まれる書面による配列表

☐ この国際出願と共に提出されたフレキシブルディスクによる配列表

☐ 出願後に、この国際調査機関に提出された書面による配列表

☐ 出願後に、この国際調査機関に提出されたフレキシブルディスクによる配列表

☐ 出願後に提出した書面による配列表が出願時における国際出願の開示の範囲を超える事項を含まない旨の陳述書の提出があった。

☐ 書面による配列表に記載した配列とフレキシブルディスクによる配列表に記載した配列が同一である旨の陳述書の提出があった。

2. ☐ 請求の範囲の一部の調査ができない(第I欄参照)。

3. ☐ 発明の単一性が欠如している(第II欄参照)。

4. 発明の名称は ☒ 出願人が提出したものを承認する。

☐ 次に示すように国際調査機関が作成した。

5. 要約は ☒ 出願人が提出したものを承認する。

☐ 第III欄に示されているように、法施行規則第47条(PCT規則38.2(b))の規定により国際調査機関が作成した。出願人は、この国際調査報告の発送の日から1カ月以内にこの国際調査機関に意見を提出することができる。

6. 要約書とともに公表される図は、  
第 3 図とする。 ☒ 出願人が示したとおりである。

☐ なし

☐ 出願人は図を示さなかった。

☐ 本図は発明の特徴を一層よく表している。

国際調査報

国際出願番号 PCT/JP01/06654

A. 発明の属する分野の分類 (国際特許分類 (IPC))  
Int. Cl<sup>7</sup> H04Q7/38, H04B7/26, 102  
Int. Cl<sup>7</sup> H04J13/00, H04L29/02

## B. 調査を行った分野

調査を行った最小限資料 (国際特許分類 (IPC))  
Int. Cl<sup>7</sup> H04B7/24-H04B7/26, 102  
Int. Cl<sup>7</sup> H04Q7/00-H04Q7/38

## 最小限資料以外の資料で調査を行った分野に含まれるもの

日本国実用新案公報 1922-1996年  
日本国公開実用新案公報 1971-2001年  
日本国登録実用新案公報 1994-2001年  
日本国実用新案登録公報 1996-2001年

## 国際調査で使用した電子データベース (データベースの名称、調査に使用した用語)

## C. 関連すると認められる文献

引用文献の カテゴリー*	引用文献名 及び一部の箇所が関連するときは、その関連する箇所の表示	関連する 請求の範囲の番号
A	JP 2000-49663 A (松下電器産業株式会社) 18. 2月. 2000 (18. 02. 00) & WO 99/55112 A & EP 986282 A & AU 9931719 A & BR 9906339 A & CN 1263681 A & EP 1122965 A & KR 2001013848 A	1-20
A	JP 11-331057 A (株式会社東芝) 30. 11月. 1999 (30. 11. 99) (ファミリーなし)	1-20

☐ C欄の続きにも文献が列挙されている。☐ パテントファミリーに関する別紙を参照。

## \* 引用文献のカテゴリー

「A」 特に関連のある文献ではなく、一般的技術水準を示すもの  
「E」 国際出願日前の出願または特許であるが、国際出願日以後に公表されたもの  
「L」 優先権主張に疑義を提起する文献又は他の文献の発行日若しくは他の特別な理由を確立するために引用する文献 (理由を付す)  
「O」 口頭による開示、使用、展示等に言及する文献  
「P」 国際出願日前で、かつ優先権の主張の基礎となる出願

の日の後に公表された文献  
「T」 国際出願日又は優先日後に公表された文献であって出願と矛盾するものではなく、発明の原理又は理論の理解のために引用するもの  
「X」 特に関連のある文献であって、当該文献のみで発明の新規性又は進歩性がないと考えられるもの  
「Y」 特に関連のある文献であって、当該文献と他の1以上の文献との、当業者にとって自明である組合せによって進歩性がないと考えられるもの  
「&」 同一パテントファミリー文献

国際調査を完了した日  
30. 10. 01

国際調査報告の発送日  
13.11.01

国際調査機関の名称及びあて先  
日本国特許庁 (ISA/JP)  
郵便番号100-8915  
東京都千代田区蔵が関三丁目4番3号

特許庁審査官 (権限のある職員)  
青木 健



5 J 9571

電話番号 03-3581-1101 内線 3534

## 特許協力条約に基づく国際出願願書

2F01102-PCT

原本（出願用） - 印刷日時 2001年08月01日 (01.08.2001) 水曜日 13時49分49秒

0	受理官庁記入欄	
0-1	国際出願番号	
0-2	国際出願日	
0-3	(受付印)	
0-4	様式-PCT/R0/101 この特許協力条約に基づく国際出願願書は、 右記によって作成された。	PCT-EASY Version 2.92 (updated 01.03.2001)
0-5	申立て 出願人は、この国際出願が特許協力条約に従って処理されることを請求する。	
0-6	出願人によって指定された受理官庁	日本国特許庁 (R0/JP)
0-7	出願人又は代理人の書類記号	2F01102-PCT
I	発明の名称	通信端末装置、基地局装置および無線通信方法
II	出願人	
II-1	この欄に記載した者は	出願人である (applicant only)
II-2	右の指定国についての出願人である。	米国を除くすべての指定国 (all designated States except US)
II-4)a	名称	松下電器産業株式会社
II-4en	Name	MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.
II-5)a	あて名:	571-8501 日本国 大阪府 門真市 大字門真1006番地
II-5en	Address:	1006, Oaza Kadoma, Kadoma-shi, Osaka 571-8501 Japan
II-6	国籍 (国名)	日本国 JP
II-7	住所 (国名)	日本国 JP
II-8	電話番号	06-6908-1473
II-9	ファクシミリ番号	06-6909-0053
III-I	その他の出願人又は発明者	
III-1-1	この欄に記載した者は	出願人及び発明者である (applicant and Inventor)
III-1-2	右の指定国についての出願人である。	米国のみ (US only)
III-1-4)a	氏名 (姓名)	三好 憲一
III-1-4en	Name (LAST, First)	MIYOSHI, Kenichi
III-1-5)a	あて名:	232-0066 日本国 神奈川県 横浜市 南区六ツ川1-240-1-501
III-1-5en	Address:	1-240-1-501, Mutsukawa, Minami-ku, Yokohama-shi, Kanagawa 232-0066 Japan
III-1-6	国籍 (国名)	日本国 JP
III-1-7	住所 (国名)	日本国 JP

## 特許協力条約に基づく国際出願願書

原本（出願用） - 印刷日時 2001年08月01日 (01.08.2001) 水曜日 13時49分49秒

III-2	その他の出願人又は発明者	
III-2-1	この欄に記載した者は	出願人及び発明者である (applicant and inventor)
III-2-2	右の指定国についての出願人である。	米国のみ (US only)
III-2-4j & III-2-4e n	氏名(姓名) Name (LAST, First)	加藤 修 KATO, Osamu
III-2-5j &	あて名:	237-0066 日本国 神奈川県 横須賀市 湘南鷹取5-45-G302
III-2-6e n	Address:	5-45-G302, Shonantakatori, Yokosuka-shi, Kanagawa 237-0066 Japan
III-2-6	国籍 (国名)	日本国 JP
III-2-7	住所 (国名)	日本国 JP
III-3	その他の出願人又は発明者	
III-3-1	この欄に記載した者は	出願人及び発明者である (applicant and inventor)
III-3-2	右の指定国についての出願人である。	米国のみ (US only)
III-3-4j & III-3-4e n	氏名(姓名) Name (LAST, First)	相沢 純一 AIZAWA, Junichi
III-3-5j &	あて名:	240-0033 日本国 神奈川県 横浜市 保土ヶ谷区境木本町9-20
III-3-6e n	Address:	9-20, Sakaijihoncho, Hodogaya-ku, Yokohama-shi, Kanagawa 240-0033 Japan
III-3-6	国籍 (国名)	日本国 JP
III-3-7	住所 (国名)	日本国 JP
IV-1	代理人又は共通の代表者、通知のあて名 下記の者は国際機関において右記のごとく出願人のために行動する。	代理人 (agent)
IV-1-1ja IV-1-1en IV-1-2ja	氏名(姓名) Name (LAST, First) あて名:	鷺田 公一 WASHIDA, Kimihito 206-0034 日本国 東京都 多摩市 鶴牧1丁目24-1 新都市センタービル5階
IV-1-2en	Address:	5th Floor, Shintoshicenter Bldg. 24-1, Tsurumaki 1-chome, Tama-shi, Tokyo 206-0034 Japan
IV-1-3	電話番号	042-338-4600
IV-1-4	ファクシミリ番号	042-338-4605

V	国の指定	
V-1	広域特許 (他の種類の保護又は取扱いを 求める場合には括弧内に記載す る。)	AP: GH GM KE LS MW MZ SD SL SZ TZ UG ZW 及びハラレプロトコルと特許協力条約の締約国であ る他の国 EA: AM AZ BY KG KZ MD RU TJ TM 及びユーラシア特許条約と特許協力条約の締約国で ある他の国 EP: AT BE CH&LI CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR 及びヨーロッパ特許条約と特許協力条約の締約国で ある他の国 OA: BF BJ CF CG CI CM GA GN GQ GW ML MR NE SN TD TG 及びアフリカ知的所有権機構と特許協力条約の締約 国である他の国
V-2	国内特許 (他の種類の保護又は取扱いを 求める場合には括弧内に記載す る。)	AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH&LI CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS 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
V-5	指定の確認の宣誓 出願人は、上記の指定に加えて 、規則4.9(b)の規定に基づき、 特許協力条約のもとで認められ る他の全ての国の指定を行う。 ただし、V-6欄に示した国の指 定を除く。出願人は、これらの 追加される指定が確認を条件と していること、並びに優先日から 15月が経過する前にその確認 がなされない指定は、この期間 の経過時に、出願人によって取 り下げられたものとみなされる ことを宣言する。	
V-6	指定の確認から除かれる国	なし (NONE)
VI-1	先の国内出願に基づく優先権 主張	
VI-1-1	出願日	2000年08月02日 (02.08.2000)
VI-1-2	出願番号	特願2000-234420
VI-1-3	国名	日本国 JP
VI-2	先の国内出願に基づく優先権 主張	
VI-2-1	出願日	2000年09月20日 (20.09.2000)
VI-2-2	出願番号	特願2000-285405
VI-2-3	国名	日本国 JP
VI-3	優先権証明書送付の請求 上記の先の出願のうち、右記の 番号のものについては、出願書 類の認証謄本を作成し国際事務 局へ送付することを、受理官庁 に対して請求している。	VI-1, VI-2
VII-1	特定された国際調査機関 (ISA)	日本国特許庁 (ISA/JP)



## 特許協力条約に基づく国際出願願書

2F01102-PCT

原本（出願用） - 印刷日時 2001年08月01日 (01.08.2001) 水曜日 13時49分49秒

VIII	申立て	申立て数	
VIII-1	発明者の特定に関する申立て	-	
VIII-2	出願し及び特許を与えられる国際出願目における出願人の資格に関する申立て	-	
VIII-3	先の出願の優先権を主張する国際出願目における出願人の資格に関する申立て	-	
VIII-4	発明者である旨の申立て（米国を指定国とする場合）	-	
VIII-5	不利にならない開示又は新規性喪失の例外に関する申立て	-	
IX	照合欄	用紙の枚数	添付された電子データ
IX-1	願書（申立てを含む）	6	-
IX-2	明細書	36	-
IX-3	請求の範囲	4	-
IX-4	要約	1	2f01102-pct.txt
IX-5	図面	17	-
IX-7	合計	63	
	添付書類	添付	添付された電子データ
IX-8	手数料計算用紙	✓	-
IX-11	包括委任状の写し	✓	-
IX-17	PCT-EASYディスク	-	フロッピーディスク
IX-18	その他	納付する手数料に相当する特許印紙を貼付した書面	-
IX-18	その他	国際事務局の口座への振り込みを証明する書面	-
IX-19	要約書とともに提示する図の番号	3	
IX-20	国際出願の使用言語名:	日本語	
X-1	提出者の記名押印		
X-1-1	氏名(姓名)	鷲田 公一	



## 受理官庁記入欄

T0-1	国際出願として提出された書類の実際の受理の日	
T0-2	図面:	
10-2-1	受理された	
10-2-2	不足図面がある	
T0-3	国際出願として提出された書類を補完する書類又は図面であってその後期間内に提出されたものの実際の受理の日（訂正日）	
T0-4	特許協力条約第11条(2)に基づく必要な補完の期間内の受理の日	
T0-5	出願人により特定された国際調査機関	ISA/JP
T0-6	調査手数料未払いにつき、国際調査機関に調査用写しを送付していない	

特許協力条約に基づく国際出願願書

原本（出願用） - 印刷日時 2001年08月01日（01.08.2001）水曜日 13時49分49秒

国際事務局記入欄

II-I	記録原本の受理の日	
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2)特許協力条約に基づいて公開された国際

(19) 世界知的所有権機関  
国際事務局



(43) 国際公開日  
2002 年 2 月 14 日 (14.02.2002)

PCT

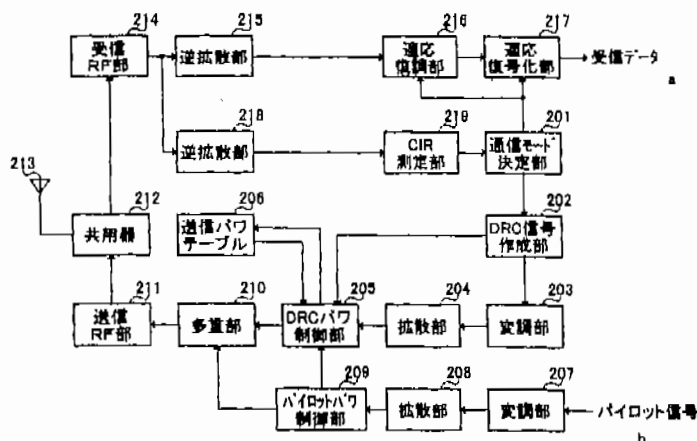
(10) 国際公開番号  
WO 02/13570 A1

- (51) 国際特許分類<sup>7</sup>: H04Q 7/38, 特願2000-285405 2000 年 9 月 20 日 (20.09.2000) JP  
H04B 7/26, H04J 13/00, H04L 29/02
- (21) 国際出願番号: PCT/JP01/06654
- (22) 国際出願日: 2001 年 8 月 2 日 (02.08.2001)
- (25) 国際出願の言語: 日本語
- (26) 国際公開の言語: 日本語
- (30) 優先権データ:  
特願2000-234420 2000 年 8 月 2 日 (02.08.2000) JP
- (71) 出願人 (米国を除く全ての指定国について): 松下電  
器産業株式会社 (MATSUSHITA ELECTRIC INDUS-  
TRIAL CO., LTD.) [JP/JP]; 〒571-8501 大阪府門真市  
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- (72) 発明者; および
- (75) 発明者/出願人 (米国についてのみ): 三好憲一  
(MIYOSHI, Kenichi) [JP/JP]; 〒232-0066 神奈川県横  
浜市南区大ッ川 1-240-1-501 Kanagawa (JP). 加藤  
修 (KATO, Osamu) [JP/JP]; 〒237-0066 神奈川県横  
須賀市湘南鹿取 5-45-G302 Kanagawa (JP). 相沢純一

[続葉有]

(54) Title: COMMUNICATION TERMINAL, BASE STATION DEVICE, AND RADIO COMMUNICATION METHOD

(54) 発明の名称: 通信端末装置、基地局装置および無線通信方法



(57) Abstract: A communication mode determining section (201) determines the communication mode on the basis of the CIR measured by a CIR measuring section (219). A DRC signal generator (202) generates a DRC signal of the number corresponding to the communication mode. A DRC power control section (203) refers to a transmission power table (206) showing the correspondence between the DRC number and the transmission power and increases the transmission power more for a DRC signal having a better line quality of the downstream line on the basis of the transmission power of a pilot signal outputted from a pilot power control section (209).

- 214...RECEPTION RF SECTION  
215...DESPREADING SECTION  
216...ADAPTIVE DEMODULATION SECTION  
217...ADAPTIVE DECODING SECTION  
...RECEPTION DATA  
218...DESPREADING SECTION  
219...CIR MEASURING SECTION  
201...COMMUNICATION MODE DETERMINING SECTION  
212...ANTENNA DUPLEXER  
206...TRANSMISSION POWER TABLE  
202...DRC SIGNAL GENERATING SECTION  
211...TRANSMISSION RF SECTION  
210...MULTIPLEXING SECTION  
203...DRC POWER CONTROL SECTION  
204...SPREADING SECTION  
203...MODULATING SECTION  
209...PILOT POWER CONTROL SECTION  
208...SPREADING SECTION  
207...MODULATING SECTION  
b...PILOT SIGNAL

WO 02/13570 A1

[続葉有]

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HTC EX1002, Page 143



(AIZAWA, Junichi) [JP/JP]; 〒240-0033 神奈川県横浜市保土ヶ谷区境木本町9-20 Kanagawa (JP).

(74) 代理人: 鷺田公一(WASHIDA, Kimihito); 〒206-0034 東京都多摩市鶴牧1丁目24-1 新都市センタービル5階 Tokyo (JP).

(81) 指定国(国内): 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, 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) 指定国(広域): ARIPO 特許 (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), ユーラシア特許 (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), ヨーロッパ特許 (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI 特許 (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

添付公開書類:

— 国際調査報告書

2文字コード及び他の略語については、定期発行される各PCTガゼットの巻頭に掲載されている「コードと略語のガイダンスノート」を参照。

(57) 要約:

通信モード決定部201が、CIR測定部219にて測定されたCIRに基づいて通信モードを決定し、DRC信号作成部202が、通信モードに対応する番号のDRC信号を作成し、DRCパワ制御部205が、DRC番号と送信パワとの対応関係が示されている送信パワテーブル206を参照して、パイロットパワ制御部209から出力されたパイロット信号の送信パワに基づいて、下り回線の回線品質が良いことを示すDRC信号ほど送信パワを高くする。

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP01/06654

## A. CLASSIFICATION OF SUBJECT MATTER

Int.Cl.<sup>7</sup> H04Q7/38, H04B7/26, 102, H04J13/00, H04L29/02

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.<sup>7</sup> H04B7/24-H04B7/26, 102, H04Q7/00-H04Q7/38

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

Jitsuyo Shinan Koho 1922-1996 Toroku Jitsuyo Shinan Koho 1994-2001  
Kokai Jitsuyo Shinan Koho 1971-2001 Jitsuyo Shinan Toroku Koho 1996-2001

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.
A	JP 2000-49663 A (Matsushita Electric Ind. Co., Ltd.), 18 February, 2000 (18.02.00), & WO 99/55112 A & EP 986282 A & AU 9931719 A & BR 9906339 A & CN 1263681 A & EP 1122965 A & KR 2001013848 A	1-20
A	JP 11-331057 A (Toshiba Corporation), 30 November, 1999 (30.11.99), (Family: none)	1-20

☐ 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  
"I" 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  
30 October, 2001 (30.10.01)

Date of mailing of the international search report  
13 November, 2001 (13.11.01)

Name and mailing address of the ISA/  
Japanese Patent Office

Authorized officer

Facsimile No.

Telephone No.

IPR2018-1557

特許協力条約に基づいて公開された国際出

(19) 世界知的所有権機関  
国際事務局



(43) 国際公開日  
2002 年 2 月 14 日 (14.02.2002)

PCT

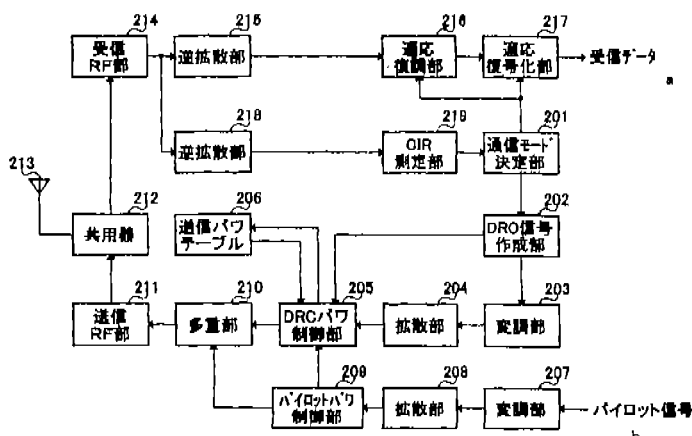
(10) 国際公開番号  
WO 02/13570 A1

- (51) 国際特許分類: H04Q 7/38, 特願2000-285405 2000 年 9 月 20 日 (20.09.2000) JP  
H04B 7/26, H04J 13/00, H04L 29/02
- (21) 国際出願番号: PCT/JP01/06654
- (22) 国際出願日: 2001 年 8 月 2 日 (02.08.2001)
- (25) 国際出願の言語: 日本語
- (26) 国際公開の言語: 日本語
- (30) 優先権データ: 特願2000-234420 2000 年 8 月 2 日 (02.08.2000) JP
- (71) 出願人 (米国を除く全ての指定国について): 松下電器産業株式会社 (MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.) [JP/JP]; 〒571-8501 大阪府門真市大字門真1006番地 Osaka (JP).
- (72) 発明者; および
- (75) 発明者/出願人 (米国についてのみ): 三好憲一 (MIYOSHI, Kenichi) [JP/JP]; 〒232-0066 神奈川県横浜市区六ッ川1-240-1-501 Kanagawa (JP). 加藤修 (KATO, Osamu) [JP/JP]; 〒237-0066 神奈川県横浜市区湘南麻取5-45-G302 Kanagawa (JP). 相沢純一

[続葉有]

(54) Title: COMMUNICATION TERMINAL, BASE STATION DEVICE, AND RADIO COMMUNICATION METHOD

(54) 発明の名称: 通信端末装置、基地局装置および無線通信方法



214...RECEPTION RF SECTION  
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204...SPREADING SECTION  
203...MODULATING SECTION  
209...PILOT POWER CONTROL SECTION  
208...SPREADING SECTION  
207...MODULATING SECTION  
b...PILOT SIGNAL

(57) Abstract: A communication mode determining section (201) determines the communication mode on the basis of the CIR measured by a CIR measuring section (219). A DRC signal generator (202) generates a DRC signal of the number corresponding to the communication mode. A DRC power control section (205) refers to a transmission power table (206) showing the correspondence between the DRC number and the transmission power and increases the transmission power more for a DRC signal having a better line quality of the downstream line on the basis of the transmission power of a pilot signal outputted from a pilot power control section (209).

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IPR2018-1557

HTC EX1002, Page 146



(AIZAWA, Junichi) [JP/JP]; 〒240-0033 神奈川県横浜市保土ヶ谷区境木本町9-20 Kanagawa (JP).

(74) 代理人: 鷺田公一(WASHIDA, Kimihito); 〒206-0034 東京都多摩市鶴牧1丁目24-1 新都市センタービル5階 Tokyo (JP).

(81) 指定国 (国内): 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, 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) 指定国 (広域): ARIPO 特許 (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), ユーラシア特許 (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), ヨーロッパ特許 (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI 特許 (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

添付公開書類:

— 国際調査報告書

2文字コード及び他の略語については、定期発行される各PCTガゼットの巻頭に掲載されている「コードと略語のガイダンスノート」を参照。

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## 明 細 書

## 通信端末装置、基地局装置および無線通信方法

## 5 技術分野

本発明は、セルラー通信システムに用いられる通信端末装置、基地局装置および無線通信方法に関する。

## 背景技術

- 10 セルラー通信システムは、1つの基地局が複数の通信端末と同時に無線通信を行うもので、近年の需要増加に伴い、伝送効率を高めることが要求されている。

- 基地局から通信端末への下り回線の伝送効率を高める技術としてH D R (High Data Rate) が提案されている。H D R は、基地局が通信リソース  
15 を時間分割して各通信端末に割り振るスケジューリングを行い、さらに下り回線の回線品質に従って通信端末毎に伝送レートを設定してデータを送信する方法である。

- 以下、基地局と通信端末とが、H D R において無線通信を行う動作について、説明する。まず、基地局が各通信端末にパイロット信号を送信する。各  
20 通信端末は、パイロット信号に基づくC I R (希望波対干渉波比) 等により下り回線の回線品質を推定し、通信可能な伝送レートを求める。そして、各通信端末は、通信可能な伝送レートに基づいて、パケット長、符号化方式および変調方式の組み合わせである通信モードを選択し、通信モードを示すデータレートコントロール (以下「D R C」) という。) 信号を基地局に送信す  
25 る。

なお、各システムにおける使用可能な変調方式の種類は、B P S K、Q P S K、1 6 Q A M、6 4 Q A M等、予め決められている。また、各システム



における使用可能な符号化の種類は、1/2ターボ符号、1/3ターボ符号、3/4ターボ符号等、予め決められている。そして、これらパケット長、変調方式、符号化方式の組み合わせにより、各システムにおける使用可能な伝送レートが複数定められている。各通信端末は、それらの組み合わせの中から、下り回線の現在の回線品質において最も効率よく通信を行える組み合わせを選択し、選択した通信モードを示すDRC信号を基地局に送信する。一般的にDRC信号は1～Nの番号により表されており、番号が大きくなるほど下り回線の回線品質が良いことを示す。

基地局は、各通信端末から送信されたDRC信号に基づいてスケジューリングを行ない、通信端末毎に伝送レートを設定し、コントロールチャネルを通して各通信端末に各通信端末への通信リソースの割り振りを示す信号を報知する。一般的に、基地局は、システムの伝送効率の向上を考慮して、下り回線の回線品質が最良の通信端末、すなわち、最も番号の大きなDRC信号を送信した通信端末に優先的に通信リソースを割り振る。

そして、基地局は、割り振った時間において該当する通信端末に対してのみデータを送信する。例えば、時間 $t_1$ を通信端末Aに割り振った場合、基地局は、時間 $t_1$ においては通信端末Aに対してのみデータを送信し、通信端末A以外の通信端末に対してはデータを送信しない。

このように、従来から、HDRにより回線品質に従って通信端末毎に伝送レートを設定し、通信可能な伝送レートが高い通信端末に優先的に通信リソースを割り振ることにより、システム全体としてデータの伝送効率を高めている。

しかしながら、通信端末から基地局へ向かう上り回線の回線状況の悪化等により、通信端末が決定した通信モードが基地局において誤って受信されると、基地局はその誤った通信モードでデータを送信してしまう。通信端末では決定した通信モードと送信されたデータの通信モードとが相違するため、データを復調および復号することができない。

また、上述したように基地局は、時間  $t_1$  を通信端末 A に割り振った場合、時間  $t_1$  においては通信端末 A に対してのみデータを送信し、通信端末 A 以外の通信端末に対してはデータを送信しない。

- 5 以上のことから、通信端末が決定した通信モードが基地局において誤って受信されると、時間分割された通信リソースが使用されない区間が生じてしまい下り回線のスループットが低下するという問題がある。

#### 発明の開示

- 10 本発明の目的は、下り回線の回線品質に基づいて各通信端末に通信リソースが割り振られる通信システムにおいて、下り回線のスループットの低下を防止することができる通信端末装置、基地局装置および無線通信方法を提供することである。

- 15 上記目的を達成するために、本発明では、通信端末が、下り回線の回線品質を示す情報のうち、基地局に誤って受信された場合に下り回線のスループットが低下する可能性が高い情報ほど伝播路において誤りにくくして送信するようにした。これにより、下り回線のスループットの低下を防止することができる。

#### 図面の簡単な説明

- 20 図 1 は、基地局における D R C 信号の選択頻度を示したグラフである。
- 図 2 は、本発明の実施の形態 1 に係る基地局の構成を示すブロック図である。
- 図 3 は、本発明の実施の形態 1 に係る通信端末の構成を示すブロック図である。
- 25 図 4 は、本発明の実施の形態 1 に係る通信端末が備える送信パワータブルの内容を示す図である。
- 図 5 は、本発明の実施の形態 1 に係る基地局の別の構成を示すブロック図

である。

図 6 は、本発明の実施の形態 2 に係る通信端末の構成を示すブロック図である。

図 7 は、本発明の実施の形態 2 に係る通信端末が備える符号語テーブルの  
5 内容を示す図である。

図 8 は、本発明の実施の形態 3 に係る基地局の構成を示すブロック図である。

図 9 は、本発明の実施の形態 3 に係る通信端末の構成を示すブロック図である。

10 図 10 は、本発明の実施の形態 4 に係る基地局の構成を示すブロック図である。

図 11 は、本発明の実施の形態 4 に係る通信端末の構成を示すブロック図である。

図 12 は、本発明の実施の形態 4 に係る基地局の別の構成を示すブロック  
15 図である。

図 13 は、本発明の実施の形態 5 に係る通信端末の構成を示すブロック図である。

図 14 は、本発明の実施の形態 6 に係る通信端末の構成を示すブロック図である。

20 図 15 は、本発明の実施の形態 6 に係る通信端末の C I R 信号作成部の構成を示すブロック図である。

図 16 は、本発明の実施の形態 7 に係る通信端末の C I R 信号作成部の構成を示すブロック図である。

図 17 は、本発明の実施の形態 8 に係る通信端末の C I R 信号作成部の構  
25 成を示すブロック図である。

発明を実施するための最良の形態

以下、本発明の実施の形態について、添付図面を参照して詳細に説明する。

(実施の形態 1)

上述したように、基地局は、下り回線の回線品質が最良の通信端末に優先的に通信リソースを割り振る。換言すれば、基地局は、最も番号の大きな D R C 信号を選択し、その選択した D R C 信号を送信した通信端末に優先的に通信リソースを割り振る。よって、基地局における D R C 信号の選択頻度は、  
5 図 1 に示すようになる。図 1 は、基地局における D R C 信号の選択頻度を示したグラフである。なお、この図では、D R C 番号には 1 ~ 5 が使用されており、番号が大きいほど回線品質が良いことを示す。

10 図 1 に示すように、番号が大きい D R C 信号ほど基地局において選択される頻度が高くなる。つまり、下り回線の回線品質が良い通信端末ほど通信リソースが割り当てられる頻度が高くなる。このような関係は、通信端末が多数存在して下り回線の回線品質が良い通信端末が存在する確率が増えることにより生じるものである。

15 このように、各 D R C 信号の選択頻度は、回線品質に応じて相違している。つまり、下り回線の回線品質が良いことを示す D R C 信号は選択される頻度が高くなる傾向にあるため、下り回線の回線品質が良いことを示す D R C 信号が誤って受信されると、下り回線のスループットが低下する可能性が高い。また、下り回線の回線品質が悪いことを示す D R C 信号は選択される頻度が  
20 低くなる傾向にあるため、下り回線の回線品質が悪いことを示す D R C 信号が誤って受信されても、下り回線のスループットの低下に与える影響は小さい。

そこで、本発明の実施の形態 1 に係る通信端末は、下り回線の回線品質が良いことを示す D R C 信号ほど送信パワを高くして送信するものである。また、  
25 本発明の実施の形態 1 に係る基地局は、所定のしきい値より受信パワが低い D R C 信号を除外して、通信リソースの割り当てを行うものである。

図 2 は、本発明の実施の形態 1 に係る基地局の構成を示すブロック図であ

る。

図2において、割り当て部101は、後述する復調部114で抽出されたDRC信号から後述する不使用DRC検出部116で検出されたDRC信号を除外したDRC信号に基づいて各通信端末への通信リソースの割り振りを  
5 決定する。そして、割り当て部101は、決定した通信リソースの割り振りに基づいて、バッファ102に下り送信データの出力を指示し、適応符号化部103に下り送信データの符号化方式を指示し、適応変調部104に下り送信データの変調方式を指示する。

バッファ102は、下り送信データを保持し、割り当て部101からの指示に従って、所定の通信端末に対する下り送信データを適応符号化部103  
10 に出力する。適応符号化部103は、割り当て部101の指示に従って、バッファ102からの出力信号を符号化して適応変調部104に出力する。適応変調部104は、割り当て部102の指示に従って、適応符号化部103からの出力信号を変調して拡散部105に出力する。拡散部105は、適応  
15 変調部104からの出力信号を拡散して多重部108に出力する。

変調部106は、パイロット信号を変調して拡散部107に出力する。拡散部107は、変調部106からの出力信号を拡散して多重部108に出力する。

多重部108は、拡散後の下り送信データに拡散後のパイロット信号を所  
20 定の間隔で時間多重し、送信RF部109に出力する。送信RF部109は、多重部108からの出力信号の周波数を無線周波数に変換して共用器110に出力する。

共用器110は、送信RF部109からの出力信号をアンテナ111から通信端末に無線送信する。また、共用器110は、各通信端末から無線送信  
25 され、アンテナ111に無線受信された信号を受信RF部112に出力する。

受信RF部112は、共用器110から出力された無線周波数信号の周波数をベースバンドに変換して逆拡散部113に出力する。逆拡散部113は、

ベースバンド信号を、D R C信号を拡散している拡散コードで逆拡散して復調部 1 1 4 および受信パワ算出部 1 1 5 に出力する。

復調部 1 1 4 は、逆拡散部 1 1 3 からの出力信号を復調してD R C信号を抽出し、割り当て部 1 0 1 に出力する。

- 5 受信パワ算出部 1 1 5 は、逆拡散後のD R C信号の受信パワを測定し、不使用D R C検出部 1 1 6 に出力する。不使用D R C検出部 1 1 6 には、後述するような所定のしきい値が設定されており、このしきい値よりも低い受信パワのD R C信号を検出し、検出結果を割り当て部 1 0 1 に出力する。

- 10 なお、逆拡散部 1 1 3、復調部 1 1 4、受信パワ算出部 1 1 5 および不使用D R C検出部 1 1 6 は、通信端末ごとに設けられており、それぞれの復調部 1 1 4 から通信端末ごとのD R C信号が出力され、それぞれの不使用D R C検出部 1 1 6 から通信端末ごとの検出結果が出力される。

- 15 図 3 は、本発明の実施の形態 1 に係る通信端末の構成を示すブロック図である。図 3 において、通信モード決定部 2 0 1 は、後述するC I R測定部 2 1 9 にて測定されたC I Rに基づいて、変調方式と符号化方式の組み合わせを示す通信モードを決定して、D R C信号作成部 2 0 2 に出力する。また、通信モード決定部 2 0 1 は、決定した通信モードに基づいて、適応復調部 2 1 6 に下り受信データの復調方式を指示し、適応復号化部 2 1 7 に下り受信データの復号化方式を指示する。

- 20 D R C信号作成部 2 0 2 は、通信モード決定部 2 0 1 から出力された通信モードに対応する番号のD R C信号を作成して、変調部 2 0 3 およびD R Cパワ制御部 2 0 5 に出力する。

- 25 変調部 2 0 3 は、D R C信号を変調して拡散部 2 0 4 に出力する。拡散部 2 0 4 は、変調部 2 0 3 からの出力信号を拡散してD R Cパワ制御部 2 0 5 に出力する。D R Cパワ制御部 2 0 5 は、D R C番号と送信パワとの対応関係が示されている送信パワテーブル 2 0 6 を参照して、後述するパイロットパワ制御部 2 0 9 から出力されたパイロット信号の送信パワに基づいてD R

C信号の送信パワを制御し、送信パワ制御後のD R C信号を多重部2 1 0に出力する。なお、D R C信号の送信パワの具体的な制御方法については後述する。

変調部2 0 7は、パイロット信号を変調して拡散部2 0 8に出力する。拡  
5 散部2 0 8は、変調部2 0 7からの出力信号を拡散してパイロットパワ制御部2 0 9に出力する。パイロットパワ制御部2 0 9は、パイロット信号の送信パワを制御して、送信パワ制御後のパイロット信号を多重部2 1 0に出力する。また、パイロットパワ制御部2 0 9は、パイロット信号の送信パワをD R Cパワ制御部2 0 9に出力する。

10 多重部2 1 0は、送信パワ制御後のD R C信号と送信パワ制御後のパイロット信号とを所定の間隔で時間多重し、送信R F部2 1 1に出力する。送信R F部2 1 1は、多重部2 1 0からの出力信号の周波数を無線周波数に変換して共用器2 1 2に出力する。

共用器2 1 2は、送信R F部2 1 1からの出力信号をアンテナ2 1 3から  
15 基地局に無線送信する。また、共用器2 1 2は、基地局から無線送信され、アンテナ2 1 3に無線受信された信号を受信R F部2 1 4に出力する。

受信R F部2 1 4は、共用器2 1 2から出力された無線周波数信号の周波数をベースバンドに変換し、逆拡散部2 1 5および逆拡散部2 1 8に出力する。

20 逆拡散部2 1 5は、ベースバンド信号のデータ成分を逆拡散して適応復調部2 1 6に出力する。適応復調部2 1 6は、通信モード決定部2 0 1の指示に従って、逆拡散部2 1 5からの出力信号を復調して適応復号化部2 1 7に出力する。適応復号化部2 1 7は、通信モード決定部2 0 1の指示に従って、適応復調部2 1 6からの出力信号を復号して、受信データを得る。

25 逆拡散部2 1 8は、ベースバンド信号のパイロット信号成分を逆拡散してC I R測定部2 1 9に出力する。C I R測定部2 1 9は、逆拡散部2 1 8から出力されたパイロット信号のC I Rを測定して通信モード決定部2 0 1に

出力する。

次に、上記図 2 に示した基地局と上記図 3 に示した通信端末との間における信号の送受の手順について説明する。

まず、通信開始時に、基地局の変調部 106 にてパイロット信号が変調され、拡散部 107 にて拡散され、多重部 108 に出力される。多重部 108 からは拡散後のパイロット信号のみが送信 RF 部 109 に出力される。拡散後のパイロット信号は、送信 RF 部 109 にて無線周波数に周波数変換され、共用器 110 を介してアンテナ 111 から各通信端末に無線送信される。

基地局から無線送信されたパイロット信号成分のみの無線信号は、通信端末のアンテナ 213 に受信され、共用器 212 を介し、受信 RF 部 214 にてベースバンドに周波数変換される。ベースバンド信号のパイロット信号成分は、逆拡散部 218 にて逆拡散され、CIR 測定部 219 に出力される。

次に、CIR 測定部 219 において、逆拡散部 218 から出力されたパイロット信号の CIR が測定され、通信モード決定部 201 にて、CIR に基づいて通信モードが決定される。そして、DRC 信号作成部 202 にて、通信モードに対応する番号の DRC 信号が作成される。

DRC 信号は、変調部 203 にて変調され、拡散部 204 にて拡散され、DRC パワ制御部 205 に出力される。DRC パワ制御部 205 においては、パイロットパワ制御部 209 から出力されるパイロット信号の送信パワと送信パワテーブル 206 に予め設定されているパイロット信号の送信パワと DRC 信号の送信パワとの比に基づいて、DRC 信号の送信パワが制御される。

以下、送信パワテーブル 206 の設定内容について説明する。図 4 は、本発明の実施の形態 1 に係る通信端末が備える送信パワテーブルの内容を示す図である。

送信パワテーブル 206 には、DRC 番号と DRC 信号の送信パワとの対応関係が示されており、DRC 番号が大きくなるほど送信パワが高くなるように設定されている。なお、ここでは、DRC 番号には 1～5 が使用されて



おり、番号が大きいほど下り回線の回線品質が良いことを示すものとする。  
つまり、送信パワテーブル 206 には、下り回線の回線品質が良いことを示す D R C 信号ほど送信パワが高くなるように設定されている。

- 上述したように下り回線の回線品質が良いことを示す D R C 信号ほど基地  
5 局において選択される頻度が高くなる傾向があるため、本実施の形態では、  
下り回線の回線品質が良いことを示す D R C 信号ほど送信パワが高くなるようにして、誤りにくくする。これにより、下り回線の回線品質が良いことを示す D R C 信号が誤って受信される確率を、下り回線の回線品質が悪いことを示す D R C 信号が誤って受信される確率よりも低くすることができる。換  
10 言すれば、基地局で選択される頻度が高い D R C 信号が誤って受信される確率を、基地局で選択される頻度が低い D R C 信号が誤って受信される確率よりも低くすることができる。

- また、送信パワテーブル 206 に設定される D R C 信号の送信パワは、パイロット信号の送信パワとの比によって表されている。ここでは、図 4 に示  
15 すように、D R C 番号 1 ~ 5 の真ん中に当たる D R C 番号 3 を基準として、  
D R C 番号 3 より小さい番号を示す D R C 信号はパイロット信号の送信パワより低い送信パワで送信され、D R C 番号 3 より大きい番号を示す D R C 信号はパイロット信号の送信パワより高い送信パワで送信されるように設定されている。つまり、ここでは、所定の回線品質（ここでは、D R C 番号 3 の  
20 D R C 番号に対応する回線品質）よりも悪い回線品質を示す D R C 信号はパイロット信号の送信パワより低い送信パワで送信され、所定の回線品質よりも良い回線品質を示す D R C 信号はパイロット信号の送信パワより高い送信パワで送信されるように設定されている。

- このように、本実施の形態では、従来の D R C 信号の送信パワ（つまり、  
25 ここでのパイロット信号の送信パワ）に比べ、送信パワを増加させる D R C 信号と送信パワを減少させる D R C 信号とを設定し、D R C 信号の送信パワの増減値の合計を  $\pm 0$  dB とすることにより、D R C 信号の平均的な送信パ

ワを従来と比べ一定に保ったまま、下り回線の回線品質が良いことを示すD R C信号ほど誤りにくくすることができる。つまり、上り回線のキャパシティを従来に比べ減少させることなく、下り回線の回線品質が良いことを示すD R C信号ほど誤りにくくすることができる。

- 5      また、このように、下り回線の回線品質が悪いことを示すD R C信号（図4においては、D R C番号1および2のD R C信号）は従来に比べ低い送信パワで送信されるため、基地局から離れた位置に存在し、下り回線の回線品質が悪いことを示すD R C信号を送信する可能性が高い通信端末においては、消費電力を削減することができる。つまり、下り回線の回線品質が悪いこと
- 10    を示すD R C信号を送信する通信端末では、従来そもそも高い送信パワでD R C信号を送信していたのに対して、本実施の形態によれば、D R C信号の送信パワをその高い送信パワよりも低くすることができるので、通信端末の消費電力を大きく削減することができる。

- なお、下り回線の回線品質が悪いことを示すD R C信号は基地局において
- 15    選択される頻度がそもそも低いため、このように下り回線の回線品質が悪いことを示すD R C信号を従来よりも低い送信パワで送信しても、スループットの低下に与える影響はほとんどない。

- また、本実施の形態では、上り回線の回線品質が良いことを示すD R C信号（図4においては、D R C番号4および5のD R C信号）は、従来に比べ
- 20    高い送信パワで送信される。しかし、上り回線の回線品質が良いことを示すD R C信号は、基地局の比較的近くに存在する通信端末から送信される可能性が高い。また、上り回線で通常行われているパイロット信号に対する送信パワ制御により、基地局の比較的近くに存在する通信端末から送信されるパイロット信号の送信パワ（つまり、従来のD R C信号の送信パワ）は、そも
- 25    とも低い。よって、上り回線の回線品質が良いことを示すD R C信号を送信する通信端末では、従来そもそも低かったD R C信号の送信パワが増加しても、D R C信号の送信パワは依然として低く消費電力は依然として低いため、

電力消費に与える影響はほとんどない。

D R C パワ制御部 2 0 5 においては、パイロットパワ制御部 2 0 9 から出力されたパイロット信号の送信パワが送信パワテーブル 2 0 6 に設定された比によって調節されることにより、D R C 信号の送信パワが求められる。そして、D R C パワ制御部 2 0 5 においては、拡散部 2 0 4 から出力された D R C 信号の送信パワがこの求められた送信パワに制御され、送信パワ制御後の D R C 信号が多重部 2 1 0 に出力される。具体的には、例えば、D R C 信号作成部 2 0 2 から D R C パワ制御部 2 0 5 に出力された D R C 信号の番号が 5 である場合には、拡散部 2 0 4 から出力された D R C 信号の送信パワは、パイロットパワ制御部 2 0 9 から出力されたパイロット信号の送信パワよりも 2 dB 低い送信パワに制御される。

送信パワ制御後の D R C 信号は、多重部 2 1 0 においてパイロット信号と多重され、送信 R F 部 2 1 1 にて無線周波数に周波数変換され、共用器 2 1 2 を介してアンテナ 2 1 3 から基地局に無線送信される。

通信端末から無線送信された信号は、基地局のアンテナ 1 1 1 に受信され、共用器 1 1 0 を介して受信 R F 部 1 1 2 に入力される。受信 R F 部 1 1 2 に入力された信号は、ベースバンドに周波数変換され、逆拡散部 1 1 3 にて D R C 信号を拡散している拡散コードで逆拡散され、復調部 1 1 4 および受信パワ算出部 1 1 5 に出力される。

復調部 1 1 4 では、逆拡散部 1 1 3 からの出力信号が復調されて D R C 信号が抽出され、割り当て部 1 0 1 に出力される。

ここで、通信端末では、下り回線の回線品質が悪いことを示す D R C 信号は従来に比べ低い送信パワで送信されるため、基地局では下り回線の回線品質が悪いことを示す D R C 信号が誤って受信される確率が高くなる。また、誤って受信された D R C 信号に基づいて通信リソースの割り振りが行われると、上述したように、下り回線のスループットが低下する。

そこで、受信パワ算出部 1 1 5 では、逆拡散後の D R C 信号の受信パワが

測定され、不使用D R C検出部 1 1 6 に出力される。不使用D R C検出部 1 1 6 には、下り回線の回線品質が最も悪いことを示すD R C信号（図 4 では、D R C番号 1 のD R C信号）に誤りが発生しない最低の受信パワがしきい値として予め設定されている。そして、不使用D R C検出部 1 1 6 では、この

5 しきい値よりも小さい受信パワのD R C信号が検出されて、検出結果が割り当て部 1 0 1 に出力される。不使用D R C検出部 1 1 6 で検出されたD R C信号は、割り当て部 1 0 1 が通信リソースの割り振りを決定する際に用いないD R C信号である。

割り当て部 1 0 1 では、復調部 1 1 4 で抽出されたD R C信号から不使用

10 D R C検出部 1 1 6 で検出されたD R C信号が除外された残りのD R C信号に基づいて各通信端末への通信リソースの割り振りが決定される。

このように、本実施の形態に係る基地局では、下り回線の回線品質が最も悪いことを示すD R C信号が誤って受信されない最低の受信パワよりも低い受信パワのD R C信号を除外する。すなわち、本実施の形態に係る基地局で

15 は、誤りが発生しやすい通知信号を除外して下り回線の通信リソースの割り振りを決定する。このため、本実施の形態に係る基地局よれば、下り回線の回線品質が悪いことを示すD R C信号が従来に比べ低い送信パワで送信されても、誤ったD R C信号に基づいて通信リソースの割り振りが決定されることを防止することができる。

20 このように、本実施の形態によれば、下り回線の回線品質が良いことを示すD R C信号ほど送信パワを高くして送信するため、下り回線の回線品質が良いことを示すD R C信号ほど誤りにくくすることができ、基地局において選択される頻度の高いD R C信号の誤り発生率を低くすることができる。これにより、誤ったD R C信号に基づいて通信リソースの割り振りが決定され

25 る可能性を低くすることができるので、下り回線のスループットの低下を防止することができる。

なお、本実施の形態に係る基地局を図 5 に示すような構成としてもよい。

図5は、本発明の実施の形態1に係る基地局の別の構成を示すブロック図である。すなわち、図2に示した受信パワ算出部115および不使用DRC検出部116に代えて、尤度算出部301および不使用DRC検出部302を備えて基地局を構成するようにしてもよい。なお、以下の説明では、図2と  
5 同じ構成には図2と同じ符号を付してその詳しい説明は省略する。

図5において、尤度算出部301は、DRC信号の確からしさの度合いを示す尤度を算出し、不使用DRC検出部302に出力する。不使用DRC検出部302には、下り回線の回線品質が最も悪いことを示すDRC信号に誤りが発生しない最低の尤度がしきい値として予め設定されている。そして、  
10 不使用DRC検出部302では、このしきい値よりも小さい尤度のDRC信号が検出されて、検出結果が割り当て部101に出力される。

このように本実施の形態に係る基地局を図5に示すような構成とした場合にも、上記同様の効果を呈する。

## 15 (実施の形態2)

本発明の実施の形態2に係る通信端末は、下り回線の回線品質が良いことを示すDRC信号ほど、他のDRC信号の符号語に対する最小符号間距離が大きい符号語に変換して送信するものである。

図6は、本発明の実施の形態2に係る通信端末の構成を示すブロック図である。この図に示すように本実施の形態に係る通信端末は、図3に示す変調部203、拡散部204、DRCパワ制御部205および送信パワテーブル206に代えて、符号語選択部401、符号語テーブル402、変調部403および拡散部404を備えて構成される。なお、以下の説明では、図3と同じ構成には図3と同じ符号を付してその詳しい説明は省略する。  
20

25 符号語選択部401は、符号語テーブル402を参照して、DRC信号作成部202で作成されたDRC信号を、所定の符号語に変換して、変調部403に出力する。変調部403は、符号語を変調して拡散部404に出力す

る。拡散部 4 0 4 は、変調部 4 0 3 からの出力信号を拡散して多重部 2 1 0 に出力する。

次に、本実施の形態に係る通信端末の動作について説明する。

まず、符号語テーブル 4 0 2 の設定内容について説明する。図 7 は、本発  
5 明の実施の形態 2 に係る通信端末が備える符号語テーブルの内容を示す図である。

符号語テーブル 4 0 2 には、D R C 番号と D R C 信号変換後の符号語との  
対応関係が示されており、D R C 番号が大きくなるほど、最小符号間距離が  
大きい符号語に変換されるように設定されている。なお、ここでは、D R C  
10 番号には 1 ~ 5 が使用されており、番号が大きいほど下り回線の回線品質が  
良いことを示すものとする。つまり、符号語テーブル 4 0 2 には、下り回線  
の回線品質が良いことを示す D R C 信号ほど、最小符号間距離が大きい符号  
語に変換されるように設定されている。

ここで、符号間距離とは、各符号語間において相違するビット数であり、  
15 最小符号間距離とは、ある符号語が他のすべての符号語に対して相違する最  
低のビット数である。具体的には、D R C 番号 5 の D R C 信号に対応する符  
号語は '111111111' であり、この符号語 '111111111' は、D R C 番号 1 ~ 4 の  
D R C 信号に対応する符号語のいずれと比較した場合にも、最低でも 6 ビッ  
ト相違する。よって、D R C 番号 5 の D R C 信号に対応する符号語の最小符  
20 号間距離は 6 である。同様に、D R C 番号 4 の D R C 信号に対応する符号語  
の最小符号間距離は 3 である。

よって、D R C 番号 5 の D R C 信号に対応する符号語は、D R C 番号 4 の  
D R C 信号に対応する符号語よりも、他の符号語に誤りにくくなる。つまり、  
最小符号間距離が大きい符号語ほど、他の符号語に誤りにくくなる。

25 符号語選択部 4 0 1 においては、D R C 信号作成部 2 0 2 から出力された  
D R C 信号が符号語テーブル 4 0 2 に設定された符号語に変換されて、変調  
部 4 0 3 に出力される。具体的には、例えば、D R C 信号作成部 2 0 2 から

出力されたD R C信号が番号5のD R C信号である場合には、符号語'111111111'に変換される。

変換後の符号語は、変調部403において変調され、拡散部404において拡散される。拡散後の符号語は、多重部210においてパイロット信号と  
5 多重され、送信R F部211にて無線周波数に周波数変換され、共用器212を介してアンテナ213から基地局に無線送信される。

このように、本実施の形態によれば、下り回線の回線品質が良いことを示すD R C信号ほど、他のD R C信号の符号語に対する最小符号間距離が大きい符号語に変換して送信するため、下り回線の回線品質が良いことを示すD  
10 R C信号ほど誤りにくくすることができ、基地局において選択される頻度の高いD R C信号の誤り発生率を低くすることができる。これにより、誤ったD R C信号に基づいて通信リソースの割り振りが決定される可能性を低くすることができるので、下り回線のスループットの低下を防止することができる。

15 また、本実施の形態によれば、D R C信号の送信パワを増加させることなく基地局において選択される頻度の高いD R C信号の誤り発生率を低くすることができるため、通信端末の消費電力を増加させることなく、誤ったD R C信号に基づいて通信リソースの割り振りが決定される可能性を低くすることができる。

20 また、本実施の形態によれば、符号語の符号長を一定にしたまま各D R C信号に対応する符号語の誤りにくさを変えることができるため、基地局では、各符号長に応じて復調系統を複数備える必要がないので、基地局の装置構成を簡易にすることができる。

### 25 (実施の形態3)

本発明の実施の形態3に係る基地局は、通信リソースの割り振りが決定される際に除外されるD R C信号の発生率に基づいてテーブル書き換えのため

次に、上記図 8 に示した基地局と上記図 9 に示した通信端末との間における信号の送受の手順について説明する。

まず、基地局の検出率算出部 5 0 1 において、不使用 D R C 検出部 1 1 6 での検出率が算出されて、制御信号作成部 5 0 2 へ出力される。検出率は、  
5 例えば、所定の時間における検出回数から算出することができる。

制御信号作成部 5 0 2 は、検出率の所定のしきい値が設定されており、このしきい値と検出率算出部 5 0 1 で算出された検出率とが比較される。そして、検出率算出部 5 0 1 で算出された検出率がしきい値以上となる場合には、送信パワテーブル 2 0 6 に設定されている送信パワをすべて増加させるよう  
10 に指示するテーブル書き換え信号が作成され、変調部 5 0 3 に出力される。つまり、制御信号作成部 5 0 2 では、通信リソースの割り振りが決定される際に除外される D R C 信号の発生率が所定のしきい値以上となる場合には、各 D R C 信号の送信パワを現在よりも一律に増加させるように指示するテーブル書き換え信号が作成される。

15 テーブル書き換え信号は、変調部 5 0 3 にて変調され、拡散部 5 0 4 にて拡散され、多重部 1 0 8 に出力される。拡散後のテーブル書き換え信号は、多重部 1 0 8 にて送信データおよびパイロット信号と多重され、送信 R F 部 1 0 9 にて無線周波数に周波数変換され、共用器 1 1 0 を介してアンテナ 1 1 1 から各通信端末に無線送信される。

20 基地局から無線送信された無線信号は、通信端末のアンテナ 2 1 3 に受信され、共用器 2 1 2 を介し、受信 R F 部 2 1 4 にてベースバンドに周波数変換される。ベースバンド信号は、逆拡散部 6 0 1 にて逆拡散され、復調部 6 0 2 にて復調されてテーブル書き換え信号が抽出される。抽出されたテーブル書き換え信号は、テーブル書き換え部 6 0 3 へ出力される。

25 そしてテーブル書き換え部 6 0 3 によって、テーブル書き換え信号に従って送信パワテーブル 2 0 6 の内容が書き換えられる。つまり、テーブル書き換え部 6 0 3 は、送信パワテーブル 2 0 6 に設定されている送信パワをすべ



の制御信号を通信端末へ送信し、本発明の実施の形態3に係る通信端末は、基地局から送信された制御信号に基づいて送信パワテーブルまたは符号語テーブルの内容を書き換えるものである。

図8は、本発明の実施の形態3に係る基地局の構成を示すブロック図である。この図に示すように本実施の形態に係る基地局は、図2に示す構成に、さらに検出率算出部501、制御信号作成部502、変調部503および拡散部504を備えて構成される。なお、以下の説明では、図2と同じ構成には図2と同じ符号を付してその詳しい説明は省略する。

図8において、検出率算出部501は、不使用DRC検出部116での検出率を算出し、制御信号作成部502に出力する。すなわち、検出率算出部501は、通信リソースの割り振りが決定される際に除外されるDRC信号の発生率を算出する。制御信号作成部502は、検出率に基づいてテーブル書き換えのための制御信号（以下「テーブル書き換え信号」という。）を作成し変調部503へ出力する。変調部503は、テーブル書き換え信号を変調し、拡散部504へ出力する。拡散部504は、変調部503からの出力信号を拡散して多重部108に出力する。

図9は、本発明の実施の形態3に係る通信端末の構成を示すブロック図である。この図に示すように本実施の形態に係る通信端末は、図3に示す構成に、さらに拡散部601、復調部602およびテーブル書き換え部603を備えて構成される。なお、以下の説明では、図3と同じ構成には図3と同じ符号を付してその詳しい説明は省略する。

図9において、逆拡散部601は、ベースバンド信号を、テーブル書き換え信号を拡散している拡散コードで逆拡散して復調部602に出力する。復調部602は、逆拡散部601からの出力信号を復調してテーブル書き換え信号を抽出して、テーブル書き換え部603へ出力する。テーブル書き換え部603は、テーブル書き換え信号に従って送信パワテーブルの内容を書き換える。

次に、上記図 8 に示した基地局と上記図 9 に示した通信端末との間における信号の送受の手順について説明する。

- まず、基地局の検出率算出部 5 0 1 において、不使用 D R C 検出部 1 1 6 での検出率が算出されて、制御信号作成部 5 0 2 へ出力される。検出率は、
- 5 例えば、所定の時間における検出回数から算出することができる。

- 制御信号作成部 5 0 2 は、検出率の所定のしきい値が設定されており、このしきい値と検出率算出部 5 0 1 で算出された検出率とが比較される。そして、検出率算出部 5 0 1 で算出された検出率がしきい値以上となる場合には、送信パワテーブル 2 0 6 に設定されている送信パワをすべて増加させるよう
- 10 に指示するテーブル書き換え信号が作成され、変調部 5 0 3 に出力される。つまり、制御信号作成部 5 0 2 では、通信リソースの割り振りが決定される際に除外される D R C 信号の発生率が所定のしきい値以上となる場合には、各 D R C 信号の送信パワを現在よりも一律に増加させるように指示するテーブル書き換え信号が作成される。

- 15 テーブル書き換え信号は、変調部 5 0 3 にて変調され、拡散部 5 0 4 にて拡散され、多重部 1 0 8 に出力される。拡散後のテーブル書き換え信号は、多重部 1 0 8 にて送信データおよびパイロット信号と多重され、送信 R F 部 1 0 9 にて無線周波数に周波数変換され、共用器 1 1 0 を介してアンテナ 1 1 1 から各通信端末に無線送信される。

- 20 基地局から無線送信された無線信号は、通信端末のアンテナ 2 1 3 に受信され、共用器 2 1 2 を介し、受信 R F 部 2 1 4 にてベースバンドに周波数変換される。ベースバンド信号は、逆拡散部 6 0 1 にて逆拡散され、復調部 6 0 2 にて復調されてテーブル書き換え信号が抽出される。抽出されたテーブル書き換え信号は、テーブル書き換え部 6 0 3 へ出力される。

- 25 そしてテーブル書き換え部 6 0 3 によって、テーブル書き換え信号に従って送信パワテーブル 2 0 6 の内容が書き換えられる。つまり、テーブル書き換え部 6 0 3 は、送信パワテーブル 2 0 6 に設定されている送信パワをすべ

て増加させる。

なお、上記説明では、テーブル書き換え部 6 0 3 が送信パワテーブル 2 0 6 の内容を書き換える構成としたが、本実施の形態を実施の形態 2 に係る通信端末に適用し、テーブル書き換え部 6 0 3 が図 6 に示す符号語テーブル 4 5 0 2 の内容を書き換える構成としてもよい。

この場合、本実施の形態に係る基地局の制御信号作成部 5 0 2 は、検出率算出部 5 0 1 で算出された検出率がしきい値以上となる場合には、符号語テーブル 4 0 2 に設定されている符号語の最小符号間距離をすべて大きくするように指示するテーブル書き換え信号を作成する。つまり、制御信号作成部 10 5 0 2 は、通信リソースの割り振りが決定される際に除外される D R C 信号の発生率が所定のしきい値以上となる場合には、各 D R C 信号に対応する符号語の最小符号間距離を現在よりも一律に大きくするように指示するテーブル書き換え信号を作成する。そして、通信端末のテーブル書き換え部 6 0 3 は、テーブル書き換え信号に従って符号語テーブル 4 0 2 の内容を書き換える。つまり、テーブル書き換え部 6 0 3 は、符号語テーブル 4 0 2 に設定さ 15 れている符号語を、現在よりも最小符号間距離をすべて大きくした符号語に書き換える。

このように本実施の形態では、通信リソースの割り振りが決定される際に除外される D R C 信号の発生率に基づいて送信パワテーブルまたは符号語テーブル 20 の内容を書き換える。換言すれば、本実施の形態では、通信環境の変動に対応して適応的に送信パワテーブルまたは符号語テーブルの内容を書き換える。つまり、本実施の形態によれば、通信環境が悪化して通信リソースの割り振りが決定される際に除外される D R C 信号の発生率が所定のしきい値以上となった場合に、各 D R C 信号の送信パワを増加させ、または各 D R C 信号に対応する符号語の最小符号間距離を大きくするため、通信環境が悪 25 化した場合にも D R C 信号の誤り発生率を抑えることができる。

なお、本実施の形態では、検出率の所定のしきい値は、通信システムが適

用される環境を考慮して適宜定められる。

また、本実施の形態では、制御信号作成部 502 にさらに 2 つ目の所定のしきい値を設定し、検出率算出部 501 で算出された検出率がこの 2 つ目のしきい値よりも小さくなる場合には、送信パワテーブル 206 に設定されている送信パワをすべて減少させるように指示するテーブル書き換え信号を作成するようにしてもよい。これにより、DRC 信号の受信品質が過剰となる場合には DRC 信号の送信パワを下げるため、通信端末の消費電力を削減することができる。

また、本実施の形態では、不使用 DRC 検出部 116 での検出率に基づいてテーブルの書き換えを行ったが、移動局から送信された DRC 信号のうち通信リソースの割り振りの決定に用いられた DRC 信号の分布に基づいて、その分布が最適な分布になるようにテーブルを書き換えるようにしてもよい。この場合には、図 8 に示す基地局は、検出率算出部に代えて使用 DRC 分布判定部を備えて構成され、使用 DRC 分布判定部は、復調部 114 から出力される DRC 信号と不使用 DRC 検出部 116 から出力される検出結果とから通信リソースの割り振りの決定に用いられた DRC 信号の分布を判定し、その分布を示す信号を制御信号作成部 502 に出力する。また、制御信号作成部 502 は、使用 DRC 分布判定部から出力された分布を示す信号に基づいて、テーブル書き換え信号を作成する。

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#### (実施の形態 4)

本発明の実施の形態 4 に係る通信端末は、下り回線の回線品質が良いことを示す CIR 情報ほど送信パワを高くして送信するものである。また、本発明の実施の形態 4 に係る基地局は、所定のしきい値より受信パワが低い CIR 情報を除外して、通信リソースの割り当てを行うものである。

上記実施の形態 1 では、通信端末が、CIR に基づいて通信モードを決定して、その決定した通信モードに対応する DRC 信号を所定の送信パワで基

地局に送信し、基地局が、D R C 信号に基づいて各通信端末への通信リソースの割り振りを決定した。D R C 信号は、下り回線の回線品質を示す他の情報（例えば、下り回線のC I R）に比べ非常に少ないビット数で表すことができるため、D R C 信号を用いることにより、上り回線の回線使用効率を高めることができるという長所がある。一方、通信端末は、通信モードを決定してD R C 信号を作成する必要があるため、通信モード決定用のテーブルやD R C 信号作成用のテーブル等を備える必要があるため、通信端末の消費電力が増大し、装置規模が大きくなってしまうという短所がある。

そこで、本実施の形態では、通信端末が、C I R 情報を所定の送信パワで基地局に送信し、基地局が、C I R 情報に基づいて通信モードを決定した後、各通信端末への通信リソースの割り振りを決定する。このようにすることにより、上り回線の回線使用効率が多少低くなってしまいう短所があるが、通信端末は、通信モードを決定してD R C 信号を作成する必要がなくなり、また、通信モード決定用のテーブルやD R C 信号作成用のテーブル等を備える必要がなくなるため、通信端末の消費電力を削減でき、装置規模を小さくすることができるという大きな長所がある。また、本実施の形態では、基地局において複数の端末のC I R 情報を比較して正確な通信モードを確実に決定することができるため、本実施の形態は、各通信端末においてC I R から通信モードを単純に決定することができない場合等に、特に有効である。

以下、本実施の形態に係る基地局および本実施の形態に係る通信端末について説明する。図10は、本発明の実施の形態4に係る基地局の構成を示すブロック図である。なお、以下の説明では、図2と同じ構成には図2と同じ符号を付してその詳しい説明は省略する。

図10において、復調部701は、逆拡散部113からの出力信号を復調してC I R 情報を含む信号（以下、「C I R 信号」という。）を抽出し、割り当て部704に出力する。

受信パワ算出部702は、逆拡散後のC I R 信号の受信パワを測定し、不

使用CIR検出部703に出力する。不使用CIR検出部703には、実施の形態1と同様に所定のしきい値が設定されており、このしきい値よりも低い受信パワのCIR信号を検出し、検出結果を割り当て部704に出力する。

5      なお、逆拡散部113、復調部701、受信パワ算出部702および不使用CIR検出部703は、通信端末ごとに設けられており、それぞれの復調部701から通信端末ごとのCIR信号が出力され、それぞれの不使用CIR検出部703から通信端末ごとの検出結果が出力される。

10     割り当て部704は、復調部701で抽出されたCIR信号から不使用CIR検出部703で検出されたCIR信号を除外したCIR信号が示すCIR情報に基づいて各通信端末への通信リソースの割り振りを決定する。そして、割り当て部101は、決定した通信リソースの割り振りに基づいて、バッファ102に下り送信データの出力を指示し、CIR情報を通信モード決定部705に出力する。

15     通信モード決定部705は、割り当て部704から出力されたCIR情報に基づいて、変調方式と符号化方式の組み合わせを示す通信モードを決定して、その通信モードを示す信号を変調部706に出力する。また、通信モード決定部705は、決定した通信モードに基づいて、適応符号化部103に下り送信データの符号化方式を指示し、適応変調部104に下り送信データの変調方式を指示する。変調部706は、通信モードを示す信号を変調し、  
20     拡散部707に出力する。拡散部707は、変調部706からの出力信号を拡散して多重部108に出力する。

図11は、本発明の実施の形態4に係る通信端末の構成を示すブロック図である。なお、以下の説明では、図3と同じ構成には図3と同じ符号を付してその詳しい説明は省略する。

25     図11において、CIR情報作成部801は、CIR測定部219で測定されたCIRを示すCIR信号を作成して、変調部802およびCIR情報パワ制御部804に出力する。変調部802は、CIR信号を変調して拡散

部 8 0 3 に出力する。拡散部 8 0 3 は、変調部 8 0 2 からの出力信号を拡散して C I R 情報パワ制御部 8 0 4 に出力する。C I R 情報パワ制御部 8 0 4 は、C I R の大きさと送信パワとの対応関係が示されている送信パワテーブル 8 0 5 を参照して、パイロットパワ制御部 2 0 9 から出力されたパイロット信号の送信パワに基づいて C I R 信号の送信パワを制御し、送信パワ制御後の C I R 信号を多重部 2 1 0 に出力する。

逆拡散部 8 0 7 は、ベースバンド信号を、通信モードを示す信号を拡散している拡散コードで逆拡散して、逆拡散後の信号を通信モード検出部 8 0 8 に出力する。通信モード検出部 8 0 8 は、逆拡散部 8 0 7 からの出力信号を復調して、通信モードを検出する。そして、通信モード検出部 8 0 8 は、検出した通信モードに基づいて、適応復調部 2 1 6 に下り受信データの復調方式を指示し、適応復号化部 2 1 7 に下り受信データの復号化方式を指示する。

次に、上記図 1 0 に示した基地局と上記図 1 1 に示した通信端末との間における信号の送受の手順について説明する。

まず、図 1 1 に示す通信端末において、C I R 測定部 2 1 9 では、逆拡散部 2 1 8 から出力されたパイロット信号の C I R が測定され、C I R 情報作成部 8 0 1 にて、C I R 信号が作成される。

C I R 信号は、変調部 8 0 2 にて変調され、拡散部 8 0 3 にて拡散され、C I R 情報パワ制御部 8 0 4 に出力される。送信パワテーブル 8 0 5 には、実施の形態 1 と同様に、C I R の大きさと C I R 信号の送信パワとの対応関係が示されており、C I R が大きくなるほど C I R 信号の送信パワが高くなるように設定されている。つまり、送信パワテーブル 8 0 5 には、実施の形態 1 と同様に、下り回線の回線品質が良いことを示す C I R 信号ほど送信パワが高くなるように設定されている。また、送信パワテーブル 8 0 5 に設定される C I R 信号の送信パワは、実施の形態 1 と同様に、パイロット信号の送信パワとの比によって表されている。

C I R 情報パワ制御部 8 0 4 においては、パイロットパワ制御部 2 0 9 か

ら出力されたパイロット信号の送信パワが送信パワテーブル805に設定された比によって調節されることにより、CIR信号の送信パワが求められる。そして、CIR情報パワ制御部804においては、拡散部803から出力されたCIR信号の送信パワがこの求められた送信パワに制御され、送信パワ制御後のCIR信号が多重部210に出力される。

送信パワ制御後のCIR信号は、多重部210においてパイロット信号と多重され、送信RF部211にて無線周波数に周波数変換され、共用器212を介してアンテナ213から基地局に無線送信される。

図10に示す基地局では、復調部701にて、逆拡散部113からの出力信号が復調されてCIR信号が抽出され、割り当て部704に出力される。受信パワ算出部702では、逆拡散後のCIR信号の受信パワが測定され、不使用CIR検出部703に出力される。不使用CIR検出部703には、実施の形態1と同様に、下り回線の回線品質が最も悪いことを示すCIR信号に誤りが発生しない最低の受信パワがしきい値として予め設定されている。そして、不使用CIR検出部703では、このしきい値よりも小さい受信パワのCIR信号が検出されて、検出結果が割り当て部704に出力される。不使用CIR検出部703で検出されたCIR信号は、割り当て部704が通信リソースの割り振りを決定する際に用いないCIR信号である。

割り当て部704では、復調部701で抽出されたCIR信号から不使用CIR検出部703で検出されたCIR信号が除外された残りのCIR信号が示すCIRに基づいて各通信端末への通信リソースの割り振りが決定され、CIR情報が通信モード決定部705に出力される。

通信モード決定部705では、割り当て部704から出力されたCIR情報に基づいて、通信モードが決定され、その通信モードを示す信号が変調部706に出力される。通信モードを示す信号は、変調部706にて変調され、拡散部707にて拡散され、多重部108にて送信データおよびパイロット信号と多重され、送信RF部109にて無線周波数に周波数変換され、共用



器 1 1 0 を介してアンテナ 1 1 1 から通信端末に無線送信される。

図 1 1 に示す通信端末では、逆拡散部 8 0 7 にて、ベースバンド信号が逆  
拡散され、逆拡散後の信号が通信モード検出部 8 0 8 に出力される。通信モ  
ード検出部 8 0 8 では、逆拡散部 8 0 7 からの出力信号が復調されて通信モ  
ードが検出され、検出された通信モードに基づいて、適応復調部 2 1 6 に下  
り受信データの復調方式が指示され、適応復号化部 2 1 7 に下り受信データ  
の復号化方式が指示される。

このように、本実施の形態によれば、実施の形態 1 と同様に、下り回線の  
回線品質が良いことを示す C I R 信号ほど送信パワを高くして送信するため、  
基地局において使用される頻度の高い C I R 情報の誤り発生率を低くするこ  
とができる。これにより、誤った C I R 情報に基づいて通信リソースの割り  
振りが決定される可能性を低くすることができるので、下り回線のスループ  
ットの低下を防止することができる。

また、本実施の形態によれば、実施の形態 1 と同様に、下り回線の回線品  
質が最も悪いことを示す C I R 信号が誤って受信されない最低の受信パワよ  
りも低い受信パワの C I R 信号を除外するため、下り回線の回線品質が悪い  
ことを示す C I R 信号が従来に比べ低い送信パワで送信されても、誤った C  
I R 情報に基づいて通信リソースの割り振りが決定されることを防止するこ  
とができる。

なお、本実施の形態に係る基地局を図 1 2 に示すような構成としてもよい。  
図 1 2 は、本発明の実施の形態 4 に係る基地局の別の構成を示すブロック図  
である。すなわち、図 1 0 に示した受信パワ算出部 7 0 2 および不使用 C I  
R 検出部 7 0 3 に代えて、尤度算出部 9 0 1 および不使用 C I R 検出部 9 0  
2 を備えて基地局を構成するようにしてもよい。なお、以下の説明では、図  
1 0 と同じ構成には図 1 0 と同じ符号を付してその詳しい説明は省略する。

図 1 2 において、尤度算出部 9 0 1 は、C I R 信号の確からしさの度合い  
を示す尤度を算出し、不使用 C I R 検出部 9 0 2 に出力する。不使用 C I R

検出部 902 には、下り回線の回線品質が最も悪いことを示す CIR 信号に誤りが発生しない最低の尤度がしきい値として予め設定されている。そして、不使用 CIR 検出部 902 では、このしきい値よりも小さい尤度の CIR 信号が検出されて、検出結果が割り当て部 704 に出力される。

- 5      このように本実施の形態に係る基地局を図 12 に示すような構成とした場合にも、上記同様の効果を呈する。

(実施の形態 5)

- 本発明の実施の形態 5 に係る通信端末は、下り回線の回線品質が良いことを示す CIR 信号ほど、他の CIR 信号の符号語に対する最小符号間距離が  
10      大きい符号語に変換して送信するものである。

- 図 13 は、本発明の実施の形態 5 に係る通信端末の構成を示すブロック図である。この図に示すように本実施の形態に係る通信端末は、図 11 に示す変調部 802、拡散部 803、CIR 情報パワ制御部 804 および送信パワ  
15      テーブル 805 に代えて、符号語選択部 1001、符号語テーブル 1002、変調部 1003 および拡散部 1004 を備えて構成される。なお、以下の説明では、図 11 と同じ構成には図 11 と同じ符号を付してその詳しい説明は省略する。

- 符号語選択部 1001 は、符号語テーブル 1002 を参照して、CIR 情報作成部 801 で作成された CIR 信号を、所定の符号語に変換して、変調部 1003 に出力する。変調部 1003 は、符号語を変調して拡散部 1004 に出力する。拡散部 1004 は、変調部 1003 からの出力信号を拡散して多重部 210 に出力する。  
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次に、本実施の形態に係る通信端末の動作について説明する。

- 25      符号語テーブル 1002 には、上記実施の形態 2 と同様に、CIR の大きさと CIR 信号変換後の符号語との対応関係が示されており、CIR の大きさが大きくなるほど、最小符号間距離が大きい符号語に CIR 信号が変換

されるように設定されている。つまり、符号語テーブル1002には、下り回線の回線品質が良いことを示すCIR信号ほど、最小符号間距離が大きい符号語に変換されるように設定されている。

符号語選択部1001においては、CIR情報作成部801から出力されたCIR信号が符号語テーブル1002に設定された符号語に変換されて、  
5 変調部1003に出力される。変換後の符号語は、変調部1003において変調され、拡散部1004において拡散される。拡散後の符号語は、多重部210においてパイロット信号と多重され、送信RF部211にて無線周波数に周波数変換され、共用器212を介してアンテナ213から基地局に無線送信される。  
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このように、本実施の形態によれば、実施の形態2と同様に、下り回線の回線品質が良いことを示すCIR信号ほど、他のCIR信号の符号語に対する最小符号間距離が大きい符号語に変換して送信するため、基地局において使用される頻度の高いCIR情報の誤り発生率を低くすることができる。これにより、誤ったCIR情報に基づいて通信リソースの割り振りが決定される可能性を低くすることができるので、下り回線のスループットの低下を防止することができる。  
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また、本実施の形態によれば、実施の形態2と同様に、CIR信号の送信パワを増加させることなく基地局において使用される頻度の高いCIR情報の誤り発生率を低くすることができるため、通信端末の消費電力を増加させることなく、誤ったCIR情報に基づいて通信リソースの割り振りが決定される可能性を低くすることができる。  
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また、本実施の形態によれば、実施の形態2と同様に、符号語の符号長を一定にしたまま各CIR信号に対応する符号語の誤りにくさを変えることができるため、基地局では、各符号長に応じて復調系統を複数備える必要がないので、基地局の装置構成を簡易にすることができる。  
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## (実施の形態6)

本発明の実施の形態6～8に係る通信端末は、CIR情報のうち変化量が大きい情報ほど伝播路において誤りにくくして送信するものである。換言すれば、本発明の実施の形態6～8に係る通信端末は、CIR情報のうち大まかな値を示す情報ほど伝播路において誤りにくくして送信するものである。

ここで、「変化量が大きい情報」および「大まかな値を示す情報」とは、具体的には例えば、CIR値が少数値（例えば、8.7 dB）で示される場合には、整数部分（すなわち、ここでは'8'）のことである。この場合、整数部分の1単位あたりの変化量は1 dBであり、少数部分の1単位あたりの変化量は0.1 dBであるため、整数部分が「変化量が大きい情報」となる。したがって、基地局では、整数部分を誤って受信すると、少数部分を誤って受信した場合に比べて、誤りの度合いが大きくなってしまい、誤った通信モードが決定されてしまう可能性が高くなる。すなわち、下り回線のスループットが低下する可能性が高くなってしまう。

また、CIR情報は、通常、限られたビット数の符号語に変換されて基地局に送信される。また、CIR情報の送信に使用できる送信パワや拡散コードの拡散率にも制限がある。よって、CIR情報全体を誤りにくくすることは限界があり、難しい。

そこで、本発明の実施の形態6～8では、CIR情報の送信についての上記制限内で、CIR情報のうち「変化量が大きい情報」（すなわち、「大まかな値を示す情報」）だけでも正確に受信されるように、上記制限内で「変化量が大きい情報」ほど伝播路において誤りにくくして送信する。

以下、本発明の実施の形態6に係る通信端末について説明する。本発明の実施の形態6に係る通信端末は、CIR値のうち上位の桁の値ほど符号長が長い符号語に変換して送信するものである。

図14は、本発明の実施の形態6に係る通信端末の構成を示すブロック図である。なお、以下の説明では、図11と同じ構成には図11と同じ符号を

付して、その詳しい説明は省略する。

図14において、CIR信号作成部1101は、CIR測定部219で測定されたCIR値を符号語に変換してCIR信号を作成し、作成したCIR信号を多重部210に出力する。この際、CIR信号作成部1101は、CIR値のうち上位の桁の値ほど符号長が長い符号語に変換してCIR信号を作成する。

次いで、CIR信号作成部1101の構成について説明する。図15は、本発明の実施の形態6に係る通信端末のCIR信号作成部の構成を示すブロック図である。

図15において、上位桁情報生成部1201は、CIR測定部219から出力されたCIR値のうち上位の桁の値を6ビット符号化部1203に出力する。下位桁情報生成部1202は、CIR測定部219から出力されたCIR値のうち下位の桁の値を4ビット符号化部1204に出力する。具体的には、例えばCIR測定部219から出力されたCIR値が8.7dBであった場合には、上位桁情報生成部1201は、'8'という整数部分の値を6ビット符号化部1203に出力し、下位桁情報生成部1202は、'4'という少数部分の値を4ビット符号化部1204に出力する。

6ビット符号化部1203は、上位桁情報生成部1201から出力された値（ここでは、'8'）を6ビットの符号語に変換して、6ビットの符号語を時間多重部1205に出力する。4ビット符号化部1204は、下位桁情報生成部1202から出力された値（ここでは、'4'）を4ビットの符号語に変換して、4ビットの符号語を時間多重部1205に出力する。なお、ここでは、CIR値を示すのに使用できるビット数は10ビットであるものとする。

時間多重部1205は、1スロットの前半部分に6ビットの符号語を格納し、それに続く後半部分に4ビットの符号語を格納することにより、CIR値の整数部分の符号語（すなわち、上位の桁の値に対応する符号語）とCIR

R 値の少数部分の符号語（すなわち、下位の桁の値に対応する符号語）とを時間多重する。そして、時間多重部 1 2 0 5 は、時間多重した 1 0 ビットの符号語を C I R 信号として変調部 1 2 0 6 に出力する。なお、ここでは、1 0 ビットで 1 スロットが構成され、前半 6 ビットで C I R 値の整数部分を表し、後半 4 ビットで C I R 値の少数部分を表すものとする。

変調部 1 2 0 6 は、C I R 信号を変調して拡散部 1 2 0 7 に出力する。拡散部 1 2 0 7 は、変調部 1 2 0 6 からの出力信号を拡散して多重部 2 1 0 に出力する。

次いで、上記構成を有する通信端末の動作について説明する。

10      6 ビット符号化部 1 2 0 3 では、C I R 値のうち上位の桁の値（ここでは、'8'）が 6 ビットの符号語に変換される。一方、4 ビット符号化部 1 2 0 4 では、C I R 値のうち下位の桁の値（ここでは、'4'）が 4 ビットの符号語に変換される。

15      6 ビットで表される符号語の種類は  $2^6$  個であり、4 ビットで表される符号語の種類は  $2^4$  個であるため、6 ビットで表される符号語の方が各符号語間における最小符号間距離を大きくとることができる。よって、6 ビットで表される符号語の方が、4 ビットで表される符号語に比べて、他の符号語に誤りにくくなる。つまり、本実施の形態では、C I R 値のうち上位の桁の値の方が誤りにくくなる。

20      このように、本実施の形態に係る通信端末は、C I R 値を示すのに使用できる 1 0 ビットという制限内で、C I R 値のうち上位の桁の値ほど符号長が長い符号語に変換することにより、変化量が大きい上位の桁の値ほど誤りにくくして送信することができる。これにより、伝播路においてたとえ C I R 信号に誤りが発生したとしても、基地局では、C I R 値のうち上位の桁の値  
25      ほど正確に受信できる確率が高くなり、C I R 値の誤りの度合いを小さく抑えることができる。よって、基地局では、誤った通信モードが決定される可能性を低くすることができる。

なお、本実施の形態においては、上位の桁の値が6ビットの符号語に変換され下位の桁の値が4ビットの符号語に変換されるとして説明した。しかし、上位の桁の値に対応する符号語のビット数が下位の桁の値に対応する符号語のビット数よりも多ければ、これらのビット数に特に制限されない。

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(実施の形態7)

本発明の実施の形態7に係る通信端末は、CIR値のうち上位の桁の値ほど送信パワを高くして送信するものである。

本実施の形態に係る通信端末は、実施の形態6に係る通信端末と、CIR  
10 信号作成部1101の内部構成のみが相違するため、以下の説明では、CIR  
信号作成部1101についてのみ説明する。

図16は、本発明の実施の形態7に係る通信端末のCIR信号作成部の構成を示すブロック図である。なお、以下の説明では、図15と同じ構成には図15と同じ符号を付して、その詳しい説明は省略する。

15 図16に示すCIR信号作成部1101は、CIR測定部219で測定されたCIR値を符号語に変換した後、上位の桁の値ほど送信パワを高くしてCIR信号を作成する。

図16において、5ビット符号化部1301は、上位桁情報生成部1201から出力された値を5ビットの符号語に変換して、5ビットの符号語を変  
20 調部1303に出力する。また、5ビット符号化部1302は、下位桁情報生成部1202から出力された値を5ビットの符号語に変換して、5ビットの符号語を変調部1304に出力する。このように、本実施の形態では、上位の桁の値も下位の桁の値も共に5ビットの符号語に変換されるため、符号語の点からは、両者間において誤りにくさに差はない。

25 変調部1303は、5ビット符号化部1301から出力された符号語を変調して、上位桁拡散部1305に出力する。また、変調部1304は、5ビット符号化部1302から出力された符号語を変調して、下位桁拡散部13

06に出力する。

上位桁拡散部1305は、変調部1303からの出力信号を拡散して、上位桁パワ制御部1307に出力する。また、下位桁拡散部1306は、変調部1304からの出力信号を拡散して、下位桁パワ制御部1308に出力する。この際、上位桁拡散部1305と下位桁拡散部1306とは、拡散率が同じで違う種類の拡散コードを使用してそれぞれ拡散処理を行う。つまり、CIR値の上位の桁の値と下位の桁の値とは、拡散率が同じで違う種類の拡散コードで拡散される。

上位桁パワ制御部1307は、パイロットパワ制御部209から出力されたパイロット信号の送信パワに基づいて、CIR値の上位の桁の値を示す信号の送信パワを制御し、送信パワ制御後の信号をコード多重部1309に出力する。また、下位桁パワ制御部1308は、パイロットパワ制御部209から出力されたパイロット信号の送信パワに基づいて、CIR値の下位の桁の値を示す信号の送信パワを制御し、送信パワ制御後の信号をコード多重部1309に出力する。なお、送信パワの具体的な制御方法は後述する。

コード多重部1309は、CIR値の上位の桁の値を示す信号と下位の桁の値を示す信号とを同一時間帯で多重する。つまり、コード多重部1309は、上位の桁の値を示す信号と下位の桁の値を示す信号とをコード多重する。

次いで、上記構成を有する通信端末の動作について説明する。

上位桁パワ制御部1307では、CIR値の上位の桁の値を示す信号が、パイロット信号の送信パワよりも所定の値だけ高い送信パワに制御される。また、下位桁パワ制御部1308では、CIR値の下位の桁の値を示す信号が、パイロット信号の送信パワよりも所定の値だけ低い送信パワに制御される。つまり、CIR値のうち上位の桁の値ほど送信パワが高くなる。

このように、本実施の形態に係る通信端末は、CIR値のうち上位の桁の値ほど送信パワを高くして送信することにより、変化量が大きい上位の桁の値ほど誤りにくくして送信することができる。これにより、伝播路において



たとえC I R 信号に誤りが発生したとしても、基地局では、C I R 値のうち上位の桁の値ほど正確に受信できる確率が高くなり、C I R 値の誤りの度合いを小さく抑えることができる。よって、基地局では、誤った通信モードが決定される可能性を低くすることができる。

- 5      また、本実施の形態では、従来のC I R 信号の送信パワ（つまり、ここでのパイロット信号の送信パワ）に比べ、上位の桁の値については送信パワを高くし、下位の桁の値については上位の桁の値について高くした分だけ送信パワを低くして、送信パワの増減値の合計を±0 dB とすることにより、C I R 信号全体の送信パワを従来のC I R 信号の送信パワと同一に保つように
- 10    した。よって、本実施の形態によれば、C I R 信号の送信パワを従来と同一に保ったまま、上位の桁の値ほど誤りにくくして送信することができる。つまり、上り回線のキャパシティを従来に比べ減少させることなく、上位の桁の値ほど誤りにくくして送信することができる。

15      （実施の形態8）

本発明の実施の形態8に係る通信端末は、C I R 値のうち上位の桁の値ほど拡散率の高い拡散コードで拡散して送信するものである。

- 本実施の形態に係る通信端末は、実施の形態6および7に係る通信端末と、C I R 信号作成部1101の内部構成のみが相違するため、以下の説明では、
- 20    C I R 信号作成部1101についてのみ説明する。

図17は、本発明の実施の形態8に係る通信端末のC I R 信号作成部の構成を示すブロック図である。なお、以下の説明では、図15または図16と同じ構成には図15または図16と同じ符号を付して、その詳しい説明は省略する。

- 25    図17に示すC I R 信号作成部1101は、C I R 測定部219で測定されたC I R 値を符号語に変換した後、上位の桁の値ほど拡散率の高い拡散コードで拡散してC I R 信号を作成する。

図17において、上位桁拡散部1401は、変調部1303からの出力信号を拡散して、時間多重部1205に出力する。また、下位桁拡散部1402は、変調部1304からの出力信号を拡散して、時間多重部1205に出力する。この際、上位桁拡散部1401は、下位桁拡散部1402で使  
5 用されるのと同じ種類で、かつ下位桁拡散部1402での拡散率よりも高い拡散率の拡散コードで拡散処理を行う。つまり、CIR値の上位の桁の値は、下位の桁の値よりも高い拡散率で拡散される。これにより、上位の桁の値ほど伝搬路において誤りにくくなる。

このように、本実施の形態に係る通信端末は、CIR値のうち上位の桁の  
10 値ほど拡散率を高くして送信することにより、変化量が大きい上位の桁の値ほど誤りにくくして送信することができる。これにより、伝播路においてたとえCIR信号に誤りが発生したとしても、基地局では、CIR値のうち上位の桁の値ほど正確に受信できる確率が高くなり、CIR値の誤りの度合いを小さく抑えることができる。よって、基地局では、誤った通信モードが  
15 決定される可能性を低くすることができる。

また、本実施の形態では、従来のCIR信号の拡散率に比べ、上位の桁の値については拡散率を高くし、下位の桁の値については上位の桁の値について高くした分だけ拡散率を低くする。このようにして、1スロットで送れるデータ量を従来のCIR信号と同等に保つようにした。よって、本実施の形  
20 態によれば、1スロットで送れるデータ量を減少させることなく、上位の桁の値ほど誤りにくくして送信することができる。

なお、上記実施の形態1に係る通信端末と上記実施の形態2に係る通信端末とを組み合わせることも可能である。また、上記実施の形態4に係る通信端末と上記実施の形態5に係る通信端末とを組み合わせることも可能である。また、上記実施の形態6～8に係る通信端末をそれぞれ組み合わせることも可能である。また、上記実施の形態4に係る通  
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信端末が備える送信パワテーブルおよび上記実施の形態 5 に係る通信端末が備える符号語テーブルを、上記実施の形態 3 と同様にして、基地局からの制御信号に基づいて適宜書き換えることも可能である

- 5       また、上記実施の形態 1～8 では、パイロット信号が時間多重される場合について説明したが、上記実施の形態 1～8 はこれに限られるものではなく、パイロット信号がコード多重される場合にも適用可能なものである。

また、上記実施の形態 1～8 では、パイロット信号の受信品質を示す値として CIR を用いたが、これに限られるものではなく、受信品質を示せる値であればいかなる値を用いても構わない。

- 10       また、上記実施の形態 1～5 では、不使用 DRC 検出部および不使用 CIR 検出部に設定される所定のしきい値を固定値としたが、DRC 信号の誤り率や CIR 信号の誤り率に応じてしきい値を適応的に変化させる構成としてもよい。

- 15       また、上記実施の形態 6～8 では、各符号語を多重する際には、時間多重およびコード多重のどちらを用いて多重してもよい。

また、上記実施の形態 6～8 では、整数部分 1 桁、少数部分 1 桁で表される CIR 値を一例に挙げて説明した。しかし、これに限られるものではなく、上記実施の形態 6～8 は、複数の桁で表される CIR 値についてすべて実施可能なものである。

- 20       また、上記実施の形態 6～8 では、CIR 値の上位の桁の値を「変化量が大きい情報」として説明した。しかし、「変化量が大きい情報」は、必ずしも桁の大きさと対応するものではない。例えば、まず 2 dB ずつ変化する値で 0 dB, 2 dB, 4 dB, 6 dB... と大まかな値を示し、その大まかな値に対し 1 dB の増加の有無を示す情報を付加して CIR 値を整数で表す方法を探  
25       る場合には、2 dB ずつ変化する値が「変化量が大きい情報」となる。この方法では、例えば 7 dB の CIR 値を表す場合には、6 dB を示す情報と 1 dB の増加が有ることを示す情報との 2 つの情報が含まれた CIR 信号が基

地局に送信される。この際通信端末装置は、上記実施の形態 6～8 と同様にして、6 dB を示す情報を 1 dB の増加が有ることを示す情報よりも誤りにくくして送信する。

- 以上説明したように、本発明によれば、下り回線の回線品質に基づいて各
- 5 通信端末に通信リソースが割り振られる通信システムにおいて、下り回線のスループットの低下を防止することができる。

本明細書は、2000年8月2日出願の特願2000-234420および2000年9月20日出願の特願2000-285405に基づくものである。これらの内容はすべてここに含めておく。

## 請求の範囲

1. 通信リソースが下り回線の回線品質に基づいて各通信端末装置に割り振られる通信システムにおいて使用される通信端末装置であって、  
下り回線の回線品質を測定する測定器と、
- 5 回線品質を示す情報を基地局装置に通知するための通知信号を送信する送信器と、を具備し、  
前記送信器は、  
回線品質を示す情報のうち、基地局装置に誤って受信された場合に下り回線のスループットが低下する可能性が高い情報ほど伝播路において誤りにくくした通知信号を送信する、  
10 通信端末装置。
2. 前記送信器は、  
回線品質が良いことを示す通知信号ほど伝播路において誤りにくくして送信する、
- 15 請求項 1 記載の通信端末装置。
3. 前記送信器は、  
回線品質が良いことを示す通知信号ほど送信パワを高くして送信する、  
請求項 2 記載の通信端末装置。
4. パイロット信号の送信パワを制御する制御器を具備し、
- 20 前記送信器は、  
所定の回線品質よりも良い回線品質を示す通知信号をパイロット信号の送信パワよりも高い送信パワにし、所定の回線品質よりも悪い回線品質を示す通知信号をパイロット信号の送信パワよりも低い送信パワにして送信する、  
請求項 3 記載の通信端末装置。
- 25 5. 通知信号と送信パワとの対応関係を示すテーブルと、  
基地局装置からの制御信号に従って前記テーブルの内容を書き換える書き換え器と、を具備し、

- 前記送信器は、  
前記テーブルに基づいて通知信号を所定の送信パワに制御する、  
請求項 3 記載の通信端末装置。
6. 前記送信器は、
- 5 回線品質が良いことを示す通知信号ほど最小符号間距離が大きい符号語に変換して送信する、  
請求項 2 記載の通信端末装置。
7. 通知信号と符号語との対応関係を示すテーブルと、  
基地局装置からの制御信号に従って前記テーブルの内容を書き換える書き
- 10 換え器と、を具備し、  
前記送信器は、  
前記テーブルに基づいて通知信号を所定の符号語に変換する、  
請求項 6 記載の通信端末装置。
8. 回線品質に基づいて変調方式と符号化方式との組み合わせで示される
- 15 通信モードを決定する決定器を具備し、  
前記送信器は、  
通知信号を通信モードを示す信号とする、  
請求項 2 記載の通信端末装置。
9. 前記測定器は、
- 20 パイロット信号の受信品質を測定し、  
前記送信器は、  
通知信号をパイロット信号の受信品質の値を示す信号とする、  
請求項 2 記載の通信端末装置。
10. 前記測定器は、
- 25 パイロット信号の受信品質を測定し、  
前記送信器は、  
パイロット信号の受信品質の値を示すのに用いる情報のうち、変化量が

- きい情報ほど伝播路において誤りにくくした通知信号を送信する、  
請求項 1 記載の通信端末装置。
- 1 1. 前記送信器は、  
上位の桁の値ほど符号長が長い符号語に変換した通知信号を送信する、
- 5 請求項 1 0 記載の通信端末装置。
- 1 2. 前記送信器は、  
上位の桁の値ほど送信パワを高くした通知信号を送信する、  
請求項 1 0 記載の通信端末装置。
- 1 3. 前記送信器は、
- 10 上位の桁の値ほど拡散率の高い拡散コードで拡散した通知信号を送信する、  
請求項 1 0 記載の通信端末装置。
- 1 4. 請求項 1 記載の通信端末装置から送信された通知信号を受信する受信器と、  
通知信号の受信パワを測定する測定器と、
- 15 受信パワが所定のしきい値より小さい通知信号を検出する検出器と、  
受信された複数の通知信号から、検出された通知信号を除外した通知信号  
を用いて下り回線の通信リソースの割り振りを決定する決定器と、  
を具備する基地局装置。
- 1 5. 前記検出器での検出率を算出する算出器と、
- 20 検出率と所定のしきい値との比較結果に基づいて前記テーブルの書き換え  
を通信端末装置に指示する制御信号を送信する送信器と、  
を具備する請求項 1 4 記載の基地局装置。
- 1 6. 請求項 1 記載の通信端末装置から送信された通知信号を受信する受信器と、
- 25 通知信号の尤度を測定する測定器と、  
尤度が所定のしきい値より小さい通知信号を検出する検出器と、  
受信された複数の通知信号から、検出された通知信号を除外した通知信号

- を用いて下り回線の通信リソースの割り振りを決定する決定器と、  
を具備する基地局装置。
17. 前記検出器での検出率を算出する算出器と、  
検出率と所定のしきい値との比較結果に基づいて前記テーブルの書き換え
- 5 通信端末装置に指示する制御信号を送信する送信器と、  
を具備する請求項16記載の基地局装置。
18. 通信端末装置が、  
下り回線の回線品質を示す情報を基地局装置に通知するための通知信号を  
送信する際に、回線品質を示す情報のうち、基地局装置に誤って受信された
- 10 場合に下り回線のスループットが低下する可能性が高い情報ほど伝播路にお  
いて誤りにくくした通知信号を送信し、  
基地局装置が、  
通知信号に従って下り回線の通信リソースの割り振りを決定する、  
無線通信方法。
- 15 19. 通信端末装置が、  
回線品質が良いことを示す通知信号ほど伝播路において誤りにくくして送  
信する、  
請求項18記載の無線通信方法。
- 20 20. 通信端末装置が、  
パイロット信号の受信品質を測定し、受信品質の値を示すのに用いる情報  
のうち、変化量が大きい情報ほど伝播路において誤りにくくした通知信号を  
送信する、  
請求項18記載の無線通信方法。



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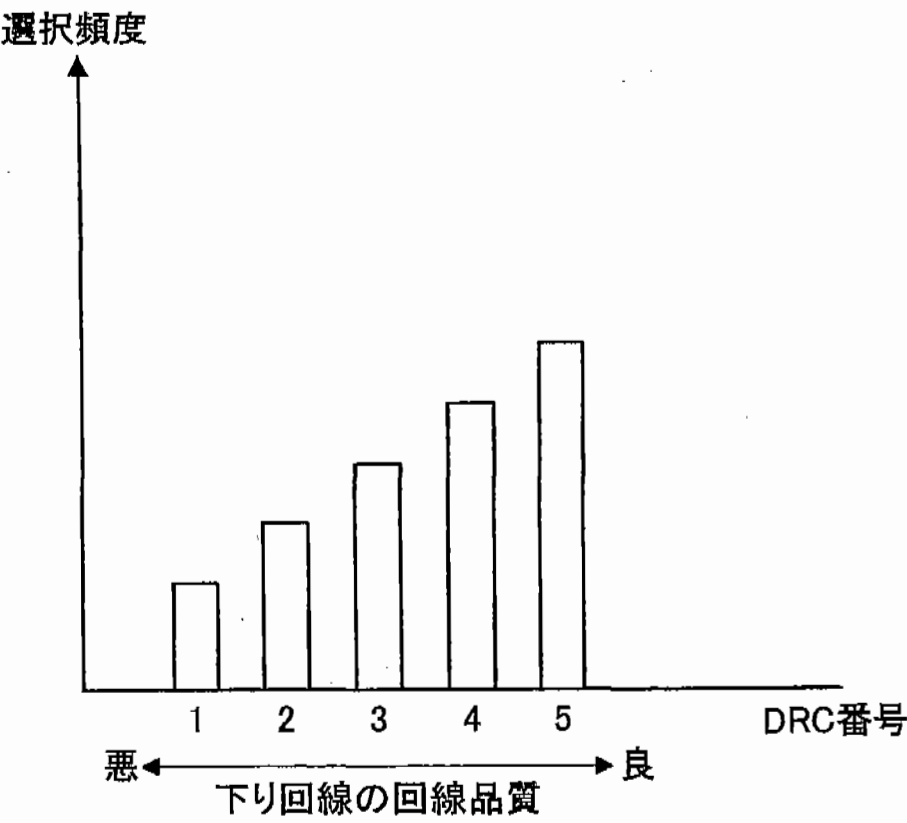


図1

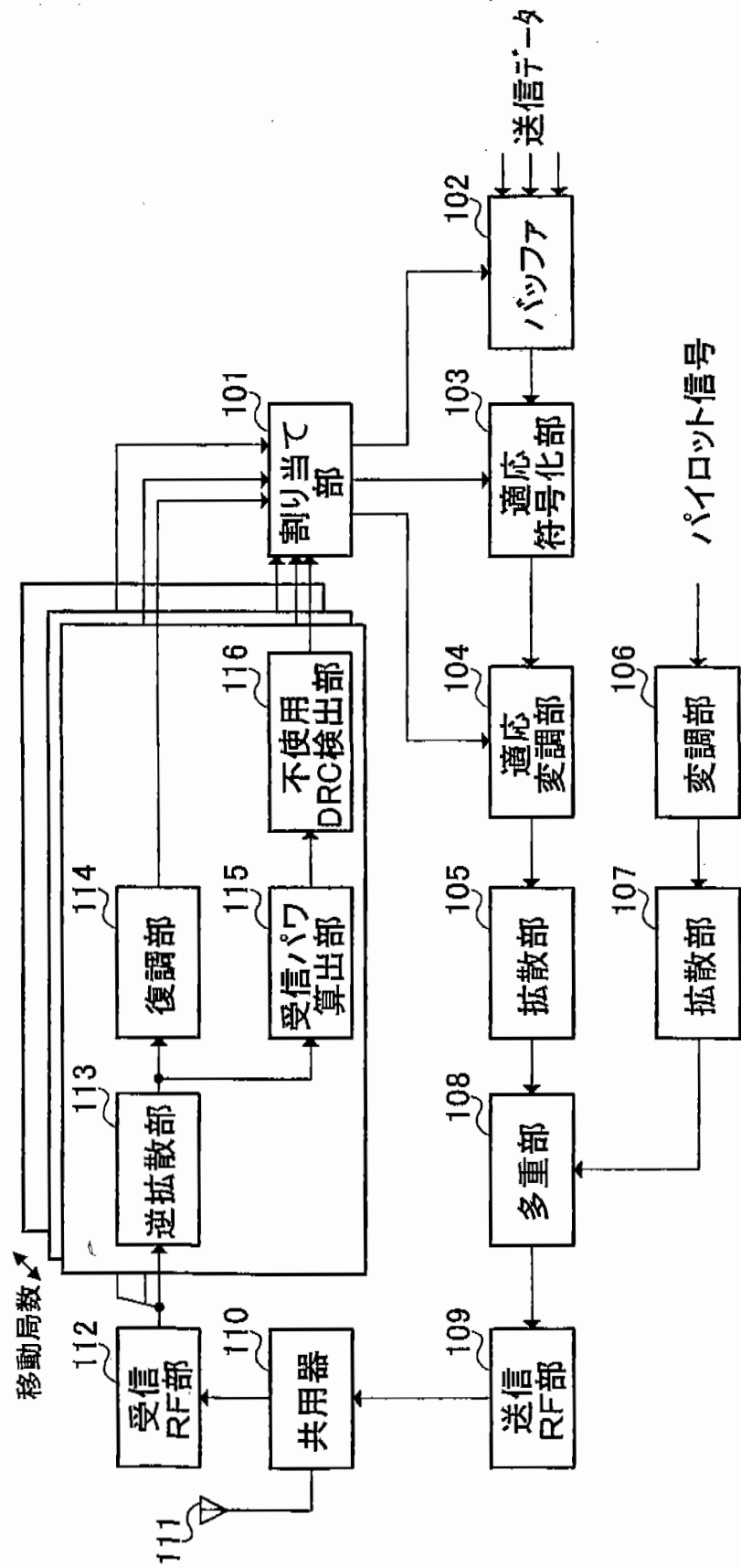
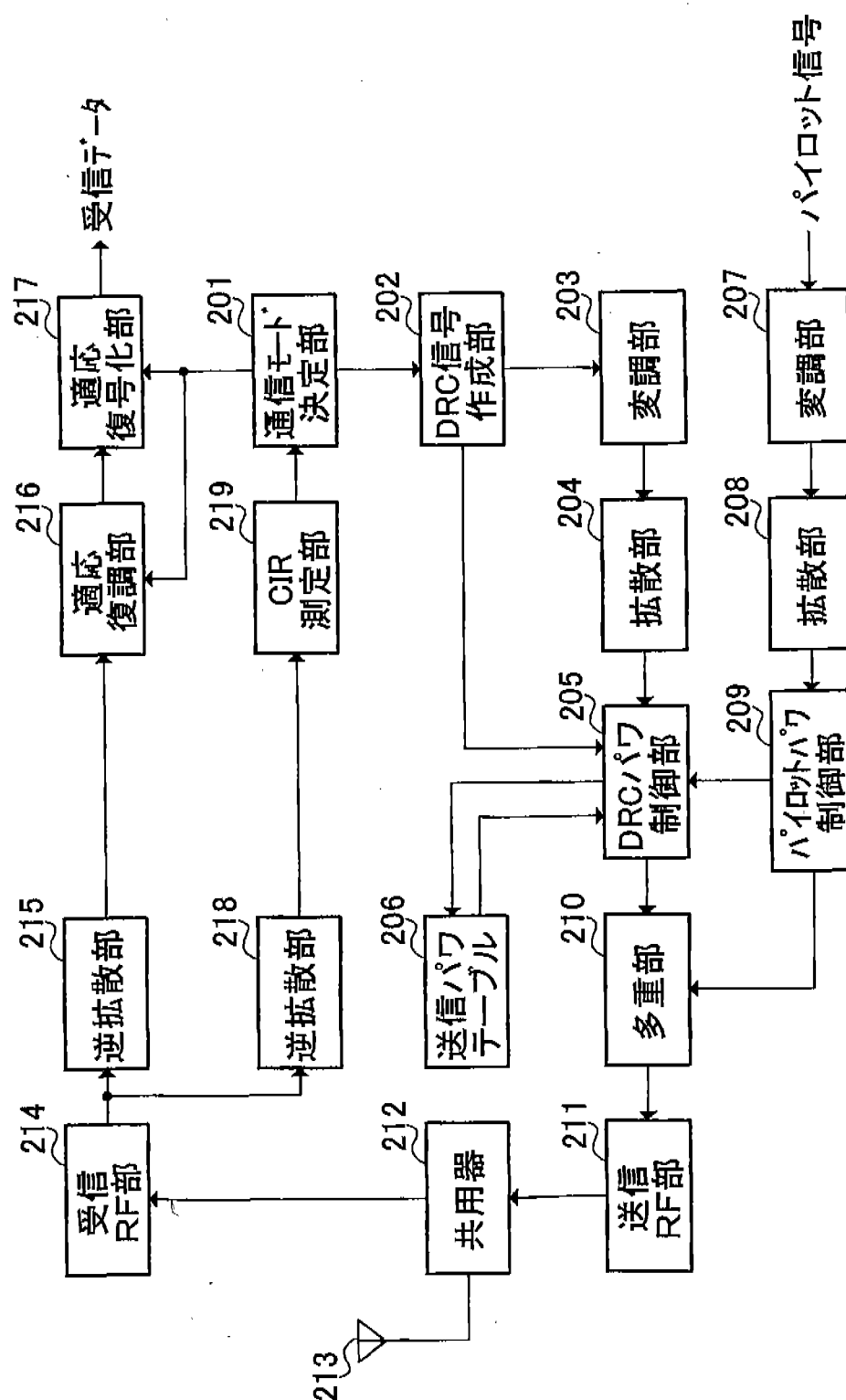


図2



4／17

DRC 番号	送信パワ (パイロット信号の送信パワとの比)
1	-2dB
2	-1dB
3	0dB
4	+1dB
5	+2dB

図4

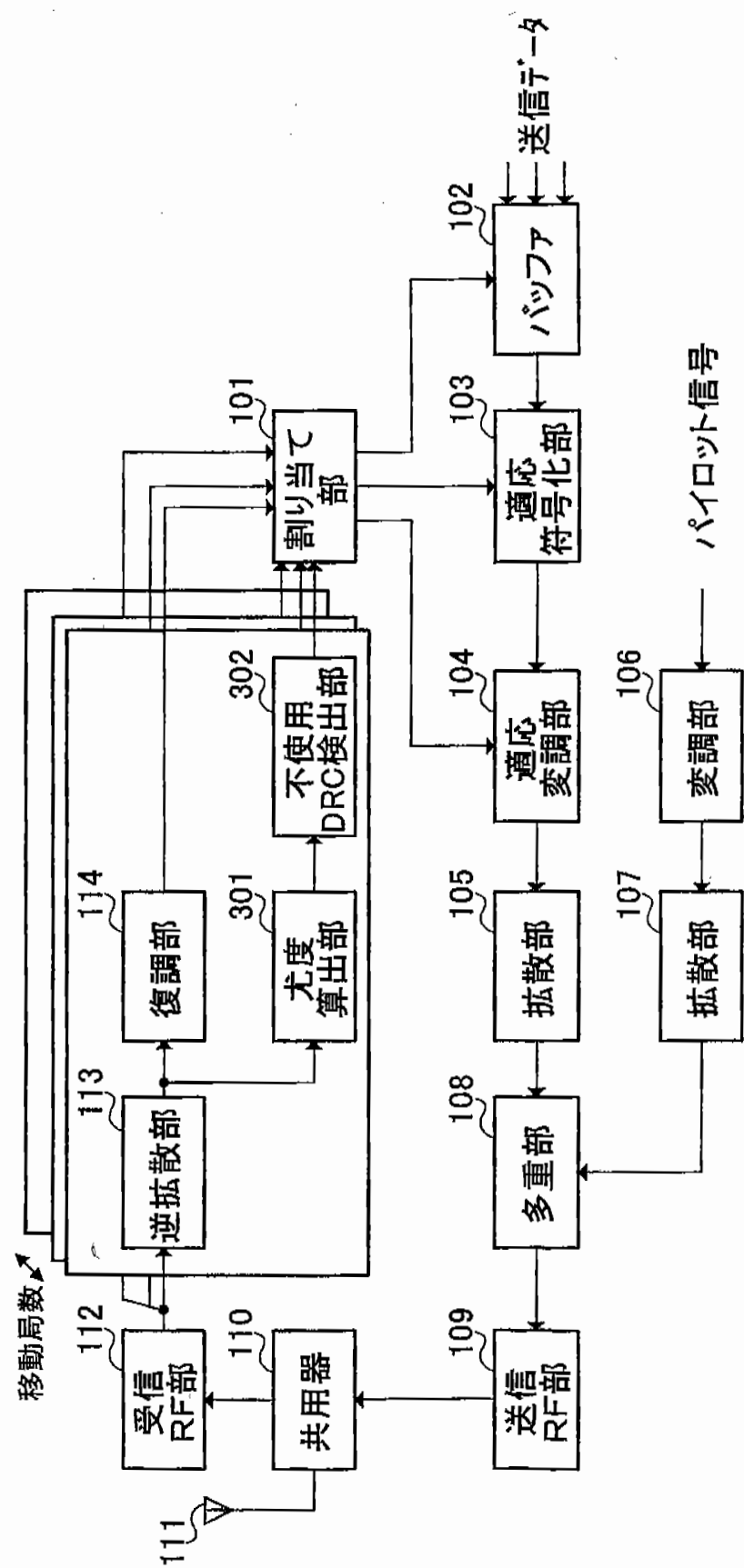
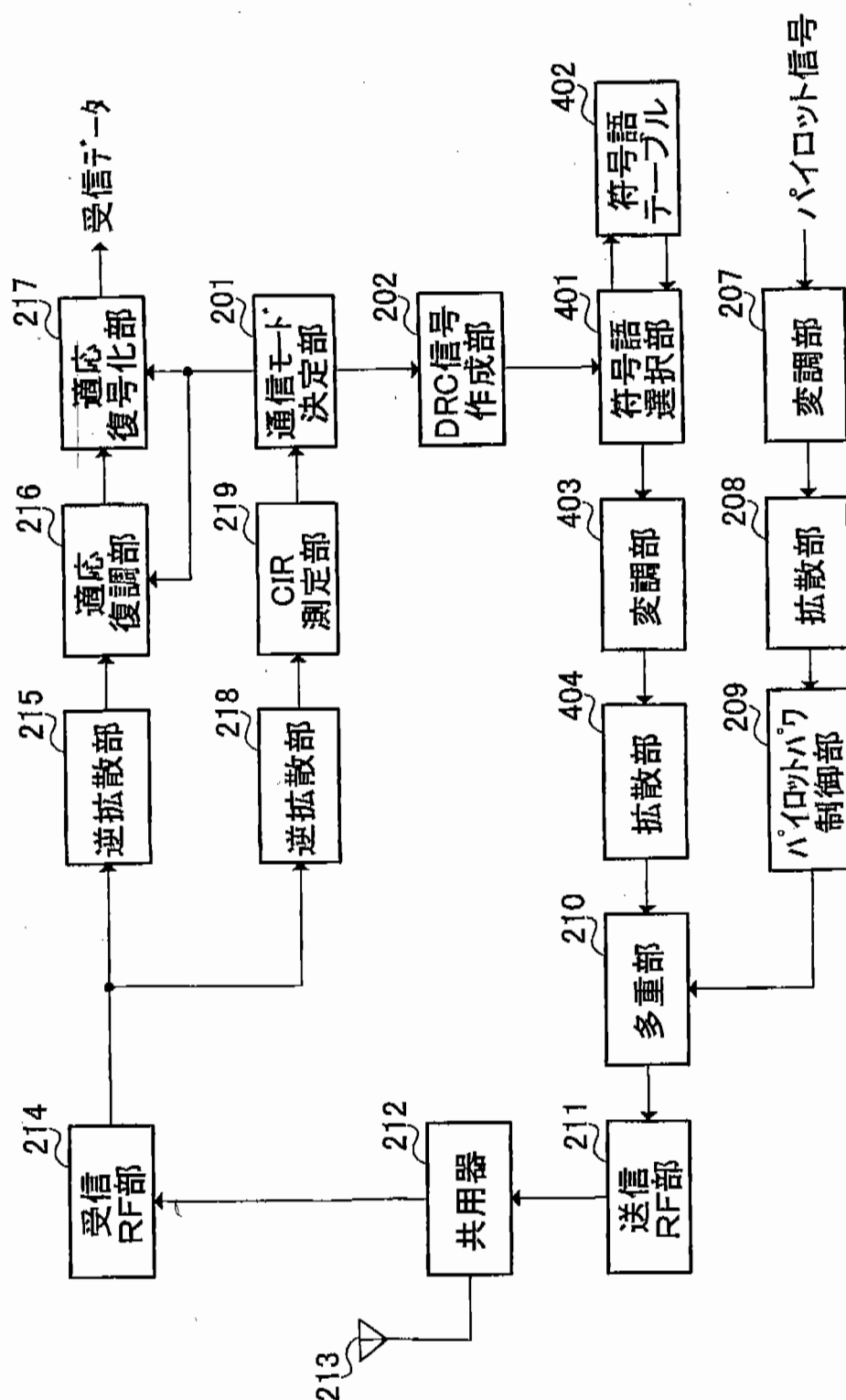


図5



6  
X

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DRC 番号	符号語	最小符号間距離
1	000000000	1
2	000000001	1
3	000000110	2
4	000111000	3
5	111111111	6

図7

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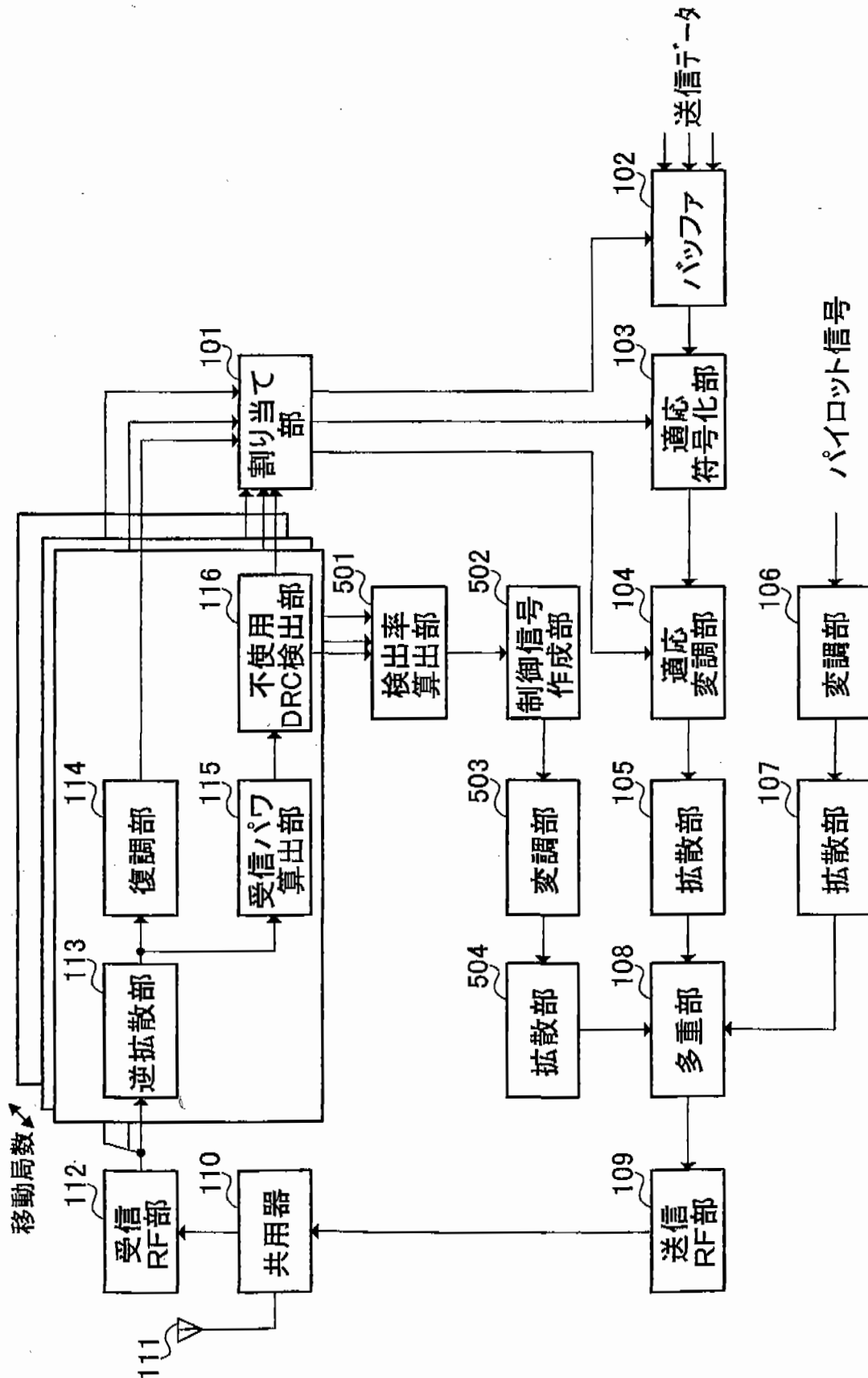


図8



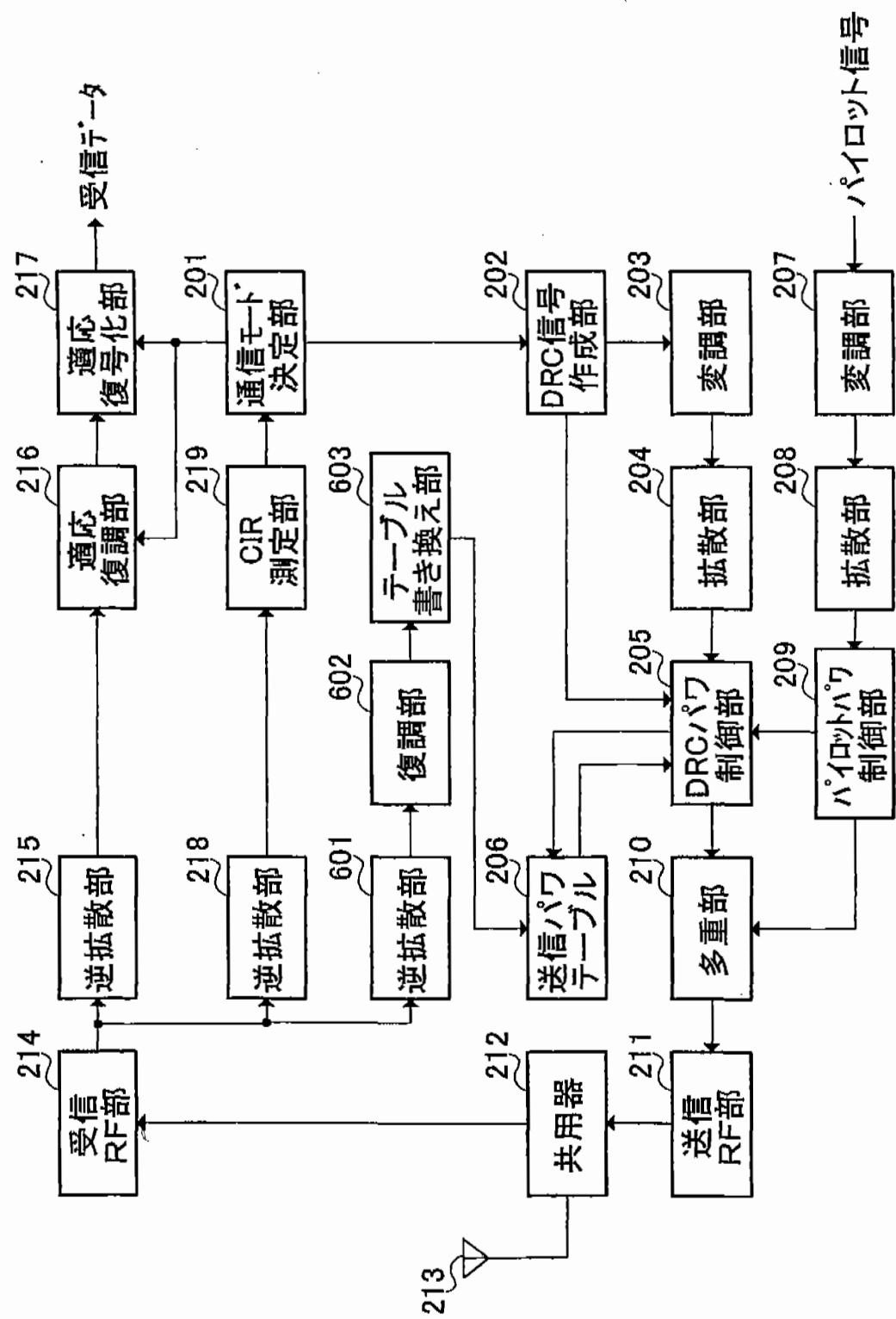


図9

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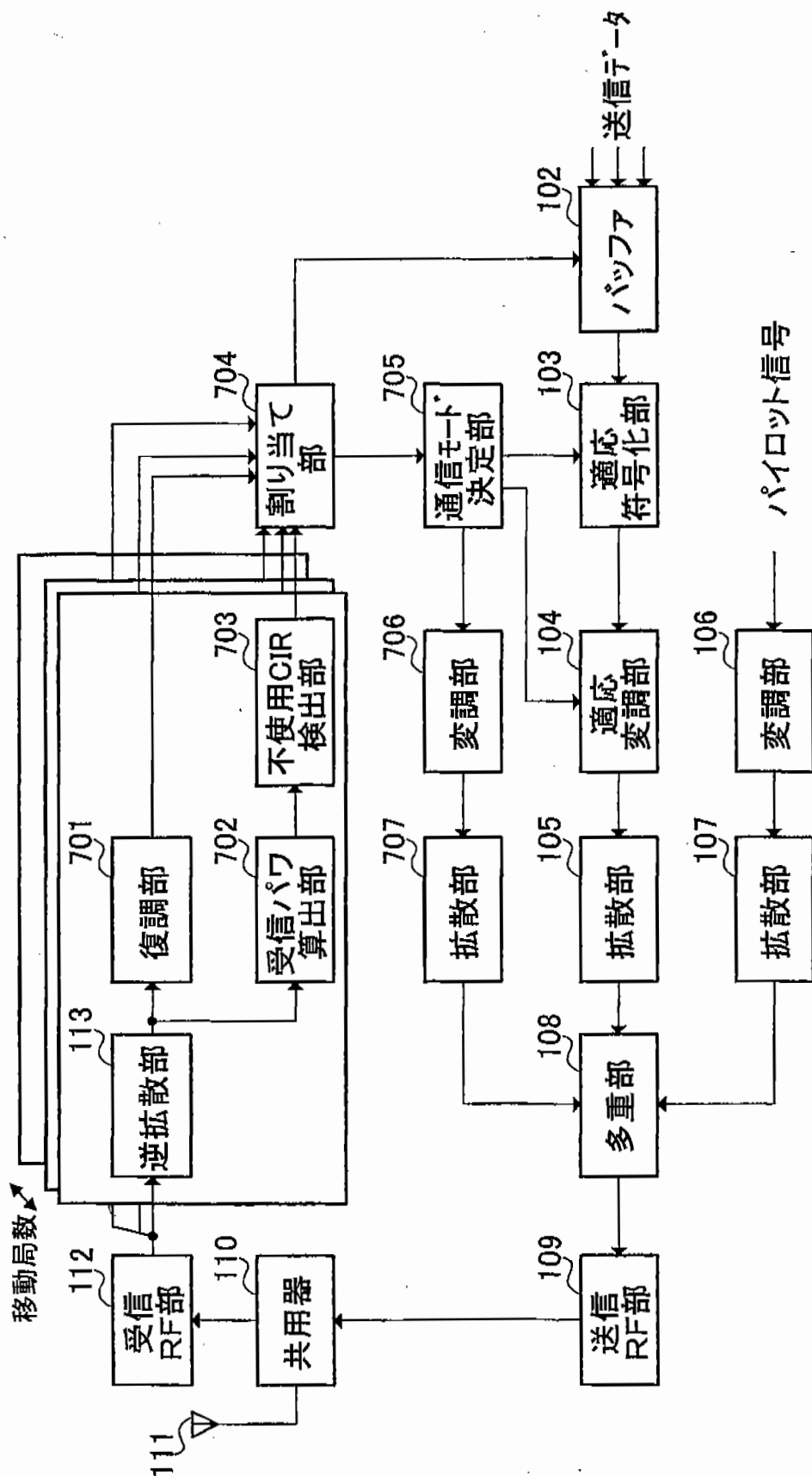


図10

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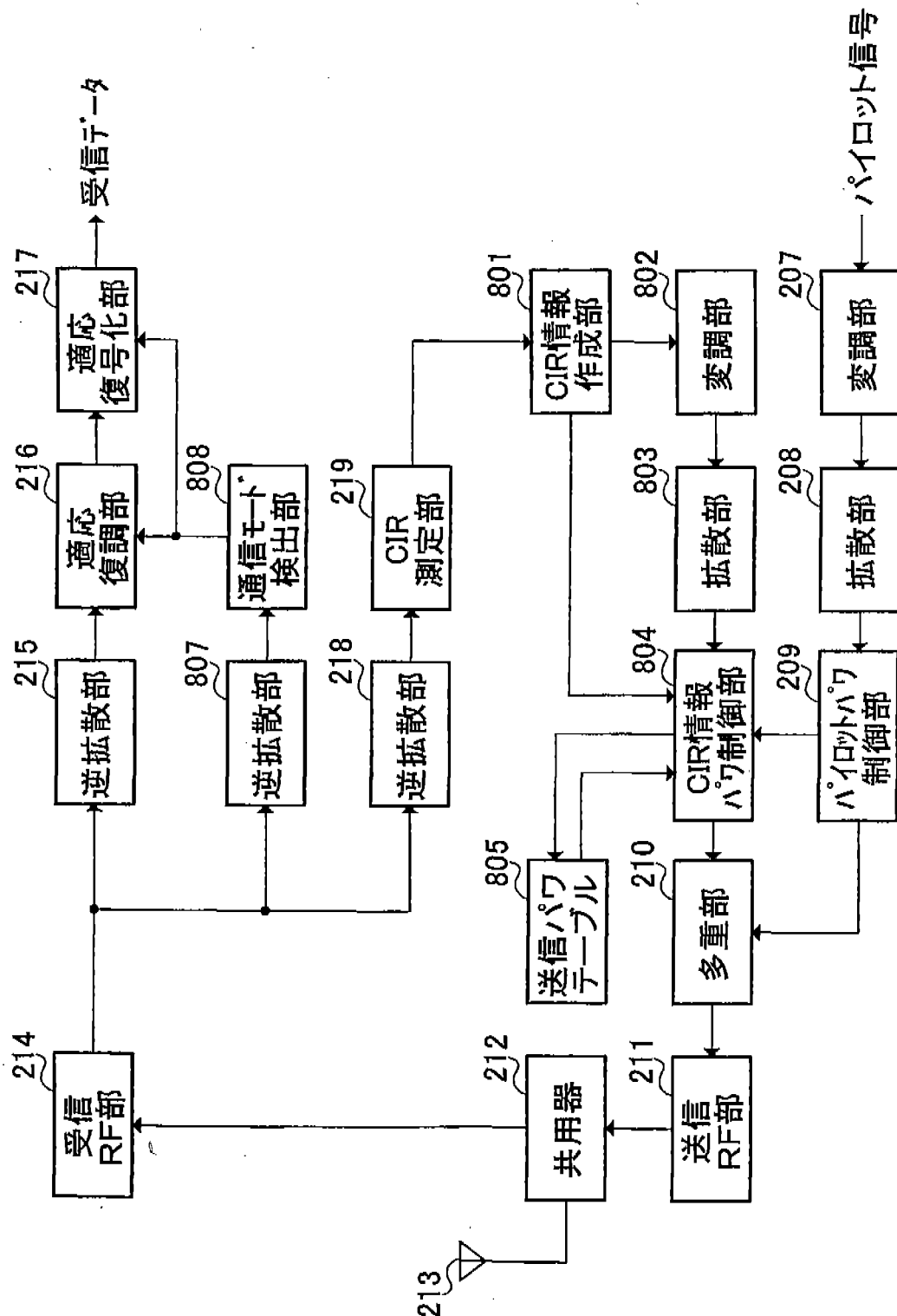


図 11

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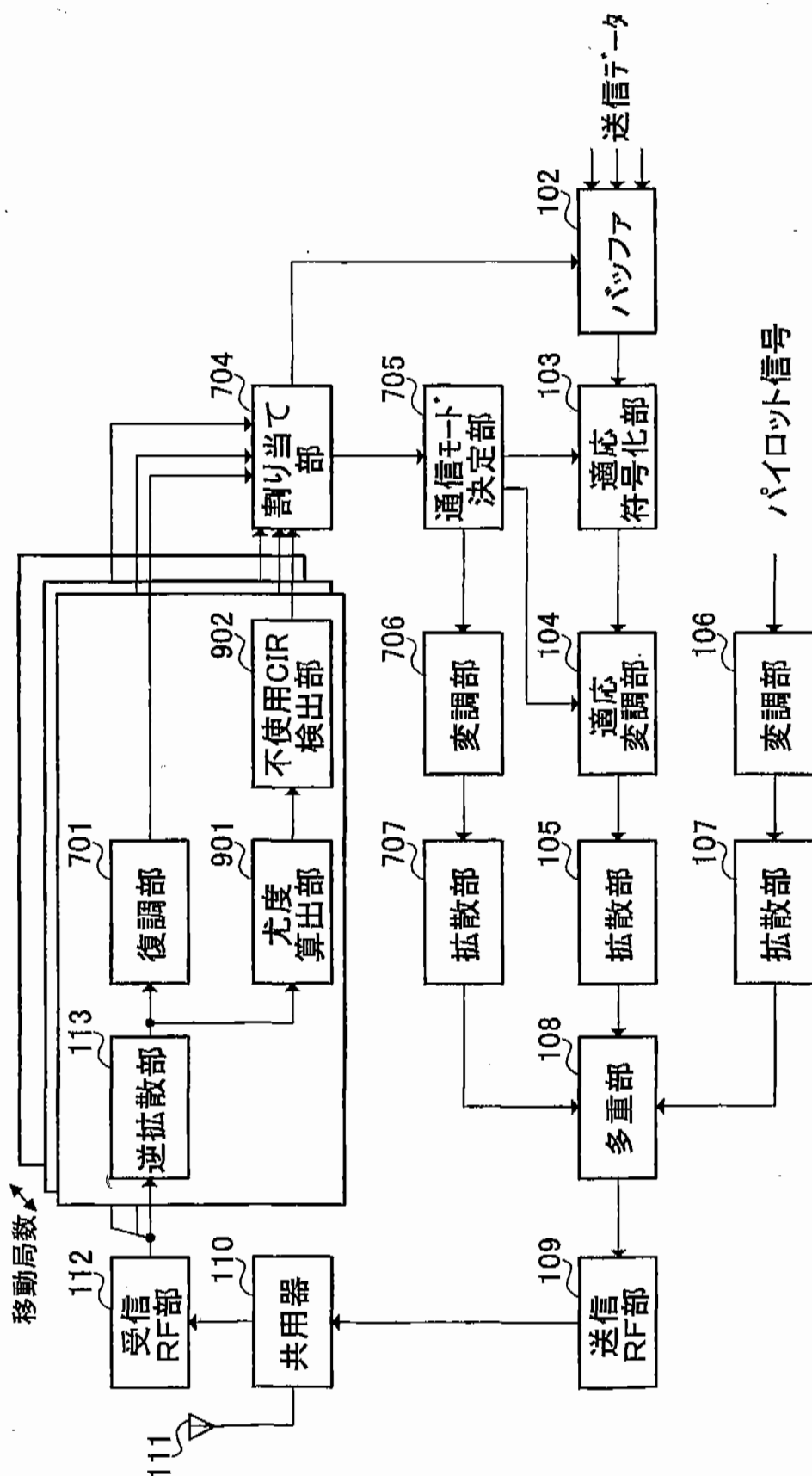


図12

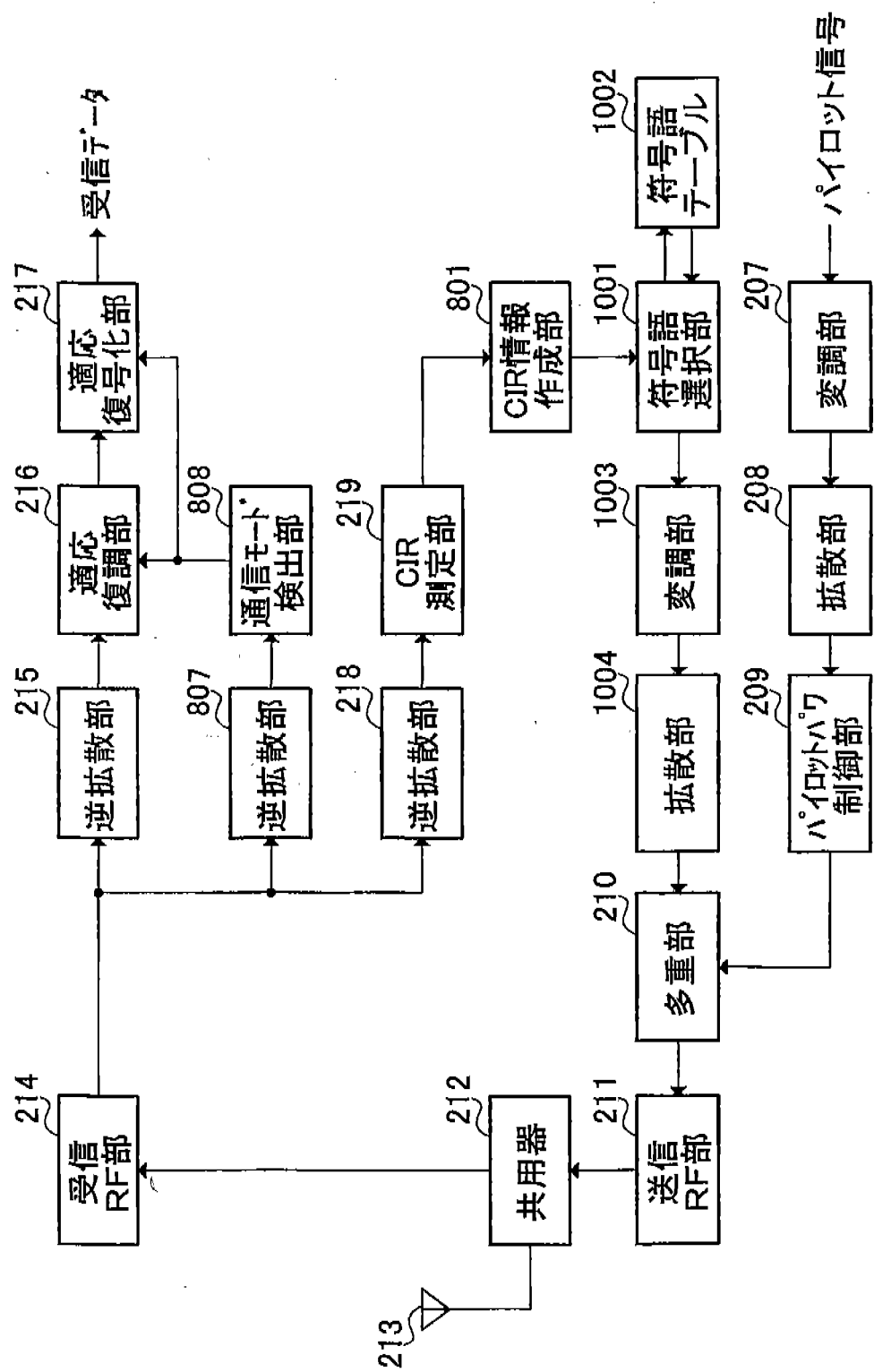


図13

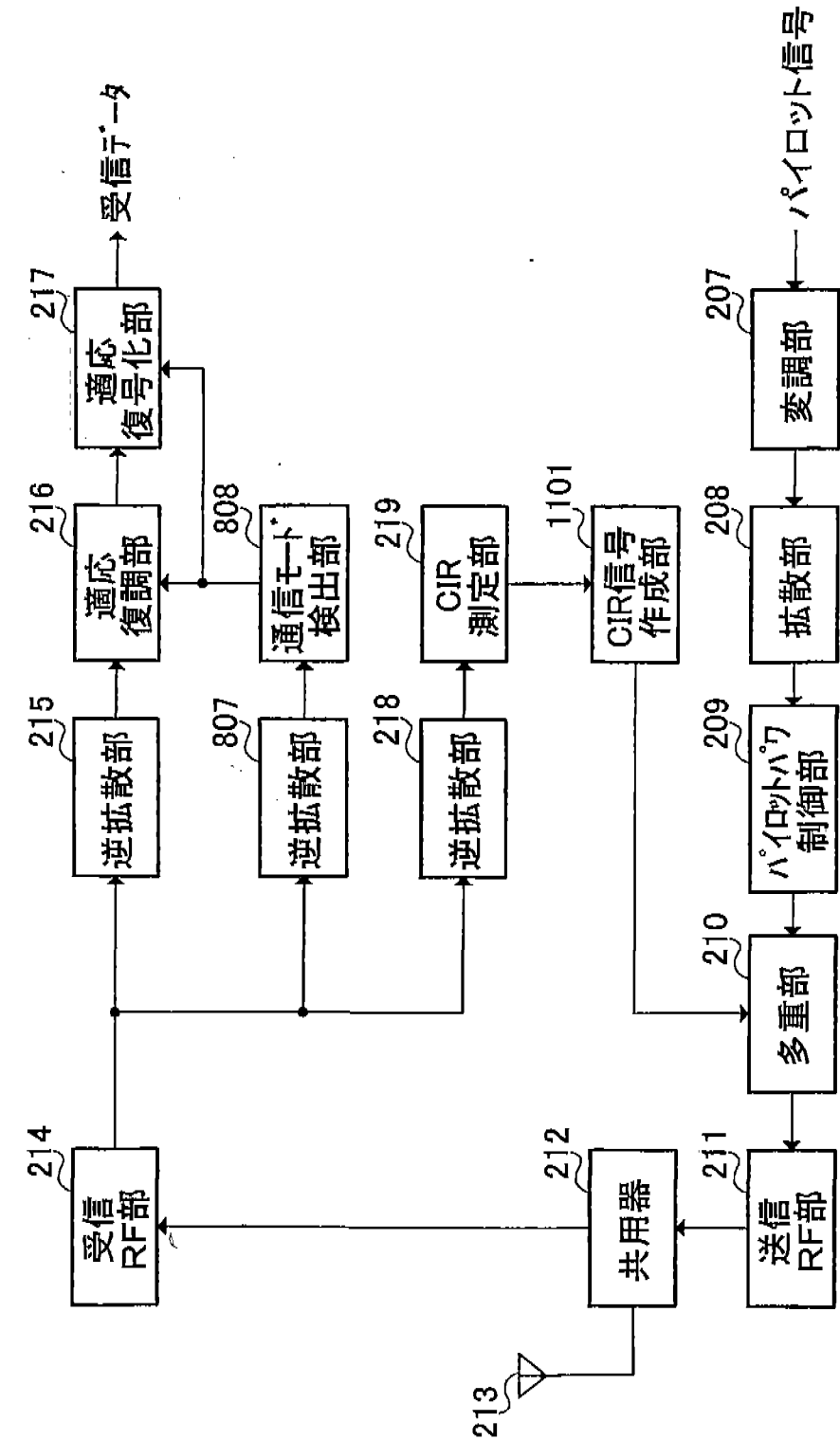


図14

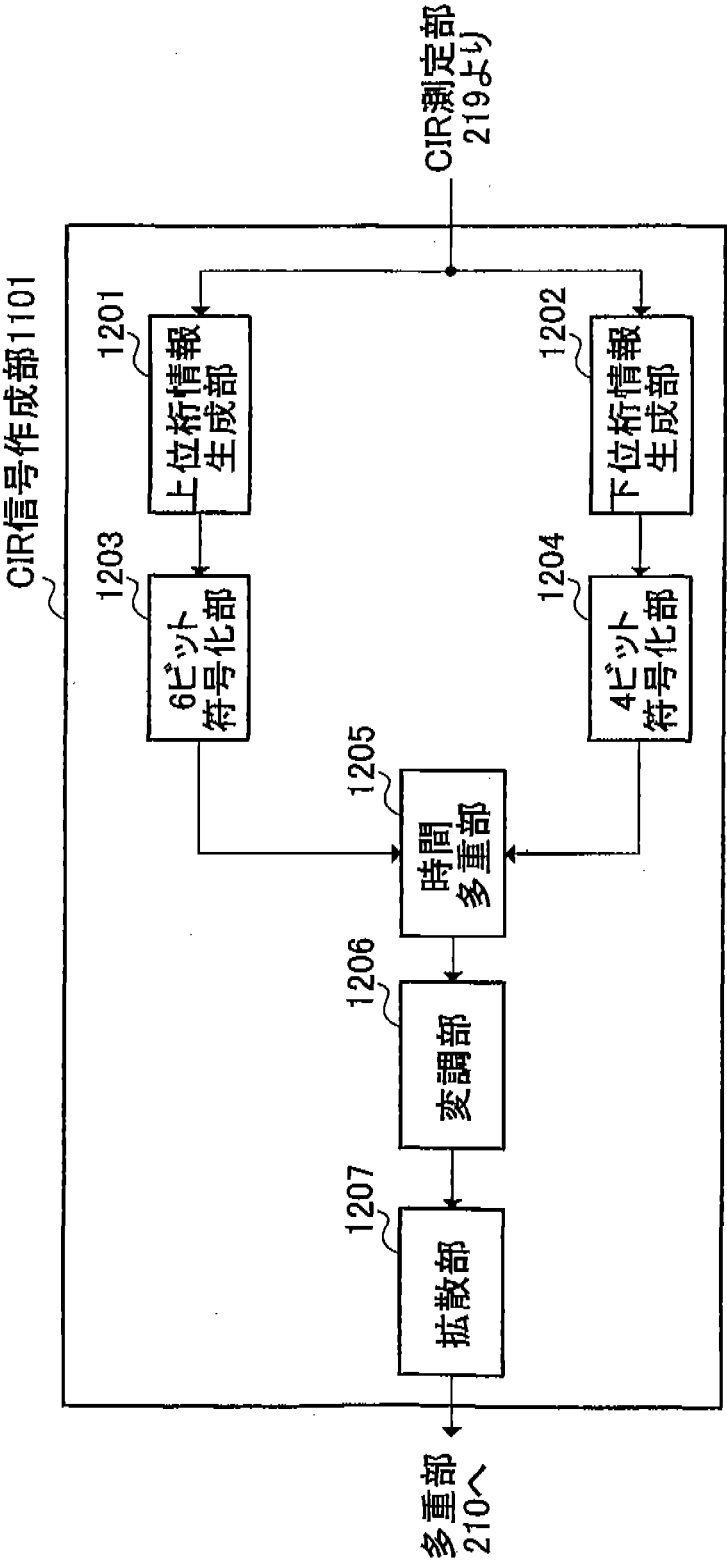


図 15

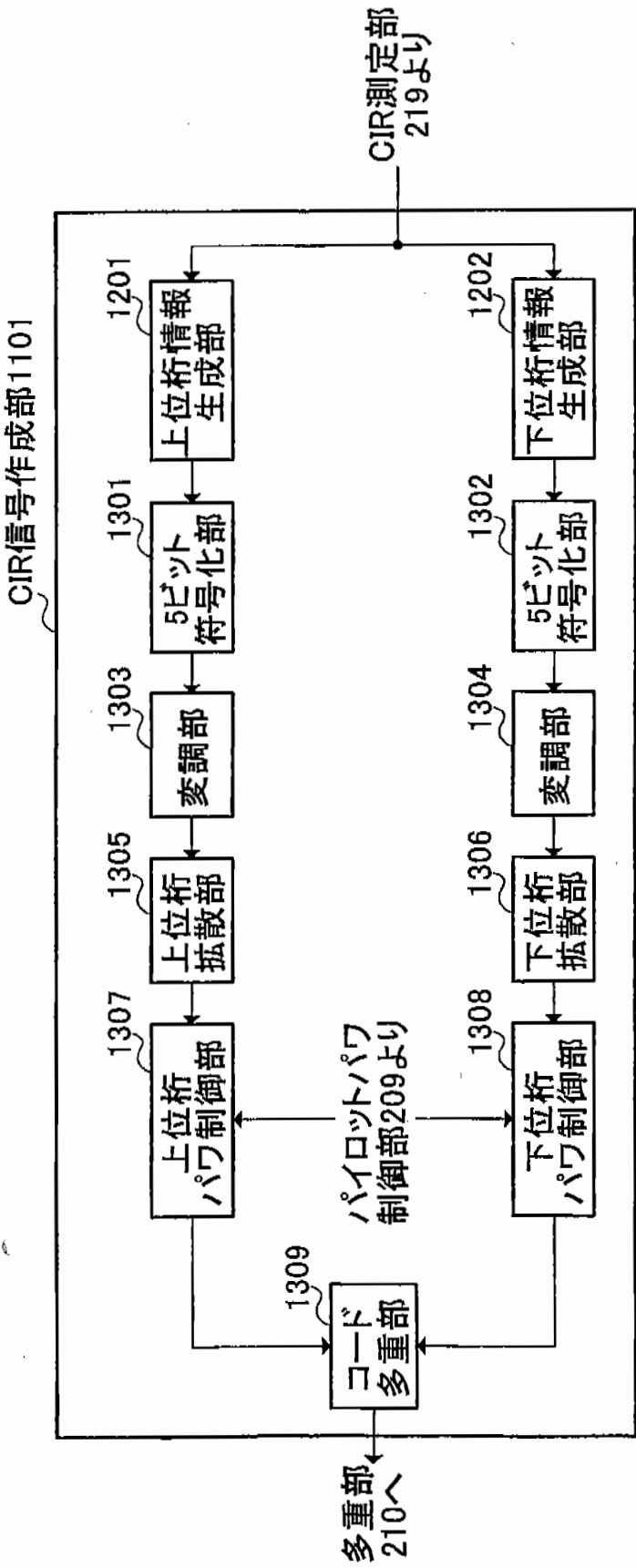


図 16



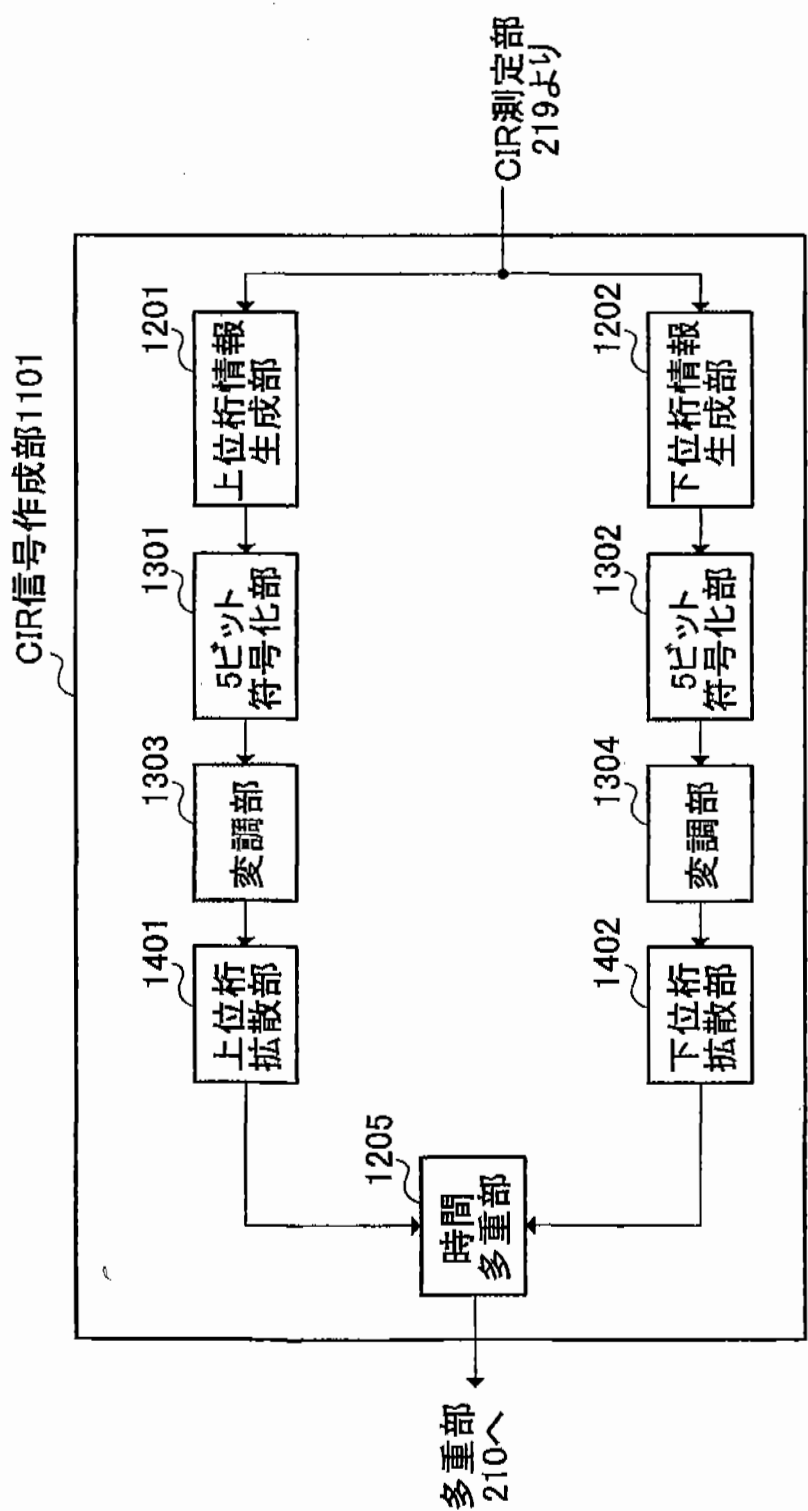


図17

# INTERNATIONAL ARCH REPORT

International application No.

PCT/JP01/06654

## A. CLASSIFICATION OF SUBJECT MATTER

Int.Cl.<sup>7</sup> H04Q7/38, H04B7/26, 102, H04J13/00, H04L29/02

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.<sup>7</sup> H04B7/24-H04B7/26, 102, H04Q7/00-H04Q7/38

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

Jitsuyo Shinan Koho 1922-1996 Toroku Jitsuyo Shinan Koho 1994-2001  
Kokai Jitsuyo Shinan Koho 1971-2001 Jitsuyo Shinan Toroku Koho 1996-2001

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.
A	JP 2000-49663 A (Matsushita Electric Ind. Co., Ltd.), 18 February, 2000 (18.02.00), & WO 99/55112 A & EP 986282 A & AU 9931719 A & BR 9906339 A & CN 1263681 A & EP 1122965 A & KR 2001013848 A	1-20
A	JP 11-331057 A (Toshiba Corporation), 30 November, 1999 (30.11.99), (Family: none)	1-20

☐ 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  
30 October, 2001 (30.10.01)

Date of mailing of the international search report  
13 November, 2001 (13.11.01)

Name and mailing address of the ISA/  
Japanese Patent Office

Authorized officer

Facsimile No.

Telephone No.

IPR2018-1557

国際調査報告

国際出願番号 PCT/JP01/06654

A. 発明の属する分野の分類 (国際特許分類 (IPC)) Int. Cl <sup>7</sup> H04Q7/38, H04B7/26. Int. Cl <sup>7</sup> H04J13/00, H04L29/02		
B. 調査を行った分野 調査を行った最小限資料 (国際特許分類 (IPC)) Int. Cl <sup>7</sup> H04B7/24-H04B7/26 Int. Cl <sup>7</sup> H04Q7/00-H04Q7/38		
最小限資料以外の資料で調査を行った分野に含まれるもの 日本国実用新案公報 1922-1996年 日本国公開実用新案公報 1971-2001年 日本国登録実用新案公報 1994-2001年 日本国実用新案登録公報 1996-2001年		
国際調査で使用した電子データベース (データベースの名称、調査に使用した用語)		
C. 関連すると認められる文献		
引用文献の カテゴリー*	引用文献名 及び一部の箇所が関連するときは、その関連する箇所の表示	関連する 請求の範囲の番号
A	JP 2000-49663 A (松下電器産業株式会社) 18. 2月. 2000 (18. 02. 00) & WO 99/55112 A & EP 986282 A & AU 9931719 A & BR 9906339 A & CN 1263681 A & EP 1122965 A & KR 2001013848 A	1-20
A	JP 11-331057 A (株式会社東芝) 30. 11月. 1999 (30. 11. 99) (ファミリーなし)	1-20
<input type="checkbox"/> C欄の続きにも文献が列挙されている。 <input type="checkbox"/> パテントファミリーに関する別紙を参照。		
* 引用文献のカテゴリー 「A」 特に関連のある文献ではなく、一般的技術水準を示すもの 「E」 国際出願日前の出願または特許であるが、国際出願日以後に公表されたもの 「L」 優先権主張に疑義を提起する文献又は他の文献の発行日若しくは他の特別な理由を確立するために引用する文献 (理由を付す) 「O」 口頭による開示、使用、展示等に関する文献 「P」 国際出願日前で、かつ優先権の主張の基礎となる出願日の後に公表された文献 「T」 国際出願日又は優先日後に公表された文献であって出願と矛盾するものではなく、発明の原理又は理論の理解のために引用するもの 「X」 特に関連のある文献であって、当該文献のみで発明の新規性又は進歩性がないと考えられるもの 「Y」 特に関連のある文献であって、当該文献と他の1以上の文献との、当業者にとって自明である組合せによって進歩性がないと考えられるもの 「&」 同一パテントファミリー文献		
国際調査を完了した日 30. 10. 01	国際調査報告の発送日 13.11.01	
国際調査機関の名称及びあて先 日本国特許庁 (ISA/JP) 郵便番号100-8915 東京都千代田区霞が関三丁目4番3号	特許庁審査官 (権限のある職員) 青木 健 電話番号 03-3581-1101 内線 3534.	5 J 9571

10/089605

JC Rec'd PCT/PTO 01 APR 2002

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Inventors: Kenichi MIYOSHI, et al.

Application No.: New PCT Application

Filed: April 1, 2002

For: COMMUNICATION TERMINAL APPARATUS, BASE STATION  
APPARATUS, AND RADIO COMMUNICATION METHOD

INFORMATION DISCLOSURE STATEMENT

Assistant Commissioner of Patents  
Washington, DC 20231

Sir:

Pursuant to Rules 56 and 99, Applicants hereby call the attention of the Patent Office to the references listed on the attached Form PTO 1449. JP '663 and JP '057 were cited in a PCT International Search Report (copy attached).

Applicants present this art so that the Patent Office may, in the first instance, determine any relevancy thereof to the presently claimed invention, see Beckman Instruments, Inc. v. Chemtronics, Inc., 439 F.2d 1369, 1380, 165 USPQ 355, 364 (5th Cir. 1970). Also see Patent Office Rules 104 and 106.

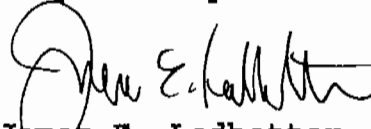
Applicants respectfully request that this art be expressly considered during the prosecution of this application and made of

10/089605

JCO1 Rec'd PCT/PTO 01 APR 2002

record herein and appear among the "References Cited" on any patent to issue herefrom.

Respectfully submitted,



James E. Ledbetter  
Registration No. 28,732

Date: April 1, 2002

JEL/tc

ATTORNEY DOCKET NO. L9289.02149

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Washington, DC 20043-4387  
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Facsimile: (202) 408-5200

## Uassigned

IPR2018-1557  
HTC EX1002, Page 210



## PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2000-049663

(43)Date of publication of application : 18.02.2000

(51)Int.Cl.

H04B 1/74  
H04B 1/40  
H04B 7/26  
H04J 13/02  
H04L 29/08

(21)Application number : 11-111301

(71)Applicant : MATSUSHITA ELECTRIC IND CO  
LTD

(22)Date of filing : 19.04.1999

(72)Inventor : KAMI TOYOKI  
HIRAMATSU KATSUHIKO  
KATO OSAMU

(30)Priority

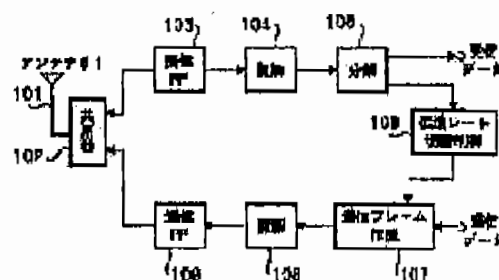
Priority number : 10107300 Priority date : 17.04.1998 Priority country : JP

## (54) RADIO COMMUNICATION DEVICE AND TRANSMISSION RATE CONTROL METHOD

(57)Abstract:

PROBLEM TO BE SOLVED: To properly control electric power transmission from a base station to a mobile station without being affected by the environment and transmission rate of the mobile station.

SOLUTION: The communication terminal device measures reception quality and reports the measurement result to a base station device, which switches the transmission rate by a transmission rate switching control circuit 106 according to the report result of the reception quality. Consequently, the transmission rate begins to be switched once the reception quality of the communication terminal device becomes worse. Further, the transmission rate is switched within a range wherein the quality of interference with others can be allowed according to the state of the communication path between the communication terminal device and base-station device.



## LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

IPR2018-1557

HTC EX1002, Page 212



Searching PAJ

2/2 ページ

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision  
of rejection]

[Date of requesting appeal against examiner's  
decision of rejection]

[Date of extinction of right]

Copyright (C); 1998,2000 Japan Patent Office

IPR2018-1557

HTC EX1002, Page 213

## PATENT ABSTRACTS OF JAPAN

(11)Publication number : 11-331057

(43)Date of publication of application : 30.11.1999

(51)Int.Cl.

H04B 7/24

H04J 13/00

(21)Application number : 10-133315

(71)Applicant : TOSHIBA CORP

(22)Date of filing : 15.05.1998

(72)Inventor : ASANUMA YUTAKA

## (54) CODE DIVISION MULTIPLEX MOBILE COMMUNICATION EQUIPMENT

## (57)Abstract:

PROBLEM TO BE SOLVED: To send a transmission parameter signal with high quality and to decode and reproduce a transmission information signal without missing at a device of a receiver side.

SOLUTION: In a CDMA cellular radio system, in the case of sending an information signal from a base station to a mobile station by using plural channels simultaneously, the base station adds transmission parameter signals PS1, PS2, PS3 respectively denoting a transmission rate of voice coded data sent through channels Ch1, Ch2, Ch3 and sends the resulting data. The transmission power per unit time of the transmission parameter signals PS1, PS2, PS3 is selected higher than transmission power of the voice coded data and a time position of the transmission parameter signals PS1, PS2, PS3 in a frame is made different among the channels Ch1, Ch2, Ch3.



## LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

IPR2018-1557

HTC EX1002, Page 214

Searching PAJ

2/2 ページ

Copyright (C); 1998,2000 Japan Patent Off.

# 3



UNITED STATES PATENT AND TRADEMARK OFFICE

 Commissioner for Patents, Box 207  
 United States Patent and Trademark Office  
 Washington, D.C. 20231  
 www.uspto.gov

U.S. APPLICATION NUMBER NO.	FIRST NAMED APPLICANT	ATTY. DOCKET NO.
10/089,605	Kenichi Miyoshi	L928902149

INTERNATIONAL APPLICATION NO.
-------------------------------

PCT/JP01/06654

 Stevens Davis Miller & Mosher  
 1615 L Street N W Suite 850  
 Washington, DC 20036

I.A. FILING DATE	PRIORITY DATE
08/02/2001	08/02/2000

CONFIRMATION NO. 3013

371 ACCEPTANCE LETTER



\*OC00000008314540\*

Date Mailed: 06/21/2002

### NOTICE OF ACCEPTANCE OF APPLICATION UNDER 35 U.S.C 371 AND 37 CFR 1.494 OR 1.495

The applicant is hereby advised that the United States Patent and Trademark Office in its capacity as a Designated Office (37 CFR 1.494), has determined that the above identified international application has met the requirements of 35 U.S.C. 371, and is ACCEPTED for national patentability examination in the United States Patent and Trademark Office.

The United States Application Number assigned to the application is shown above and the relevant dates are:

04/01/2002
 DATE OF RECEIPT OF 35 U.S.C. 371(c)(1), (c)(2) and  
 (c)(4) REQUIREMENTS
04/01/2002
 DATE OF RECEIPT OF ALL 35 U.S.C.  
 REQUIREMENTS

A Filing Receipt (PTO-103X) will be issued for the present application in due course. **THE DATE APPEARING ON THE FILING RECEIPT AS THE " FILING DATE" IS THE DATE ON WHICH THE LAST OF THE 35 U.S.C. 371 REQUIREMENTS HAS BEEN RECEIVED IN THE OFFICE. THIS DATE IS SHOWN ABOVE.** The filing date of the above identified application is the international filing date of the international application (Article 11(3) and 35 U.S.C. 363). Once the Filing Receipt has been received, send all correspondence to the Group Art Unit designated thereon.

The following items have been received:

- U.S. Basic National Fee
- Assignee Statement
- Copy of references cited in ISR
- Copy of the International Application
- Copy of the International Search Report
- Information Disclosure Statements
- Oath or Declaration
- Request for Immediate Examination

---

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

---

INDIA L EVANS  
Telephone: (703) 305-2936

PART 3 - OFFICE COPY

FORM PCT/DO/EO/903 (371 Acceptance Notice)



254

525 Rec'd PPT/PTC 08 JUL 2002  
FILE COPY 8-402  
C.F.R.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application

Inventors: K. MIYOSHI, et al. Art Unit: 2681  
Application No.: 10/089,605  
Filed: April 1, 2002  
For: COMMUNICATION TERMINAL APPARATUS, BASE  
STATION APPARATUS, AND RADIO COMMUNICATION  
METHOD

REQUEST FOR CORRECTED FILING RECEIPT

Assistant Commissioner of Patents  
Washington, D.C. 20231

Sir:

Please issue a Corrected Filing Receipt reflecting the correct title as follows: --COMMUNICATION TERMINAL APPARATUS, BASE STATION APPARATUS, AND RADIO COMMUNICATION METHOD-- and the additional Priority data --JAPAN 2000-285405 filed SEPTEMBER 20, 2000--

A copy of the Filing Receipt with changes marked in red ink is attached.

Respectfully submitted,

James E. Ledbetter  
Registration No. 28,732

Date: July 8, 2002

JEL/spp

ATTORNEY DOCKET NO. L9289.02149  
STEVENS, DAVIS, MILLER & MOSHER, L.L.P.  
1615 L Street, NW, Suite 850  
P.O. Box 34387  
Washington, DC 20043-4387  
Telephone: (202) 785-0100  
Facsimile: (202) 408-5200

#4

F. copy



## UNITED STATES PATENT AND TRADEMARK OFFICE

COMMISSIONER FOR PATENTS  
UNITED STATES PATENT AND TRADEMARK OFFICE  
WASHINGTON, D.C. 20231  
www.uspto.gov

APPLICATION NUMBER	FILING DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	DRAWINGS	TOT CLAIMS	IND CLAIMS
10/089,605	04/01/2002	2684	890	L928902149	17	20	2

CONFIRMATION NO. 3013

Stevens Davis Miller & Mosher  
1615 L Street N W Suite 850  
Washington, DC 20036

## CORRECTED FILING RECEIPT

\*OC000000008570938\*

Date Mailed: 08/05/2002

Receipt is acknowledged of this nonprovisional Patent Application. It will be considered in its order and you will be notified as to the results of the examination. Be sure to provide the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION when inquiring about this application. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please write to the Office of Initial Patent Examination's Filing Receipt Corrections, facsimile number 703-746-9195. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections (if appropriate).

## Applicant(s)

Kenichi Miyoshi, Yokohama-shi, JAPAN;  
Osamu Kato, Yokusuka-shi, JAPAN;  
Junichi Aizawa, Yokohama-shi, JAPAN;

## Domestic Priority data as claimed by applicant

THIS APPLICATION IS A 371 OF PCT/JP01/06654 08/02/2001

## Foreign Applications

JAPAN 2000-234420 08/02/2000

If Required, Foreign Filing License Granted 08/04/2002

Projected Publication Date: 10/17/2002

Non-Publication Request: No

Early Publication Request: No

## Title

COMMUNICATION TERMINAL APPARATUS BASE STATION APPARATUS AND RADIO  
COMMUNICATION METHOD

**Preliminary Class**

455

---

**LICENSE FOR FOREIGN FILING UNDER  
Title 35, United States Code, Section 184  
Title 37, Code of Federal Regulations, 5.11 & 5.15**

**GRANTED**

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

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

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Office of Export Administration, Department of Commerce (15 CFR 370.10 (j)); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

**NOT GRANTED**

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



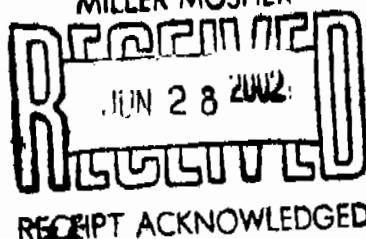


## UNITED STATES PATENT AND TRADEMARK OFFICE

COMMISSIONER FOR PATENTS  
UNITED STATES PATENT AND TRADEMARK OFFICE  
WASHINGTON, D.C. 20231  
www.uspto.gov

APPLICATION NUMBER	FILING DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	DRAWINGS	TOT CLAIMS	IND CLAIMS
10/089,605	04/01/2002	2681	890	L928902149	17	20	2

Stevens Davis Miller & Mosher  
1615 L Street N W Suite 850  
Washington, DC 20036



CONFIRMATION NO. 3013

## FILING RECEIPT



\*OC000000008314539\*

Date Mailed: 06/21/2002

Receipt is acknowledged of this nonprovisional Patent Application. It will be considered in its order and you will be notified as to the results of the examination. Be sure to provide the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION when inquiring about this application. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please write to the Office of Initial Patent Examination's Filing Receipt Corrections, facsimile number 703-746-9195. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt Incorporating the requested corrections (if appropriate).

## Applicant(s)

Kenichi Miyoshi, Yokohama-shi, JAPAN;  
Osamu Kato, Yokusuka-shi, JAPAN;  
Junichi Aizawa, Yokohama-shi, JAPAN;

## Domestic Priority data as claimed by applicant

THIS APPLICATION IS A 371 OF PCT/JP01/06654 08/02/2001

## Foreign Applications

JAPAN 2000-234420 08/02/2000

JAPAN 2000-285405, 09/20/00

## DOCKETED

By SP on 2/2/02

Projected Publication Date: To Be Determined - pending completion of Security Review

Non-Publication Request: No

Early Publication Request: No

## Title

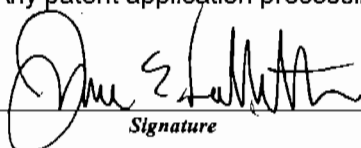
COMMUNICATION TERMINAL APPARATUS, BASE STATION APPARATUS,  
AND RADIO COMMUNICATION METHOD

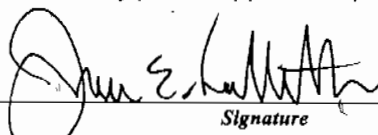
~~Communication terminal, base station device and radio communication method~~

## Preliminary Class

455

2684

AMENDMENT TRANSMITTAL LETTER (Large Entity)				Docket No.	
Applicant(s): Kenichi MIYOSHI, et al.				L9289.02149	
Serial No.	Filing Date	Examiner	Group Art Unit		
10/089,605	April 1, 2002	Unassigned	Unassigned		
Invention: COMMUNICATION TERMINAL APPARATUS, BASE STATION APPARATUS, AND RADIO COMMUNICATION METHOD					
TO THE ASSISTANT COMMISSIONER FOR PATENTS:					
Transmitted herewith is an amendment in the above-identified application.					
The fee has been calculated and is transmitted as shown below.					
CLAIMS AS AMENDED					
	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST # PREV. PAID FOR	NUMBER EXTRA CLAIMS PRESENT	RATE	ADDITIONAL FEE
TOTAL CLAIMS	8	20	0	x \$18.00	\$0.00
INDEP. CLAIMS	4	3	1	x \$84.00	\$84.00
Multiple Dependent Claims (check if applicable) <input type="checkbox"/>					\$0.00
TOTAL ADDITIONAL FEE FOR THIS AMENDMENT					\$84.00
<input type="checkbox"/> No additional fee is required for amendment.					
<input type="checkbox"/> Please charge Deposit Account No. In the amount of					
A duplicate copy of this sheet is enclosed.					
<input checked="" type="checkbox"/> A check in the amount of \$396.00 to cover the filing fee is enclosed.					
<input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge payment of the following fees associated with this communication or credit any overpayment to Deposit Account No. 19-4375					
A duplicate copy of this sheet is enclosed.					
<input checked="" type="checkbox"/> Any additional filing fees required under 37 C.F.R. 1.16.					
<input checked="" type="checkbox"/> Any patent application processing fees under 37 CFR 1.17.					
 Signature			Dated: December 16, 2002		
James E. Ledbetter, Esq. Registration No. 28,732 STEVENS, DAVIS, MILLER & MOSHER, LLP 1615 L Street, N.W., Suite 850 Washington, DC 20036 Tel: 202-785-0100 Fax: 202-408-5200					
I certify that this document and fee is being deposited on with the U.S. Postal Service as first class mail under 37 C.F.R. 1.8 and is addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231.					
Signature of Person Mailing Correspondence					
Typed or Printed Name of Person Mailing Correspondence					

<b>AMENDMENT TRANSMITTAL LETTER (Large Entity)</b>			Docket No. L9289.02149		
Applicant(s): Kenichi MIYOSHI, et al.			DEC 16 2002		
Serial No. 10/089,605	Filing Date April 1, 2003	Examiner Unassigned	Group Art Unit Unassigned		
Invention: COMMUNICATION TERMINAL APPARATUS, BASE STATION APPARATUS, AND RADIO COMMUNICATION METHOD					
TO THE ASSISTANT COMMISSIONER FOR PATENTS:			<b>RECEIVED</b> DEC 19 2002 Technology Center 2800		
Transmitted herewith is an amendment in the above-identified application. The fee has been calculated and is transmitted as shown below.					
CLAIMS AS AMENDED					
	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST # PREV. PAID FOR	NUMBER EXTRA CLAIMS PRESENT	RATE	ADDITIONAL FEE
TOTAL CLAIMS	8 -	20 =	0 x	\$18.00	\$0.00
INDEP. CLAIMS	4 -	3 =	1 x	\$84.00	\$84.00
Multiple Dependent Claims (check if applicable) <input type="checkbox"/>					\$0.00
TOTAL ADDITIONAL FEE FOR THIS AMENDMENT					\$84.00
<input type="checkbox"/> No additional fee is required for amendment. <input type="checkbox"/> Please charge Deposit Account No. _____ in the amount of _____ A duplicate copy of this sheet is enclosed. <input checked="" type="checkbox"/> A check in the amount of \$396.00 to cover the filing fee is enclosed. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge payment of the following fees associated with this communication or credit any overpayment to Deposit Account No. 19-4375 A duplicate copy of this sheet is enclosed. <input checked="" type="checkbox"/> Any additional filing fees required under 37 C.F.R. 1.16. <input checked="" type="checkbox"/> Any patent application processing fees under 37 CFR 1.17.					
 Signature			Dated: December 16, 2002		
James E. Ledbetter, Esq. Registration No. 28,732 STEVENS, DAVIS, MILLER & MOSHER, LLP 1615 L Street, N.W., Suite 850 Washington, DC 20036 Tel: 202-785-0100 Fax: 202-408-5200			<div>I certify that this document and fee is being deposited on _____ with the U.S. Postal Service as first class mail under 37 C.F.R. 1.8 and is addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231.</div> <div>Signature of Person Mailing Correspondence</div> <div>Typed or Printed Name of Person Mailing Correspondence</div>		
CC:			IPR2018-1557 HTC EX1002, Page 223		



*N.W.  
Greene  
#5  
12/24/02*

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application

Inventors: Kenichi MIYOSHI, et al.

Appln. No.: 10/089,605

Filed: April 1, 2002

For: COMMUNICATION TERMINAL APPARATUS, BASE STATION  
APPARATUS, AND RADIO COMMUNICATION METHOD

PRELIMINARY AMENDMENT

Assistant Commissioner of Patents  
Washington, D.C. 20231

RECEIVED

DEC 10 2002

Technology Center 2600

Sir:

Please amend the above-captioned application as follows:

IN THE CLAIMS

Please cancel claims 1-20 in favor of the following new claims

21-28:

-21. (New) A communication terminal apparatus comprising:

*Cont*  
a measurer that measures a downlink channel quality and  
outputs information that is generated in association with said  
downlink channel quality and composed of a plurality of digits  
including an upper digit and a lower digit;

a coder that encodes the information such that the upper digit  
has a larger code word minimum distance than the lower digit; and

a transmitter that transmits the encoded information to a base  
station apparatus.

<sup>2</sup>  
~~22.~~ (New) The communication terminal apparatus according to claim ~~21~~, wherein the upper digit contains a most significant bit of the information.

<sup>3</sup>  
~~23.~~ (New) A communication terminal apparatus comprising:  
a measurer that measures a downlink channel quality and outputs information that is generated in association with said downlink channel quality and composed of a plurality of digits including an upper digit and a lower digit,

*Adm*  
a coder that encodes the information such that the upper digit is assigned a larger number of bits than the lower digit, and

a transmitter that transmits the encoded information to a base station apparatus.

<sup>4</sup>  
~~24.~~ (New) The communication terminal apparatus according to claim ~~23~~<sup>3</sup>, wherein the upper digit contains a most significant bit of the information.

<sup>5</sup>  
~~25.~~ (New) A coding and transmission method for use in a communication system where a base station apparatus assigns a downlink channel to each of a plurality of communication terminal apparatuses on a time division basis, wherein said each of a plurality of communication terminal apparatuses:

encodes information that is used for the assignment of the downlink channel and composed of a plurality of digits including an upper digit and a lower digit such that the upper digit has a larger code word minimum distance than the lower digit; and

transmits the encoded information to said base station apparatus.

*Ad  
Cont.*  
6  
~~26.~~ (New) The coding and transmission method according to claim ~~25~~<sup>5</sup>, wherein the upper digit contains a most significant bit of the information.

17  
~~27.~~ (New) A coding and transmission method for use in a communication system where a base station apparatus assigns a downlink channel to each of a plurality of communication terminal apparatuses on a time division basis, wherein said each of a plurality of communication terminal apparatuses:

encodes information that is used for the assignment of the downlink channel and composed of a plurality of digits including an upper digit and a lower digit such that the upper digit is assigned a larger number of bits than the lower digit; and

transmits the encoded information to said base station apparatus.

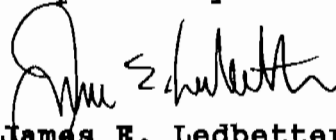
*As included* <sup>8</sup>  
~~28.~~ (New) The coding and transmission method according to  
<sup>7</sup>  
claim ~~27~~, wherein the upper digit contains a most significant bit  
of the information.--

---

REMARKS

Original claims 1-20 are hereby replaced by new claims 21-28 to highlight additional patentable features of this invention. Early and favorable consideration of this application is respectfully requested.

Respectfully submitted,



James E. Ledbetter  
Registration No. 28,732

Date: December 16, 2002

JEL/spp

ATTORNEY DOCKET NO. L9289.02149

STEVENS, DAVIS, MILLER & MOSHER, L.L.P.  
1615 L Street, NW, Suite 850  
P.O. Box 34387  
Washington, DC 20043-4387  
Telephone: (202) 785-0100  
Facsimile: (202) 408-5200





#6  
2/12/03

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Inventor(s): Kenichi MIYOSHI et al.

Art Unit: 2684

Serial No.: 10/089,605

Filed: April 1, 2002

For: COMMUNICATION TERMINAL APPARATUS, BASE STATION  
APPARATUS, RADIO COMMUNICATION METHOD

INFORMATION DISCLOSURE STATEMENT

Assistant Commissioner of Patents  
Washington, DC 20231

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FEB 06 2003

Technology Center 2600

Dear Sir:

Pursuant to Rules 56 and 99, Applicants hereby call the attention of the Patent Office to the art listed on the attached Form PTO 1449.

Applicants present this art so that the Patent Office may, in the first instance, determine any relevancy thereof to the presently claimed invention, see Beckman Instruments, Inc. v. Chemtronics, Inc., 439 F.2d 1369, 1380, 165 USPQ 355, 364 (5th Cir. 1970). Also see Patent Office Rules 104 and 106. Applicants respectfully request that this art be expressly considered during the prosecution of this application and made of record herein and appear among the "References Cited" on any patent to issue herefrom.

  
Respectfully submitted,

Date: February 4, 2003

James E. Ledbetter  
Registration No. 28,732

JEL/ejw

ATTORNEY DOCKET NO. L9289.02149

STEVENS, DAVIS, MILLER & MOSHER, L.L.P.

1615 L STREET, NW, Suite 850

WASHINGTON, DC 20043-4387

Telephone: (202) 785-0100

Facsimile: (202) 408-5200

IPR2018-1557  
HTC EX1002, Page 229

FORM PTO-1449 U.S. Department of Commerce  
(Rev. 4/92) Patent and Trademark Office

# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use several sheets if necessary)

FEB 04 2003

ATTY. DOCKET NO.

L9289.02149

SERIAL NO.

10/089,605 #6

APPLICANT

Kenichi MIYOSHI, et al.

FILING DATE

April 1, 2002

GROUP

2684

## U.S. PATENT DOCUMENTS

EXAMINER INITIAL	DOCUMENT NUMBER								DATE	NAME	CLASS	SUBCLASS	FILING DATE APPROPRIATE
DC	2003	0	0	0	2	4	4	6	01/2003	Komai et al.			
	2002	0	1	6	8	9	4	4	11/2002	Terry et al.			
	2002	0	0	9	4	8	1	0	07/2002	Hassan			
	2002	0	0	6	1	7	5	0	05/2002	Mohebbi			
	2002	0	0	0	1	2	9	2	01/2002	Miyamoto			
	6	4	5	6	5	9	8		09/2002	Le Strat et al.			
	5	7	5	2	1	6	6		05/1998	Dorenbosch et al.			

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FEB 06 2003

Technology Center 2600

## FOREIGN PATENT DOCUMENTS

DOCUMENT NUMBER								DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
												YES	NO

## OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)


EXAMINER

*Janet*

DATE CONSIDERED

12/08/03

EXAMINER: Initial if citation is considered, draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

(Form PTO-1449 [6-4])

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

#7  
135  
4303

In re the Application of

Inventors: Kenichi MIYOSHI, et al. Art Unit: 2684

Application No.: 10/089,605

Filed: April 1, 2002

For: COMMUNICATION TERMINAL APPARATUS, BASE STATION  
APPARATUS, AND RADIO COMMUNICATION METHOD



INFORMATION DISCLOSURE STATEMENT

Assistant Commissioner of Patents  
Washington, DC 20231

RECEIVED

MAR 31 2003

Dear Sir:

Technology Center 2600

Pursuant to Rules 56 and 99, Applicants hereby call the attention of the Patent Office to the art listed on the attached Form PTO 1449. JP '113 and JP '432 were cited in a Japanese Office Action dated January 7, 2003 (English translation attached).

Applicants present this art so that the Patent Office may, in the first instance, determine any relevancy thereof to the presently claimed invention, see Beckman Instruments, Inc. v. Chemtronics, Inc., 439 F.2d 1369, 1380, 165 USPQ 355, 364 (5th Cir. 1970). Also see Patent Office Rules 104 and 106. Applicants respectfully request that this art be expressly considered during the prosecution of this application and made of record herein and appear among the "References Cited" on any patent to issue herefrom.

Respectfully submitted,

A handwritten signature in dark ink, appearing to read "James E. Ledbetter".

James E. Ledbetter  
Registration No. 28,732

Date: March 28, 2003

JEL/spp

ATTORNEY DOCKET NO. L9289.02149  
STEVENS, DAVIS, MILLER & MOSHER, L.L.P.  
1615 L STREET, NW, Suite 850  
WASHINGTON, DC 20043-4387  
Telephone: (202) 785-0100  
Facsimile: (202) 408-5200

(Use several sheets if necessary)

**L9289.02149**

**10/089,605**

Kenichi MIYOSHI, et al.

DATE **April 1, 2002**

2684

**U.S. PATENT DOCUMENTS**

RECEIVED

MAR 31 2003

Technology Center 2600

## FOREIGN PATENT DOCUMENTS

DCL

DCL

**OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)**

KL

**Japanese Office Action dated January 7, 2003 with English translation.**

**EXAMINER**

**DATE CONSIDERED**

12/8/03

**EXAMINER:** Initial if citation is considered, draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

## PATENT ABSTRACTS OF JAPAN

(11)Publication number : 08-223113

(43)Date of publication of application : 30.08.1996

(51)Int.Cl.

H04B 7/26

H04J 13/00

(21)Application number : 07-020824

(71)Applicant : NIPPON TELEGR &amp; TELEPH CORP &lt;NTT&gt;

(22)Date of filing : 08.02.1995

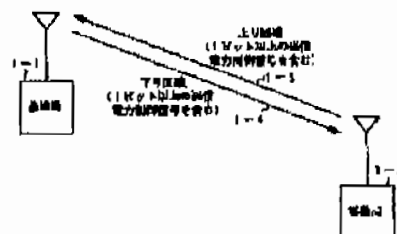
(72)Inventor : OKAZAKI ISAO  
KUDO EISUKE  
OGOSE SHIGEAKI

## (54) MOBILE COMMUNICATION SYSTEM

## (57)Abstract:

PURPOSE: To provide a mobile communication system which reduces the power control error in a mobile station and a base station even when there is large variance in the reception signal power and effectively uses the radio wave.

CONSTITUTION: A base station 1-1 measures the reception signal power in this station 1-1 of the radio signal coming from a mobile station 1-2 and adds information of one or more bits corresponding to the value, which is obtained by subtracting a required reception signal power in the base station 1-1 from the reception signal power in the base station 101, to the data frame (transmission signal) from the base station 1-1 to the mobile station 1-2. When the data frame to which this information is added is received by the mobile station 1-2, the mobile station 1-2 adjusts the transmission signal power of the mobile station 1-2 based on this information.



## LEGAL STATUS

[Date of request for examination] 29.10.1999

[Date of sending the examiner's decision of rejection] 13.04.2001

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

Copyright (C); 1998,2000 Japan Patent Office

## PATENT ABSTRACTS OF JAPAN

(11)Publication number : 62-163432

(43)Date of publication of application : 20.07.1987

(51)Int.Cl.

H04L 1/00  
H03M 13/00  
H04N 7/13

(21)Application number : 61-004517

(71)Applicant : MATSUSHITA ELECTRIC IND CO LTD

(22)Date of filing : 13.01.1986

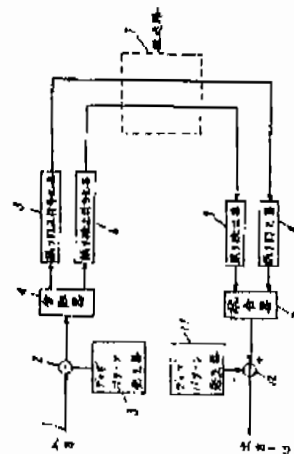
(72)Inventor : SHIGESATO TATSURO

## (54) ENCODER

## (57)Abstract:

PURPOSE: To decrease the deterioration in picture quality when many low-order digits are missed by adding a dither (pseudo random number) to a quantized number of a picture, separating the result into the high-order digit and the low-order digit and sending them.

CONSTITUTION: After a dither from a dither pattern generator 3 is added to n-bit picture element information from an input 1, the result is separated into high-order digits (n-m) bits and low-order digits (m) bits by a separator 4, they are subjected to error correction coding by error correction encoders 5, 6 respectively and the result is sent to a transmission line 7. The high-order digit passed through the transmission line 7 is inputted to an error correction device 8, where the information is subjected to error correction and inputted to an integrator 10. When no error is detected from the low-order digit by an error detector 9, the result is sent to the integrator 10 as it is, and if any error is detected, the information is replaced into an m-bit specific pattern (e.g., 2<sup>m</sup>-1) and the result is sent to the integrator 10. The signal decoded into n bits by the integrator is subjected to subtraction of dither from a dither pattern generator 11 and the result is outputted (13). Then even when many low-order digits are missed, no false profile is caused and the deterioration of picture quality is suppressed.



## LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

Copyright (C); 1998,2000 Japan Patent Office

(English Translation)

## **NOTICE OF REASON FOR REJECTION**

Dispatch Date : January 7, 2003

Japanese Patent Application Number : No. 2000-285405

Drafting Date : December 20, 2002

Examiner of Patent Office : Yousuke TANAKA

Attorney : Kimihito WASHIDA

Applied Provision : Section 29(2)

**RECEIVED**

MAR 31 2003

Technology Center 2600

The present application is rejected for the following reason(s). An argument against this office action, if any, may be filed within 60 days from the issue date of the office action.

### **REASON(S)**

The invention(s) as claimed in the following claim(s) of the present application are rejected under the provision of Section 29(2) of the Japanese Patent Law, as the present invention is readily conceivable to one of ordinary skill in the art, to which the invention pertains, on the basis of invention(s) disclosed in the cited reference(s) published, or invention(s) made accessible to public through electric telecommunication line, in Japan or foreign countries prior to the filing of the present application.

Reference [Please refer to a list of cited reference(s).]

Claim(s) 1-6

Cited Reference(s) 1, 2

Remarks:

Cited Reference 1 discloses a communication terminal apparatus and a coding / transmitting method which measures the reception quality of a downlink channel, generates control information having a plurality of digits based on the measurement result, and then transmits the said information to a base station terminal apparatus.

Meanwhile as a publicly known technique, Cited Reference 2 (refer to Patent Application Publication, Page 1, Right-bottom Column, Line 9 through Page 2, Upper-left Column, Line 20) discloses a control technique wherein a plurality of bits are separated into upper bits and lower bits when transmitting a plurality of bits of signals via a propagation path which is not free from errors, and further wherein the upper bits, which have an greater effect on accuracy of data than the lower bits, are made less susceptible to errors.

The invention according to the claims of the present application is nothing more than one which employs a communication terminal apparatus according to Cited Reference 1 and uses a well-known technical means described in Cited Reference 2 as a means for transmitting control information having a plurality of digits under a coding / transmitting method.

In addition, it is a well-known technical matter for a person skilled in the art to widen code word distance and use a greater number of bits so that information sent becomes less susceptible to errors.

There has not been found any further reason for rejection of this application except for the above. If, however, any further reason is found in future, a further notice will be issued.

- Cited Reference(s)
  1. Japanese Laid-Open Patent Publication No. H8-223113
  2. Japanese Laid-Open Patent Publication No. S62-163432





IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

#8 2684

In re the Application of

Inventor(s): Kenichi MIYOSHI et al. Art Unit: 2684  
Serial No.: 10/089,605  
Filed: April 1, 2002  
For: COMMUNICATION TERMINAL APPARATUS, BASE STATION  
APPARATUS, RADIO COMMUNICATION METHOD

PETITION TO MAKE SPECIAL

Attn: Office of Petitions  
Assistant Commissioner of Patents  
Washington, DC 20231

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FEB 06 2003

Technology Center 2600

Sir:

Applicants respectfully petition that the above-captioned application be granted special status. The requirements of MPEP section 708.02(VIII) are complied with as follows:

(1) Please charge the petition fee set forth in 37 CFR §1.17(i) to Deposit Account No. 19-4375.

(2) All pending claims (claims 21-28 submitted in a Preliminary Amendment filed December 16, 2002) are believed to be directed to a single invention; if the Office determines that all the claims presented are not obviously directed to a single invention, Applicants agree to make an election without traverse as a prerequisite to the grant of special status.

(3) A pre-examination search has been made, and an Information Disclosure Statement directed thereto is attached. The field of search is:

Class 455, subclasses 67.1, 67.3, 69, 423, 442, 450, 452, 464, and 522; and

Class 370, subclasses 252, 442, 465, and 468.

In addition, a further pre-examination search was made in the form of a PCT International Search Report; an Information Disclosure Statement directed thereto was filed on April 1, 2002.

(4) One copy each of the related art deemed most closely related to the subject matter encompassed by the claims is of record in the form of the art cited in the attached Information Disclosure Statement and in the Information Disclosure Statement filed on April 1, 2002.

(5) The following is a detailed discussion of the art cited in the above-mentioned Information Disclosure Statements, pointing out how the instant claimed subject matter is patentably distinguishable thereover.

The present application has a filing date of August 2, 2001 (national stage filing on April 1, 2002), and priority dates, under 35 USC §119, of August 2, 2000 and September 20, 2000. The following patent application publications, identified through Applicants' pre-examination search, have effective filing dates that post-date Applicants' priority dates:

Terry et al. (US 2002/0168944), filed provisionally as 60/290,877 on May 14, 2001, and published November 14, 2002;

Hassan (US 2002/0094810), filed January 17, 2001, and published July 18, 2002, and

Miyamoto (US 2002/0001292), filed February 6, 2001, and published January 3, 2002.

Since the present application has a priority date preceding the relevant filing date of each of the above-listed patent applications and none of these applications was published more than one year prior to Applicants' U.S. filing date, these publications may be disqualified as prior art references by the filing of translations of the present priority applications. Nevertheless, the pending claims are deemed to be patentable over the teachings of these documents alone or in combination with the other prior art of record, and the following analysis includes a discussion of these documents.

Terry et al. (US 2002/0168944) disclose a digital radio communication technique employing adaptive modulation and coding. The base station requests downlink channel quality measurements only from mobile terminals with pending downlink transmissions. These mobile terminals report downlink channel quality to the base station, which then allocates resources. The base station notifies the mobile terminals of the physical channel allocation indicating the modulation/coding rate and allocated slots followed by transmission of blocks of downlink data.

Hassan (US 2002/0094810) discloses a radio communication technique in which ARQ transmission techniques are tailored to those situations where the signal quality on the uplink channel is expected to be poor. The signal quality on a downlink channel is examined prior to sending an uplink message. When signal quality on the uplink channel is below a predetermined threshold, the mobile terminal assumes an ARQ transmission mode. When the signal quality is not below the threshold, the mobile terminal assumes a non-ARQ transmission mode. The message length is also used to help determine whether the ARQ transmission mode should be used.

Miyamoto (US 2002/0001292) discloses a radio communication system wherein CDMA downlink transmit power is controlled based on a power decrease command signal from a mobile station. The base station decreases the transmit power based upon a nominal lower limit of its power control range and the downlink channel quality.

Komaili et al. (US 2003/0002446) disclose a rate adaptation device for use in an adaptive multi-rate vocoder of a time division multiple access (TDMA) wireless communication system. This rate adaptation device has the ability to increase or decrease the vocoder rate and channel coding in response to the level of interference present on a wireless communication channel. As a result, the rate adaptation device provides only the amount of channel coding required by the existing channel conditions.

Communication resources made available due to lowering the channel coding may be used to improve the communicated speech quality.

Komaili's rate adaptation device decreases channel coding during periods of low channel interference to allow the transmission of more speech information, which is provided by a higher vocoder rate. As the amount of communicated speech information is increased, so too is the communicated speech quality. During periods of higher channel interference, the amount of channel coding may be increased to provide consistent and reliable call handling. As the channel coding is increased, the vocoder rate is decreased and so too is the speech quality.

Mohebbi (US 2002/0061750) discloses a cellular mobile communication network that provides a soft hand-off to a mobile terminal moving between service areas of multiple base stations. According to Mohebbi, the mobile station receives a downlink signal from each of the multiple base stations and transmits an uplink signal to each of the base stations, through a wireless channel. The mobile station measures the signal quality of the downlink signal received from each base station and identifies the base station providing the best signal quality. Thereafter, the mobile station transmits an uplink signal to all of the base stations to inform them which base station will be used for subsequent communications with the mobile station. Each base station processes

the uplink signal to identify the selected base station and to act accordingly.

Le Strat et al. (US 6,456,598) disclose a method of adapting the air interface in a mobile radio system. According to this method, a base station and a mobile station analyze the channel conditions of a full-duplex channel by measuring the signal quality of their respectively received signals. The base station informs the mobile station of the signal quality it measured on its receive channel of the full-duplex channel, and the mobile station does likewise. Based on the combined signal quality measures of the full-duplex channel, a transmission mode for each half-duplex channel is selected and utilized by the mobile and base stations. The transmission mode comprises a user bit rate and a channel code. In accordance with this method, the transmission mode may be dynamically adjusted during a call to provide either:

1. a mode that is less robust with respect to transmission errors, but offers a higher level of voice quality and/or a lower consumption of resources; or

2. a mode that is more robust with respect to transmission errors, but offers a lower level of voice quality and/or a higher consumption of resources.

Dorenbosch et al. (US 5,752,166) disclose a method for controlling how a receiver responds to a message received in a radio communication system. According to this method, a message

element and an indication of a signal quality threshold, corresponding to the message element, are transmitted by a controller. A receiver receives the transmitted message and measures the received signal quality of the message, as it is received. Thereafter, the receiver communicates to the controller a negative indication, when the measured signal quality is worse than the signal quality threshold, and a positive indication otherwise.

JP 2000-049663 discloses a transmission rate control method for a radio communication device. According to this method, a communication terminal measures the reception quality of a signal and reports the measurement to a base station. Based on the received report, the base station adjusts its transmission rate. Using this method, the base station's transmission rate can be dynamically adjusted in accordance with the quality of the communication channel.

JP 11-331057 discloses a method of sending an information signal from a base station to a mobile station in a code division multiple access (CDMA) cellular radio system. According to this method, the base station includes the transmission parameter signals PS1, PS2, and PS3 in its communications to the mobile station through channels Ch1, Ch2, and Ch3, respectively. PS1, PS2, and PS3 indicate the respective transmission rates for the voice coded data sent through channels Ch1, Ch2, and Ch3. Upon

transmission of signals PS1, PS2, and PS3, the base station increases the transmission power so that PS1, PS2, and PS3 are transmitted at a higher power than the voice coded data sent through the corresponding channels. Also, the base station transmits each of the signals PS1, PS2, and PS3 at a different time.

The HDR Reverse Link Proposal provides an overview of Qualcomm's reverse link proposal for High Data Rate (HDR) communications. This document proposes for the reverse link a continuous pilot signal, communication of an acknowledgment (ACK) signal on a separate Walsh code, communication of a Data Rate Control (DRC) signal on a separate Walsh code, an independent gain control for the DRC and ACK channels relative to the pilot signal, and repeated DRC mode and gain control.

By contrast to the disclosures discussed above, the Applicants recite in independent claim 21 a communication terminal apparatus having a measurer that measures a downlink channel quality and outputs information that is generated in association with the downlink channel quality. The output information comprises a plurality of digits including an upper digit and a lower digit. A coder encodes the information such that the upper digit has a larger code word minimum distance than the lower digit. A transmitter of the apparatus transmits the encoded information to a base station apparatus.



Independent claim 23 also recites a communication terminal apparatus having a measurer that measures a downlink channel quality and outputs information that is generated in association with the downlink channel quality. Here too, the output information comprises a plurality of digits including an upper digit and a lower digit. However, in this case, the coder encodes the information such that the upper digit is assigned a larger number of bits than the lower digit. As with claim 21, a transmitter of the apparatus transmits the encoded information to a base station apparatus.

Independent claim 25 recites a coding and transmission method. According to this method, a communication terminal encodes information that is used for the assignment of the downlink channel. The information comprises a plurality of digits including an upper digit and a lower digit and is encoded such that the upper digit has a larger code word minimum distance than the lower digit. After the information is encoded, the communication terminal transmits it to the base station apparatus.

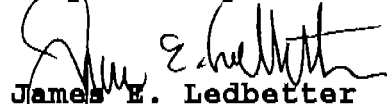
Independent claim 28 recites another coding and transmission method. According to this method, a communication terminal encodes information that is used for the assignment of the downlink channel. The information comprises a plurality of digits including an upper digit and a lower digit and is encoded such that the upper digit is assigned a larger number of bits than the lower digit.

After the information is encoded, the communication terminal transmits it to the base station apparatus.

None of the documents discussed above discloses the features of *inter alia*: (1) encoding information used for the assignment of a downlink channel such that an upper digit of the information has a larger code word minimum distance than the lower digit of the information and (2) encoding information used for the assignment of a downlink channel such that the upper digit is assigned a larger number of bits than the lower digit of the information. Thus, the Applicants submit that the documents identified in the pre-examination searches, considered alone or in combination, fail to disclose or suggest the claimed subject matter. Therefore, in light of the foregoing discussion pointing out how the claimed invention distinguishes over these references, Applicants respectfully submit that the inventions of each of the independent claims are not anticipated by these references and would not have been obvious over any combination thereof.

Grant of special status in accordance with this petition is respectfully requested.

Respectfully submitted,



James E. Ledbetter  
Registration No. 28,732

Date: February 4, 2003

JEL/DWW/att  
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Paper No. 9

MAIL

NOV 26 2003

DIRECTOR OFFICE  
TECHNOLOGY CENTER 2600

STEVENS DAVIS MILLER & MOSHER, LLP  
1615 L STREET, NW  
SUITE 850  
WASHINGTON DC 20036

In re Application of: Kenichi MIYOSHI, et al. :  
Application Serial No.: 10/089,605 : DECISION ON PETITION  
Filed: April 1, 2002 :  
For: COMMUNICATIONS TERMINAL :  
APPARATUS, BASE STATION :  
APPARATUS, AND RADIO COMMUNICATION: :  
METHOD : :

This is a decision on the petition, filed on February 4, 2003 under 37 C.F.R. §102(d) and M.P.E.P. § 708.02(VIII): Accelerated Examination, to make the above-identified application special.

The petition is **GRANTED**.

M.P.E.P. § 708.02, Section VIII which sets out the prerequisites for a grantable petition for Accelerated Examination under 37 C.F.R. § 102(d) states in relevant part:

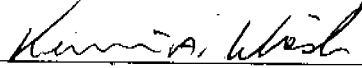
A new application (one which has not received any examination by the examiner) may be granted special status provided that applicant (and this term includes applicant's attorney or agent) complies with each of the following items:

- (A) Submits a petition to make special accompanied by the fee set forth in 37 CFR 1.17(i);
- (B) Presents all claims directed to a single invention, or if the Office determines that all the claims presented are not obviously directed to a single invention, will make an election without traverse as a prerequisite to the grant of special status;
- (C) Submits a statement(s) that a pre-examination search was made, listing the field of search by class and subclass, publication, Chemical Abstracts, foreign patents, etc. A search made by a foreign patent office satisfies this requirement;
- (D) Submits one copy each of the references deemed most closely related to the subject matter encompassed by the claims if said references are not already of record; and
- (E) Submits a detailed discussion of the references, which discussion points out, with the particularity required by 37 CFR 1.111 (b) and (c), how the claimed subject matter is patentable over the references.

Serial No.: 10/089,605  
Decision on Petition

- 2 -

Applicant's submissions of February 4, 2003 meet all the criteria set out above. Accordingly, the petition is **GRANTED**. The application file is being forwarded to the Examiner for accelerated examination in accordance with M.P.E.P. § 708.02.

  
Kenneth A. Wieder  
Special Program Examiner  
Technology Center 2600  
Communications

<b>Notice of Allowability</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/089,605	MIYOSHI ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	DANH C LE	2683	

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

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

1. ☒ This communication is responsive to 4/1/02.
  2. ☒ The allowed claim(s) is/are 21-28.
  3. ☒ The drawings filed on 01 April 2002 are accepted by the Examiner.
  4. ☒ 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: \_\_\_\_\_.
5. ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
 (a) ☐ The translation of the foreign language provisional application has been received.
  6. ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

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**

7. ☐ 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.
8. ☐ 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. \_\_\_\_\_.
  - (b) ☐ Including changes required by the proposed drawing correction filed \_\_\_\_\_, which has been approved by the Examiner.
  - (c) ☐ Including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No. \_\_\_\_\_.

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 margin according to 37 CFR 1.121(d).

9. ☐ 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 <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 5 <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)          |
| 2 <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 6 <input type="checkbox"/> Interview Summary (PTO-413), Paper No. _____.            |
| 3 <input checked="" type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),<br>Paper No. <u>2,6,7</u> | 7 <input type="checkbox"/> Examiner's Amendment/Comment                             |
| 4 <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material                  | 8 <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
|  | 9 <input type="checkbox"/> Other  |

IPR2018-1557  
HTC EX1002, Page 249

***Allowable Subject Matter***

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

Claims 21-28 are allowed.

As to claims 21 and 25, Niemela (US 6,452,914) teaches the mobile TDMA/GSM system which uses a plurality of bits for the steal symbols/flags. Haavisto (US 6,208,715) teaches the method and apparatus for transmitting messages in a telecommunication system. Hong (US 6,341,125) teaches the method for improving TFCI transportation performance. Uesugi (US 5,526,271) teaches the method and apparatus for interference rejection. The teaching of above prior arts either alone or in combine fails to teach the encodes information that is used for the assignment of the downlink channel and composed of a plurality of digits including an upper digit and a lower digit such that the upper digit has a larger code word minimum distance that the lower digit.

As to claims 23 and 27, Niemela (US 6,452,914) teaches the mobile TDMA/GSM system which uses a plurality of bits for the steal symbols/flags. Haavisto (US 6,208,715) teaches the method and apparatus for transmitting messages in a telecommunication system. Hong (US 6,341,125) teaches the method for improving TFCI transportation performance. Uesugi (US 5,526,271) teaches the method and apparatus for interference rejection. The teaching of above prior arts either alone or in combine fails to teach the encodes information that is used for the assignment of the downlink channel and composed of a plurality of digits including an upper digit and a lower digit such that the upper digit is assigned a larger number of bit than the lower digit.

Application/Control Number: 10/089,605  
Art Unit: 2683

Page 3

Dependent claims 22, 24, 26, 28 are allowable for the same reason.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

A. Gaal et al (US 2003/0157900) teaches the channel quality feedback mechanism and method.

B. Kim et al (US 2003/0095523) teaches coding apparatus and method in a CDMA mobile communication system.

C. Wan et al (US 6,539,205) teaches the traffic channel quality estimate from a digital control channel.

D. Kim et al (US 2001/0019589) teaches the method for controlling the target bit error rate of each packet in wired and wireless video communication system.

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

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANH C LE whose telephone number is 703-306-0542. The examiner can normally be reached on 8:00AM-5:00PM.

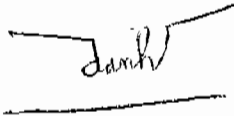
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, WILLIAM TROST can be reached on 703-308-5318. The

Application/Control Number: 10/089,605  
Art Unit: 2683

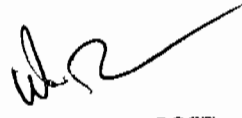
Page 4

fax phone number for the organization where this application or proceeding is assigned is 703-872-9314.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.



Danh C. Le



WILLIAM TROST  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2600



<b>Notice of References Cited</b>	Application/Control No. 10/089,605	Applicant(s)/Patent Under Reexamination MIYOSHI ET AL.	
	Examiner DANH C LE	Art Unit 2683	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-2003/0157900	08-2003	Gaal et al.	455/69
	B	US-2003/0095532	05-2003	Klm et al.	370/342
	C	US-6,452,914	09-2002	Niemela, Karl	370/337
	D	US-6,208,715	03-2001	Haavisto, Petri	379/88.07
	E	US-6,341,125	01-2002	Hong et al.	370/335
	F	US-6,526,271	02-2003	Uesugi et al.	455/296
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

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

NON-PATENT DOCUMENTS

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

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



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

7590 12/24/2003  
Stevens Davis Miller & Mosher  
1615 L Street N W Suite 850  
Washington, DC 20036

EXAMINER	
LE, DANH C	
ART UNIT	PAPER NUMBER
2683	10
DATE MAILED: 12/24/2003	

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/089,605	04/01/2002	Kenichi Miyoshi	L928902149	3013

TITLE OF INVENTION: COMMUNICATION TERMINAL APPARATUS BASE STATION APPARATUS AND RADIO COMMUNICATION METHOD

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1330	\$300	\$1630	03/24/2004

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 REFLECTS A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE APPLIED IN THIS APPLICATION. THE PTOL-85B (OR AN EQUIVALENT) MUST BE RETURNED WITHIN THIS PERIOD EVEN IF NO FEE IS DUE OR THE APPLICATION WILL BE REGARDED AS ABANDONED.

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 is changed, pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above and notify the United States Patent and Trademark Office of the change in status, 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 the box below and enclose the PUBLICATION FEE and 1/2 the ISSUE FEE shown above.

☐ Applicant claims SMALL ENTITY status.  
See 37 CFR 1.27.

II. PART B - FEE(S) TRANSMITTAL should be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). Even if the fee(s) have already been paid, Part B - Fee(s) Transmittal should be completed and returned. 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.

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** (703) 746-4000

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 4 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: Legibly mark-up with any corrections or use Block 1)

7590 12/24/2003

Stevens Davis Miller & Mosher  
1615 L Street N W Suite 850  
Washington, DC 20036

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, on the date indicated below.

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/089,605	04/01/2002	Kenichi Miyoshi	L928902149	3013

TITLE OF INVENTION: COMMUNICATION TERMINAL APPARATUS BASE STATION APPARATUS AND RADIO COMMUNICATION METHOD

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1330	\$300	\$1630	03/24/2004

EXAMINER	ART UNIT	CLASS-SUBCLASS
LE, DANH C	2683	455-452100

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. Inclusion of assignee data is only appropriate when an assignment has been previously submitted to the USPTO or is being submitted under separate cover. 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 enclosed:

- ☐ Issue Fee  
☐ Publication Fee  
☐ Advance Order - # of Copies \_\_\_\_\_

## 4b. Payment of Fee(s):

- ☐ A check in the amount of the fee(s) is enclosed.  
☐ Payment by credit card. Form PTO-2038 is attached.  
☐ The Director is hereby authorized by charge the required fee(s), or credit any overpayment, to Deposit Account Number \_\_\_\_\_ (enclose an extra copy of this form).

Director for Patents is requested to apply the Issue Fee and Publication Fee (if any) or to re-apply any previously paid issue fee to the application identified above.

(Authorized Signature)

(Date)

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.

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, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, Alexandria, Virginia 22313-1450.

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IPR2018-1557

HTC EX1002, Page 255

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/089,605	04/01/2002	Kenichi Miyoshi	L928902149	3013

7590 12/24/2003

Stevens Davis Miller & Mosher  
1615 L Street N W Suite 850  
Washington, DC 20036

EXAMINER
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LE, DANII C

ART UNIT	PAPER NUMBER
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2683

DATE MAILED: 12/24/2003

10

**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 206 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 206 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) system (<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 (703) 305-1383. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at (703) 305-8283.

# PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail** **Mail Stop ISSUE FEE**  
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**P.O. Box 1450**  
**Alexandria, Virginia 22313-1450**  
**or Fax (703) 746-4000**

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CURRENT CORRESPONDENCE ADDRESS (Note: Legibly mark-up with any corrections or use Block 1)

7590 12/24/2003  
**Stevens Davis Miller & Mosher**  
**1615 L Street N W Suite 850**  
**Washington, DC 20036**



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, on the date indicated below.

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/089,605	04/01/2002	Kenichi Miyoshi	L928902149	3013

TITLE OF INVENTION: COMMUNICATION TERMINAL APPARATUS BASE STATION APPARATUS AND RADIO COMMUNICATION METHOD

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1330	\$300	\$1630	03/24/2004
EXAMINER	ART UNIT	CLASS-SUBCLASS			
LE, DANH C	2683	455-452100			

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 STEVENS, DAVIS, MILLER,**  
**2 & MOSHER, LLP.**  
**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. Inclusion of assignee data is only appropriate when an assignment has been previously submitted to the USPTO or is being submitted under separate cover. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

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

**MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD. Osaka, JAPAN**

Please check the appropriate assignee category or categories (will not be printed on the patent); ☐ Individual ☒ corporation or other private group entity ☐ government

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

☒ Issue Fee

☒ Publication Fee

☐ Advance Order - # of Copies

4b. Payment of Fee(s):

☒ A check in the amount of the fee(s) is enclosed.

☐ Payment by credit card. Form PTO-2038 is attached.

☒ The Director is hereby authorized by charge the required fee(s), or credit any overpayment, to Deposit Account Number **19-4375** (enclose an extra copy of this form).

Director for Patents is requested to apply the Issue Fee and Publication Fee (if any) or to re-apply any previously paid issue fee to the application identified above.

(Authorized Signature) **James E. Ledbetter, Reg. No. 28,732** (Date) **02/27/2004**

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.

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, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, Alexandria, Virginia 22313-1450.

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**03/03/2004 FNETK12 00000139 10089605**

**01 FC:1501**  
**02 FC:1504**

**1330.00 OP**  
**300.00 OP**

**IPR2018-1557**

TRANSMIT THIS FORM WITH FEE(S)

**HTC EX1002, Page 257**

AO 120 (Rev. 08/10)

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

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

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

DOCKET NO.	DATE FILED 2/24/2017	U.S. DISTRICT COURT District of Delaware
PLAINTIFF Inventergy, Inc.		DEFENDANT Apple Inc.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 See Attached Sheet		
2		
3		
4		
5		

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

DATE INCLUDED	INCLUDED BY <input type="checkbox"/> Amendment <input type="checkbox"/> Answer <input type="checkbox"/> Cross Bill <input type="checkbox"/> Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
2		
3		
4		
5		

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

DECISION/JUDGEMENT		
CLERK	(BY) DEPUTY CLERK	DATE

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

PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 US 6,466,563 B1	10/15/2002	Inventergy, Inc.
2 US 6,611,676 B2	8/26/2003	Inventergy, Inc.
3 US 7,206,587 B2	4/17/2007	Inventergy, Inc.
4 US 7,760,815 B2	7/20/2010	Inventergy, Inc.
5 US 7,764,711 B2	7/27/2010	Inventergy, Inc.
6 US 7,848,439 B2	12/7/2010	Inventergy, Inc.
7 US 6,760,590 B2	7/6/2004	Inventergy, Inc.



AO 120 (Rev. 08/10)

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

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

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

DOCKET NO.	DATE FILED 2/27/2017	U.S. DISTRICT COURT District of Delaware
PLAINTIFF Inventergy, Inc.		DEFENDANT HTC Corporation and HTC America, Inc.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 See Attached Sheet		
2		
3		
4		
5		

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

DATE INCLUDED	INCLUDED BY <input type="checkbox"/> Amendment <input type="checkbox"/> Answer <input type="checkbox"/> Cross Bill <input type="checkbox"/> Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
2		
3		
4		
5		

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

DECISION/JUDGEMENT
--------------------

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



PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 US 6,466,563 B1	10/15/2002	Inventergy, Inc.
2 US 6,611,676 B2	8/26/2003	Inventergy, Inc.
3 US 7,206,587 B2	4/17/2007	Inventergy, Inc.
4 US 7,760,815 B2	7/20/2010	Inventergy, Inc.
5 US 7,764,711 B2	7/27/2010	Inventergy, Inc.
6 US 7,848,439 B2	12/7/2010	Inventergy, Inc.
7 US 6,760,590 B2	7/6/2004	Inventergy, Inc.

## POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

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

I hereby appoint:

☒ Practitioners associated with the Customer Number:

146691

OR

☐ Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b).

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



The address associated with Customer Number:

OR

<input type="checkbox"/> Firm or individual Name			
Address			
City	State	Zip	
Country			
Telephone			Email


Assignee Name and Address:

INVT SPE LLC  
One Market Plaza, Spear Tower, 42nd Floor  
San Francisco, CA 94105

A copy of this form, together with a statement under 37 CFR 3.73(b) (Form PTO/SB/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(b) may be completed by one of the practitioners appointed in this form if the appointed practitioner is authorized to act on behalf of the assignee, and must identify the application in which this Power of Attorney is to be filed.

### SIGNATURE of Assignee of Record

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

Signature		Date	5/8/2017
Name	Eran Zur	Telephone	415-284-7400
Title	Authorized Signatory		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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

**STATEMENT UNDER 37 CFR 3.73(c)**

Applicant/Patent Owner: INVT SPE LLC

Application No./Patent No.: 6,760,590 Filed/Issue Date: 07-06-2004

Titled: COMMUNICATION TERMINAL APPARATUS BASE STATION APPARATUS AND RADIO COMMUNICATION METHOD  
INVT SPE LLC, a Corporation

(Name of Assignee)

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

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

1. ☒ The assignee of the entire right, title, and interest.
2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):
- ☐ The extent (by percentage) of its ownership interest is \_\_\_\_%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.
- ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

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

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

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

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

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

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

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

1. From: MIYOSHI, KATO and AIZAWA To: MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.

The document was recorded in the United States Patent and Trademark Office at  
Reel 013035, Frame 0059, or for which a copy thereof is attached.

2. From: MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD. To: PANASONIC CORPORATION

The document was recorded in the United States Patent and Trademark Office at  
Reel 035279, Frame 0746, or for which a copy thereof is attached.

[Page 1 of 2]

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

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

**STATEMENT UNDER 37 CFR 3.73(c)**

3. From: PANASONIC CORPORATION To: INVENTERGY, INC.

The document was recorded in the United States Patent and Trademark Office at  
Reel 031911, Frame 0911, or for which a copy thereof is attached.

4. From: INVENTERGY, INC. To: INVT SPE LLC

The document was recorded in the United States Patent and Trademark Office at  
Reel 042885, Frame 0685, or for which a copy thereof is attached.

5. From: \_\_\_\_\_ To: \_\_\_\_\_

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

6. From: \_\_\_\_\_ To: \_\_\_\_\_

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

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

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

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

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

/Eric Scheuerlein/

Signature

Eric Scheuerlein

Printed or Typed Name

08-09-2017

Date

61234

Title or Registration Number

## Privacy Act Statement

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

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

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

Electronic Acknowledgement Receipt	
EFS ID:	30024330
Application Number:	10089605
International Application Number:	
Confirmation Number:	3013
Title of Invention:	COMMUNICATION TERMINAL APPARATUS BASE STATION APPARATUS AND RADIO COMMUNICATION METHOD
First Named Inventor/Applicant Name:	Kenichi Miyoshi
Correspondence Address:	Stevens Davis Miller & Mosher - 1615 L Street N W Suite 850 - Washington DC 20036 US 2027850100 -
Filer:	Ricky Quoc Lam
Filer Authorized By:	
Attorney Docket Number:	L928902149
Receipt Date:	09-AUG-2017
Filing Date:	01-APR-2002
Time Stamp:	03:08:53
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no
File Listing:	



Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	20170809_INVE_POA.pdf	768768	no	1
			78db457b0ec765e945ca829dd13f82573c60f4ea		
Warnings:					
Information:					
2	Assignee showing of ownership per 37 CFR 3.73	20170809_US6760590_statem ent37CFR.pdf	78024	no	3
			52a75c0b06a2b1d75edd5eed2d6400bd90e80d93		
Warnings:					
Information:					
Total Files Size (in bytes):			846792		
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					



UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
10/089,605	04/01/2002	Kenichi Miyoshi	

146691  
Daylight Law, P.C.  
626 Jefferson Avenue  
Suite 7  
Redwood City, CA 94063

**CONFIRMATION NO. 3013**  
**POA ACCEPTANCE LETTER**



Date Mailed: 08/14/2017

**NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY**

This is in response to the Power of Attorney filed 08/09/2017.

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

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

/nrhayden/





UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
10/089,605	04/01/2002	Kenichi Miyoshi	L928902149

Stevens Davis Miller & Mosher  
1615 L Street N W Suite 850  
Washington, DC 20036

**CONFIRMATION NO. 3013**  
**POWER OF ATTORNEY NOTICE**



Date Mailed: 08/14/2017

**NOTICE REGARDING CHANGE OF POWER OF ATTORNEY**

This is in response to the Power of Attorney filed 08/09/2017.

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

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

/nrhayden/

AO 120 (Rev. 08/10)

<b>TO:</b> <b>Mail Stop 8</b> <b>Director of the U.S. Patent and Trademark Office</b> <b>P.O. Box 1450</b> <b>Alexandria, VA 22313-1450</b>	<b>REPORT ON THE</b> <b>FILING OR DETERMINATION OF AN</b> <b>ACTION REGARDING A PATENT OR</b> <b>TRADEMARK</b>
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In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been  
filed in the U.S. District Court District of Delaware on the following

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

DOCKET NO.	DATE FILED 2/24/2017	U.S. DISTRICT COURT District of Delaware
PLAINTIFF Inventergy, Inc.		DEFENDANT Apple Inc.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 See Attached Sheet		
2		
3		
4		
5		

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

DATE INCLUDED	INCLUDED BY <input type="checkbox"/> Amendment <input type="checkbox"/> Answer <input type="checkbox"/> Cross Bill <input type="checkbox"/> Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
2		
3		
4		
5		

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

<b>DECISION/JUDGEMENT</b>  Case voluntarily dismissed 5/25/2017.
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CLERK John A. Cerino	(BY) DEPUTY CLERK Deborah L. Benyo	DATE 5/25/2017
-------------------------	---------------------------------------	-------------------

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

PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 US 6,466,563 B1	10/15/2002	Inventergy, Inc.
2 US 6,611,676 B2	8/26/2003	Inventergy, Inc.
3 US 7,206,587 B2	4/17/2007	Inventergy, Inc.
4 US 7,760,815 B2	7/20/2010	Inventergy, Inc.
5 US 7,764,711 B2	7/27/2010	Inventergy, Inc.
6 US 7,848,439 B2	12/7/2010	Inventergy, Inc.
7 US 6,760,590 B2	7/6/2004	Inventergy, Inc.

L Number	Hits	Search text	DB	Time stamp
1	82212	(quality or RSSI or strength or robust or error\$2 or BER or C/I or interfer\$5) with (cod\$3 or encod\$3)	USPAT; US-PGPUB	2003/12/12 07:22
2	6919	((quality or RSSI or strength or robust or error\$2 or BER or C/I or interfer\$5) with (cod\$3 or encod\$3) ) with (wireless or radio or mobile or RF or cellular)	USPAT; US-PGPUB	2003/12/12 07:22
3	29	((quality or RSSI or strength or robust or error\$2 or BER or C/I or interfer\$5) with (cod\$3 or encod\$3) ) with (wireless or radio or mobile or RF or cellular)) with (long\$2 or great\$2 or more) near6 (bit\$2 or length or word\$2)	USPAT; US-PGPUB	2003/12/12 07:23

L Number	Hits	Search Text	DB	Time stamp
-	261	downlink with (digit bit) and 455/\$.ccls.	USPAT	2003/12/11 13:12
-	156	(code same distance) and (channel near2 quality)	USPAT	2003/12/11 18:00
-	215	455/\$.ccls. and (code same distance)	US-PGPUB	2003/12/11 15:19
-	228	(code same distance) and (channel)	EPO;	2003/12/11 17:50
-	104	(cod\$3 near3 word) same (mobile cellular)	DERWENT	
-	294	(cod\$3 near3 word) same (mobile cellular)	EPO;	2003/12/11 17:56
-	58	larger same bit same (lower fewer) and 455/\$.ccls.	DERWENT	
			USPAT	2003/12/11 17:57
			USPAT	2003/12/11 18:10

# U.S. NATIONAL STAGE WORKSHEET (DO/EO)

U.S. APPL. NO. 10/089605 INTERNATIONAL APPL. JP01/06654  
APPLICATION FILED BY: 20 MOS., ☒ OR 30 MOS., ☐ SCREENED BY

## INTERNATIONAL APPLICATION PAPERS IN THE APPLICATION FILE:

- ☒ International application
- ☐ Article 19 amendments
- ☐ Priority Document(s) No. \_\_\_\_\_
- ☐ Request Form PCT/RO/101
- ☐ PCT/IB/302
- ☐ PCT/IB/304
- ☐ PCT/IB/306
- ☐ PCT/IB/308
- ☐ PCT/IB/331
- ☐ OTHER PCT/IB/ \_\_\_\_\_
- ☐ PCT/IPEA/409 also 416

- ☐ 409 annexes to IPER
- ☒ PCT/ISA/210 (Search report)
- ☒ Search report References
- ☐ Other Papers filed

WIPO PUBLICATION  
PUBLICATION NO. WO 02/13570  
PUBLICATION DATE 2-14-02  
PUBLICATION LANG., en/pt/es  
NOT PUBLISHED  
☐ U.S. only ☐ Requested

## RECEIVED FROM THE APPLICANT: (other than checked above)

- |  |  |
|--|--|
| <input checked="" type="checkbox"/> National application basic fee paid          | <input type="checkbox"/> Preliminary Amendment(s) filed                              |
| <input checked="" type="checkbox"/> Express Processing Requested                 | <input type="checkbox"/> second submission   |
| <input checked="" type="checkbox"/> Translation of the International Application | <input checked="" type="checkbox"/> Information Disclosure Statement <u>4/1/02</u>   |
| <input type="checkbox"/> Used the IB copy of the IA                              | <input type="checkbox"/> second submission   |
| <input checked="" type="checkbox"/> Description                                  | <input checked="" type="checkbox"/> Assignment                                       |
| <input checked="" type="checkbox"/> Claims <u>20</u>                             | <input type="checkbox"/> Forward to Assignment Branch                                |
| <input checked="" type="checkbox"/> Drawings <u>17</u>                           | <input type="checkbox"/> Substitute Specification                                    |
| <input type="checkbox"/> Foreign Language in drawing                             | <input type="checkbox"/> Small Entity Statement                                      |
| <input type="checkbox"/> Article 19 Amendments                                   | <input type="checkbox"/> type  |
| <input type="checkbox"/> Amendment used in application                           | <input checked="" type="checkbox"/> Oath/Declaration (date submitted <u>4/1/02</u> ) |
| <input type="checkbox"/> Article 34 Amendment                                    | <input type="checkbox"/> Not executed  |
| <input type="checkbox"/> Amendment used in application                           | <input checked="" type="checkbox"/> Executed   |
| <input type="checkbox"/> DNA   | <input type="checkbox"/> Power of Attorney   |
| <input type="checkbox"/> 1194 transaction done                                   | <input type="checkbox"/> Change of Address   |
| <input type="checkbox"/> Sequence listing  | <input type="checkbox"/> Sequence Letter   |

## 35 USC Receipt of Request (PTO - 1399 Transmittal Letter)

Date Acceptable oath/declaration received \_\_\_\_\_

102(e) Date \_\_\_\_\_

Date complete 35 USC 371 requirements met \_\_\_\_\_

## DATE NOTICE COMPLETED

- DO/EO 903 Notice of Acceptance
- DO/EO 905 Notice of Missing Requirements
- DO/EO 917 Notice of A defective oath or declaration
- DO/EO 916 Notice of defective response
- DO/EO 913 Notice of defective translation
- DO/EO 909 Notification of Abandonment
- DO/EO 920 Notification Nucleotide Sequence

10/089605  
 SERIAL NUMBER

FOR PROCESSING NEW APPLICATION

Rev. 12/

INSTRUCTIONS:

1. Make a checkmark beside each item IF verified.
2. IF corrections are required, write notes to the examiner or supervisor on reverse side.

FACE OF FILE

1. Printed and stamped serial numbers match the bar code label.
2. Filing Date present
3. Class/Subclass present
4. Applicant(s) name present
5. Total number of drawings present
6. Total number of claims present
7. Total number of independent claims present.
8. Filing fee received present
9. Mailing address present
10. Title of invention present.

CENTER OF THE FILE

A. DRAWINGS

1. None (GO TO B)
2. Serial number present and correct on each sheet
3. Number of sheets entered on line 1 of contents

B. SMALL ENTITY STATEMENT

1. None and not recorded on face of file (GO TO C)
2. Statement present
3. Small Entity recorded on face of file

C. DECLARATION OR OATH

1. Title matches face of file and specification
2. Declaration phrase present  
(I HEREBY DECLARE ALL...)
3. (Original and first inventor or inventors...) phrase present
4. (Reviewed and understood the contents of the application, including claims...) Phrase present
5. (Acknowledge duty to disclose information in accordance With 1.56(a)...) Phrase present
6. Residence, citizenship, post office address of all applicants present
7. Signed by all applicants
8. Less than 3 months before filing date, or less than six months after filing date

D. CLAIMS (AS FILED)

1. Complete forms 1360 and 845: (forms on right side of file)
2. Circle independent claims on the Index of claims
3. Draw line under the last claim number on the Index of claims

E. SPECIFICATION

1. Serial number present and correct
2. Specification in permanent ink
3. Brief Description of each drawing figure
4. No missing or duplicate pages
5. No holes punched in text.

F. ABSTRACT

1. None (GO TO G)
2. Serial Number present and correct
3. Abstract on separate page
4. 25 lines or less.
5. One paragraph ONLY

G. PTO-1536

1. PRESENT

H. PRE-AMENDMENTS

(Found on right side of file)

1. None (GO TO I)
2. Enter on Contents of flowrapper
3. Instruction to cancel claim(s)
4. Claims canceled on Index of Claims
5. Instruction to add claim(s)
6. Circle new independent claim(s) on the Index of Claims
7. Draw line under the new last claim number on the Index of Claims
8. Complete forms 1360 and 875

I. PTO-948

1. Present

RIGHT SIDE OF FILE

1. PALM FILE DATA SHEET PRESENT
2. TRANSMITTAL LETTERS PRESENT
3. FORMS 1360 & 875 PRESENT/COMPLETE
4. MISCELLANEOUS PAPERS PRESENT/ENTERED
5. PETITION TO MAKE SPECIAL PRESENT (ENTER AND PLACE IN THE CENTER)
6. DRAWING PRINTS PRESENT (2 COPIES)

**FEES**

- ☒ 1. Correct filing fee paid.
- ☒ 2. Excess claim fees paid:
  - ☒ a. Excess total claims more than 20
  - ☒ b. Excess independent claims more than 3
  - ☒ c. First multiple dependent claims fee paid
- ☒ 3. Miscellaneous paper fee paid.

**FINAL STEPS**

- ☒ 1. Sign and date center of filewrapper, under flap
- ☒ 2. Docketed to examiner.

**NOTES TO SUPERVISOR**

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**NOTES TO EXAMINER**

DGR case need a 948 sheet.

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SIGNATURE OF PREPARER:

*D. Johnson*

*7-14-02*



**MULTIPLE DEPENDENT CLAIM  
FEE CALCULATION SHEET  
(FOR USE WITH FORM PTO-876)**

SERIAL NO. 101089605  
APPLICANT(S)

FILING DATE

**CLAIMS**

	AS FILED		AFTER 1st AMENDMENT		AFTER 2nd AMENDMENT	
	IND.	DEP.	IND.	DEP.	IND.	DEP.
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TOTAL IND.	2		4			
TOTAL DEP.	18		4			
TOTAL CLAIMS	20		8			

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