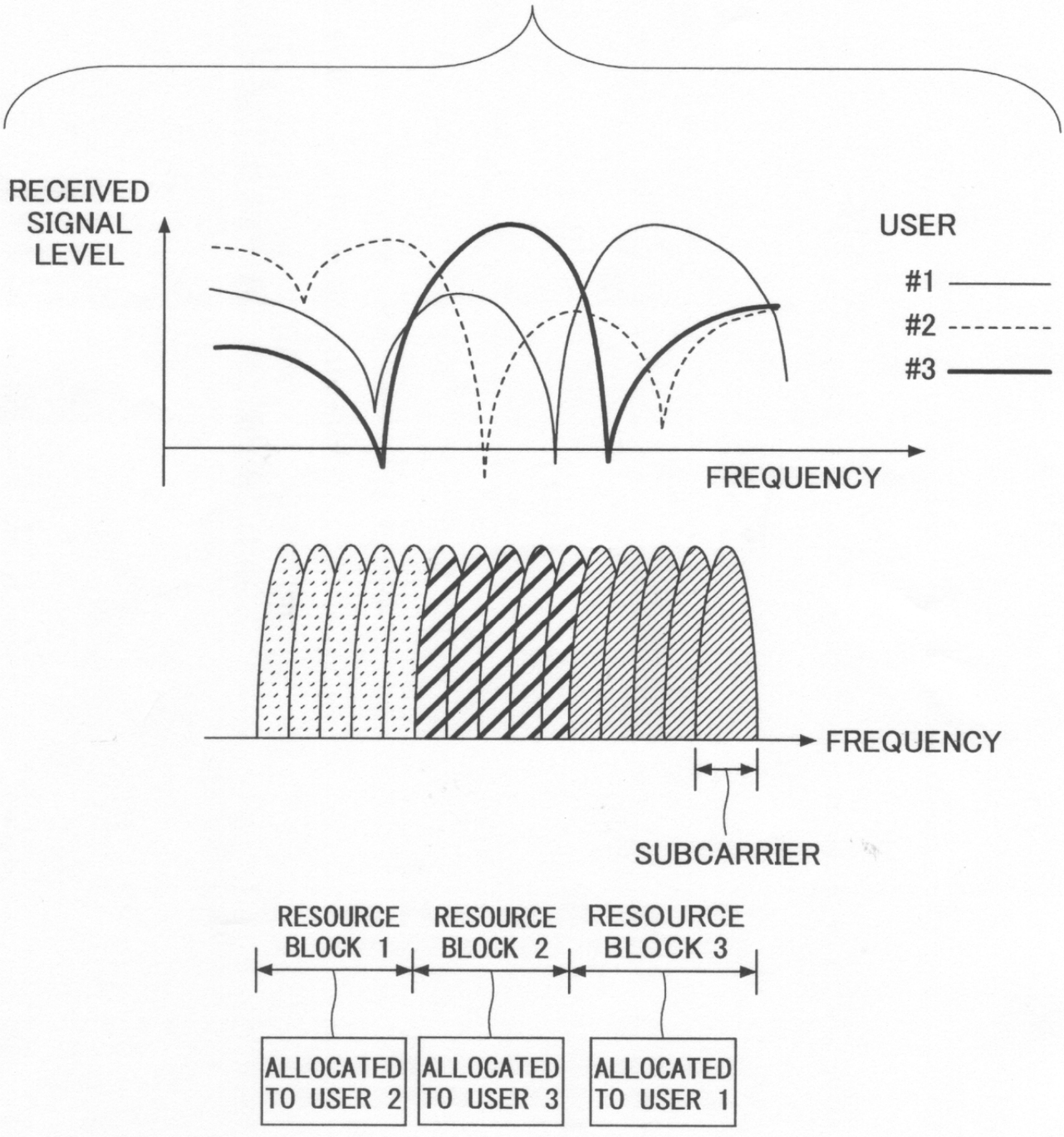
FIG.1


RECEIVED SIGNAL LEVEL
USER
#1
#2
#3
FREQUENCY
FREQUENCY
SUBCARRIER
RESOURCE BLOCK 1
RESOURCE BLOCK 2
RESOURCE BLOCK 3
ALLOCATED TO USER 2
ALLOCATED TO USER 3
ALLOCATED TO USER 1

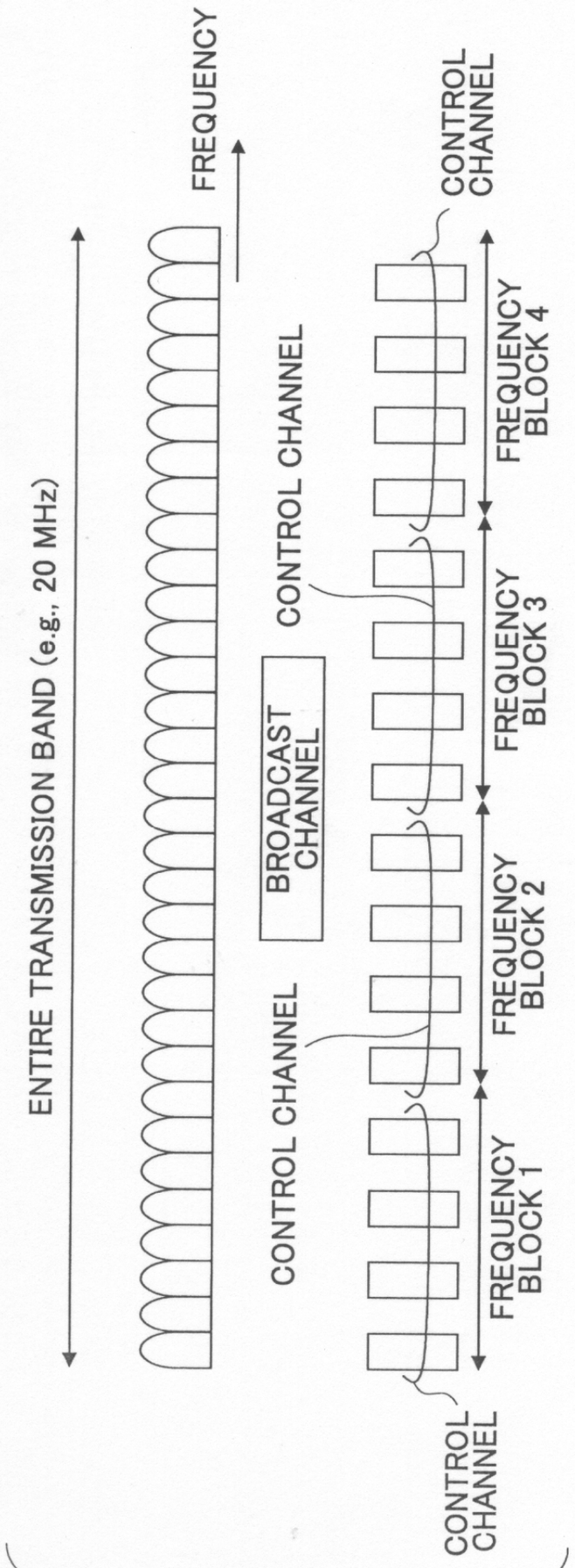

ENTIRE TRANSMISSION BAND (e.g., 20 MHz)
FREQUENCY
BROADCAST CHANNEL
CONTROL CHANNEL
CONTROL CHANNEL
CONTROL CHANNEL
CONTROL CHANNEL
FREQUENCY BLOCK 1
FREQUENCY BLOCK 2
FREQUENCY BLOCK 3
FREQUENCY BLOCK 4

FIG.2

FIG.3A

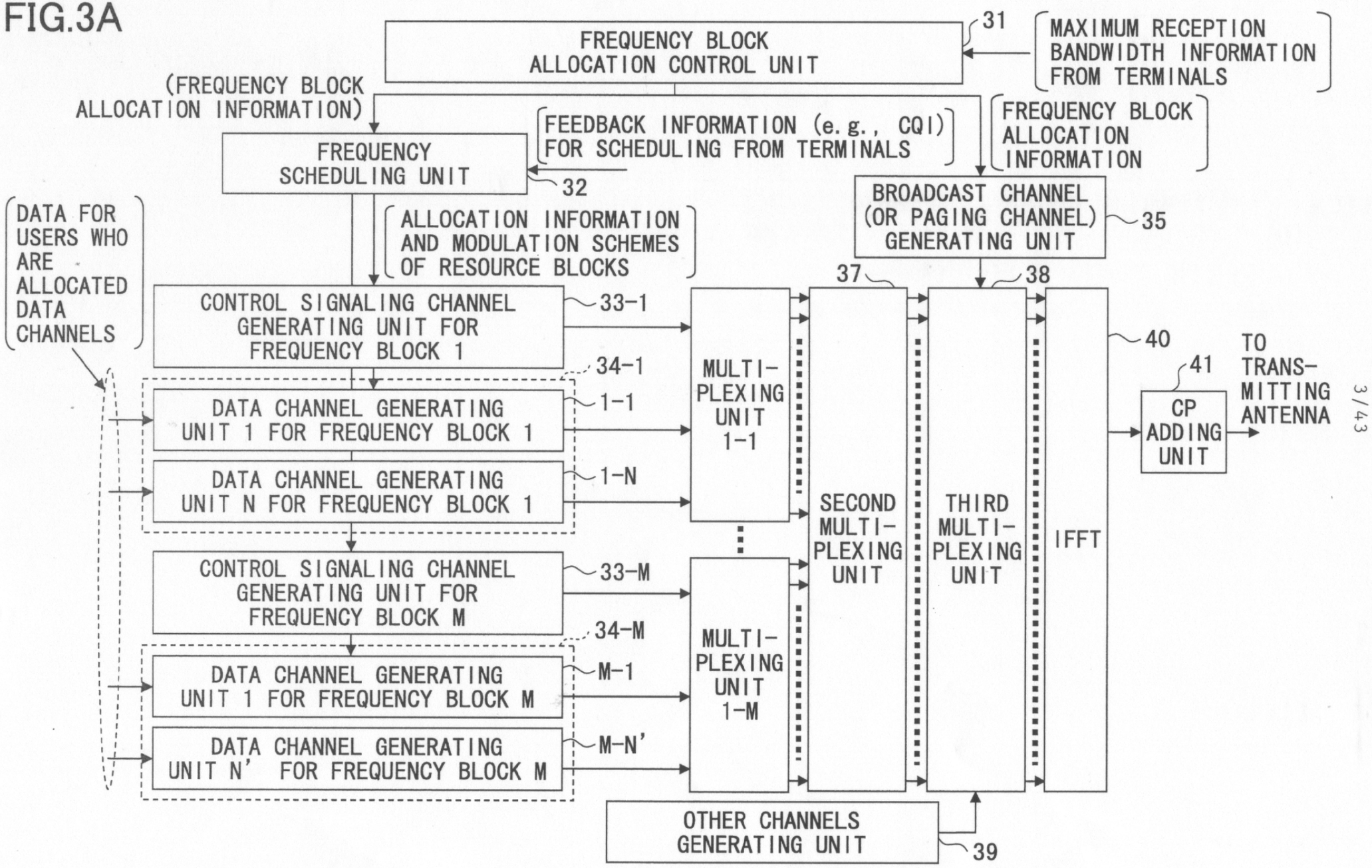

FREQUENCY BLOCK ALLOCATION CONTROL UNIT
31
MAXIMUM RECEPTION BANDWIDTH INFORMATION FROM TERMINALS
(FREQUENCY BLOCK ALLOCATION INFORMATION)
FEEDBACK INFORMATION (e.g., CQI) FOR SCHEDULING FROM TERMINALS
FREQUENCY BLOCK ALLOCATION INFORMATION
FREQUENCY SCHEDULING UNIT
32
BROADCAST CHANNEL (OR PAGING CHANNEL) GENERATING UNIT
35
DATA FOR USERS WHO ARE ALLOCATED DATA CHANNELS
ALLOCATION INFORMATION AND MODULATION SCHEMES OF RESOURCE BLOCKS
37
38
CONTROL SIGNALING CHANNEL GENERATING UNIT FOR FREQUENCY BLOCK 1
33-1
34-1
DATA CHANNEL GENERATING UNIT 1 FOR FREQUENCY BLOCK 1
1-1
DATA CHANNEL GENERATING UNIT N FOR FREQUENCY BLOCK 1
1-N
MULTI-PLEXING UNIT 1-1
SECOND MULTI-PLEXING UNIT
THIRD MULTI-PLEXING UNIT
IFFT
40
41
CP ADDING UNIT
TO TRANS-MITTING ANTENNA
CONTROL SIGNALING CHANNEL GENERATING UNIT FOR FREQUENCY BLOCK M
33-M
34-M
DATA CHANNEL GENERATING UNIT 1 FOR FREQUENCY BLOCK M
M-1
DATA CHANNEL GENERATING UNIT N' FOR FREQUENCY BLOCK M
M-N'
MULTI-PLEXING UNIT 1-M
OTHER CHANNELS GENERATING UNIT
39

FIG.3B

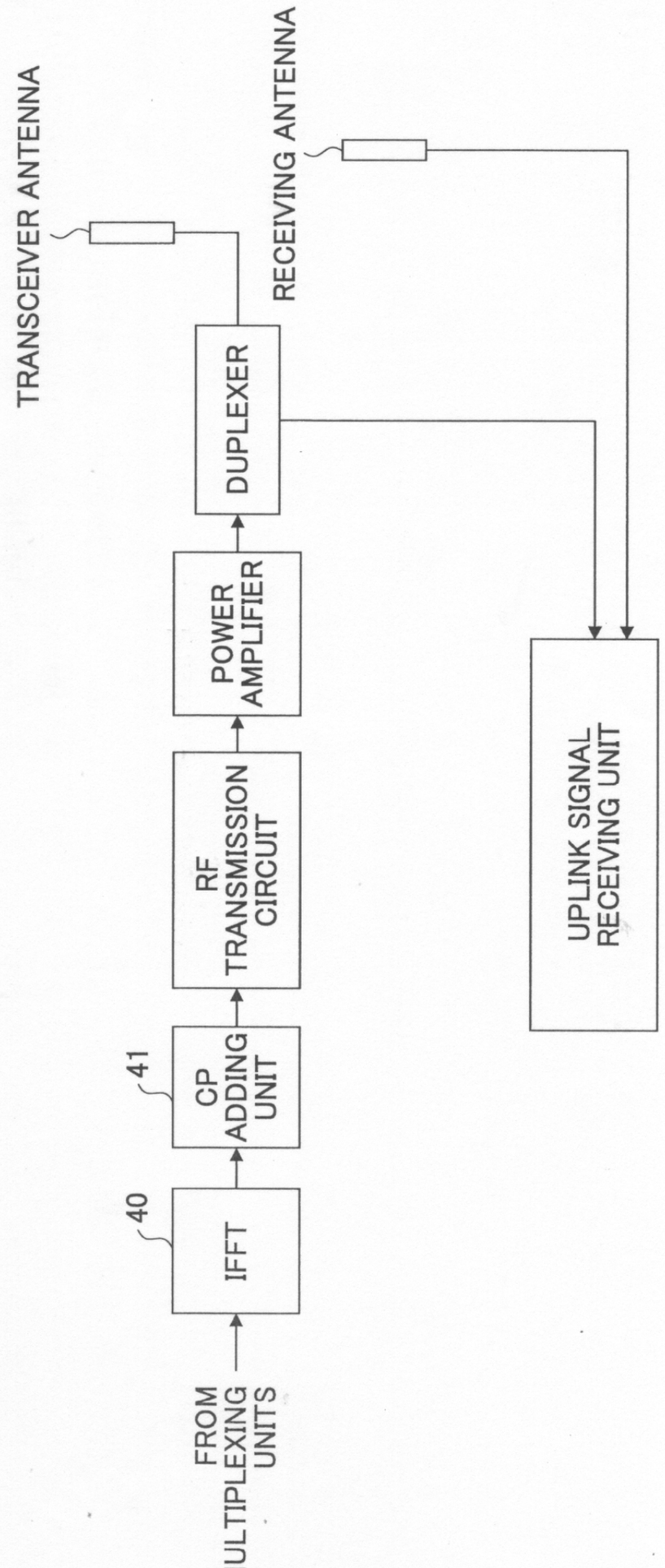
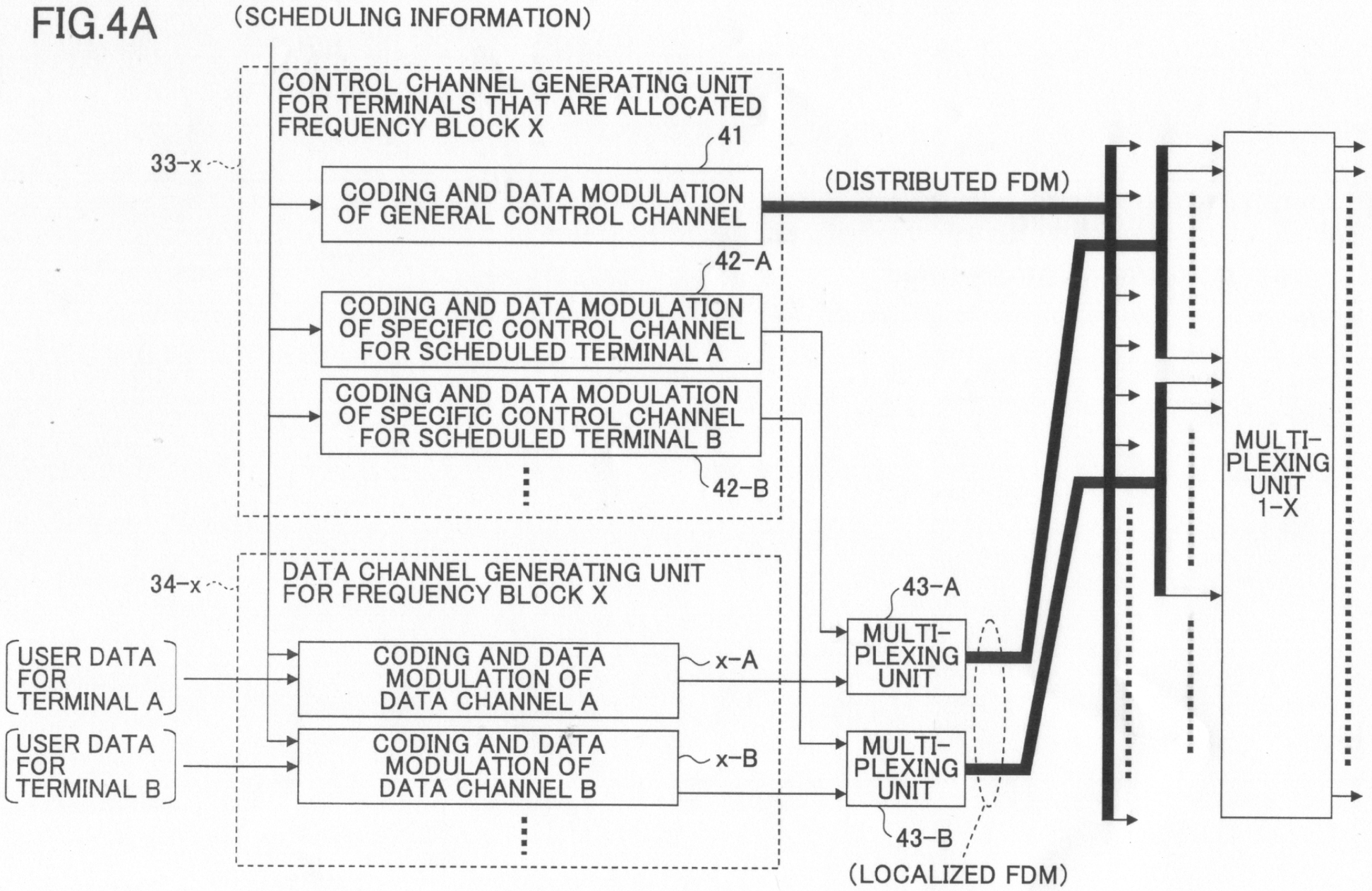

FROM MULTIPLEXING UNITS
40
IFFT
41
CP ADDING UNIT
RF TRANSMISSION CIRCUIT
POWER AMPLIFIER
DUPLEXER
TRANSCEIVER ANTENNA
RECEIVING ANTENNA
UPLINK SIGNAL RECEIVING UNIT

FIG.4A


(SCHEDULING INFORMATION)
CONTROL CHANNEL GENERATING UNIT FOR TERMINALS THAT ARE ALLOCATED FREQUENCY BLOCK X
33-x
41
CODING AND DATA MODULATION OF GENERAL CONTROL CHANNEL
(DISTRIBUTED FDM)
42-A
CODING AND DATA MODULATION OF SPECIFIC CONTROL CHANNEL FOR SCHEDULED TERMINAL A
CODING AND DATA MODULATION OF SPECIFIC CONTROL CHANNEL FOR SCHEDULED TERMINAL B
42-B
34-x
DATA CHANNEL GENERATING UNIT FOR FREQUENCY BLOCK X
43-A
USER DATA FOR TERMINAL A
CODING AND DATA MODULATION OF DATA CHANNEL A
x-A
MULTI-PLEXING UNIT
USER DATA FOR TERMINAL B
CODING AND DATA MODULATION OF DATA CHANNEL B
x-B
MULTI-PLEXING UNIT
43-B
(LOCALIZED FDM)
MULTI-PLEXING UNIT 1-X

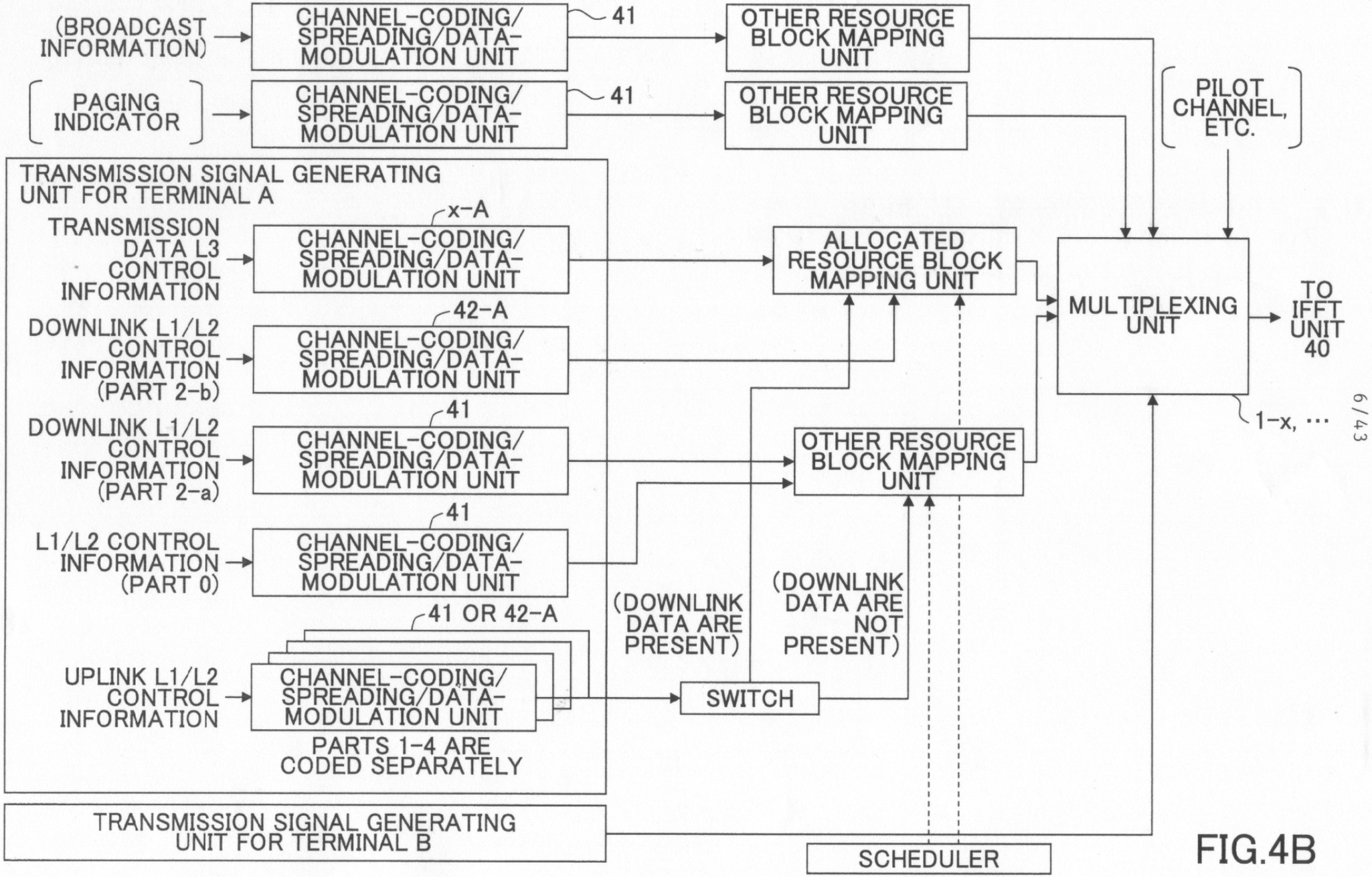

(BROADCAST INFORMATION)
CHANNEL-CODING/ SPREADING/DATA-MODULATION UNIT
41
OTHER RESOURCE BLOCK MAPPING UNIT
PAGING INDICATOR
CHANNEL-CODING/ SPREADING/DATA-MODULATION UNIT
41
OTHER RESOURCE BLOCK MAPPING UNIT
PILOT CHANNEL, ETC.
TRANSMISSION SIGNAL GENERATING UNIT FOR TERMINAL A
x-A
TRANSMISSION DATA L3 CONTROL INFORMATION
CHANNEL-CODING/ SPREADING/DATA-MODULATION UNIT
ALLOCATED RESOURCE BLOCK MAPPING UNIT
MULTIPLEXING UNIT
TO IFFT UNIT 40
42-A
DOWNLINK L1/L2 CONTROL INFORMATION (PART 2-b)
CHANNEL-CODING/ SPREADING/DATA-MODULATION UNIT
41
DOWNLINK L1/L2 CONTROL INFORMATION (PART 2-a)
CHANNEL-CODING/ SPREADING/DATA-MODULATION UNIT
OTHER RESOURCE BLOCK MAPPING UNIT
1-x, ...
41
L1/L2 CONTROL INFORMATION (PART 0)
CHANNEL-CODING/ SPREADING/DATA-MODULATION UNIT
41 OR 42-A
(DOWNLINK DATA ARE PRESENT)
(DOWNLINK DATA ARE NOT PRESENT)
UPLINK L1/L2 CONTROL INFORMATION
CHANNEL-CODING/ SPREADING/DATA-MODULATION UNIT
SWITCH
PARTS 1-4 ARE CODED SEPARATELY
TRANSMISSION SIGNAL GENERATING UNIT FOR TERMINAL B
SCHEDULER

FIG.4B

FIG.5A

CHANNEL TYPE			INFORMATION ITEM	
BROADCAST CHANNEL			TRANSMISSION FORMAT OF L1/L2 CONTROL CHANNEL MAXIMUM NUMBER OF MULTIPLEXED USERS RESOURCE BLOCK ALLOCATION MIMO SCHEME	
DEDICATED L3 SIGNALING CHANNEL			TYPE OF FDM SCHEME PERSISTENT SCHEDULING INFORMATION	SPECIFIC CONTROL CHANNEL
L1/L2 CONTROL CHANNEL	PART 0		TRANSMISSION FORMAT OF L1/L2 CONTROL CHANNEL NUMBER OF MULTIPLEXED USERS	GENERAL CONTROL CHANNEL
	DOWNLINK DATA TRANSMISSION INFORMATION	PART 1	PAGING INDICATOR	GENERAL CONTROL CHANNEL
		PART 2a	DOWNLINK RESOURCE ALLOCATION ALLOCATION FREQUENCY MIMO INFORMATION (NO. OF STREAMS, ETC.)	
		PART 2b	MIMO PRECODING INFORMATION MODULATION SCHEME PAYLOAD SIZE HARQ INFORMATION CRC INFORMATION	SPECIFIC CONTROL CHANNEL
	UPLINK DATA TRANSMISSION INFORMATION	PART 1	ACK/NACK	SPECIFIC OR GENERAL CONTROL CHANNEL
		PART 2	UPLINK RESOURCE ALLOCATION MODULATION SCHEME PAYLOAD SIZE TRANSMISSION POWER CRC INFORMATION	
		PART 3	TRANSMISSION TIMING CONTROL BITS	
		PART 4	TRANSMISSION POWER CONTROL BITS	

FIG.5B

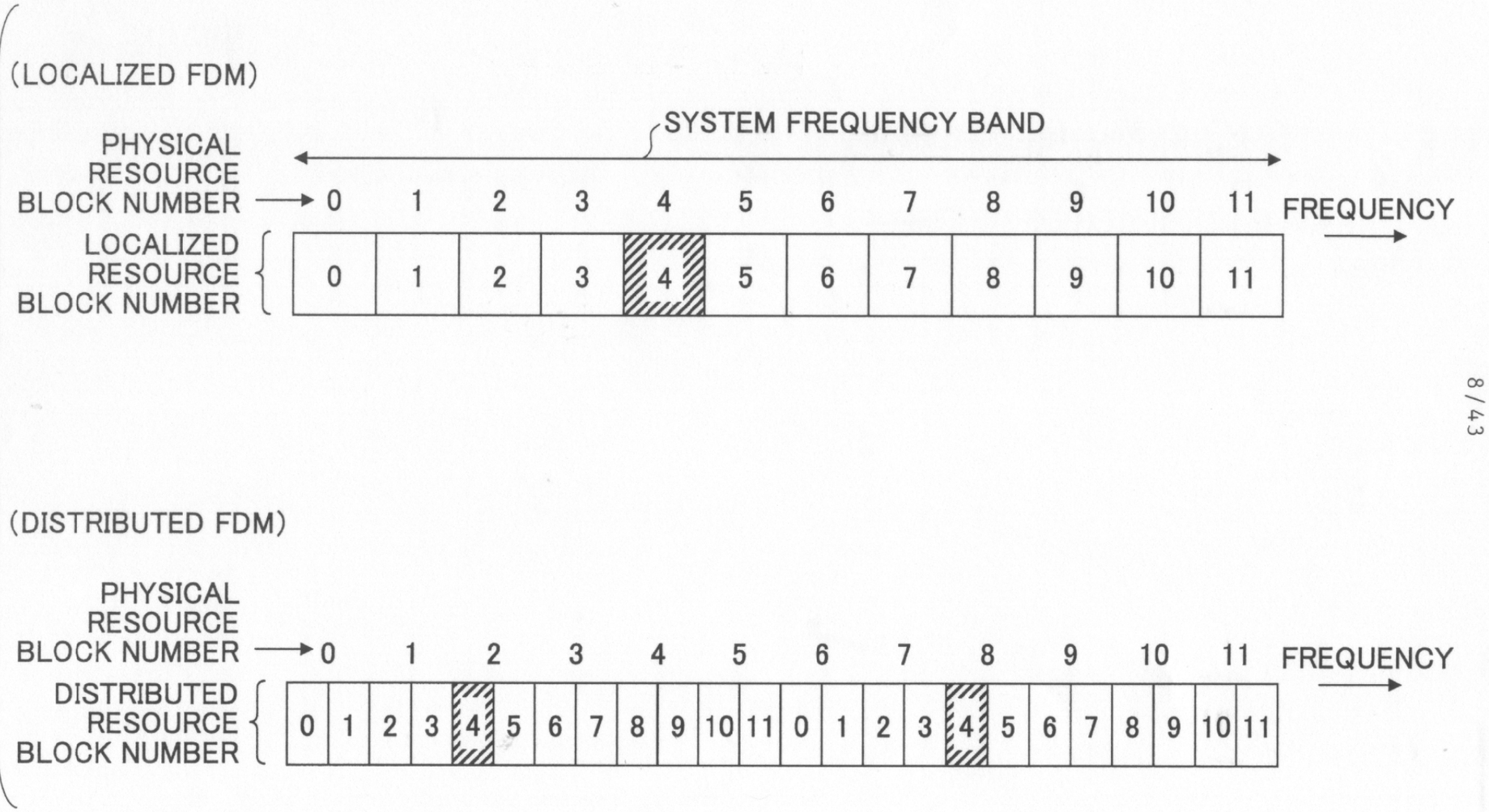
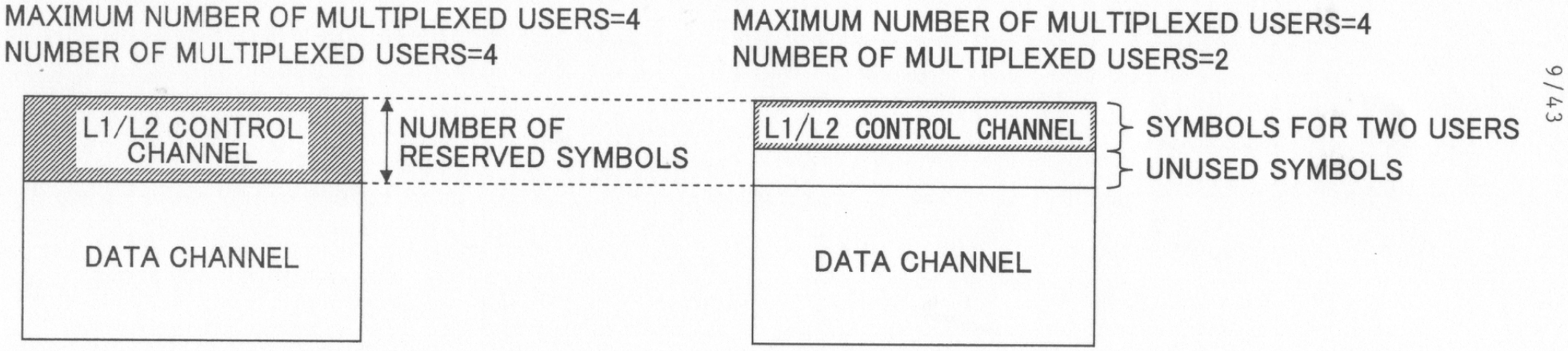

(LOCALIZED FDM)
SYSTEM FREQUENCY BAND
PHYSICAL RESOURCE BLOCK NUMBER
0 1 2 3 4 5 6 7 8 9 10 11
FREQUENCY
LOCALIZED RESOURCE BLOCK NUMBER
0 1 2 3 4 5 6 7 8 9 10 11
(DISTRIBUTED FDM)
PHYSICAL RESOURCE BLOCK NUMBER
0 1 2 3 4 5 6 7 8 9 10 11
FREQUENCY
DISTRIBUTED RESOURCE BLOCK NUMBER
0 1 2 3 4 5 6 7 8 9 10 11 0 1 2 3 4 5 6 7 8 9 10 11

FIG.5C


MAXIMUM NUMBER OF MULTIPLEXED USERS=4
NUMBER OF MULTIPLEXED USERS=4
L1/L2 CONTROL CHANNEL
NUMBER OF RESERVED SYMBOLS
DATA CHANNEL
MAXIMUM NUMBER OF MULTIPLEXED USERS=4
NUMBER OF MULTIPLEXED USERS=2
L1/L2 CONTROL CHANNEL
SYMBOLS FOR TWO USERS
UNUSED SYMBOLS
DATA CHANNEL

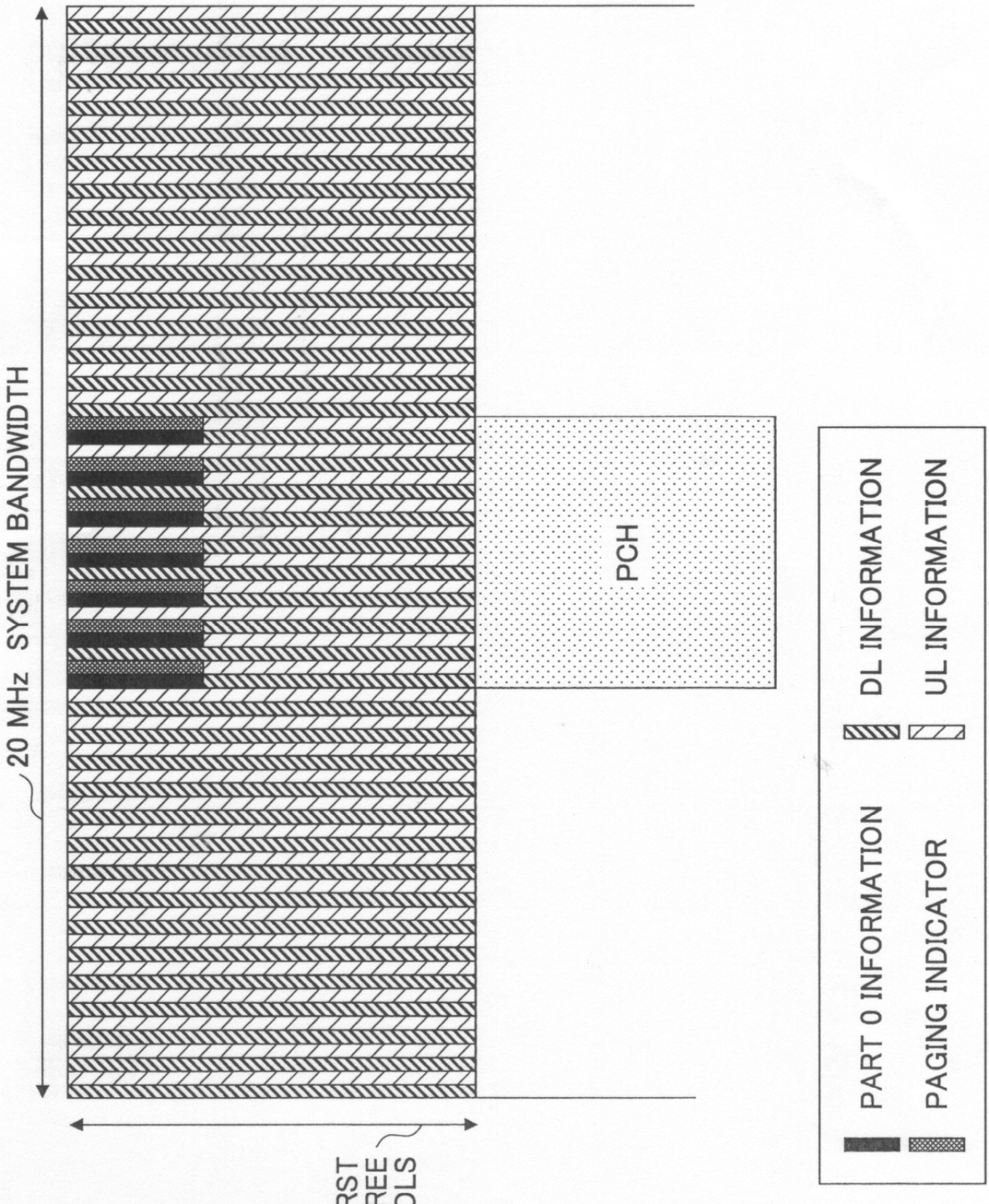

20 MHz SYSTEM BANDWIDTH
FIRST THREE SYMBOLS
PCH
PART 0 INFORMATION
PAGING INDICATOR
DL INFORMATION
UL INFORMATION

FIG.5D

FIG.5E

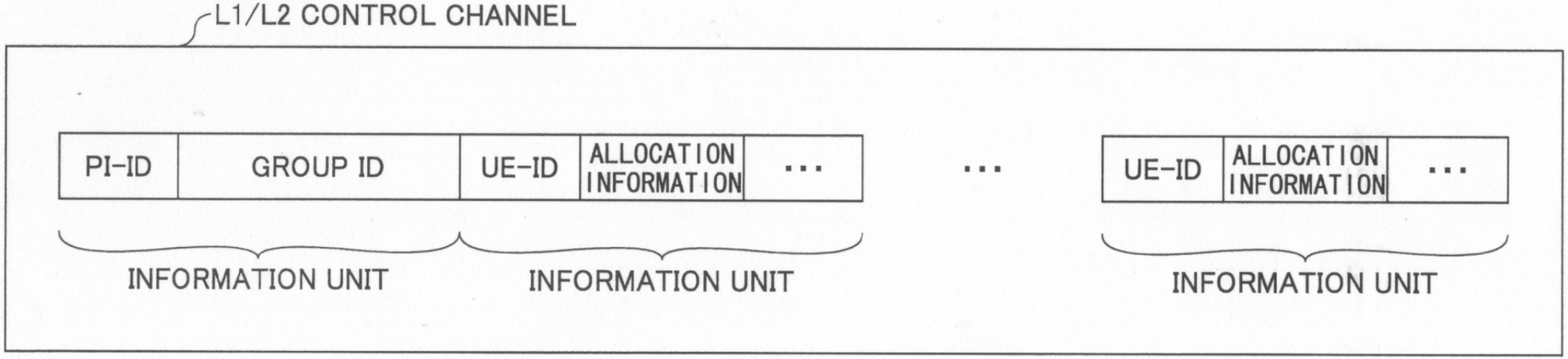

L1/L2 CONTROL CHANNEL
PI-ID
GROUP ID
UE-ID
ALLOCATION INFORMATION
...
...
UE-ID
ALLOCATION INFORMATION
...
INFORMATION UNIT
INFORMATION UNIT
INFORMATION UNIT

FIG.5F

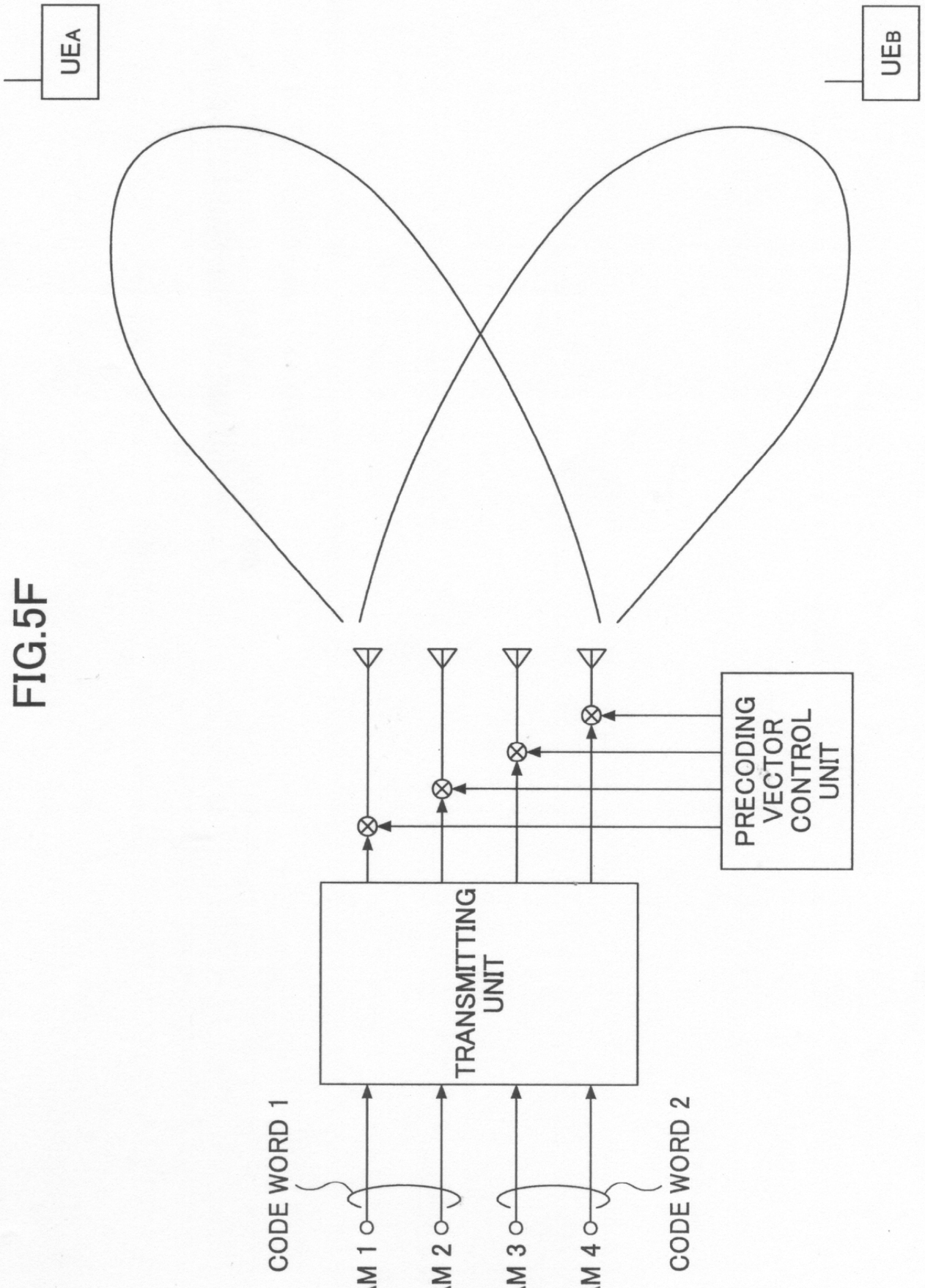

UEA
UEB
CODE WORD 1
CODE WORD 2
STREAM 1
STREAM 2
STREAM 3
STREAM 4
TRANSMITTING UNIT
PRECODING VECTOR CONTROL UNIT

FIG.6

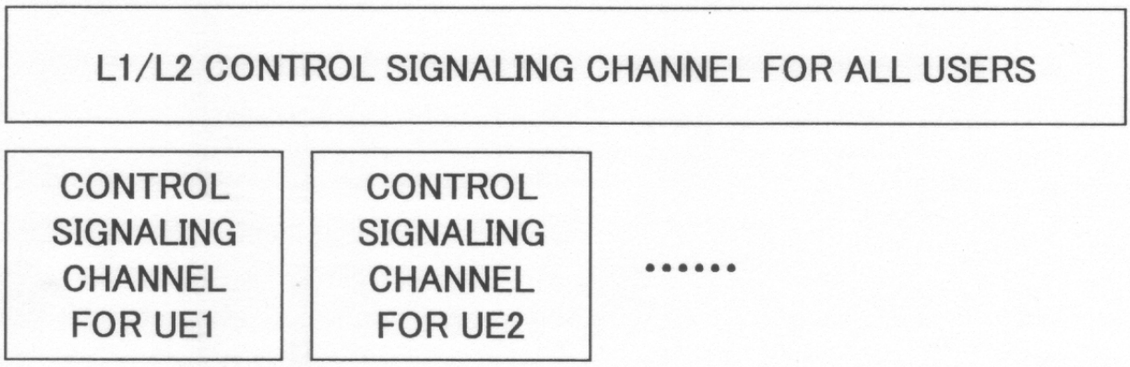

L1/L2 CONTROL SIGNALING CHANNEL FOR ALL USERS
CONTROL SIGNALING CHANNEL FOR UE1
CONTROL SIGNALING CHANNEL FOR UE2
.....

FIG.7A

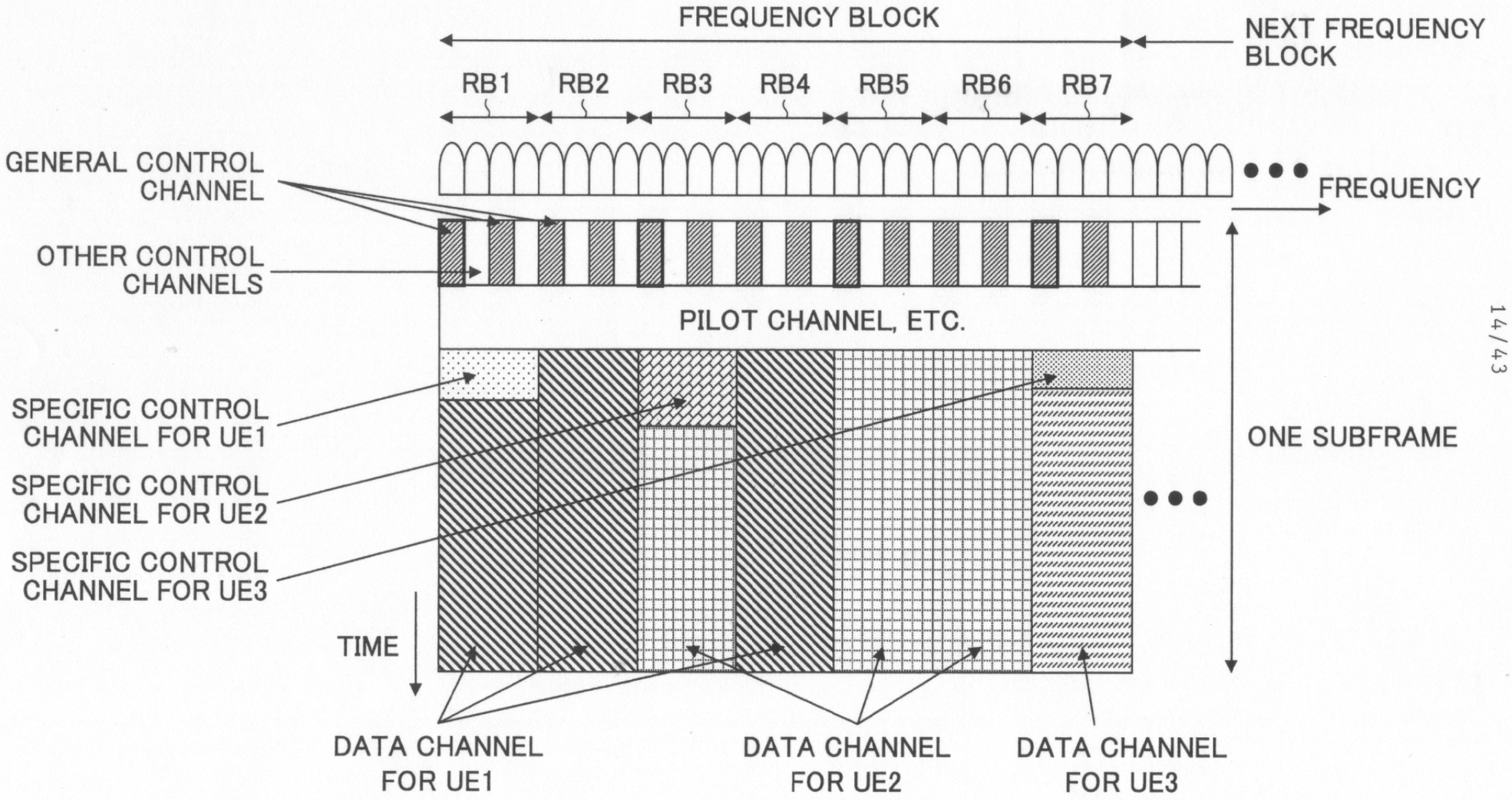

FREQUENCY BLOCK
NEXT FREQUENCY BLOCK
RB1
RB2
RB3
RB4
RB5
RB6
RB7
GENERAL CONTROL CHANNEL
FREQUENCY
OTHER CONTROL CHANNELS
PILOT CHANNEL, ETC.
SPECIFIC CONTROL CHANNEL FOR UE1
SPECIFIC CONTROL CHANNEL FOR UE2
SPECIFIC CONTROL CHANNEL FOR UE3
ONE SUBFRAME
TIME
DATA CHANNEL FOR UE1
DATA CHANNEL FOR UE2
DATA CHANNEL FOR UE3

FIG.7B

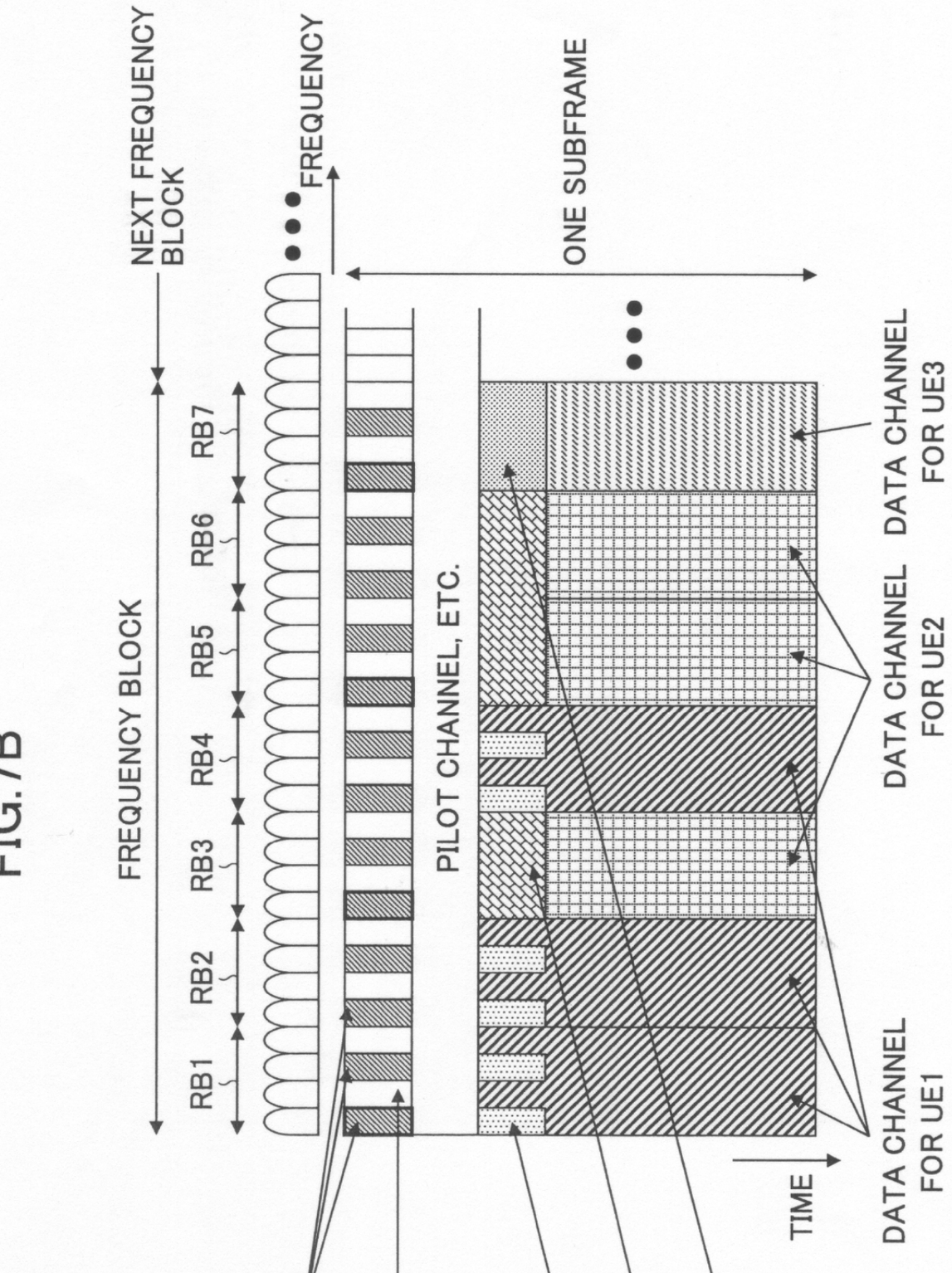

FREQUENCY BLOCK
NEXT FREQUENCY BLOCK
FREQUENCY
RB1
RB2
RB3
RB4
RB5
RB6
RB7
ONE SUBFRAME
PILOT CHANNEL, ETC.
GENERAL CONTROL CHANNEL
OTHER CONTROL CHANNELS
SPECIFIC CONTROL CHANNEL FOR UE1
SPECIFIC CONTROL CHANNEL FOR UE2
SPECIFIC CONTROL CHANNEL FOR UE3
DATA CHANNEL FOR UE1
DATA CHANNEL FOR UE2
DATA CHANNEL FOR UE3
TIME

FIG.7C

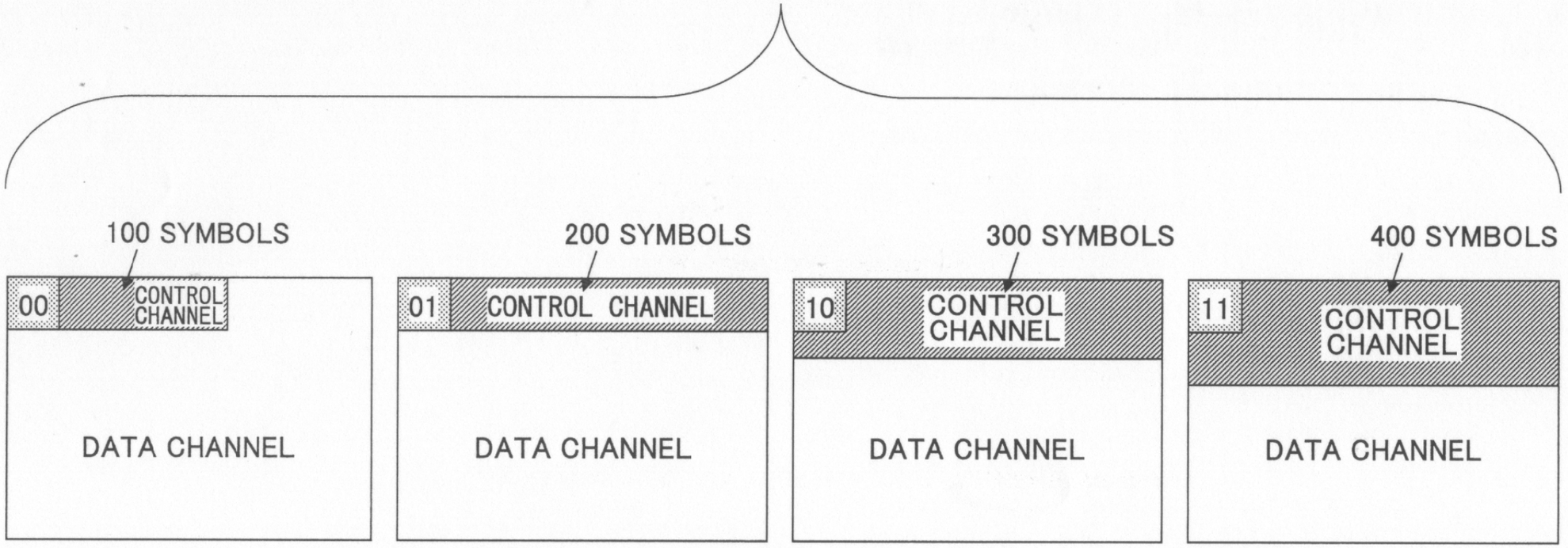
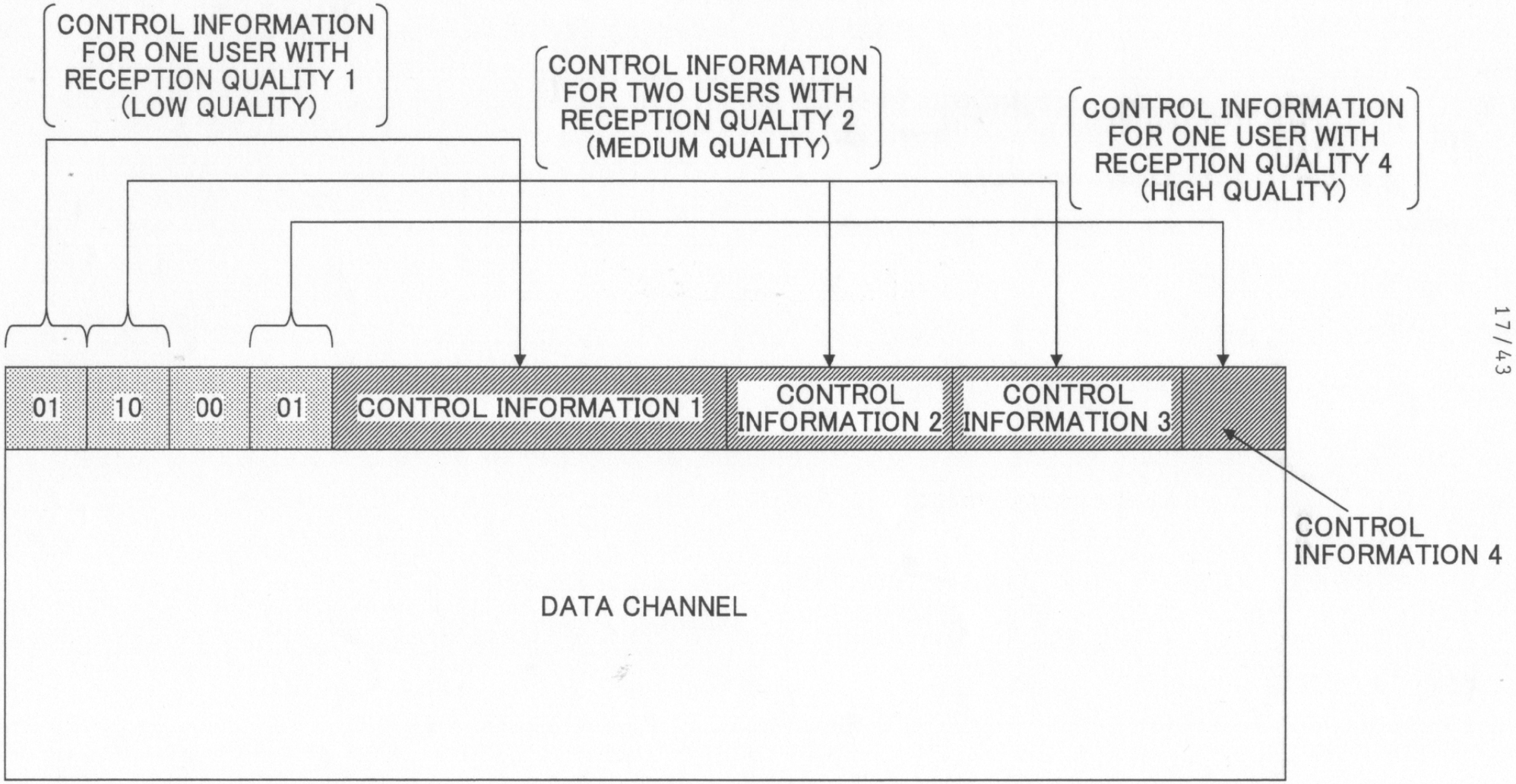

100 SYMBOLS
200 SYMBOLS
300 SYMBOLS
400 SYMBOLS
00
CONTROL CHANNEL
01
CONTROL CHANNEL
10
CONTROL CHANNEL
11
CONTROL CHANNEL
DATA CHANNEL
DATA CHANNEL
DATA CHANNEL
DATA CHANNEL

FIG.7D


CONTROL INFORMATION FOR ONE USER WITH RECEPTION QUALITY 1 (LOW QUALITY)
CONTROL INFORMATION FOR TWO USERS WITH RECEPTION QUALITY 2 (MEDIUM QUALITY)
CONTROL INFORMATION FOR ONE USER WITH RECEPTION QUALITY 4 (HIGH QUALITY)
01
10
00
01
CONTROL INFORMATION 1
CONTROL INFORMATION 2
CONTROL INFORMATION 3
CONTROL INFORMATION 4
DATA CHANNEL

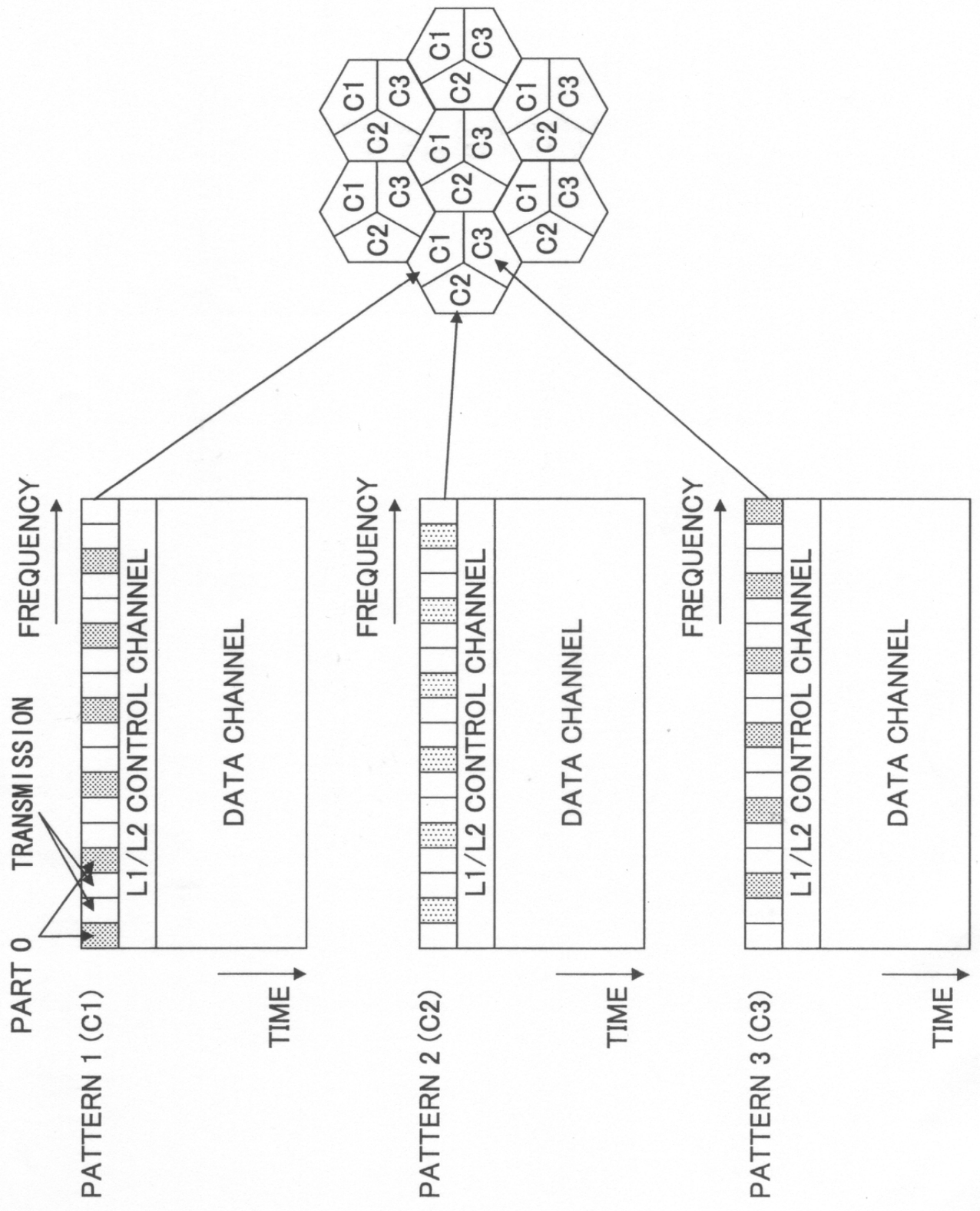

C1
C2
C3
PART 0
NO TRANSMISSION
FREQUENCY
L1/L2 CONTROL CHANNEL
DATA CHANNEL
TIME
PATTERN 1 (C1)
PATTERN 2 (C2)
PATTERN 3 (C3)

FIG.7E

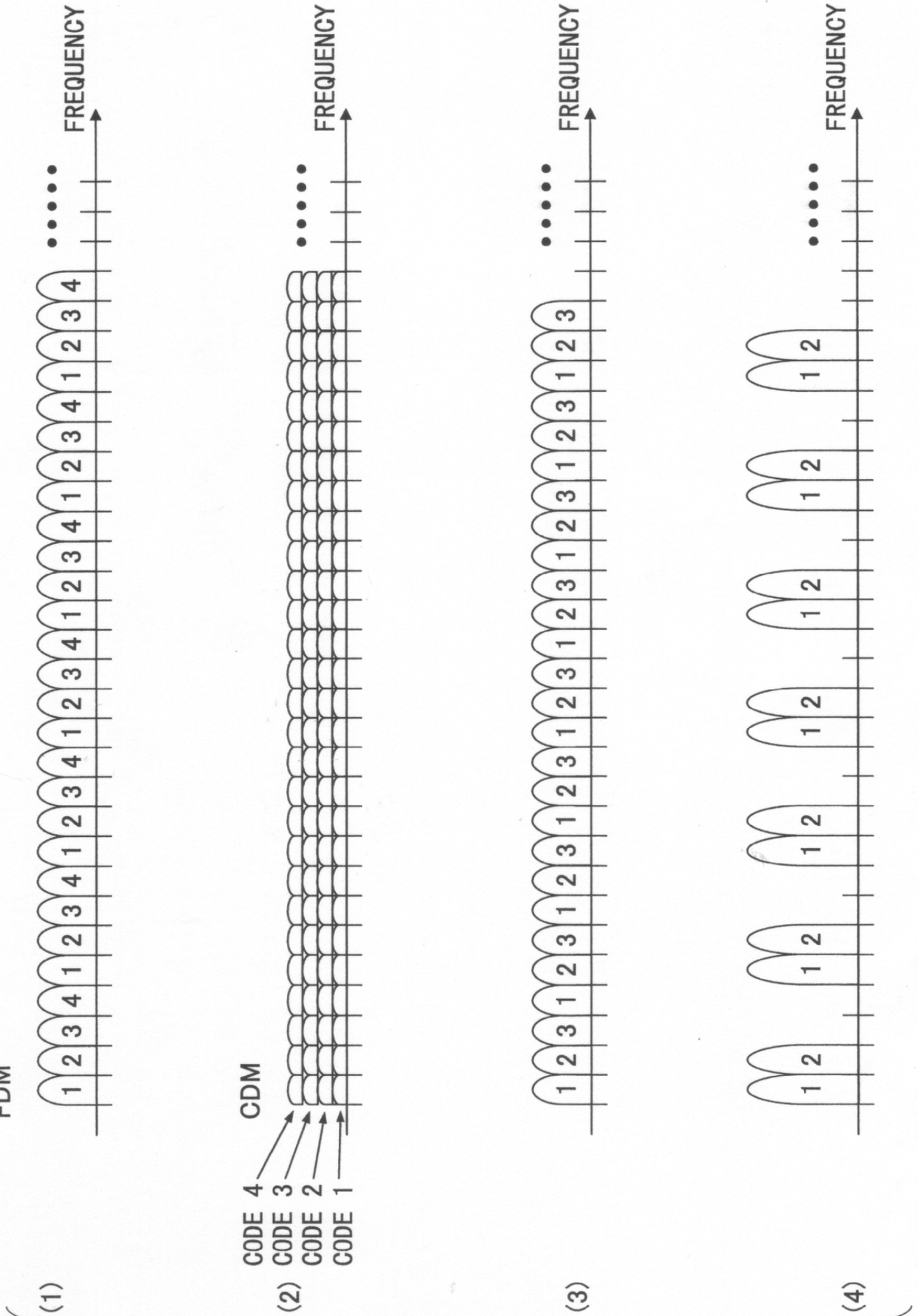

(1)
FDM
FREQUENCY
(2)
CDM
CODE 4
CODE 3
CODE 2
CODE 1
FREQUENCY
(3)
FREQUENCY
(4)
FREQUENCY

FIG.7F

FIG.7G

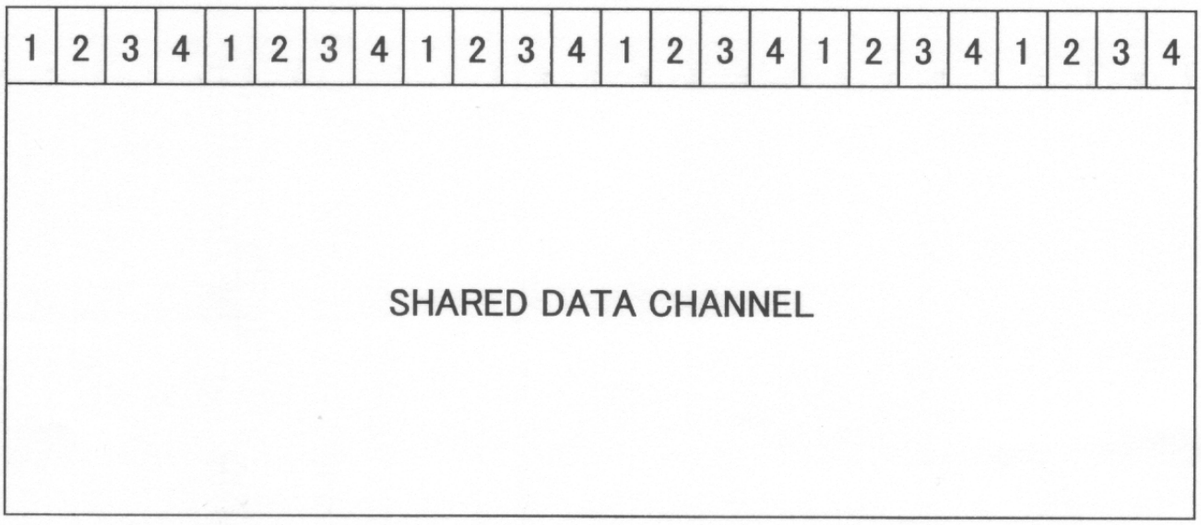

1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4
SHARED DATA CHANNEL

FIG.7H

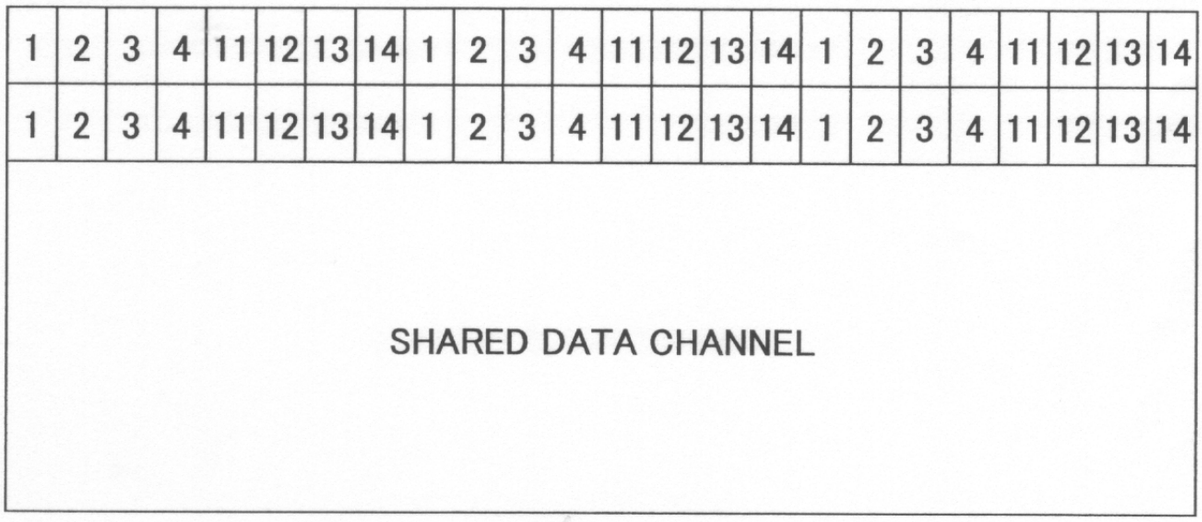

1 2 3 4 11 12 13 14 1 2 3 4 11 12 13 14 1 2 3 4 11 12 13 14
1 2 3 4 11 12 13 14 1 2 3 4 11 12 13 14 1 2 3 4 11 12 13 14
SHARED DATA CHANNEL

FIG.7I

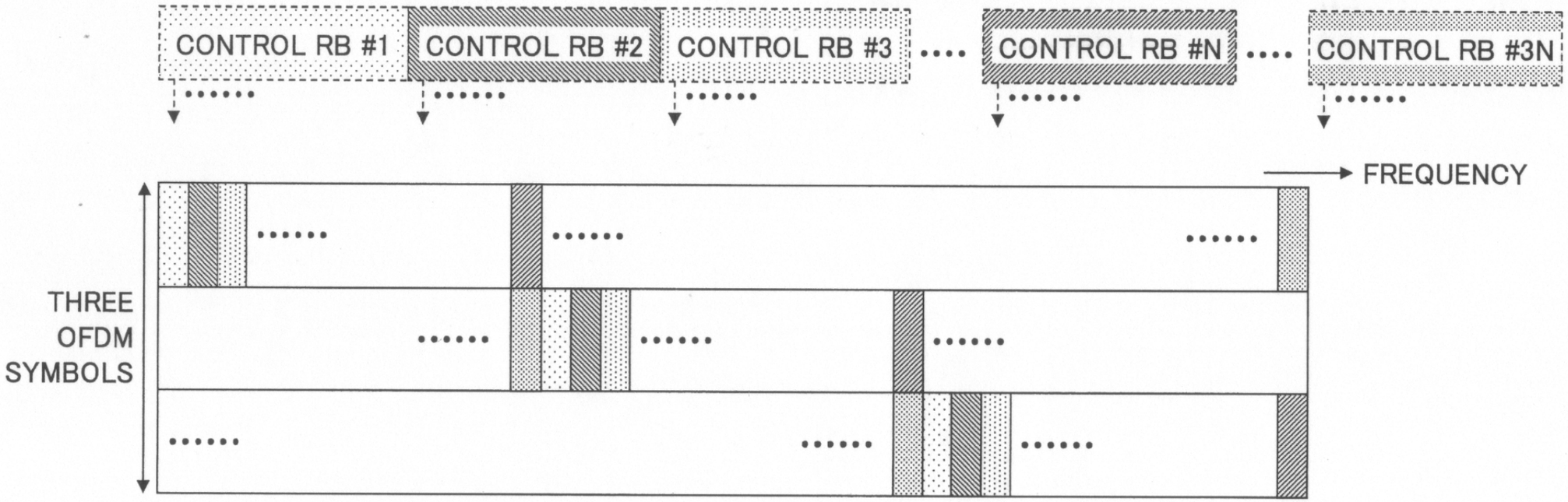

CONTROL RB #1
CONTROL RB #2
CONTROL RB #3
CONTROL RB #N
CONTROL RB #3N
FREQUENCY
THREE OFDM SYMBOLS

FIG.8A

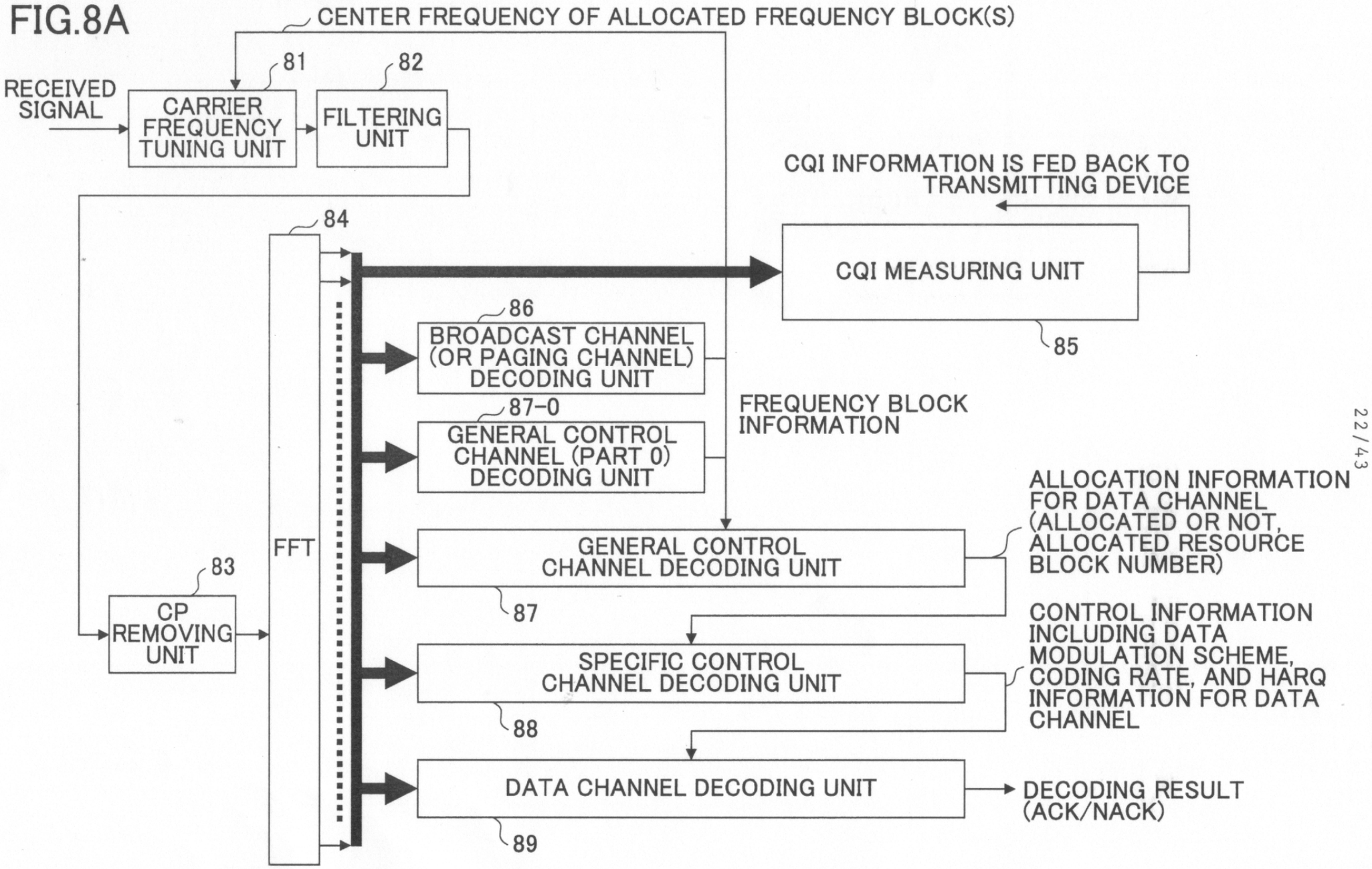

CENTER FREQUENCY OF ALLOCATED FREQUENCY BLOCK(S)
RECEIVED SIGNAL
81
CARRIER FREQUENCY TUNING UNIT
82
FILTERING UNIT
CQI INFORMATION IS FED BACK TO TRANSMITTING DEVICE
CQI MEASURING UNIT
85
84
86
BROADCAST CHANNEL (OR PAGING CHANNEL) DECODING UNIT
87-0
GENERAL CONTROL CHANNEL (PART 0) DECODING UNIT
FREQUENCY BLOCK INFORMATION
FFT
83
CP REMOVING UNIT
GENERAL CONTROL CHANNEL DECODING UNIT
87
ALLOCATION INFORMATION FOR DATA CHANNEL (ALLOCATED OR NOT, ALLOCATED RESOURCE BLOCK NUMBER)
SPECIFIC CONTROL CHANNEL DECODING UNIT
88
CONTROL INFORMATION INCLUDING DATA MODULATION SCHEME, CODING RATE, AND HARQ INFORMATION FOR DATA CHANNEL
DATA CHANNEL DECODING UNIT
89
DECODING RESULT (ACK/NACK)

FIG.8B

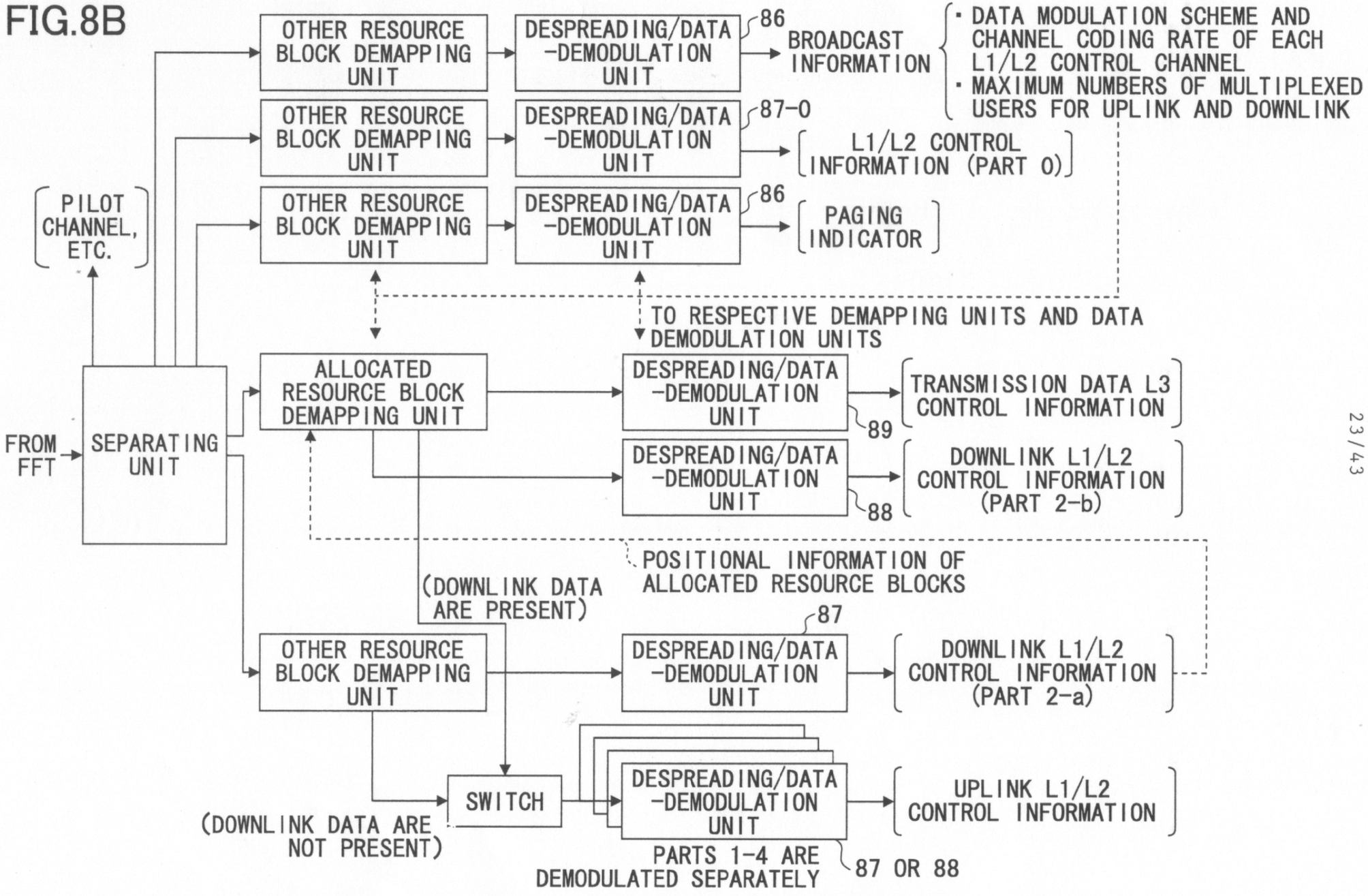

OTHER RESOURCE BLOCK DEMAPPING UNIT
DESPREADING/DATA -DEMODULATION UNIT
86
BROADCAST INFORMATION
· DATA MODULATION SCHEME AND CHANNEL CODING RATE OF EACH L1/L2 CONTROL CHANNEL
· MAXIMUM NUMBERS OF MULTIPLEXED USERS FOR UPLINK AND DOWNLINK
OTHER RESOURCE BLOCK DEMAPPING UNIT
DESPREADING/DATA -DEMODULATION UNIT
87-0
L1/L2 CONTROL INFORMATION (PART 0)
PILOT CHANNEL, ETC.
OTHER RESOURCE BLOCK DEMAPPING UNIT
DESPREADING/DATA -DEMODULATION UNIT
86
PAGING INDICATOR
TO RESPECTIVE DEMAPPING UNITS AND DATA DEMODULATION UNITS
FROM FFT
SEPARATING UNIT
ALLOCATED RESOURCE BLOCK DEMAPPING UNIT
DESPREADING/DATA -DEMODULATION UNIT
89
TRANSMISSION DATA L3 CONTROL INFORMATION
DESPREADING/DATA -DEMODULATION UNIT
88
DOWNLINK L1/L2 CONTROL INFORMATION (PART 2-b)
POSITIONAL INFORMATION OF ALLOCATED RESOURCE BLOCKS
(DOWNLINK DATA ARE PRESENT)
87
OTHER RESOURCE BLOCK DEMAPPING UNIT
DESPREADING/DATA -DEMODULATION UNIT
DOWNLINK L1/L2 CONTROL INFORMATION (PART 2-a)
SWITCH
DESPREADING/DATA -DEMODULATION UNIT
UPLINK L1/L2 CONTROL INFORMATION
(DOWNLINK DATA ARE NOT PRESENT)
PARTS 1-4 ARE DEMODULATED SEPARATELY
87 OR 88

FIG.8C

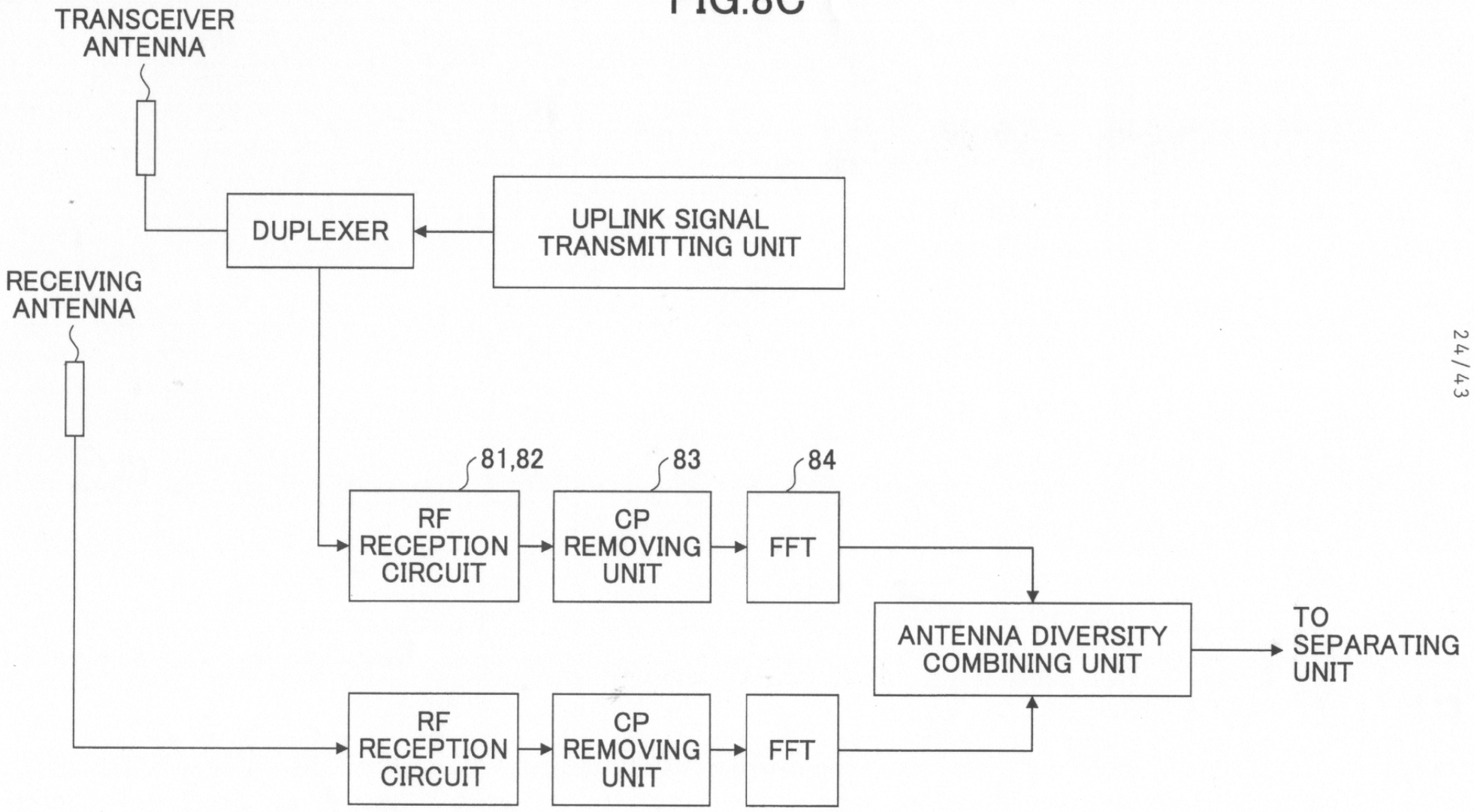

TRANSCEIVER ANTENNA
DUPLEXER
UPLINK SIGNAL TRANSMITTING UNIT
RECEIVING ANTENNA
81,82
83
84
RF RECEPTION CIRCUIT
CP REMOVING UNIT
FFT
ANTENNA DIVERSITY COMBINING UNIT
TO SEPARATING UNIT
RF RECEPTION CIRCUIT
CP REMOVING UNIT
FFT

FIG.9A

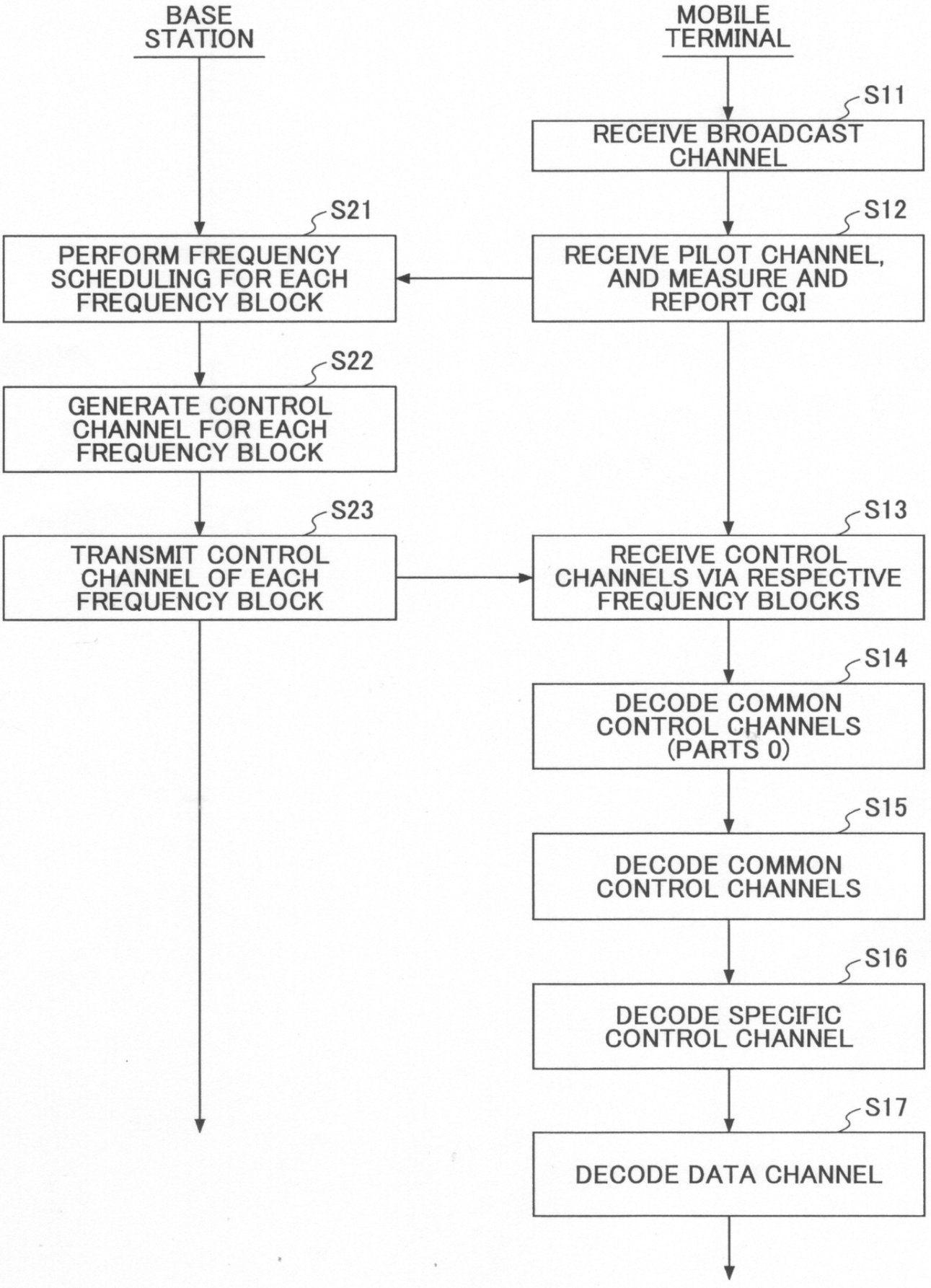

BASE STATION
MOBILE TERMINAL
S11
RECEIVE BROADCAST CHANNEL
S21
PERFORM FREQUENCY SCHEDULING FOR EACH FREQUENCY BLOCK
S12
RECEIVE PILOT CHANNEL, AND MEASURE AND REPORT CQI
S22
GENERATE CONTROL CHANNEL FOR EACH FREQUENCY BLOCK
S23
TRANSMIT CONTROL CHANNEL OF EACH FREQUENCY BLOCK
S13
RECEIVE CONTROL CHANNELS VIA RESPECTIVE FREQUENCY BLOCKS
S14
DECODE COMMON CONTROL CHANNELS (PARTS 0)
S15
DECODE COMMON CONTROL CHANNELS
S16
DECODE SPECIFIC CONTROL CHANNEL
S17
DECODE DATA CHANNEL

FIG.9B

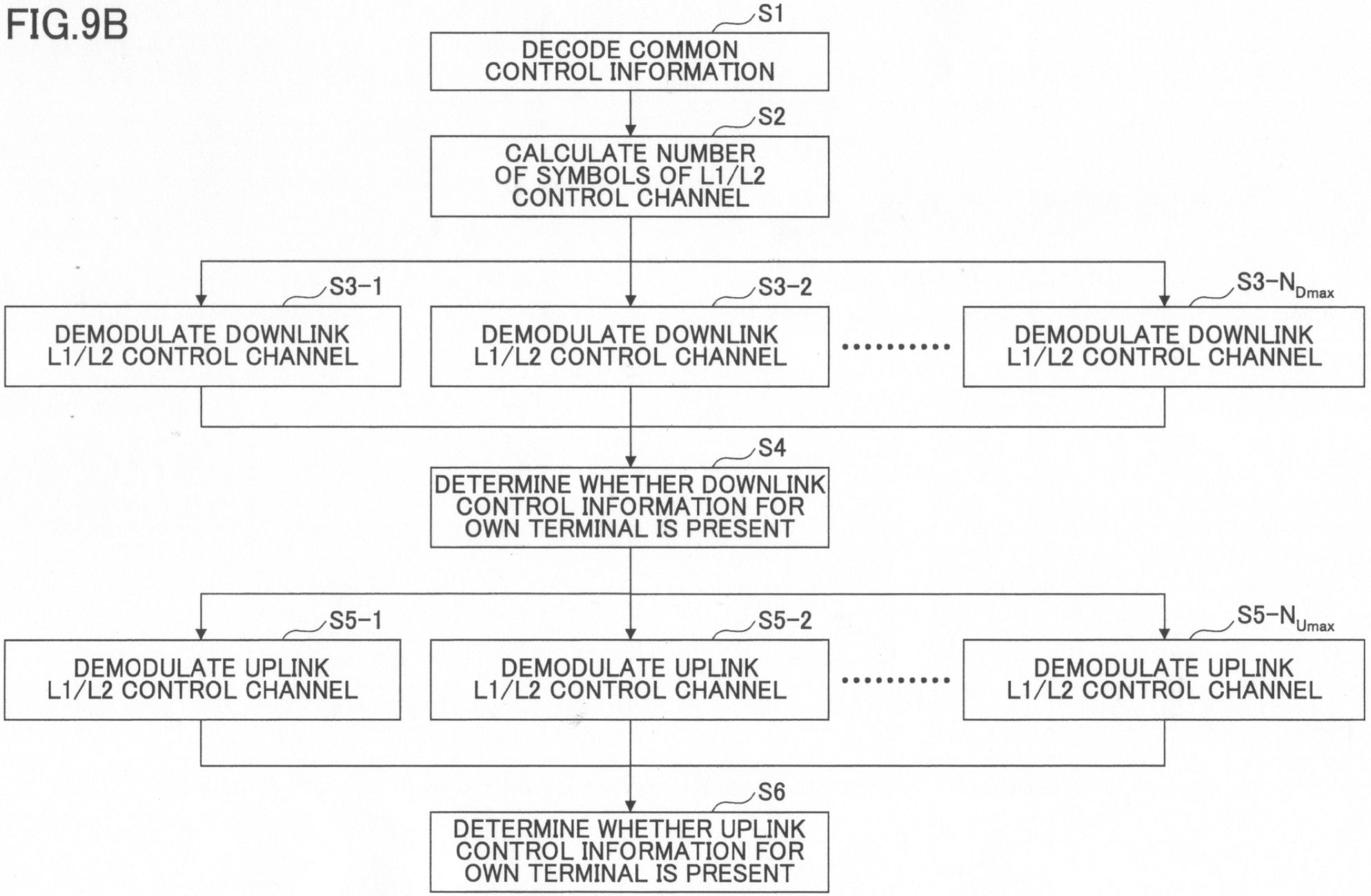

S1
DECODE COMMON CONTROL INFORMATION
S2
CALCULATE NUMBER OF SYMBOLS OF L1/L2 CONTROL CHANNEL
S3-1
DEMODULATE DOWNLINK L1/L2 CONTROL CHANNEL
S3-2
DEMODULATE DOWNLINK L1/L2 CONTROL CHANNEL
S3-N_Dmax
DEMODULATE DOWNLINK L1/L2 CONTROL CHANNEL
S4
DETERMINE WHETHER DOWNLINK CONTROL INFORMATION FOR OWN TERMINAL IS PRESENT
S5-1
DEMODULATE UPLINK L1/L2 CONTROL CHANNEL
S5-2
DEMODULATE UPLINK L1/L2 CONTROL CHANNEL
S5-N_Umax
DEMODULATE UPLINK L1/L2 CONTROL CHANNEL
S6
DETERMINE WHETHER UPLINK CONTROL INFORMATION FOR OWN TERMINAL IS PRESENT

FIG.9C

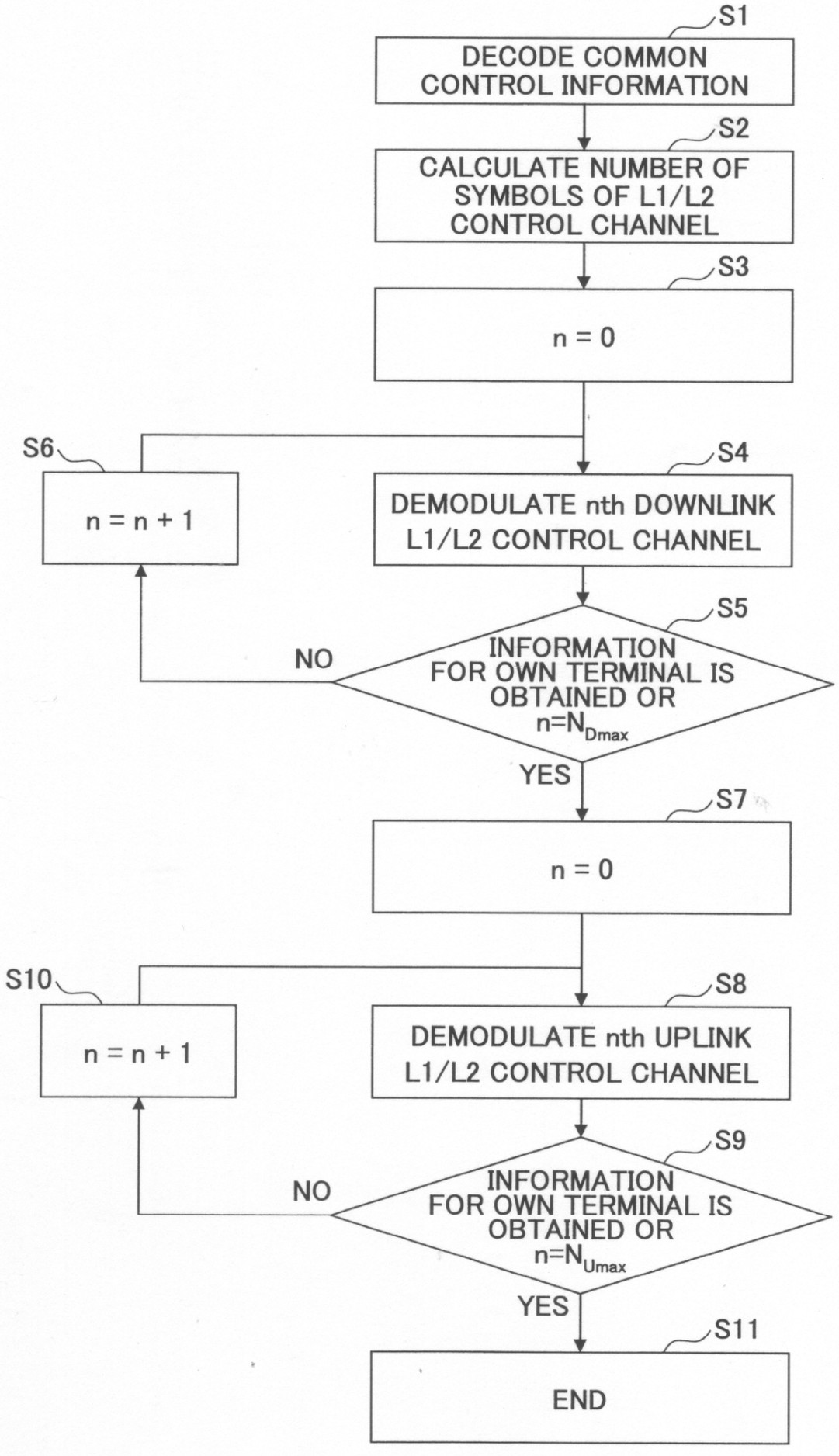

S1
DECODE COMMON CONTROL INFORMATION
S2
CALCULATE NUMBER OF SYMBOLS OF L1/L2 CONTROL CHANNEL
S3
n = 0
S6
n = n + 1
S4
DEMODULATE nth DOWNLINK L1/L2 CONTROL CHANNEL
S5
INFORMATION FOR OWN TERMINAL IS OBTAINED OR n=N_Dmax
NO
YES
S7
n = 0
S10
n = n + 1
S8
DEMODULATE nth UPLINK L1/L2 CONTROL CHANNEL
S9
INFORMATION FOR OWN TERMINAL IS OBTAINED OR n=N_Umax
NO
YES
S11
END

FIG.10A

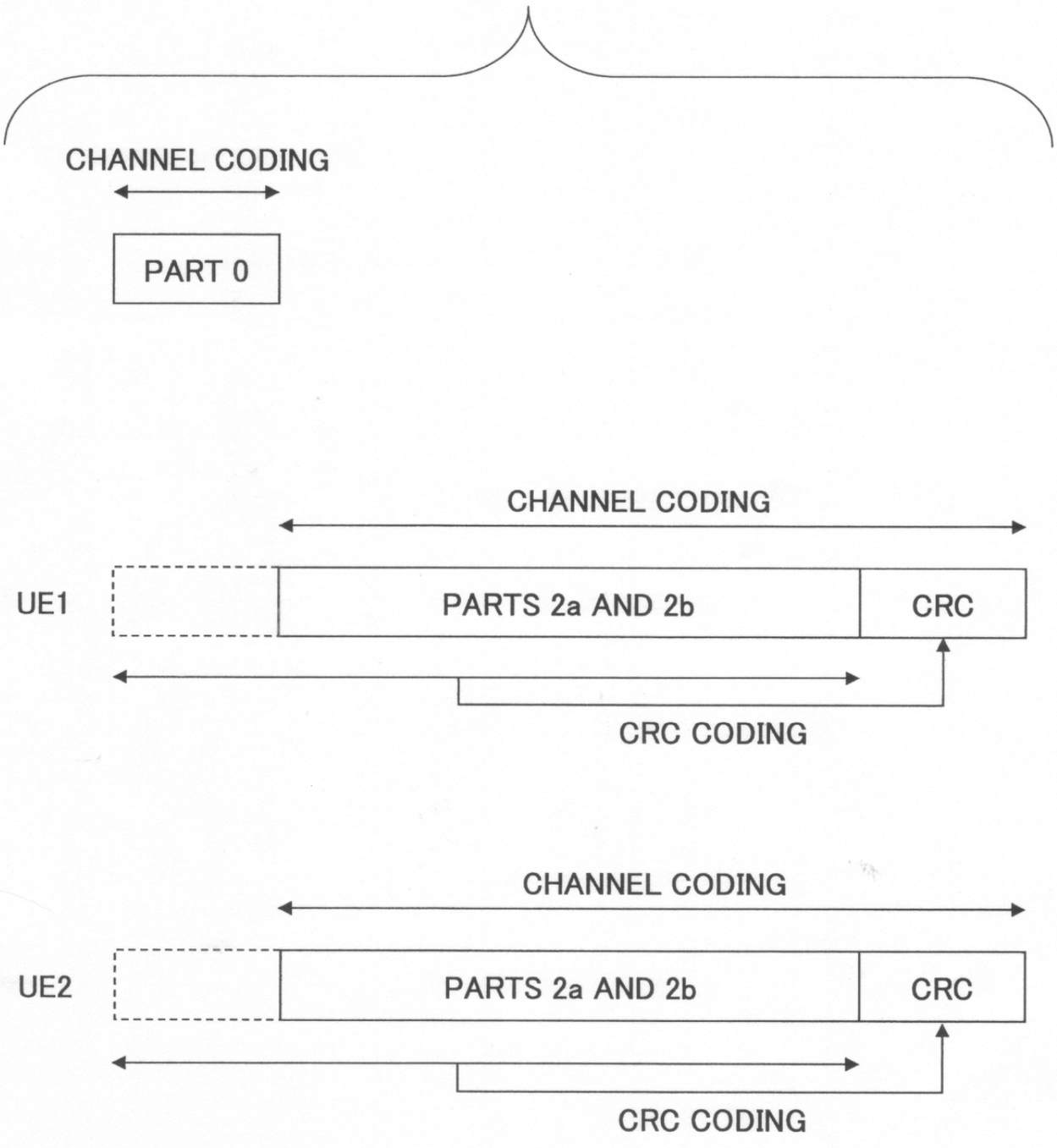

CHANNEL CODING
PART 0
CHANNEL CODING
UE1
PARTS 2a AND 2b
CRC
CRC CODING
CHANNEL CODING
UE2
PARTS 2a AND 2b
CRC
CRC CODING

FIG.10B

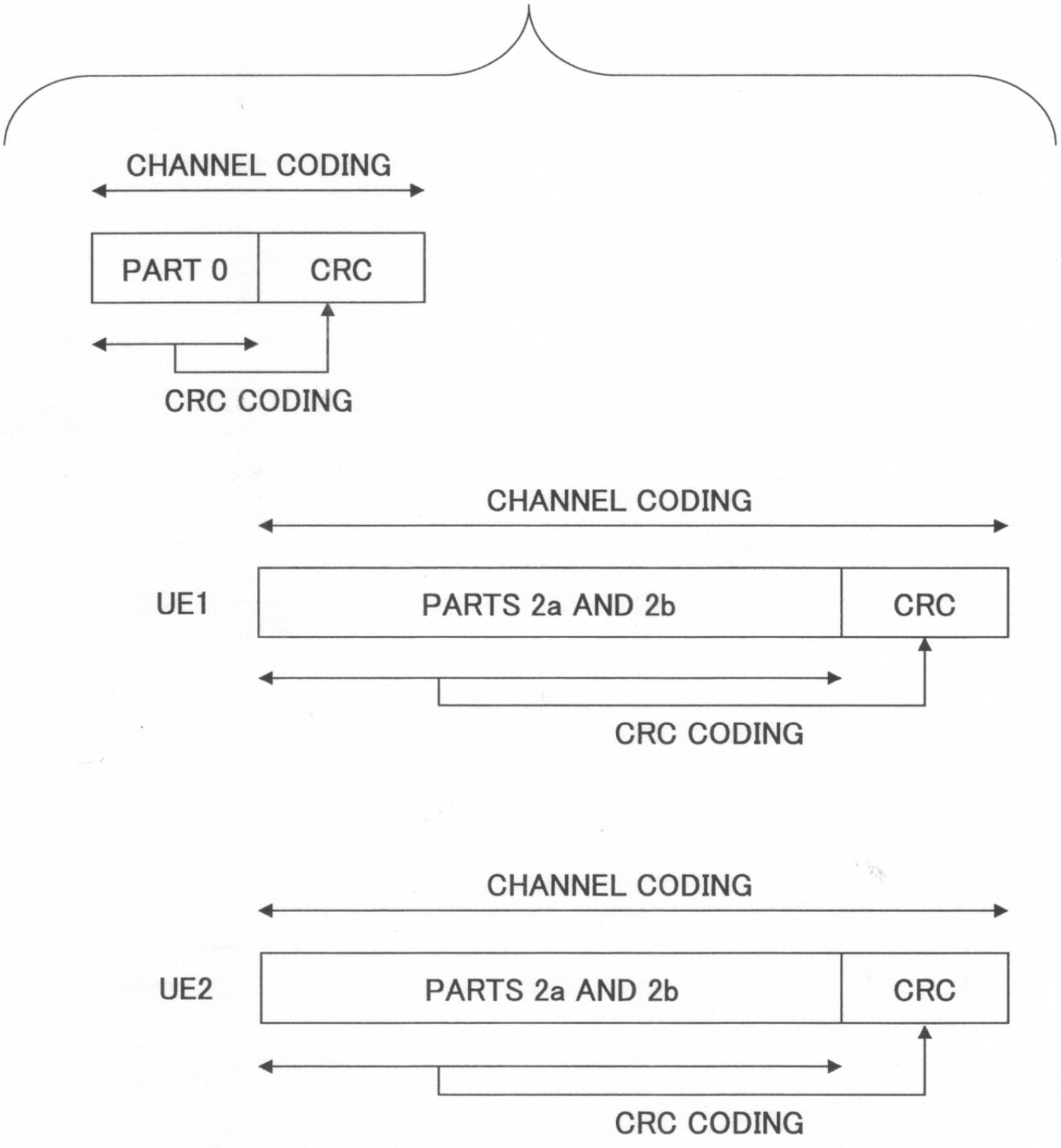

CHANNEL CODING
PART 0
CRC
CRC CODING
CHANNEL CODING
UE1
PARTS 2a AND 2b
CRC
CRC CODING
CHANNEL CODING
UE2
PARTS 2a AND 2b
CRC
CRC CODING

FIG.10C

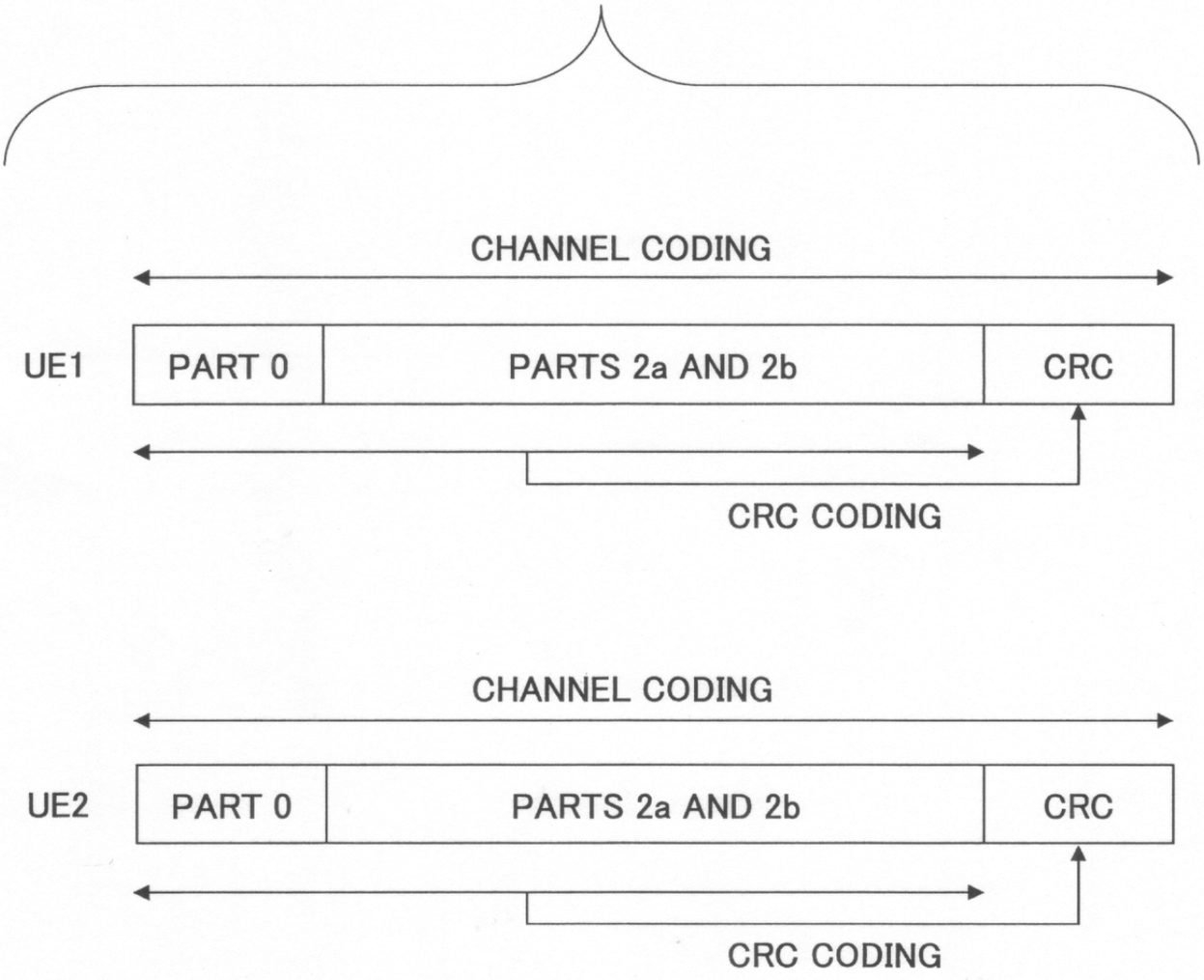

CHANNEL CODING
UE1
PART 0
PARTS 2a AND 2b
CRC
CRC CODING
CHANNEL CODING
UE2
PART 0
PARTS 2a AND 2b
CRC
CRC CODING

FIG.11

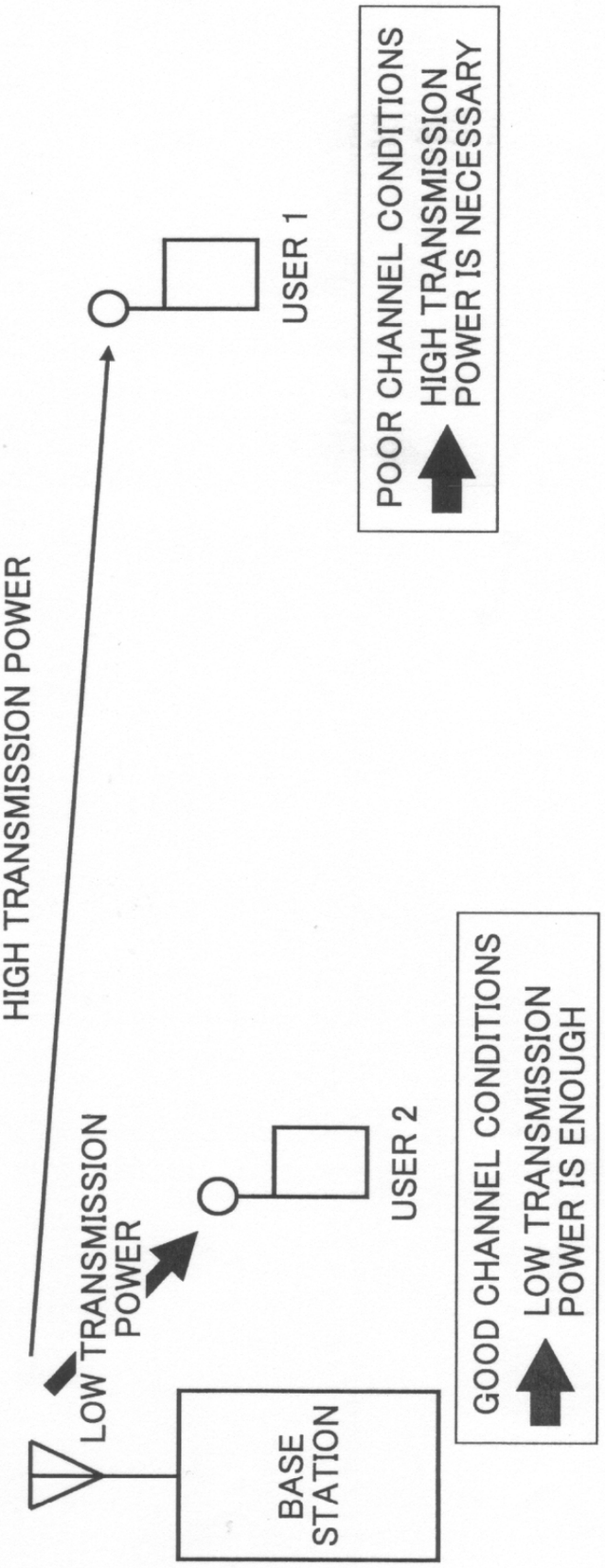

HIGH TRANSMISSION POWER
LOW TRANSMISSION POWER
BASE STATION
USER 2
USER 1
POOR CHANNEL CONDITIONS
HIGH TRANSMISSION POWER IS NECESSARY
GOOD CHANNEL CONDITIONS
LOW TRANSMISSION POWER IS ENOUGH

FIG.12

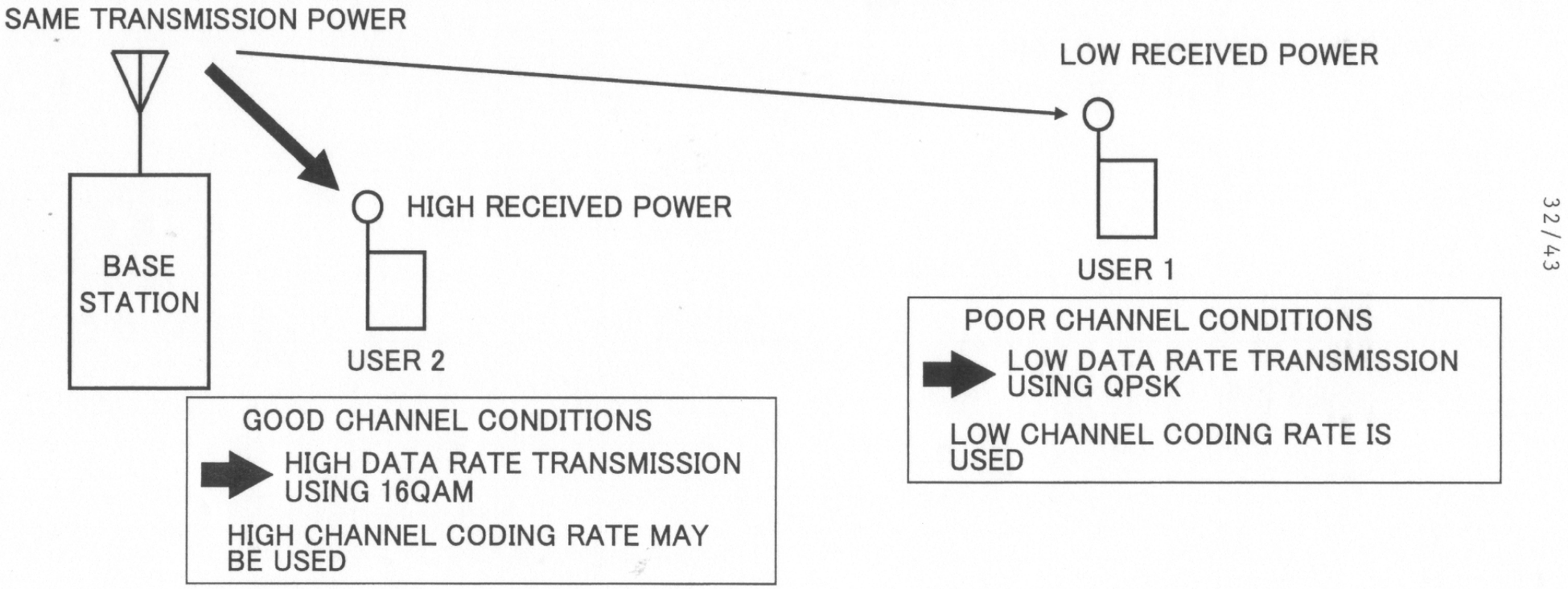

SAME TRANSMISSION POWER
LOW RECEIVED POWER
BASE STATION
HIGH RECEIVED POWER
USER 2
USER 1
GOOD CHANNEL CONDITIONS
HIGH DATA RATE TRANSMISSION USING 16QAM
HIGH CHANNEL CODING RATE MAY BE USED
POOR CHANNEL CONDITIONS
LOW DATA RATE TRANSMISSION USING QPSK
LOW CHANNEL CODING RATE IS USED

FIG.13

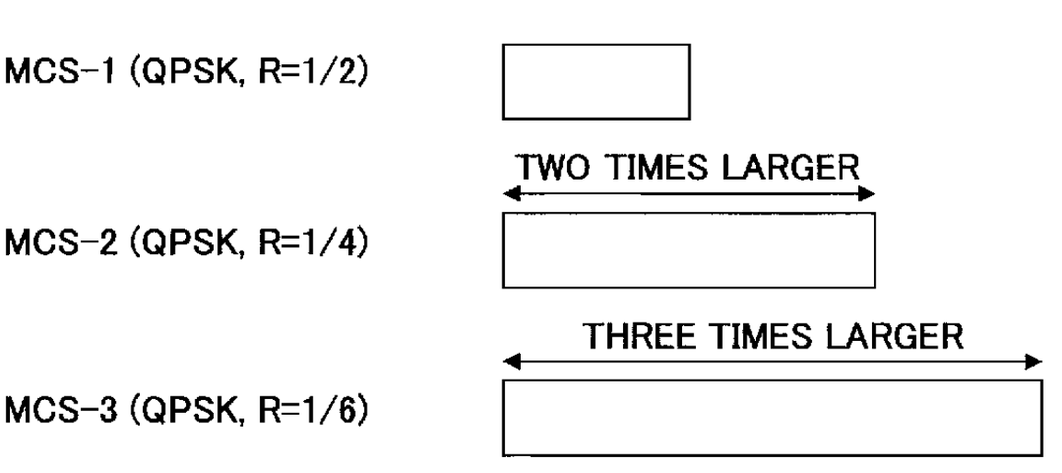


FIG.14A

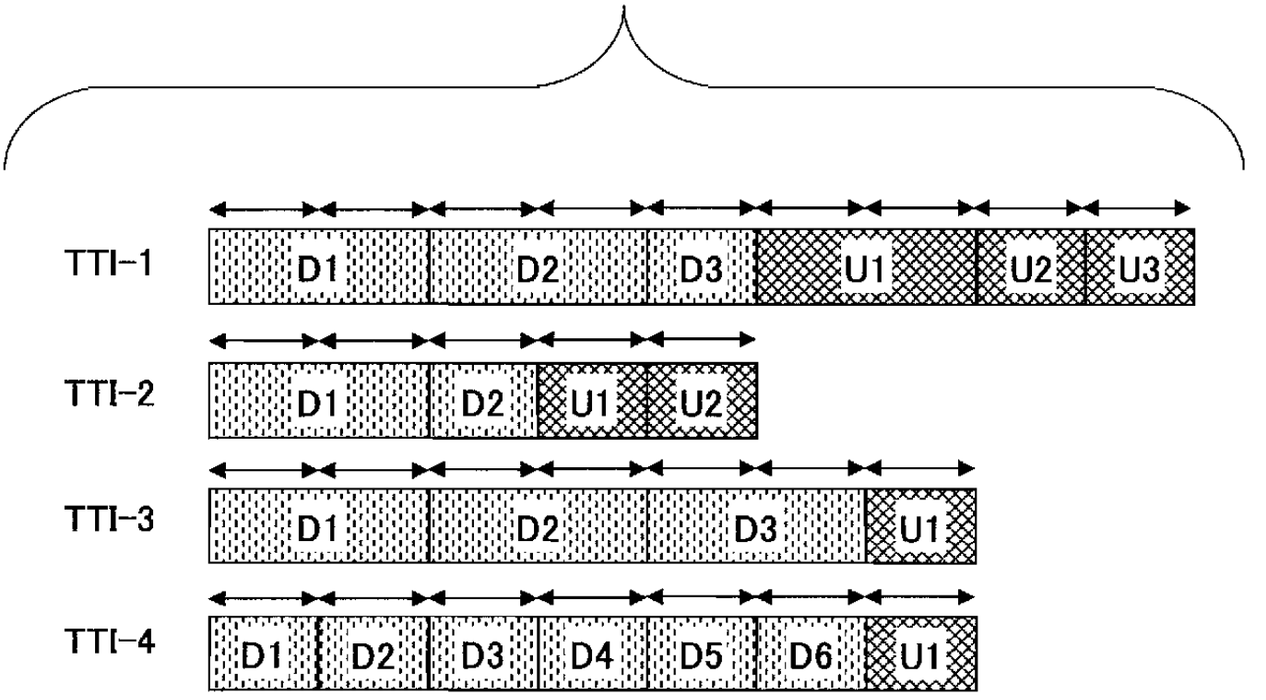


FIG.14B

	$N_{L1/L2(max)}$	$N_{UE,D}$		$N_{UE,U}$		N_D	N'_D	N_U	N'_U
		MCS1	MCS2	MCS1	MCS2				
TTI-1	9	1	2	2	1	3	5	3	4
TTI-2	5	1	2	2	0	2	3	2	2
TTI-3	7	0	3	1	0	3	6	1	1
TTI-4	7	6	0	1	0	6	6	1	1

FIG.15

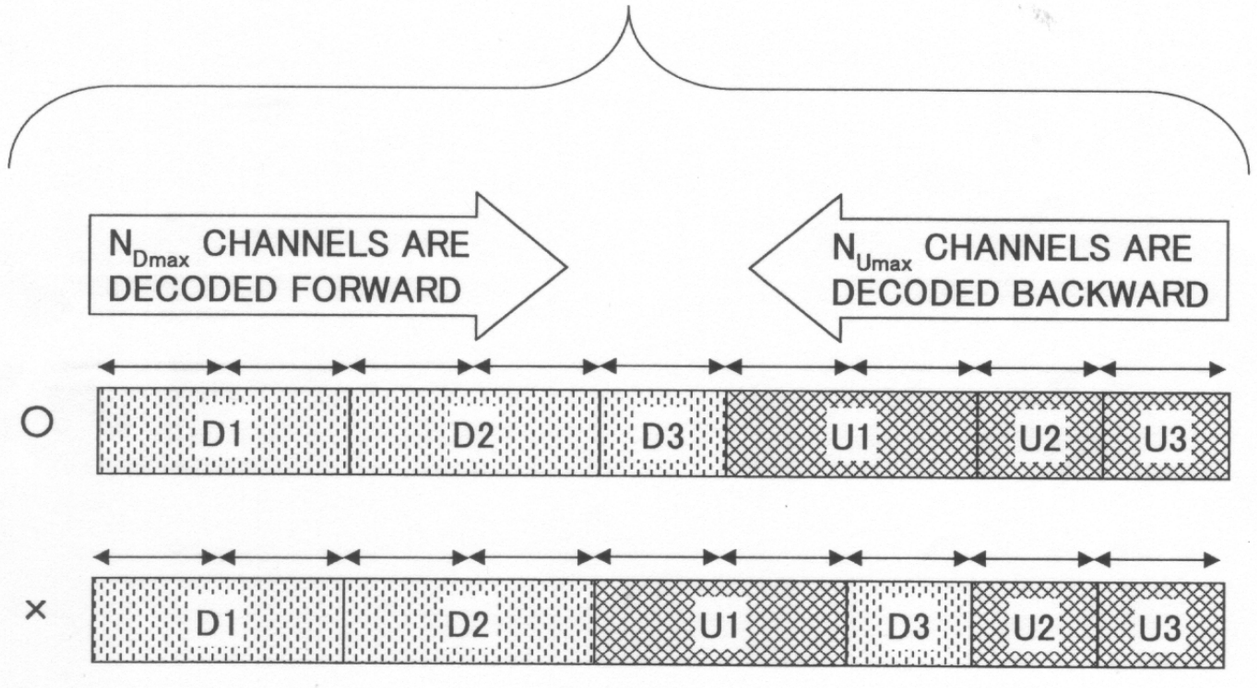


FIG.16

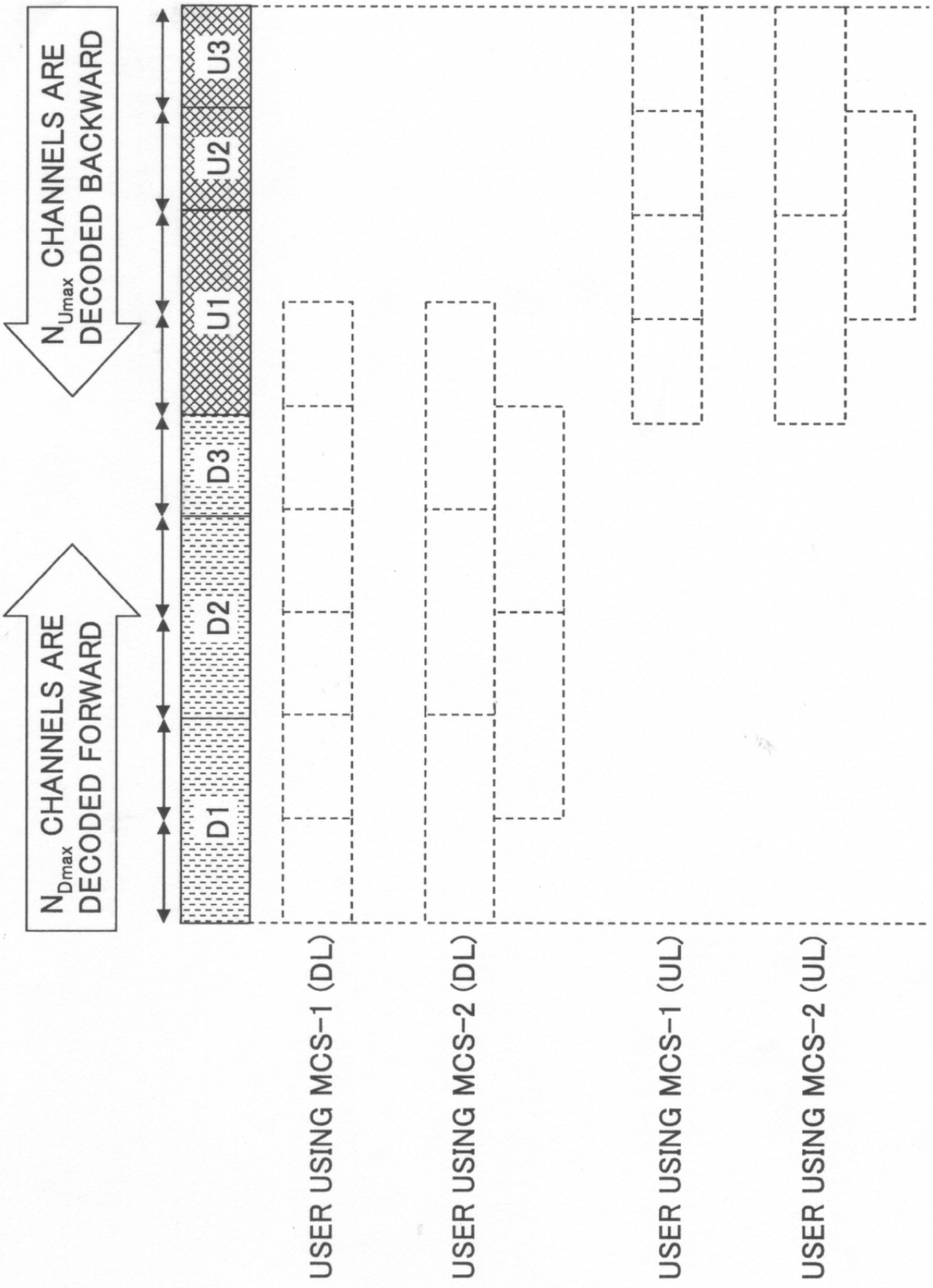

N_{Dmax} CHANNELS ARE DECODED FORWARD
N_{Umax} CHANNELS ARE DECODED BACKWARD
D1
D2
D3
U1
U2
U3
USER USING MCS-1 (DL)
USER USING MCS-2 (DL)
USER USING MCS-1 (UL)
USER USING MCS-2 (UL)

FIG.17

	METHOD 1	METHOD 2	METHOD 3	METHOD 4	METHOD 5	METHOD 6	METHOD 7
L1/L2 CONTROL INFORMATION (EVERY TTI)	$N_{UE,D}(m)$, $N_{UE,U}(m)$	N'_D, N'_U	$N'_D+N'_U$	N'_D, N'_U	$N'_D+N'_U$	$N'_D+N'_U$	$N'_D+N'_U$
L3 CONTROL INFORMATION (LONGER INTERVAL)	–	–	–	MCS	MCS	MCS	–
BCH (LONGER INTERVAL)	–	–	–	–	–	N_{Dmax}, N_{Umax}	N_{Dmax}, N_{Umax}
NUMBER OF BLIND DETECTION STEPS	N_D+N_U	$N_{MCS}x$ $(N'_D + N'_U)$	$2xN_{MCS}x$ $(N'_D + N'_U)$	$N'_D + N'_U$	$2x(N'_D + N'_U)$	$N_{Dmax} + N_{Umax}$	$N_{Dmax} + N_{Umax}$
RADIO RESOURCE EFFICIENCY	◎	◎	◎	○	○	○	△

FIG.18

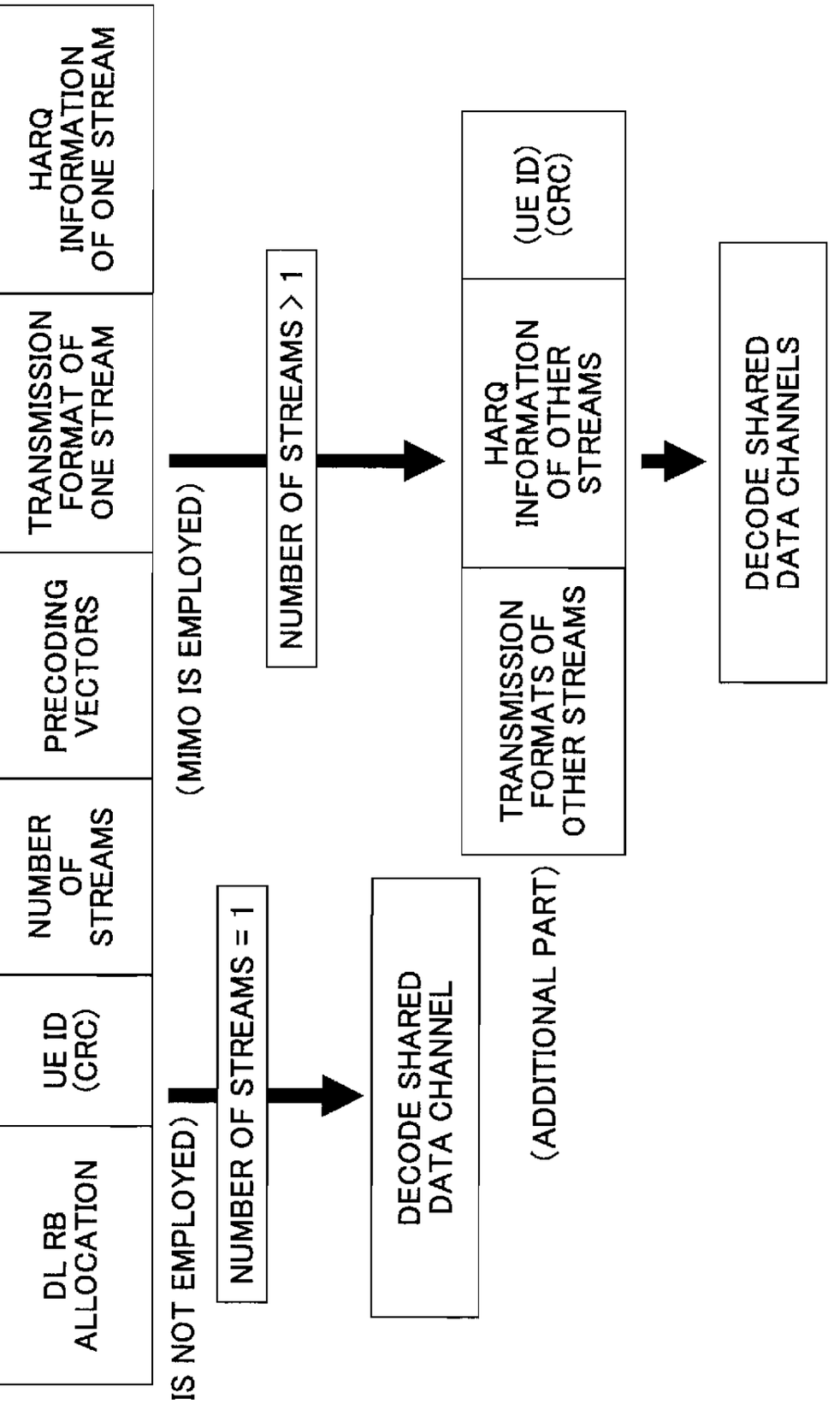

BASIC PART
DL RB ALLOCATION
UE ID (CRC)
NUMBER OF STREAMS
PRECODING VECTORS
TRANSMISSION FORMAT OF ONE STREAM
HARQ INFORMATION OF ONE STREAM
(MIMO IS NOT EMPLOYED)
NUMBER OF STREAMS = 1
DECODE SHARED DATA CHANNEL
(MIMO IS EMPLOYED)
NUMBER OF STREAMS > 1
(ADDITIONAL PART)
TRANSMISSION FORMATS OF OTHER STREAMS
HARQ INFORMATION OF OTHER STREAMS
(UE ID) (CRC)
DECODE SHARED DATA CHANNELS

FIG.19A


DL RB ALLOCATION
NUMBER OF STREAMS
UE ID (CRC)
PRECODING VECTORS
TRANSMISSION FORMATS OF ALL STREAMS
HARQ INFORMATION OF ALL STREAMS

FIG.19B

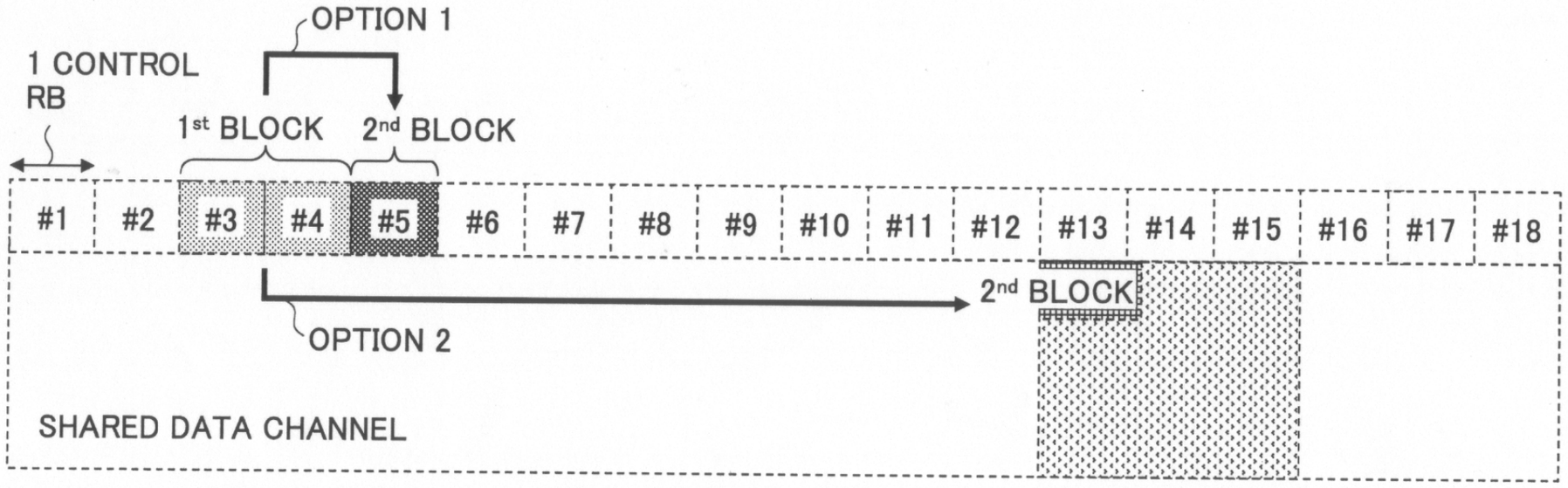

OPTION 1
1 CONTROL RB
1st BLOCK
2nd BLOCK
#1
#2
#3
#4
#5
#6
#7
#8
#9
#10
#11
#12
#13
#14
#15
#16
#17
#18
2nd BLOCK
OPTION 2
SHARED DATA CHANNEL

FIG.20

DL RB ALLOCATION	UE ID (CRC)	NUMBER OF STREAMS	PRECODING VECTORS	TRANSMISSION FORMATS OF ALL STREAMS	HARQ INFORMATION OF ALL STREAMS

FIG.21

	FIRST METHOD BASIC PART AND ADDITIONAL PART ARE CODED SEPARATELY	SECOND METHOD FIXED-LENGTH PART AND VARIABLE-LENGTH PART ARE CODED SEPARATELY	THIRD METHOD ALL CONTROL INFORMATION ITEMS ARE CODED COLLECTIVELY
CHANNEL CODING GAIN	CODING GAIN OF BASIC PART IS HIGH AND CODING GAIN OF ADDITIONAL PART IS LOW	MEDIUM	HIGH
DECODING DELAY	DECODING DELAY OF NON-MIMO USER IS SMALL BECAUSE DECODING PROCESS IS REPEATED ONLY ONCE, AND DECODING DELAY OF MIMO USER IS LARGE BECAUSE DECODING PROCESS IS REPEATED MULTIPLE TIMES	DECODING DELAY IS LARGE BECAUSE DECODING PROCESS IS REPEATED MULTIPLE TIMES	DECODING DELAY IS SMALL BECAUSE DECODING PROCESS IS REPEATED ONLY ONCE
NUMBER OF BLIND DETECTION STEPS (WHEN PRECODING INFORMATION, TRANSMISSION FORMAT INFORMATION, AND HARQ INFORMATION ARE NOT FIXED)	NUMBER OF BLIND DETECTION STEPS FOR BASIC PART MAY BECOME LARGE	NUMBER OF BLIND DETECTION STEPS IS SMALL BECAUSE DATA SIZES OF ALL PARTS ARE KNOWN	NUMBER OF BLIND DETECTION STEPS MAY BECOME LARGE
OVERHEAD (WHEN PRECODING INFORMATION, TRANSMISSION FORMAT INFORMATION, AND HARQ INFORMATION ARE FIXED AND THE NUMBER OF BLIND DETECTION STEPS IS REDUCED)	OVERHEAD MAY BECOME SLIGHTLY LARGER BECAUSE OF DUMMY BITS USED TO FIX SIZE OF PRECODING INFORMATION	SMALL	OVERHEAD MAY BECOME LARGE BECAUSE OF DUMMY BITS USED TO FIX SIZES OF PRECODING INFORMATION, TRANSMISSION FORMAT INFORMATION, AND HARQ INFORMATION

FIG.22

CONTROL SIGNALING INFORMATION	NUMBER OF BITS	DESCRIPTIONS (ASSUMPTIONS)
DOWNLINK RESOURCE ALLOCATION INFORMATION	$N_{RB}/2$	BIT MAPPING FOR EACH PAIR OF ADJACENT TWO RBs IS USED
UE ID	16	=CRC
NUMBER OF SPATIAL STREAMS	2	FOUR STREAMS
PRECODING VECTOR INFORMATION	[3]$N_{precoding}$ (2 ANTENNAS) [4-6]$N_{precoding}$ (4 ANTENNAS)	PRELIMINARY VALUE FFS
TRANSMISSION FORMAT INFORMATION	$8N_{codeword}$	TWO BITS ARE PROVIDED FOR MODULATION SCHEME AND SIX BITS ARE PROVIDED FOR PAYLOAD SIZE FOR EACH CODE WORD CONTROL (FFS)
HARQ INFORMATION	$5N_{codeword}$	THREE BITS ARE PROVIDED FOR PROCESS NUMBER, AND TWO BITS ARE PROVIDED FOR REDUNDANCY VERSION AND NEW DATA INDICATOR
UPLINK RESOURCE ALLOCATION INFORMATION	$\log_2(N_{RB}(N_{RB}+1)/2)$	TREE MAPPING
UE ID	16	=CRC
TRANSMISSION FORMAT INFORMATION	8	TWO BITS ARE PROVIDED FOR MODULATION SCHEME AND SIX BITS ARE PROVIDED FOR PAYLOAD SIZE
TRANSMISSION POWER	[1-4]	SELECTED FROM 2-16 POWER OFFSET VALUES (FFS)
FORMAT INFORMATION OF DECODING REFERENCE SIGNAL H	[2]	SELECTED FROM FOUR CYCLIC SHIFT VALUES (FFS)

N_{RB}: NUMBER OF RESOURCE BLOCKS IN SYSTEM FREQUENCY BAND (e.g., 50 RESOURCE BLOCKS IN 10 MHz BAND)
$N_{precoding}$: NUMBER OF FREQUENCY BLOCKS OF PRECODING CONTROL UNIT TO WHICH ALLOCATED RB BELONGS
$N_{codeword}$: NUMBER OF CODE WORDS (ONE FOR ONE STREAM, AND TWO FOR 2-4 STREAMS)

FIG.23

CONDITIONS	NUMBER OF SYMBOLS PER DL SCHEDULING GRANT INFORMATION (IT IS ASSUMED THAT DUMMY BITS ARE ADDED TO FIX CODE BLOCK SIZE OF BASIC PART (FIXED PART) IN FIRST AND SECOND METHODS)								
	5 MHz BAND			10 MHz BAND			20 MHz BAND		
	FIRST METHOD	SECOND METHOD	THIRD METHOD	FIRST METHOD	SECOND METHOD	THIRD METHOD	FIRST METHOD	SECOND METHOD	THIRD METHOD
CASE A Min/Max B = 3 / 4 Min/Max $N_{codeword}$ = 1 / 2	BASIC:47-48 ADDITIONAL: 0-13 (1.14-1.45%)	FIXED:15 VARIABLE: 32-46 (1.12-1.45%)	47-61 (1.45%)	BASIC:59-60 ADDITIONAL: 0-13 (0.71-0.87%)	FIXED:27 VARIABLE: 32-46 (0.70-0.87%)	59-73 (0.87%)	BASIC:84-85 ADDITIONAL: 0-13 (0.51-0.58%)	FIXED:52 VARIABLE: 32-46 (0.50-0.58%)	84-98 (0.58%)
CASE B Min/Max B = 3 / (4 x N_{RB}/5) Min/Max $N_{codeword}$ = 1 / 2	BASIC:47-64 ADDITIONAL: 0-13 (1.52-1.83%)	FIXED:15 VARIABLE: 32-62 (1.12-1.83%)	47-77 (1.83%)	BASIC:59-96 ADDITIONAL: 0-13 (1.14-1.30%)	FIXED:27 VARIABLE: 32-82 (0.70-1.30%)	59-109 (1.30%)	BASIC:84-161 ADDITIONAL: 0-13 (0.96-1.04%)	FIXED:52 VARIABLE: 32-122 (0.50-1.04%)	84-174 (1.04%)