

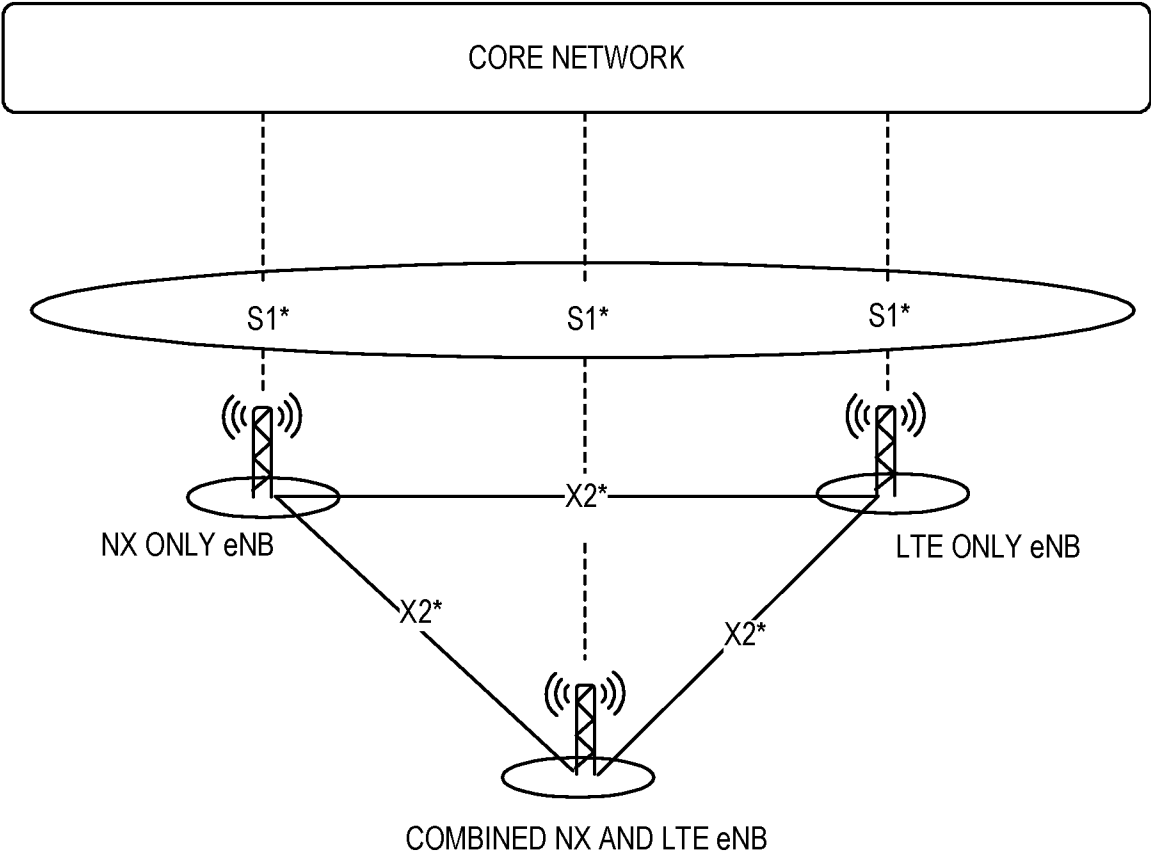


FIG. 1

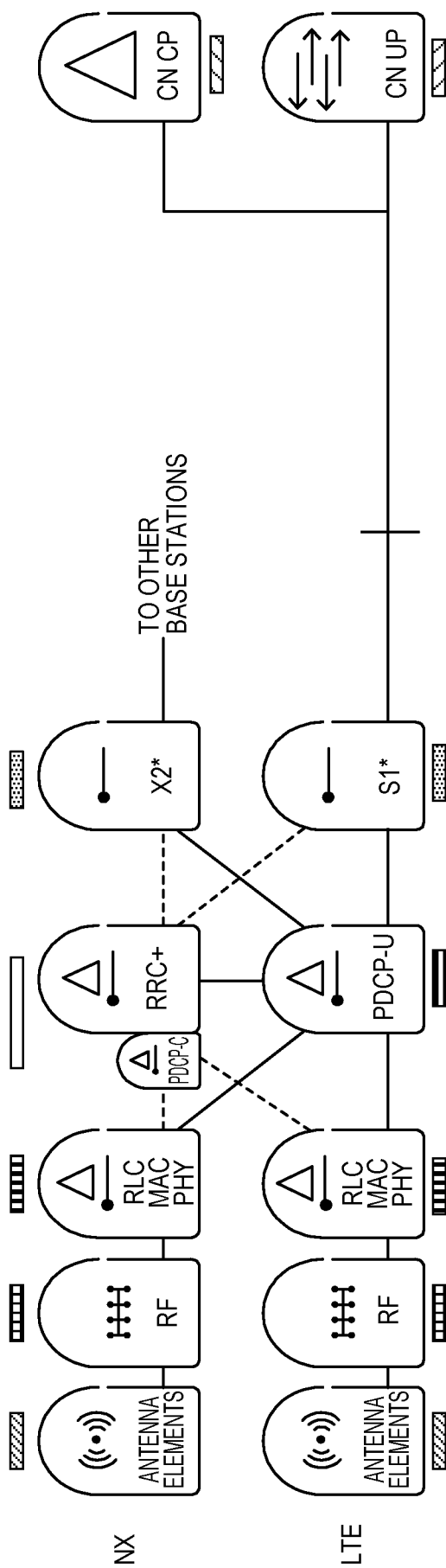
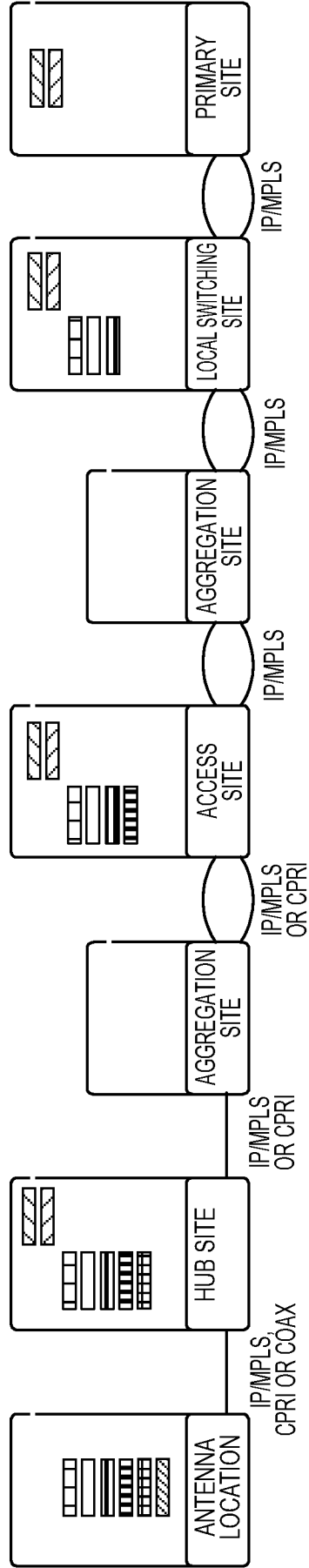
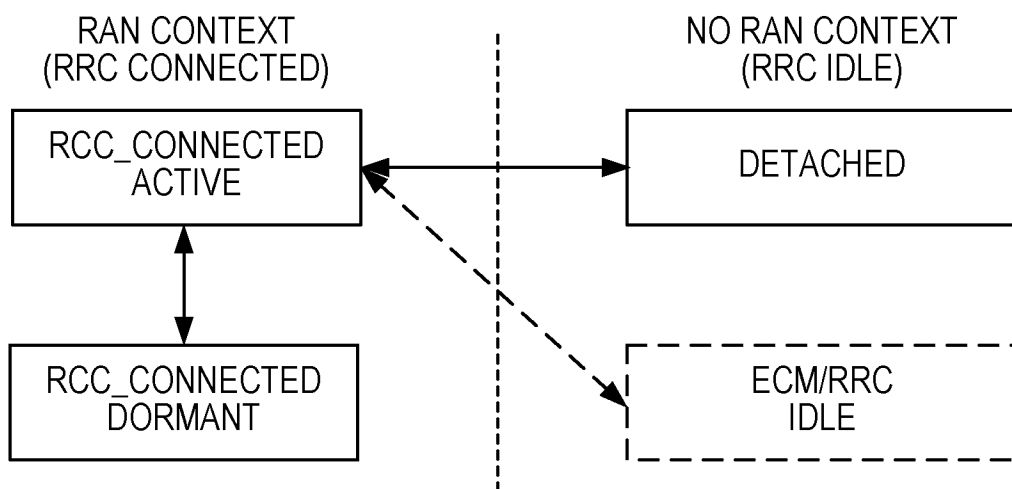


FIG. 2

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**FIG. 3**

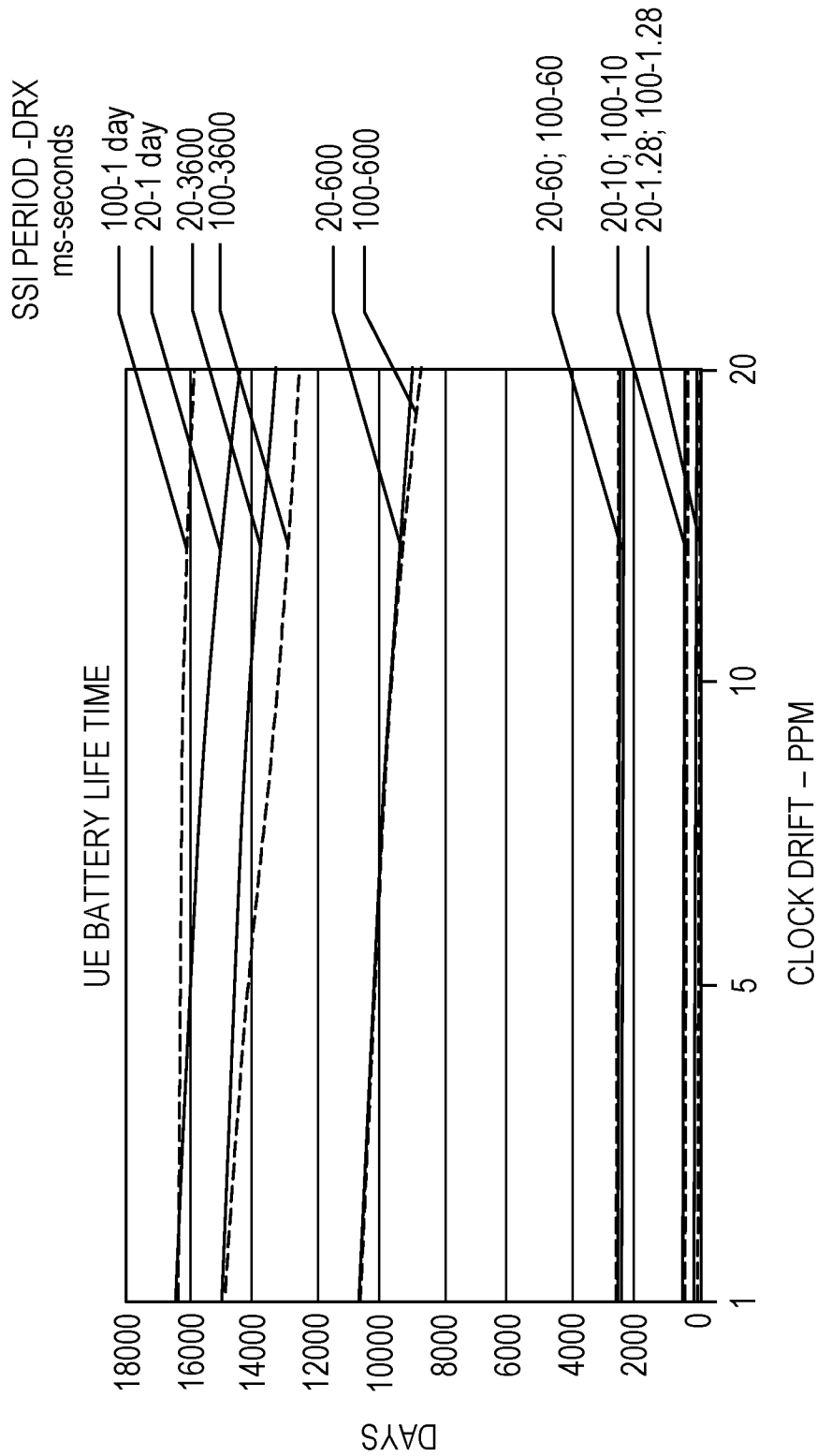


FIG. 4

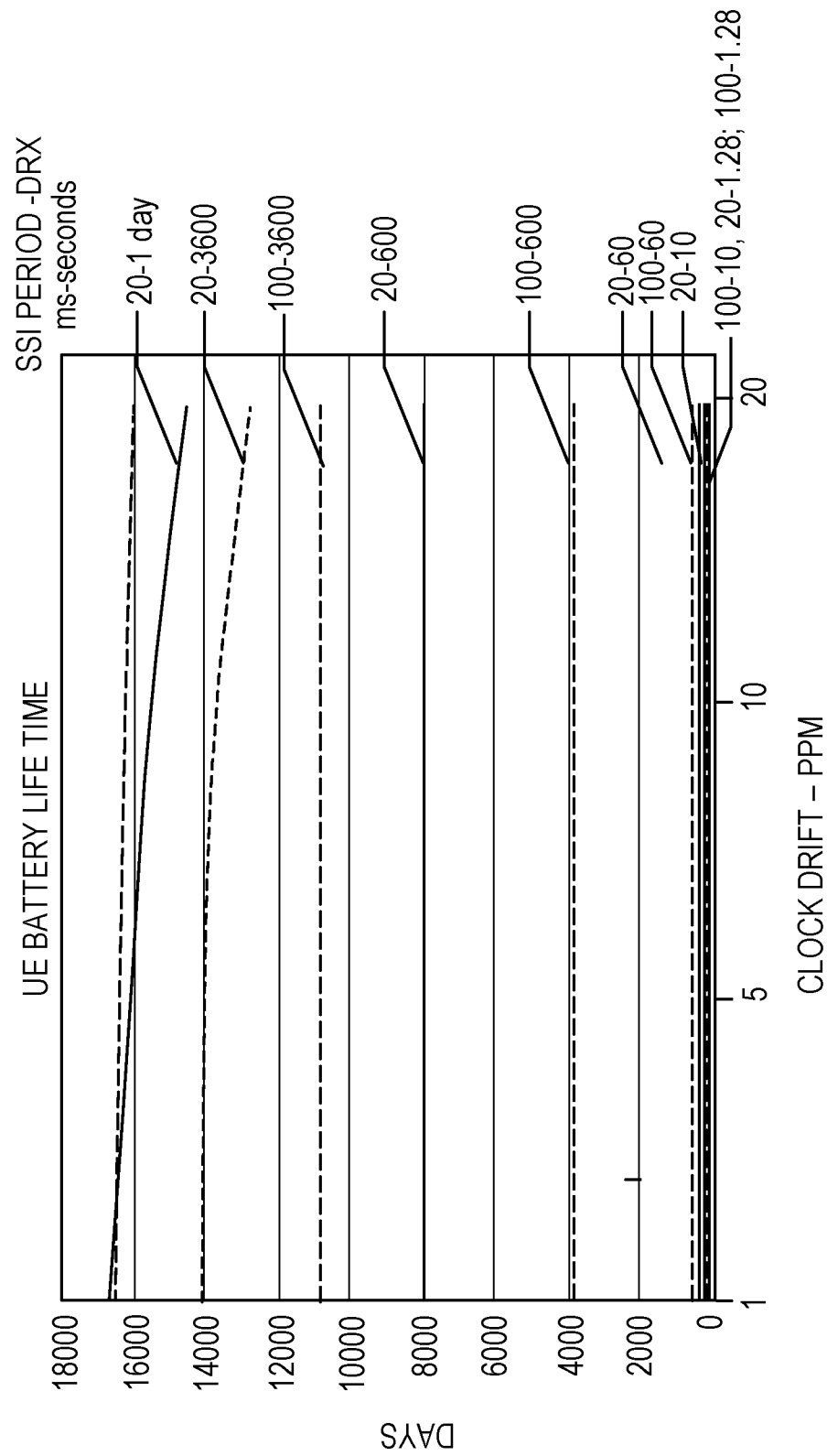
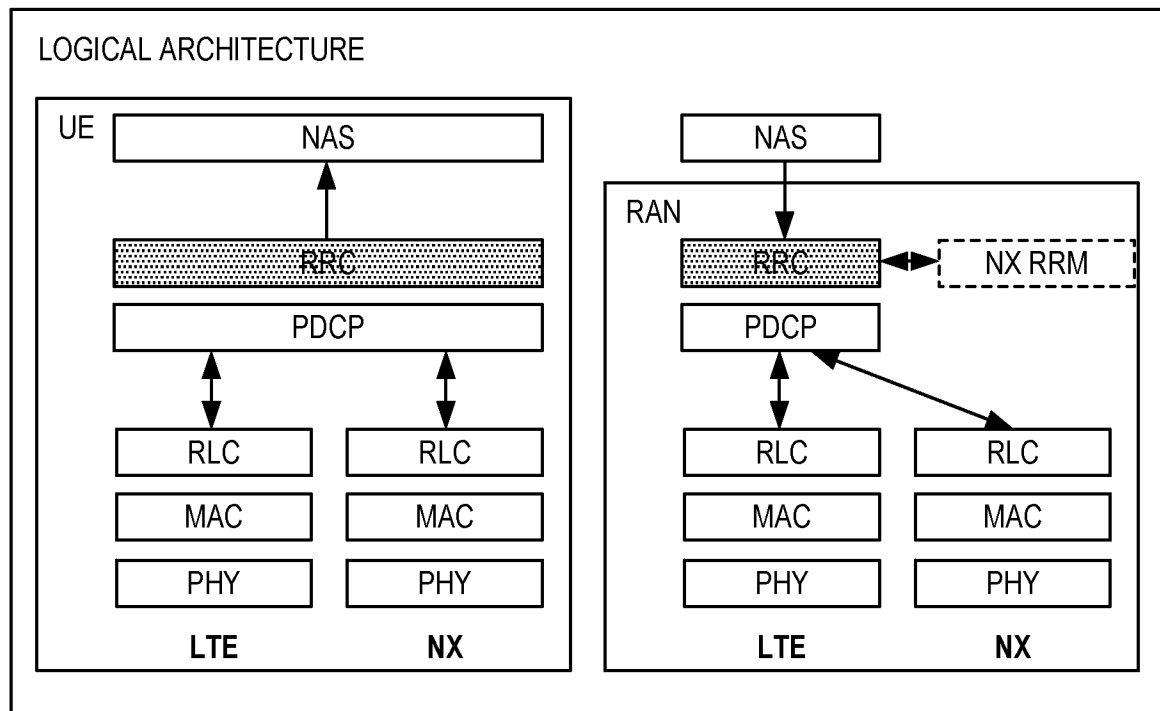
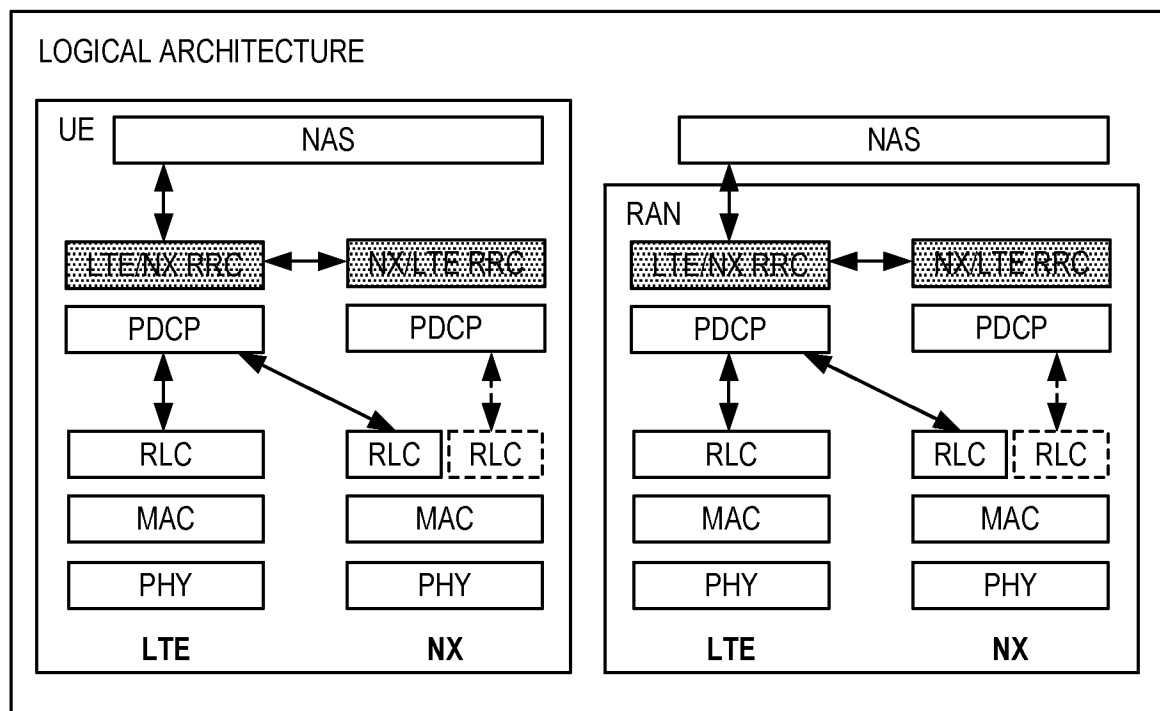


FIG. 5

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**FIG. 6****FIG. 7**

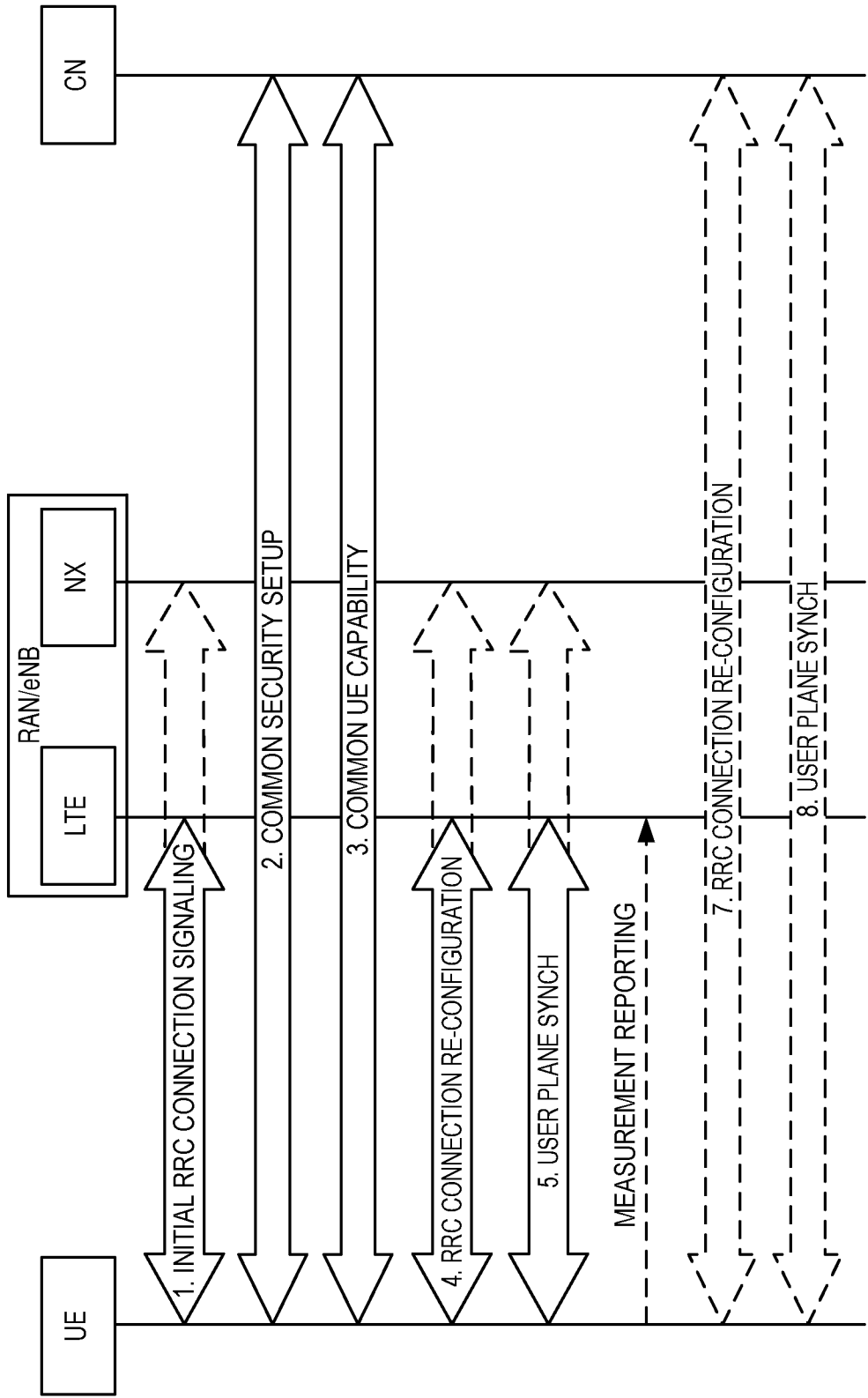


FIG. 8

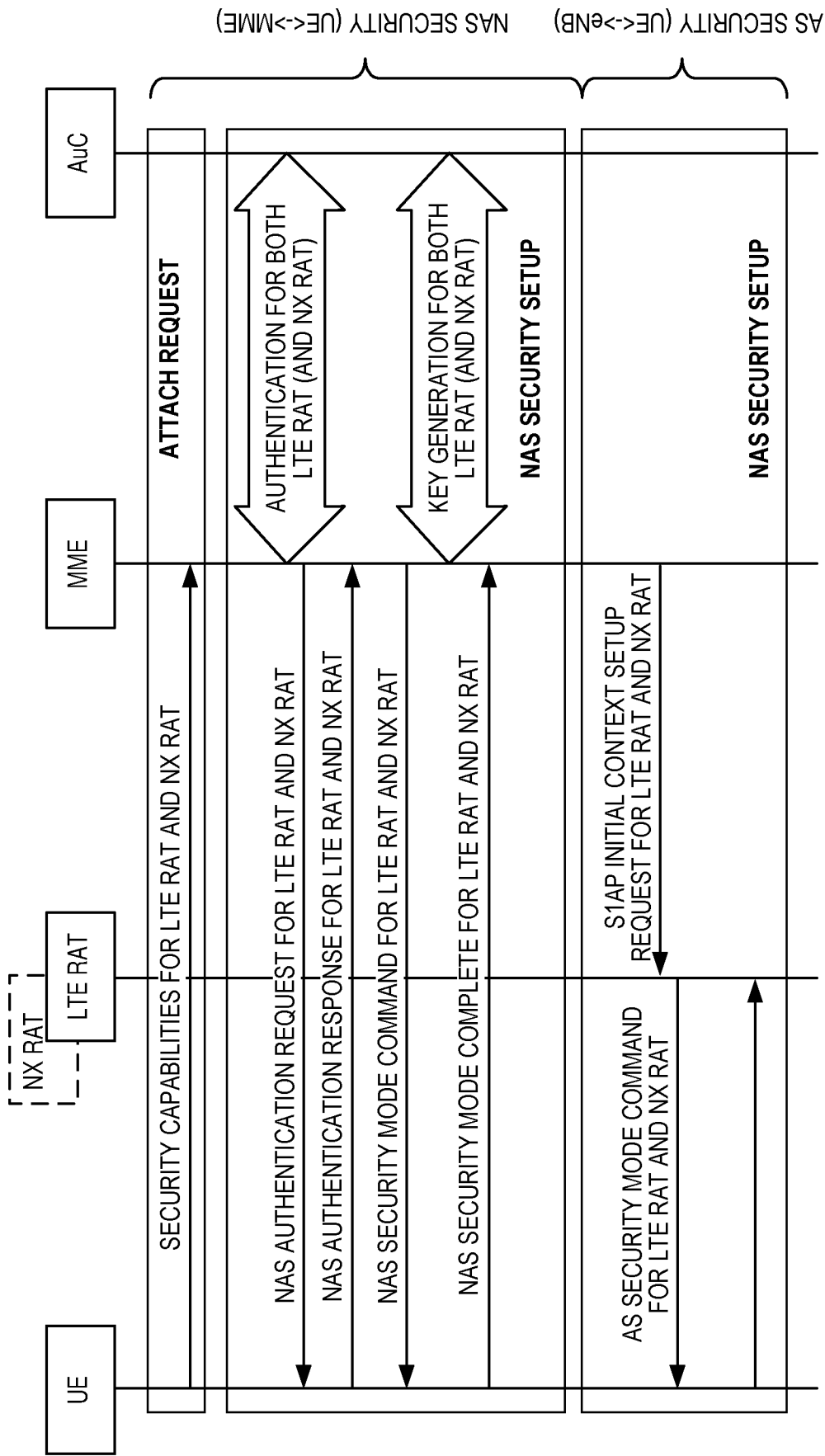
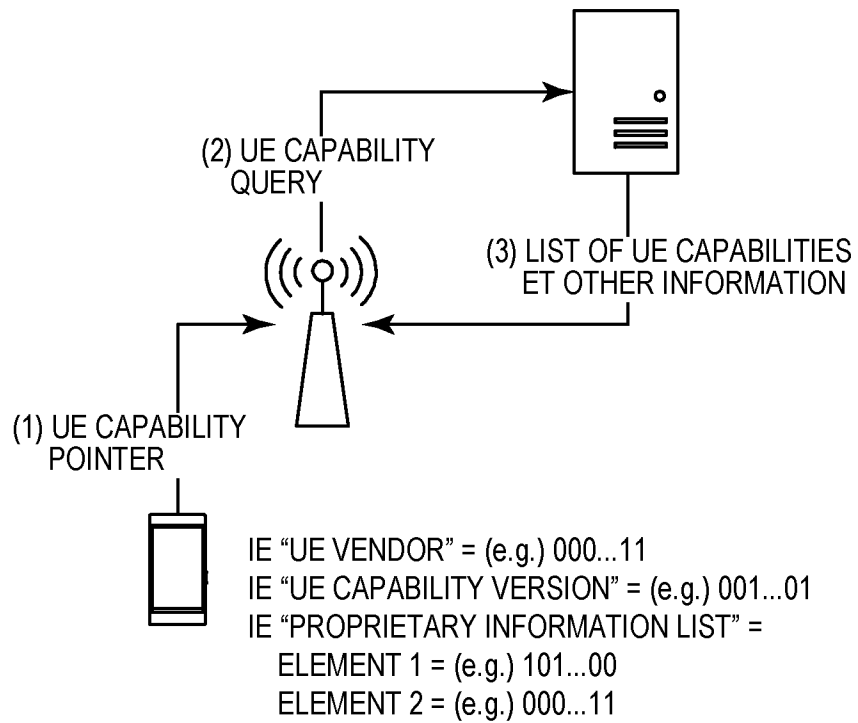
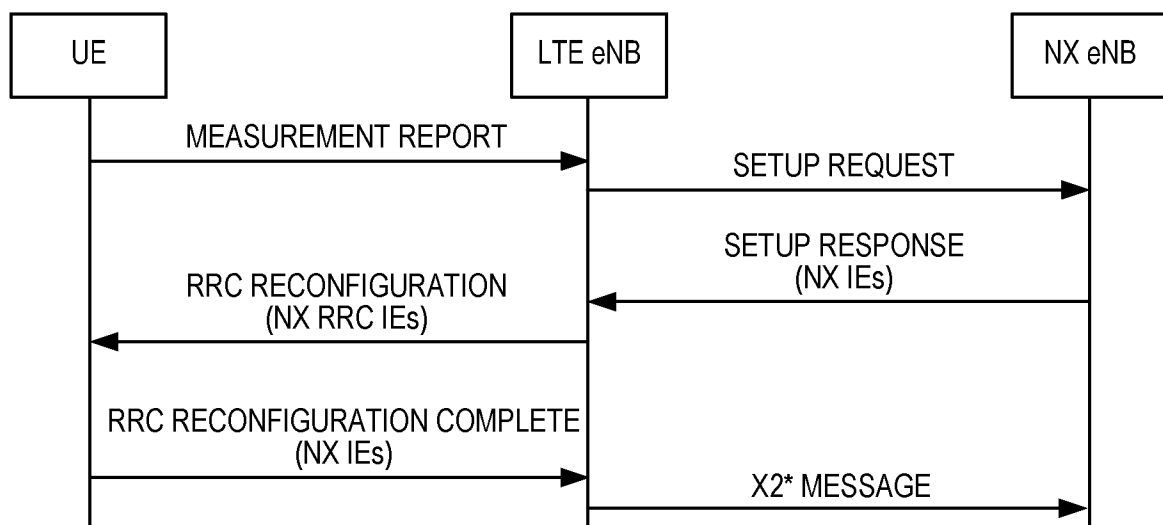
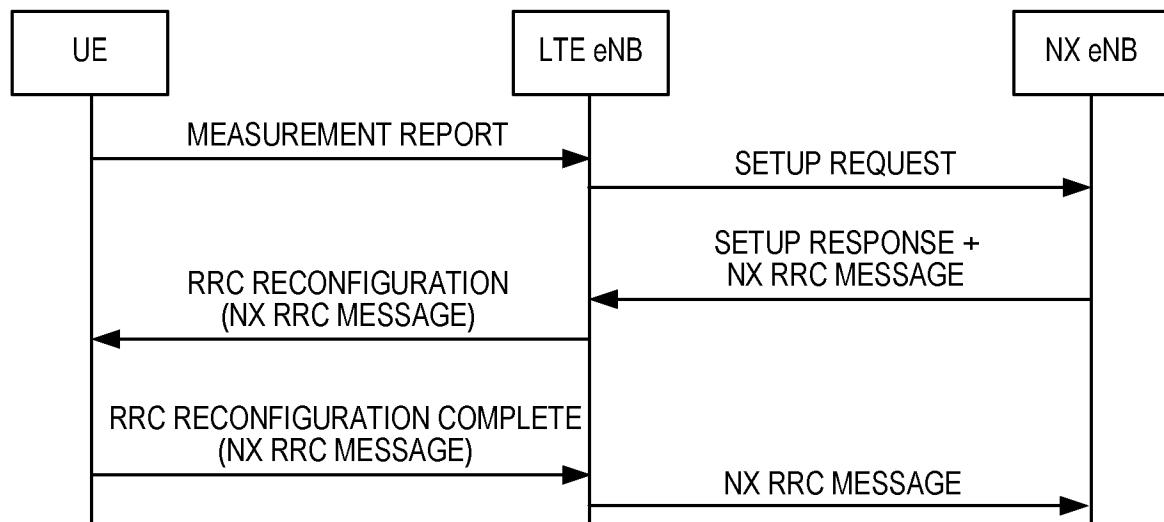
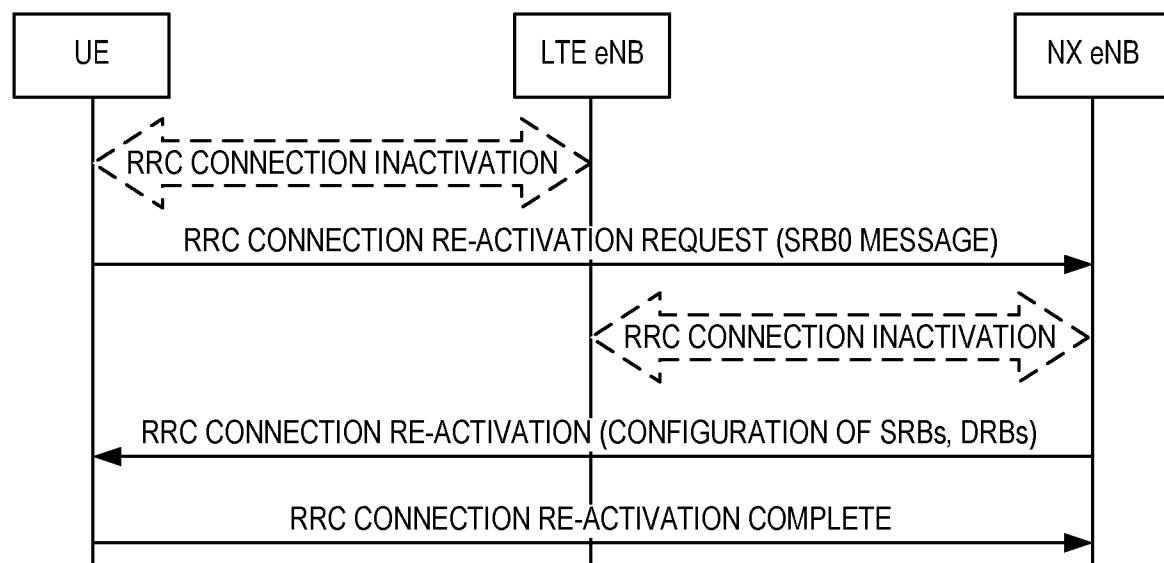


FIG. 9

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**FIG. 10****FIG. 11**

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**FIG. 12****FIG. 13**

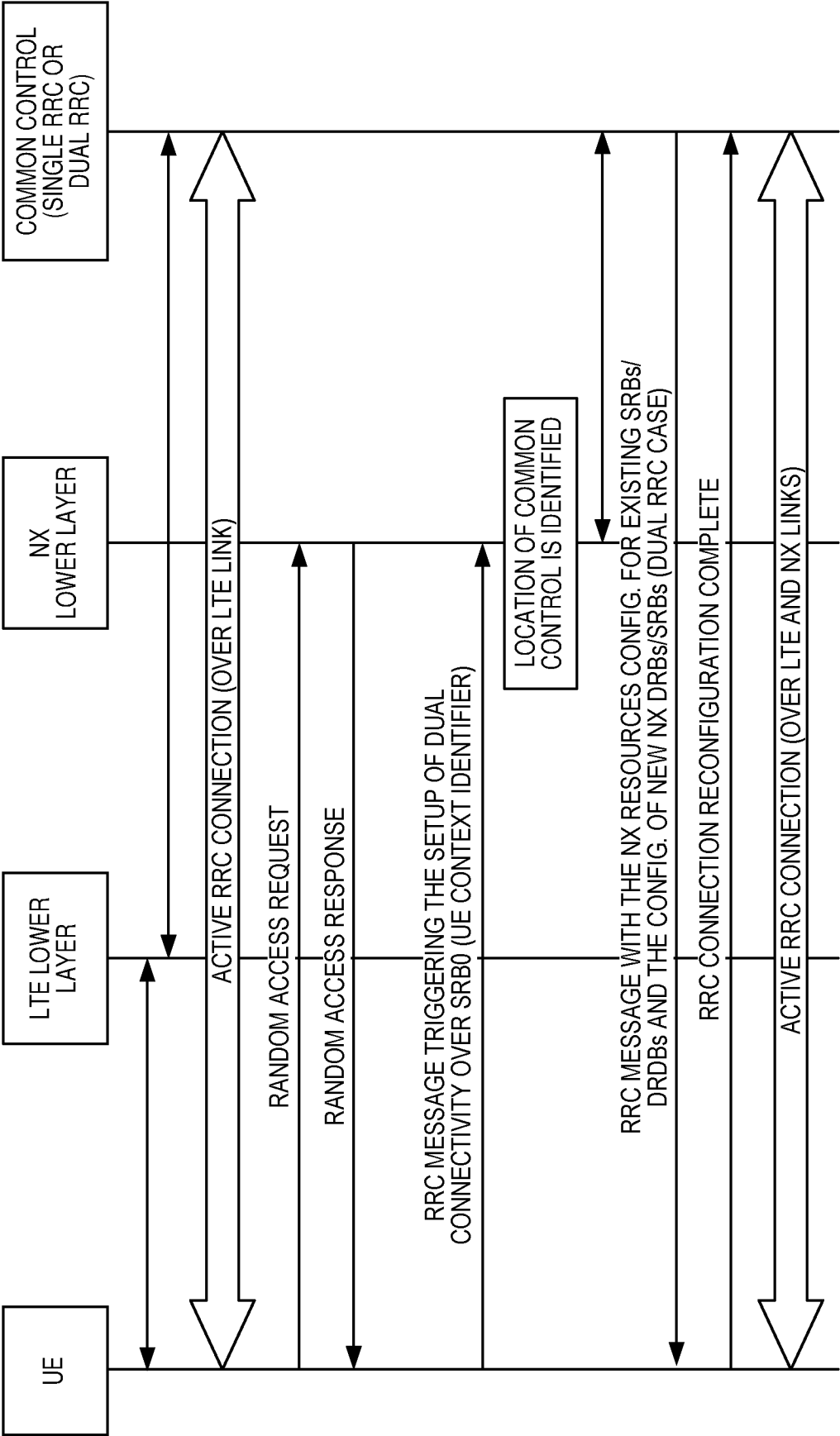


FIG. 14

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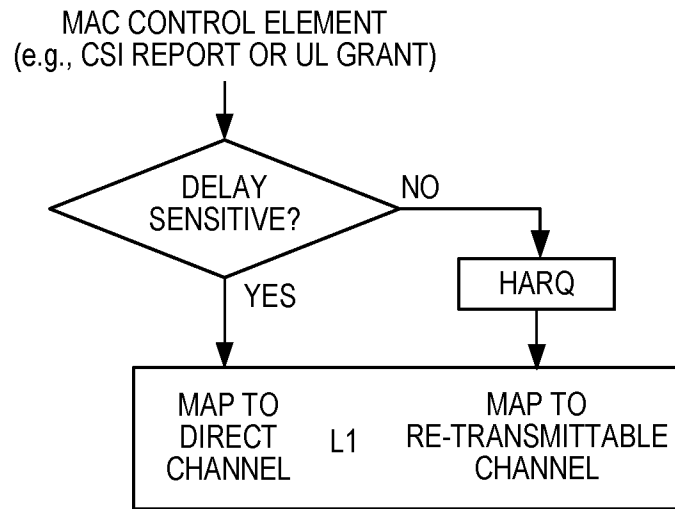


FIG. 15

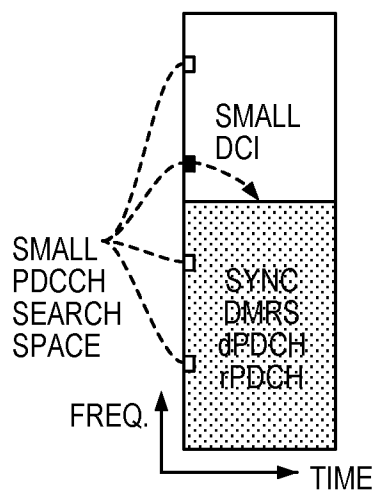
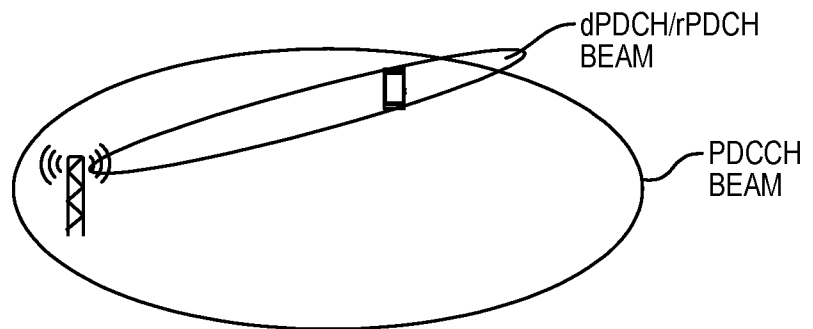


FIG. 16

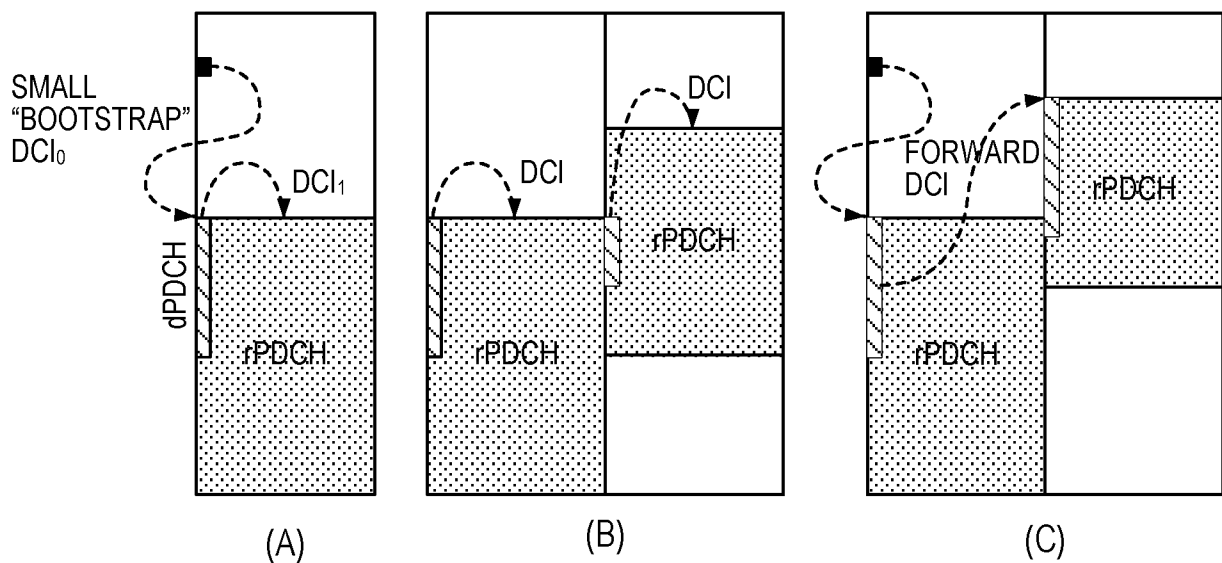


FIG. 17

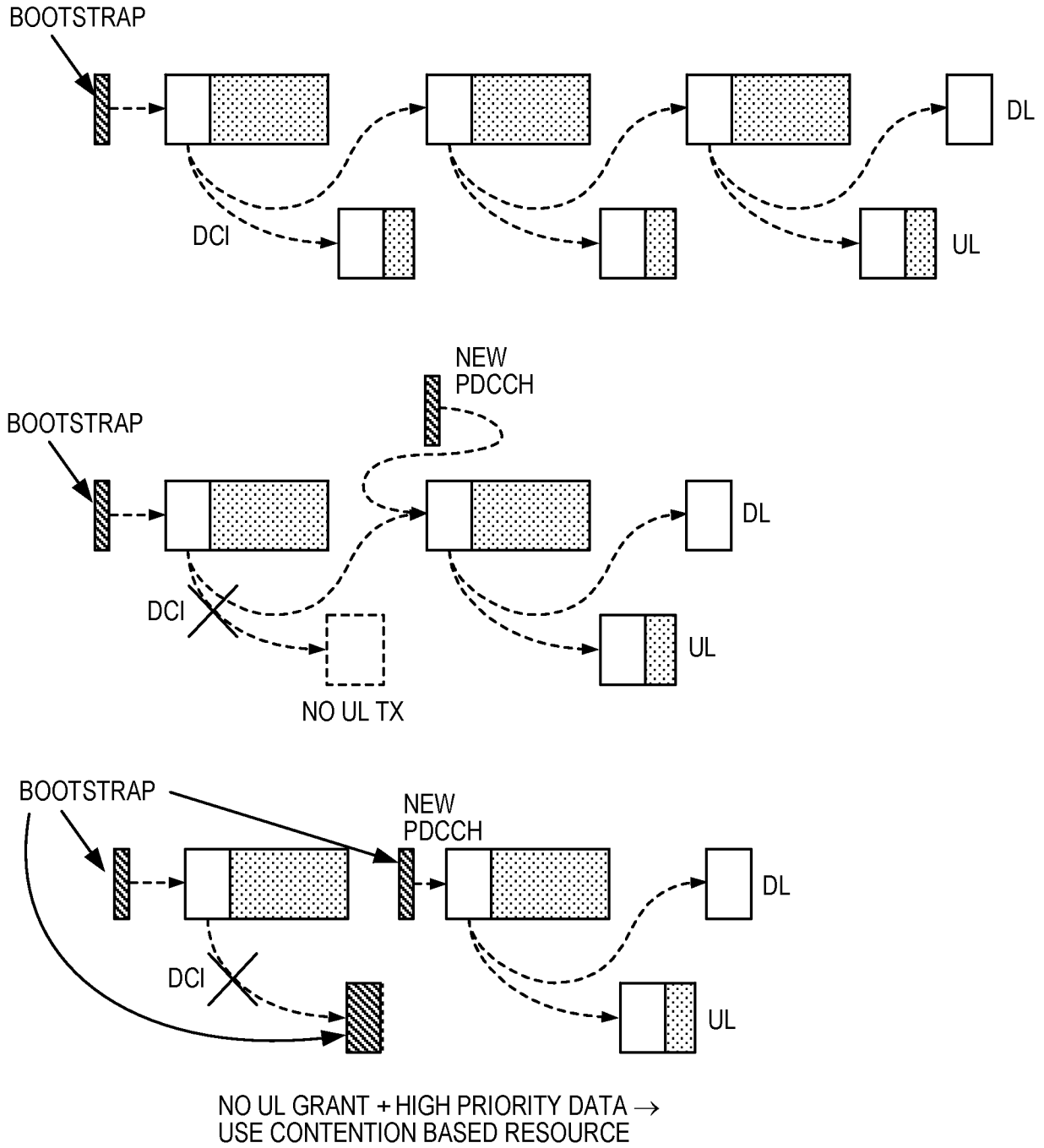


FIG. 18

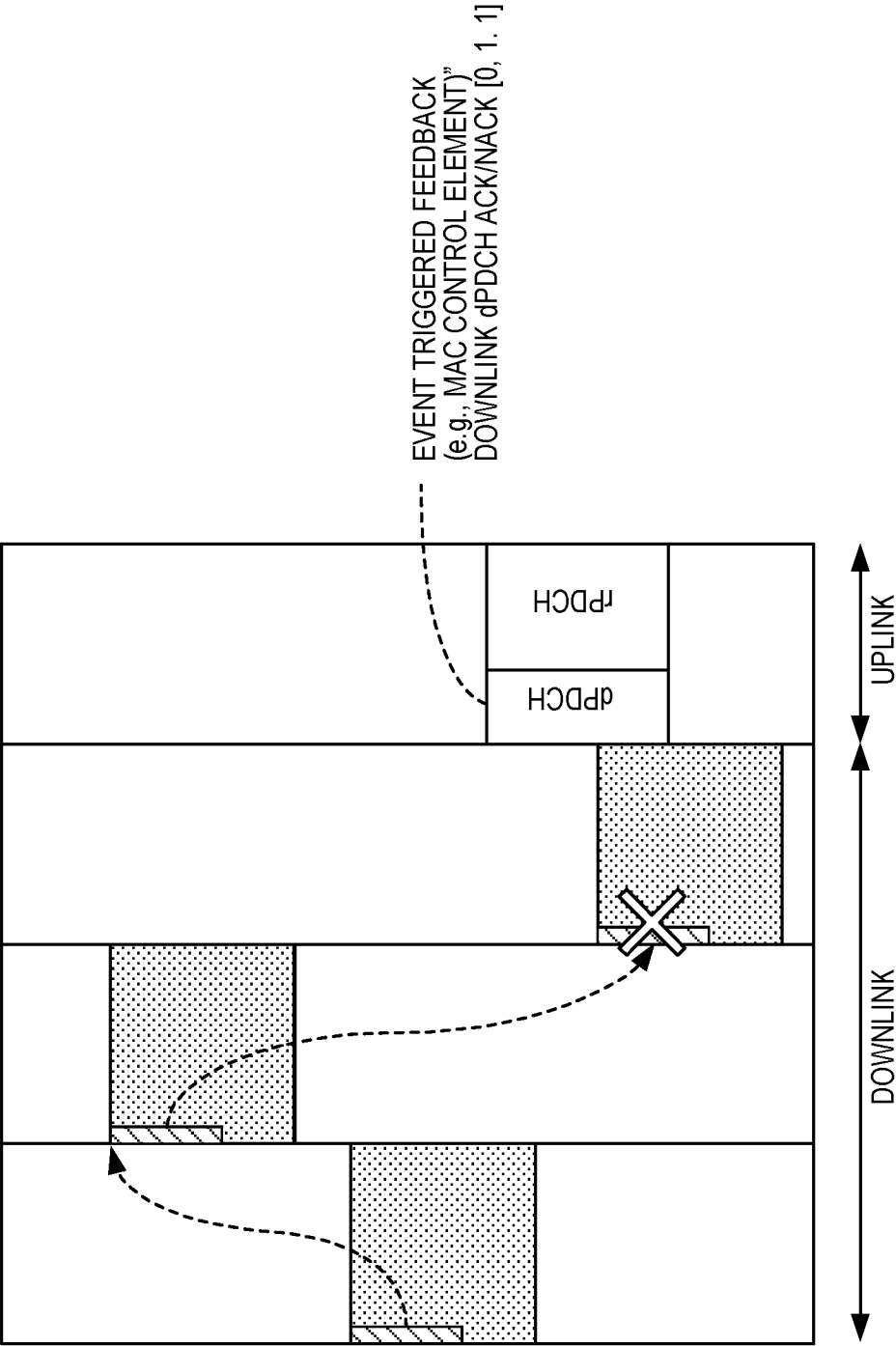


FIG. 19

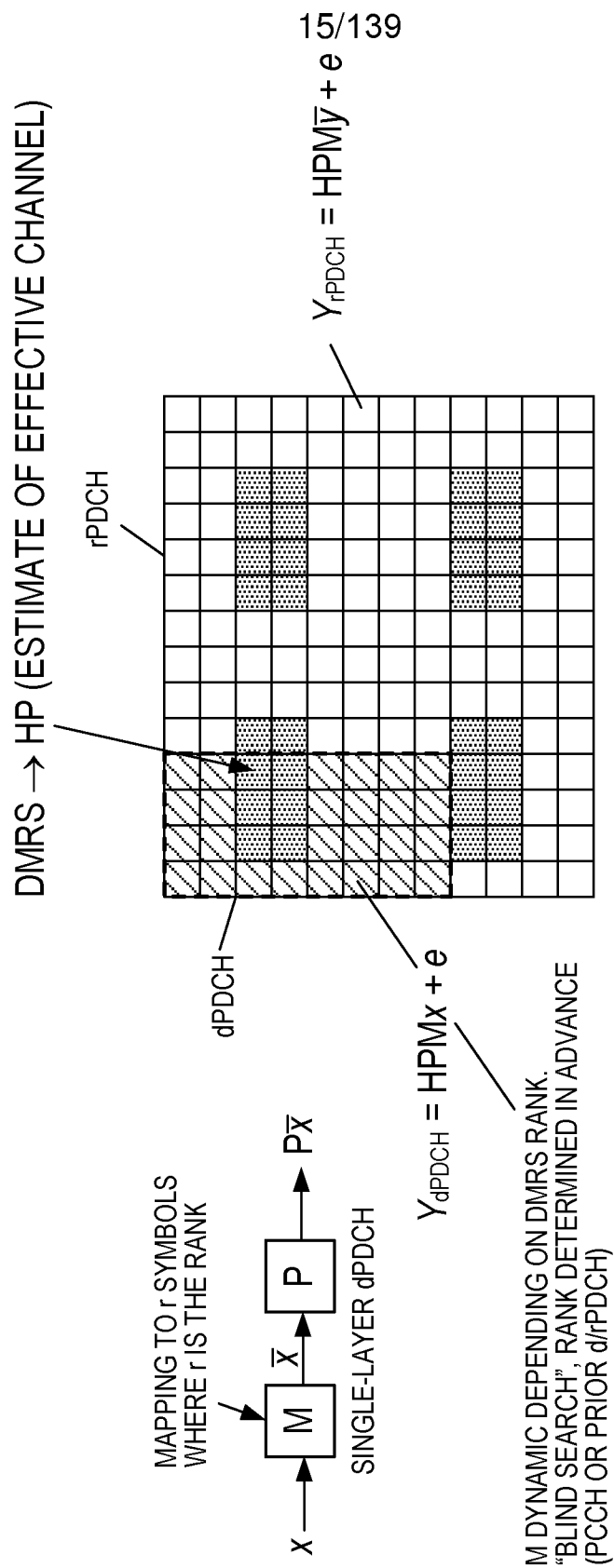


FIG. 20

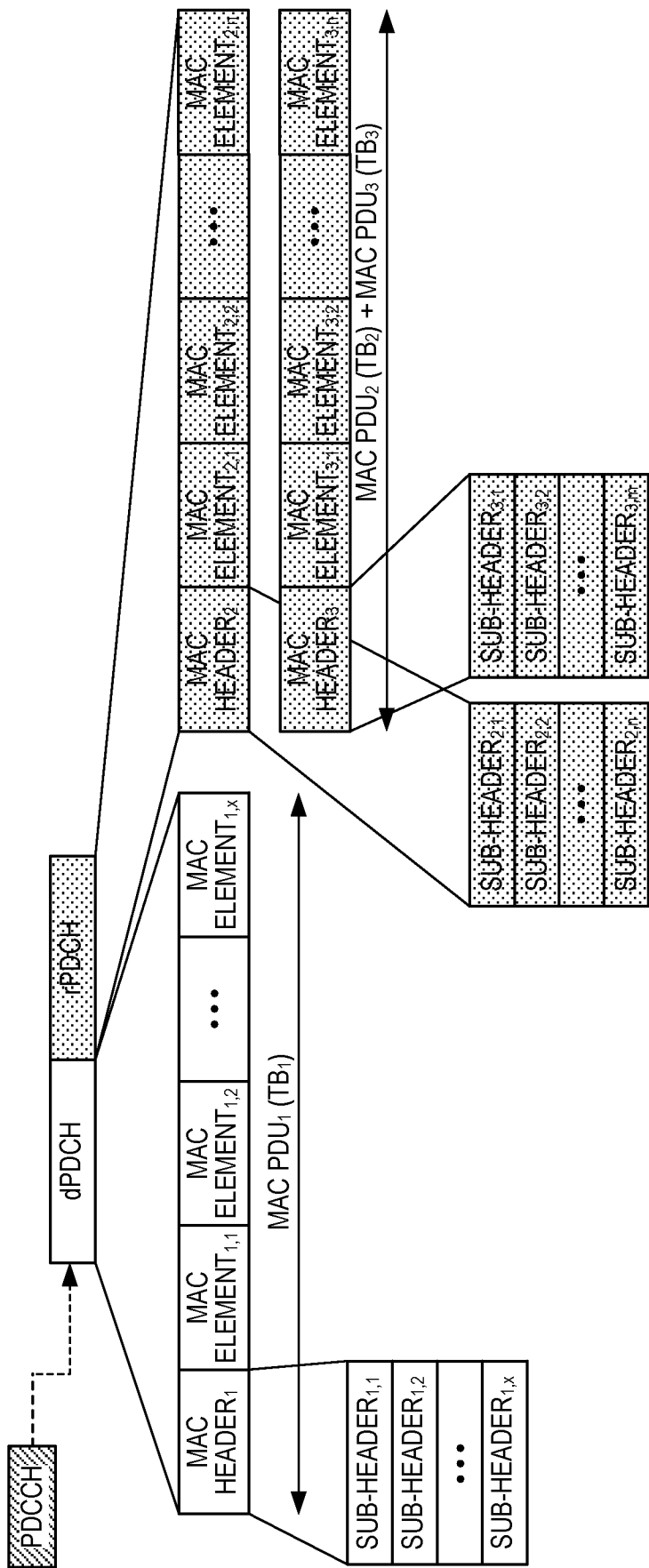


FIG. 21

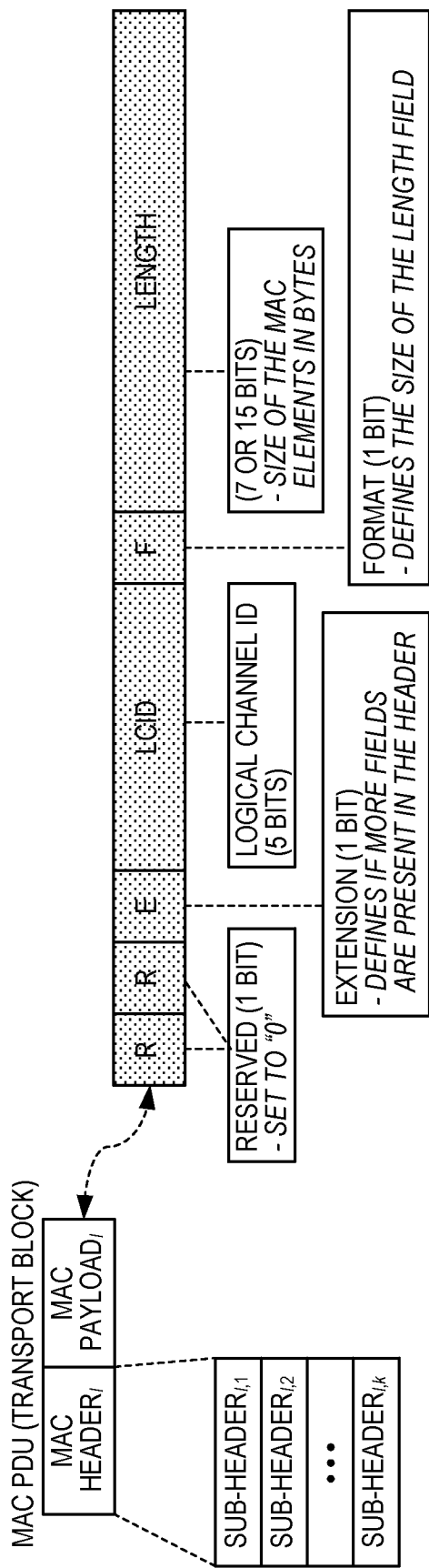


FIG. 22

INDEX	LCID VALUES FOR UL-PDCH
00000	CCCH
00001-01010	IDENTITY OF THE LOGICAL CHANNEL (10 DIFFERENT)
01011-10101	RESERVED
10110	POWER HEADROOM REPORT
10111	C-RNTI
11000	TRUNCATED BSR
11001	SHORT BSR
11010	LONG BSR
11011	RS MEASUREMENT FEEDBACK
11100	RESERVE LINK CSI FEEDBACK
11101	RESERVE LINK HARQ FEEDBACK
11110	RS TRANSMISSION INFORMATION
11111	PADDING

INDEX	LCID VALUES FOR DL-PDCH
00000	CCCH
00001-01010	IDENTITY OF THE LOGICAL CHANNEL (10 DIFFERENT)
01011-10101	RESERVED
11000	DCI - UL GRANT - DL ASSIGNMENT - POWER-CONTROL COMMAND - RS TRANSMISSION COMMAND - RS TRANSMISSION INFORMATION
11001	UE CONTENTION RESOLUTION IDENTITY
11010	TIMING ADVANCE COMMAND
11011	DRX COMMAND
11100	RS MEASUREMENT FEEDBACK
11101	RESERVE LINK CSI FEEDBACK
11110	RESERVE LINK HARQ FEEDBACK
11111	PADDING

FIG. 23

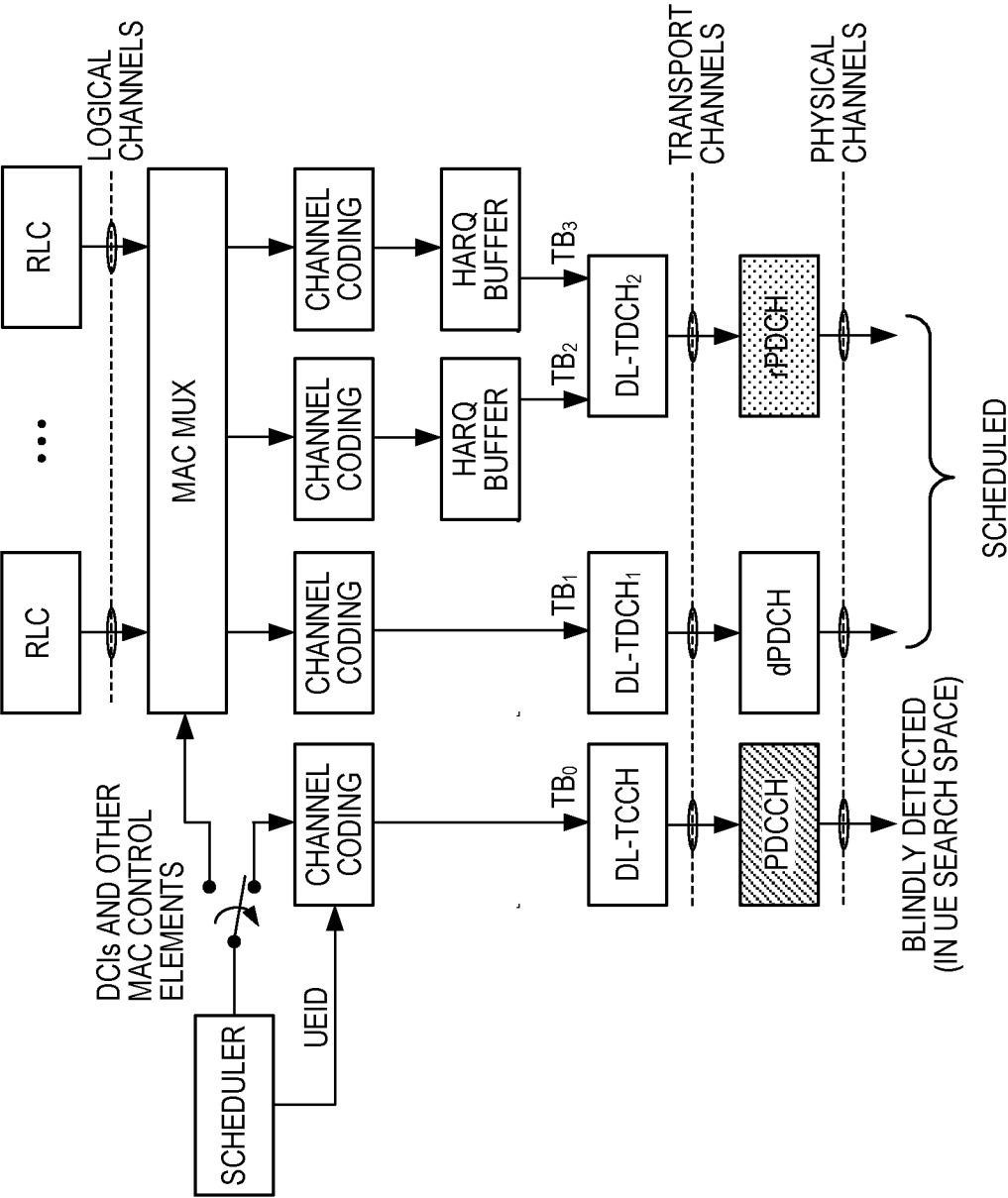


FIG. 24

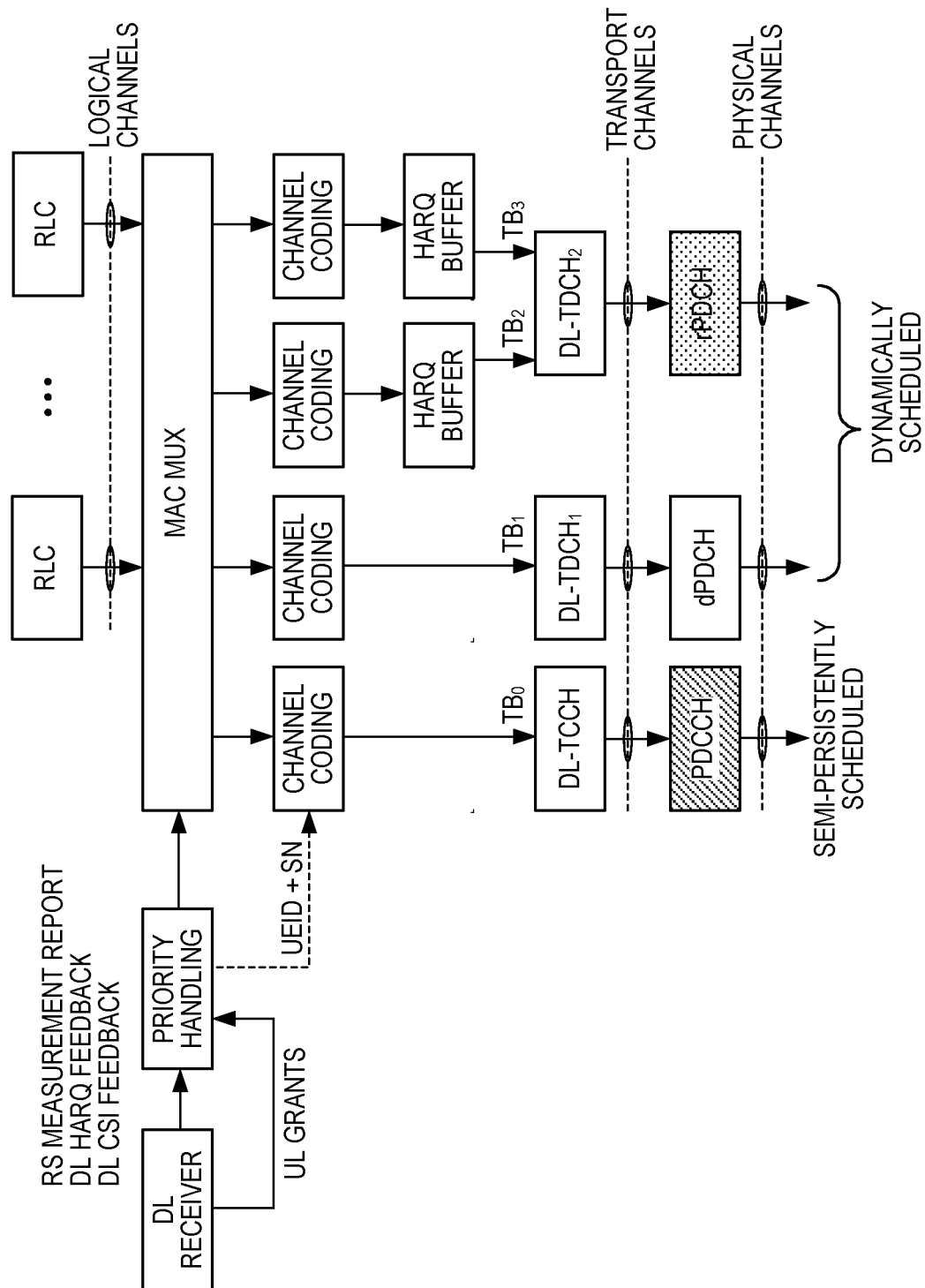


FIG. 25

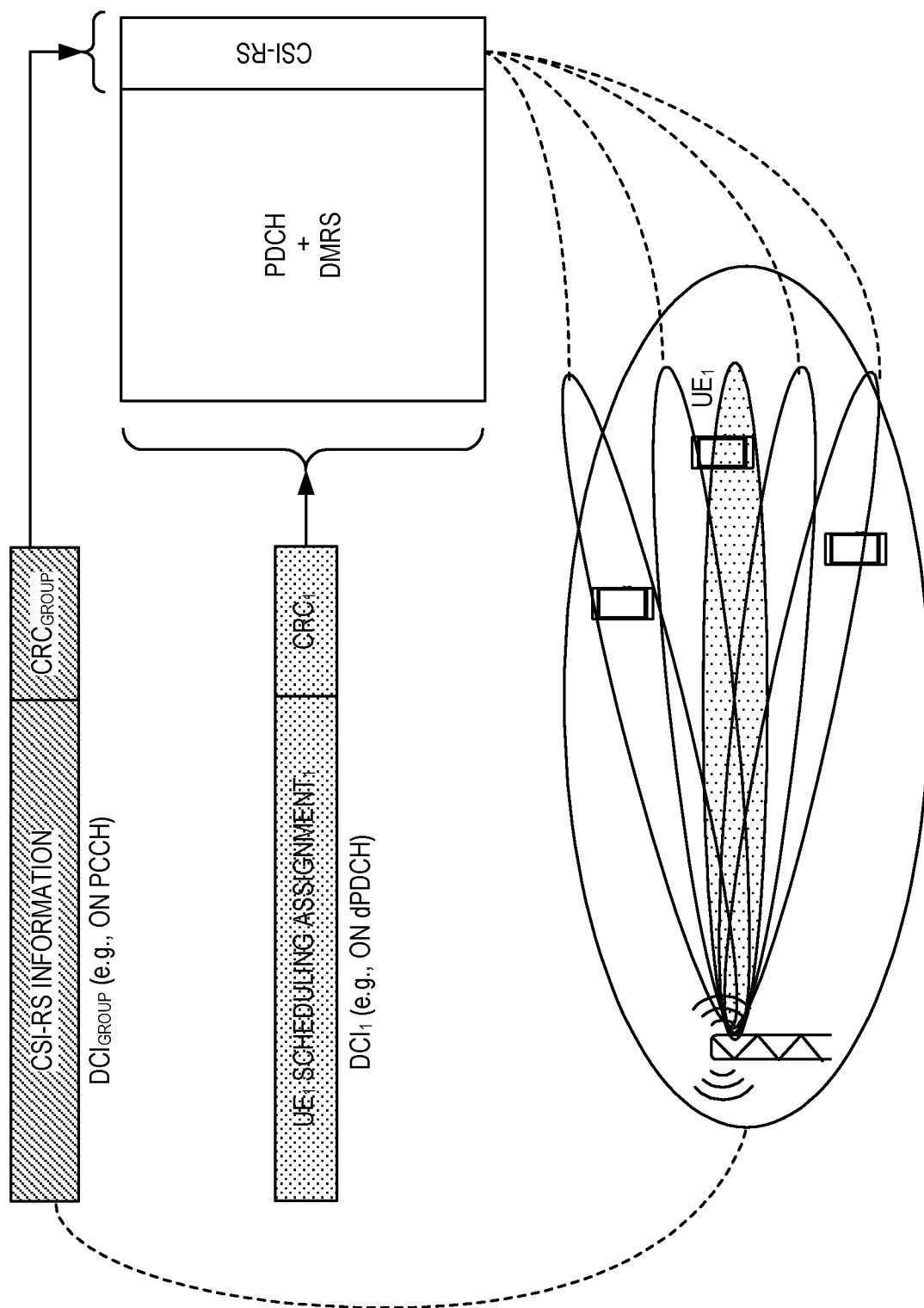


FIG. 26

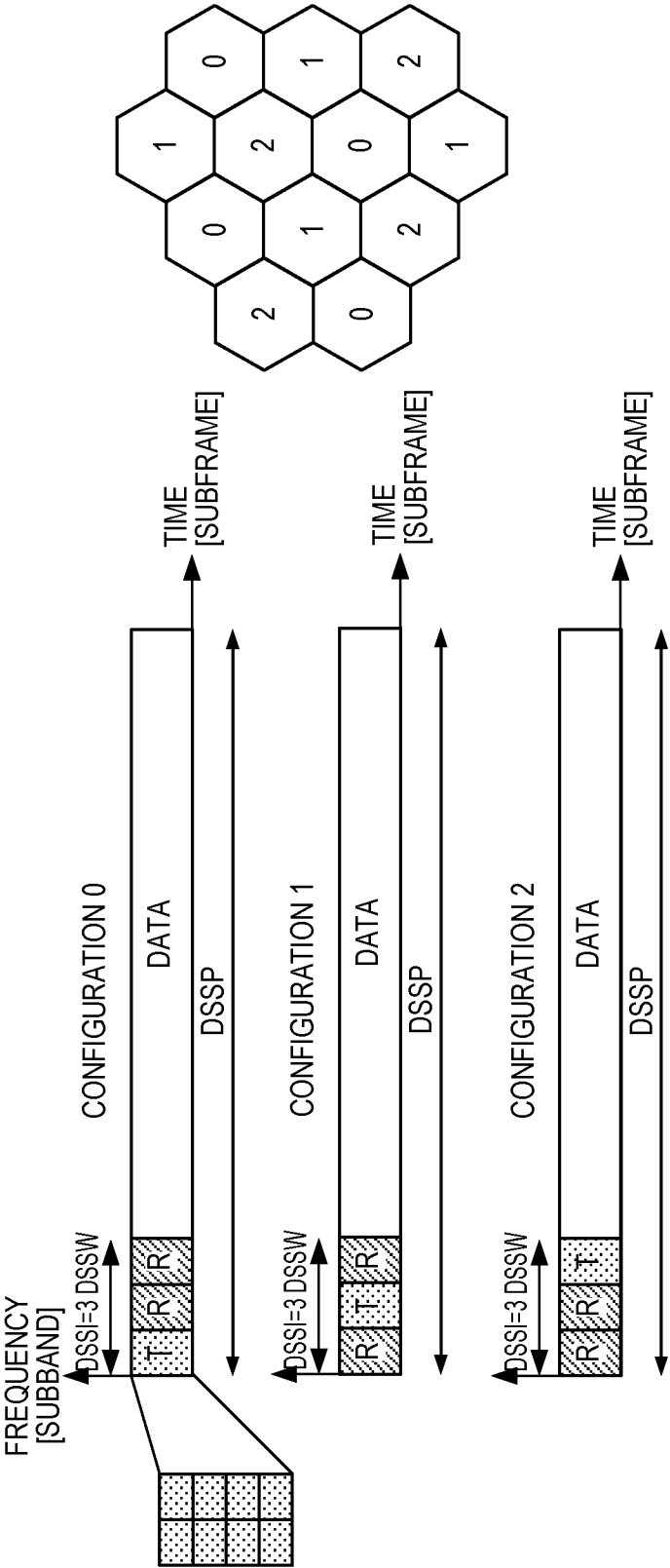


FIG. 27

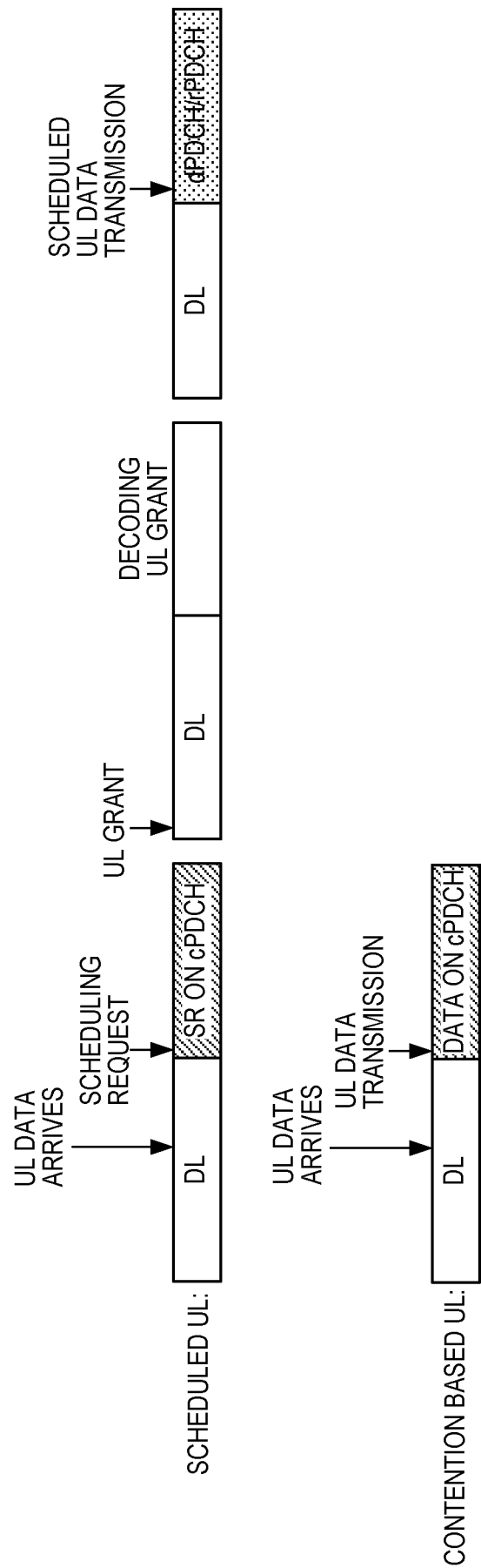


FIG. 28

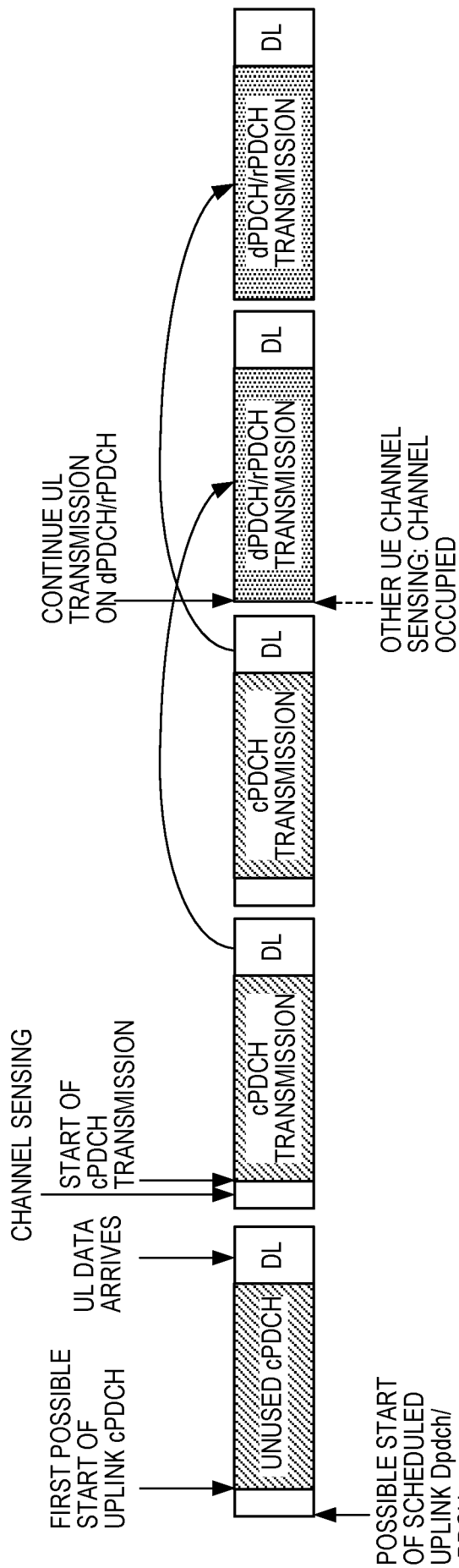


FIG. 29

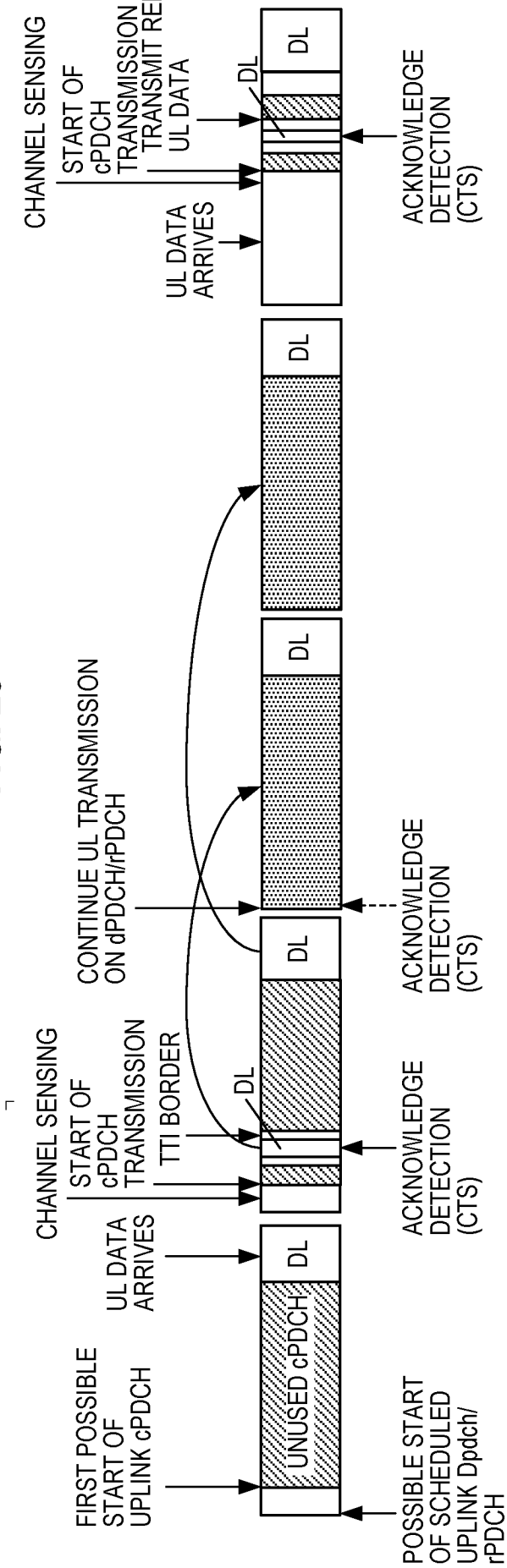


FIG. 30

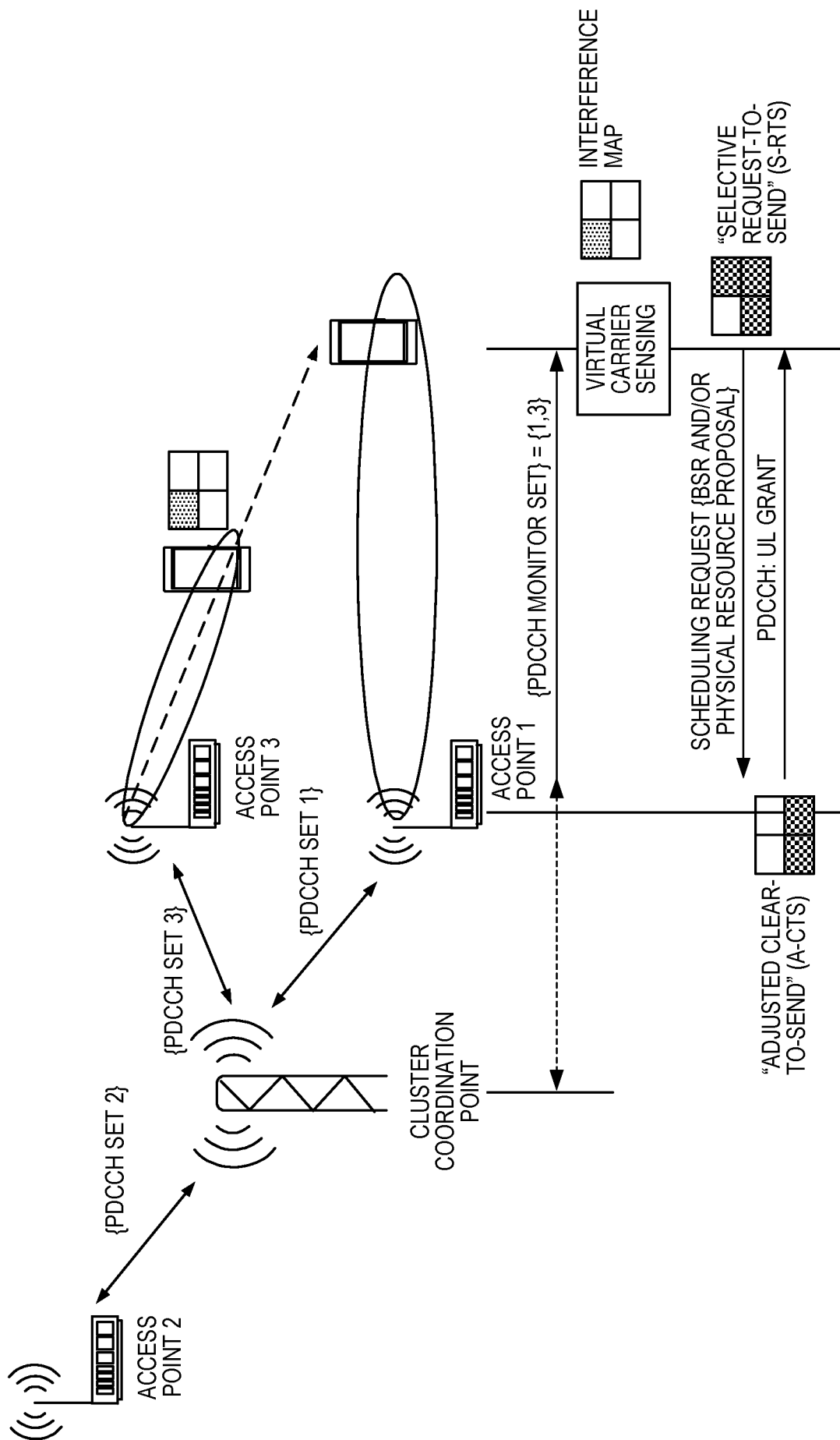


FIG. 31

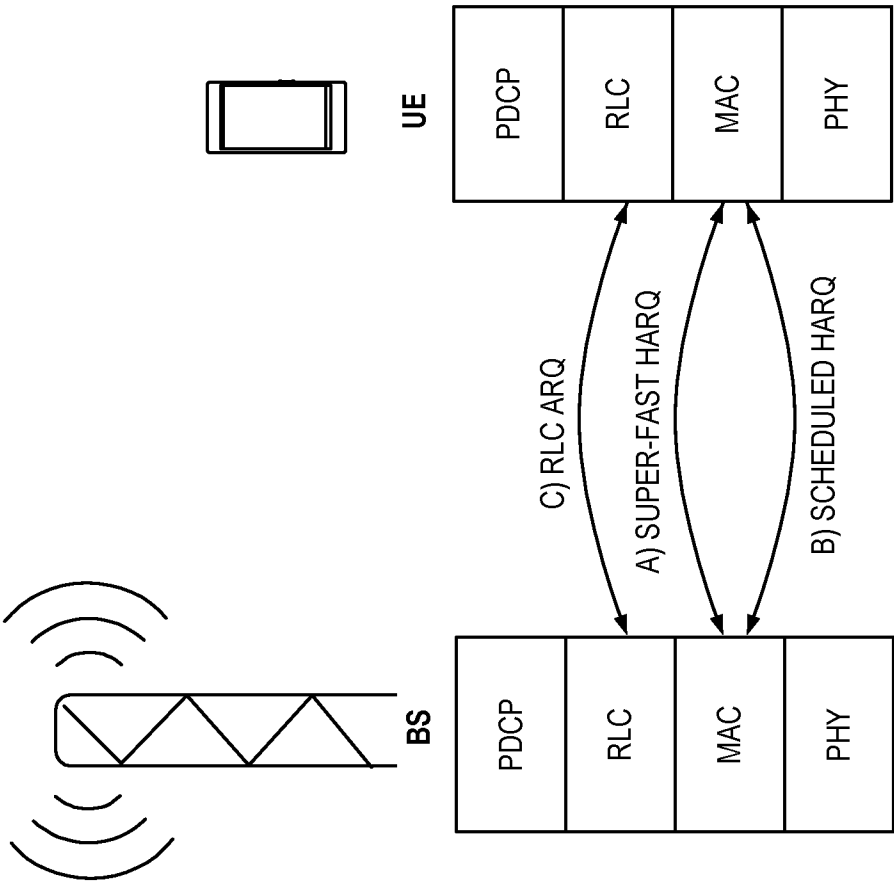
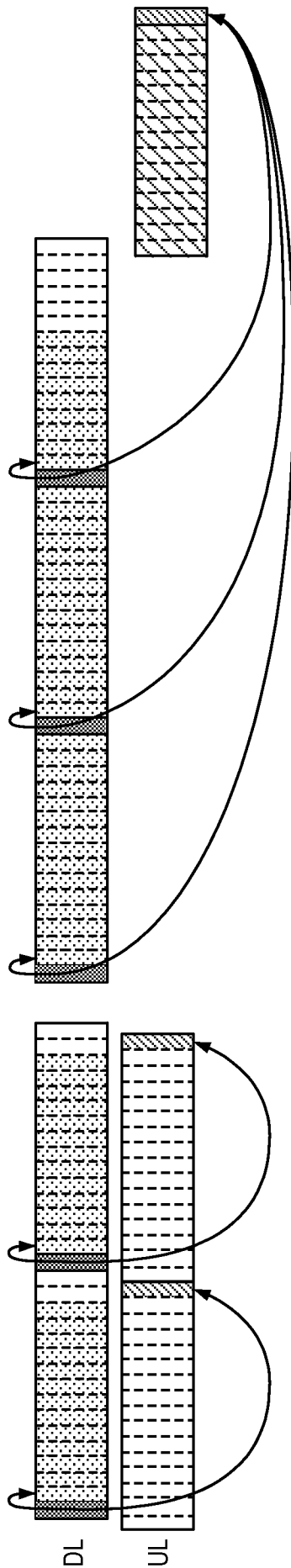


FIG. 32



EXAMPLE FOR FDD OR SMALL TDD CELLS

EXAMPLE FOR HD-FDD OR LARGE TDD CELLS

FIG. 33

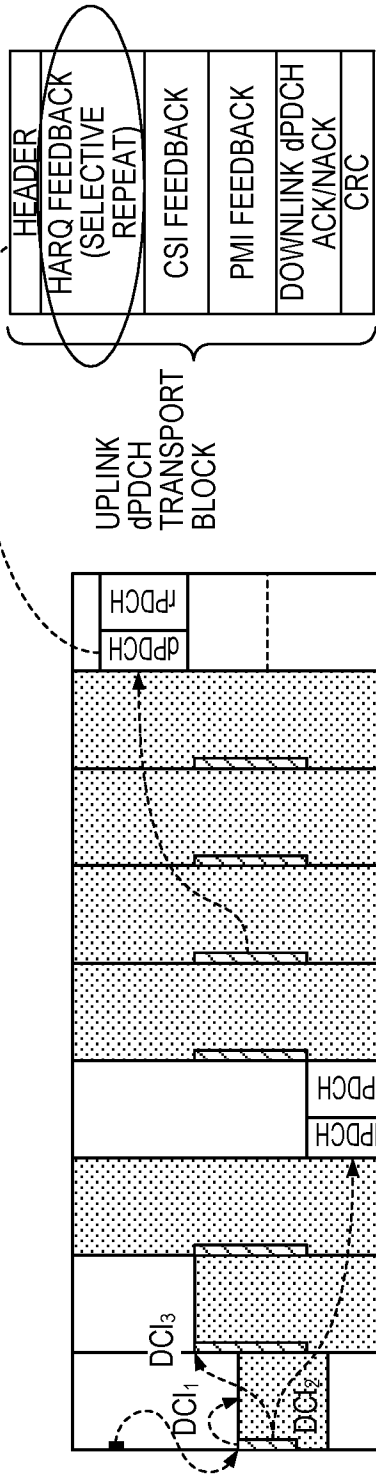


FIG. 34

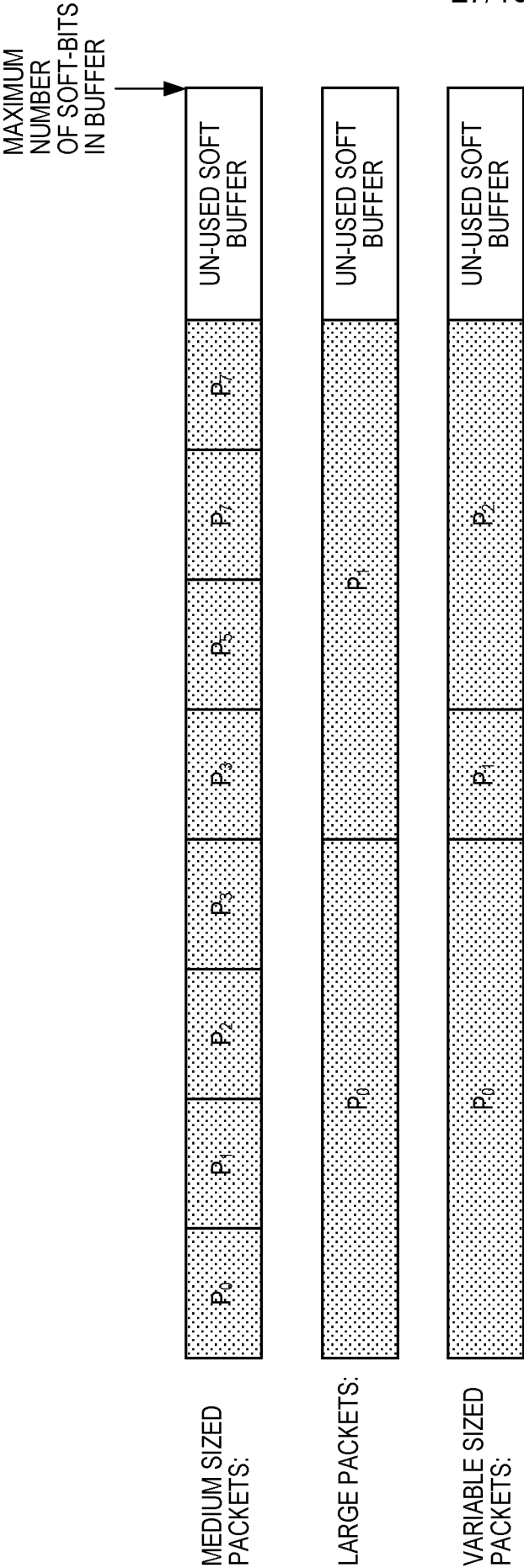


FIG. 35

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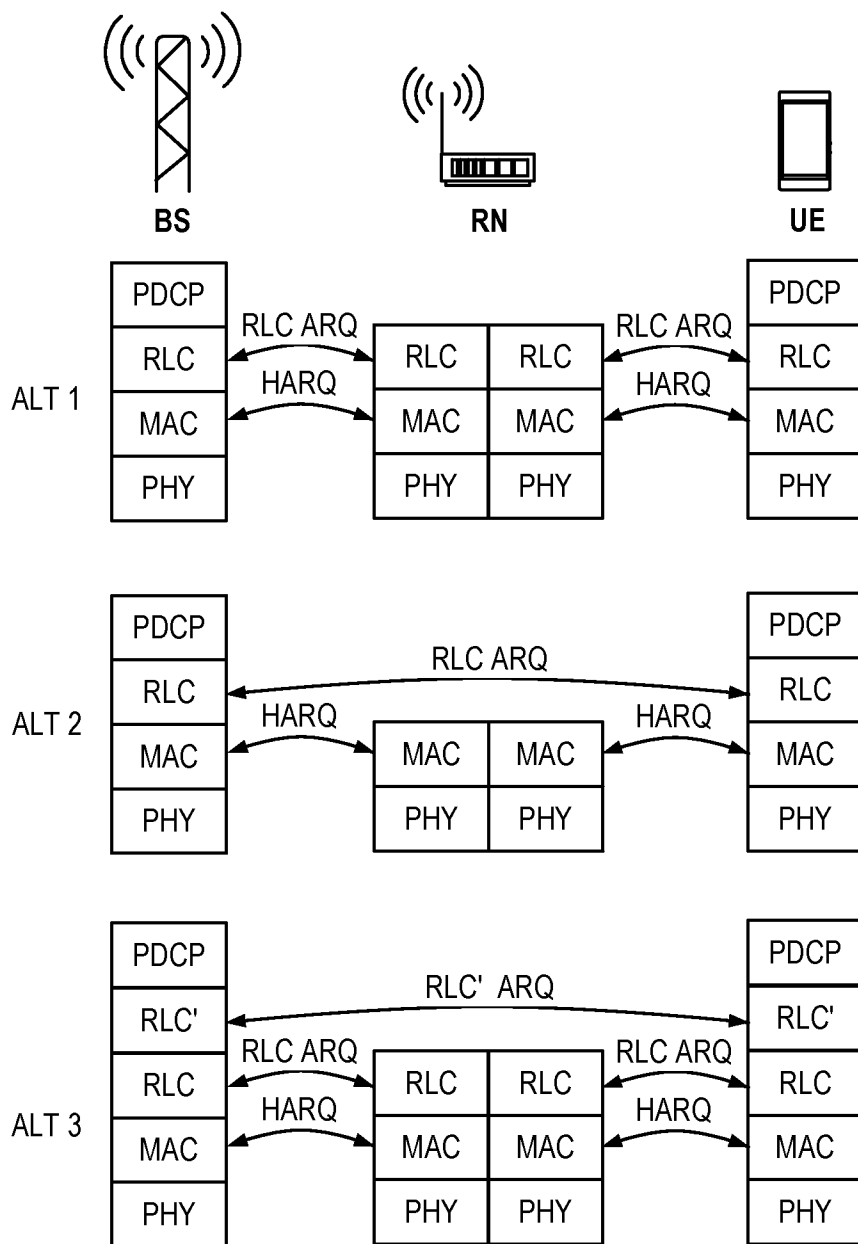


FIG. 36

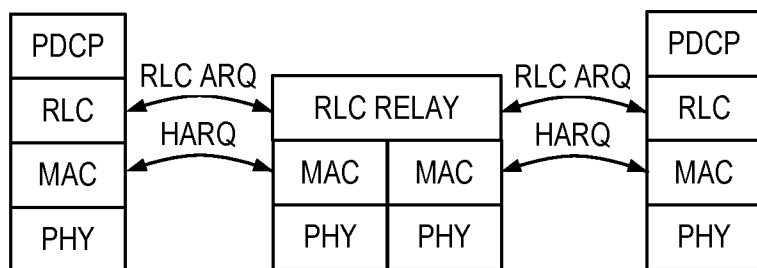


FIG. 37

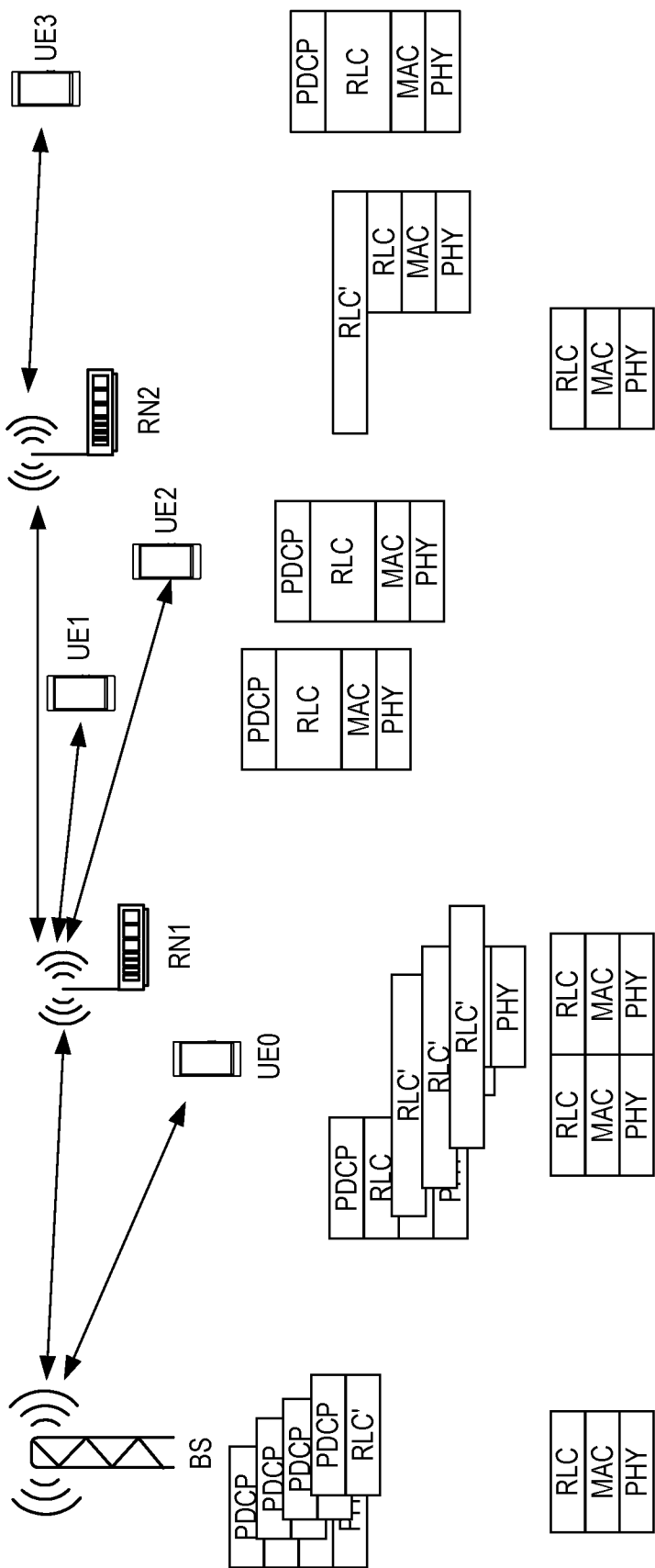


FIG. 38

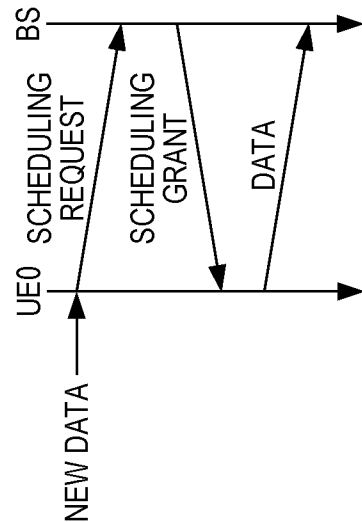


FIG. 39

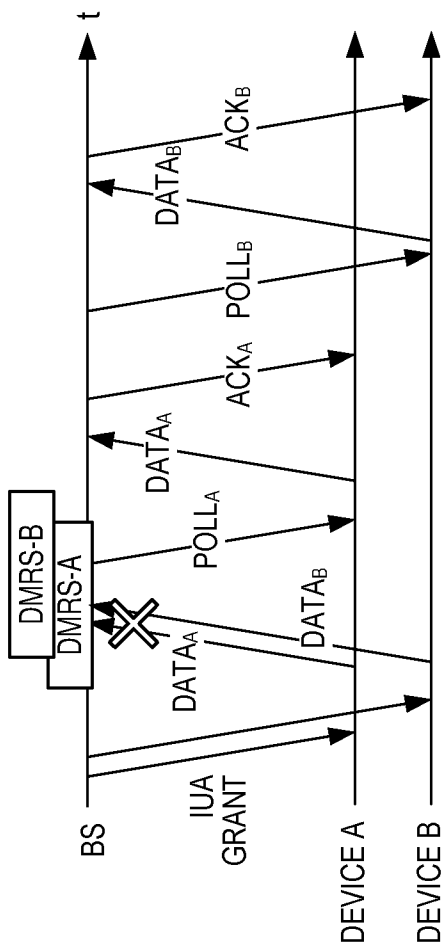


FIG. 40

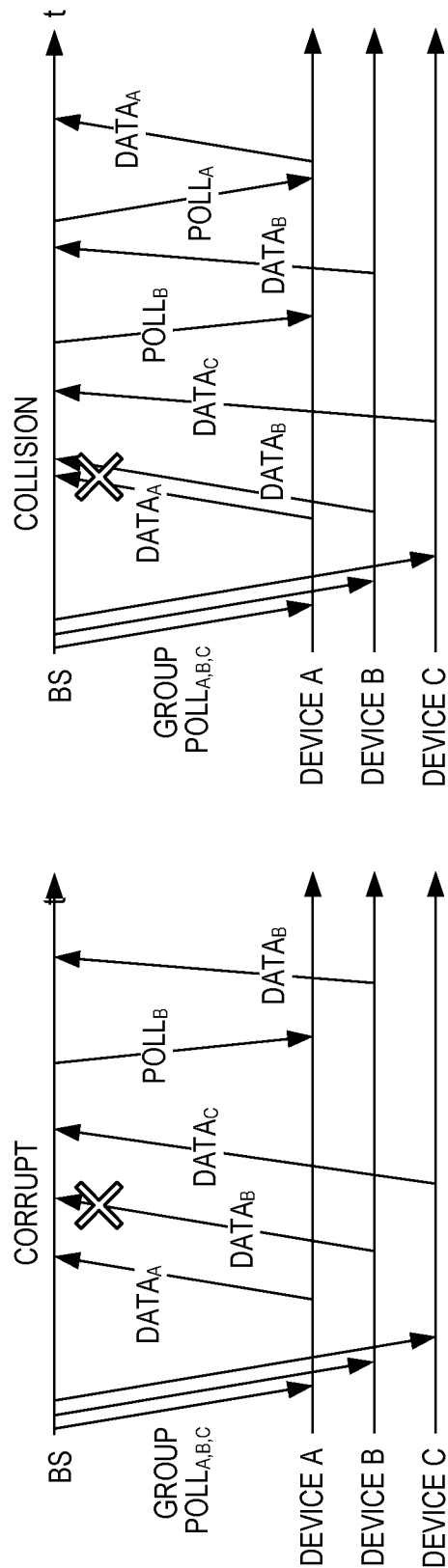


FIG. 41

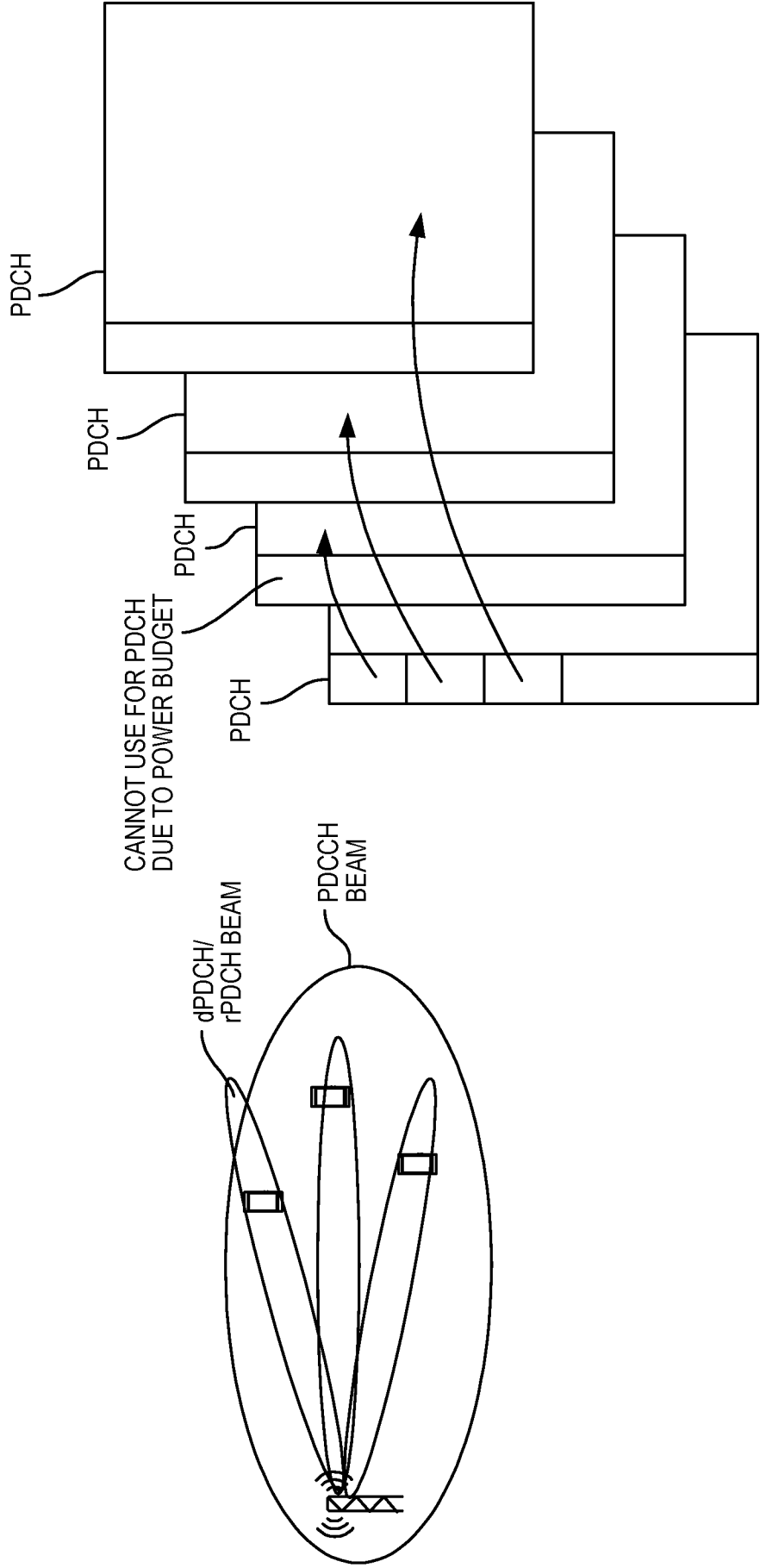


FIG. 42

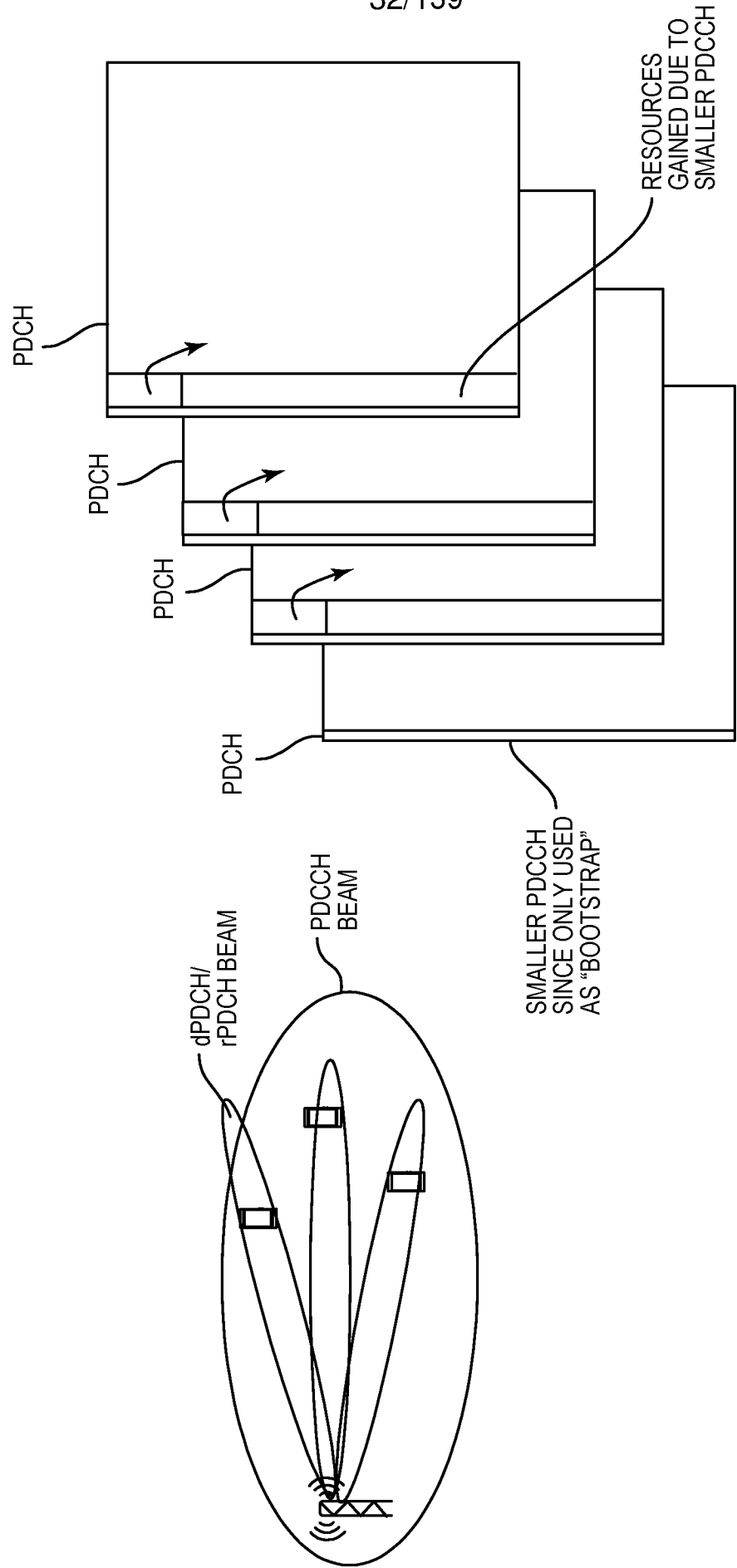


FIG. 43

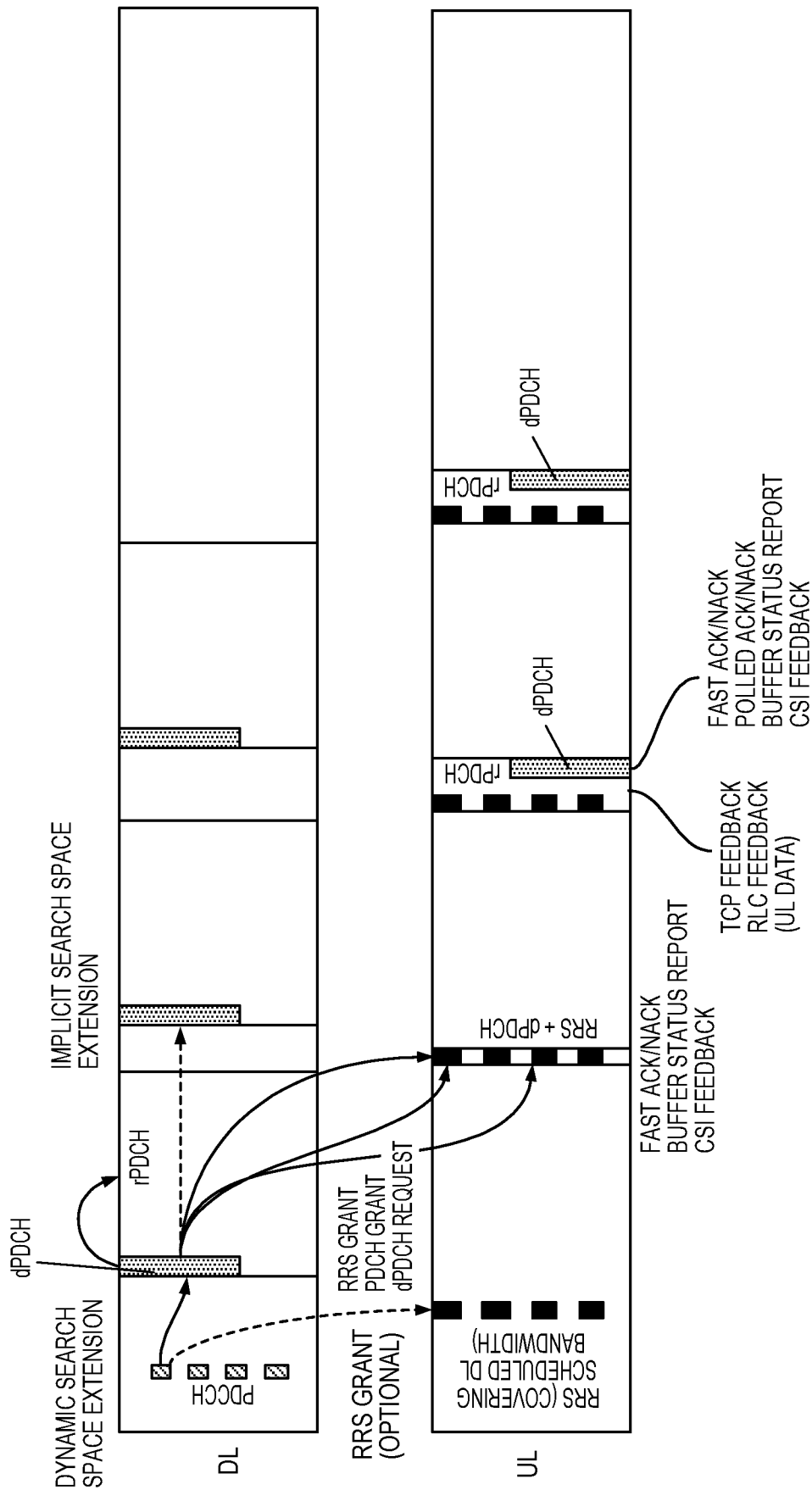


FIG. 44

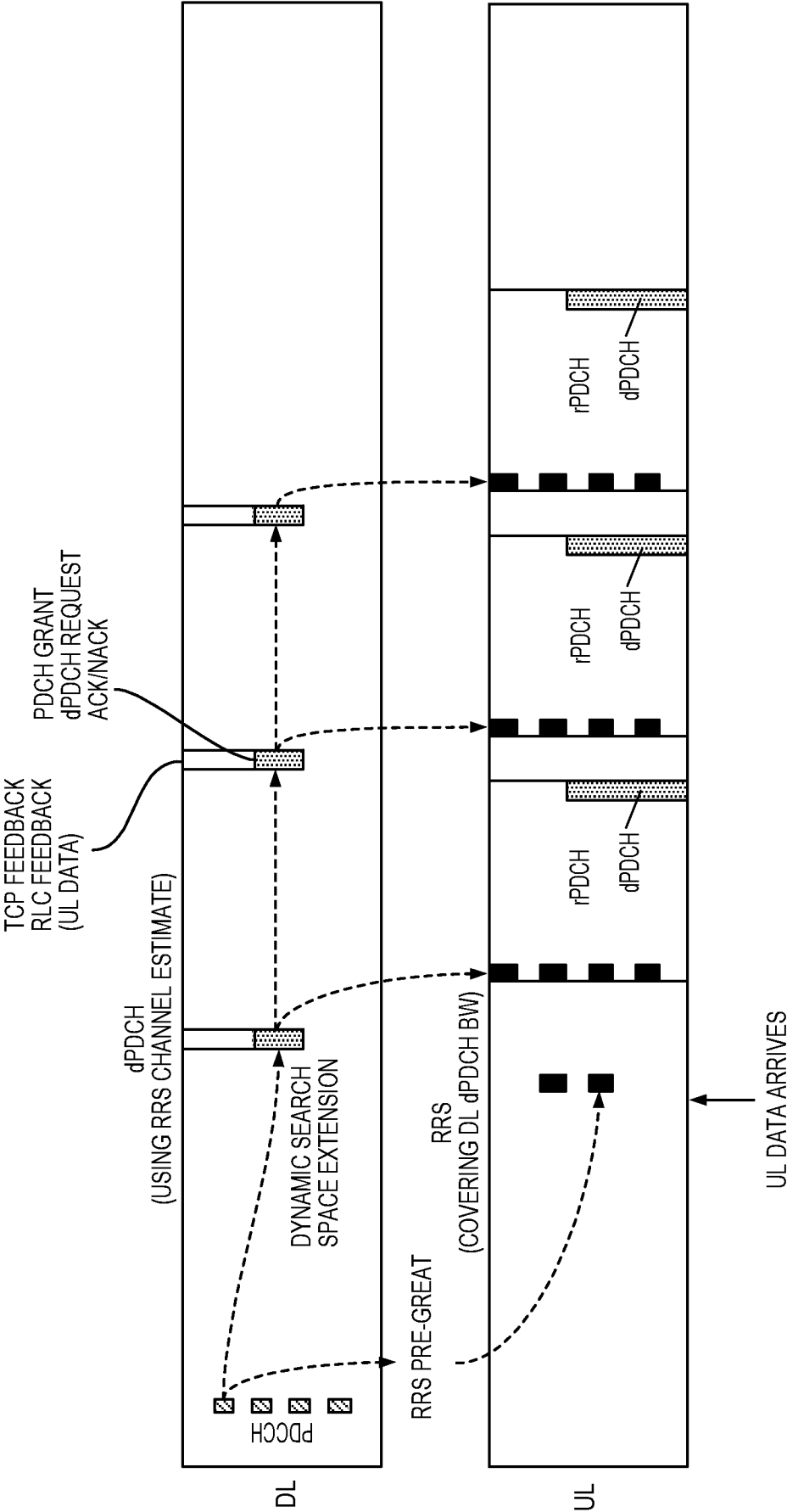


FIG. 45

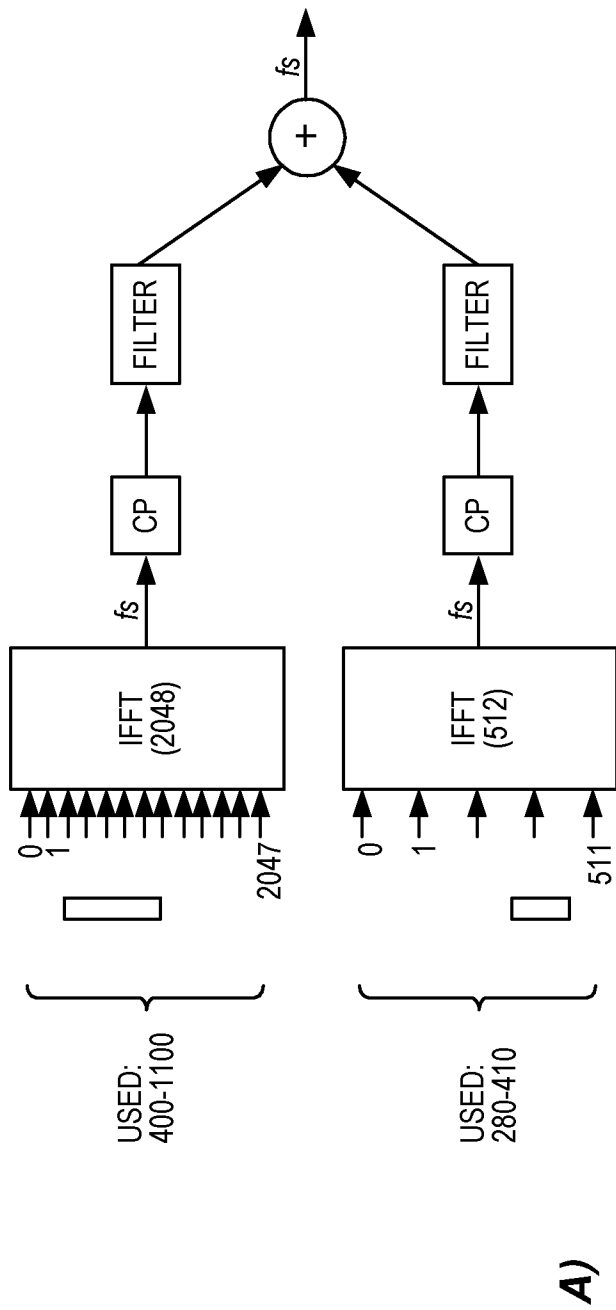
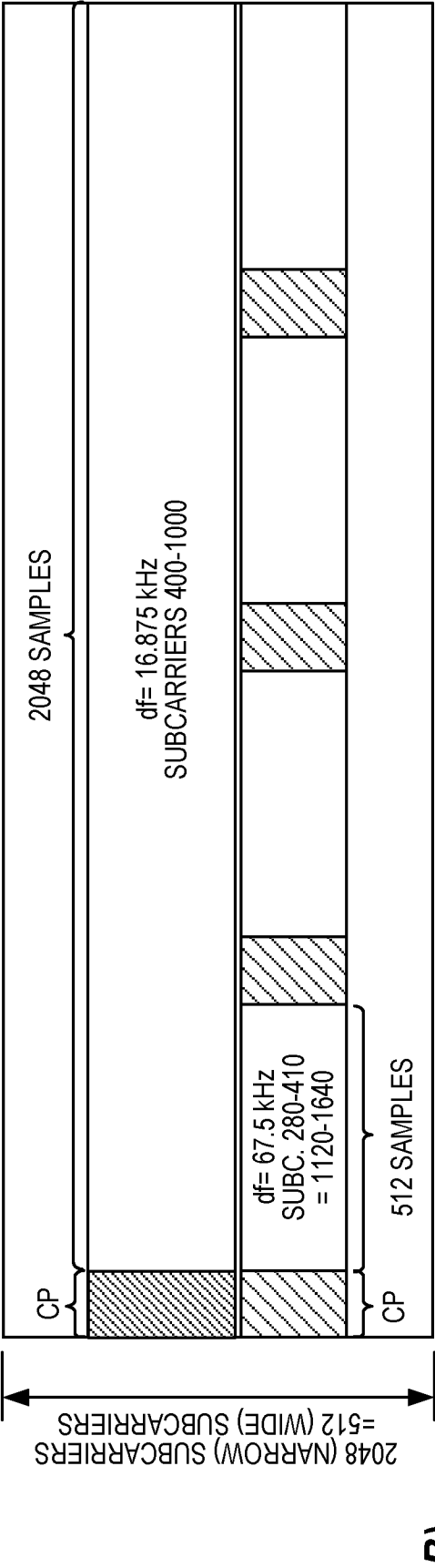
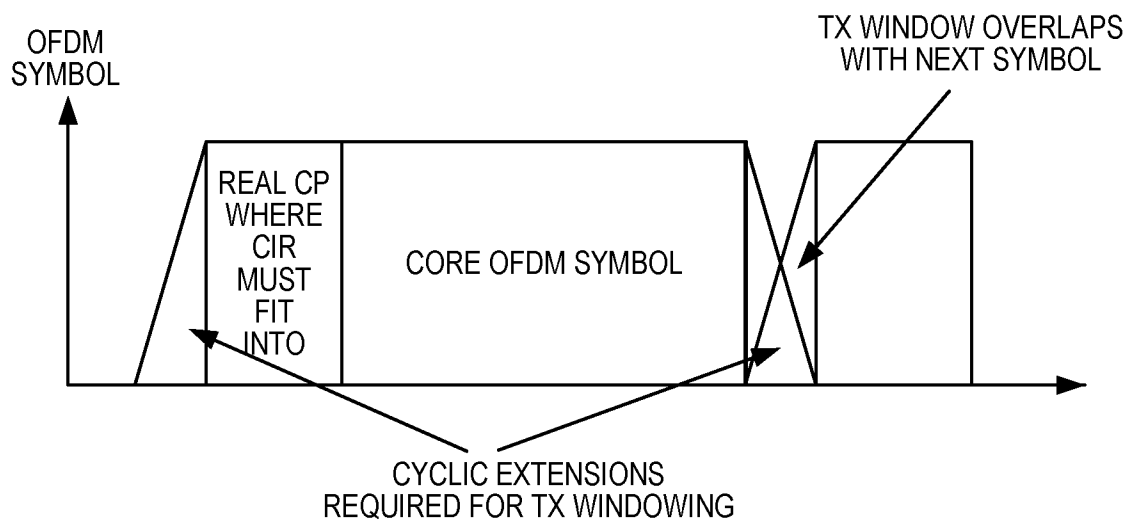
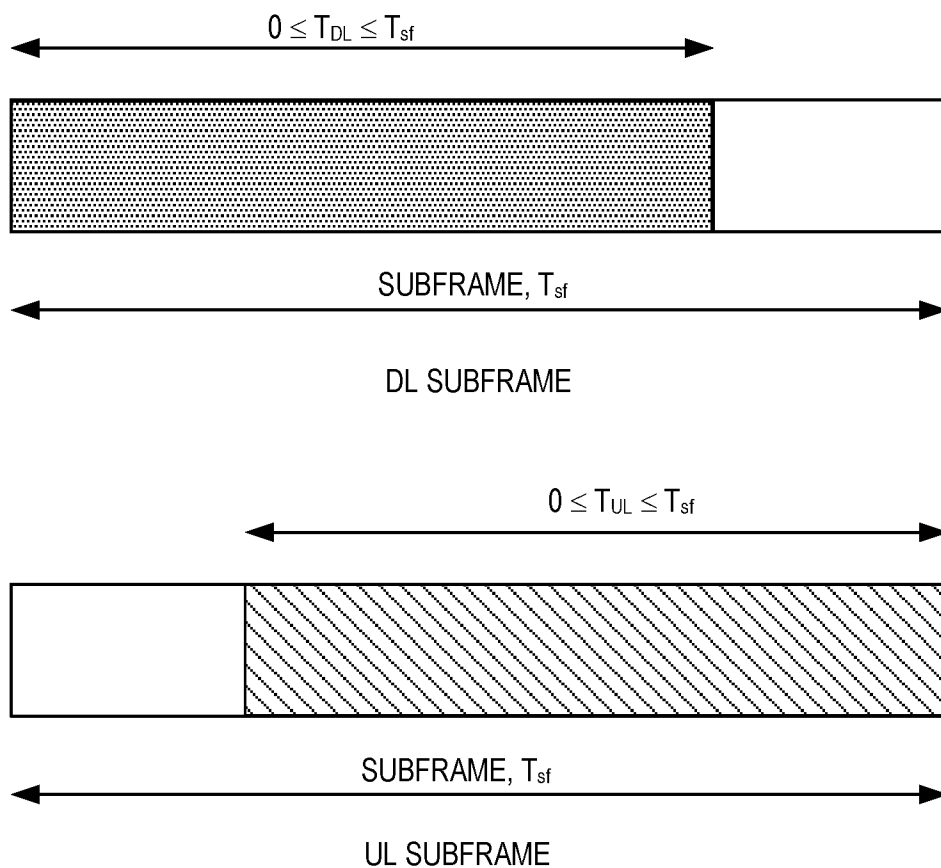
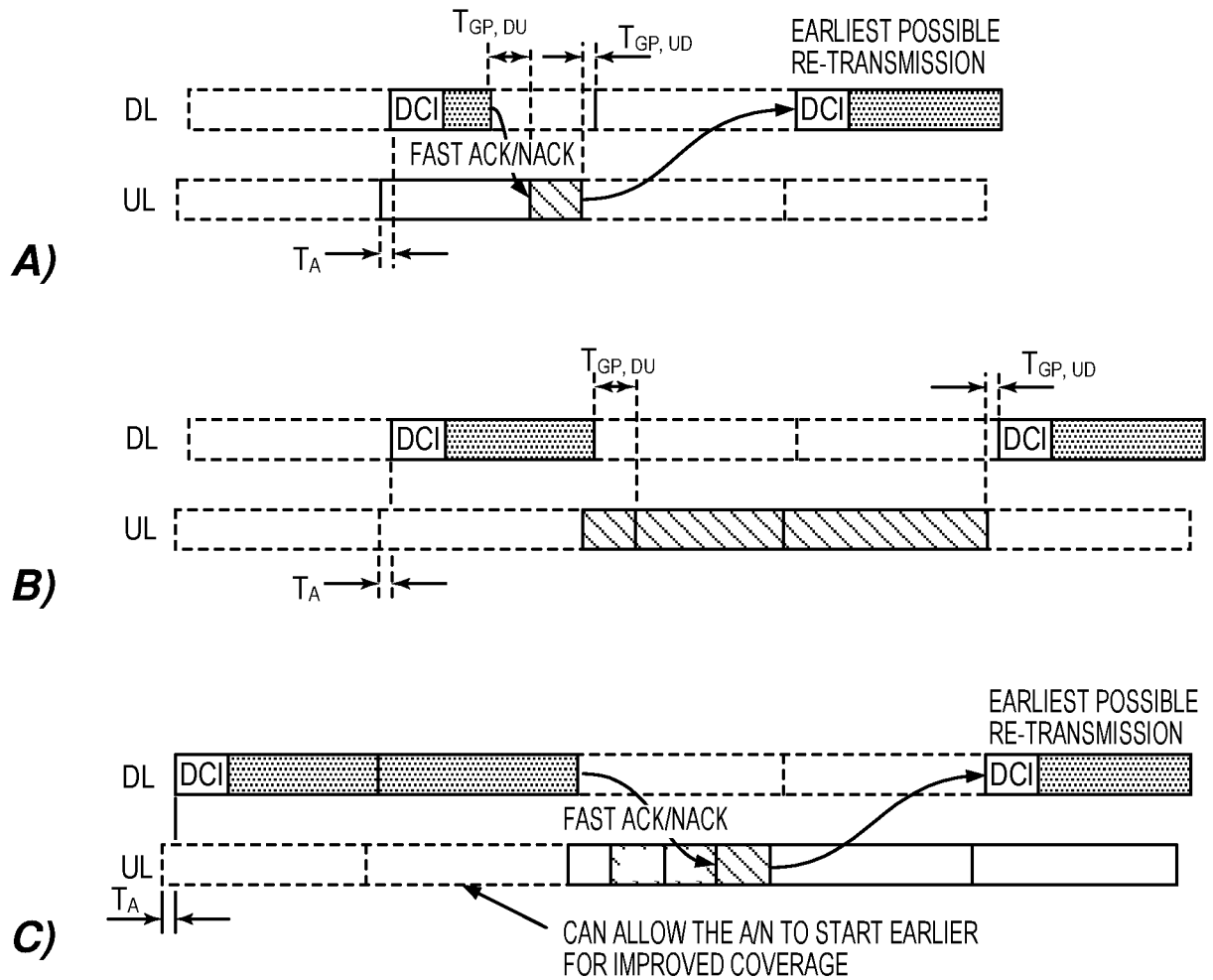
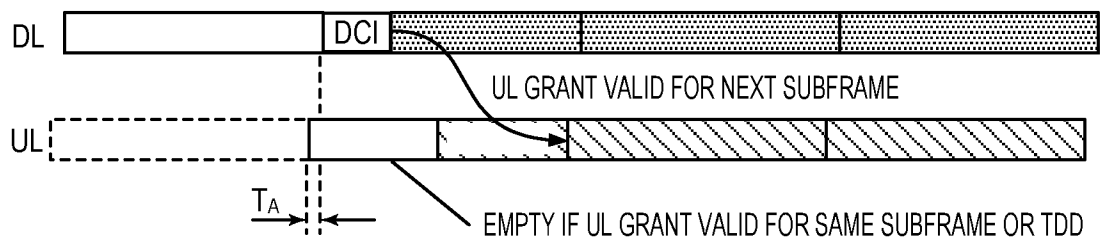


FIG. 46

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**FIG. 47****FIG. 48**

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**FIG. 49****FIG. 50**

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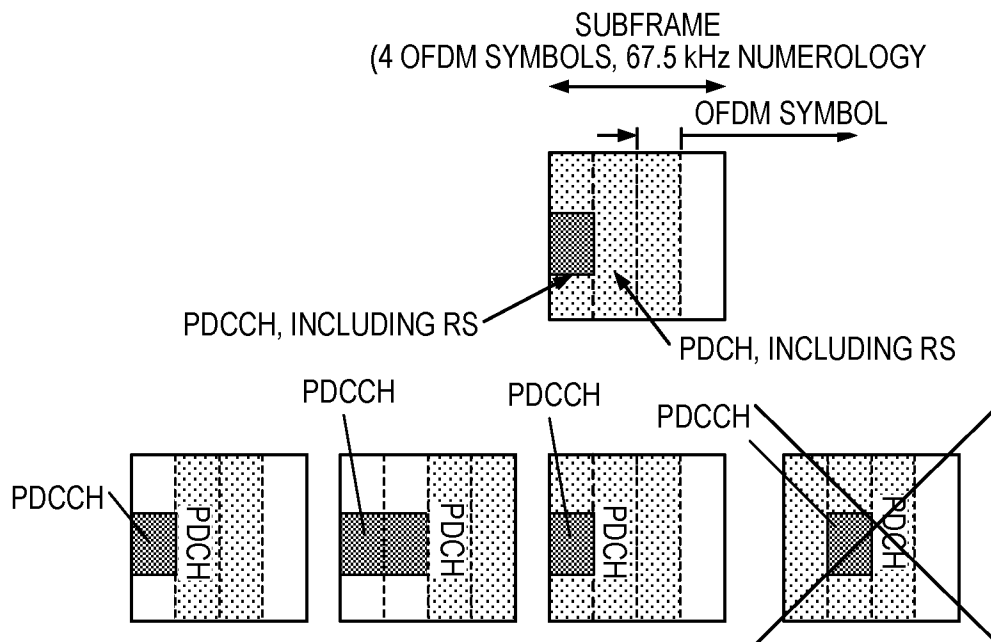


FIG. 51

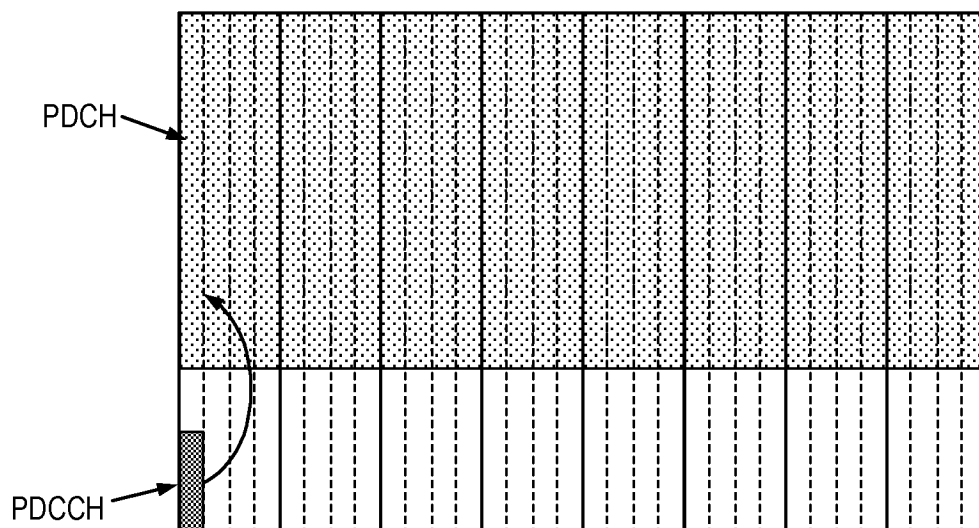


FIG. 52

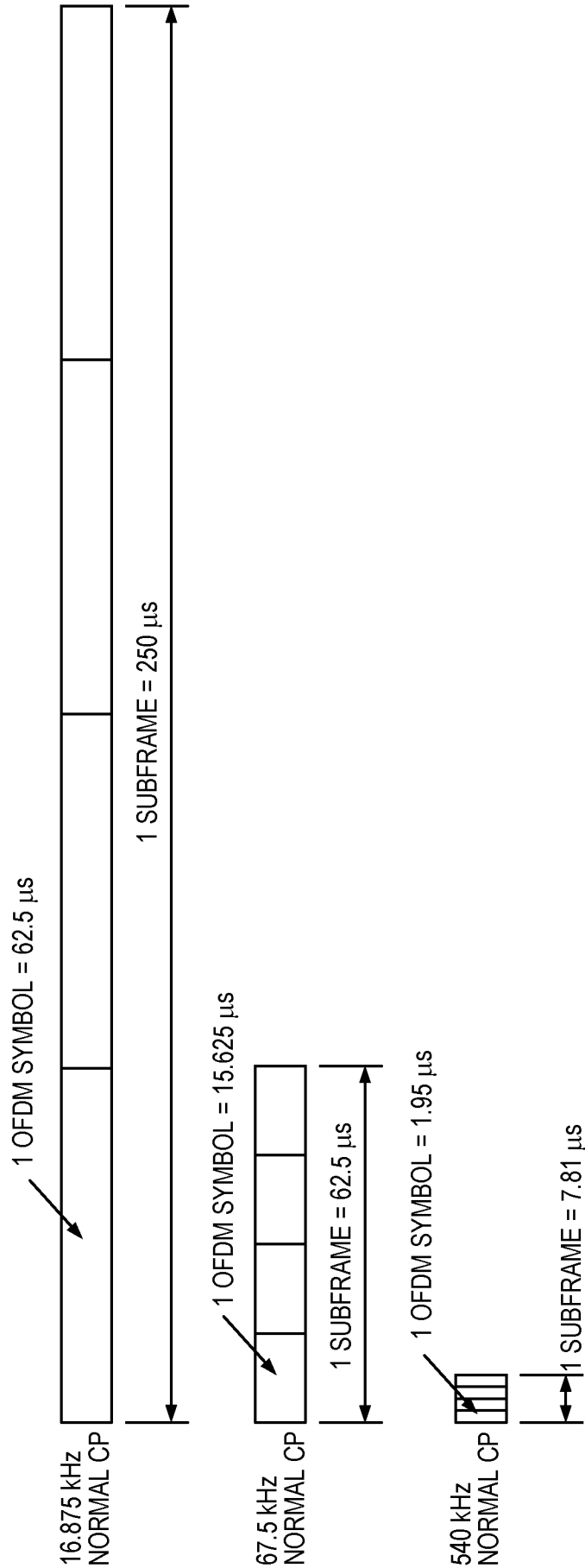


FIG. 53

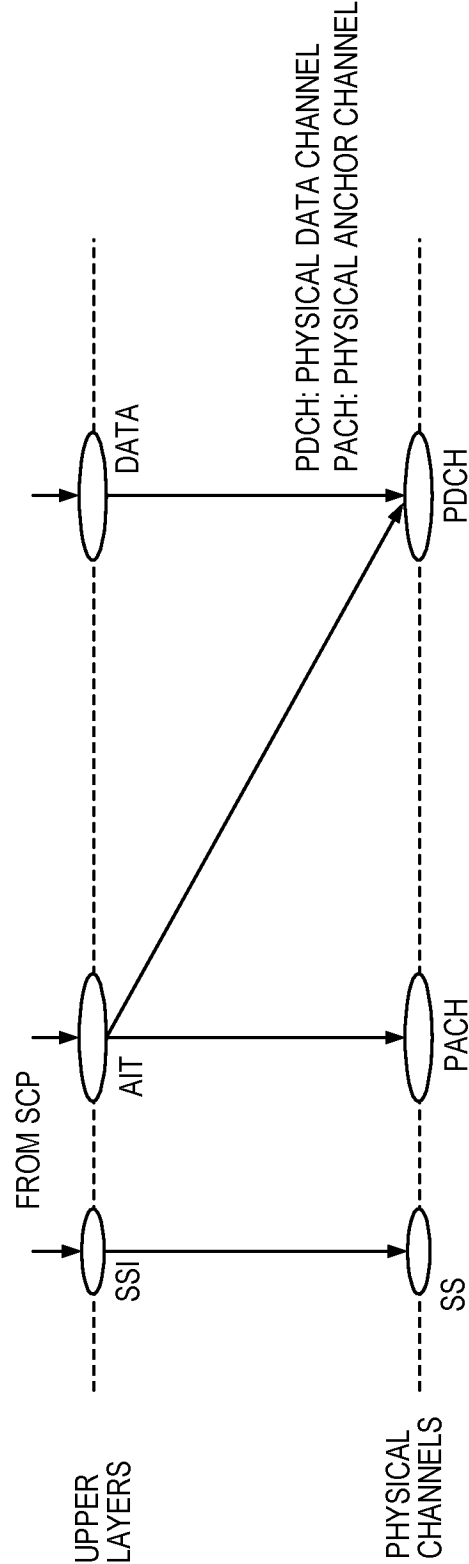


FIG. 54

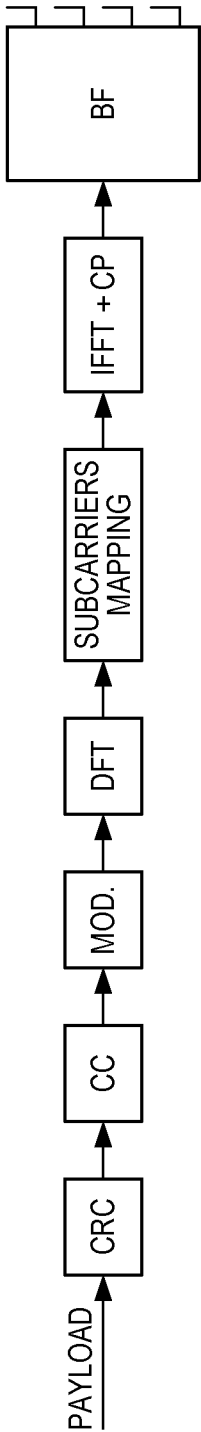


FIG. 55

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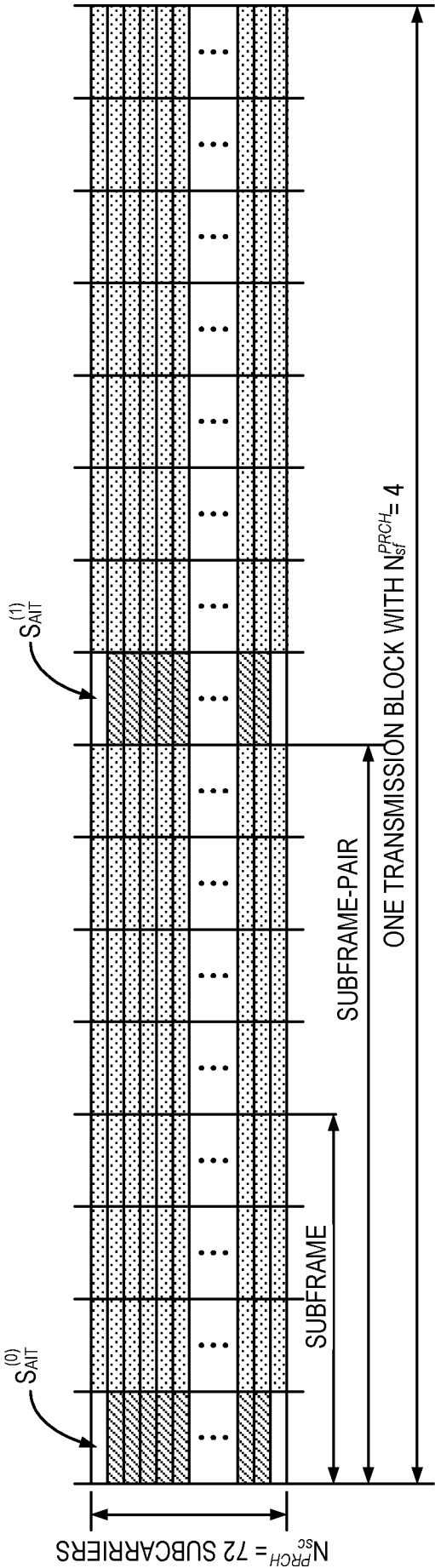


FIG. 56

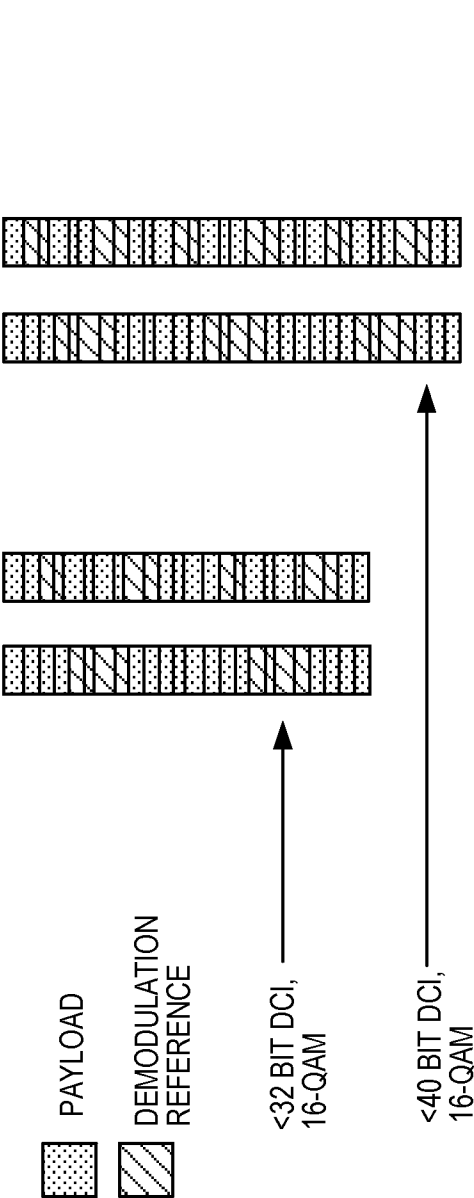


FIG. 57

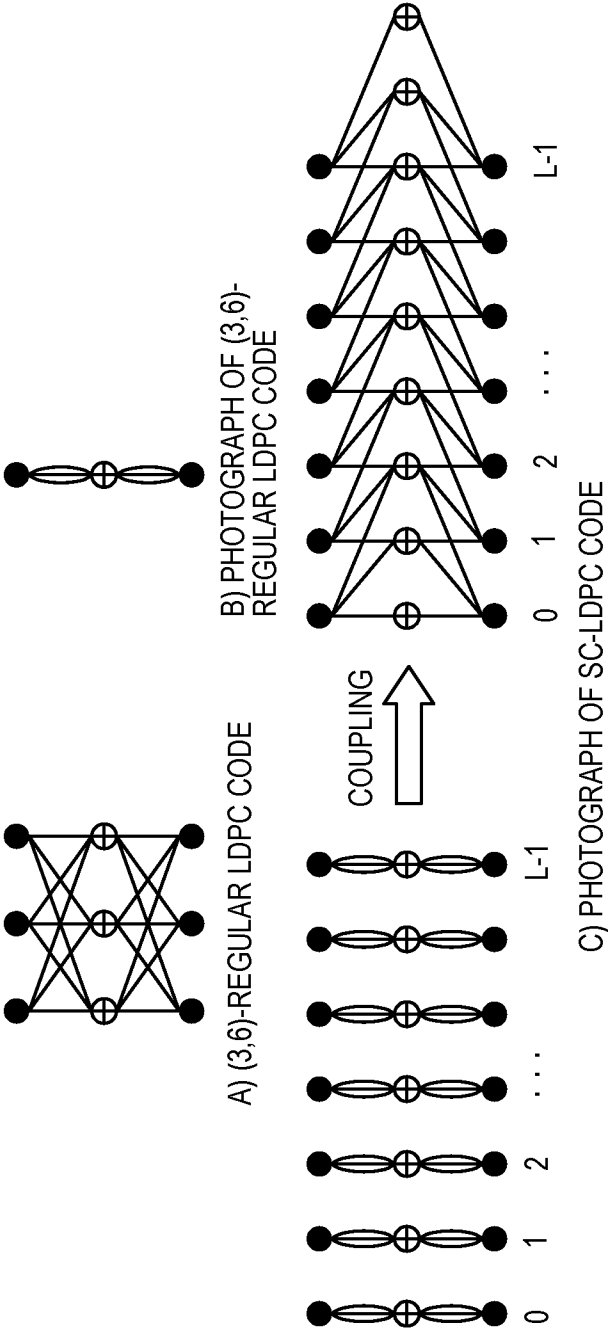
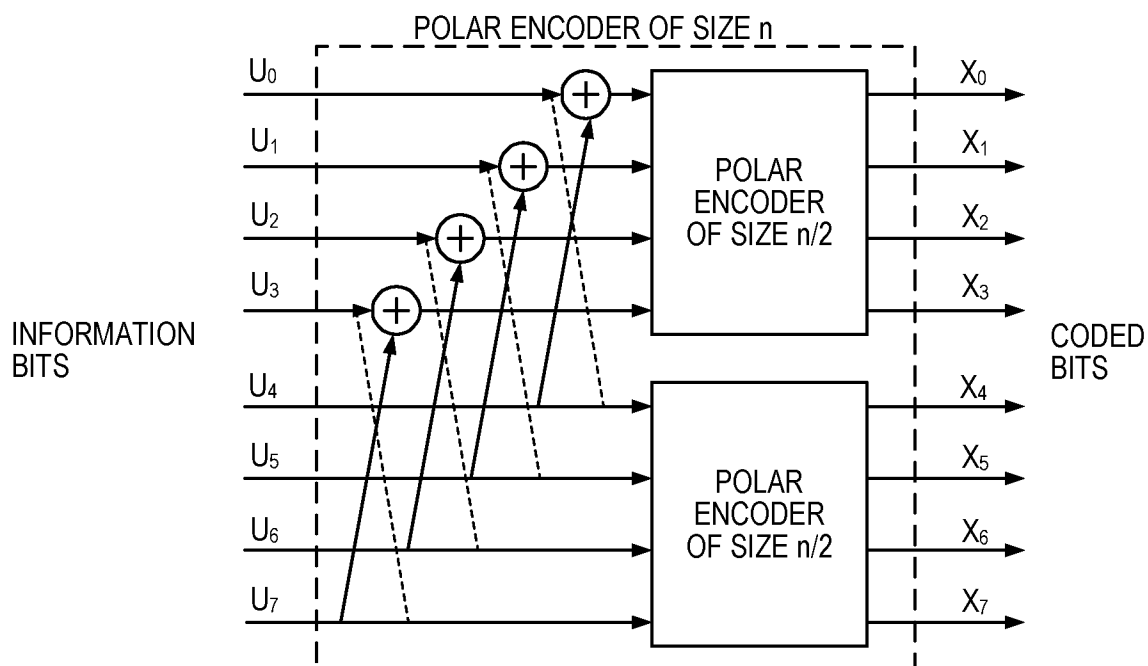
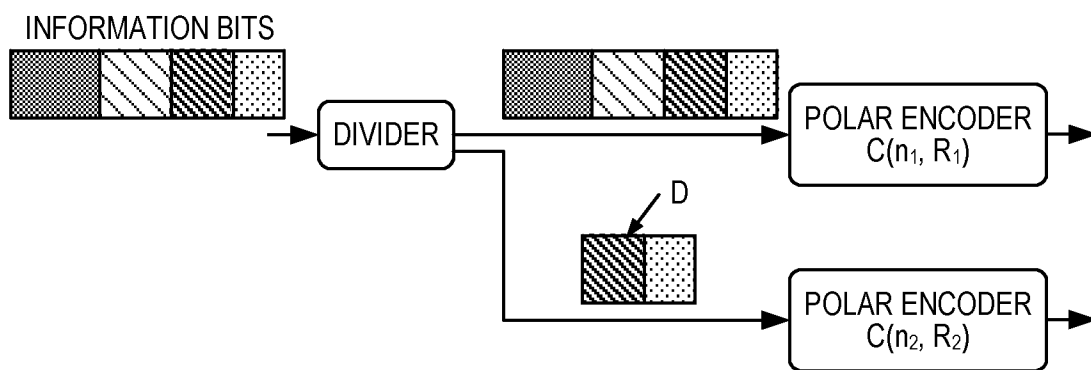
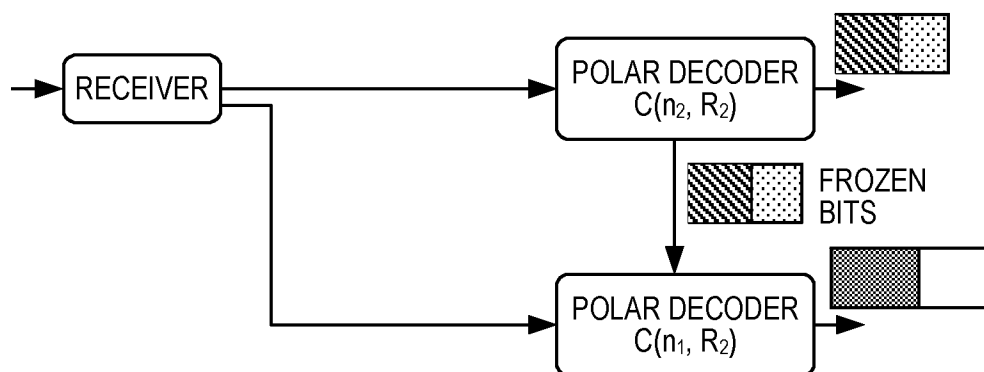


FIG. 58

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**FIG. 59****FIG. 60****FIG. 61**

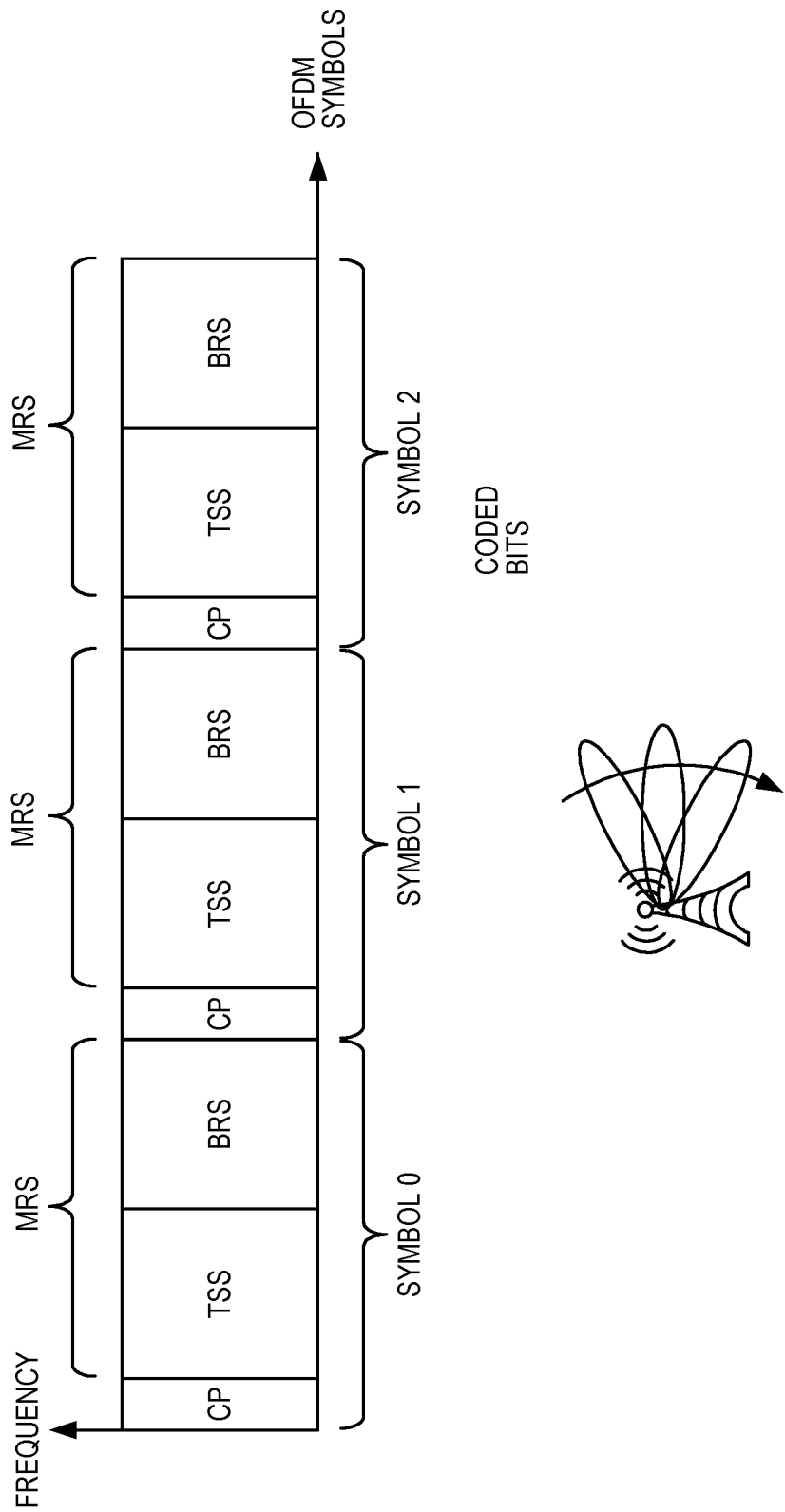
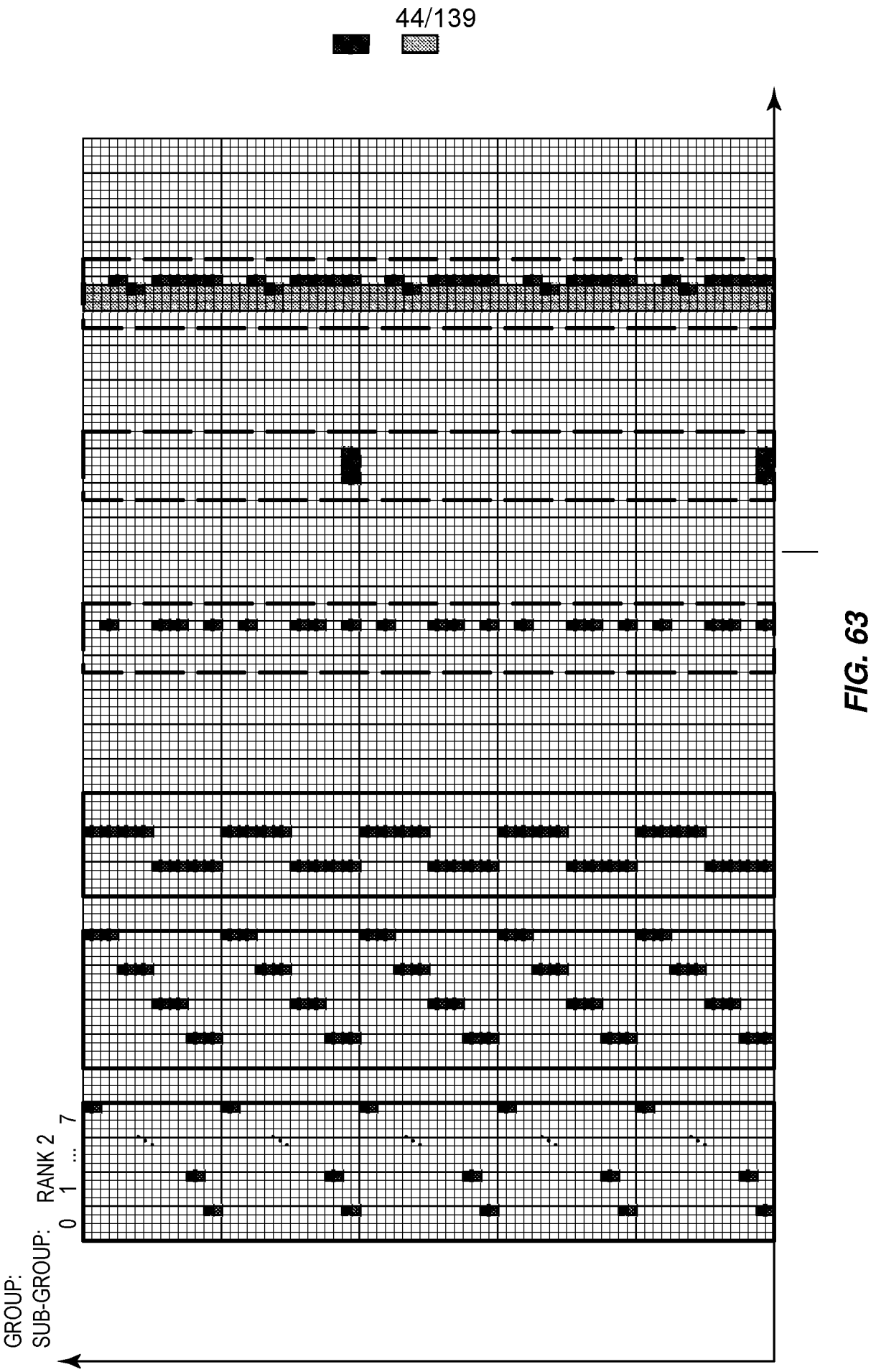


FIG. 62



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GROUP:

SUB-GROUP:

RANK 2

RANK 4

RANK 8

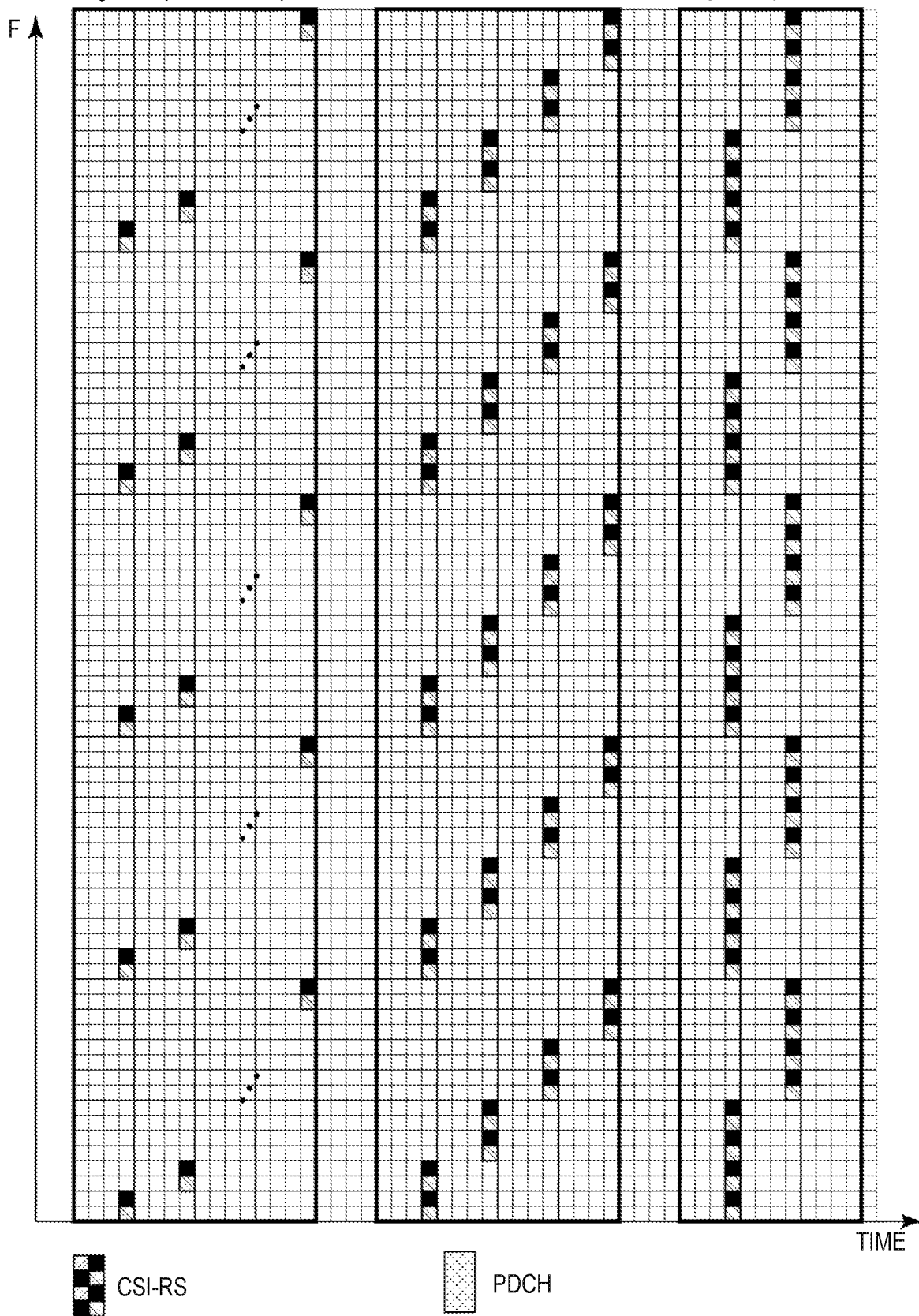


FIG. 63A

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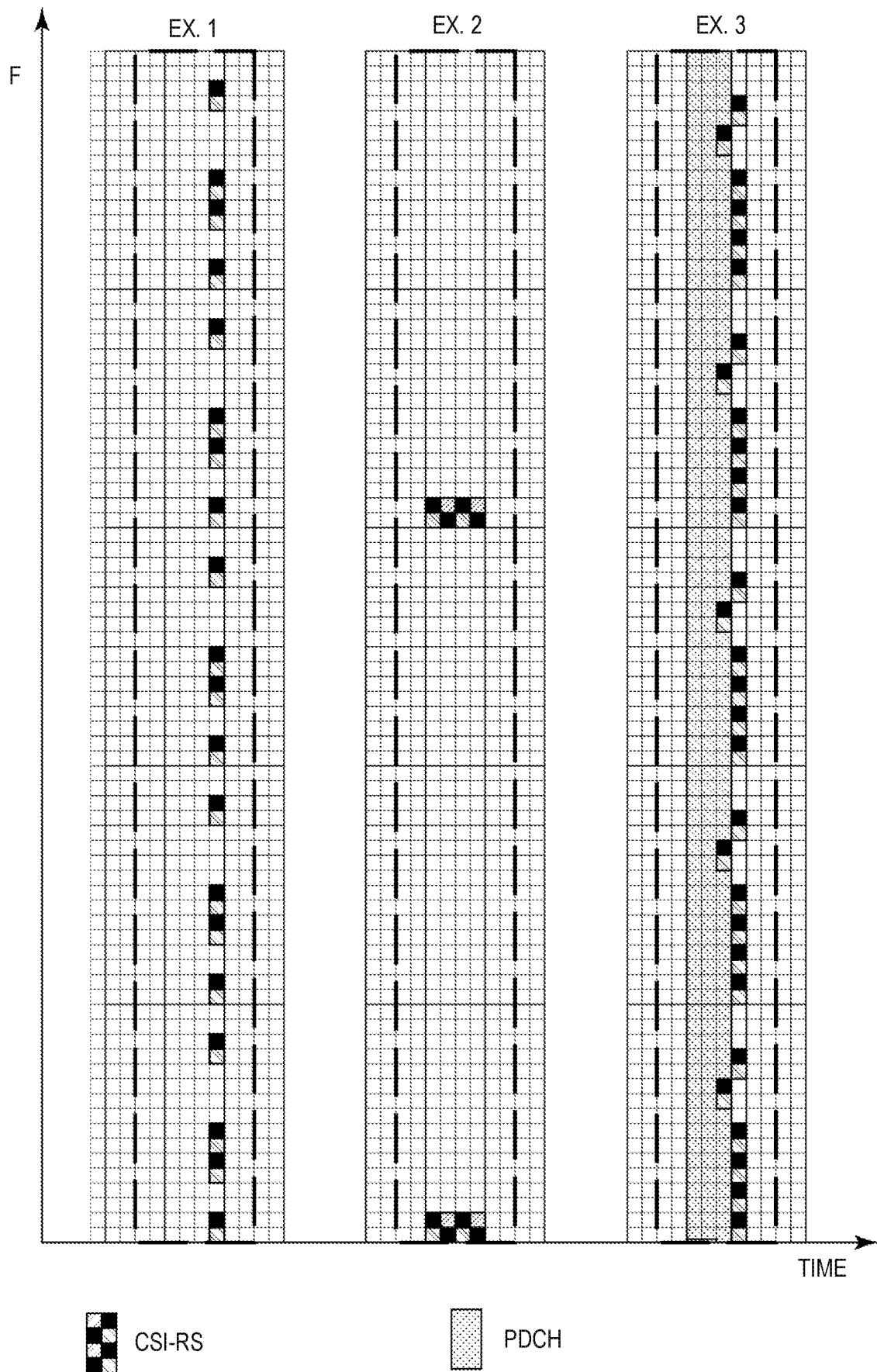


FIG. 63B

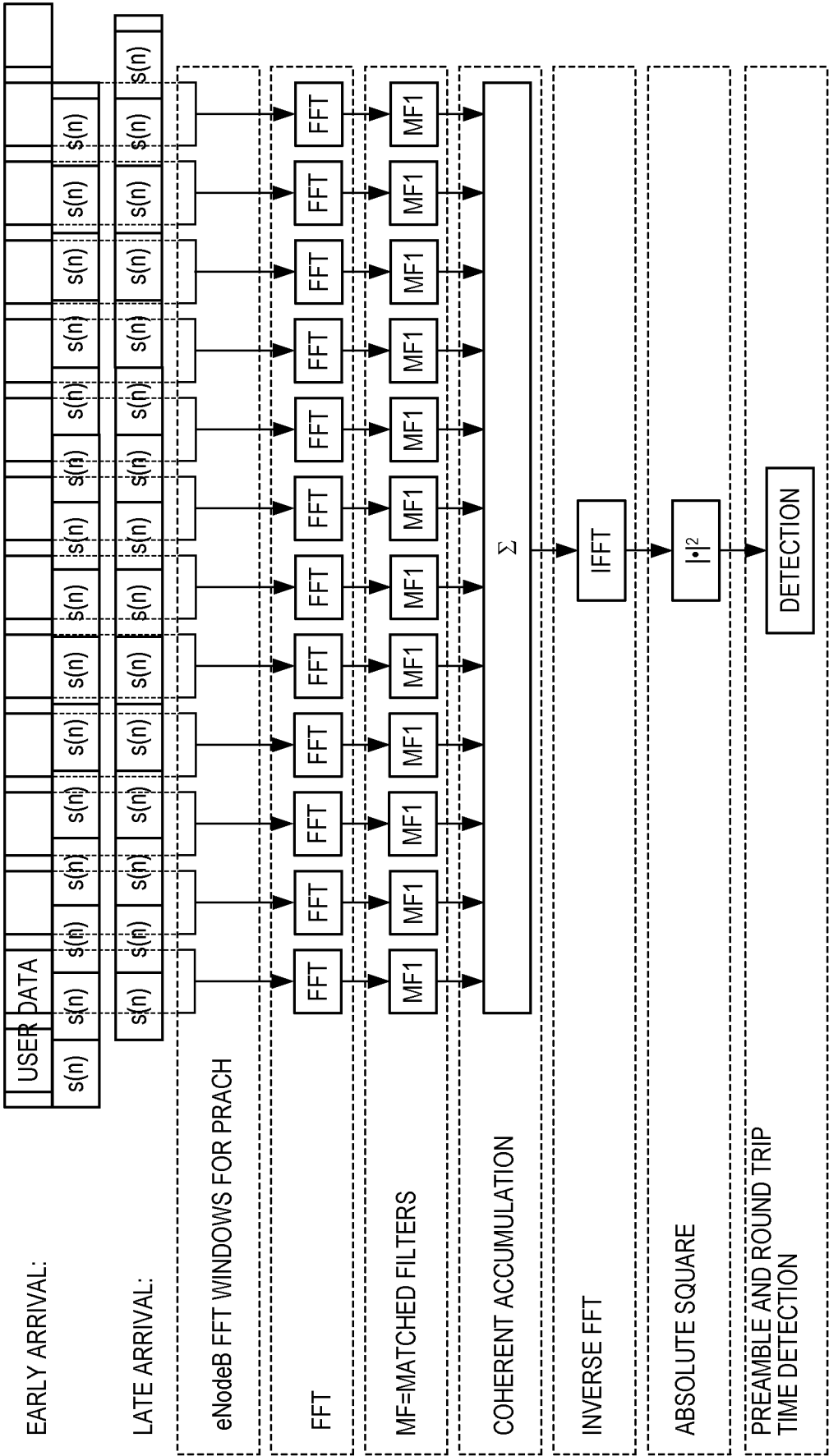
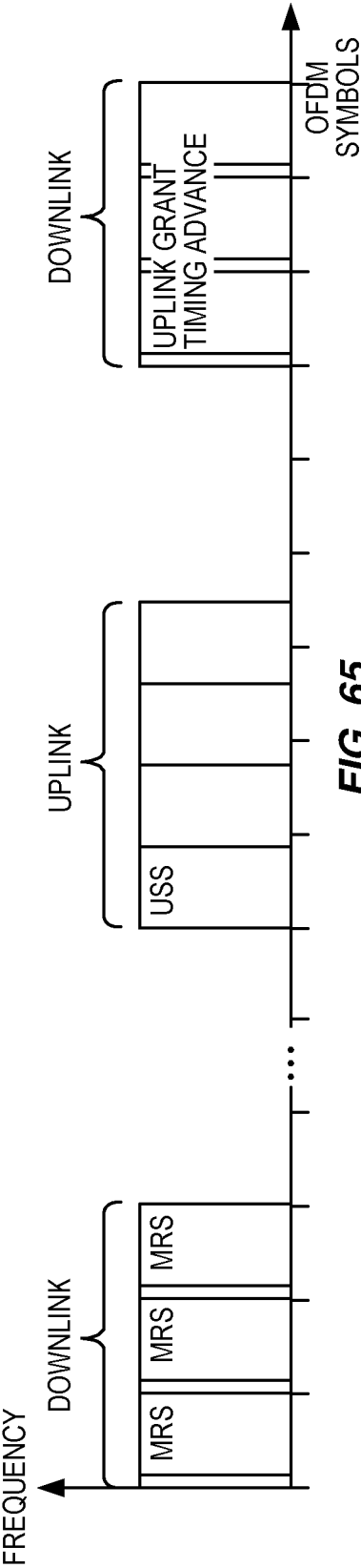
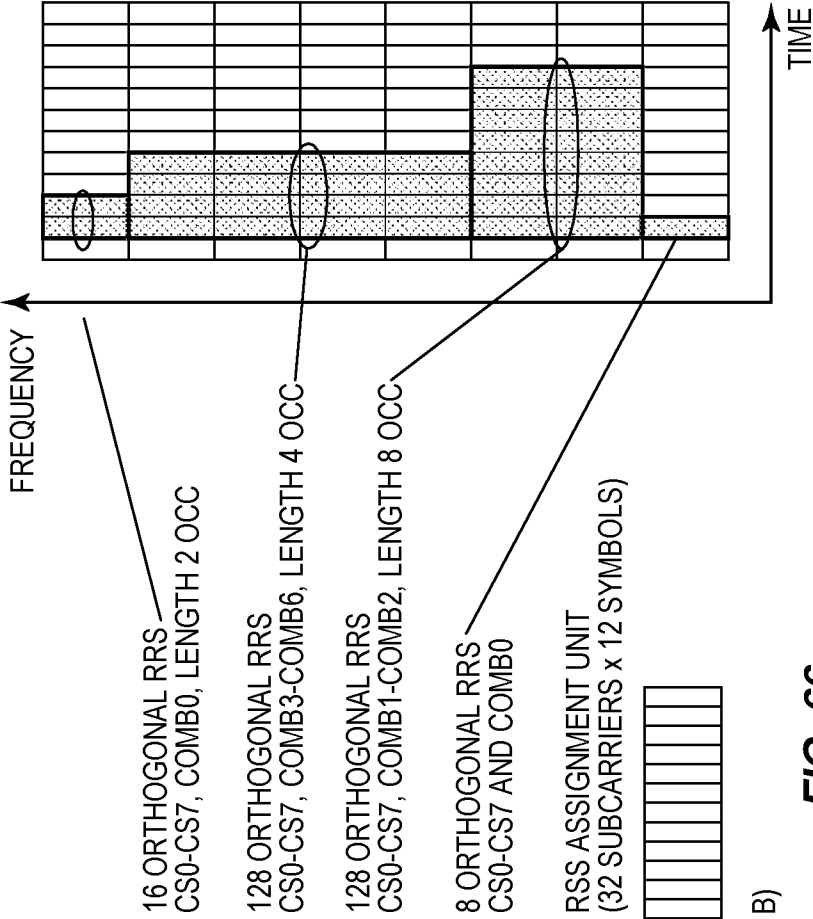
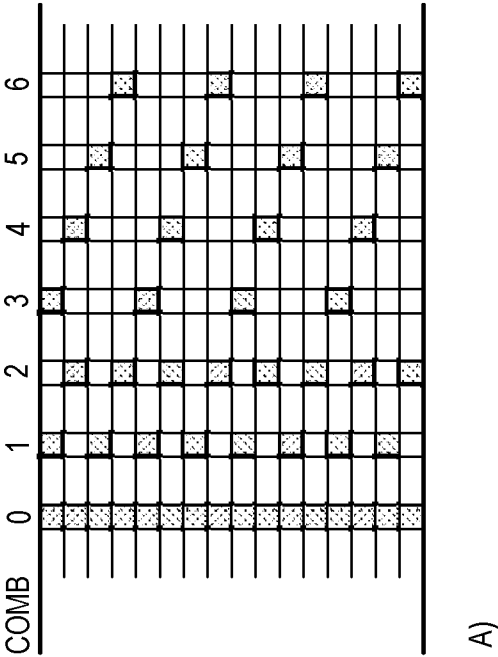


FIG. 64



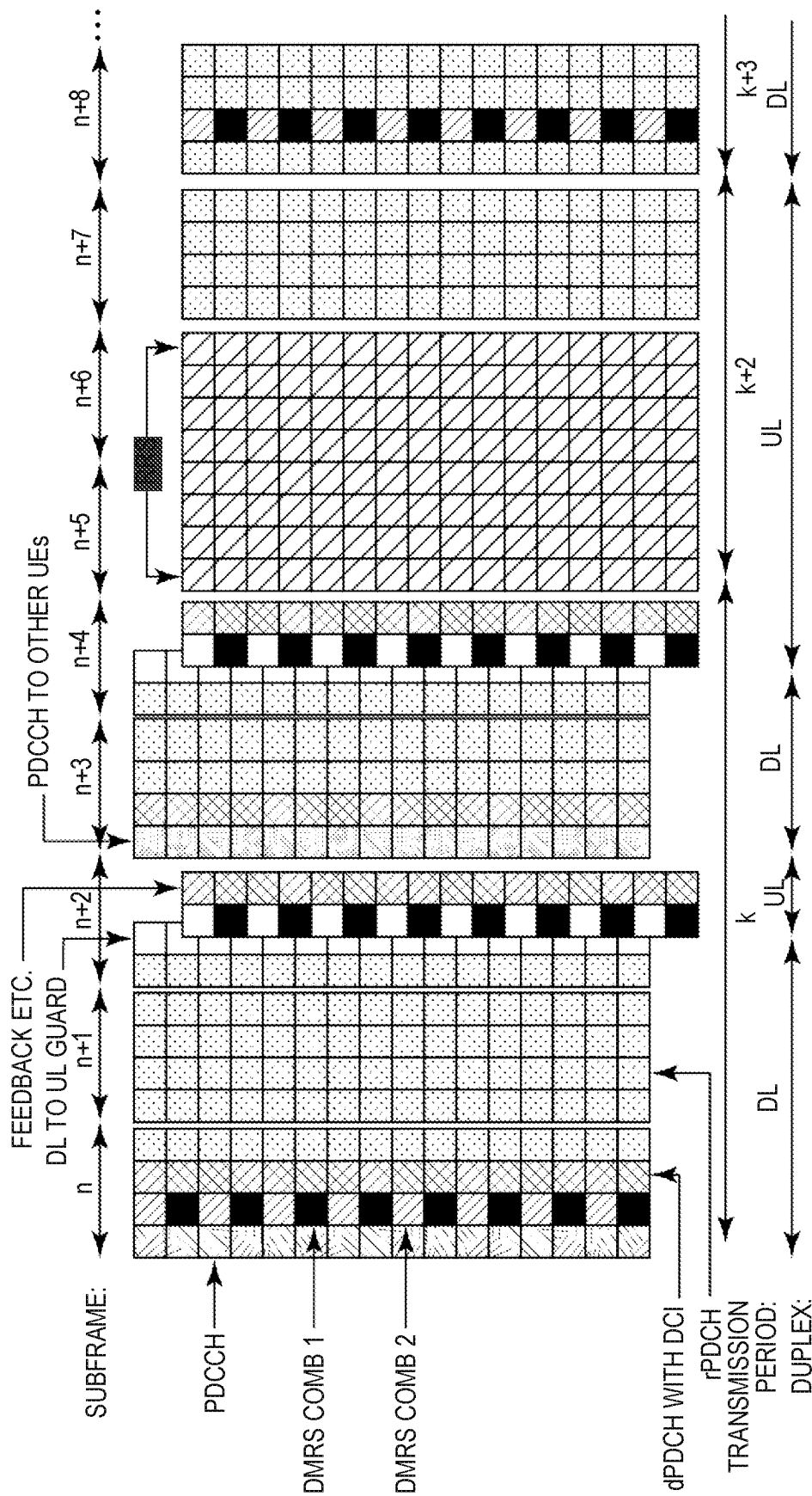


FIG. 67

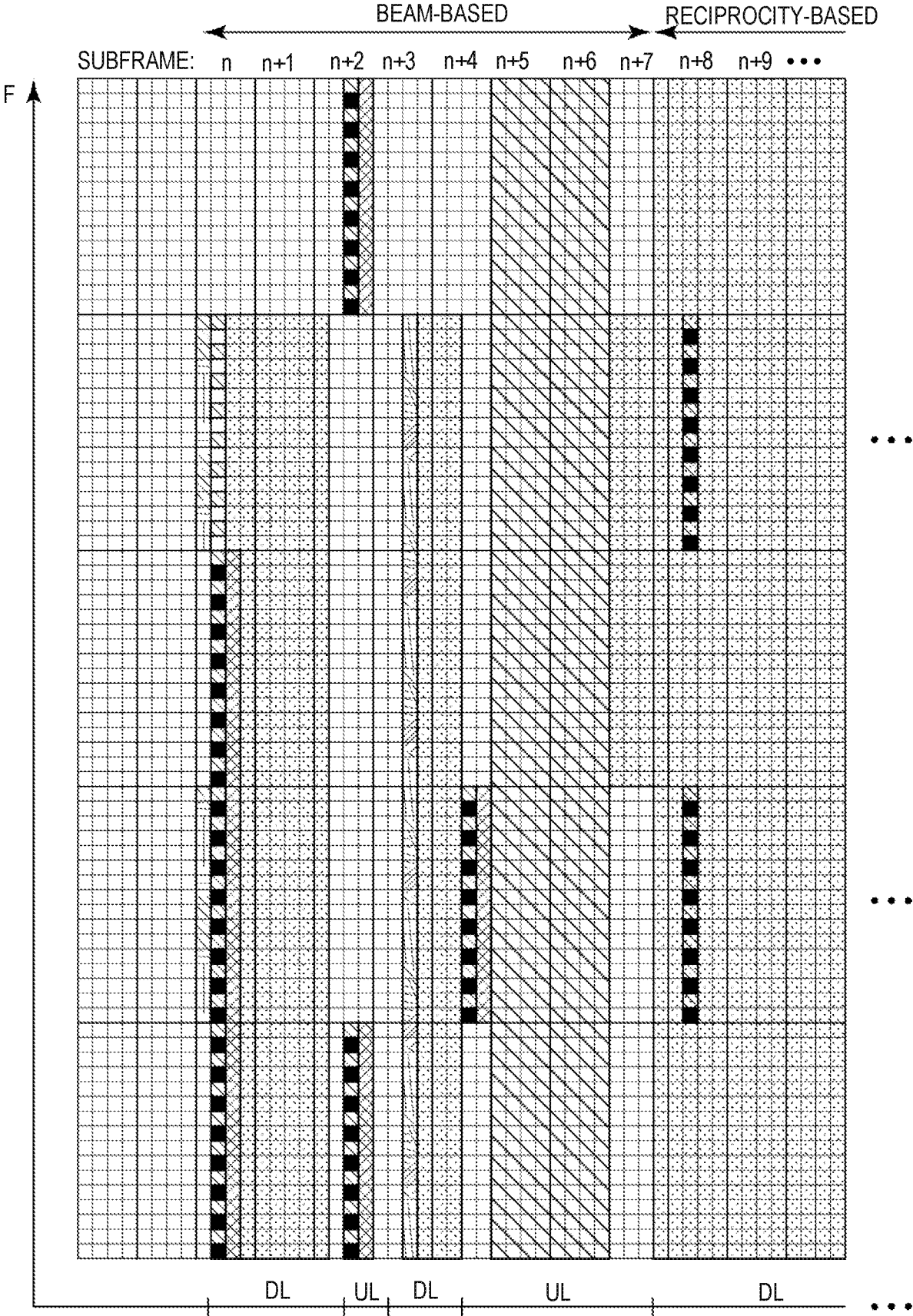


FIG. 68A

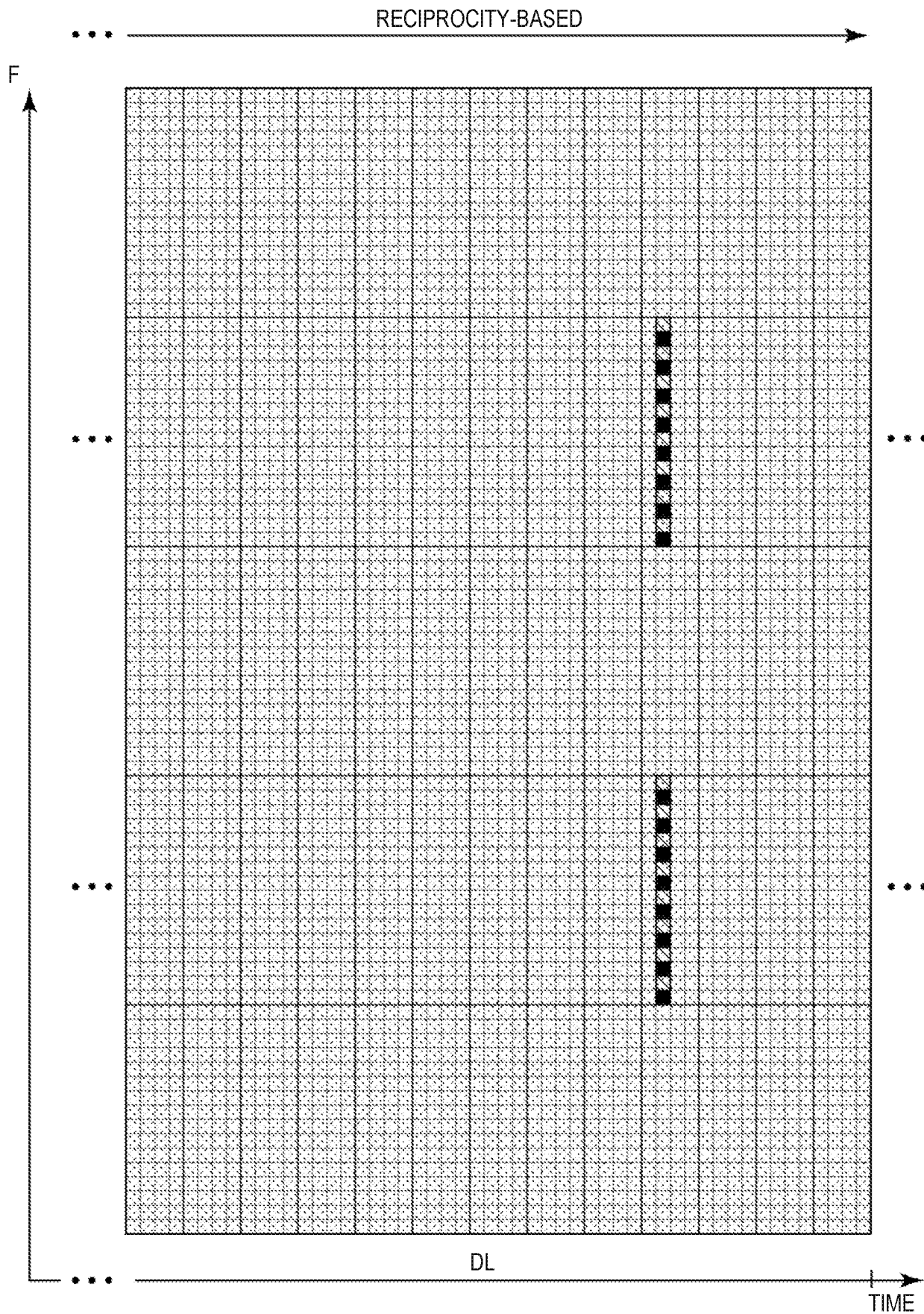
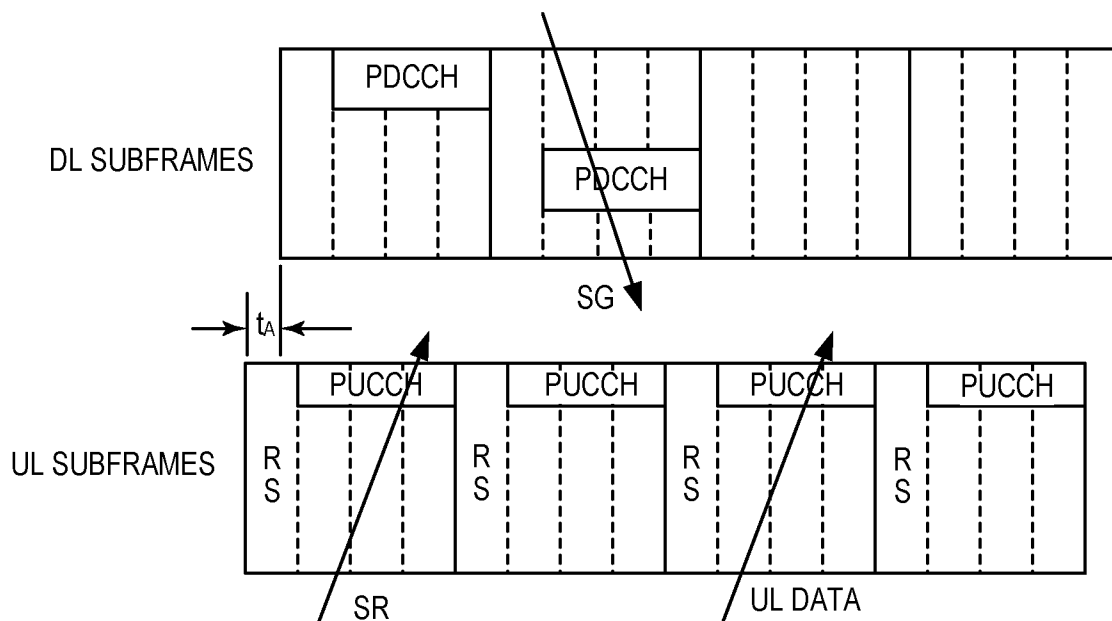
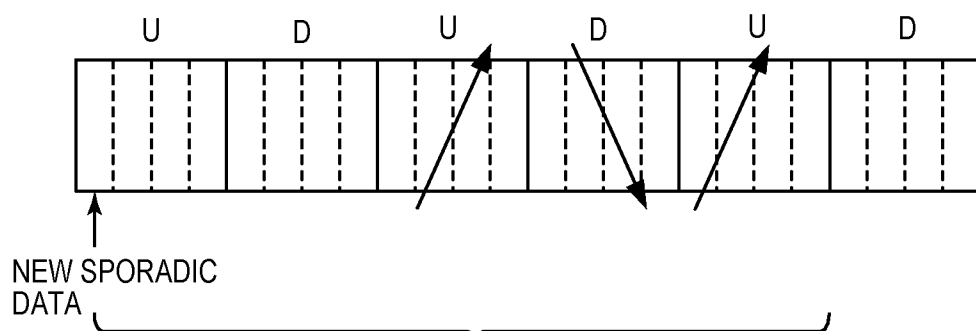
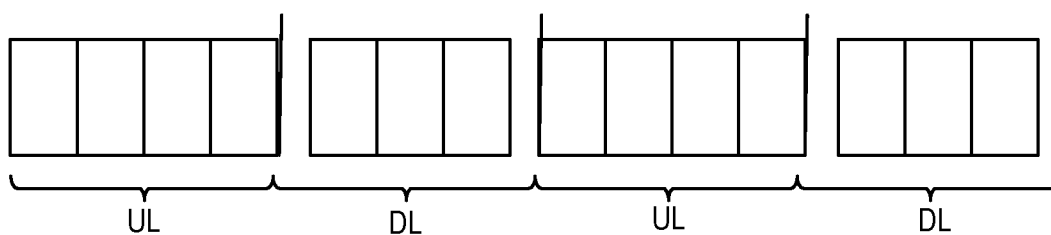


FIG. 68B

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**FIG. 69**

WORST CASE DELAY AIR INTERFACE: $62.5 \cdot (5 - \delta) = 312(-\delta)$ usec
 BEST CASE DELAY: $62.5 \cdot (3 + \delta) = 187(+\delta)$ usec
 (COMPARE TO FDD: $(3-4) \cdot 62.5 = 187-250$ usec)

FIG. 70**FIG. 71**

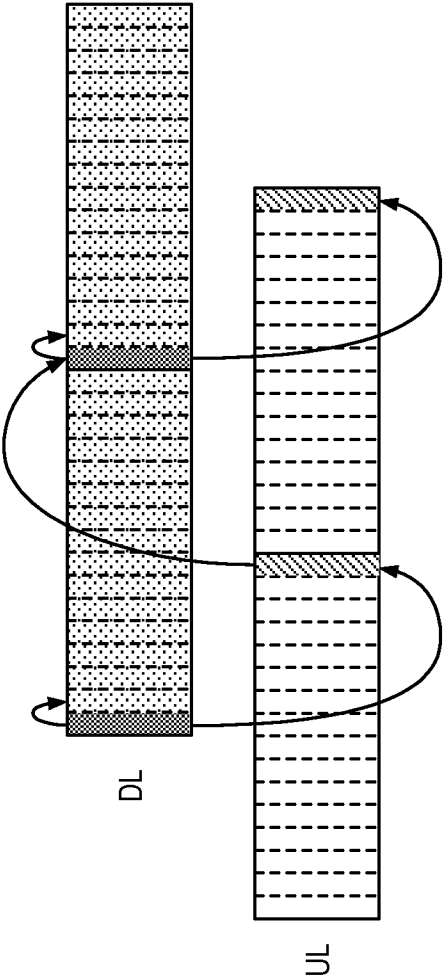


FIG. 72

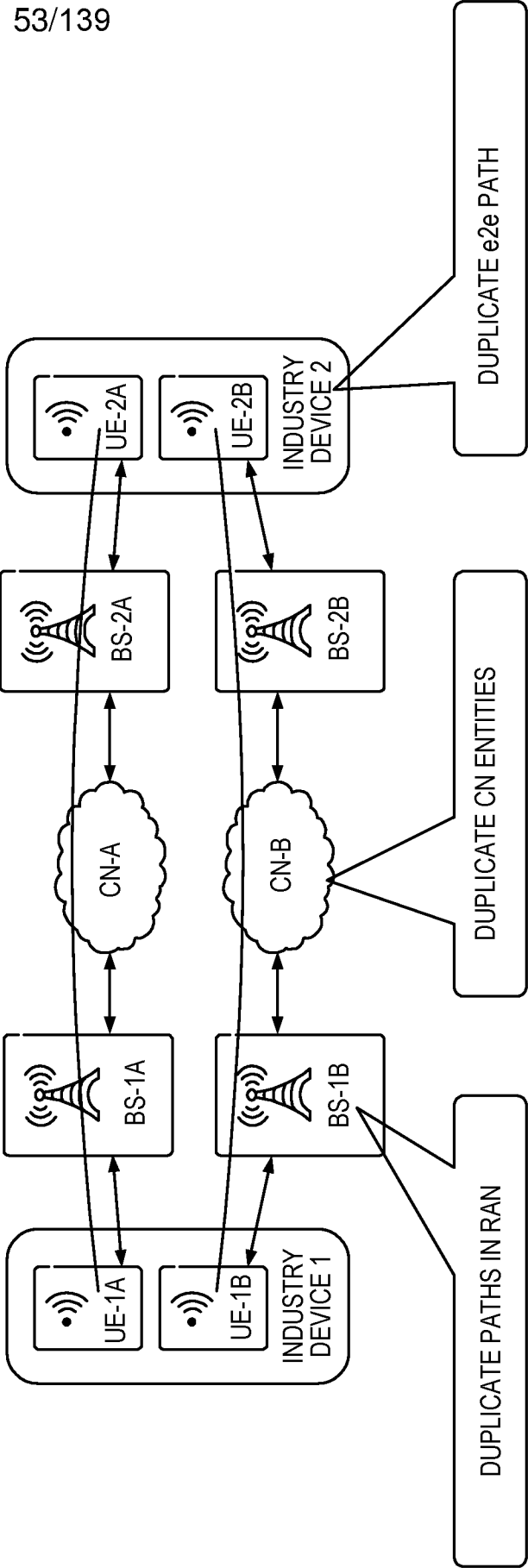
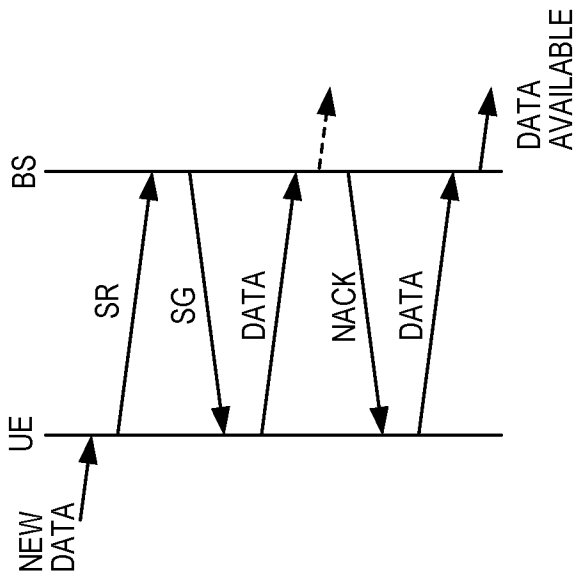


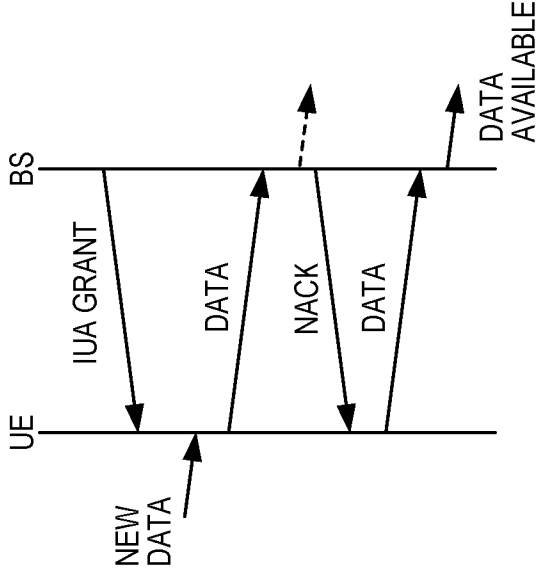
FIG. 73



SCHEDULED TRANSMISSION

COMPONENT	DESCRIPTION	SUBFRAME (OPTIMAL)	SUBFRAME (RELAXED)
1	DATA IS AVAILABLE JUST AFTER START OF SUBFRAME N		
2	SCHEDULING REQUEST (SR)	N+1	N+1
3	TRANSMISSION OF SCHEDULING GRANT (SG)	N+2	N+3
4	TRANSMISSION OF UL DATA	N+3	N+5
5	TRANSMISSION OF ACK/NACK	N+4	N+7
6	RETRANSMISSION OF UL DATA	N+5	N+9
	TOTAL DELAY UNACKNOWLEDGED DATA	4 SUBFRAMES	6 SUBFRAMES
	TOTAL DELAY INCLUDING k RETRANSMISSIONS	4 + 2*k SUBFRAMES	6 + 4*k SUBFRAMES

FIG. 74



IUA TRANSMISSION

COMPONENT	DESCRIPTION	SUBFRAME (OPTIMAL)	SUBFRAME (RELAXED)
1	DATA IS AVAILABLE JUST AFTER START OF SUBFRAME N		
2	TRANSMISSION OF UL DATA	N+1	N+1
3	TRANSMISSION OF ACK/NACK	N+2	N+3
4	RETRANSMISSION OF UL DATA	N+3	N+5
	TOTAL DELAY UNACKNOWLEDGED DATA	2 SUBFRAMES	2 SUBFRAMES
	TOTAL DELAY INCLUDING k RETRANSMISSIONS	2 + 2*k SUBFRAMES	2 + 4*k SUBFRAMES

FIG. 75

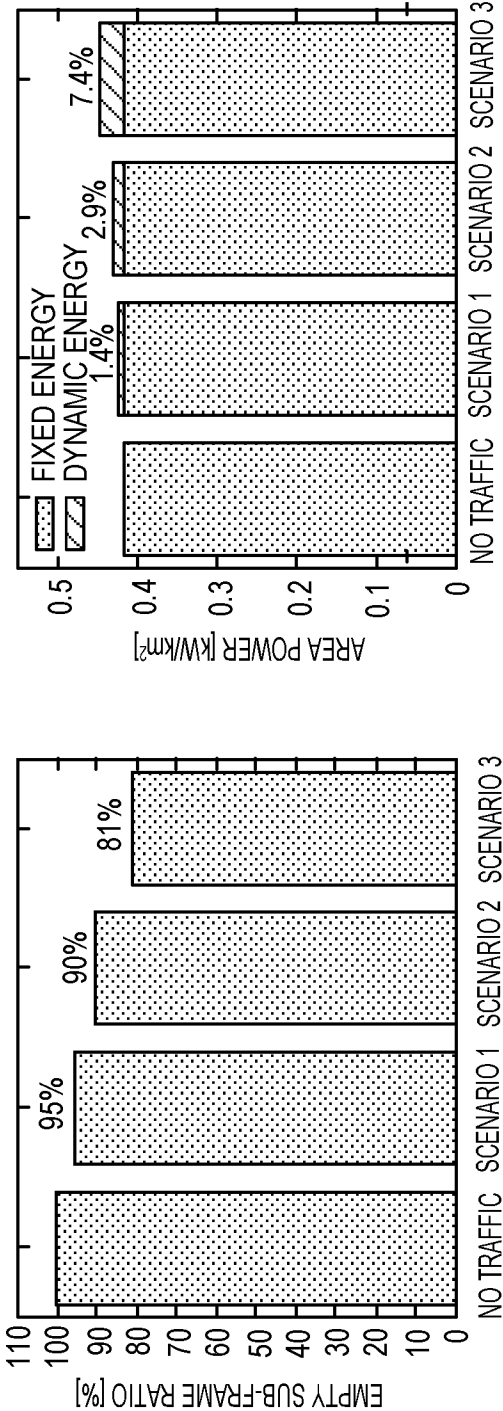


FIG. 76

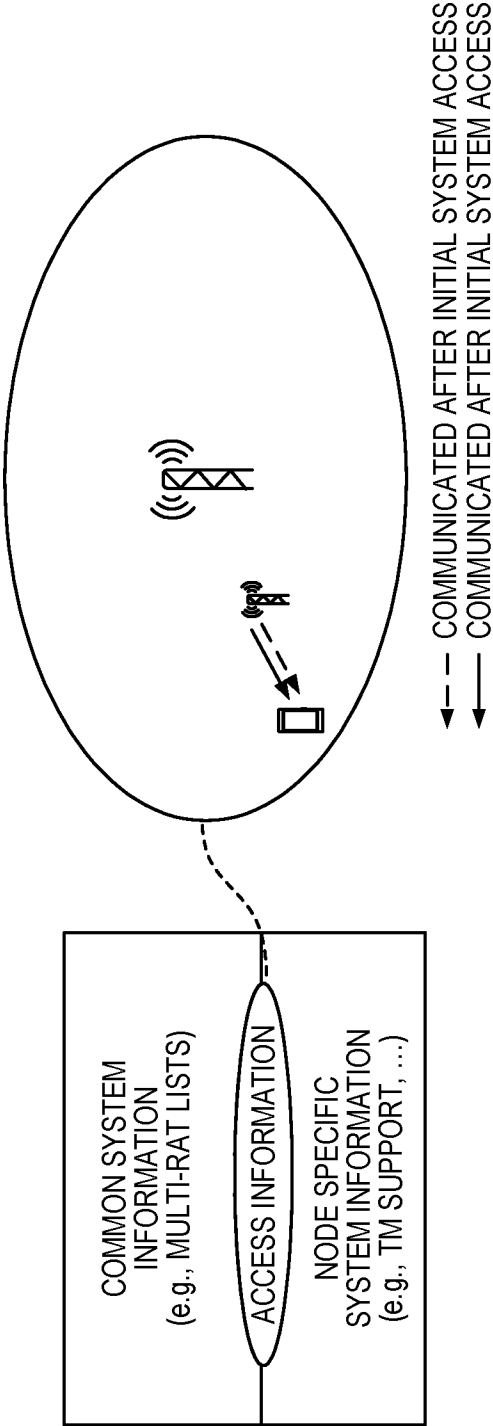


FIG. 77

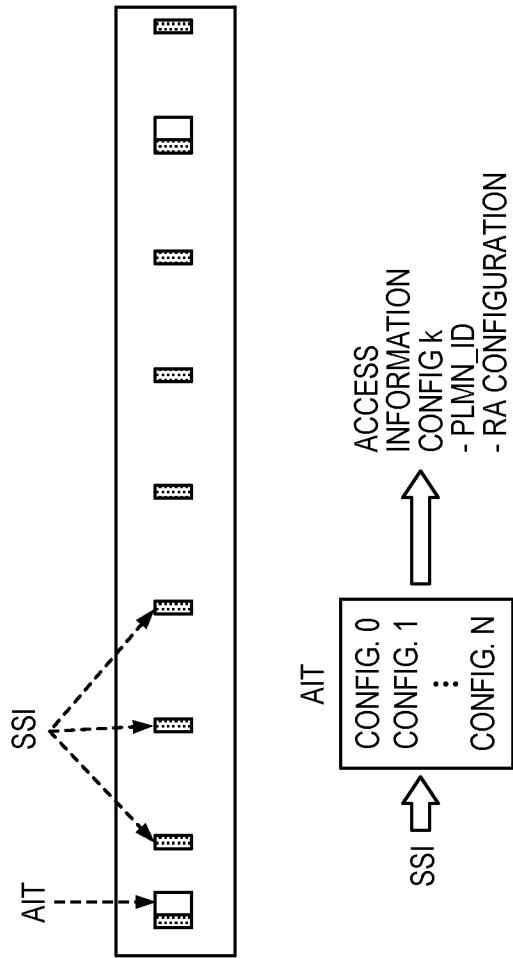


FIG. 78

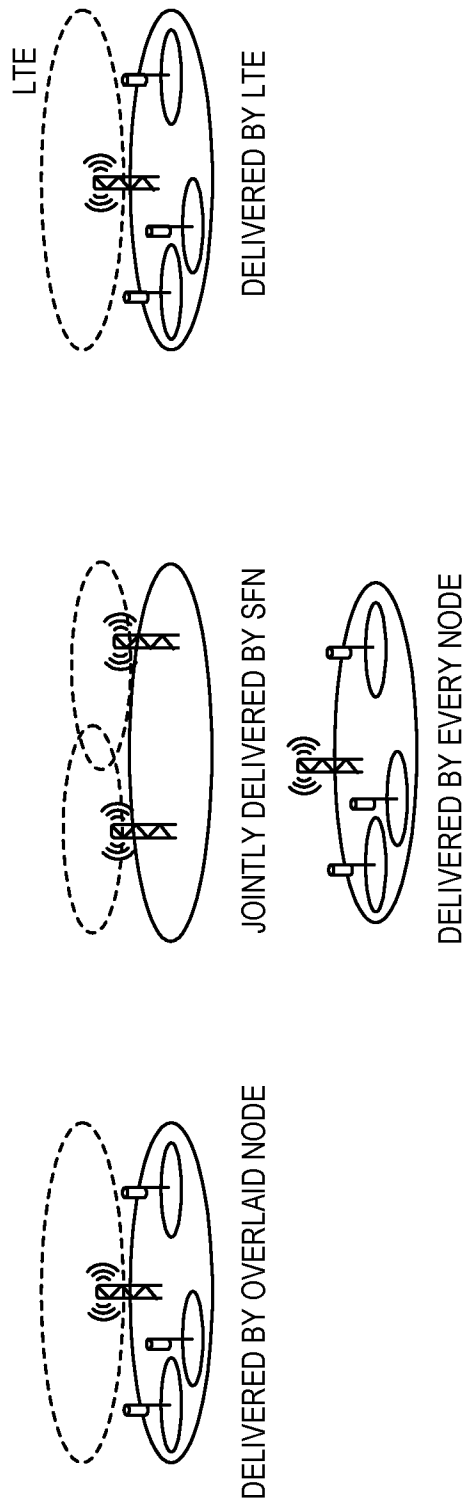


FIG. 79

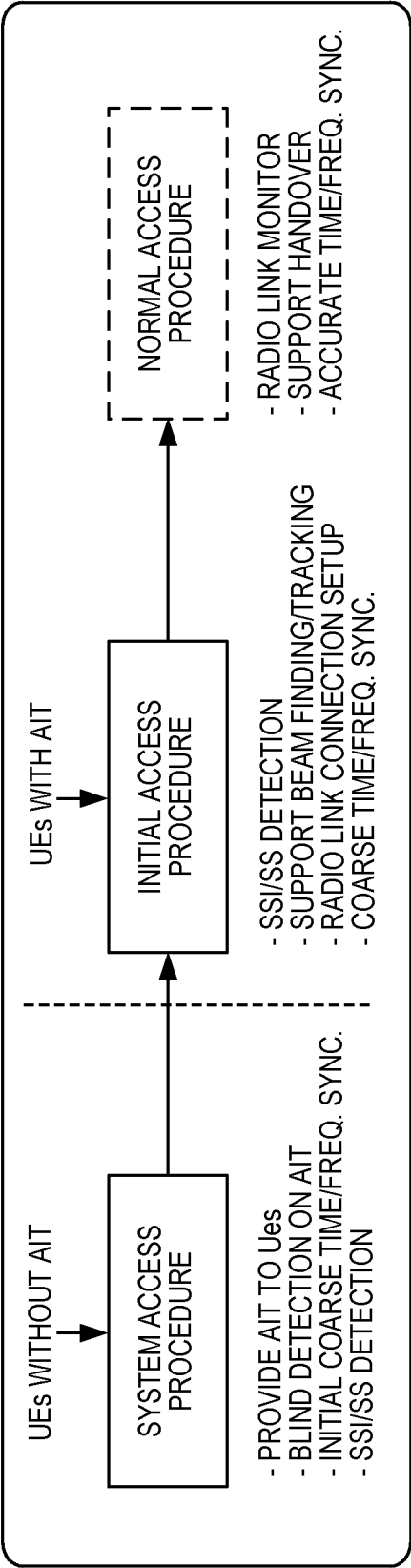


FIG. 80

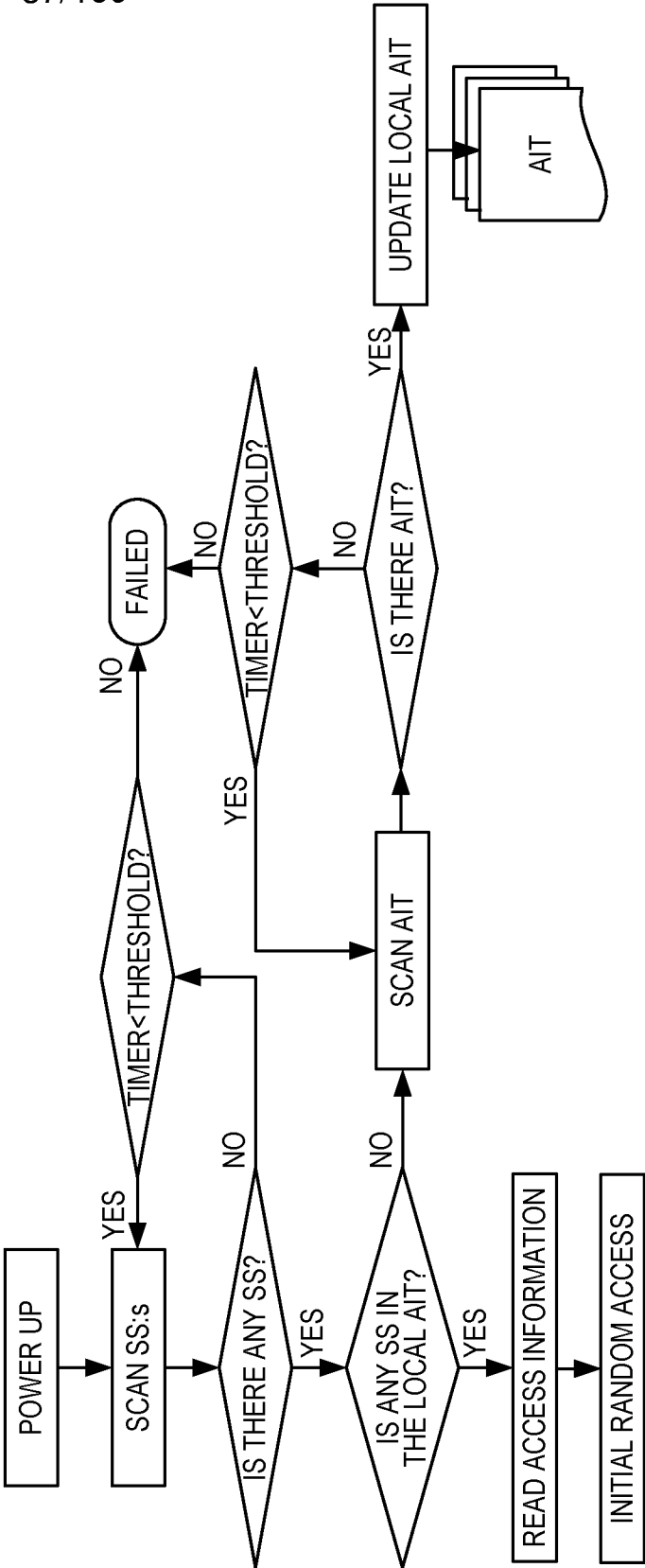


FIG. 81

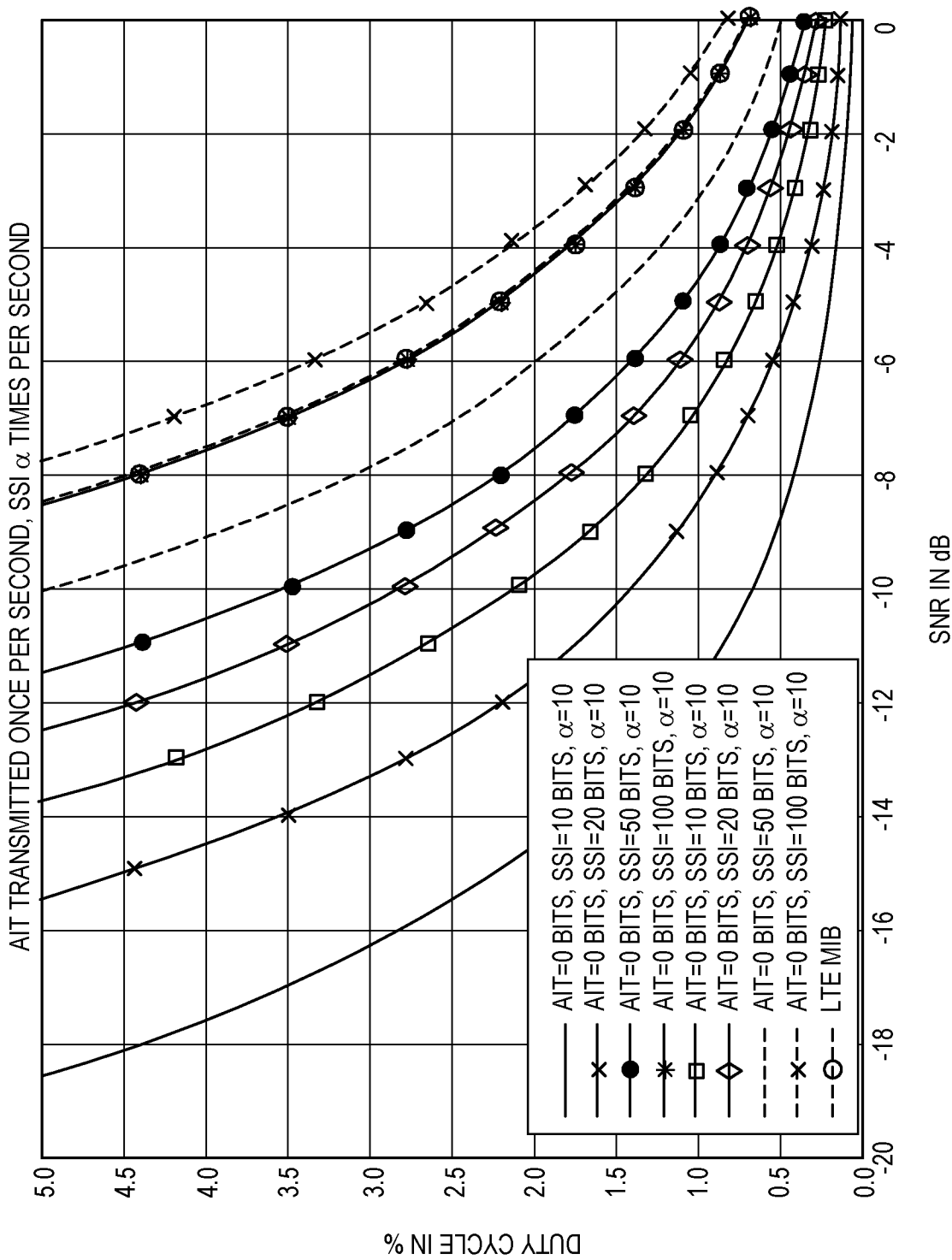
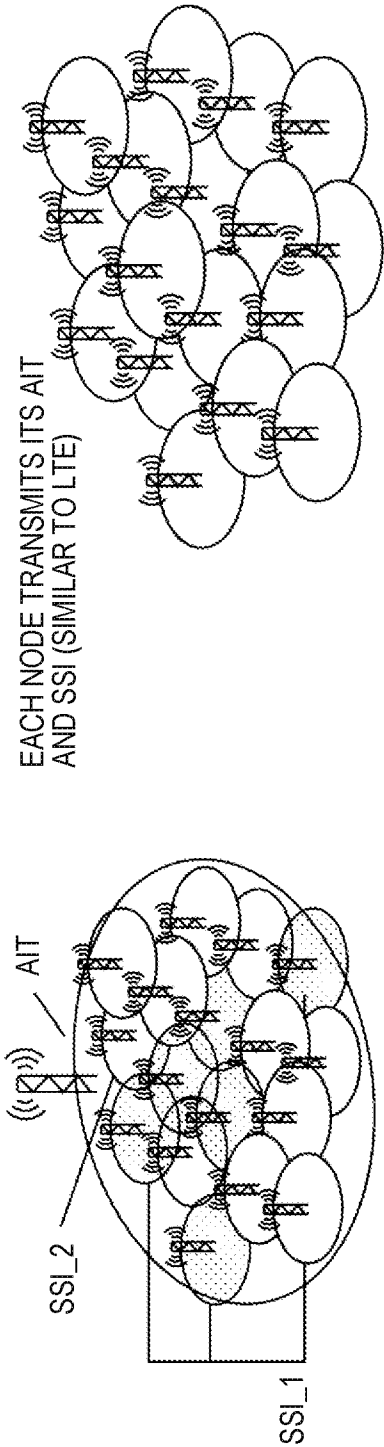


FIG. 82



EACH NODE TRANSMITS ITS AIT
AND SSI (SIMILAR TO LTE)

FIG. 83

TRACKING AREAS

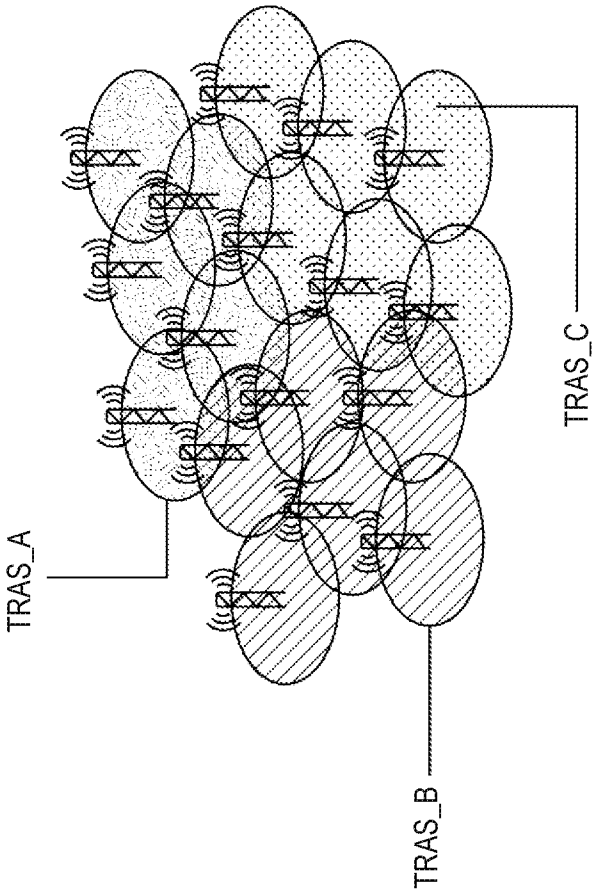
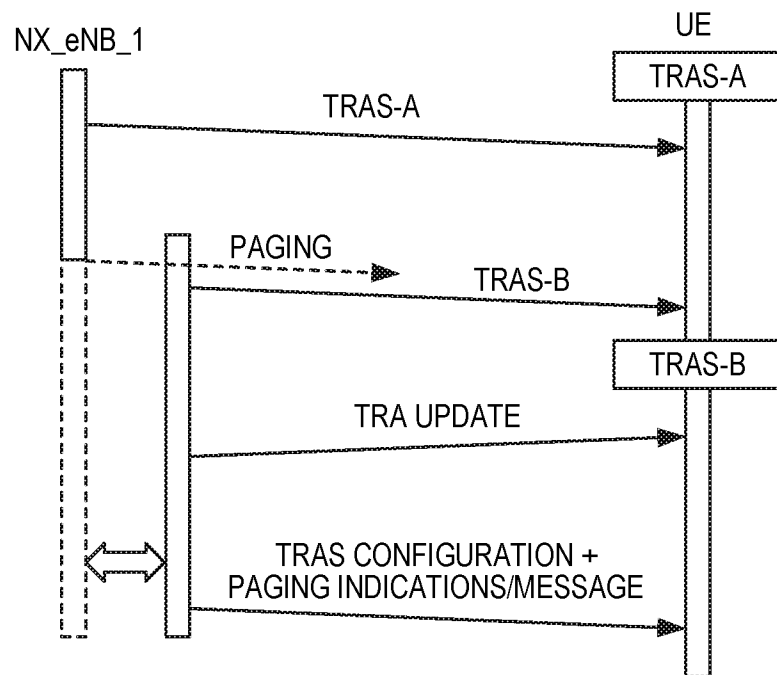
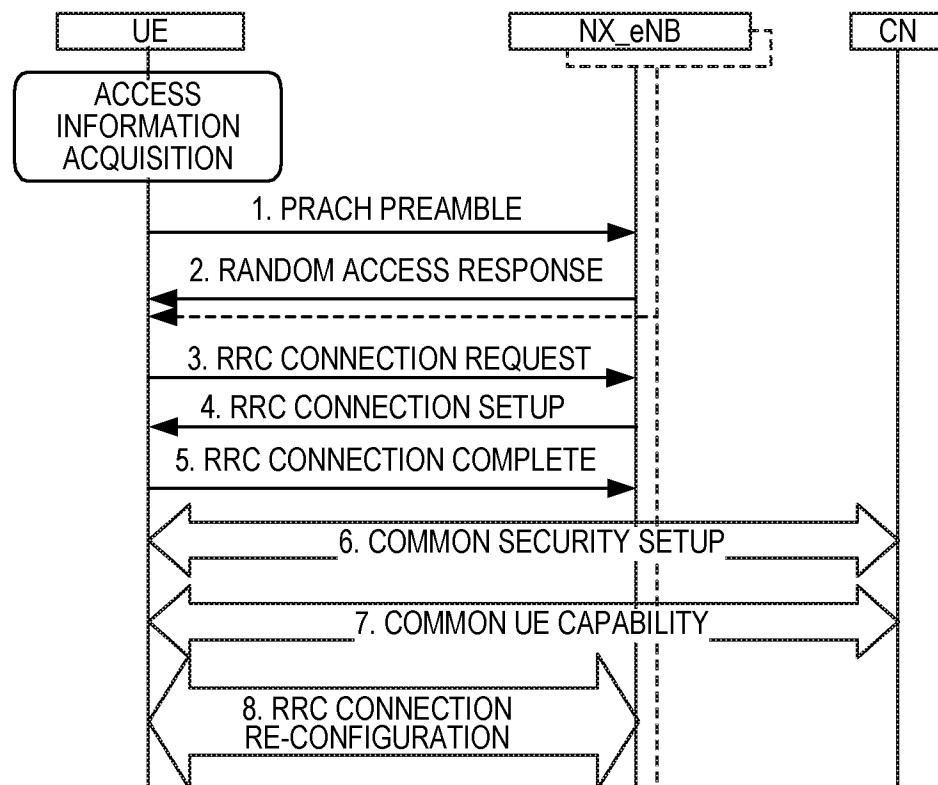


FIG. 84

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**FIG. 85****FIG. 86**

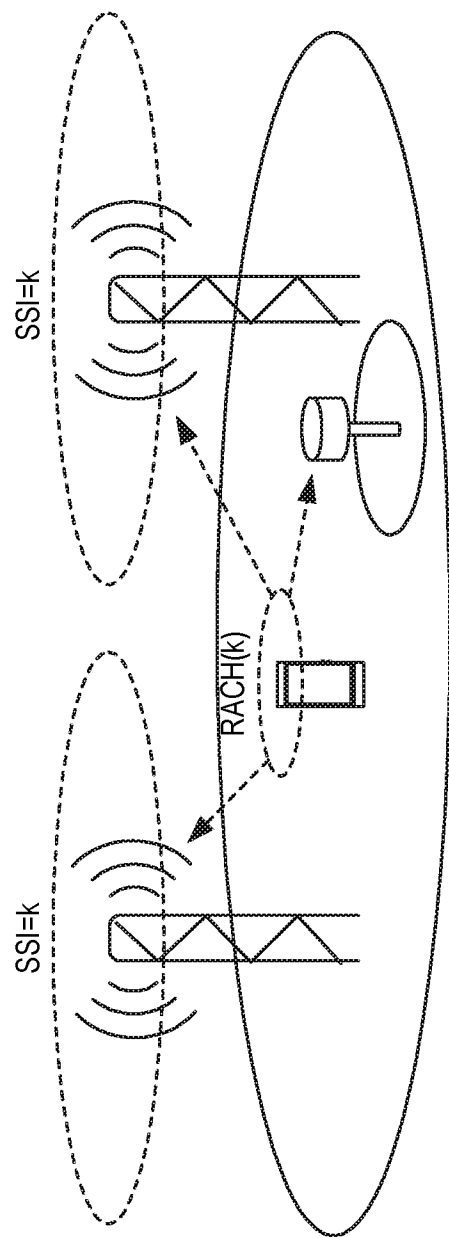


FIG. 87

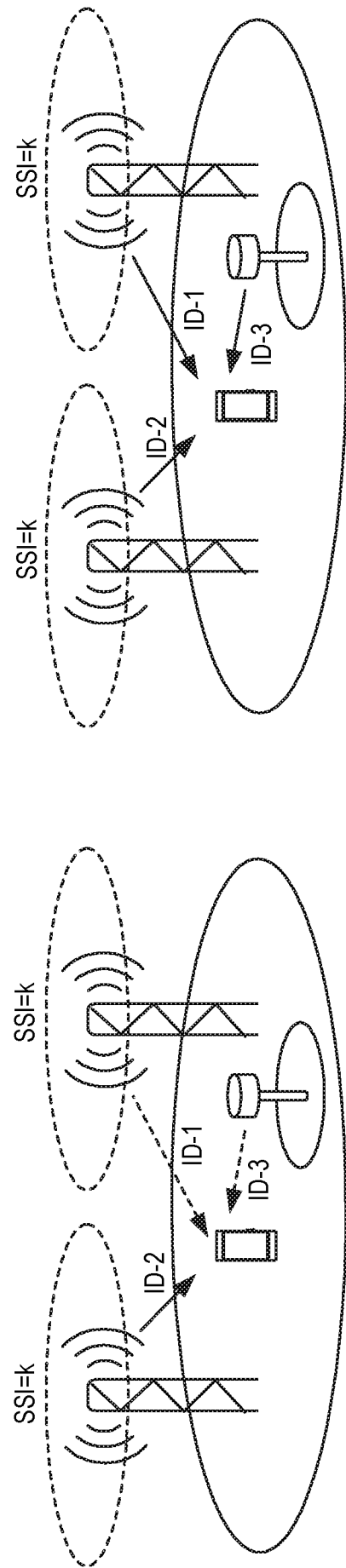


FIG. 88

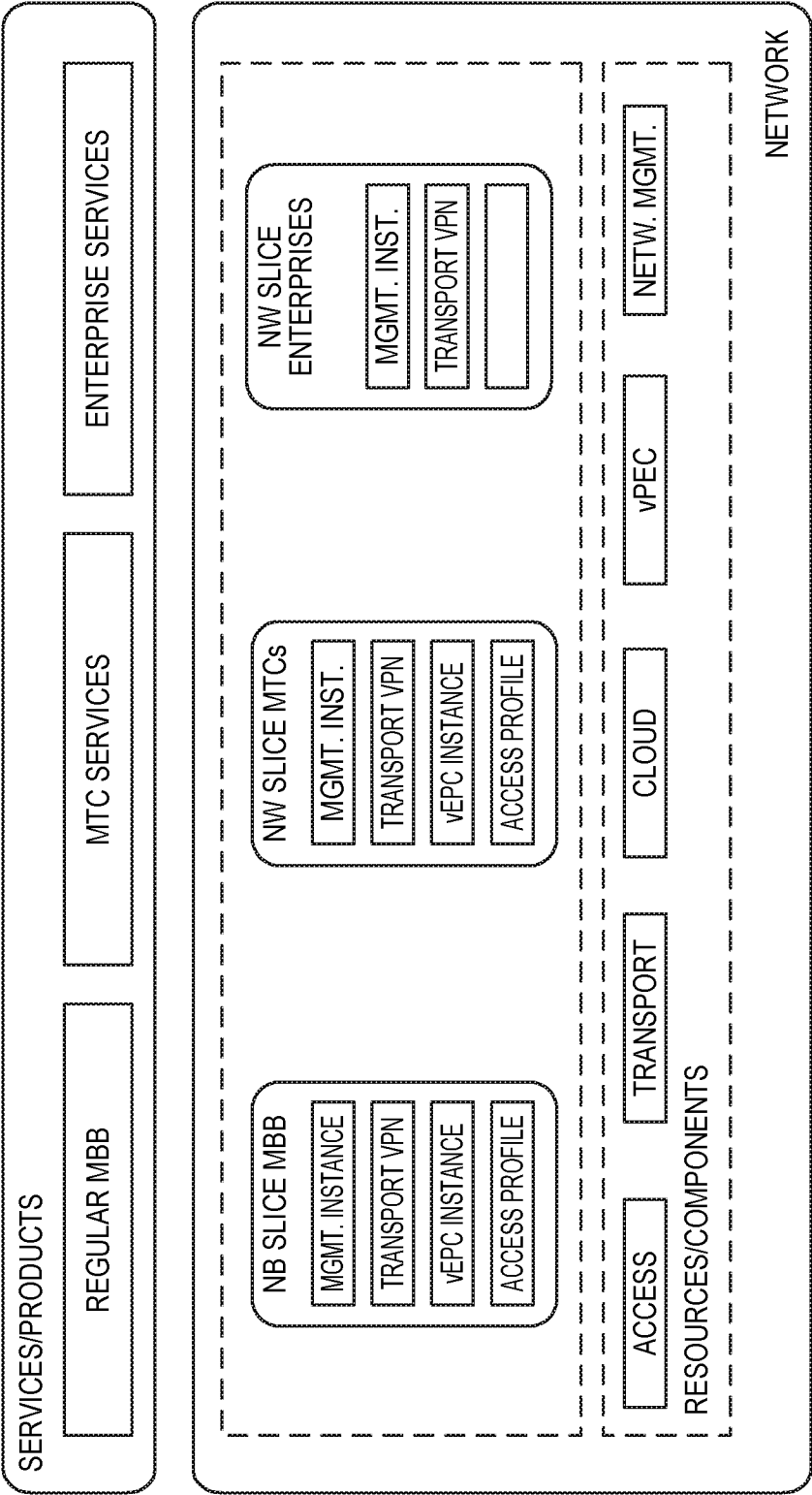
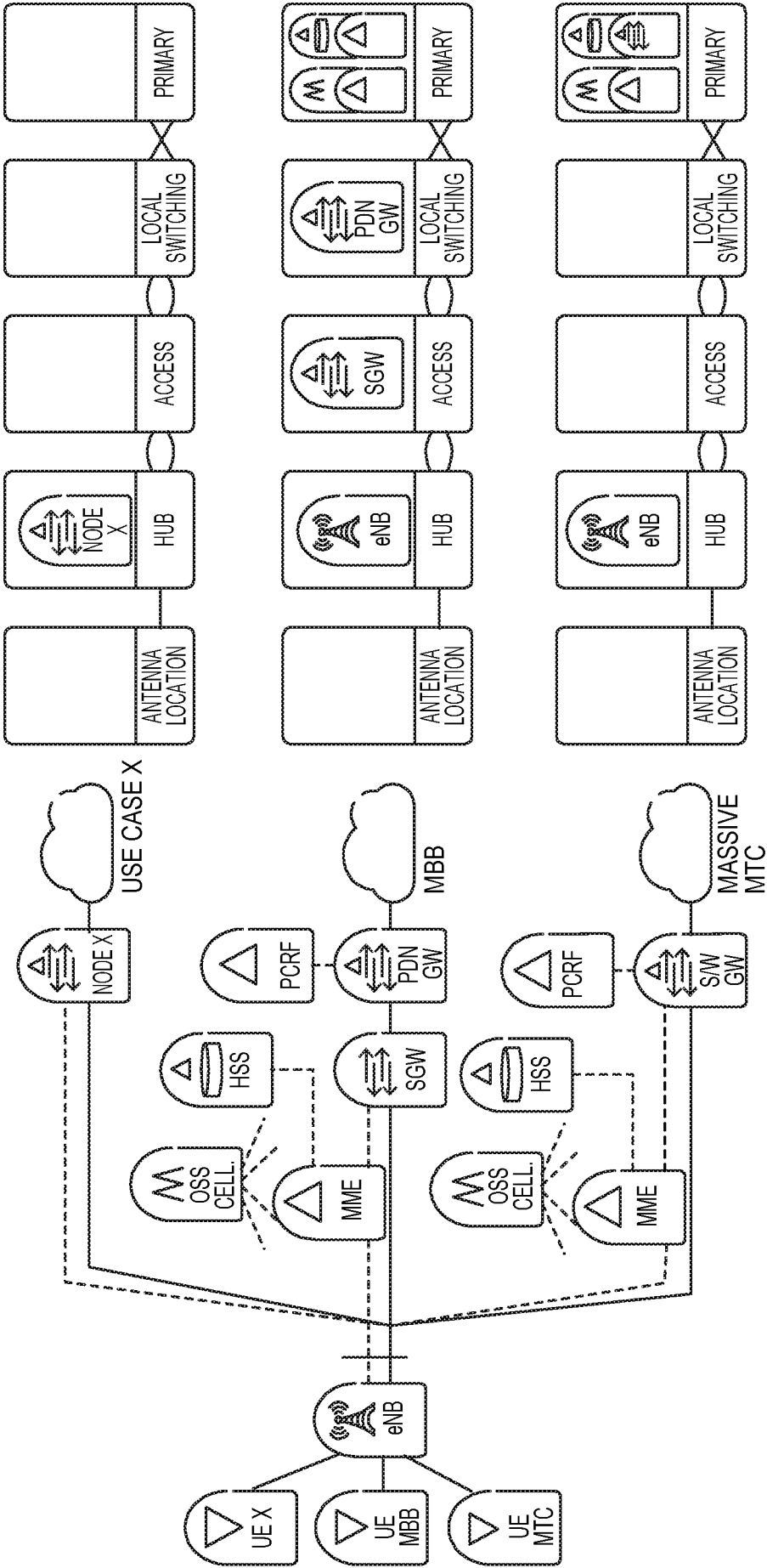


FIG. 89



EXAMPLES ILLUSTRATING THE FLEXIBILITY

FIG. 90

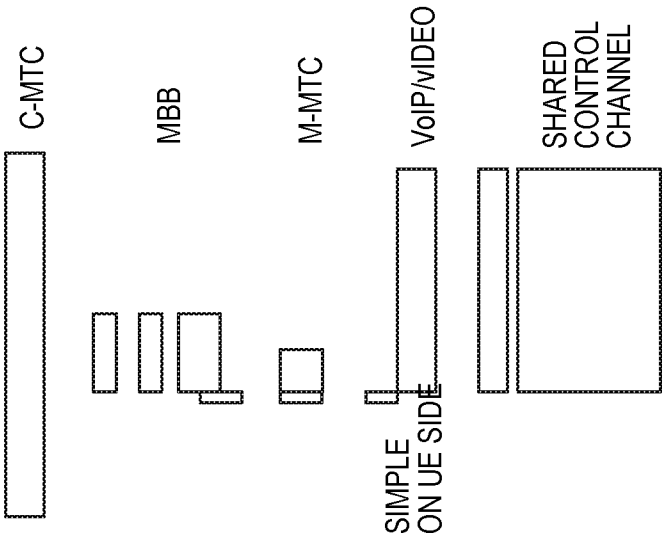


FIG. 91

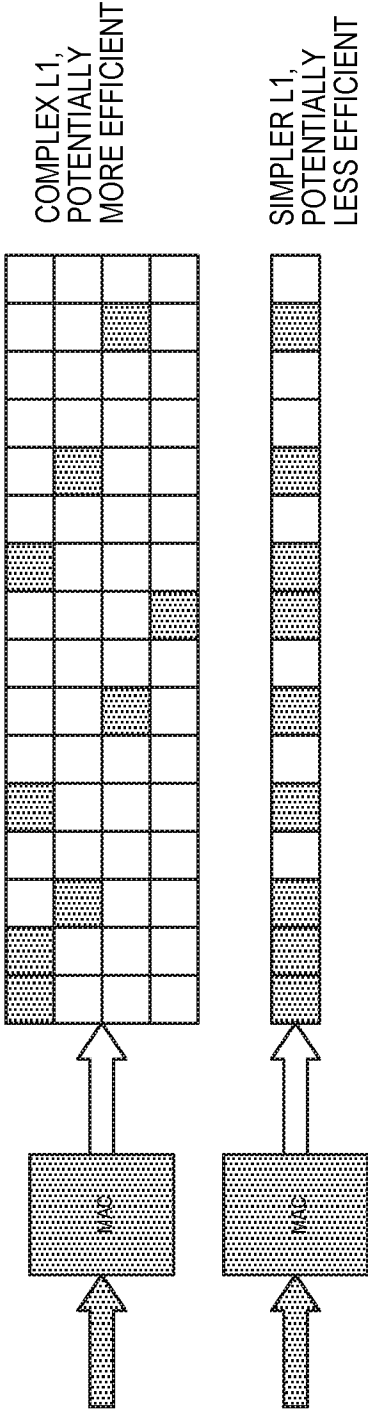


FIG. 92

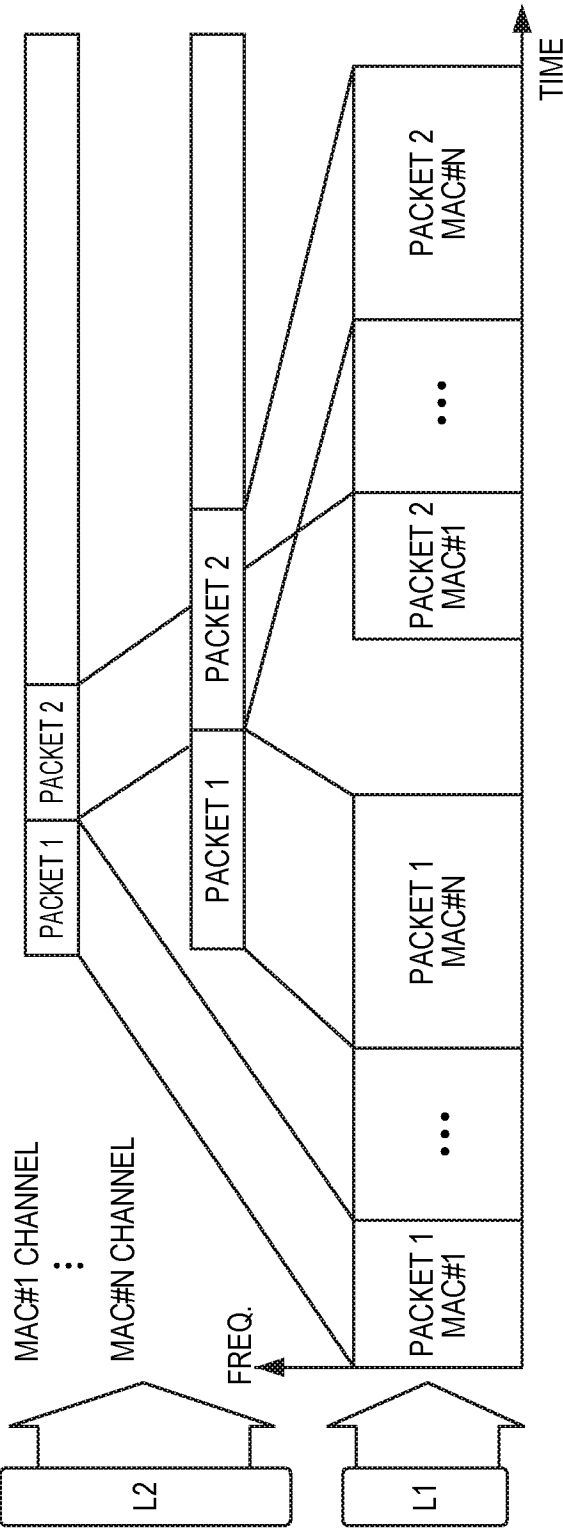


FIG. 93

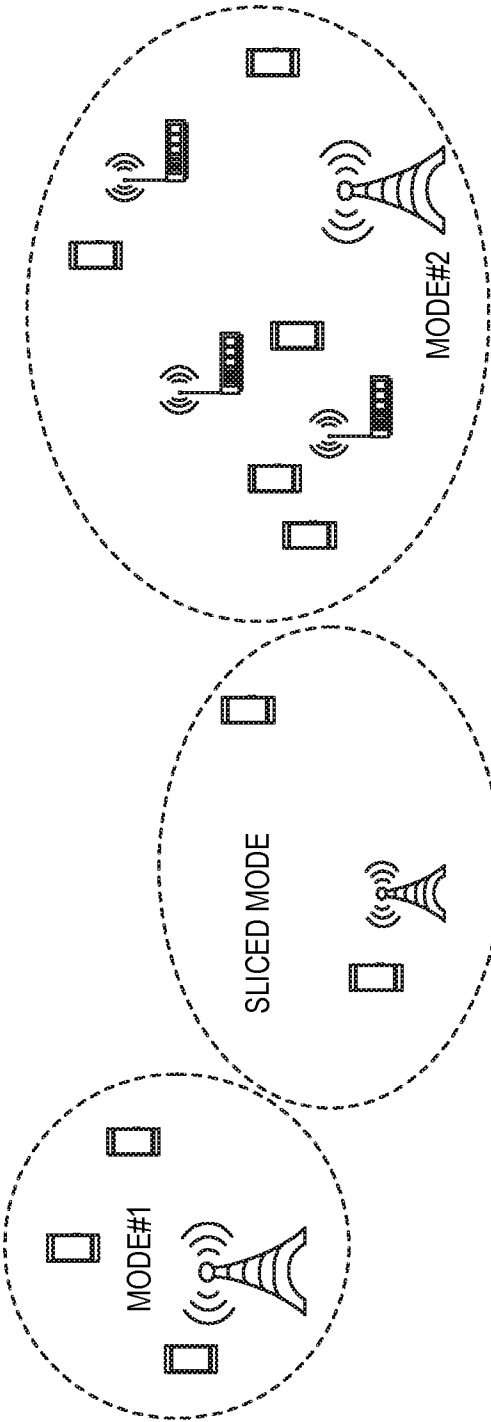


FIG. 94

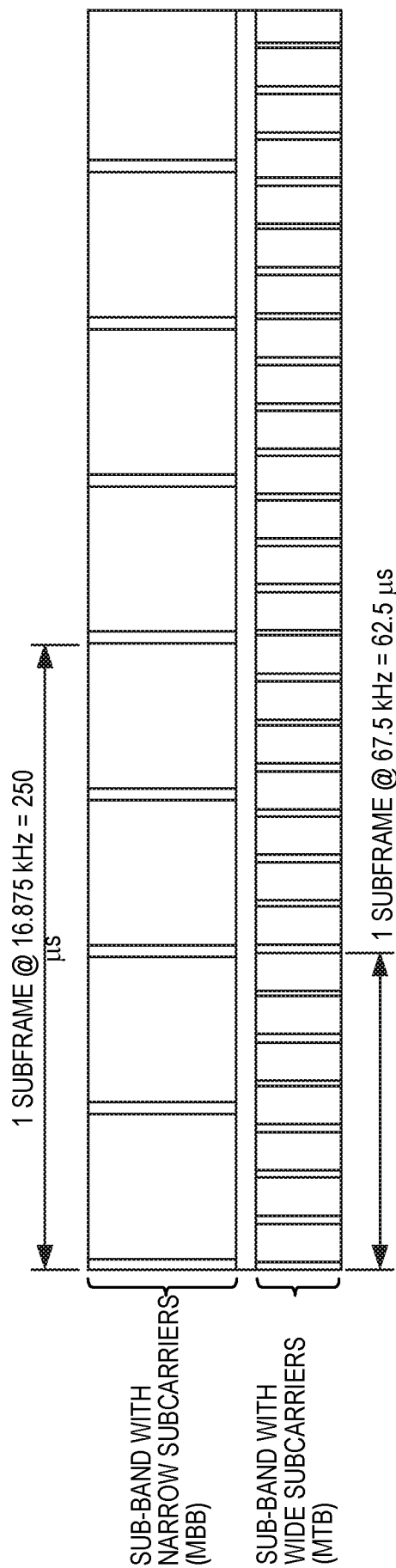


FIG. 95

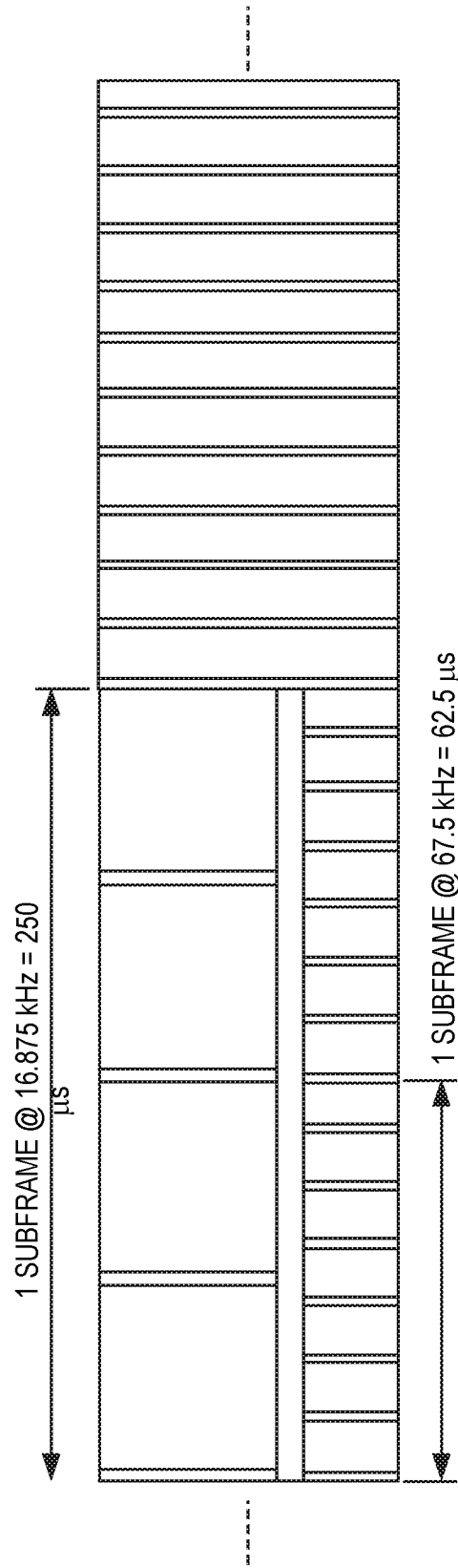


FIG. 96

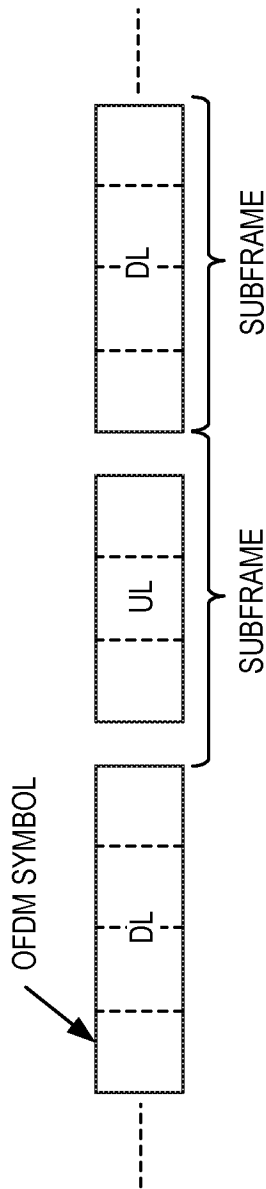


FIG. 97

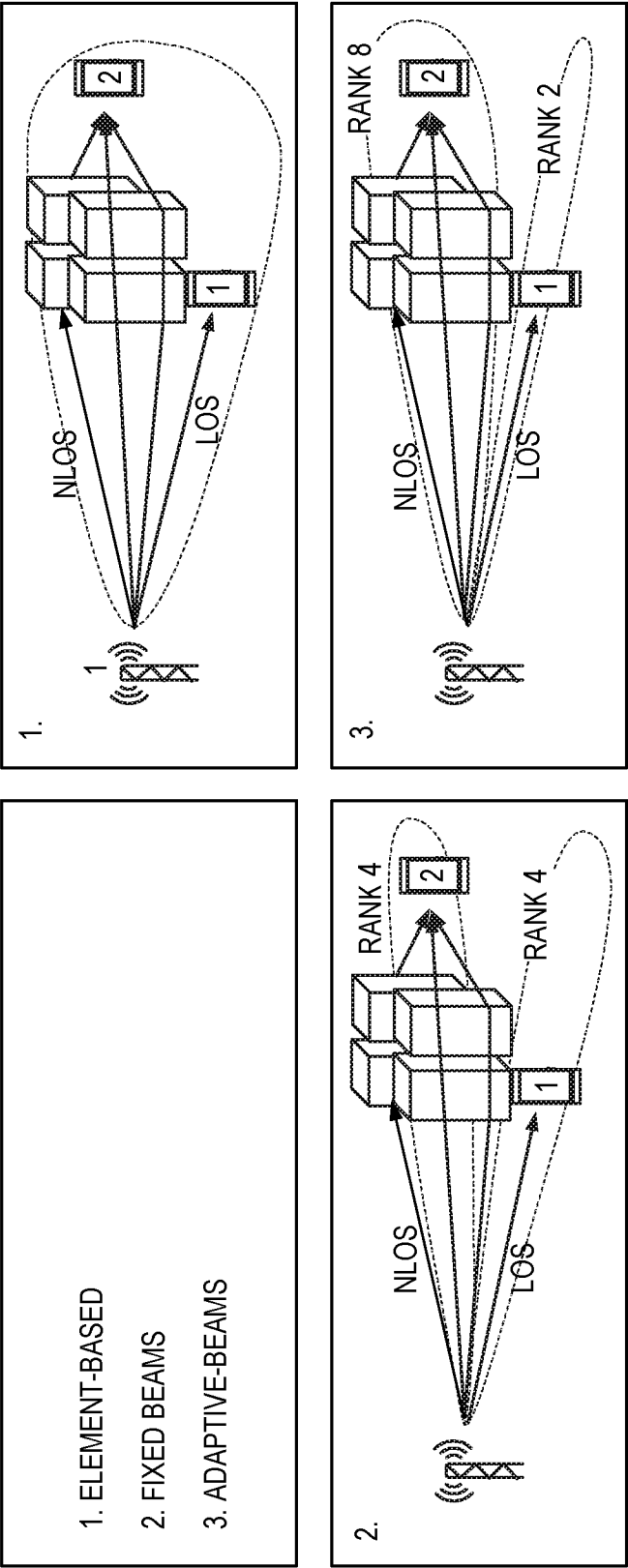


FIG. 98

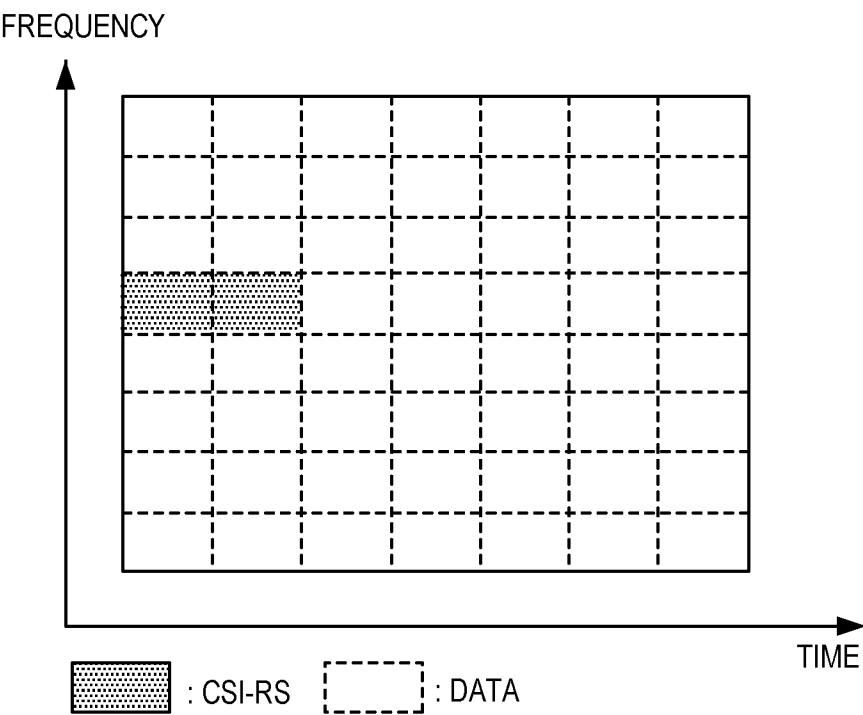


FIG. 99

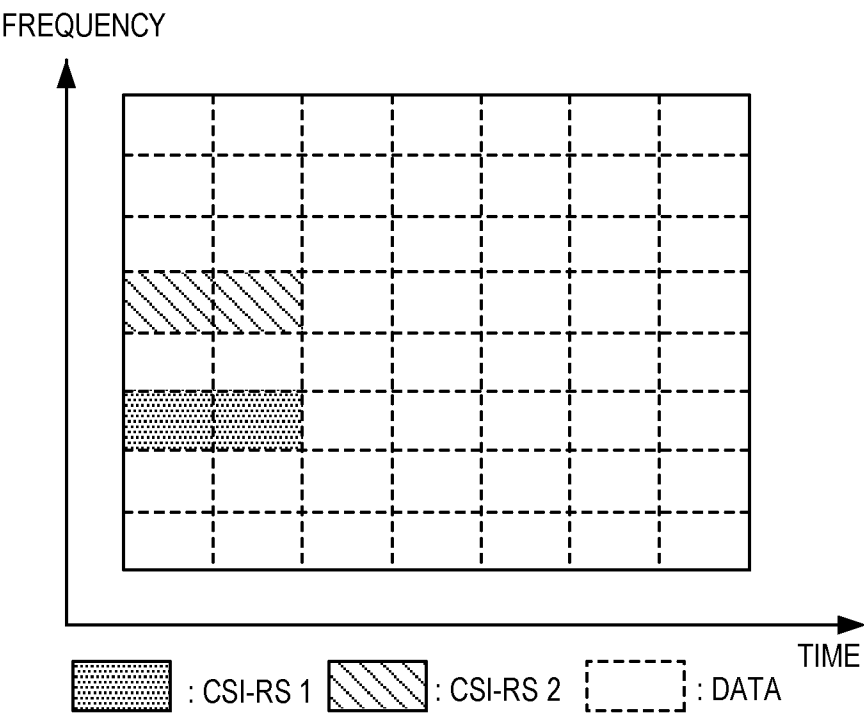


FIG. 100

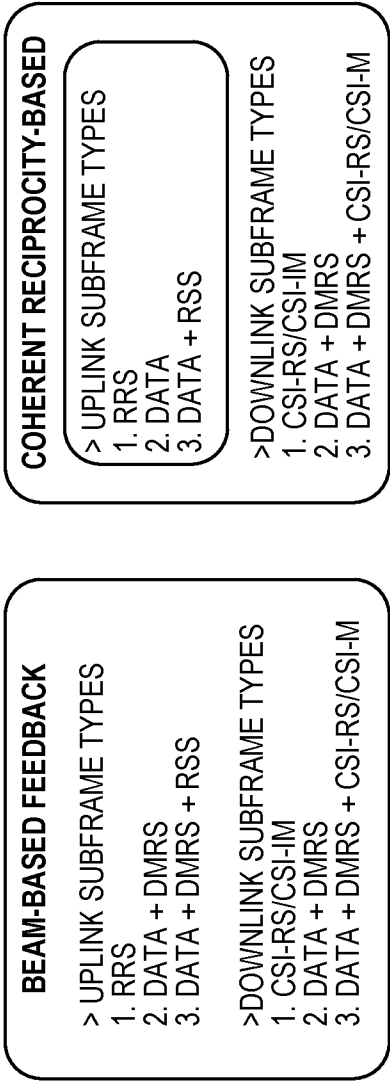
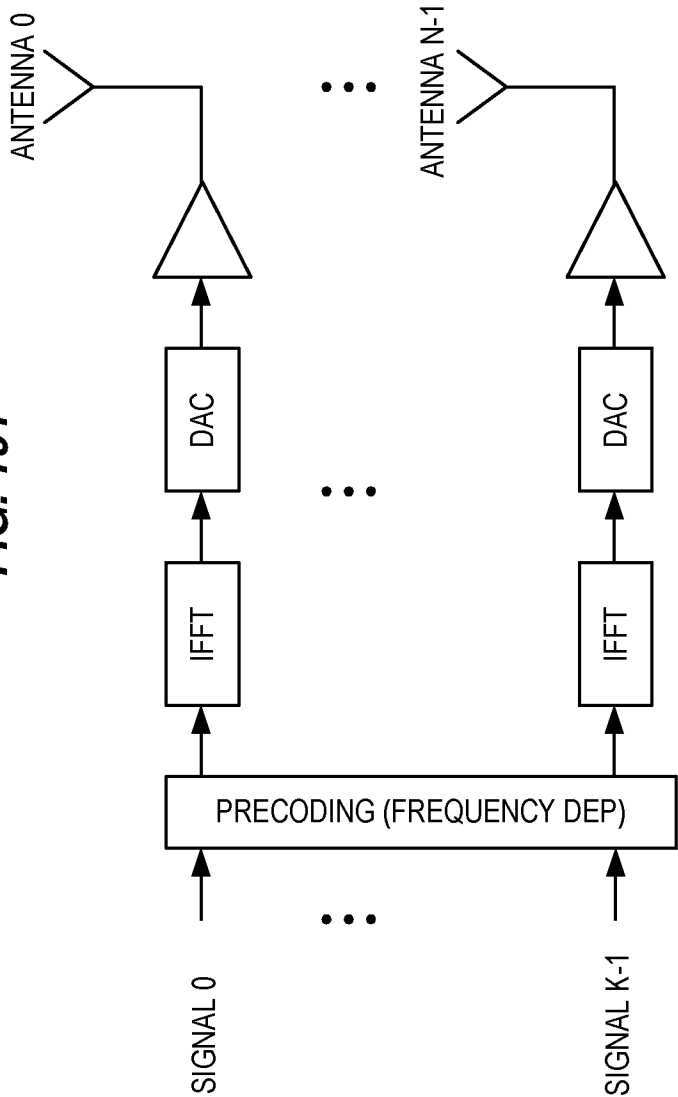


FIG. 101



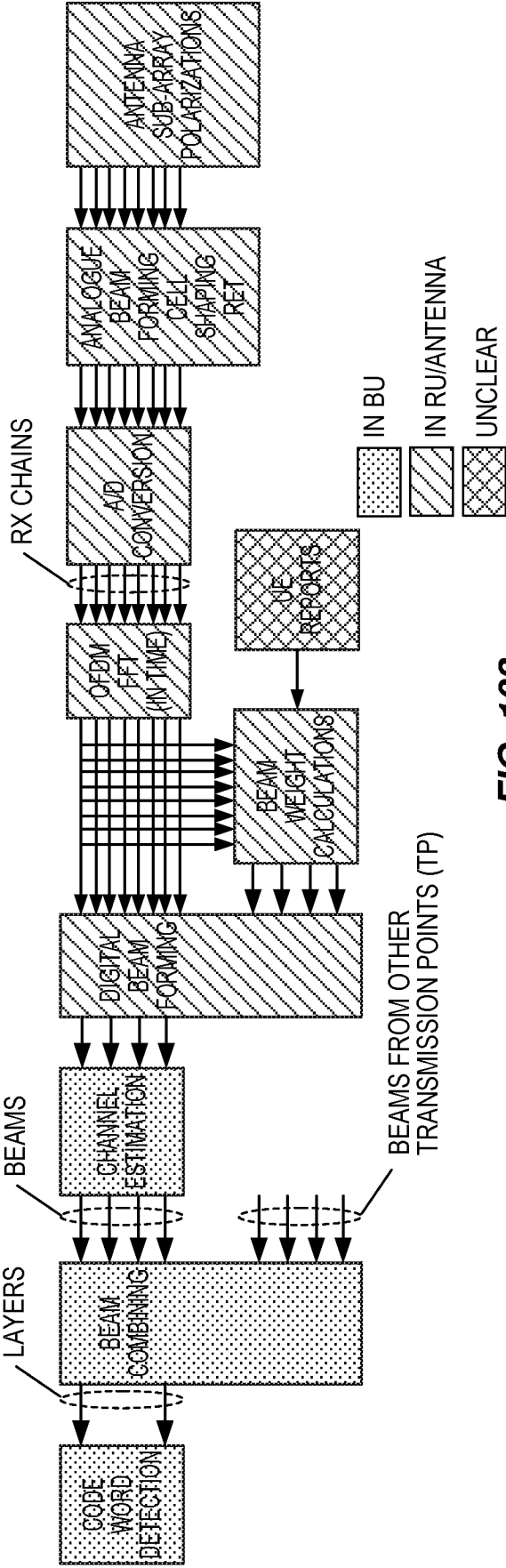


FIG. 103

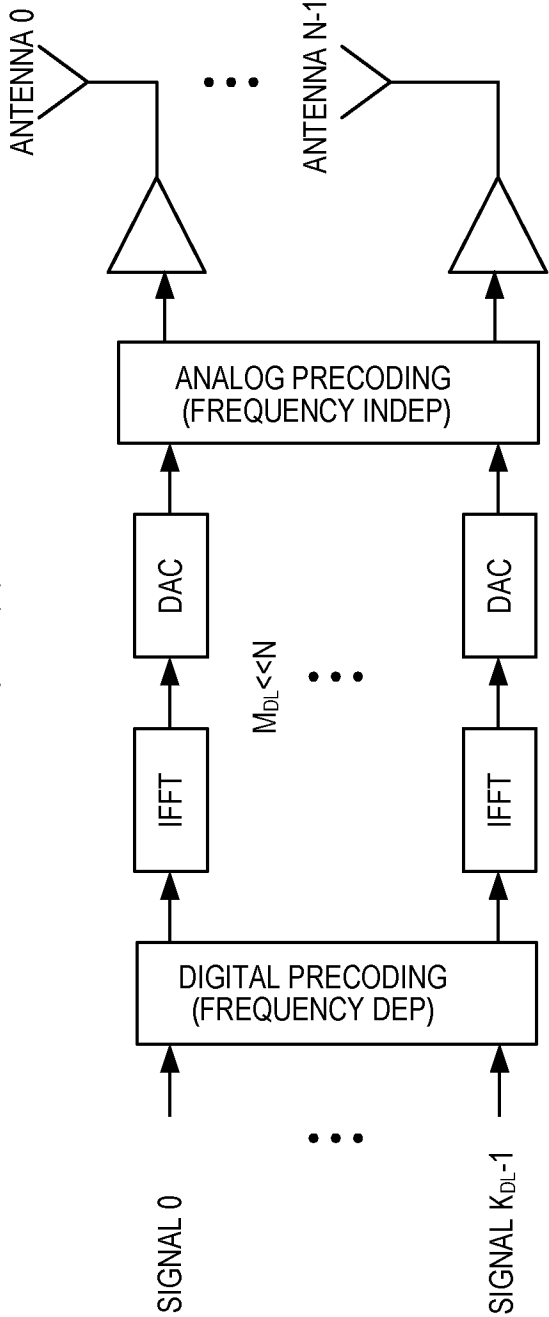
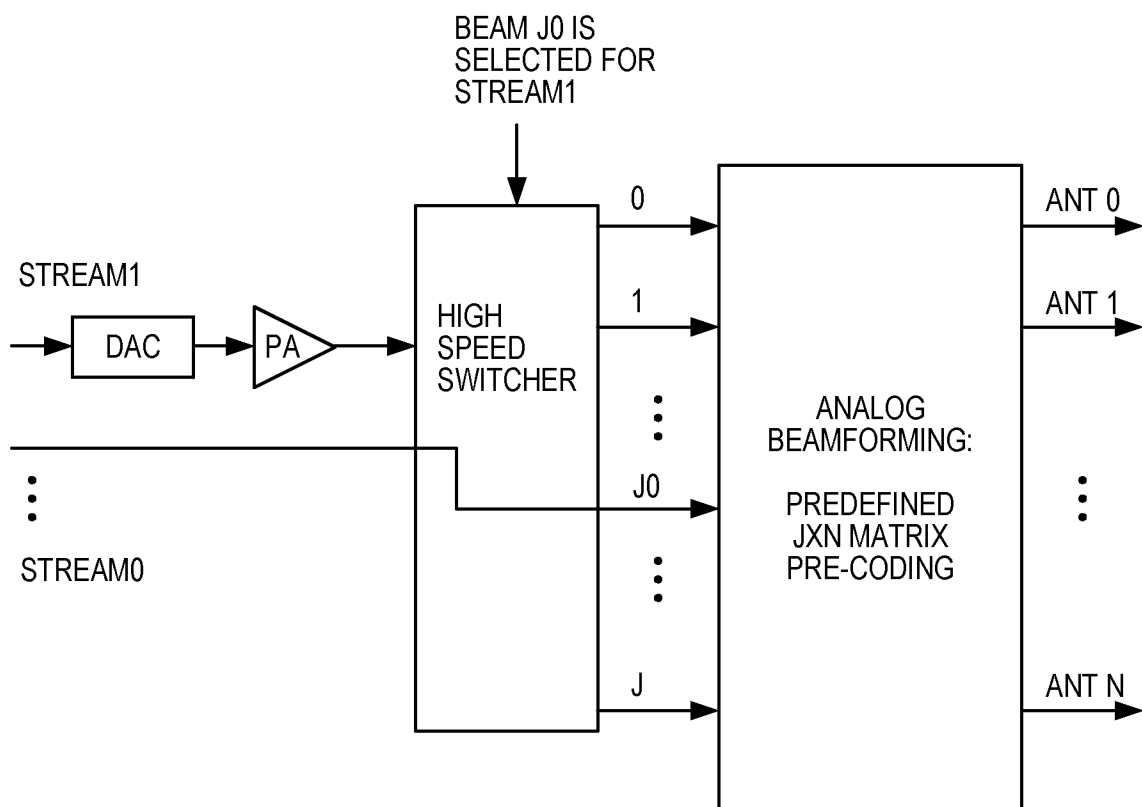
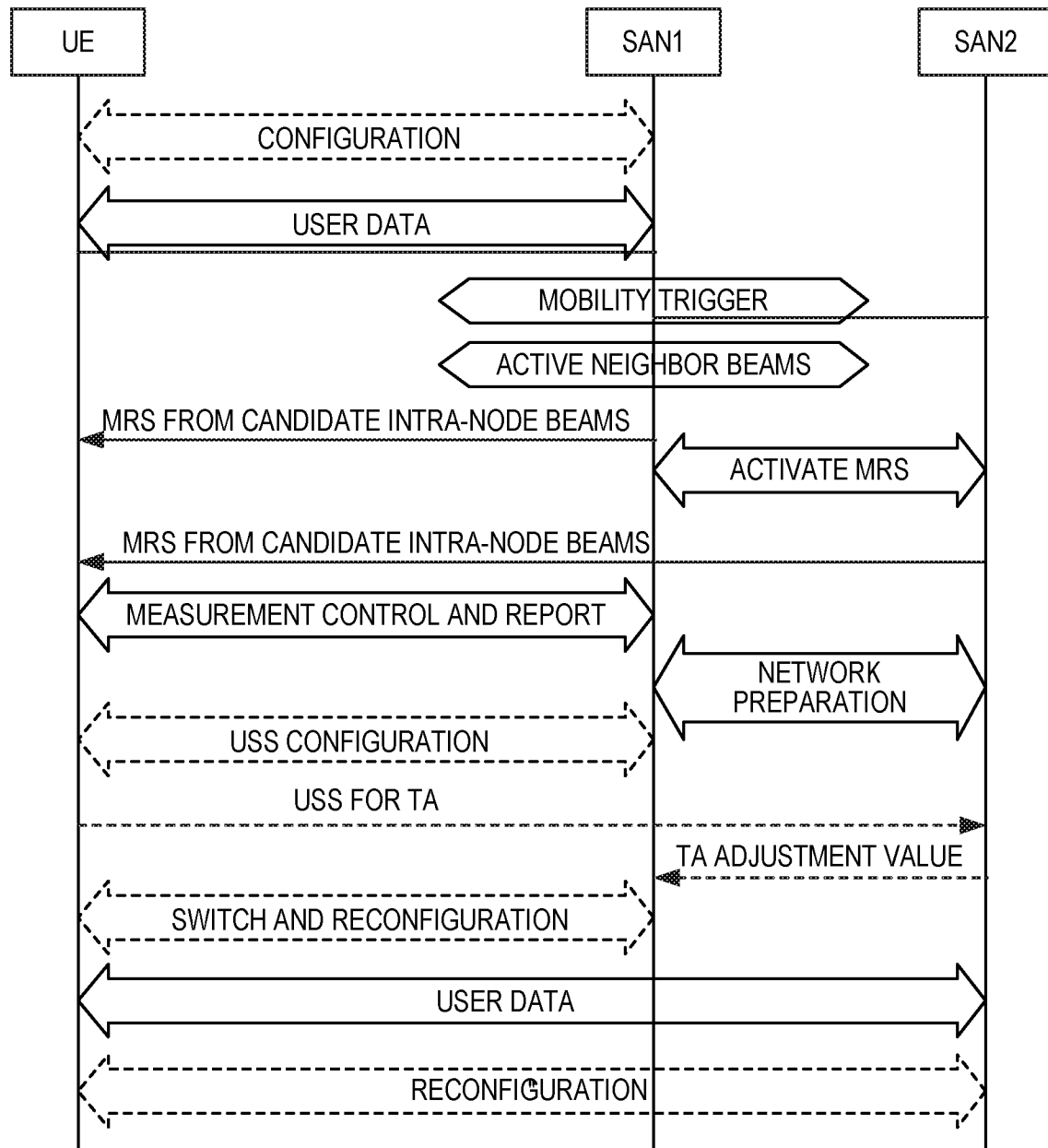


FIG. 104

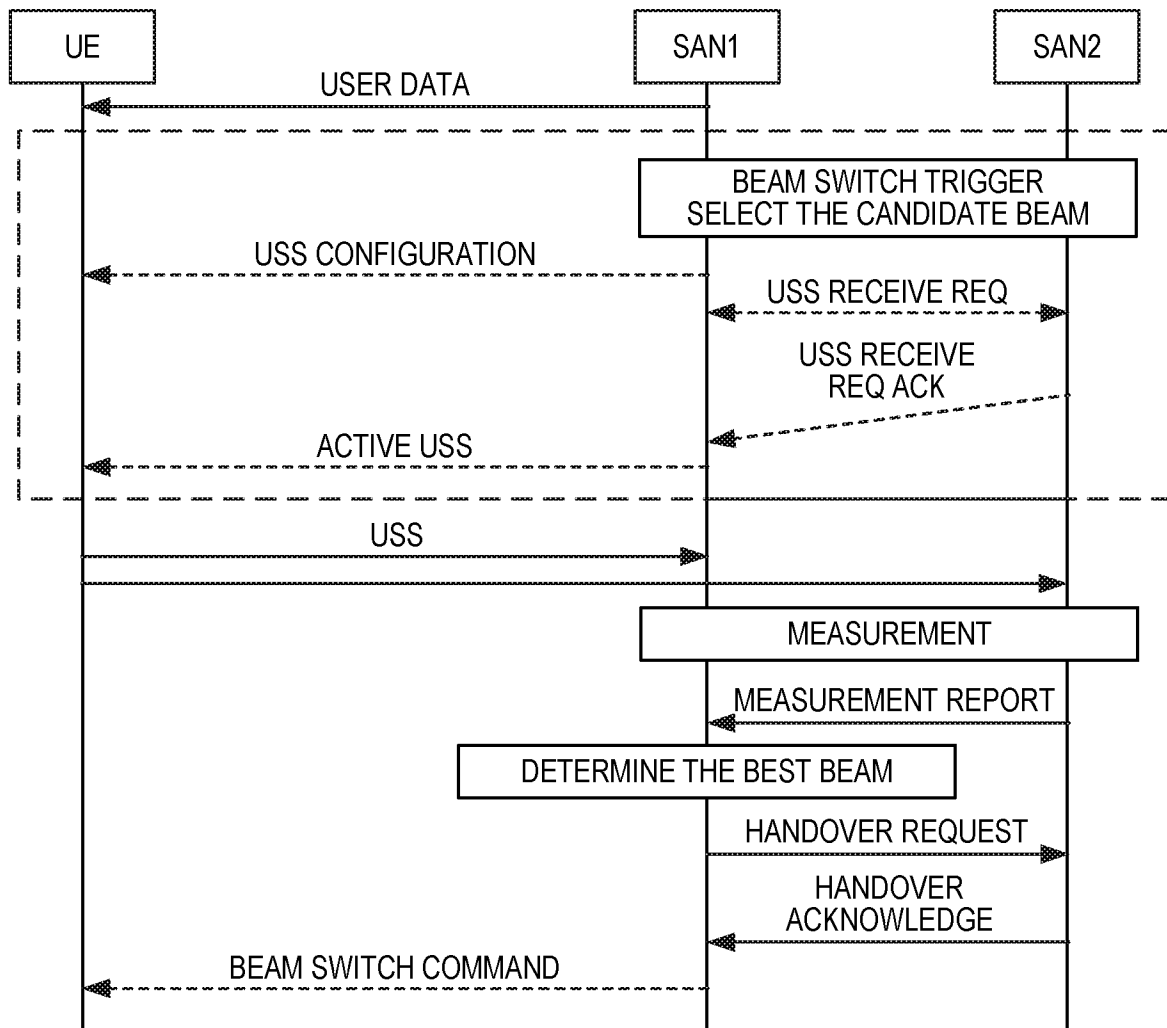
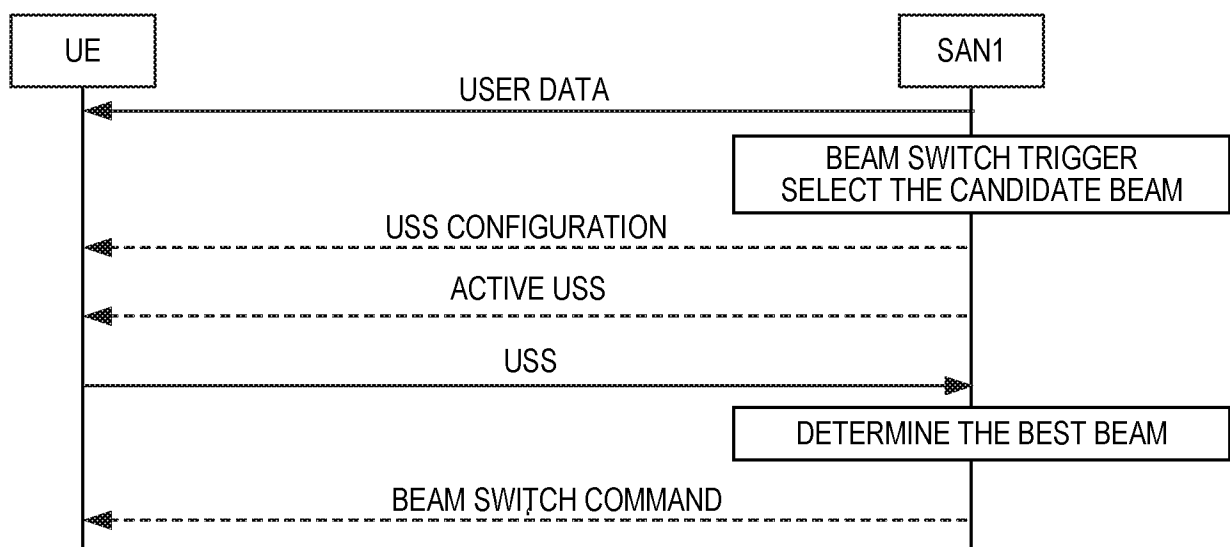
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**FIG. 105**

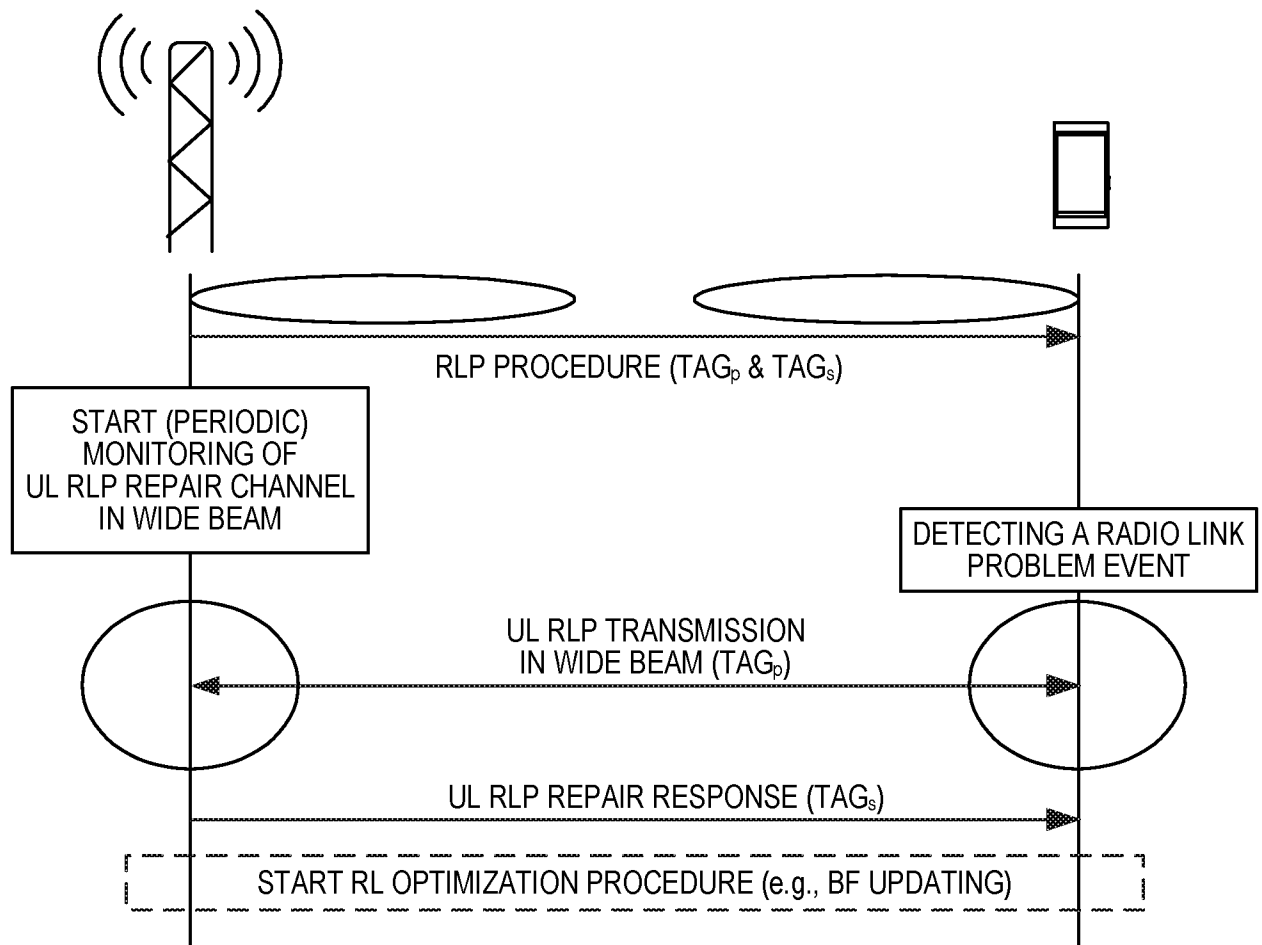
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**FIG. 106**

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**FIG. 107****FIG. 108**

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**FIG. 109**

1. LONG RANGE BACKHAUL FOR MACRO
 - A. SUBURBAN/RURAL
 - B. URBAN/SUBURBAN

GI

2. VARYING CAPACITY DEMAND OR SERVICE IN A CROWD (METIS)
 - A. INDOOR EVENT HALL
 - B. OUTDOOR FAIR OR CONCERT
 - C. STADIUM

GII

3. GROUP MOBILITY HANDLING
 - A. HIGH SPEED TRAIN
 - B. URBAN MASS TRANSPORTATION

4. SHORT-HAUL NON-LOS
 - A. WIRELESS "FIBRE" TO THE HOME OR RESIDENTIAL INTERNET ACCESS (NLOS) INCLUDING OUTDOOR TO INDOOR
 - B. SMALL CELL BACKHAUL (NLOS) INCLUDING OUTDOOR TO INDOOR
 - C. MASSIVE MTC GATEWAY

5. ULTRA-DENSE mmW MESH

GIII

6. PUBLIC SAFETY AND DISASTER RESPONSE
7. V2V AND V2I COMMUNICATION

FIG. 110

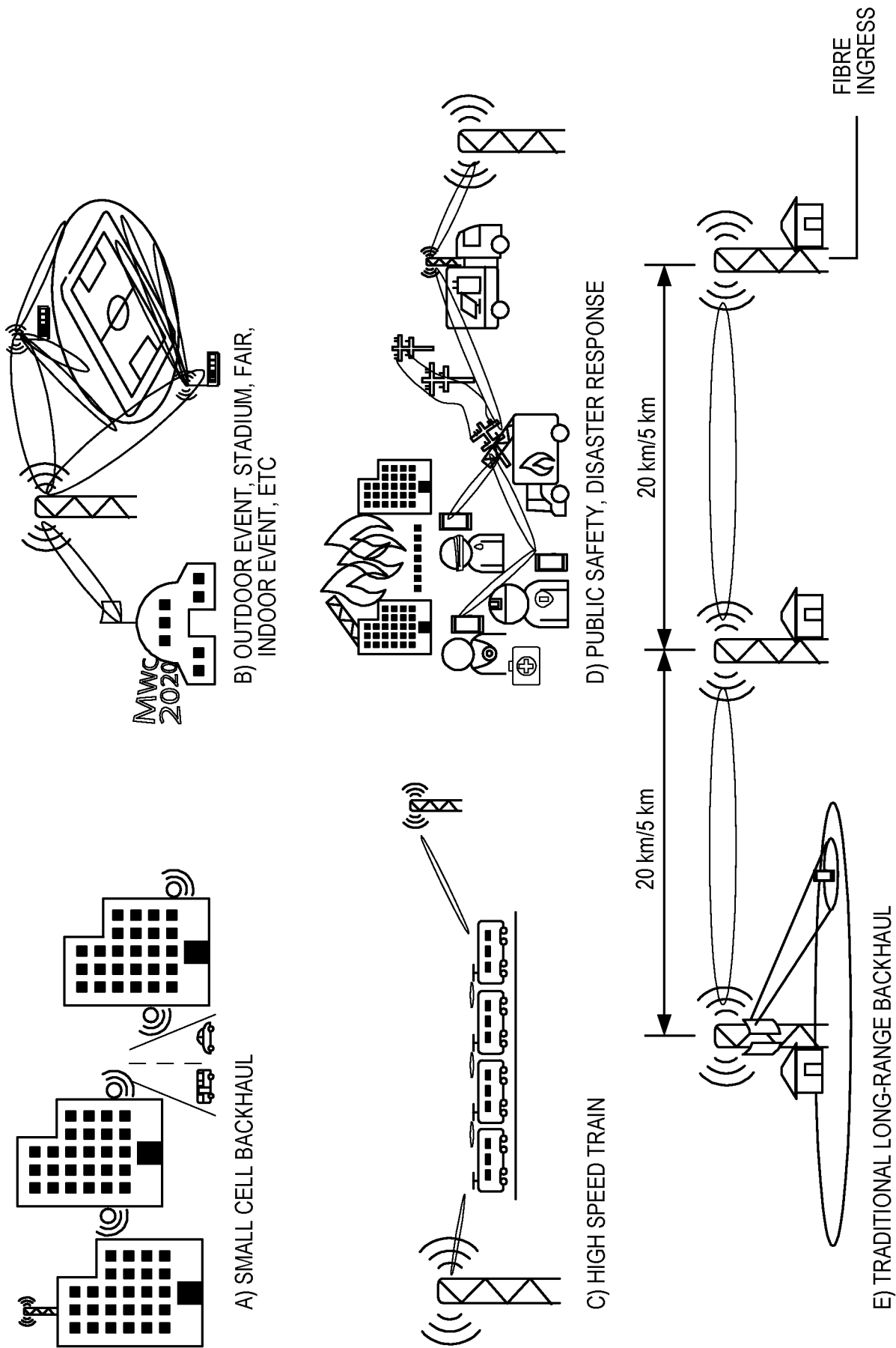


FIG. 111

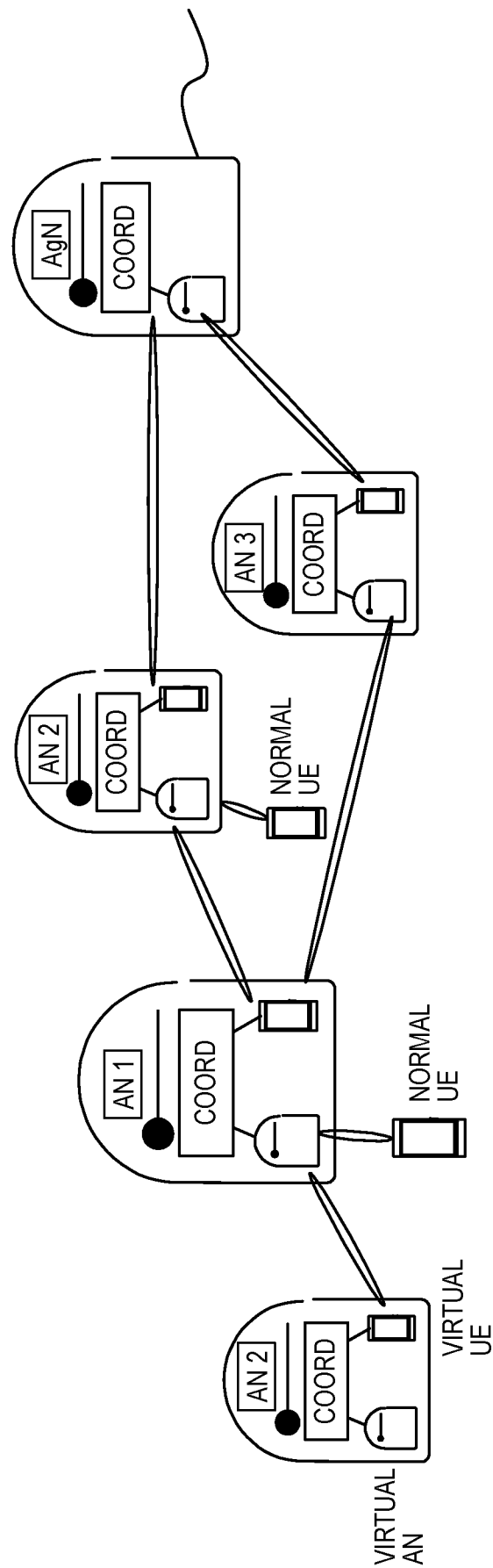


FIG. 112

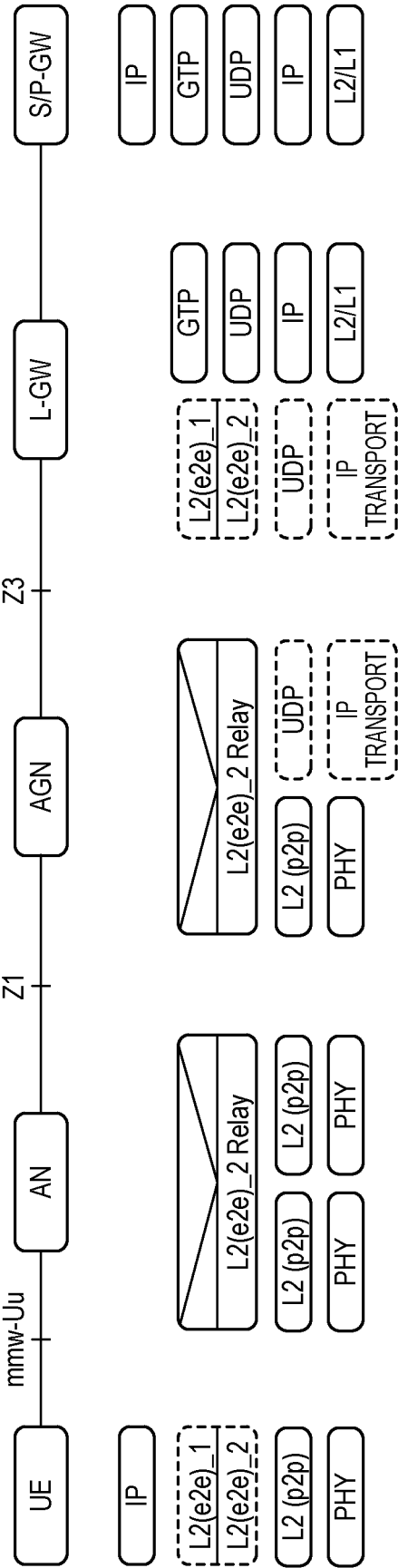


FIG. 113

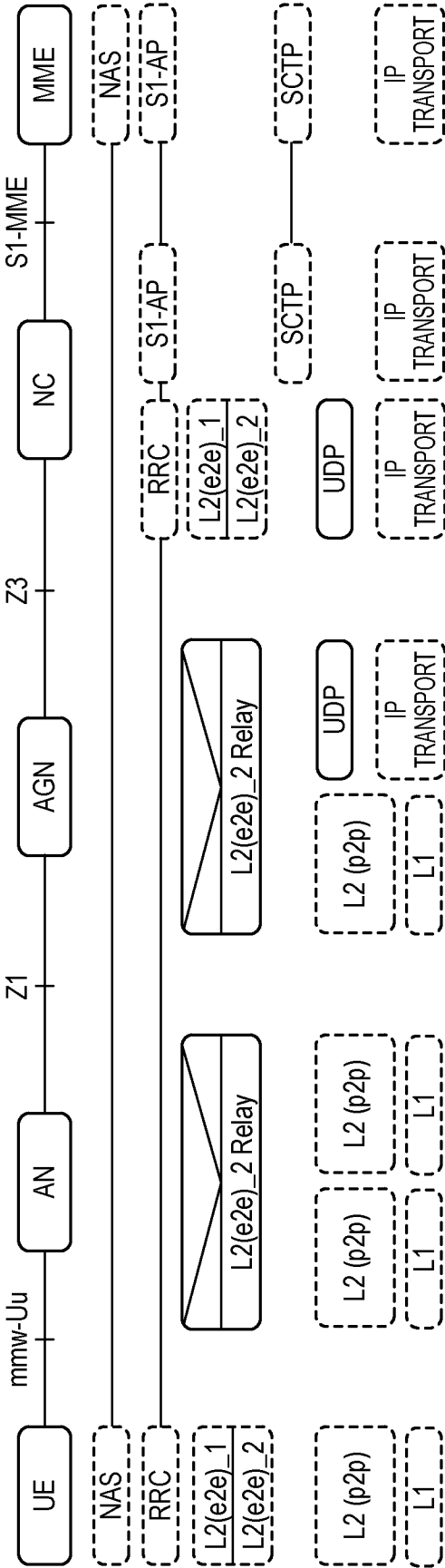


FIG. 114

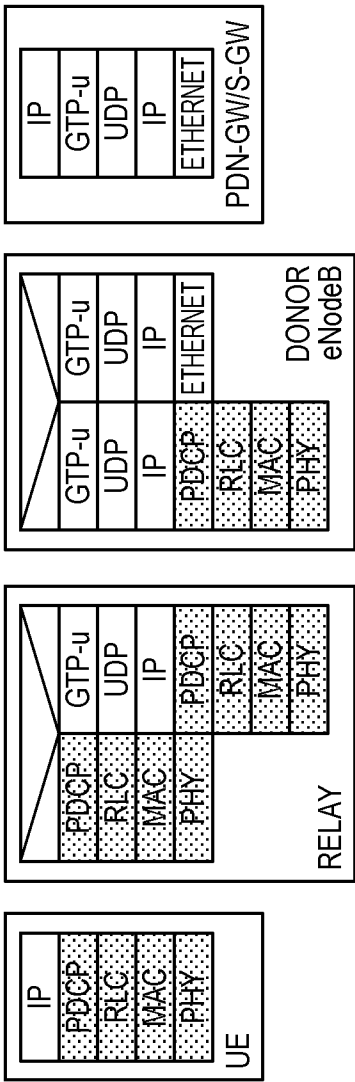


FIG. 115

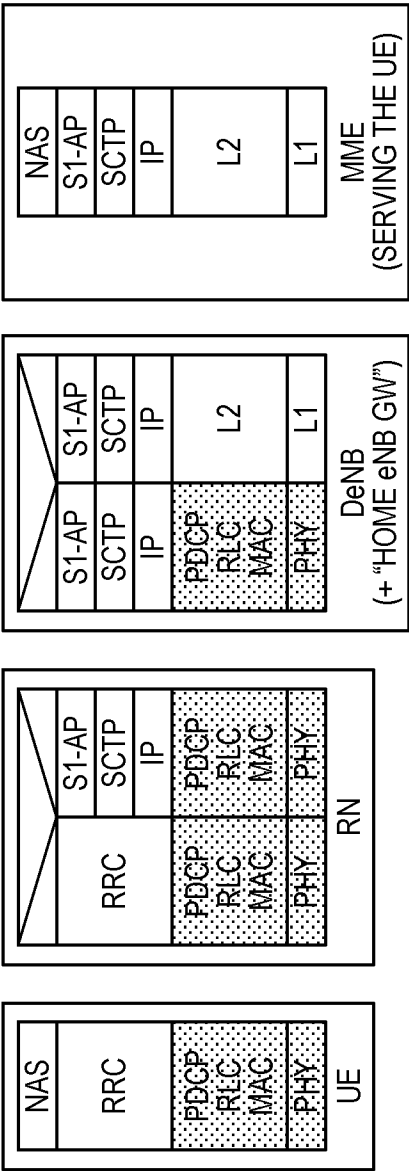


FIG. 116

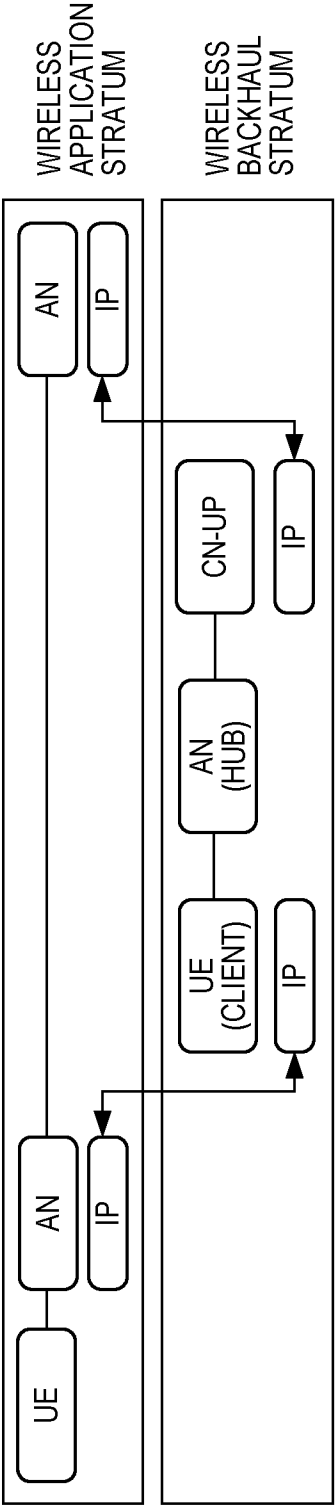


FIG. 117



FIG. 118

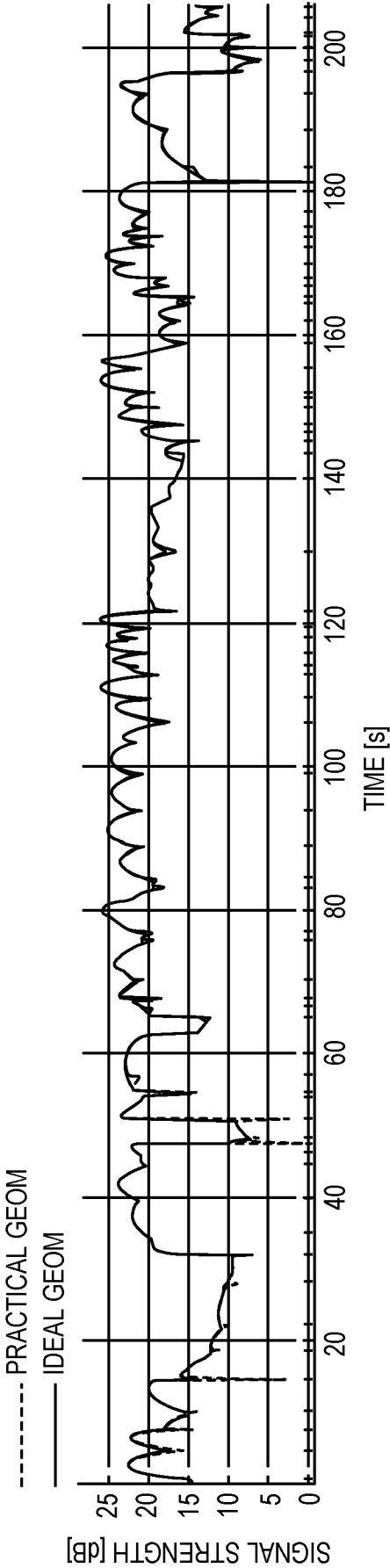


FIG. 119

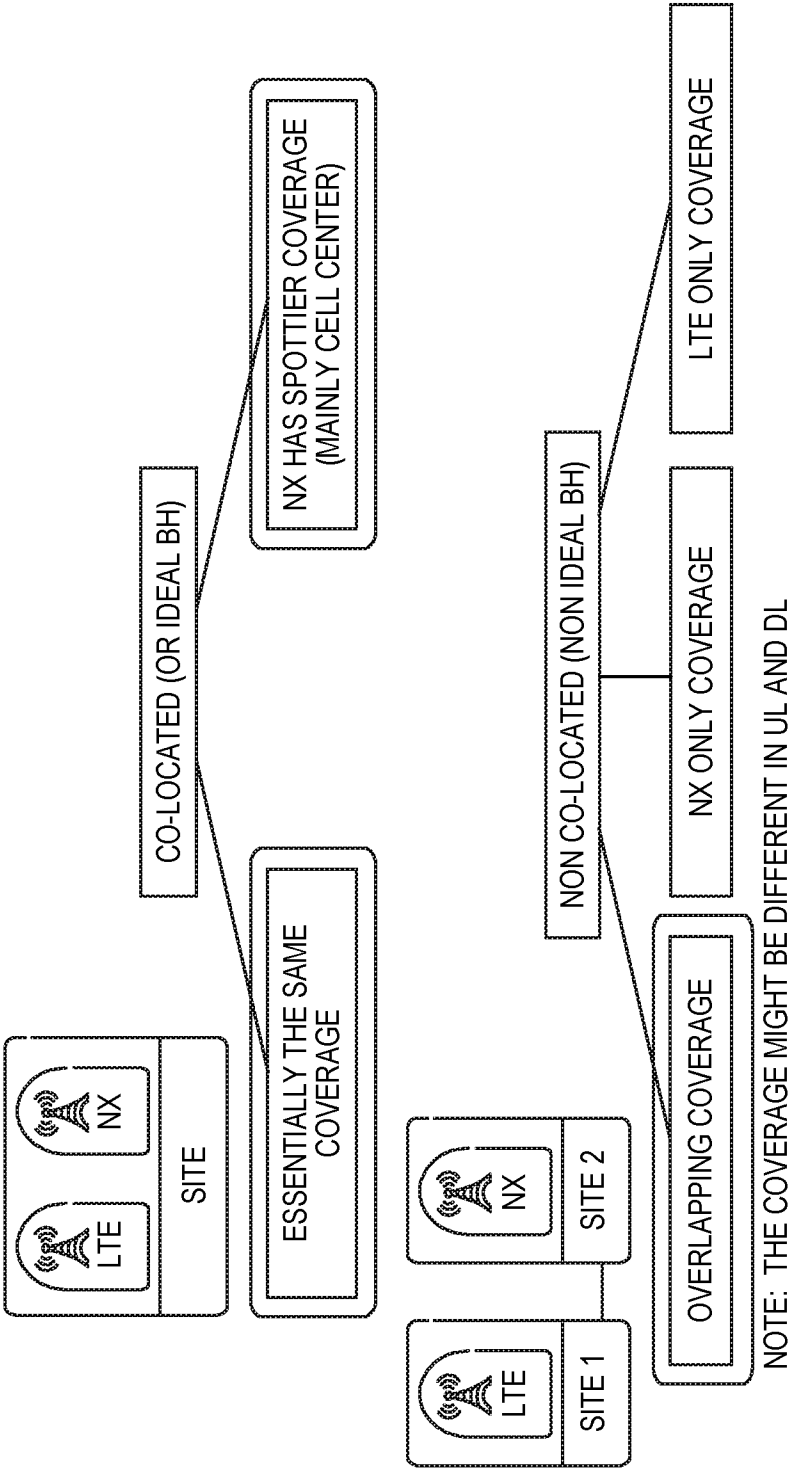


FIG. 120

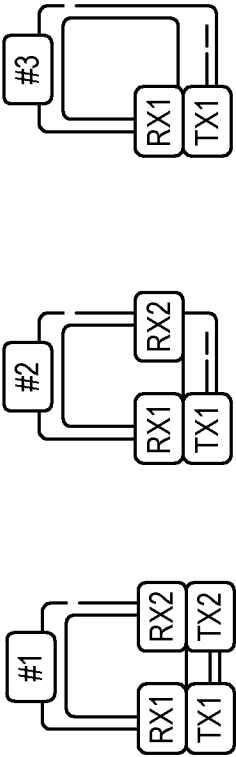


FIG. 121

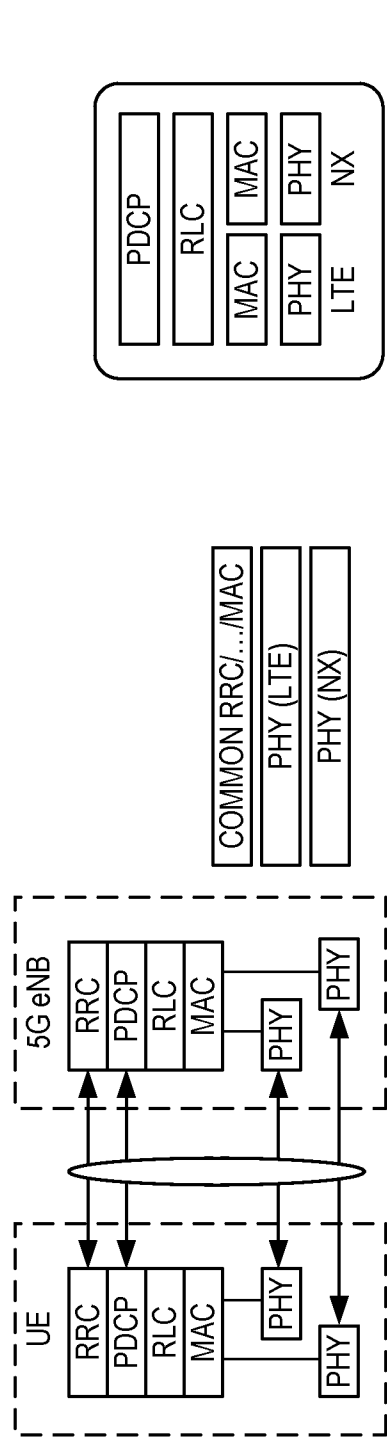


FIG. 122

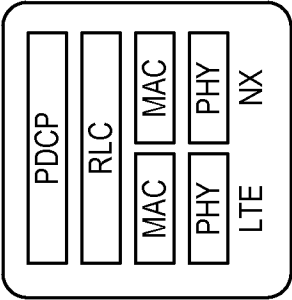


FIG. 123

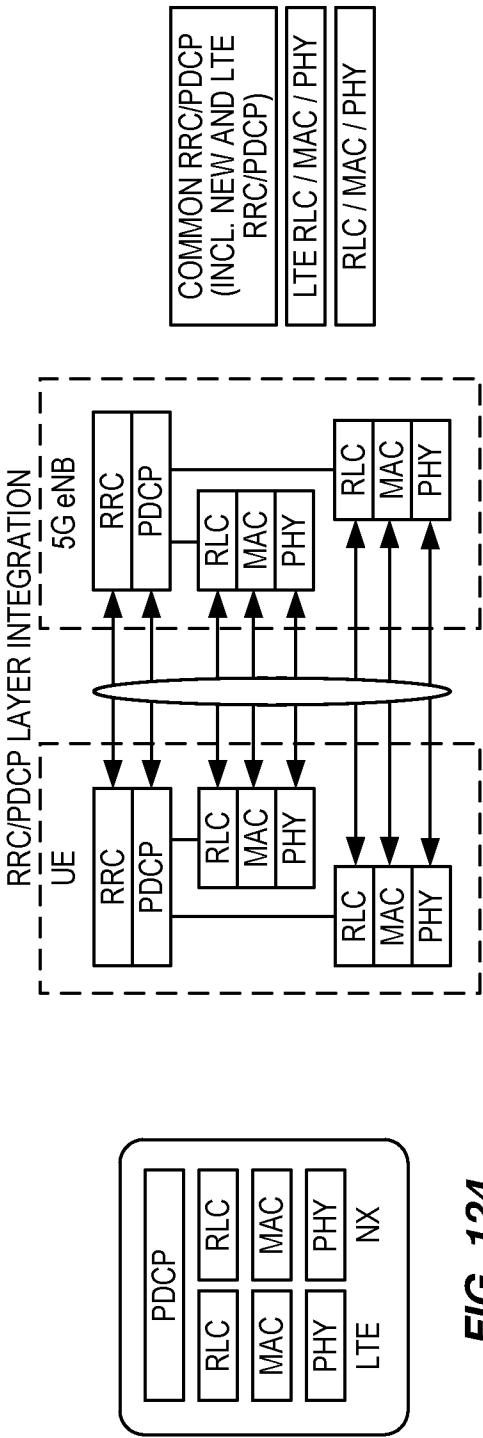


FIG. 124

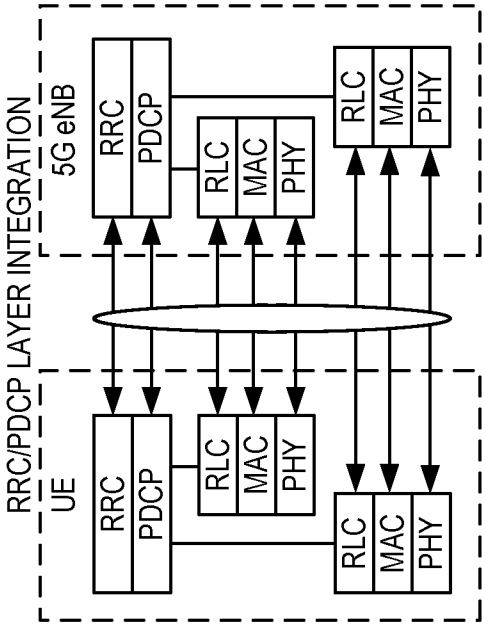


FIG. 125

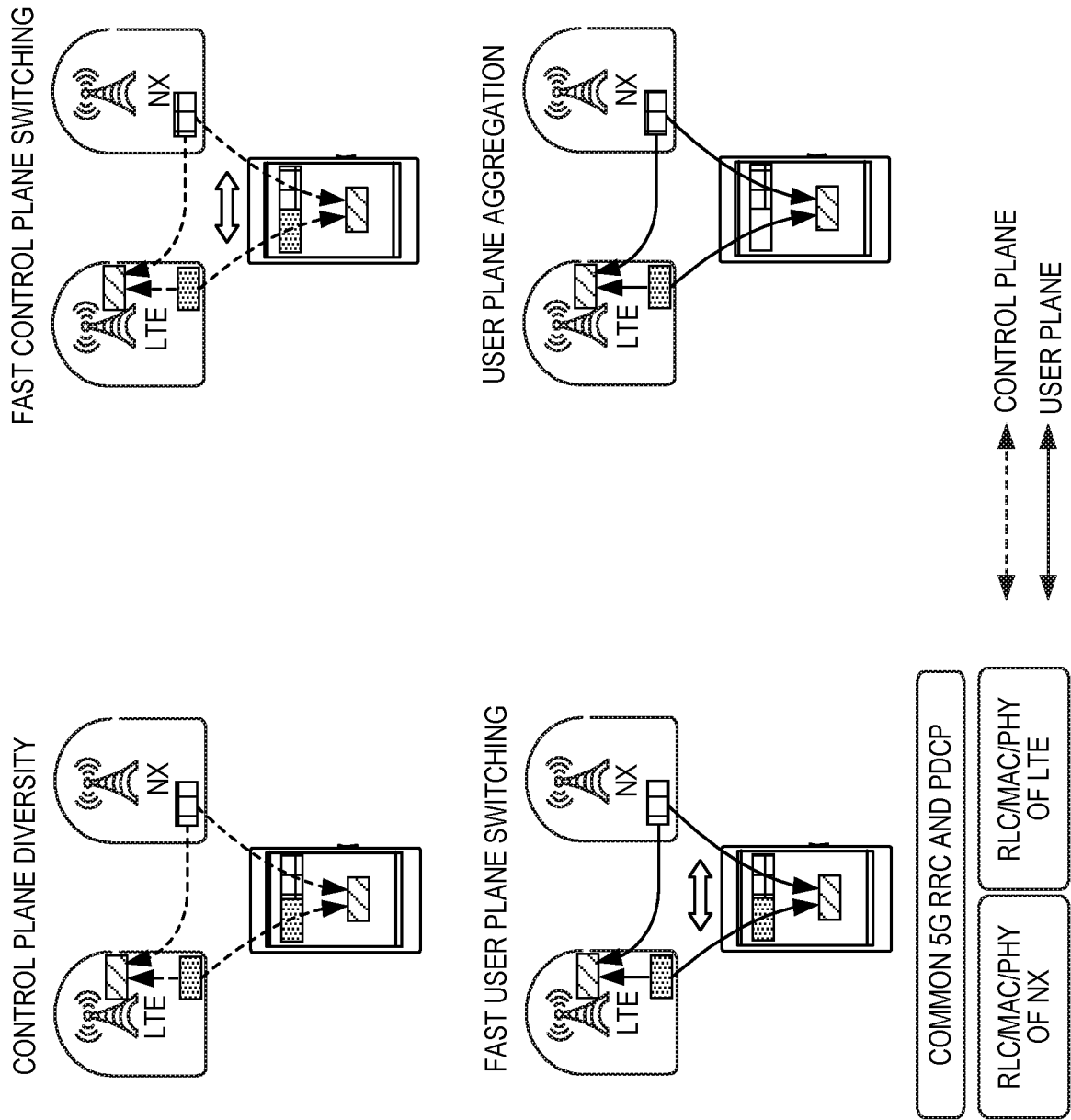


FIG. 126

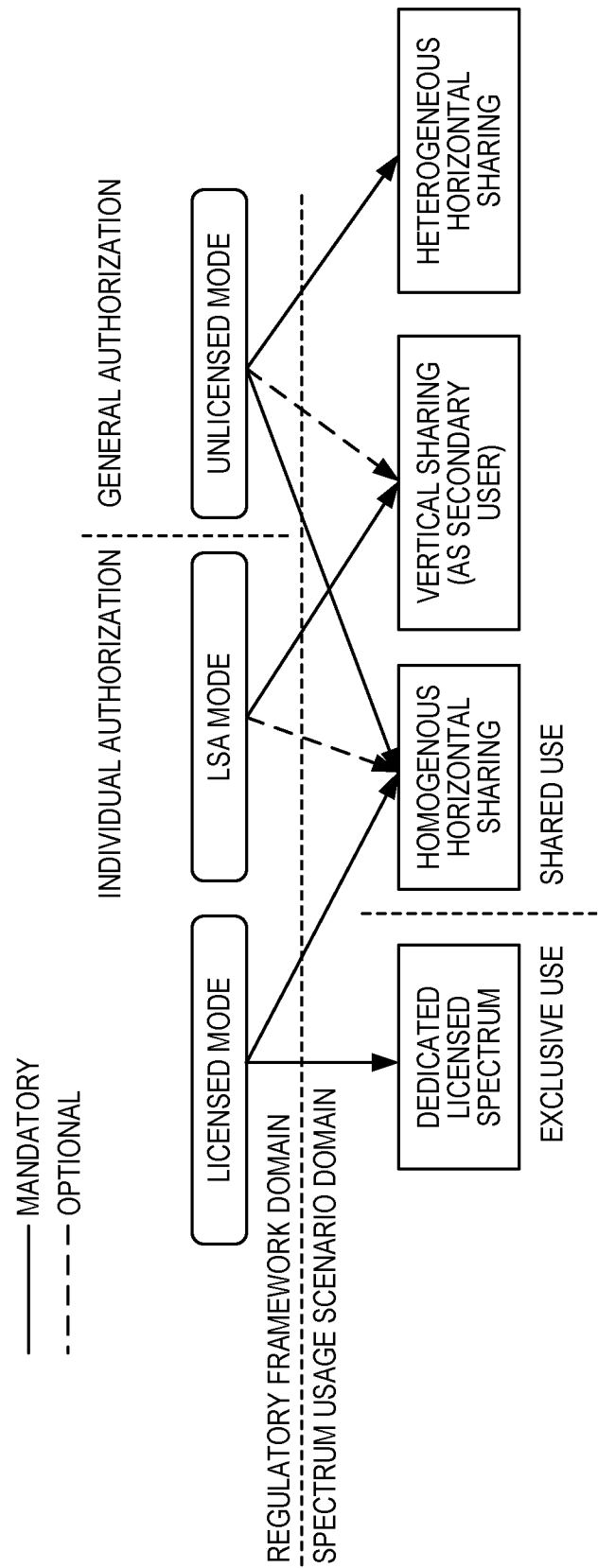
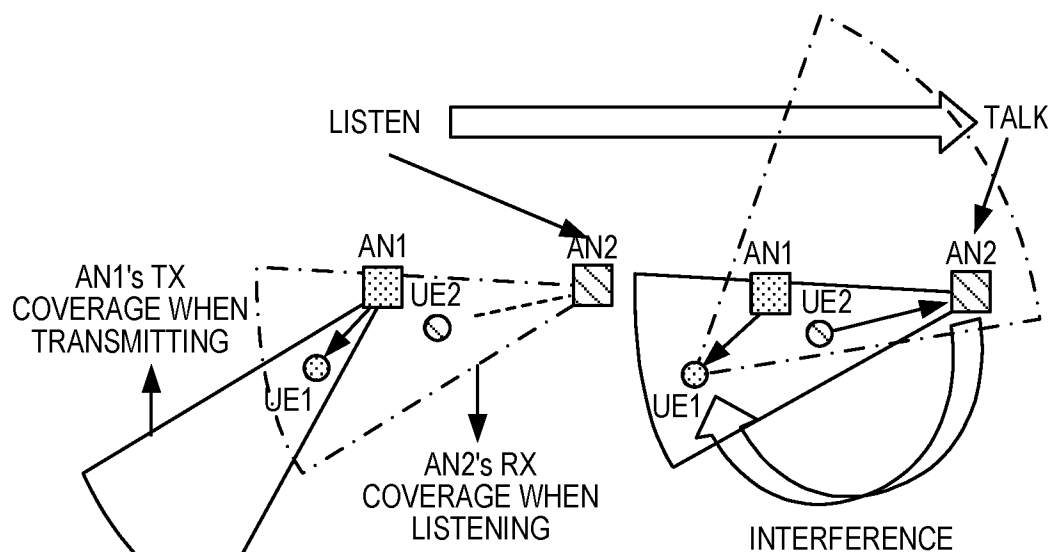
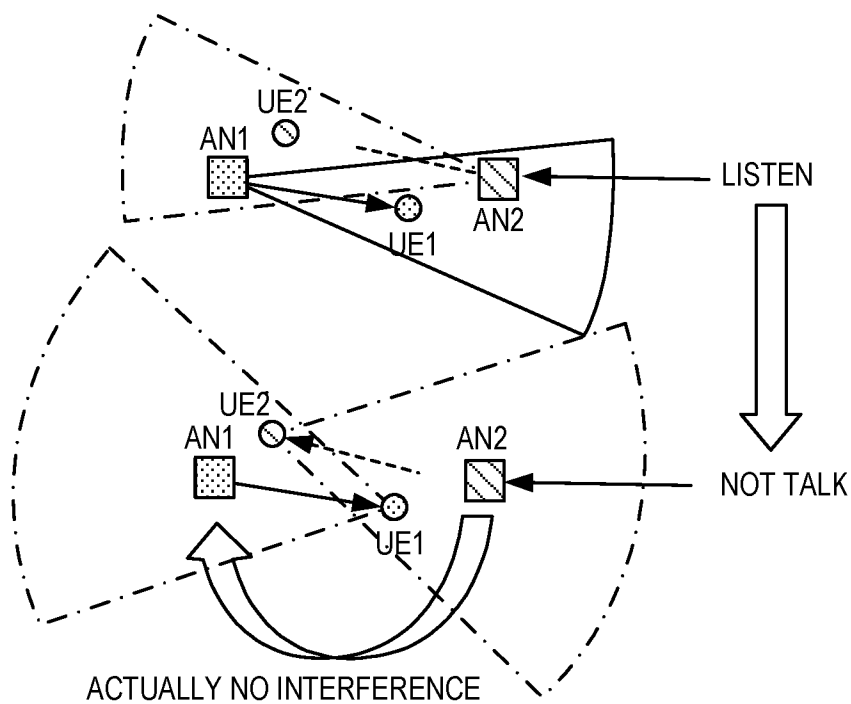


FIG. 127

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A) HIDDEN NODE PROBLEM



B) EXPOSED NODE PROBLEM

FIG. 128

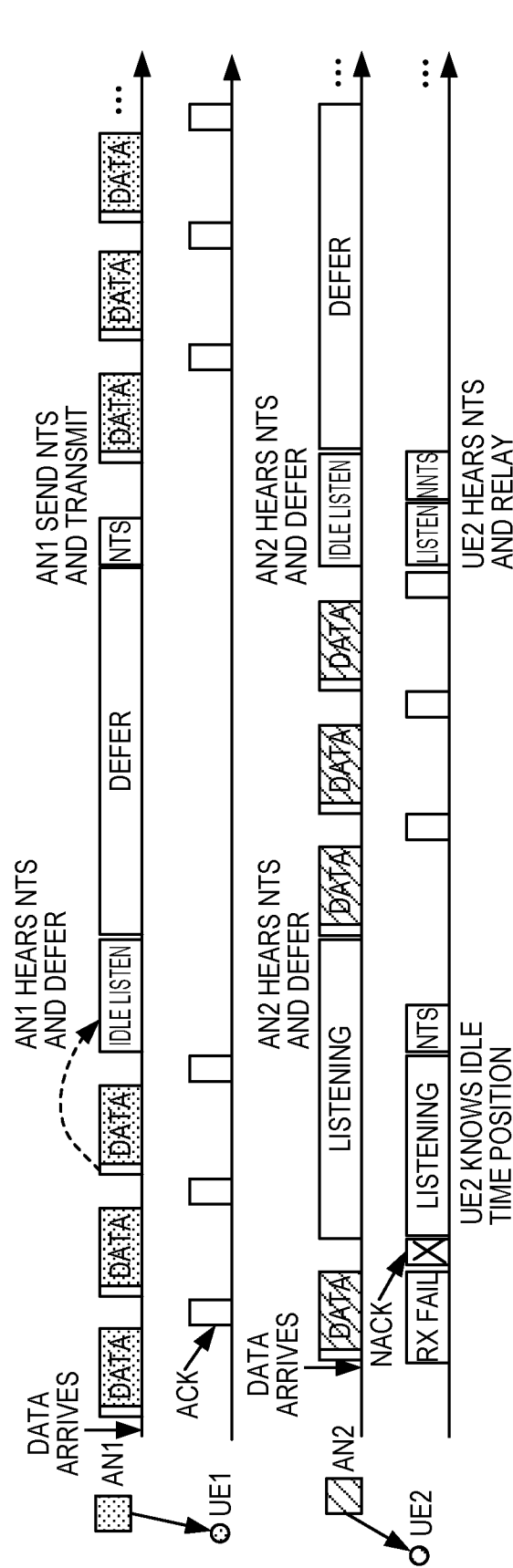


FIG. 129

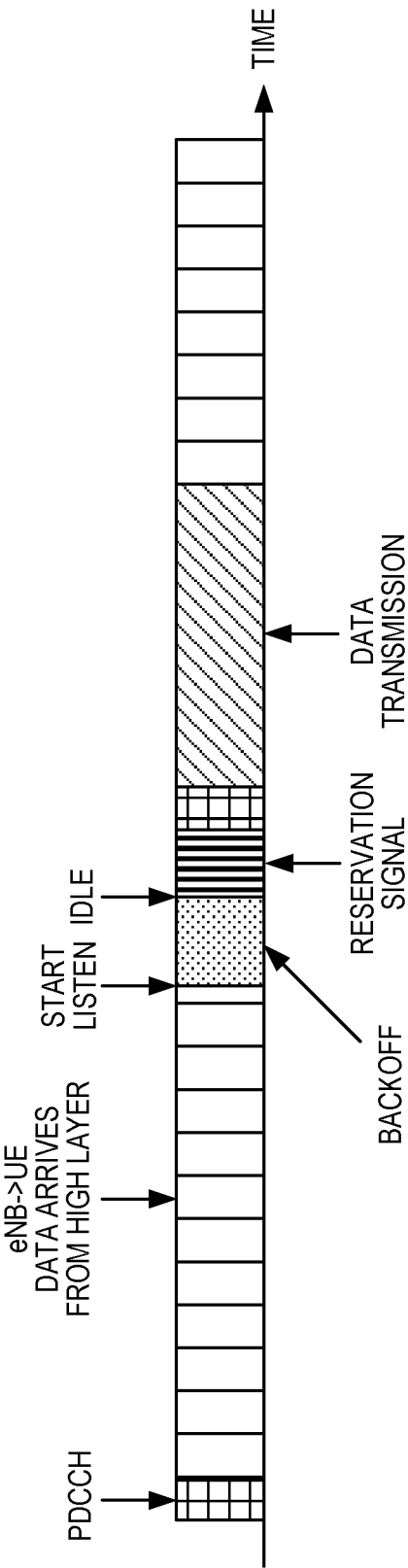


FIG. 130

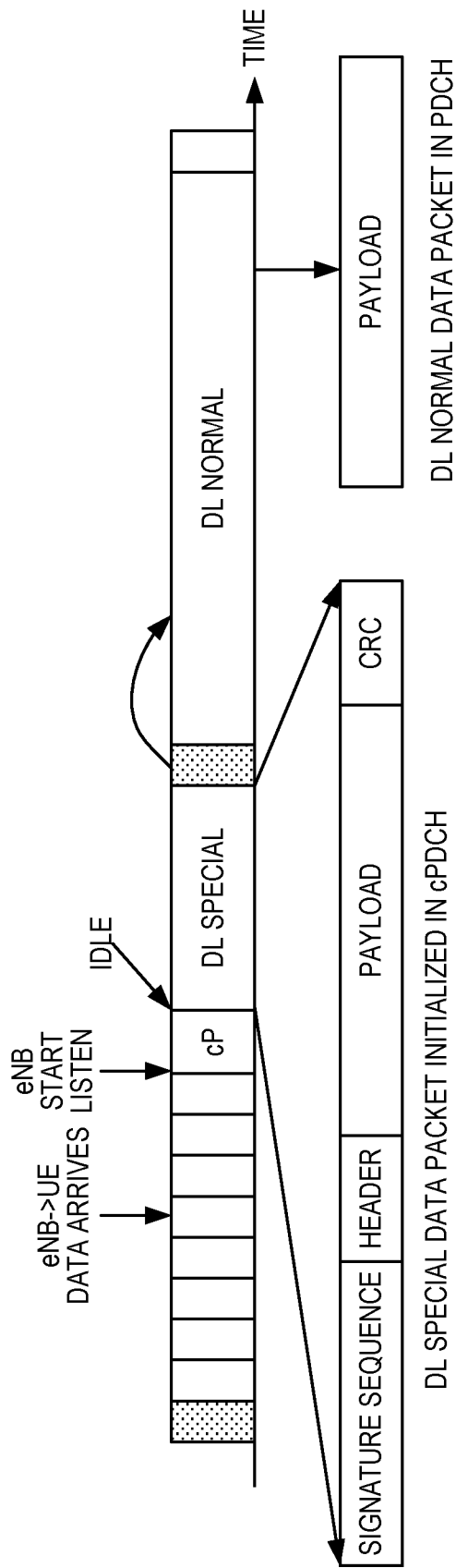


FIG. 131

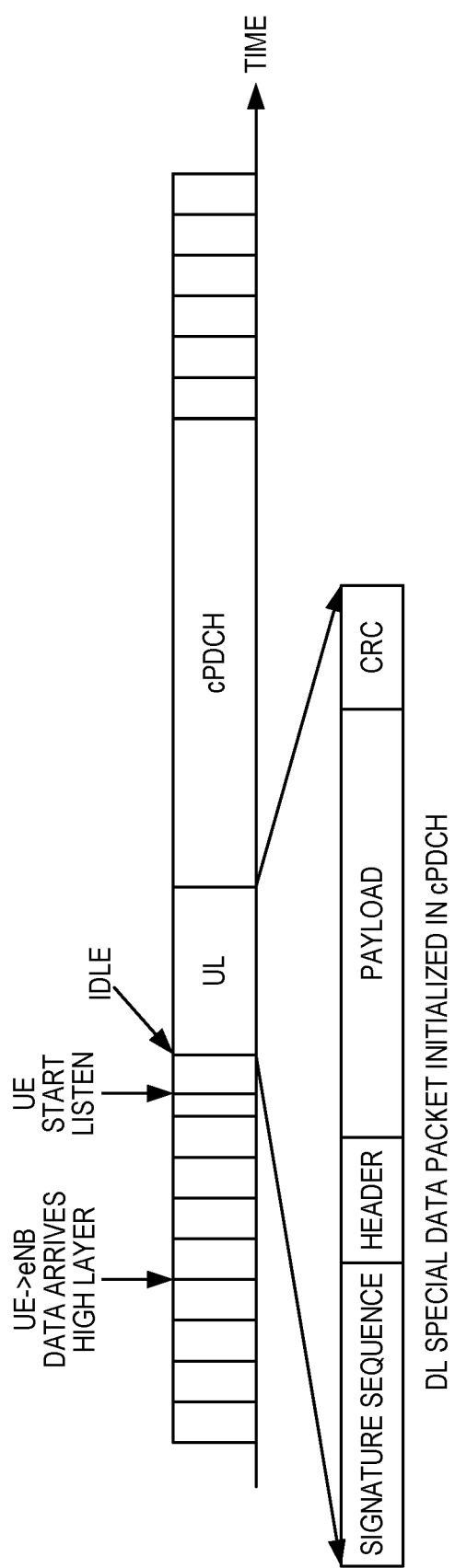


FIG. 132

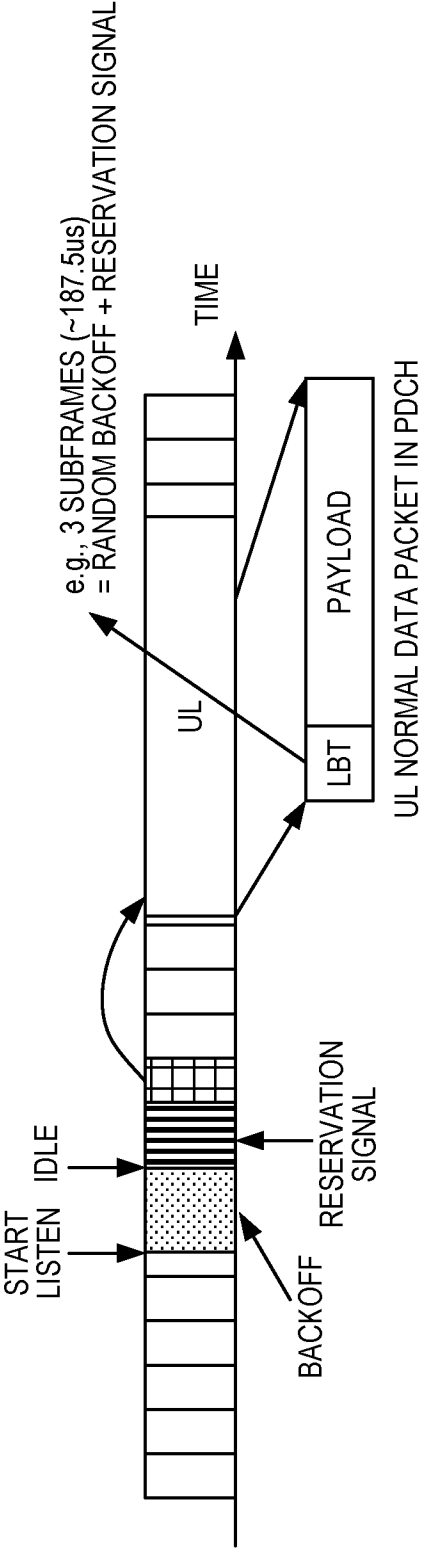


FIG. 133

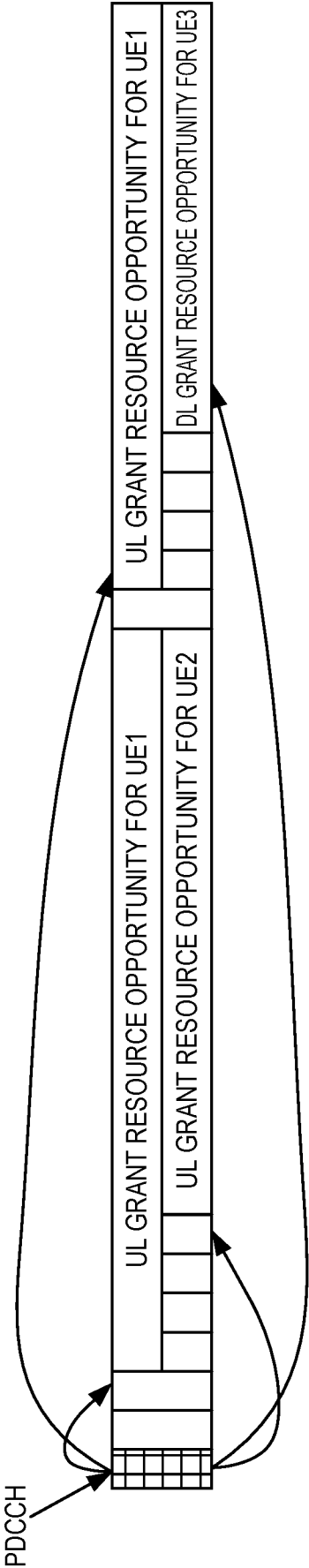


FIG. 134

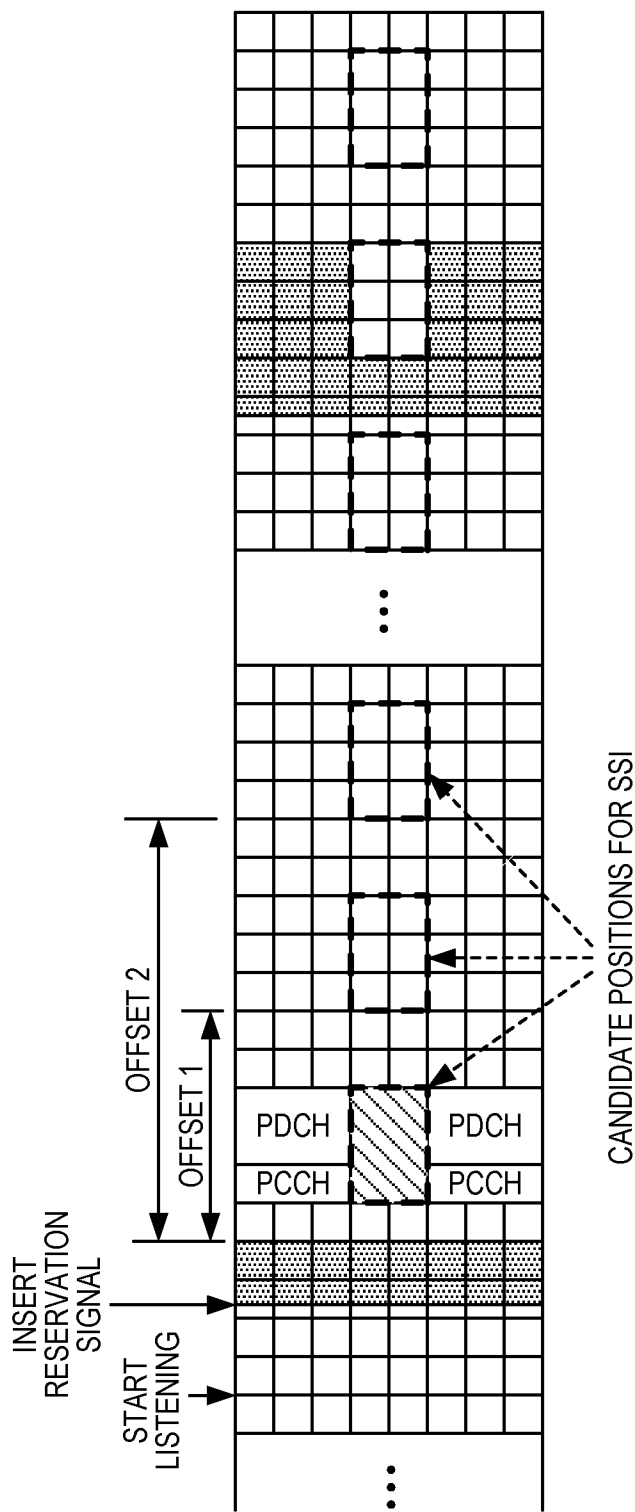


FIG. 135

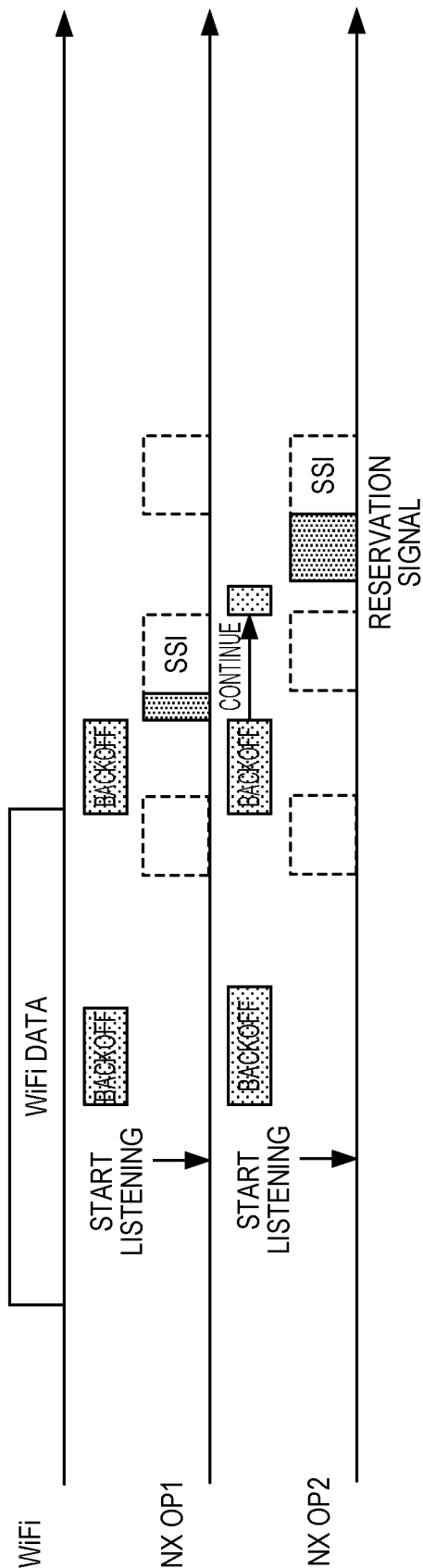


FIG. 136

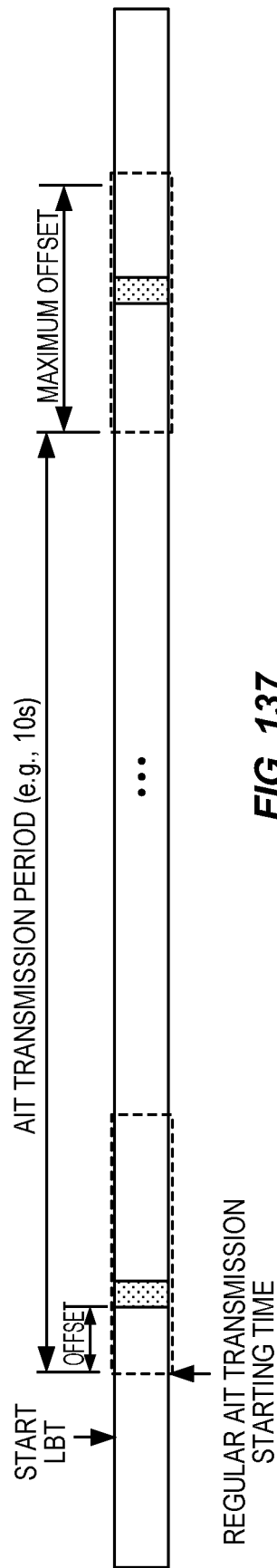


FIG. 137

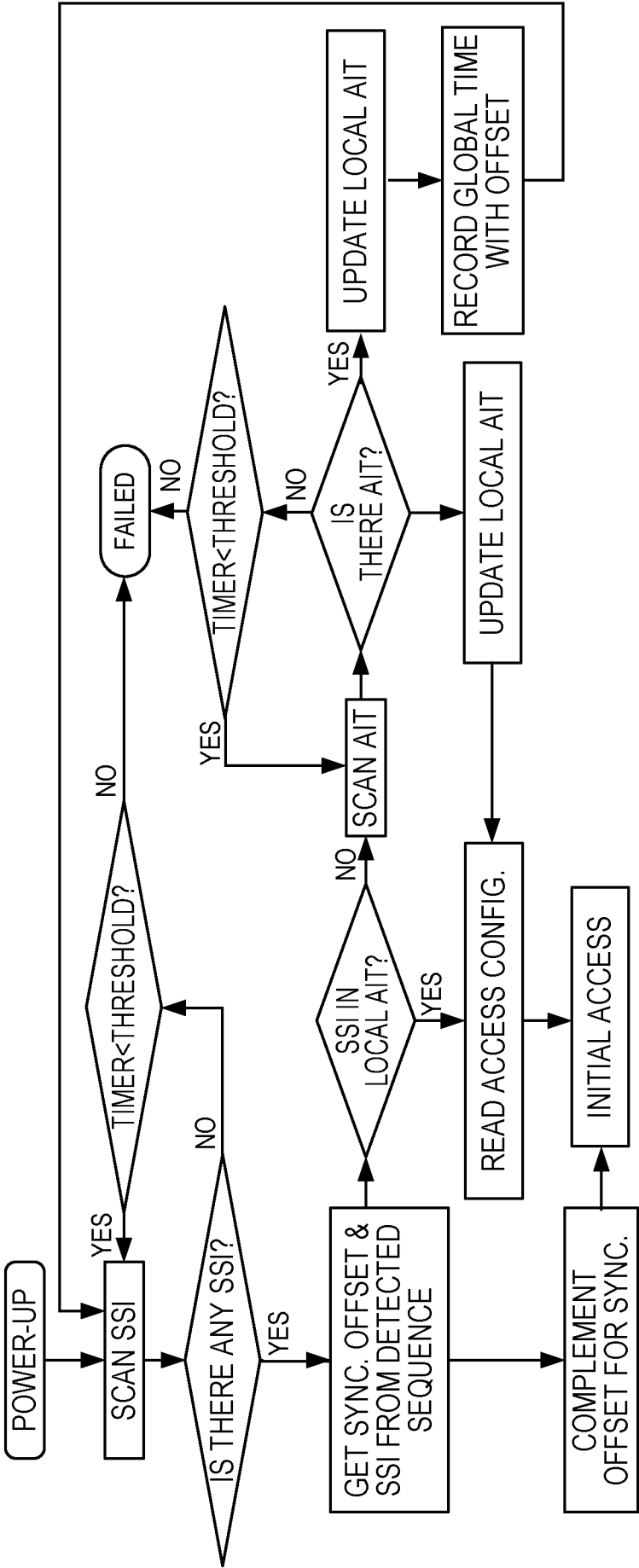
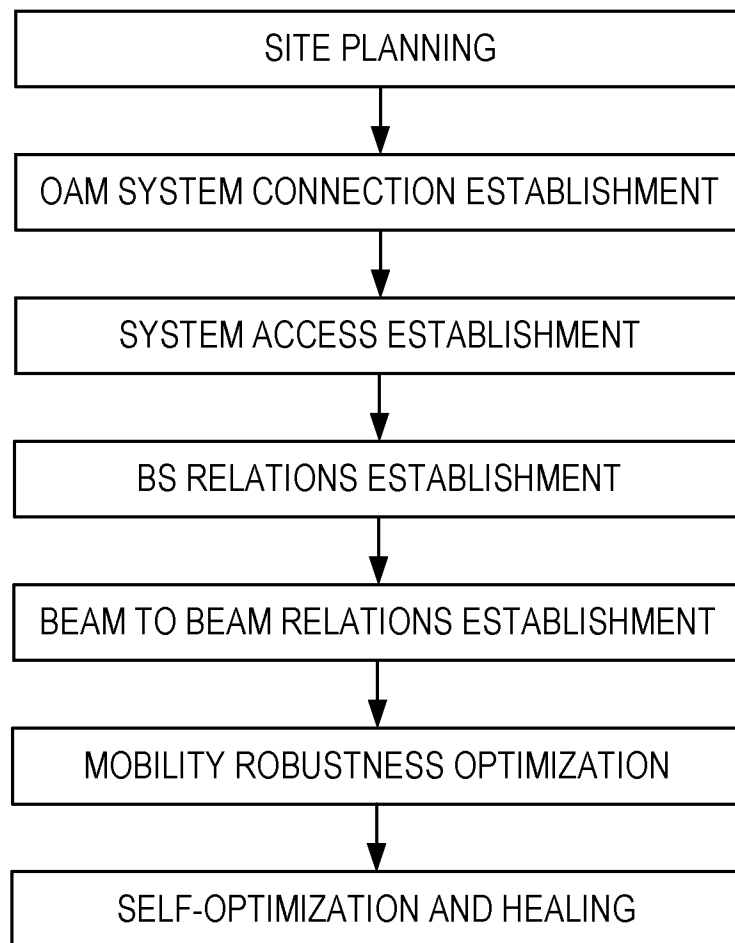


FIG. 138

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**FIG. 139**

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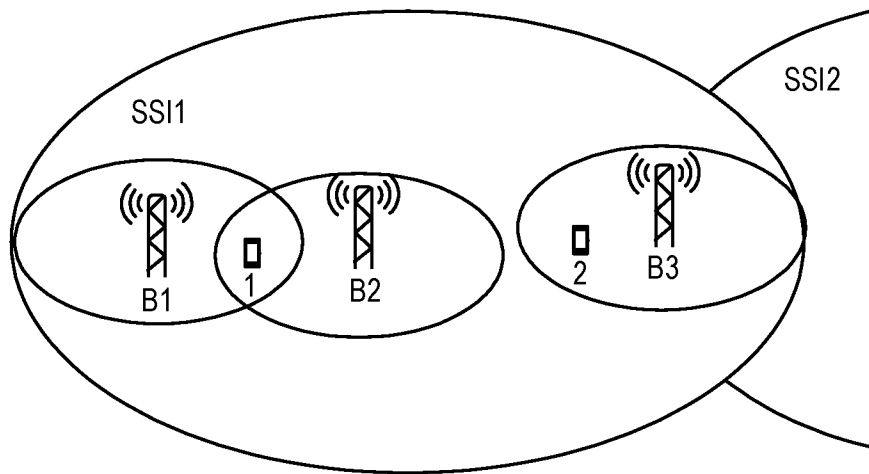


FIG. 140

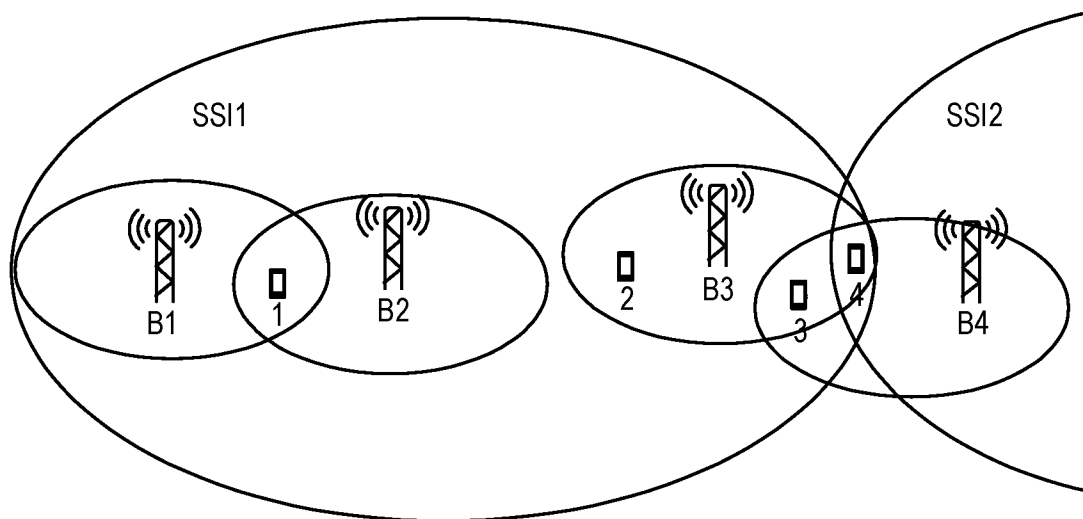


FIG. 141

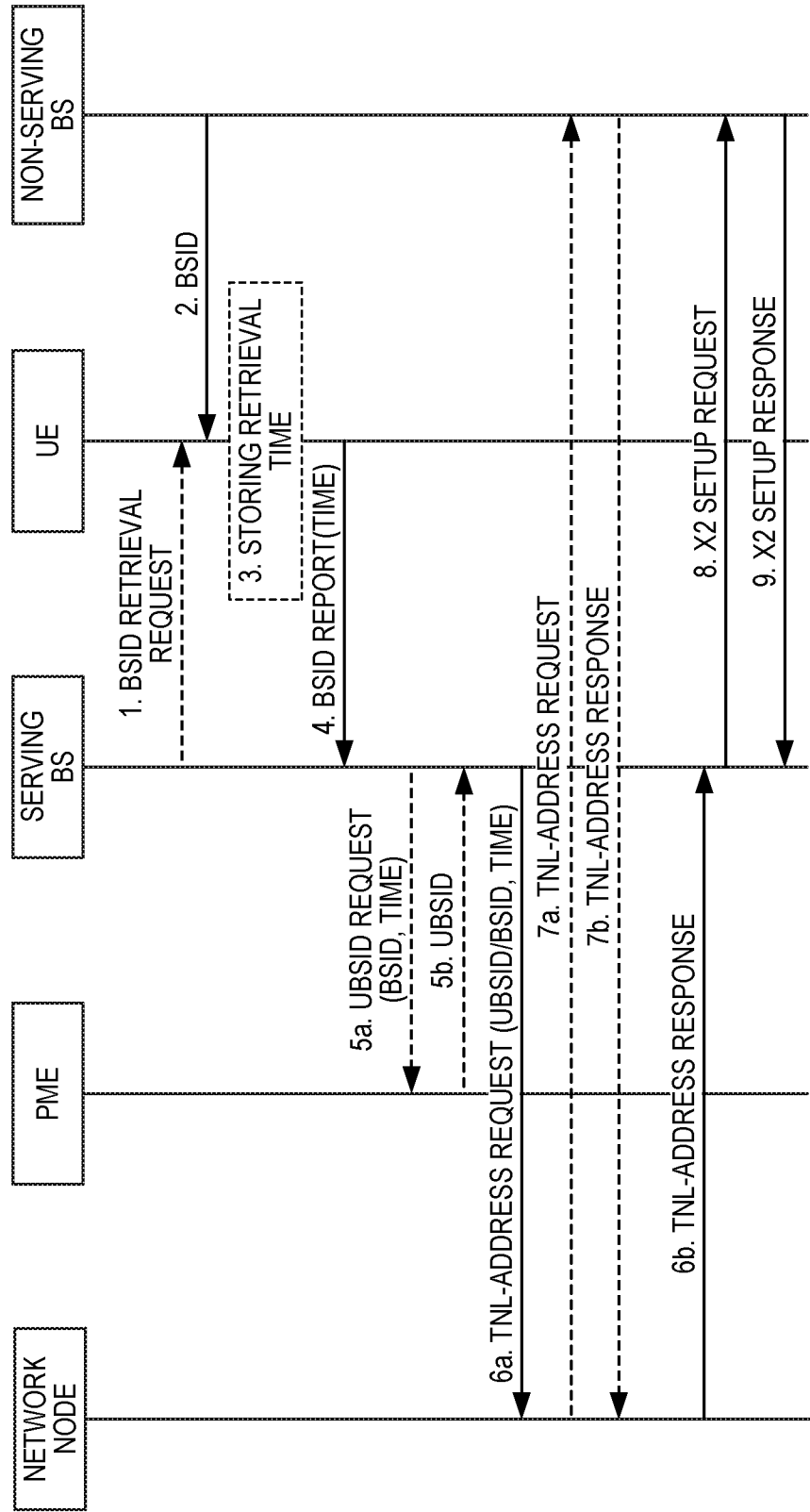


FIG. 142

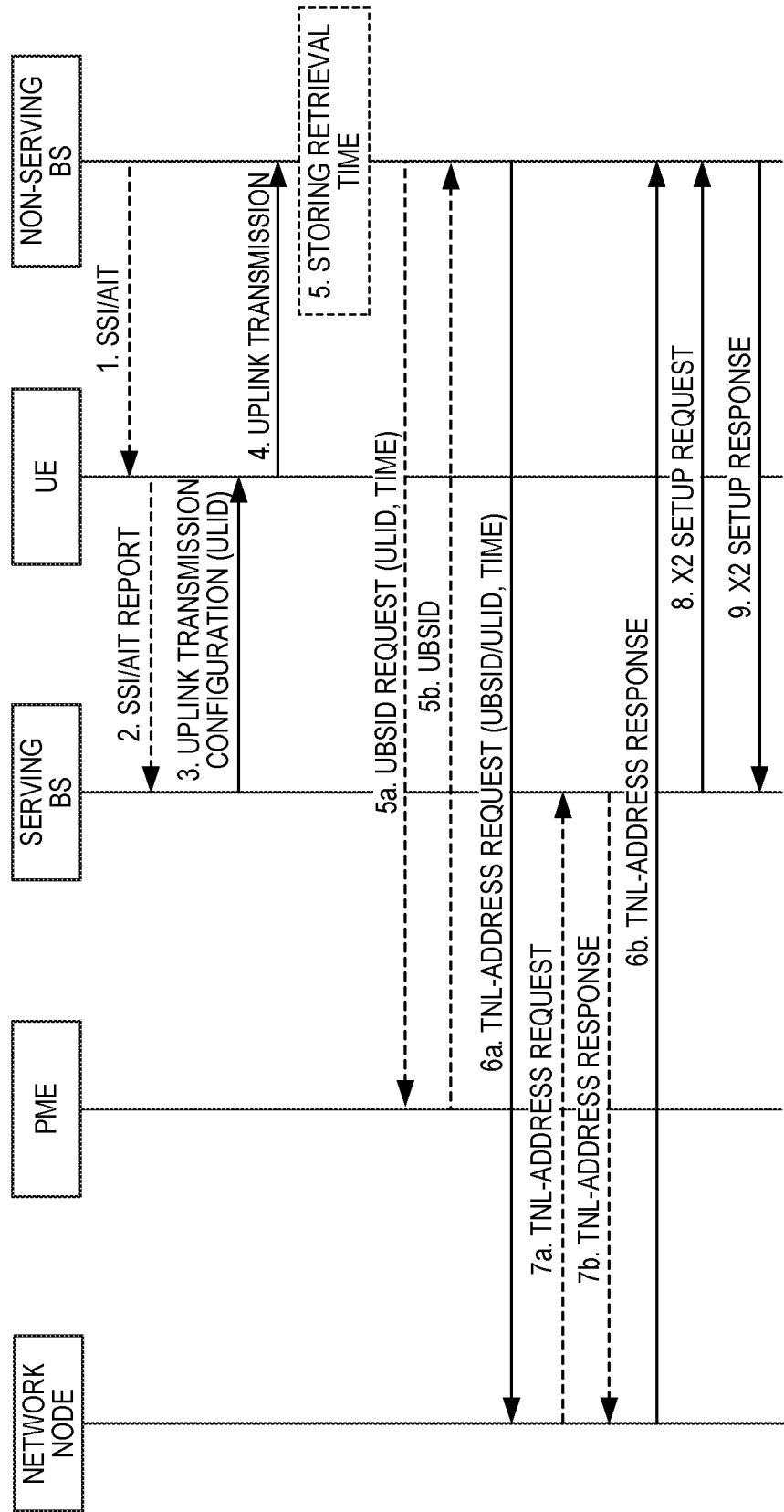


FIG. 143

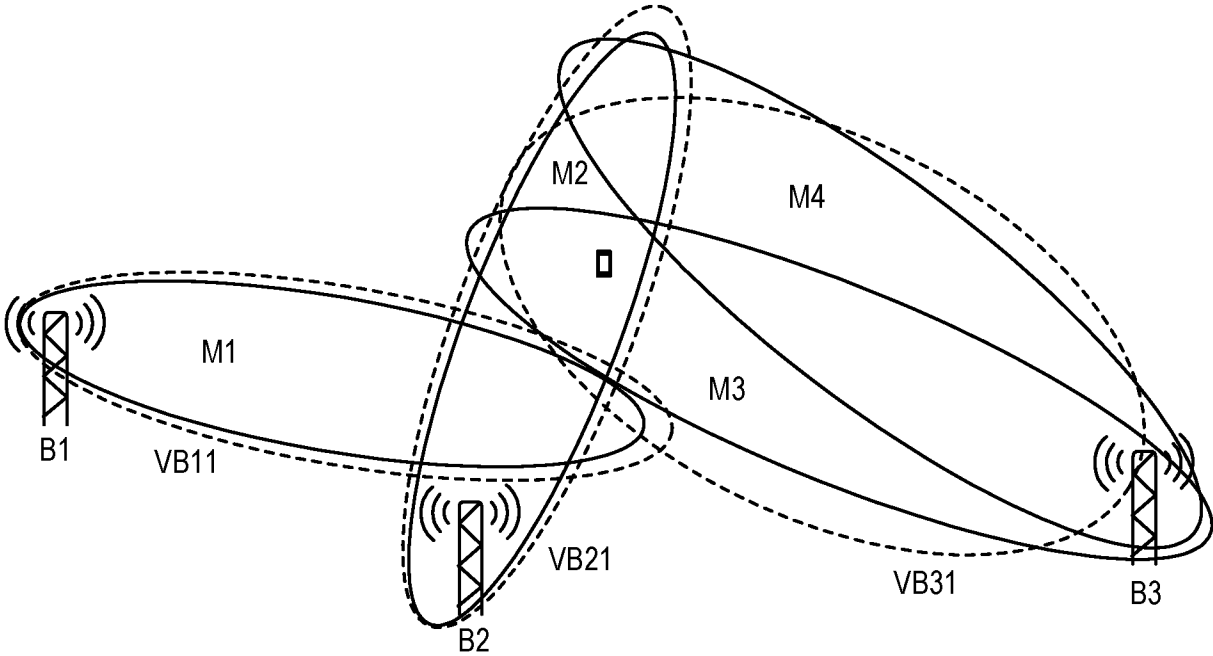


FIG. 144

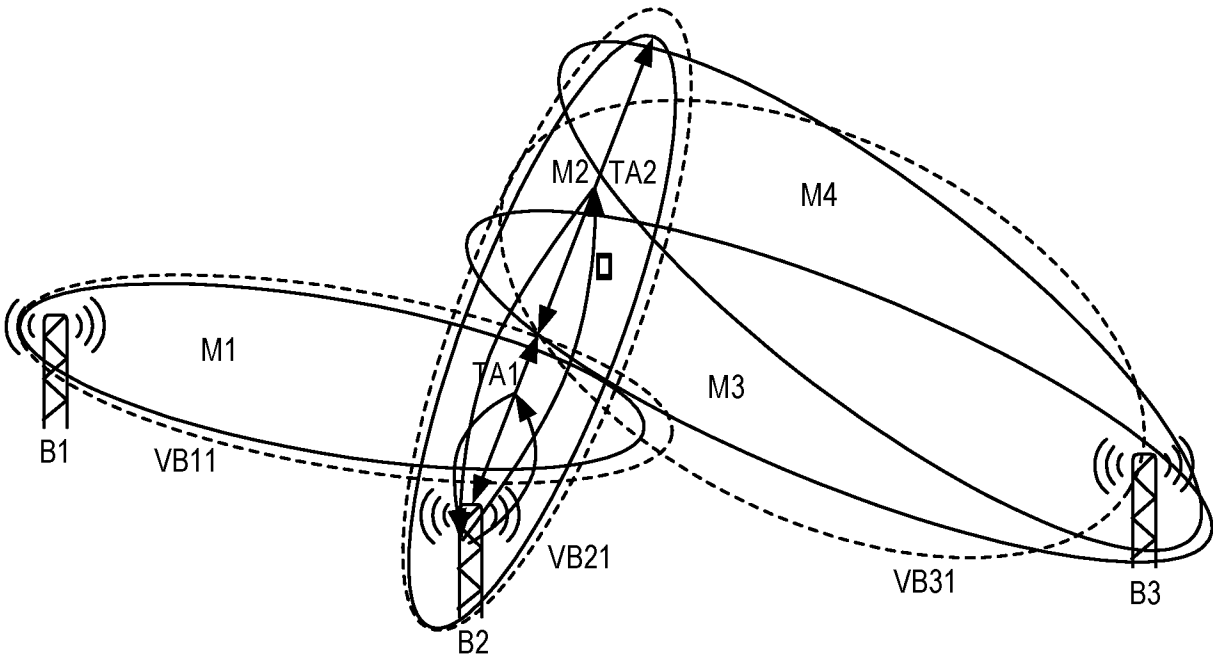
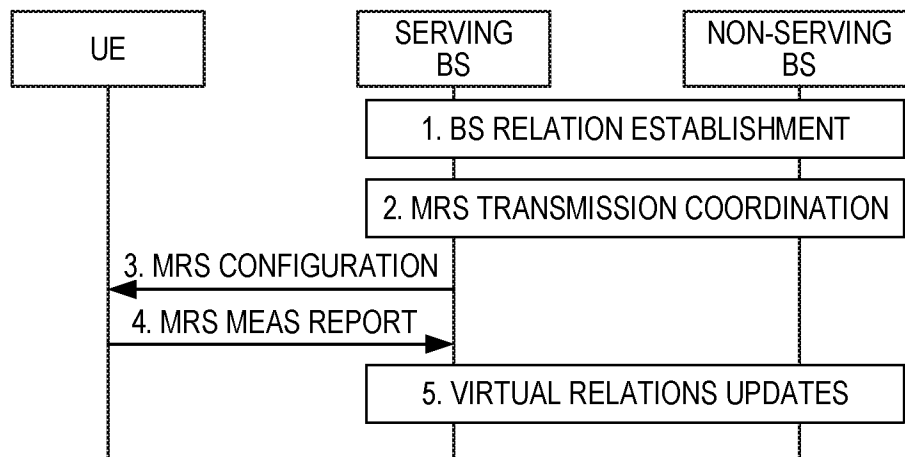
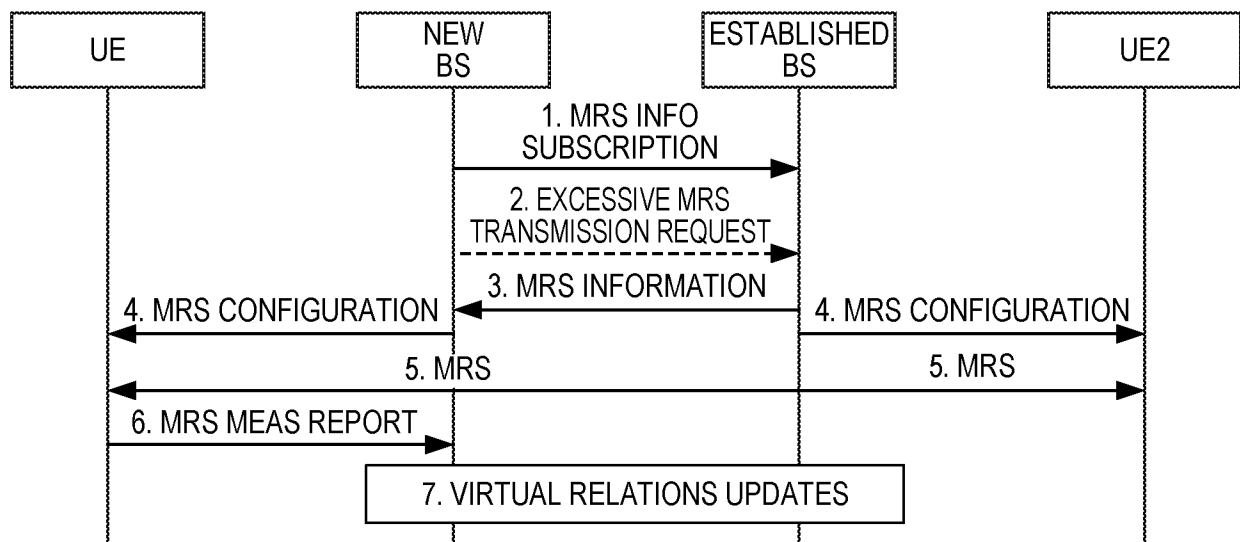
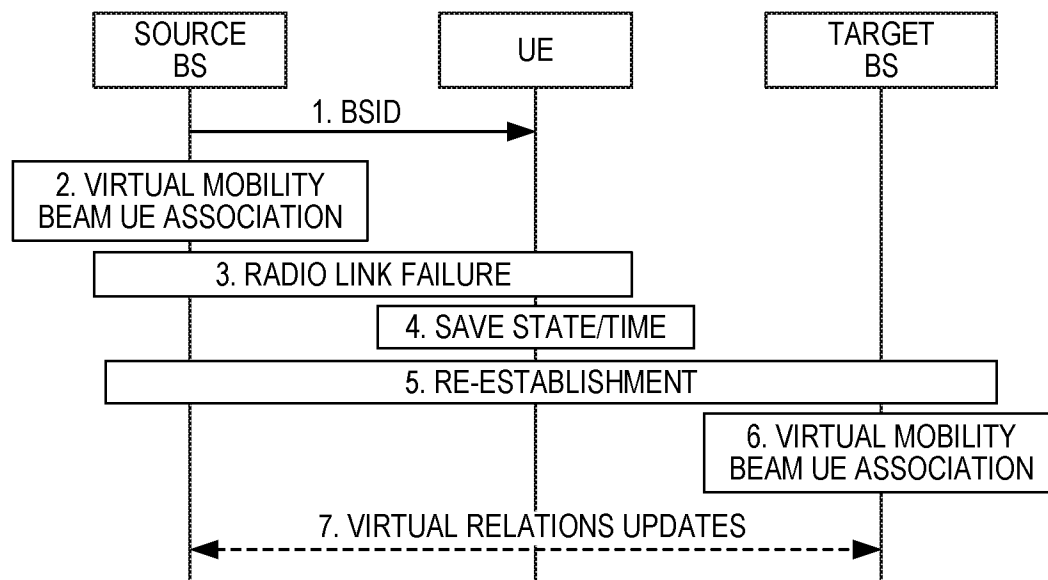
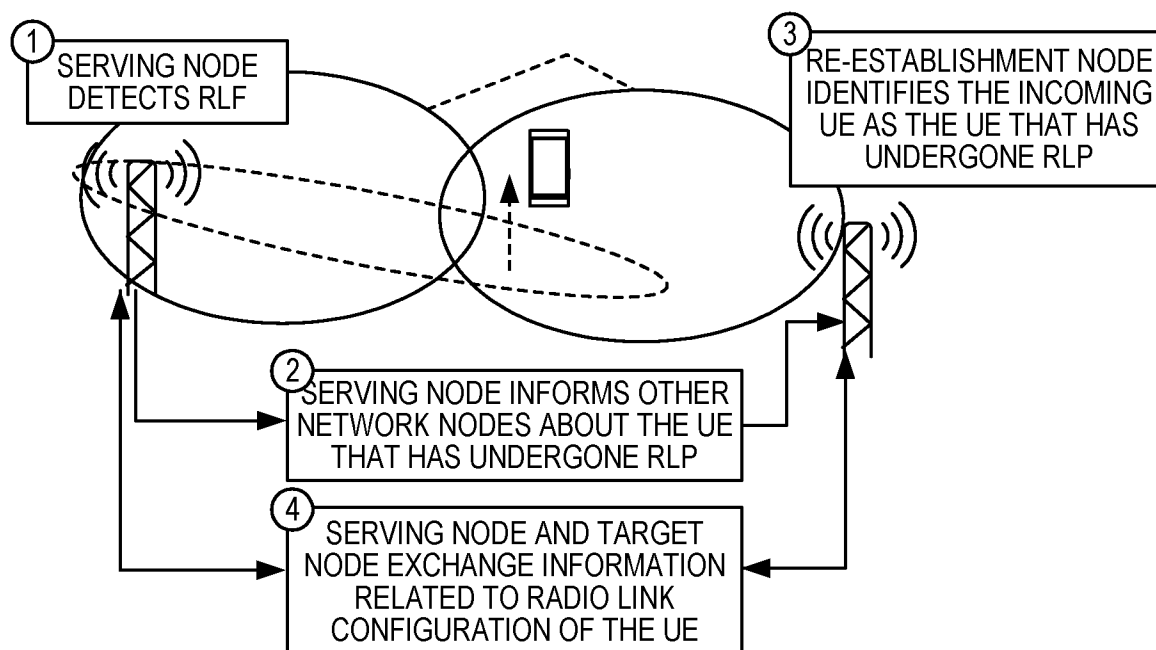


FIG. 145

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**FIG. 146****FIG. 147**

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**FIG. 148****FIG. 149**

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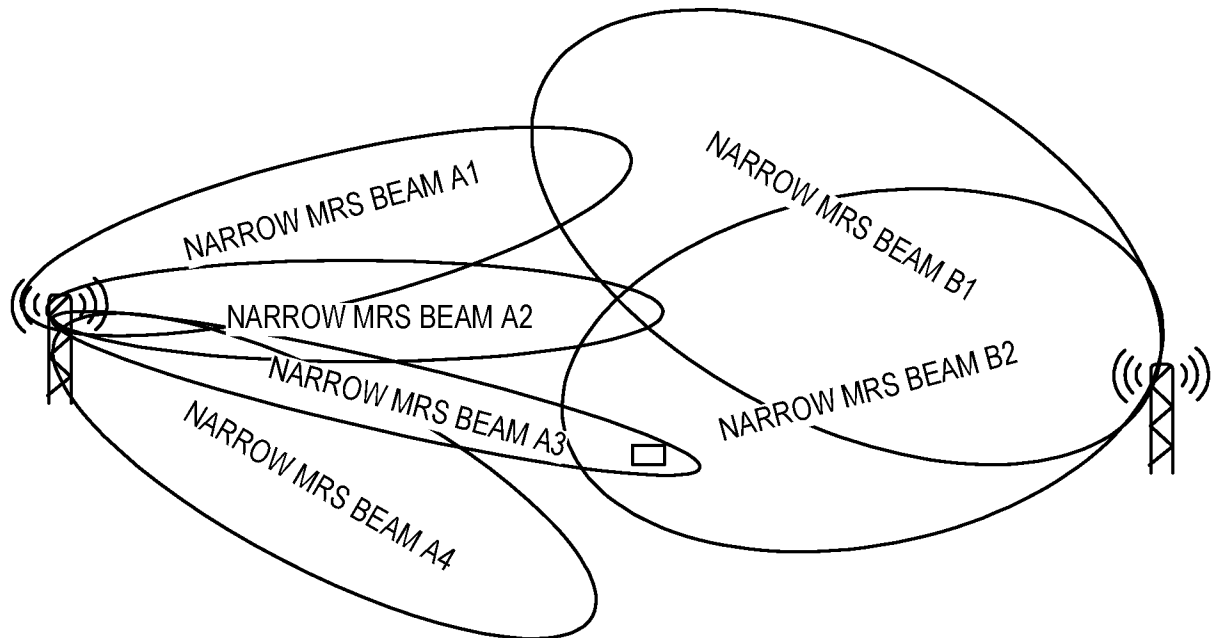


FIG. 150

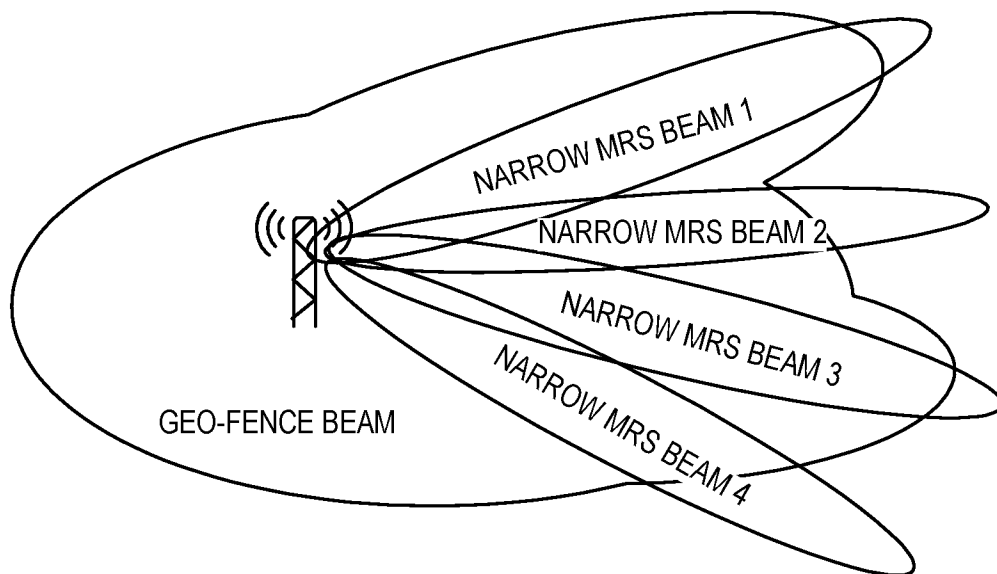
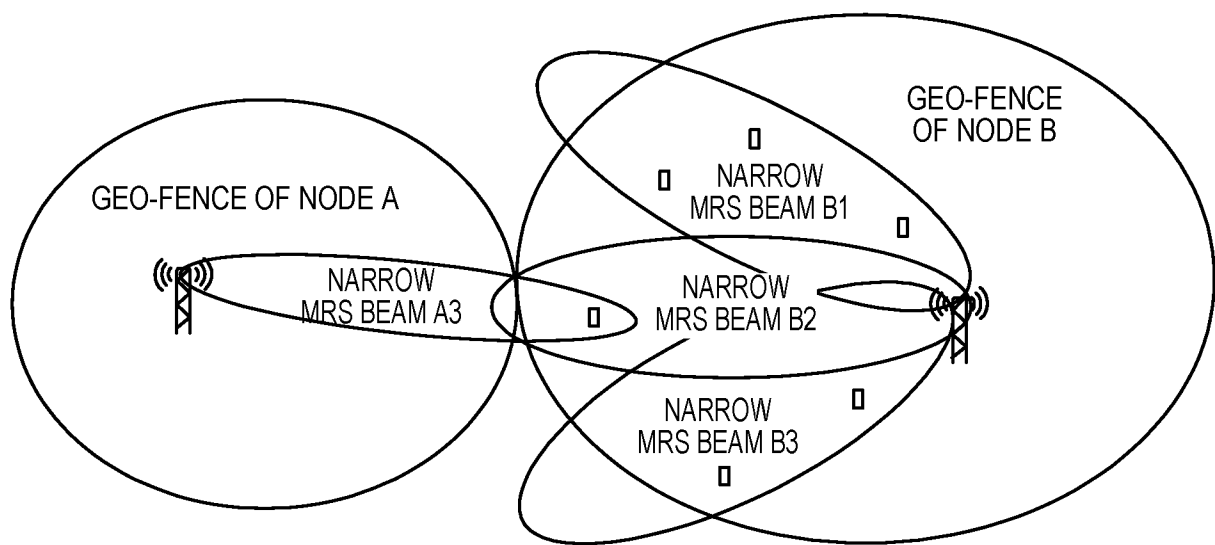
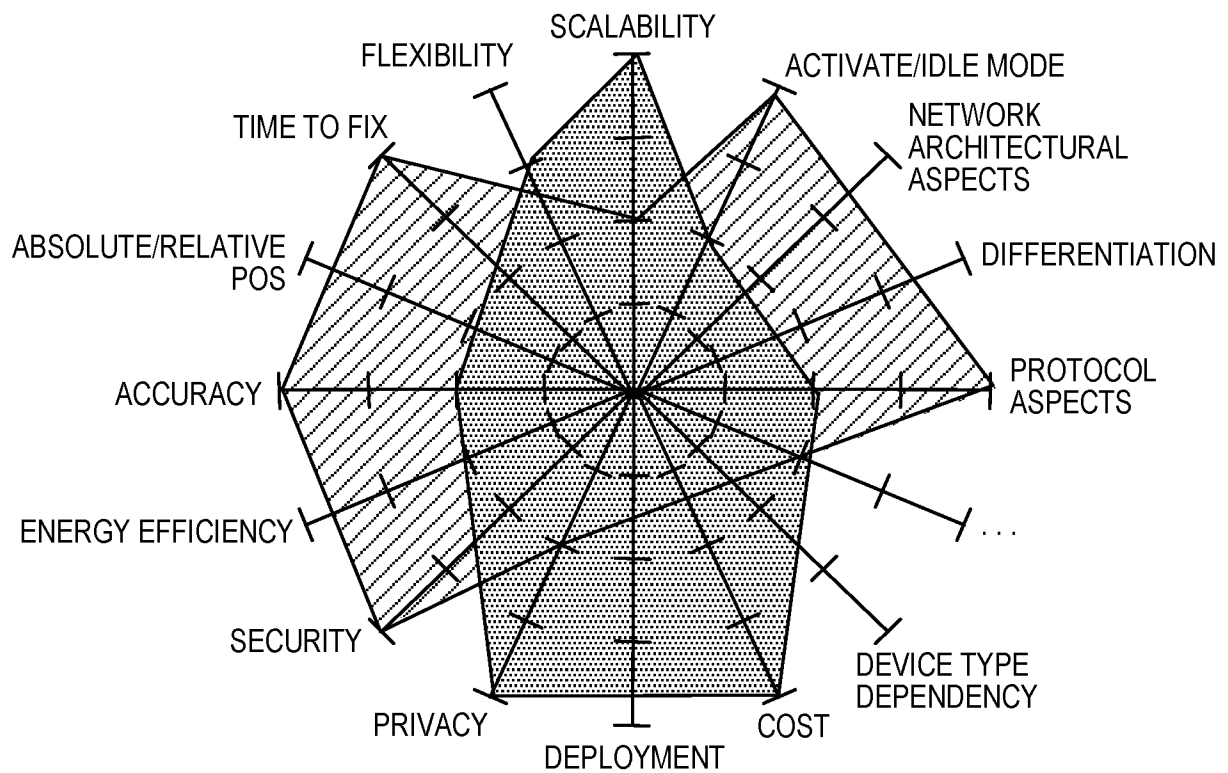


FIG. 151

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**FIG. 152****FIG. 153**

EXPLOITING POSITION INFO	NO		YES		
DOWNLINK MEASUREMENTS	NO	TIME	POWER	CODEBOOK	BEAM
ULINK TRANSMISSIONS	NO	SEQUENCE	TIME ALIGNMENT		BEAM
CONFIGURATION OPTIONS	PRE-CONFIGURATION		COMMON CONFIG.		DEDICATED CONFIG.
POWER OPTIONS	ENERGY HARVEST		BATTERY	CHARGEABLE	POWERED
NUMEROLOGY	CRUDE		...		FINE
<div>COMPLEXITY</div>					

FIG. 154

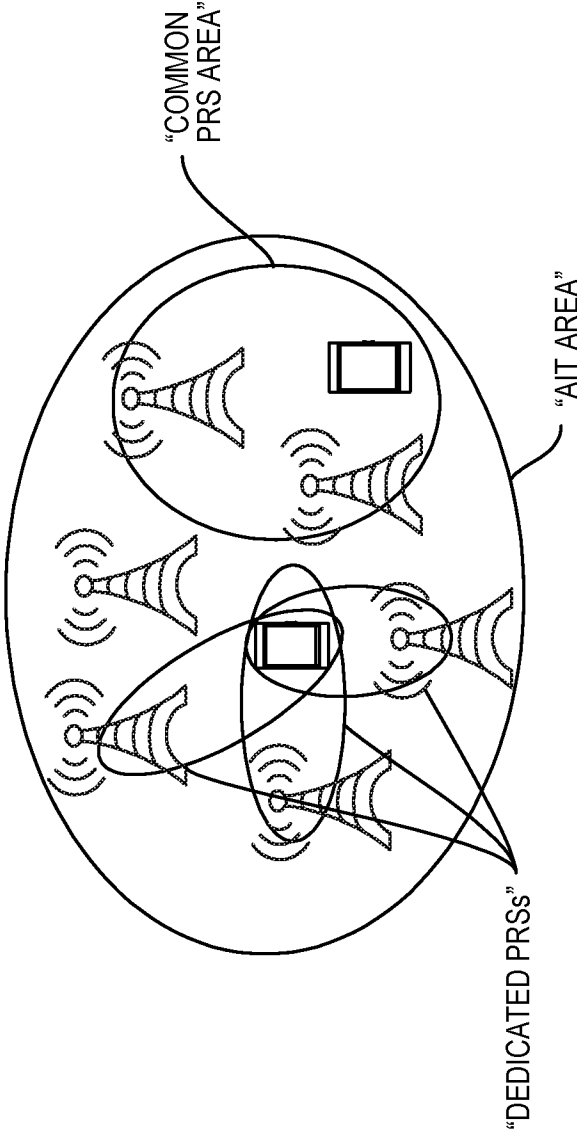


FIG. 155

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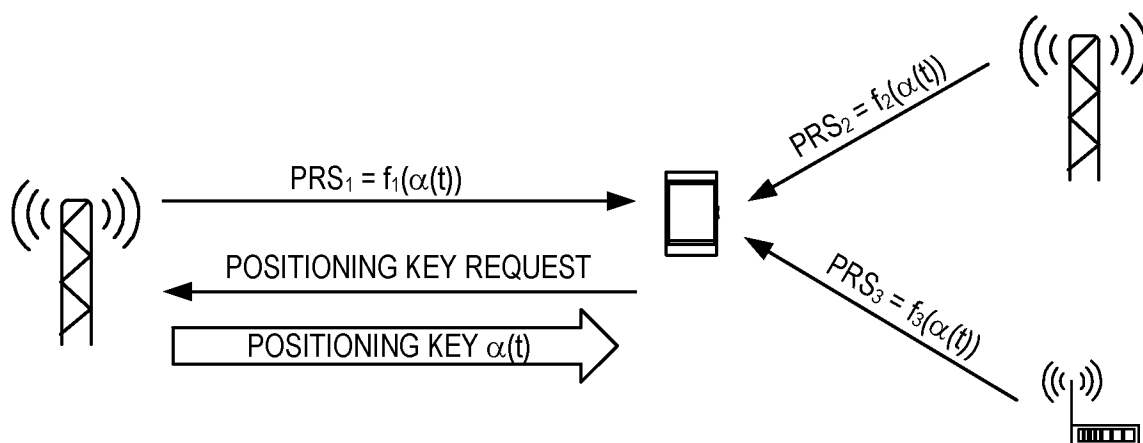


FIG. 156

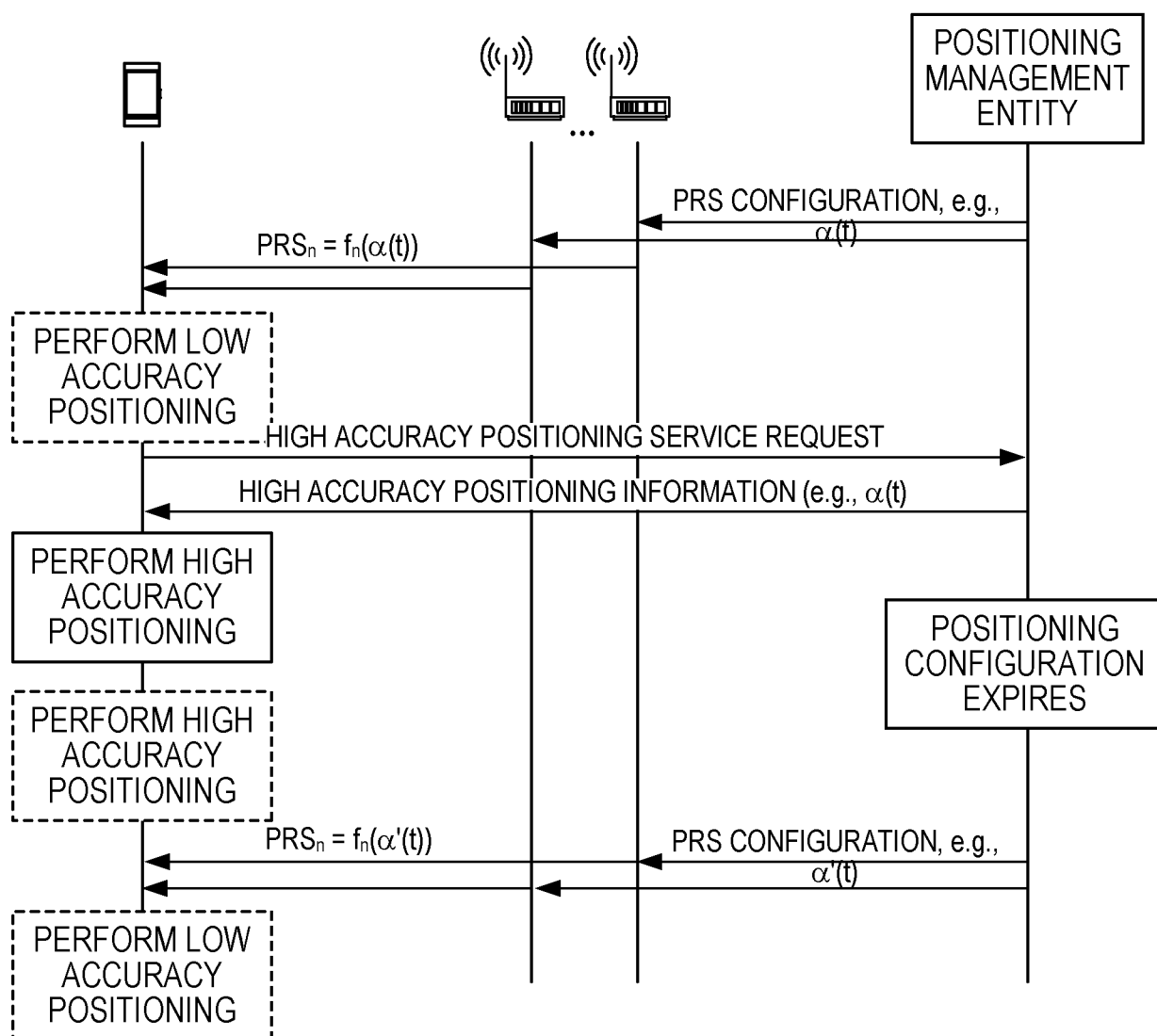
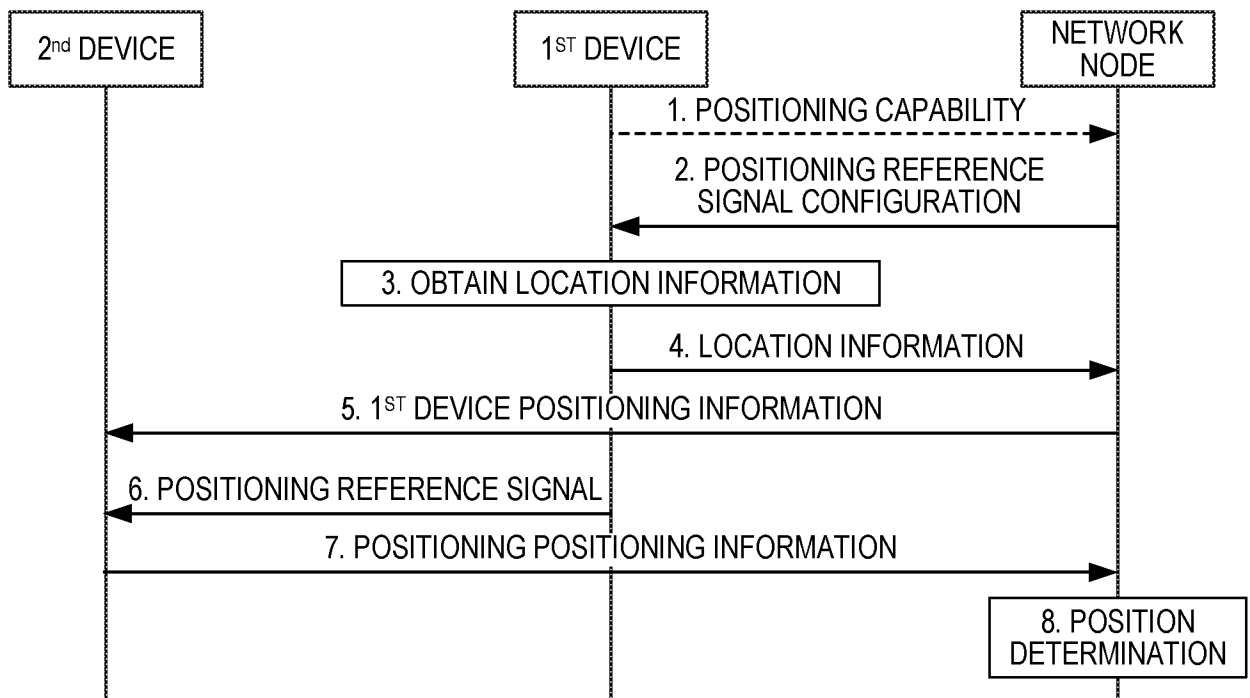


FIG. 157

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**FIG. 158**

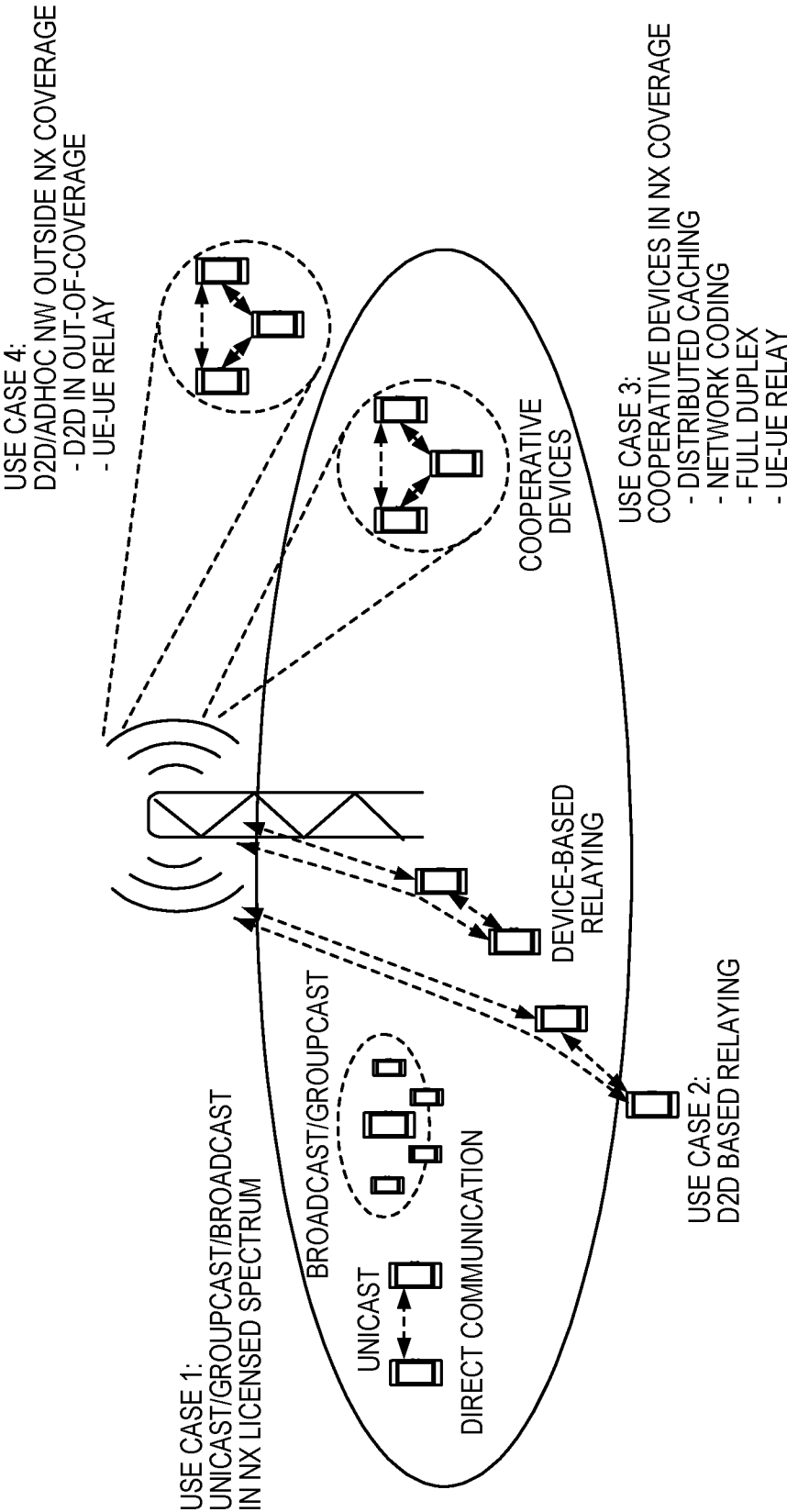


FIG. 159

USE CASE	STATUS IN 3GPP	NX REQUIREMENT
UNICAST IN NX COVERAGE (IN NX LICENSED SPECTRUM) (USE CASE 1)	- NOTHING IN 3GPP - FRA/LIGER CONCEPT AVAILABLE	UNICAST D2D IN CELLULAR SPECTRUM SHOULD BE SUPPORTED
GROUP-CAST/BROADCAST IN NX COVERAGE (IN NX LICENSED SPECTRUM) (USE CASE 1)	- AVAILABLE IN 3GPP - LIGER CONCEPT AVAILABLE	(PROPRIETARY) PERFORMANCE ENHANCEMENTS (IN TERMS OF SE/EE/DELAY/RELIABILITY/...)
D2D (UE-TO-UE) BASED RELAYING (USE CASE 2)	- AVAILABLE IN 3GPP (R13 ON-GOING) - LIGER CONCEPT AVAILABLE	(PROPRIETARY) PERFORMANCE ENHANCEMENTS (IN TERMS OF SE/ EE/DELAY/RELIABILITY/...)
COOPERATIVE DEVICES IN NX COVERAGE (USE CASE 3)	- UNAVAILABLE IN 3GPP - NO INTERNAL CONCEPT	RESEARCH ON SOME IDEAS IS ONGOING TO EVALUATE POTENTIAL GAINS. REQUIREMENTS ARE NOT SPECIFIED
D2D ADHOC NW OUTSIDE NX COVERAGE (USE CASE 4)	- AVAILABLE IN 3GPP (FOR GROUP BROAD-CAST, NO UE-UE RELAY) - FRA/LIGER CONCEPT AVAILABLE (UE-UE RELAY ONLY IN FRA)	(PROPRIETARY) PERFORMANCE ENHANCEMENTS (IN TERMS OF SE/ EE/DELAY/RELIABILITY/...)

FIG. 160

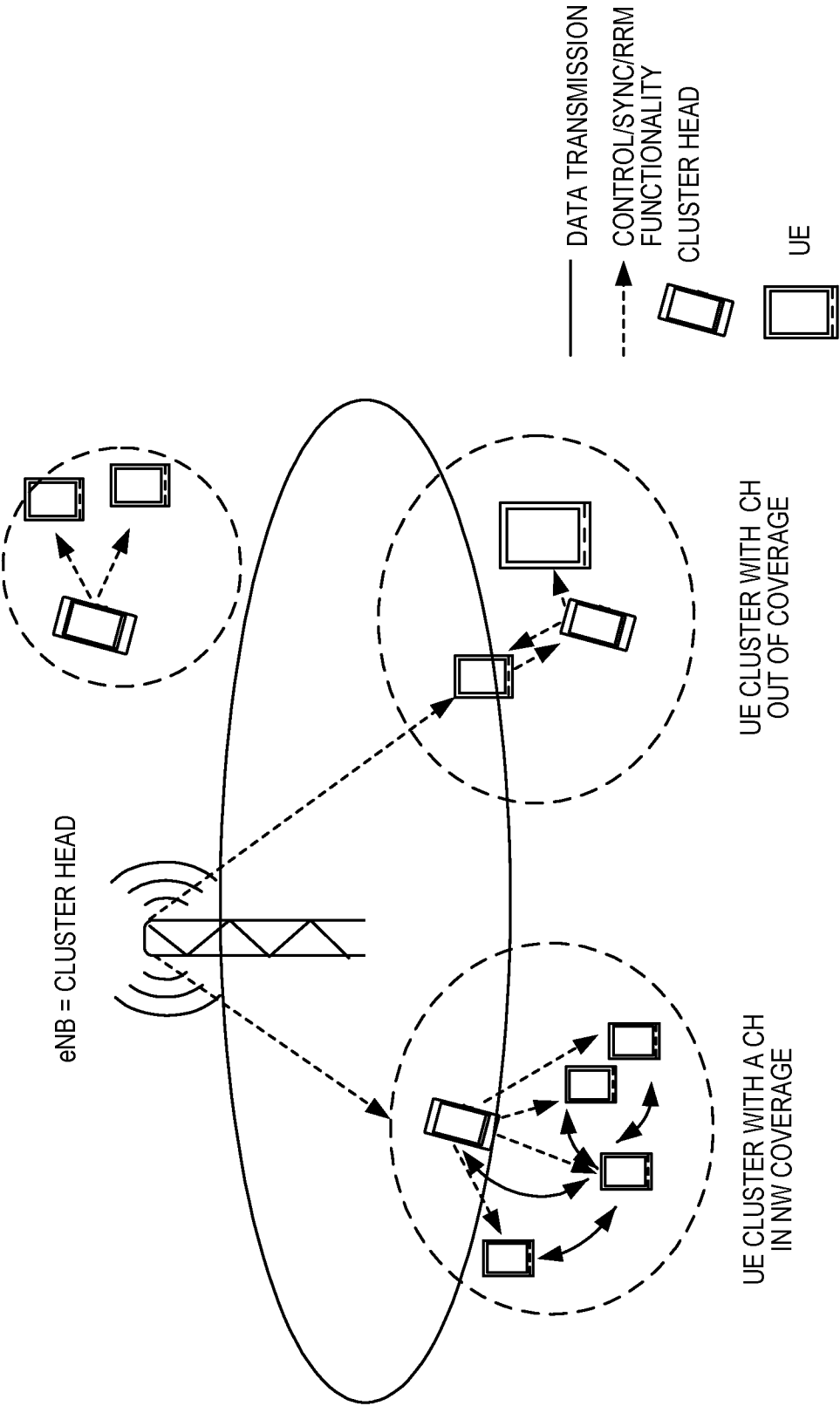


FIG. 161

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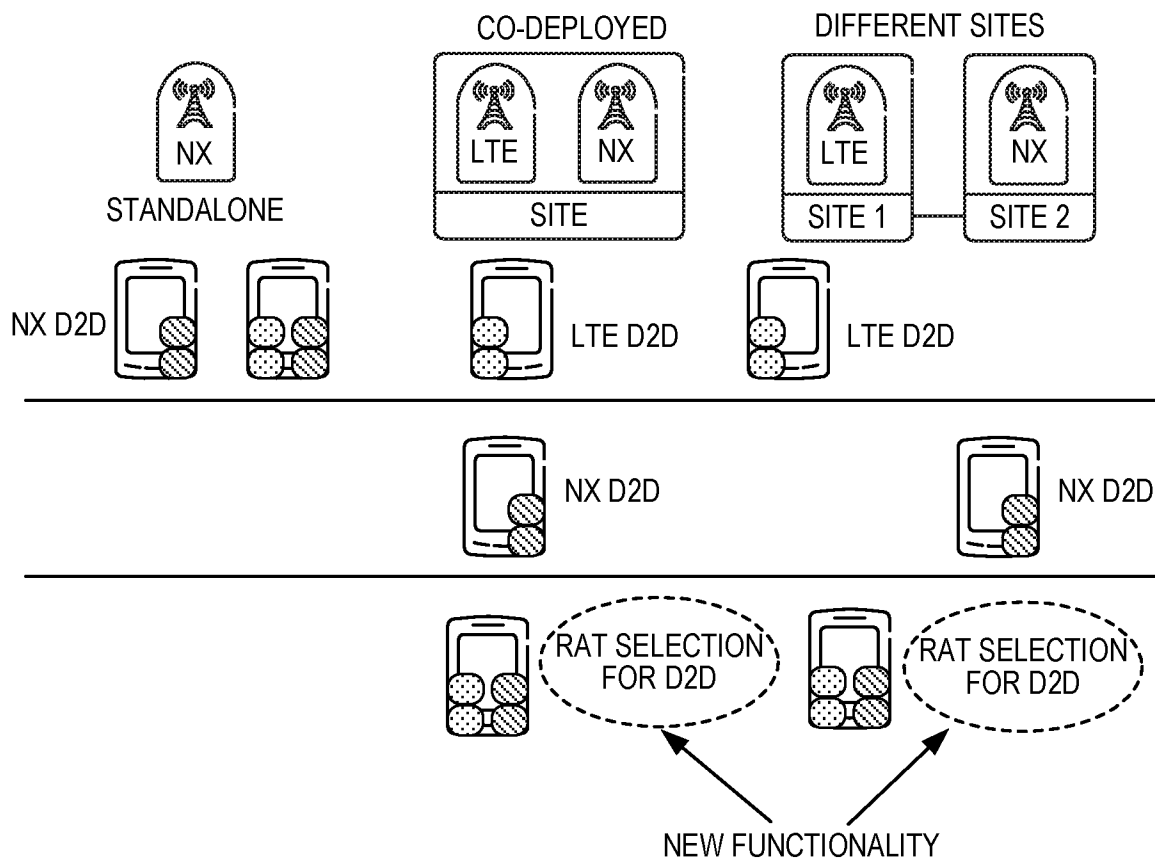


FIG. 162

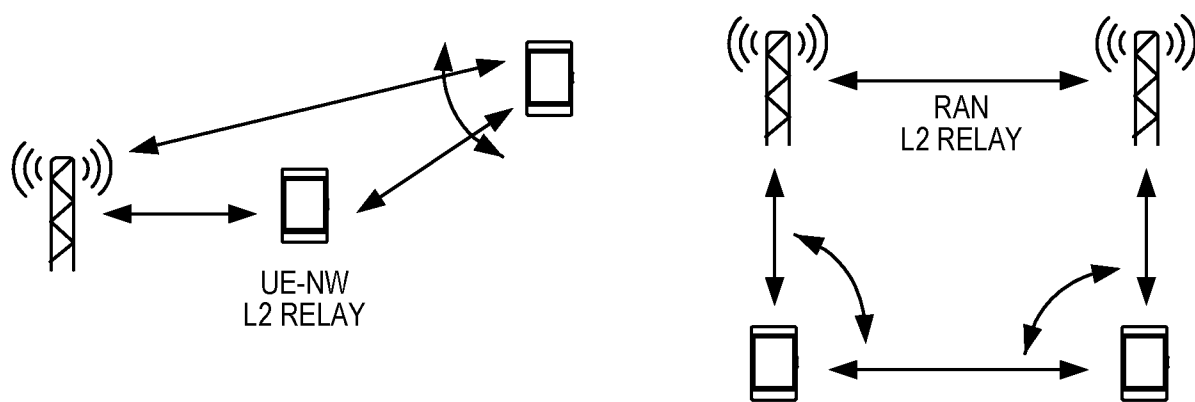
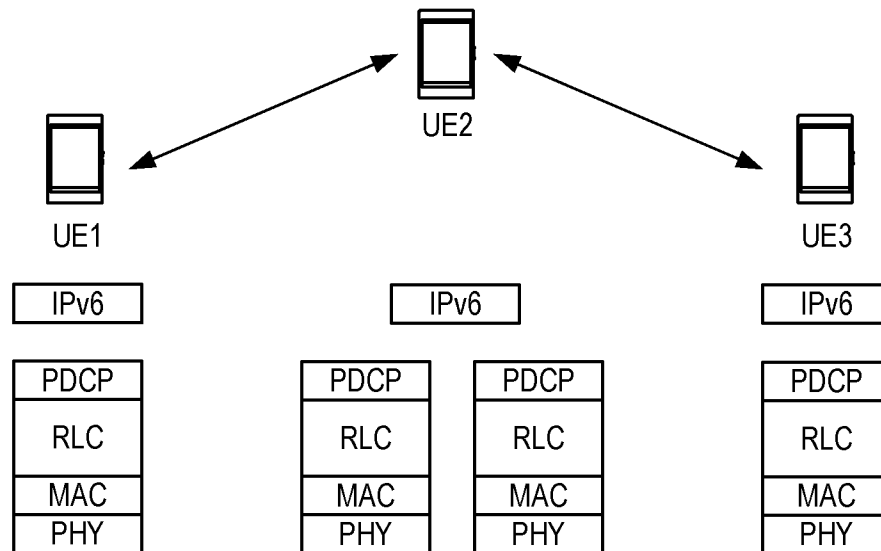
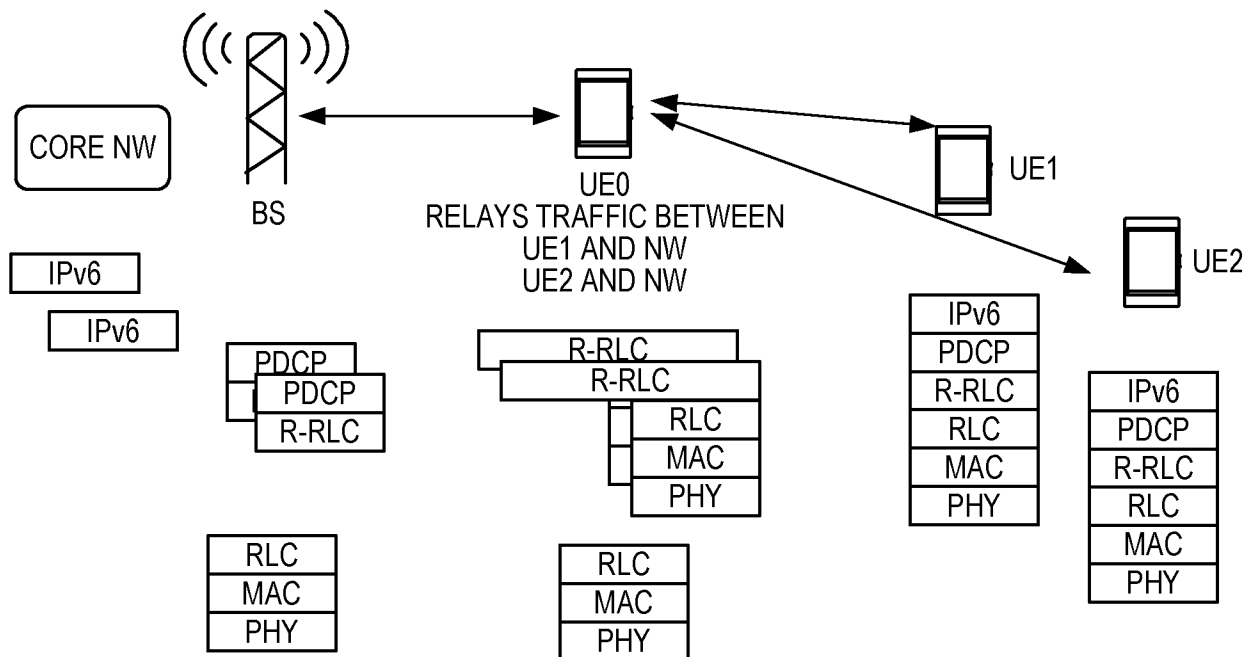
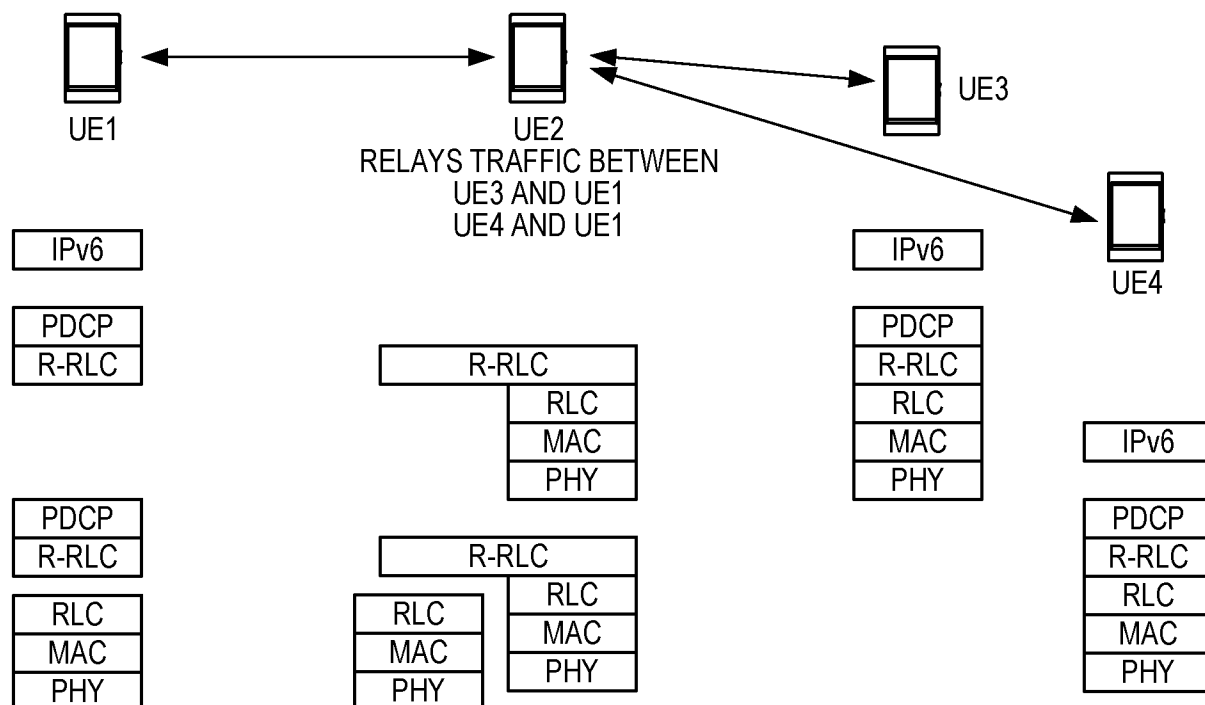
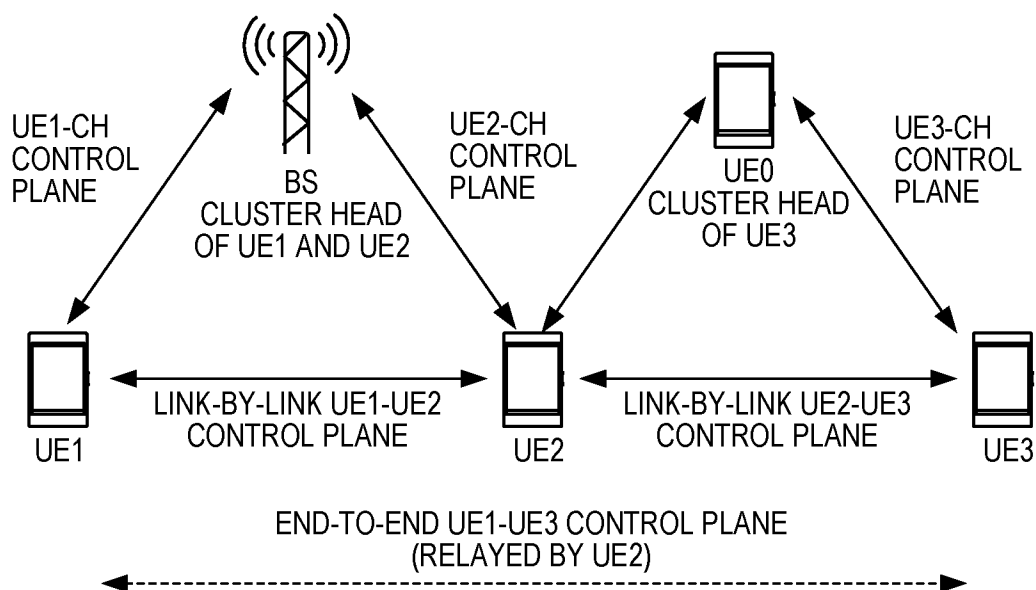


FIG. 163

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**FIG. 164****FIG. 165**

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**FIG. 166****FIG. 167**

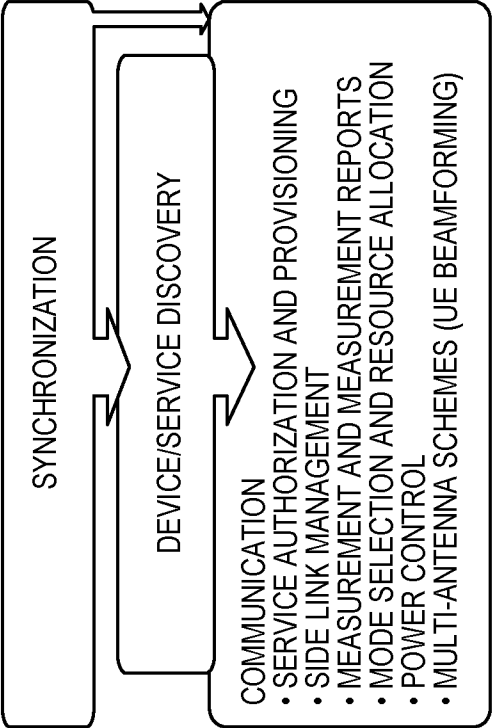


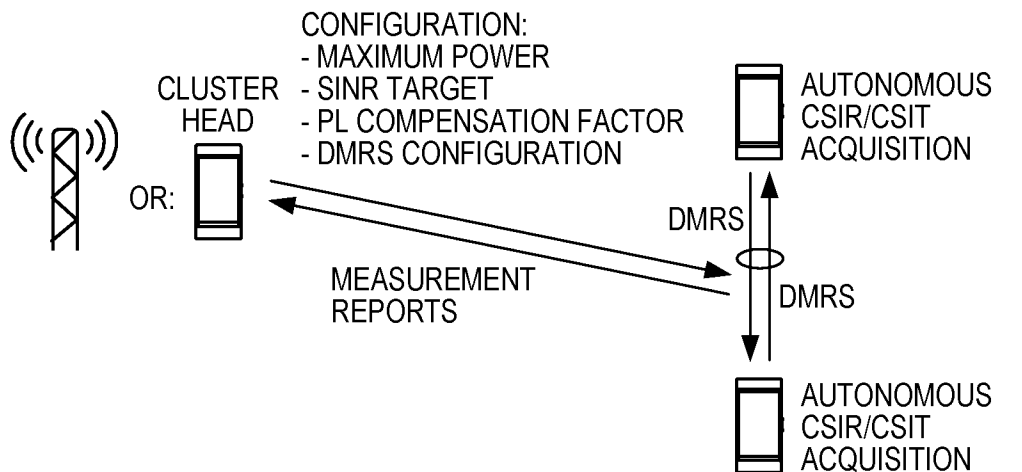
FIG. 168

SIDELINK MANAGEMENT FUNCTION (EXAMPLE)	REQUIREMENT	COMMENT
TRIGGER BROADCAST DISCOVERY (ANNOUNCING/INQUIRY) BEACONS	IN-COVERAGE, OUT-OF-COVERAGE, PARTIAL COVERAGE (IN TERMS OF ANNOUNCING AND DISCOVERY UE) SHOULD BE SUPPORTED	THE TIME/FREQUENCY RESOURCES AND OTHER CONFIGURATION PARAMETERS CAN BE PROVIDED (PRECONFIGURED) OR DYNAMICALLY ALLOCATED
ESTABLISH SIDELINK SHARED CHANNEL WITH A SPECIFIC PEER UEs (e.g., UE3-UE4)	IN-COVERAGE, OUT-OF-COVERAGE, PARTIAL COVERAGE (FOR EITHER OF THE UEs) SHOULD BE SUPPORTED SIDELINK "ADMISSION CONTROL" CAN BE EXERCISED BY THE NW	ADMISSION CONTROL FOR SIDELINK SHOULD BE POSSIBLE WHEN UNDER NW COVERAGE AND USING "CELLULAR RESOURCES" (OWNED BY eNB)
TRIGGER BROADCASTING/MULTICASTING TO A SET OF PEER UEs	IN-COVERAGE, OUT-OF-COVERAGE, PARTIAL COVERAGE (FOR ANY BROADCAST MEMBER) SHOULD BE SUPPORTED	MULTICAST GROUP CONTROL BY NW AND MULTICASTING UE SHOULD BE SUPPORTED

FIG. 169

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MEASUREMENT PURPOSE	WHAT SIGNAL TO MEASURE ON	WHERE TO REPORT
SYNCHRONIZATION	SYNCH SIGNALS	
DISCOVER PEER DEVICES	DISCOVERY BEACONS	<ul style="list-style-type: none"> • eNB • HIGHER LAYER • PEER UE
MODE SELECTION AND RESOURCE (POOL) ALLOCATION	DISCOVERY BEACONS AND D2D/NX REFERENCE SIGNALS	<ul style="list-style-type: none"> • eNB • HIGHER LAYER • PEER UE
RESOURCE ALLOCATION WITHIN RESOURCE POOL	D2D/NX REFERENCE SIGNALS	<ul style="list-style-type: none"> • HIGHER LAYER • PEER UE
POWER CONTROL	D2D/NX REFERENCE SIGNALS	
DEMODULATION (CSIR)	"DMRS"	
PRECODER SELECTION (CSIT)	"DMRS"	

FIG. 170

PL: PATH LOSS
 CSIR: CHANNEL STATE INFORMATION AT THE RECEIVER
 CSIT: CHANNEL STATE INFORMATION AT THE TRANSMITTER

FIG. 171

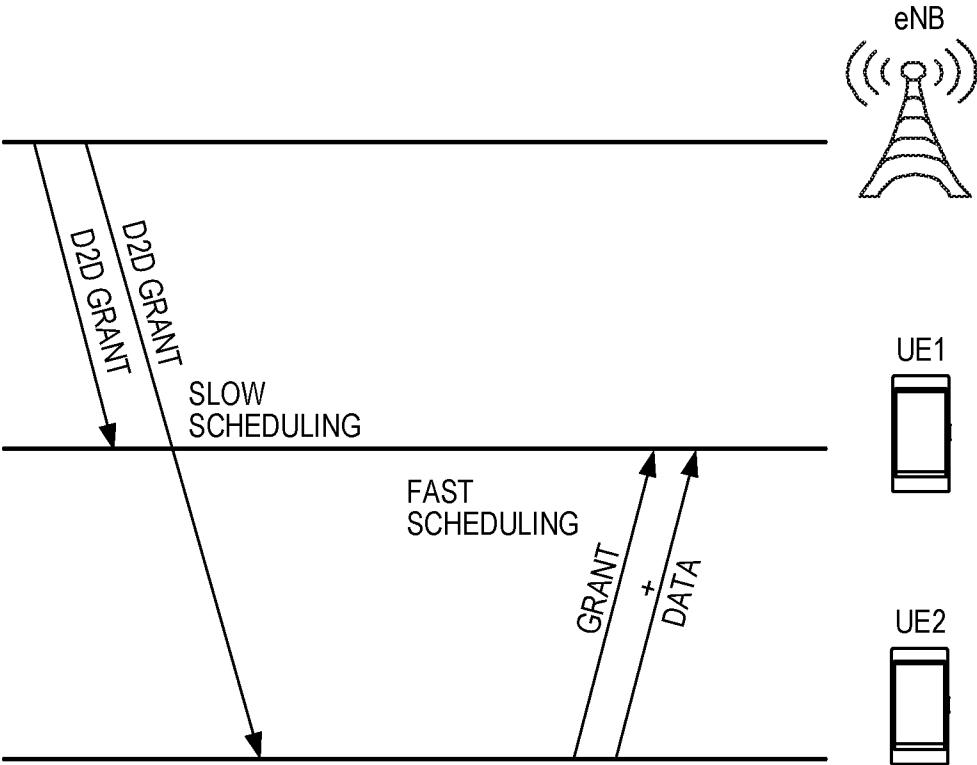


FIG. 172

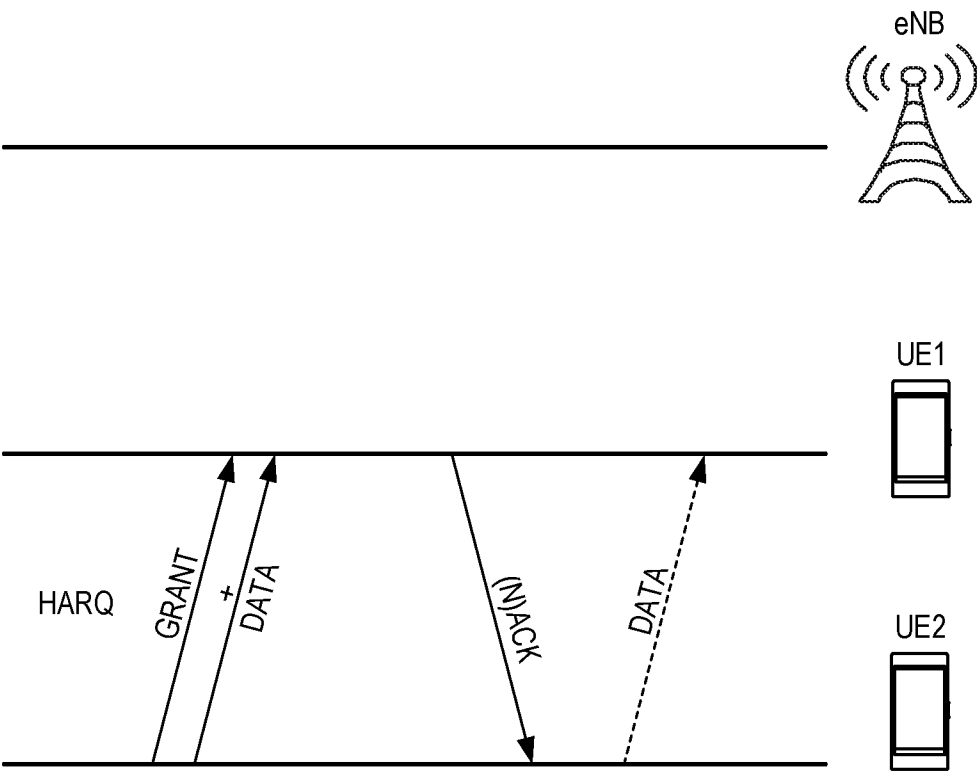


FIG. 173

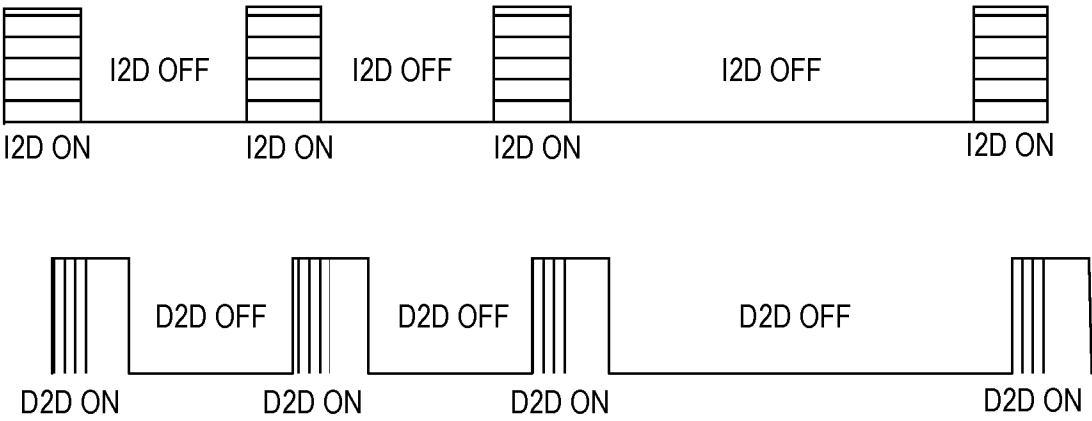


FIG. 174

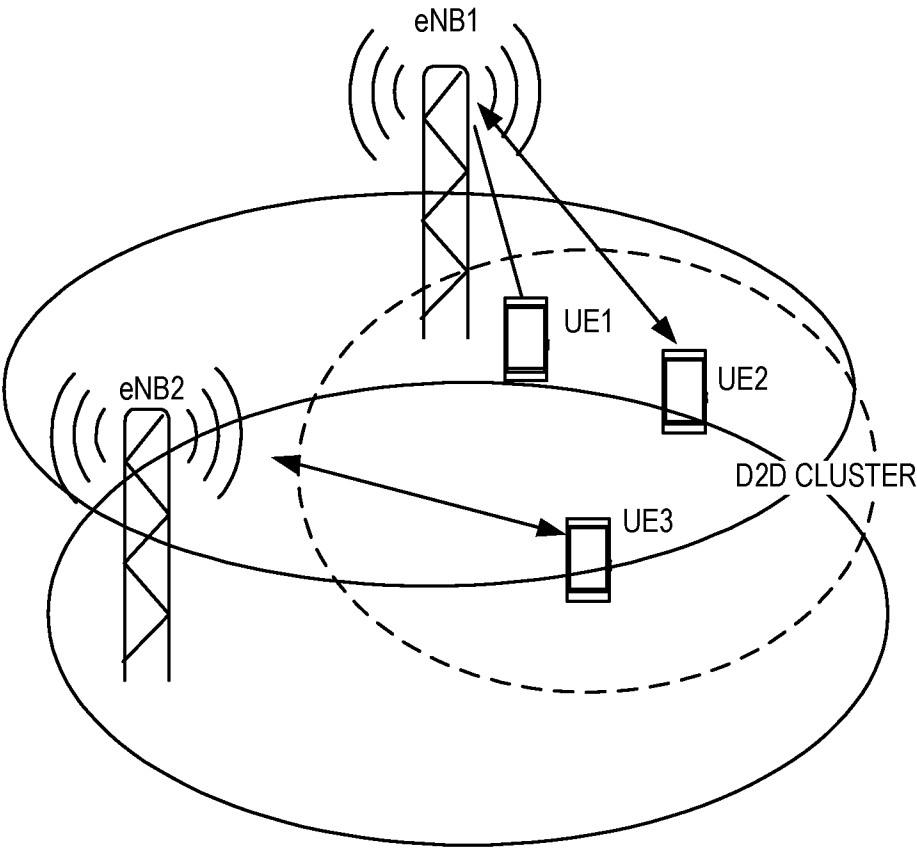


FIG. 175

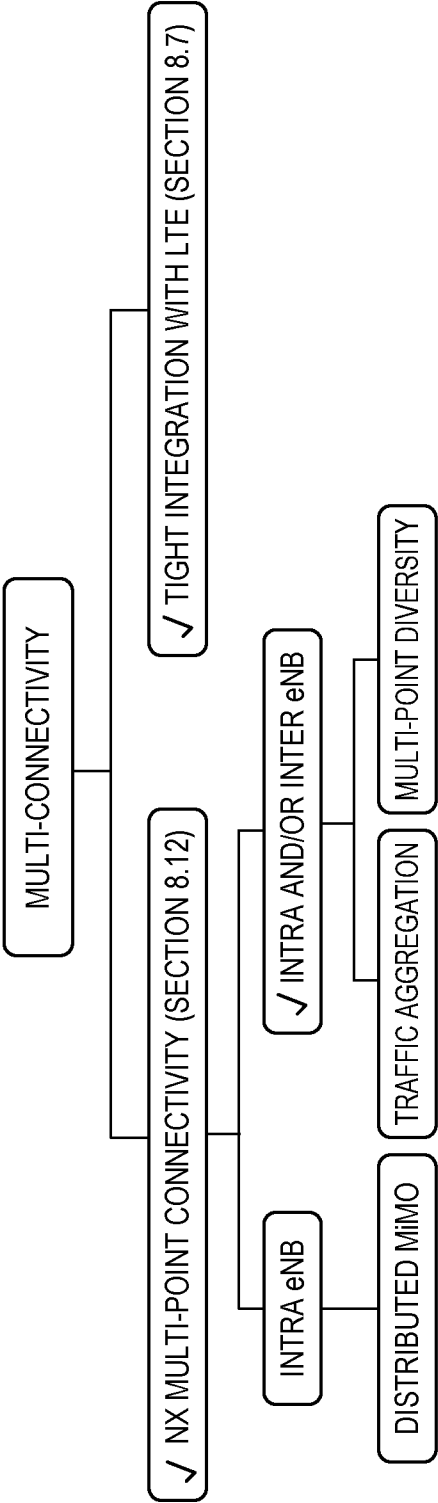


FIG. 176

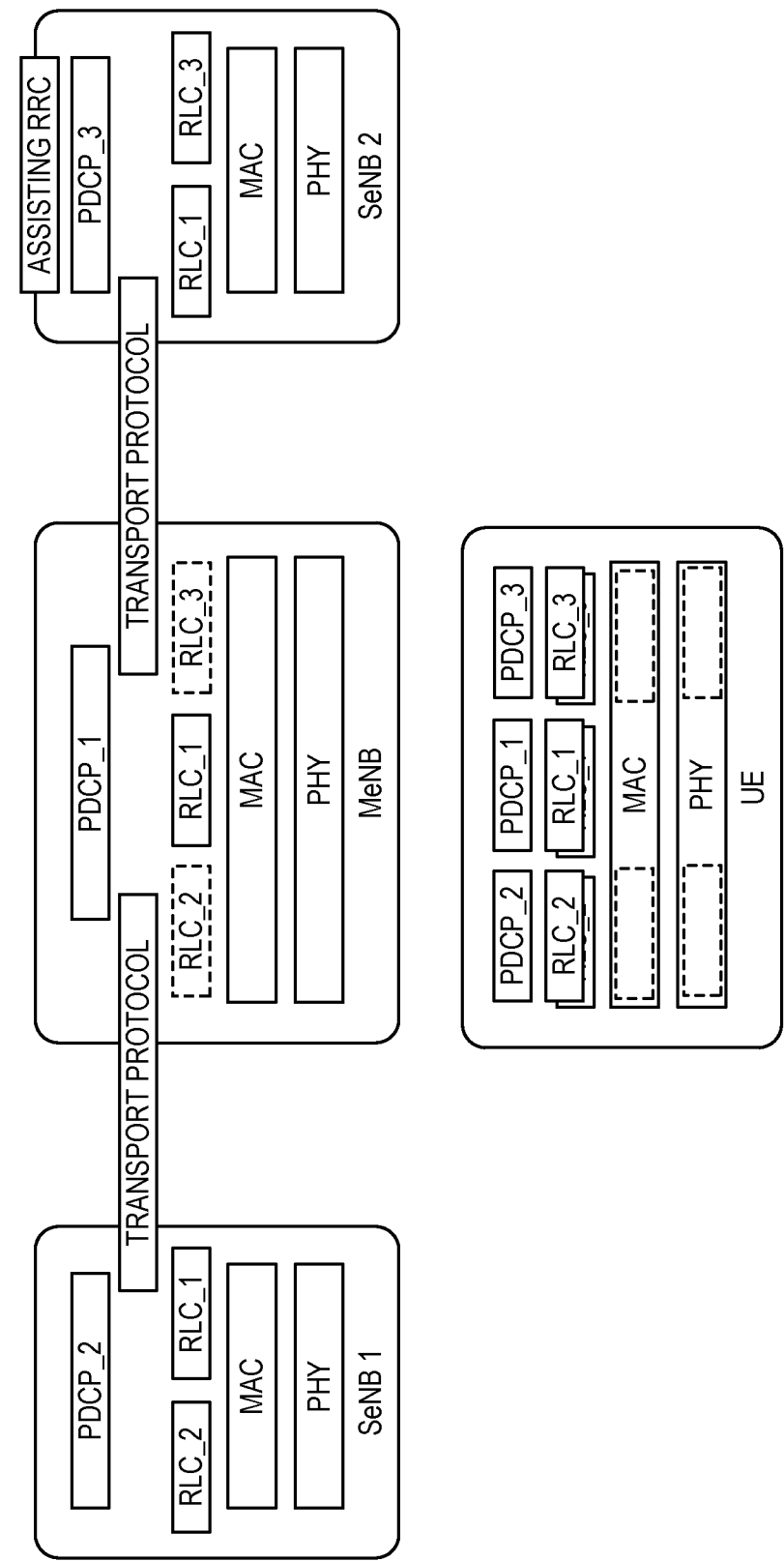


FIG. 177

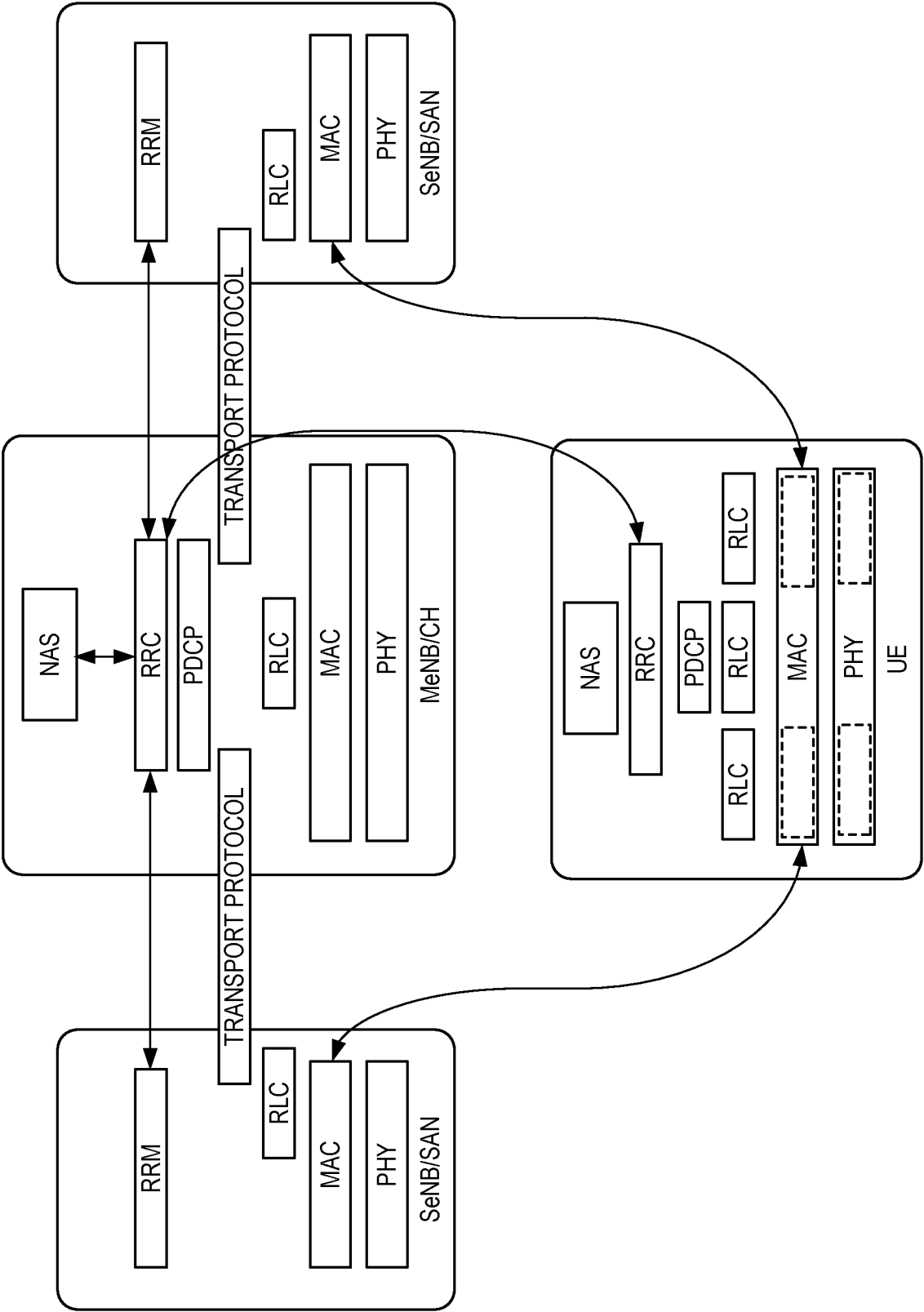


FIG. 178

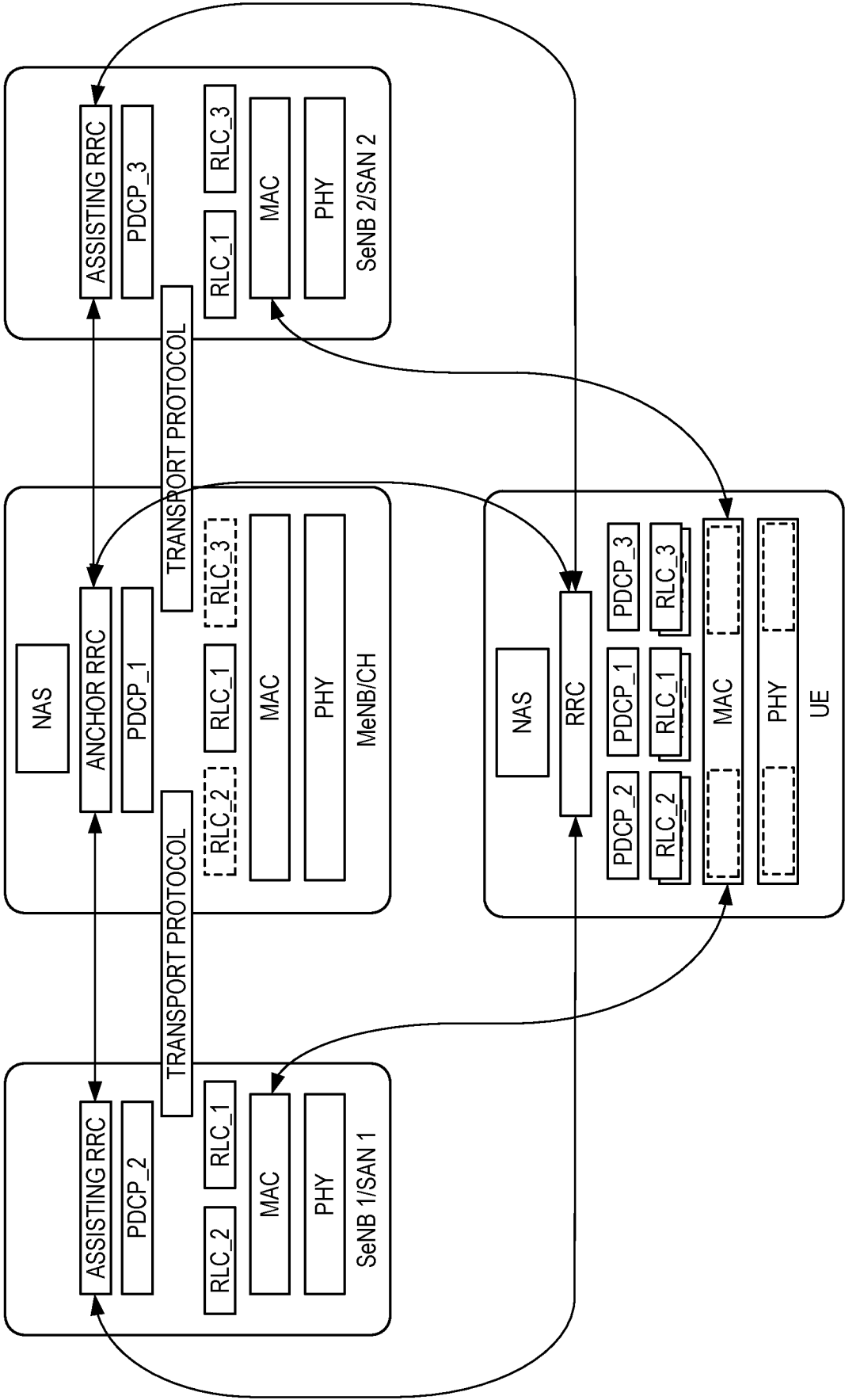


FIG. 179

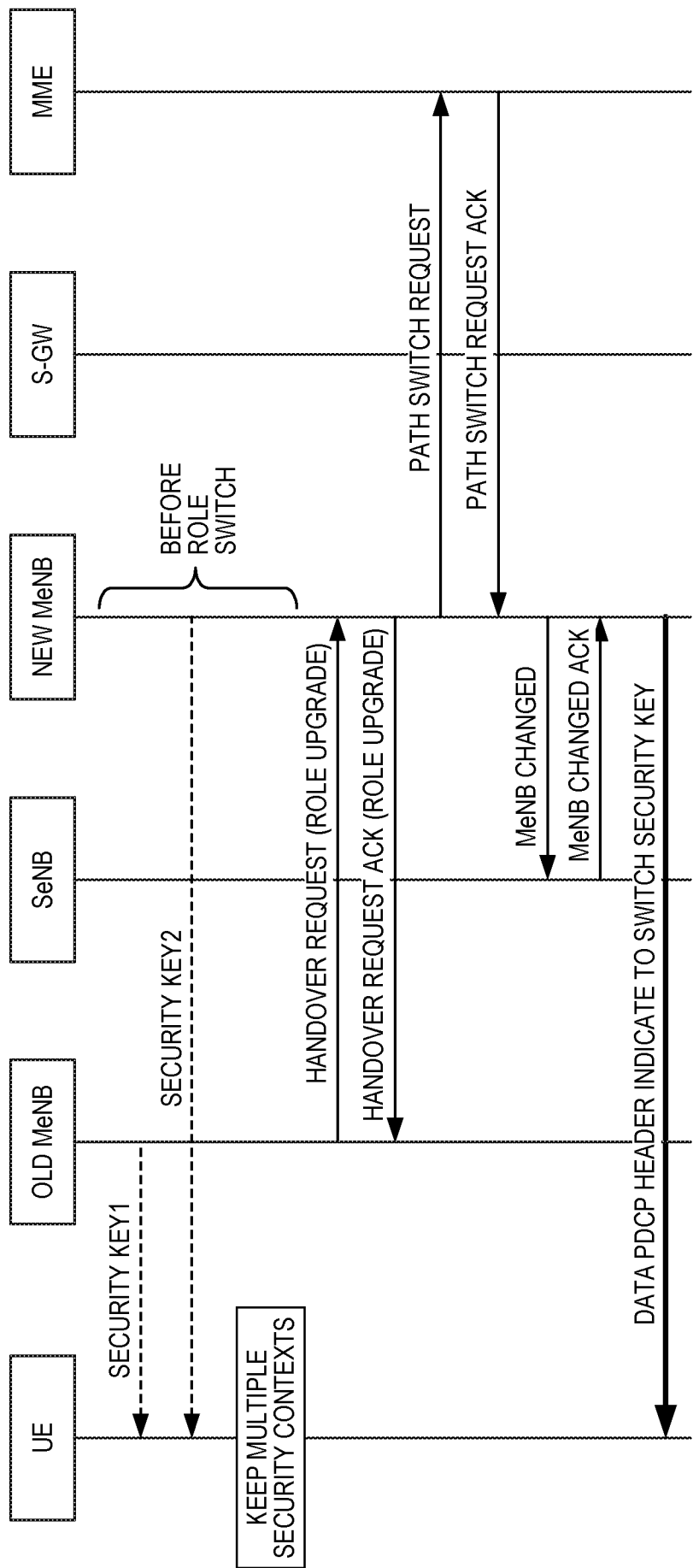


FIG. 180

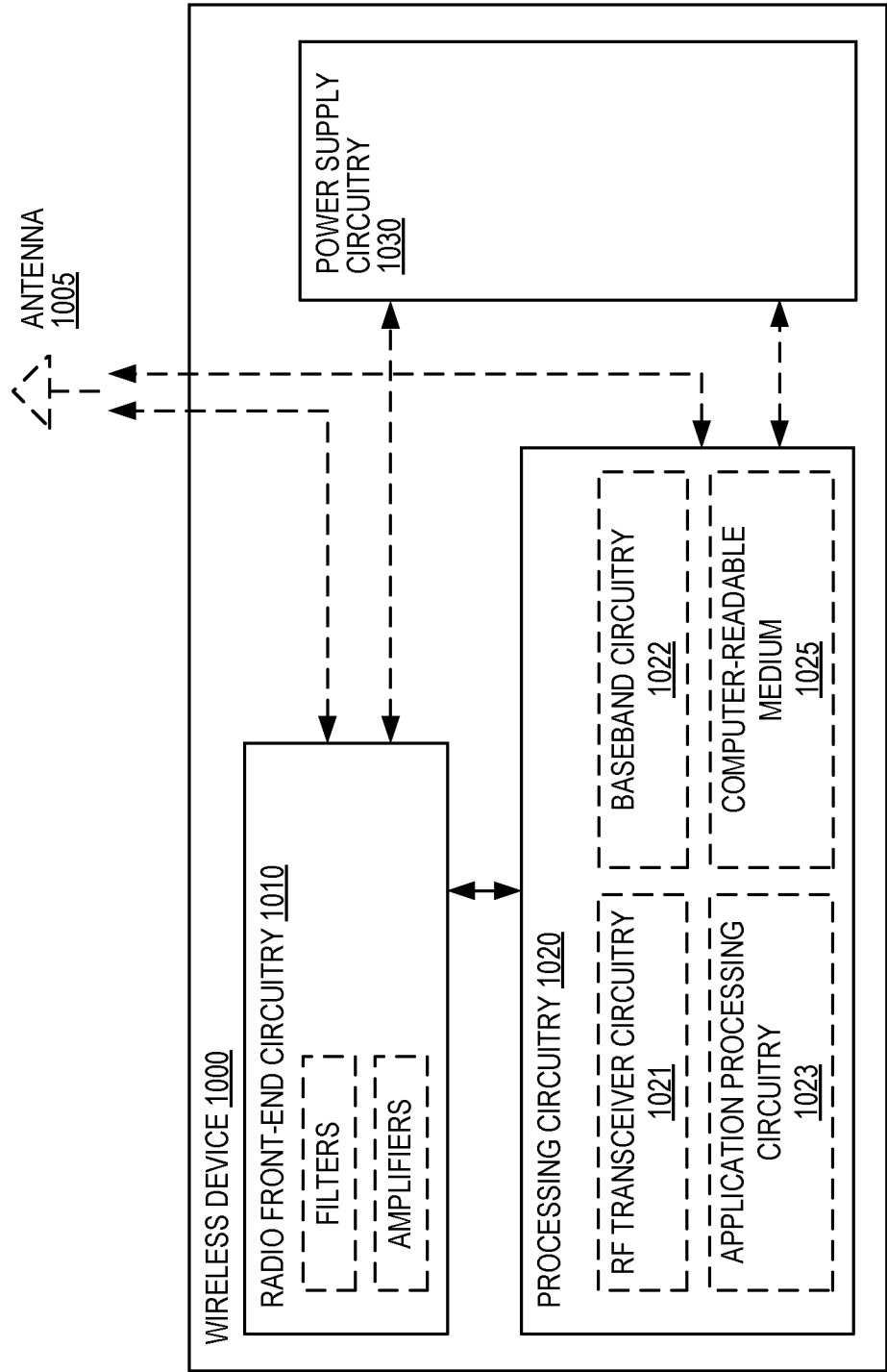
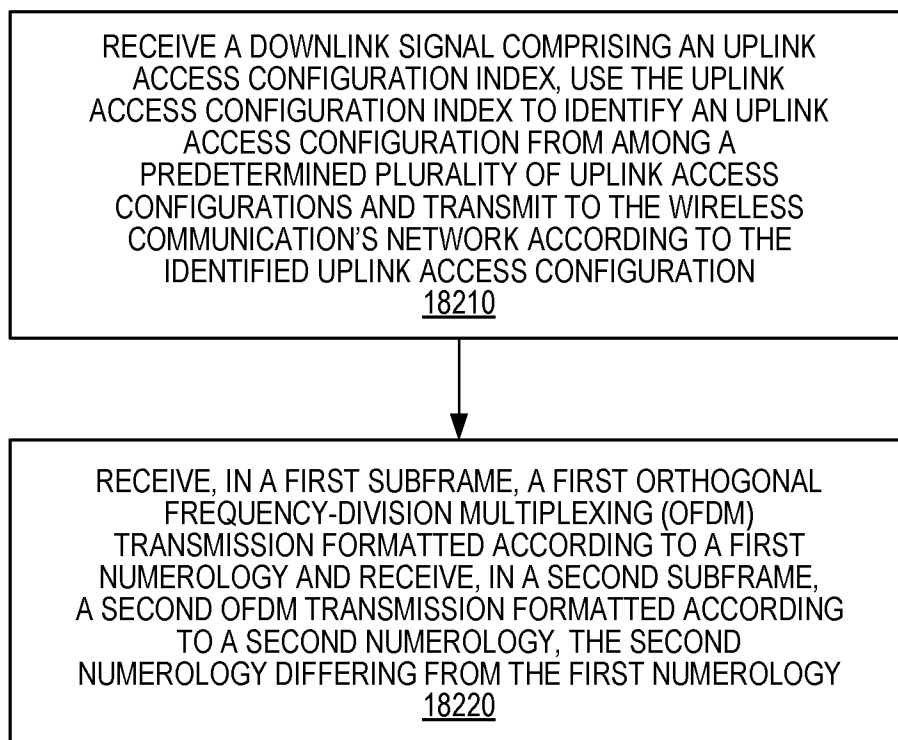
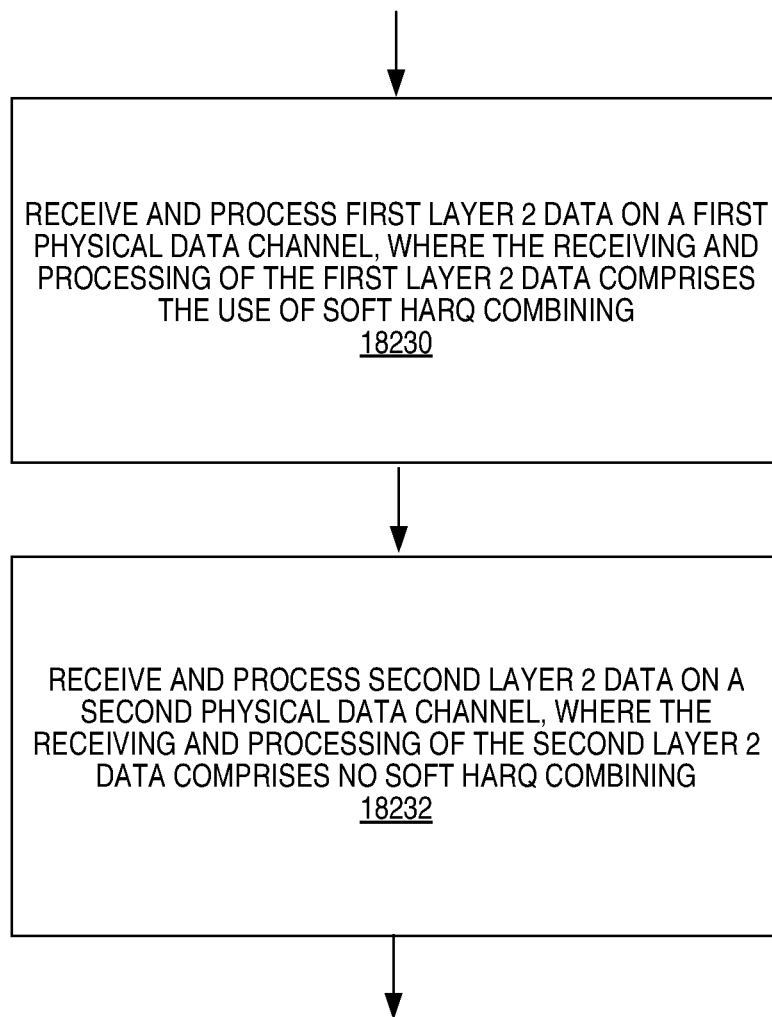


FIG. 181

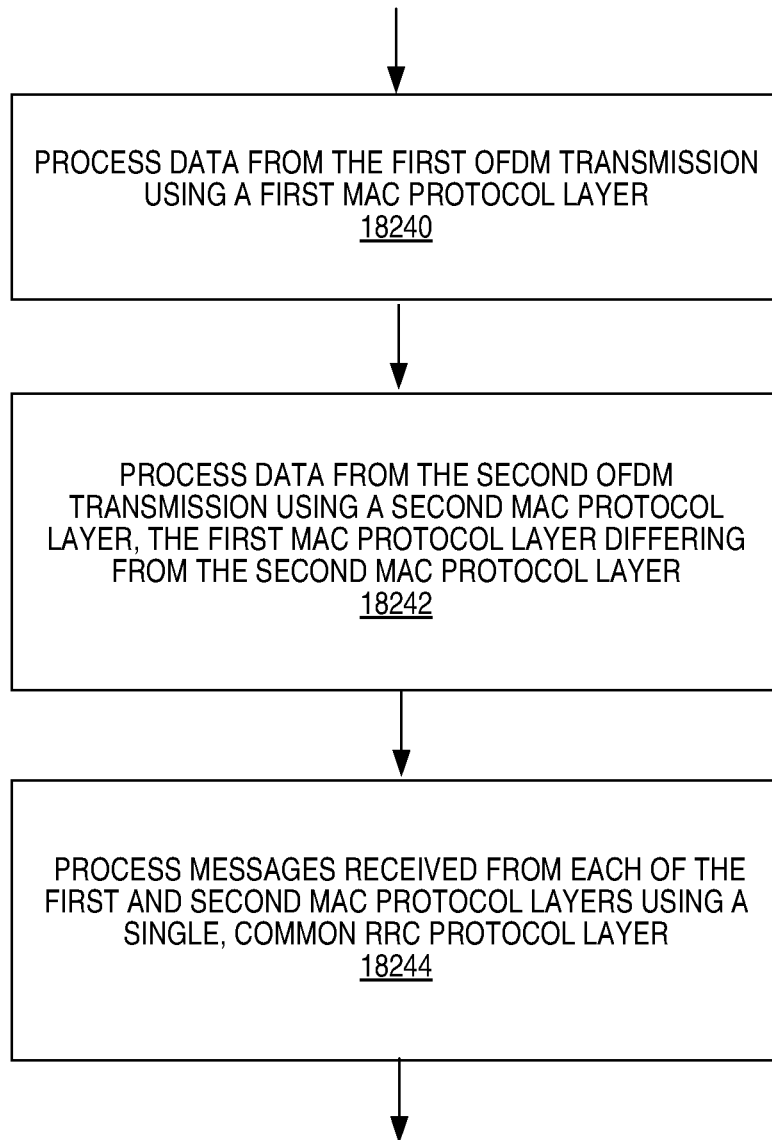
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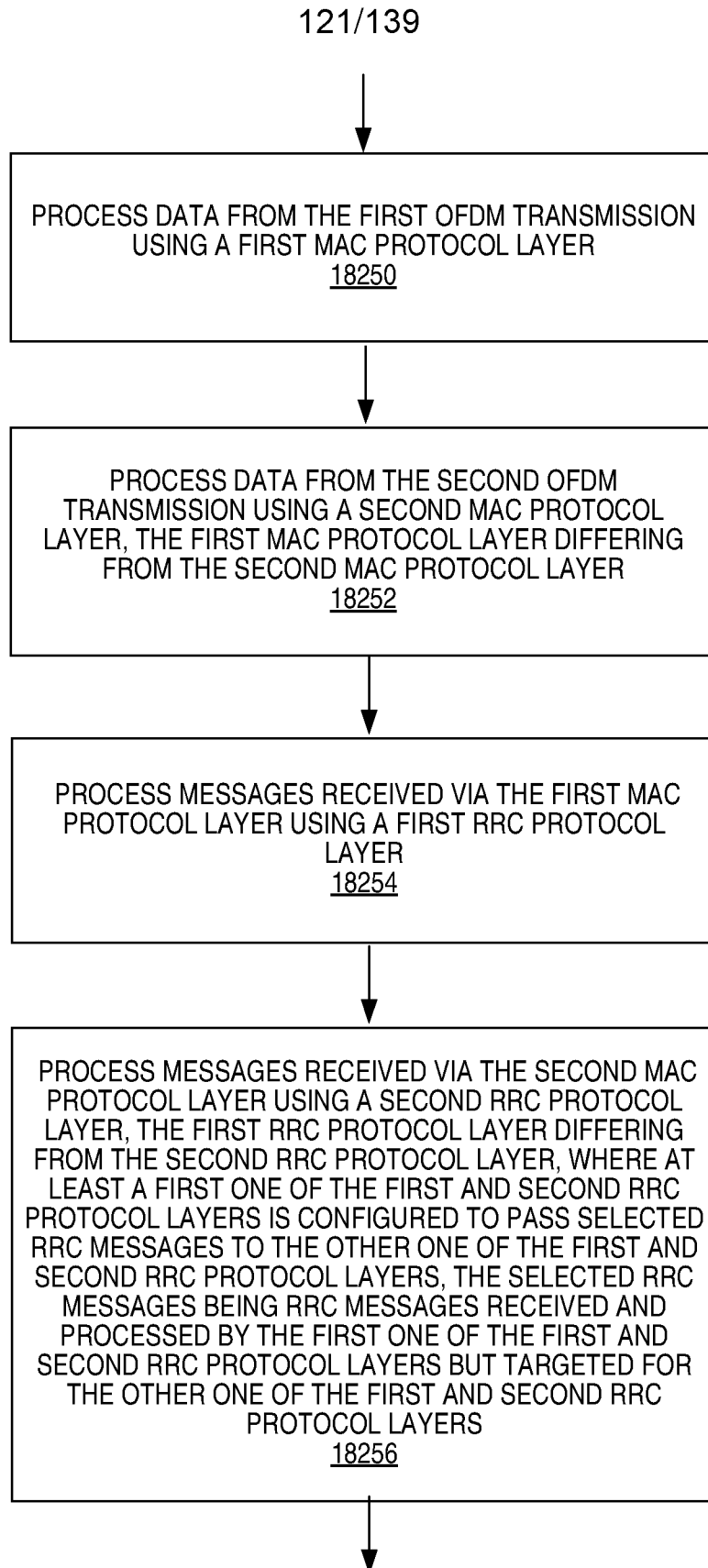
18200 **FIG. 182**

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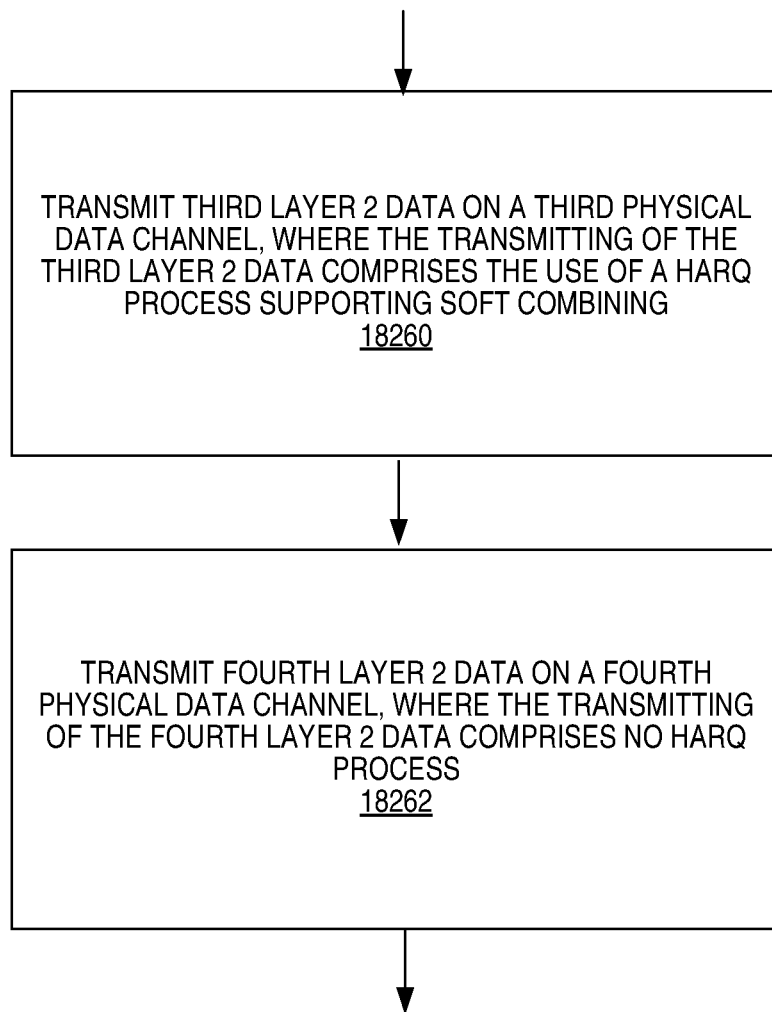
**FIG. 183**

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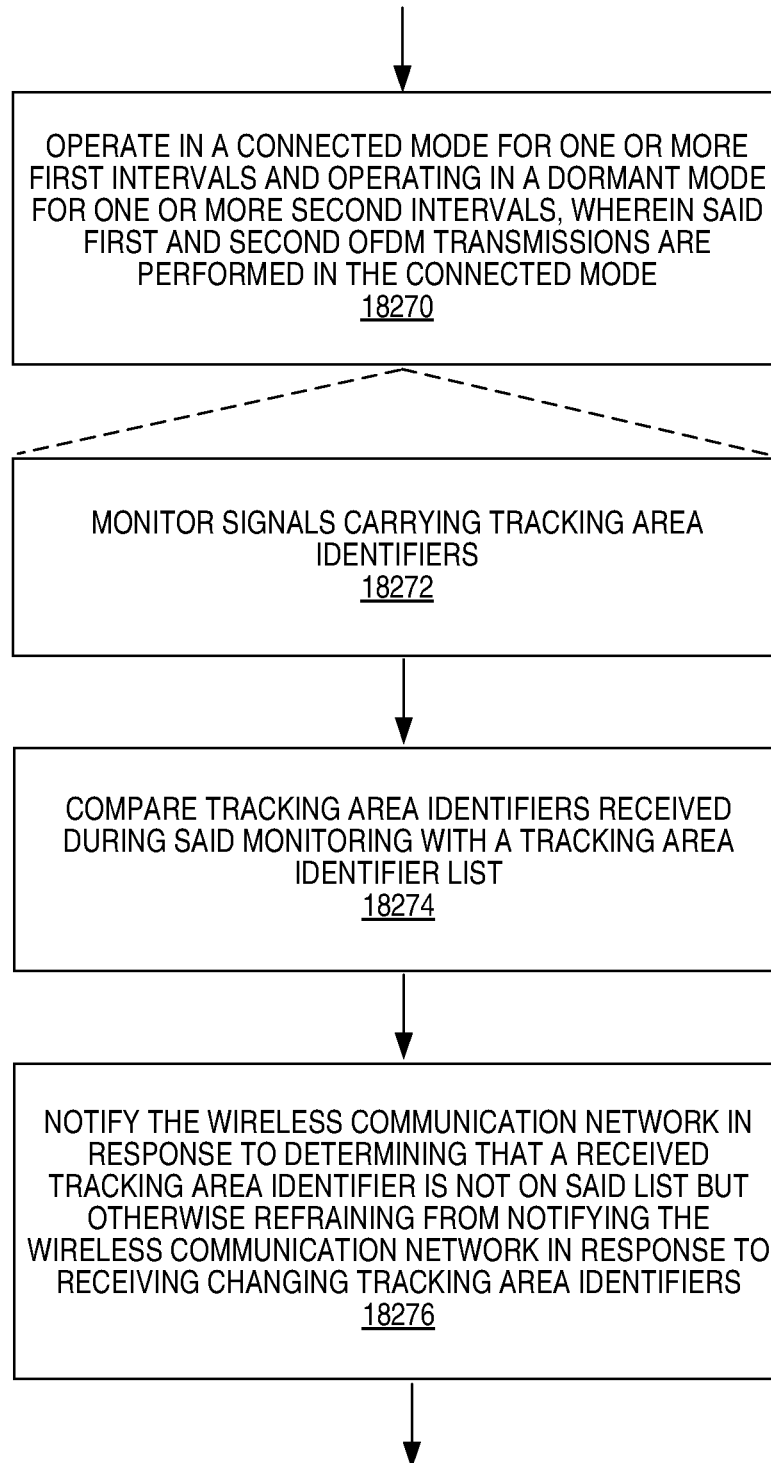
**FIG. 184**

**FIG. 185**

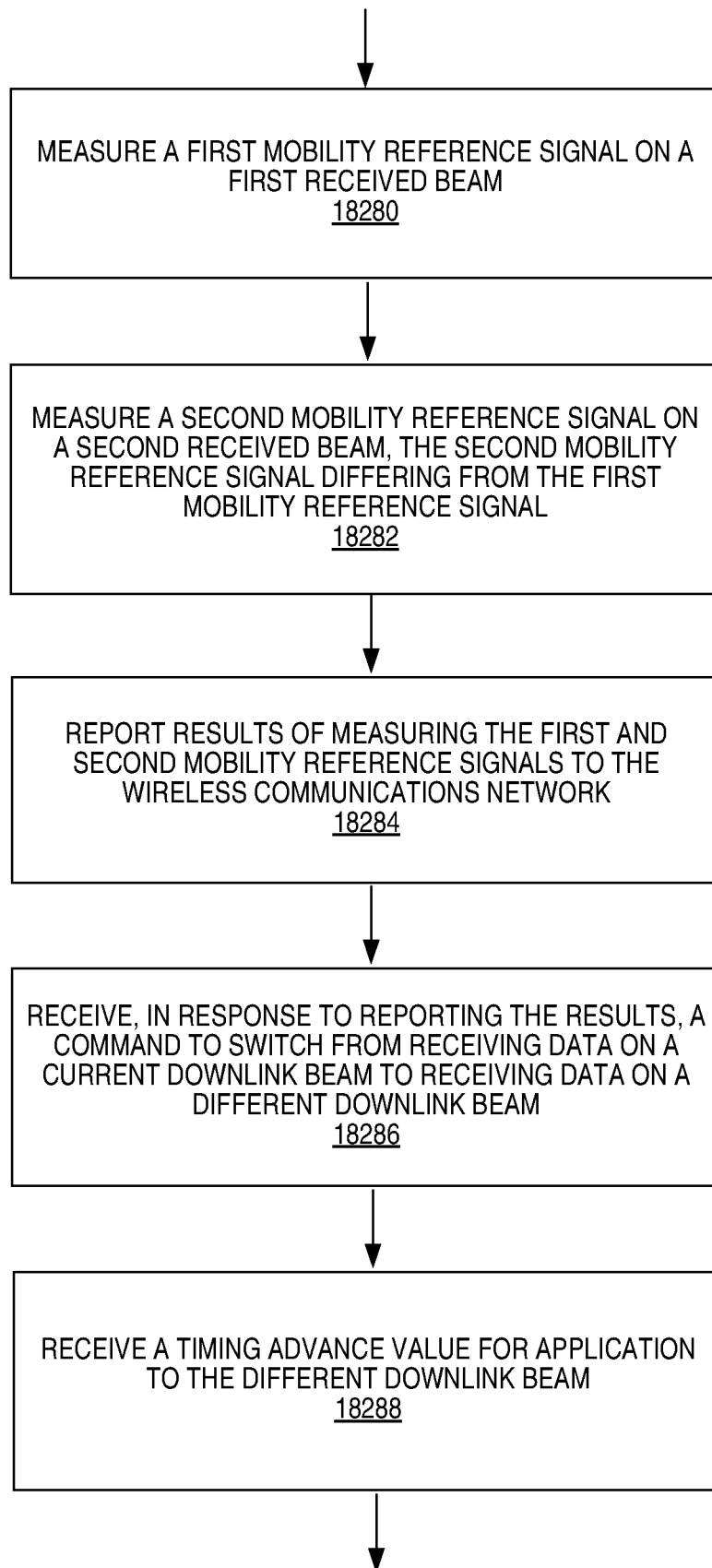
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**FIG. 186**

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**FIG. 187**

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**FIG. 188**

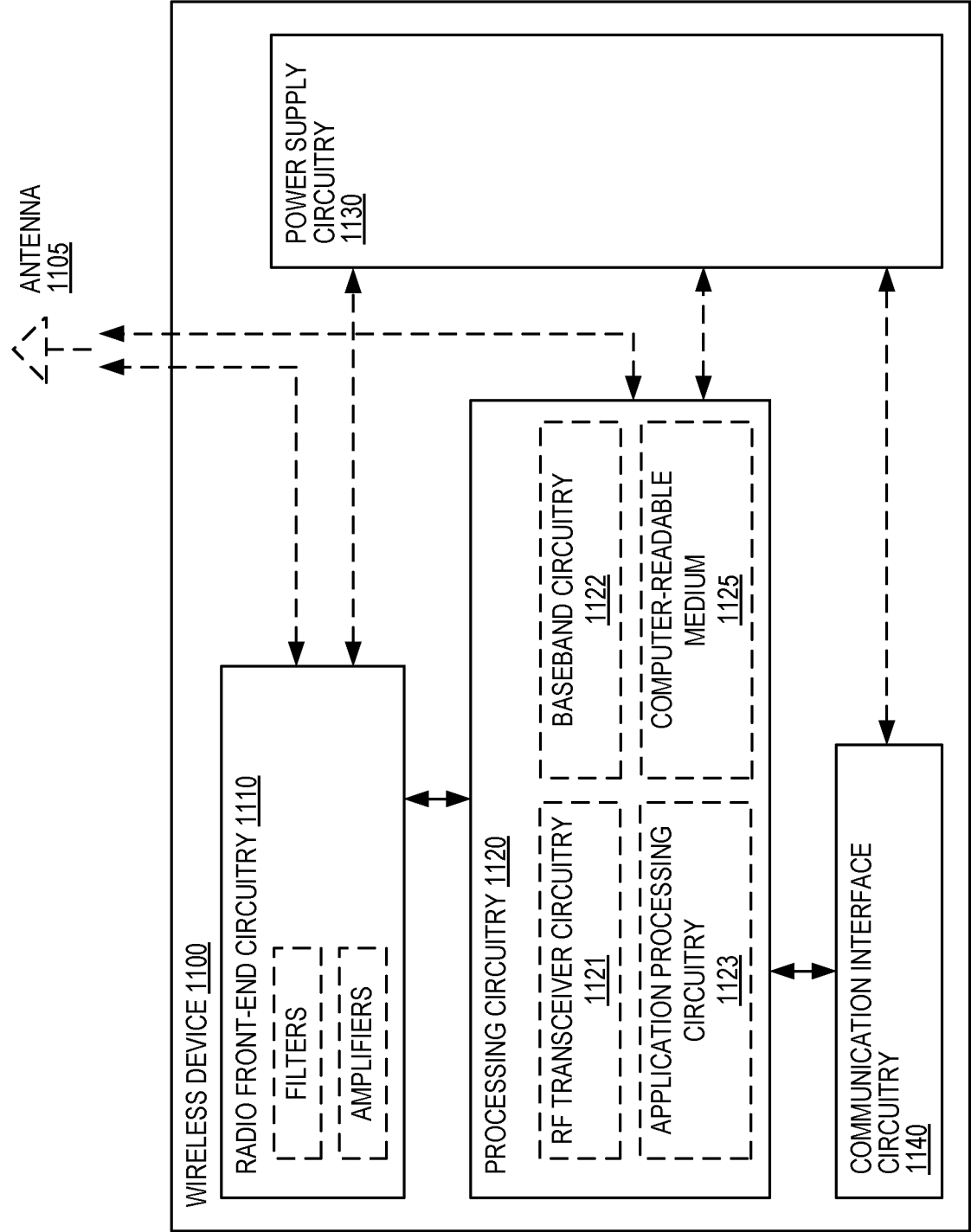
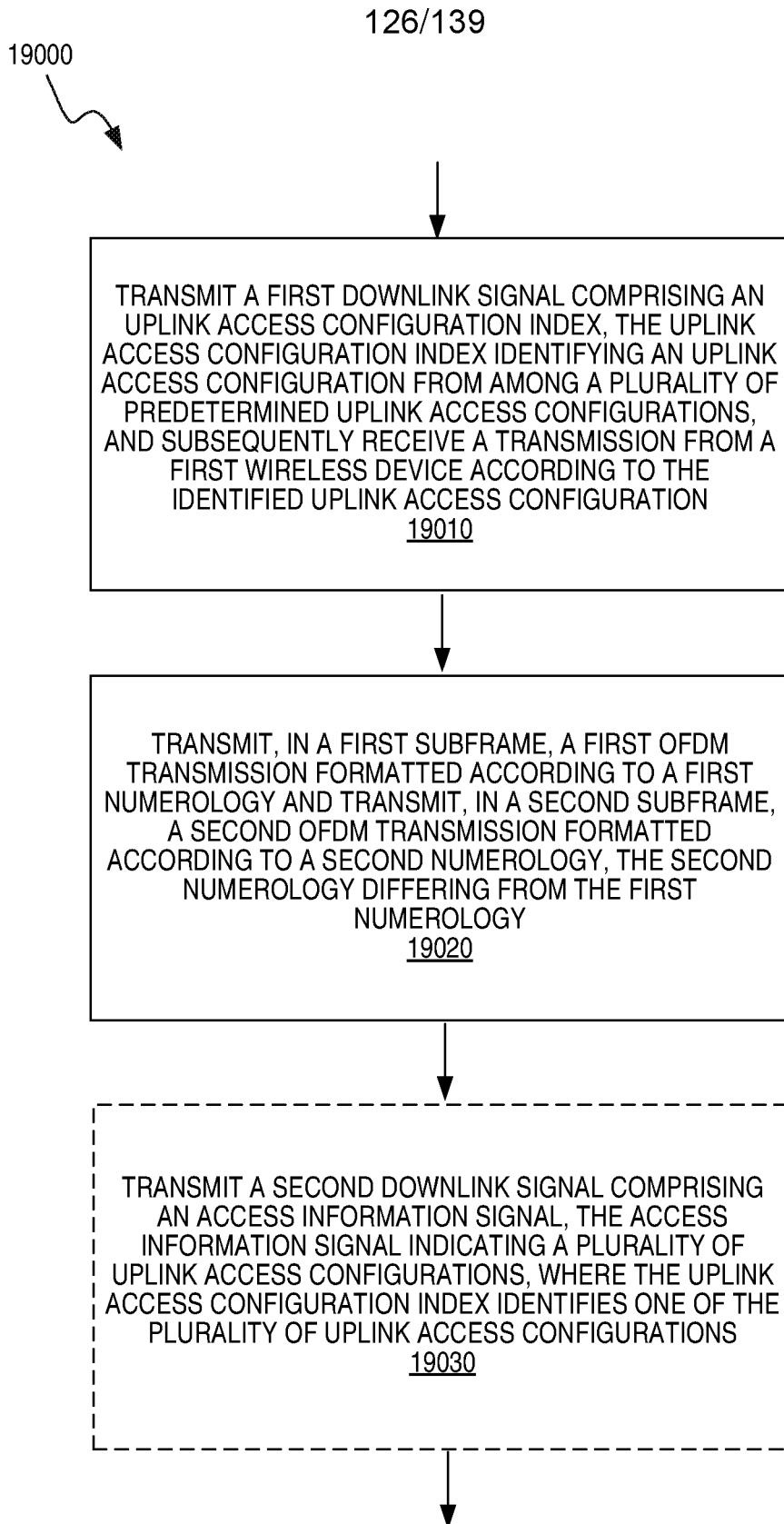
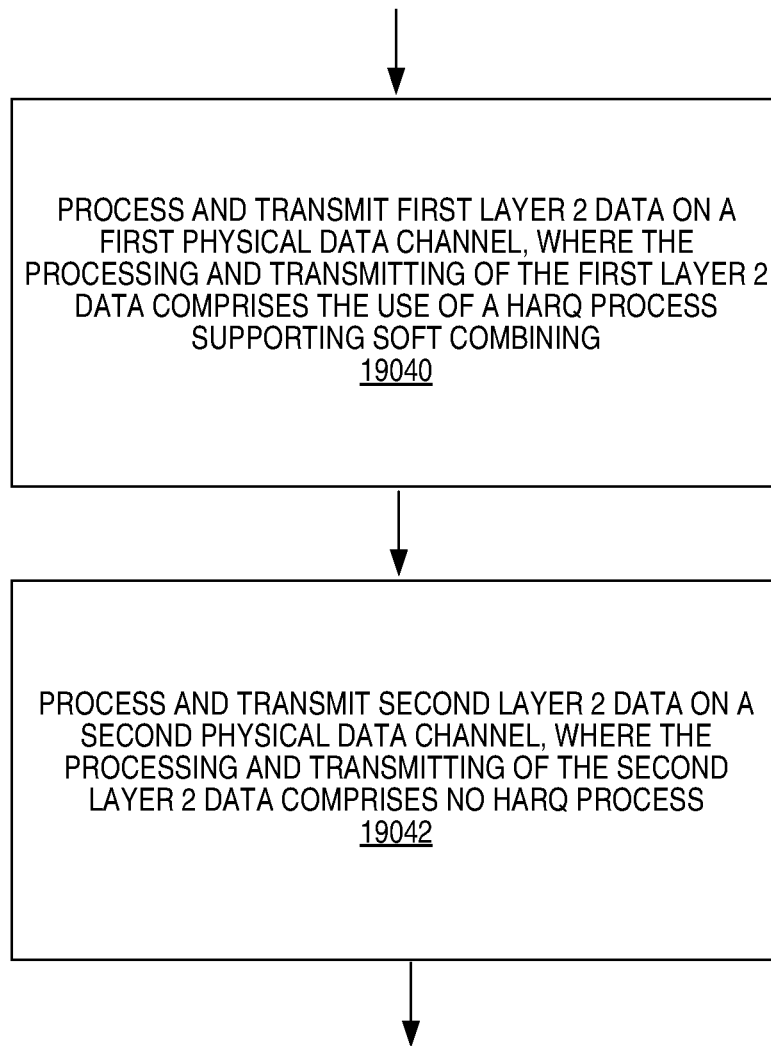


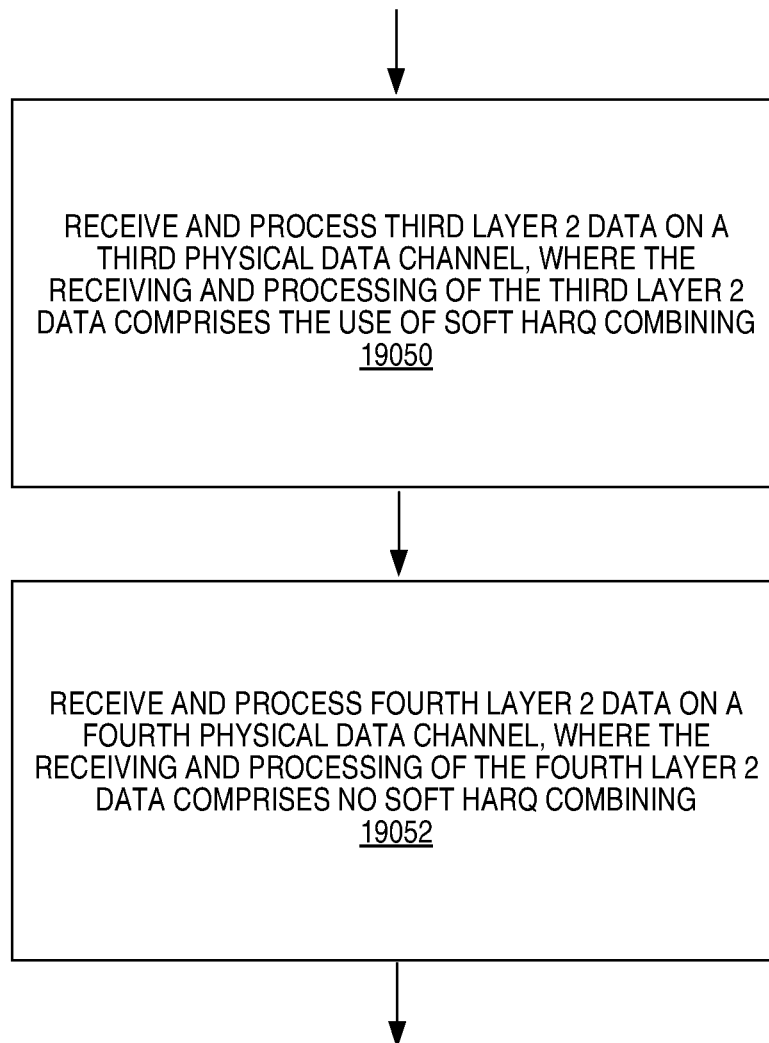
FIG. 189

**FIG. 190**

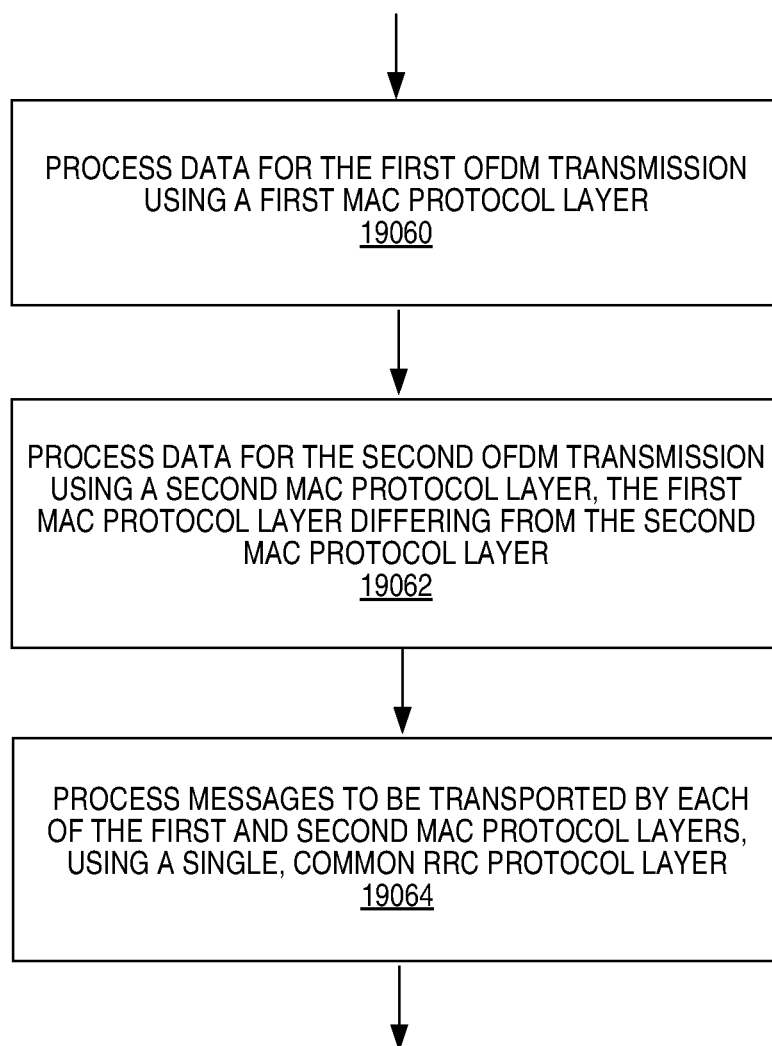
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**FIG. 191**

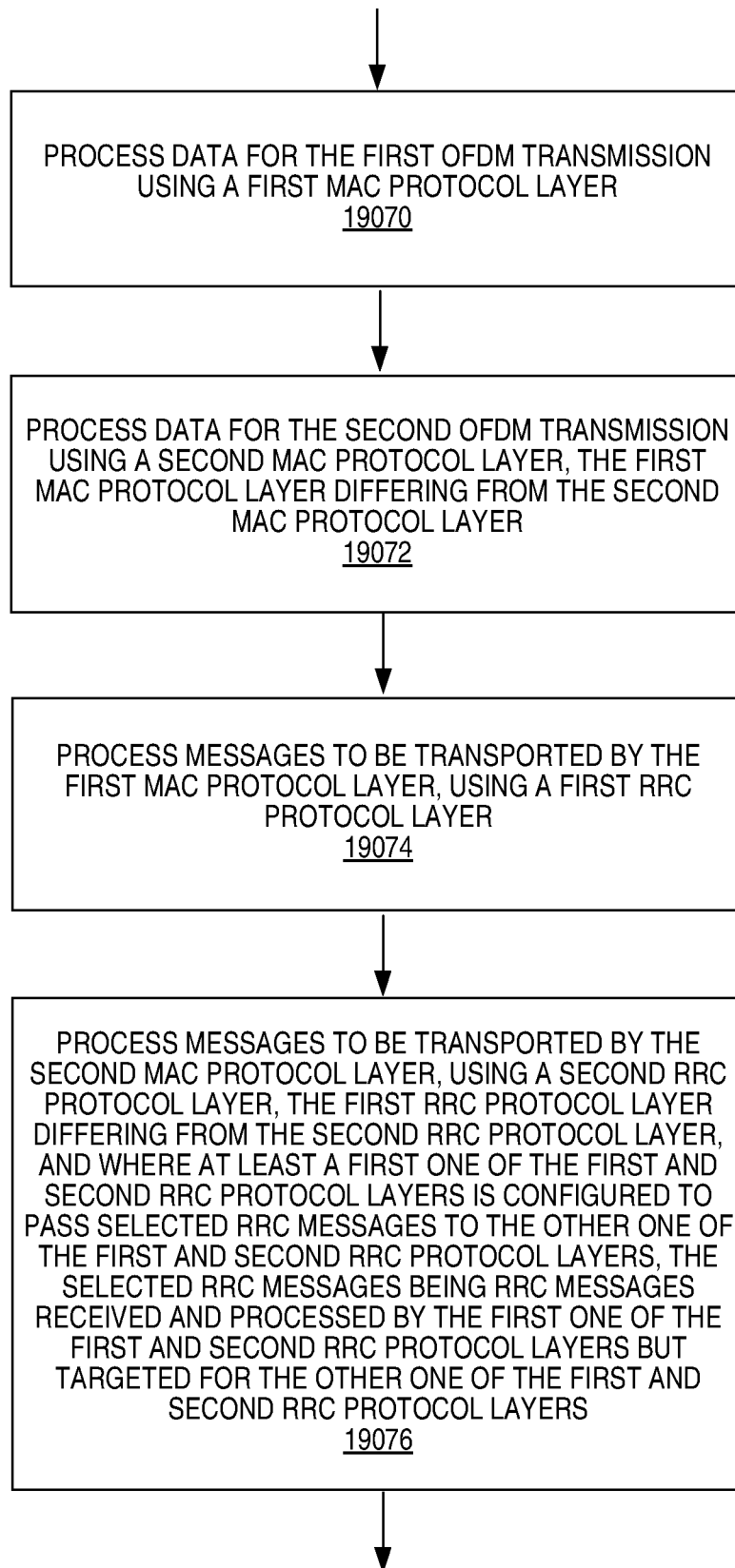
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**FIG. 192**

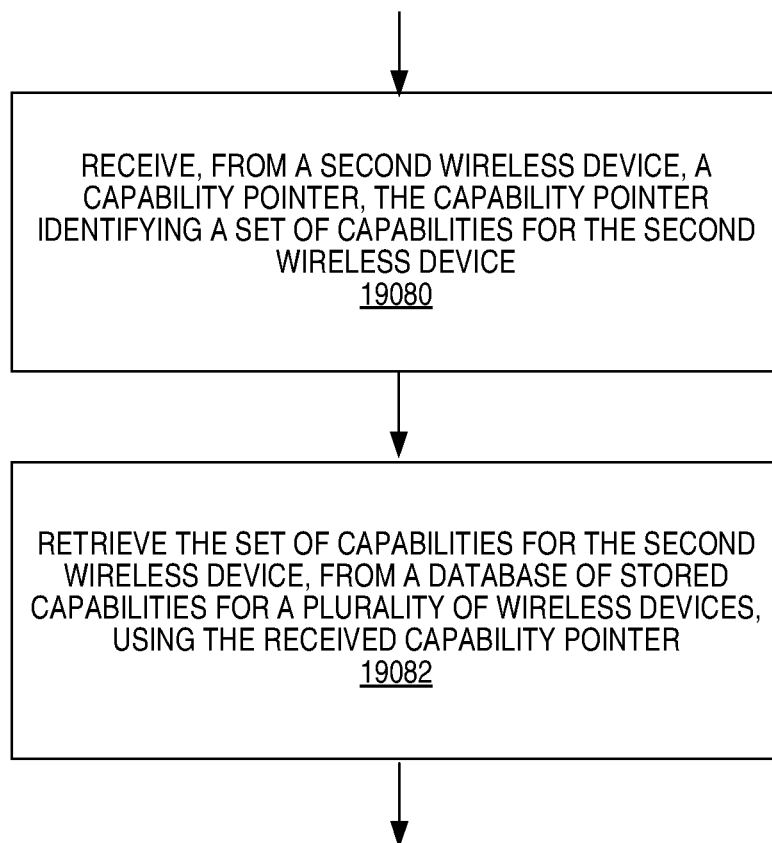
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**FIG. 193**

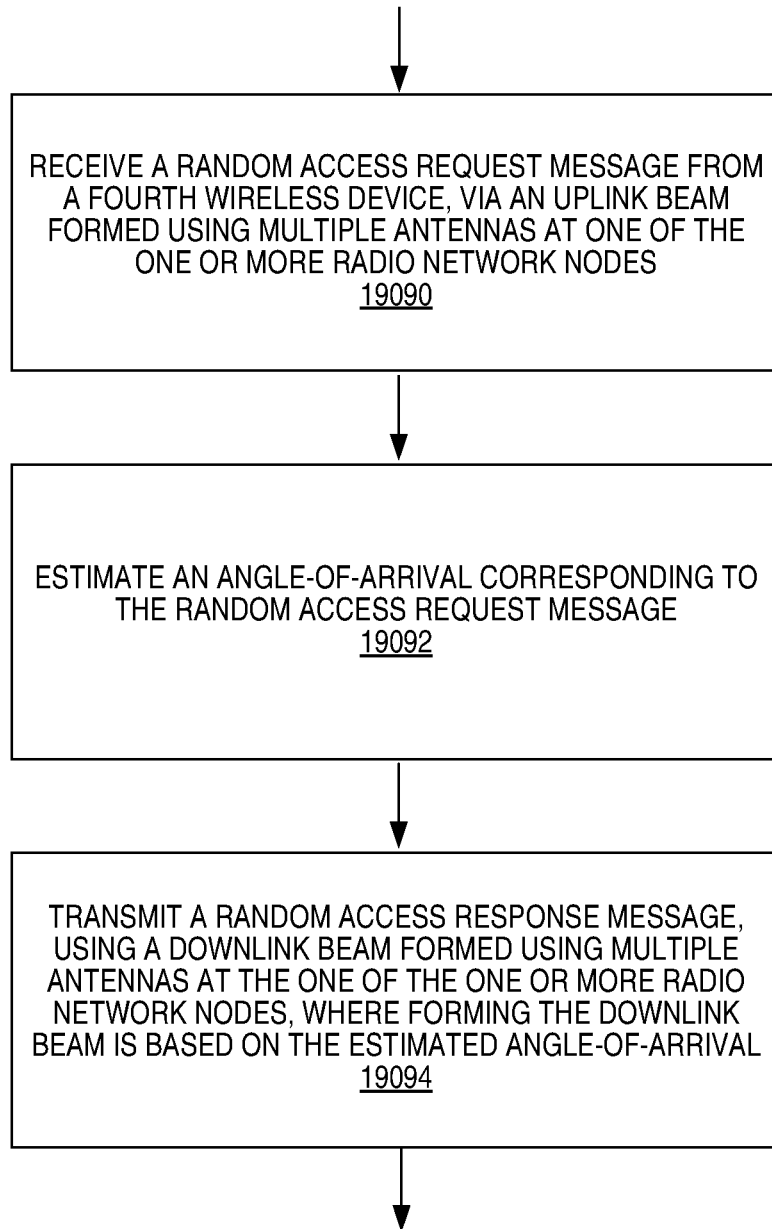
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**FIG. 194**

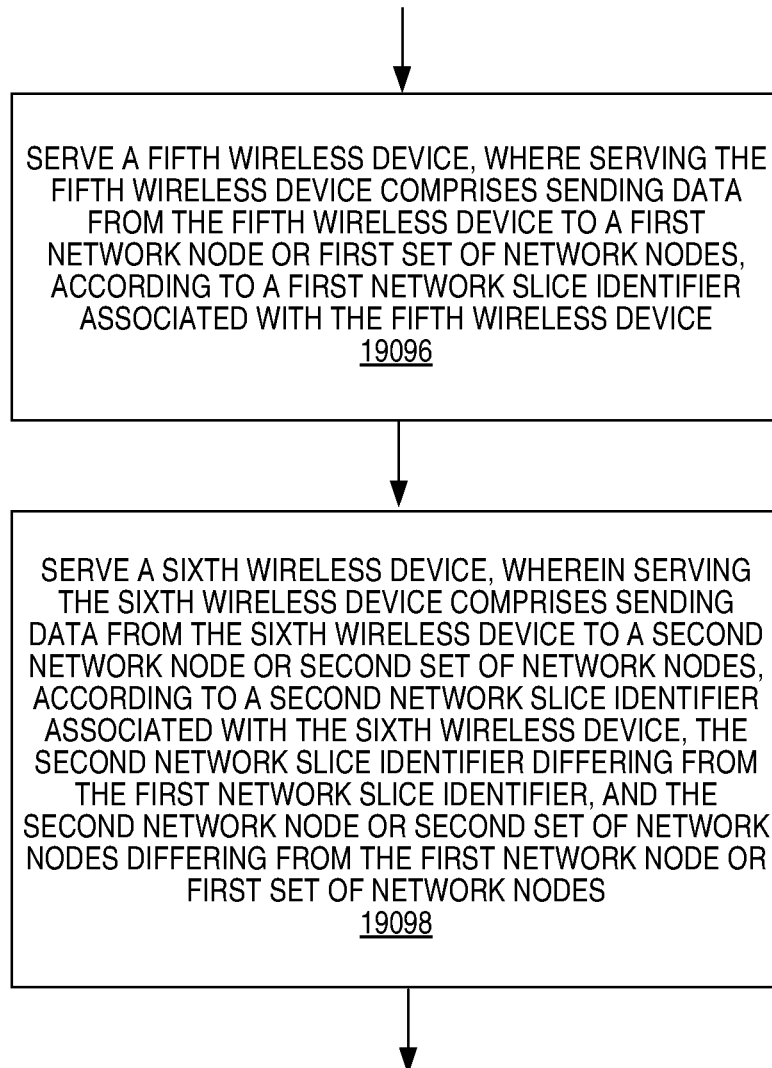
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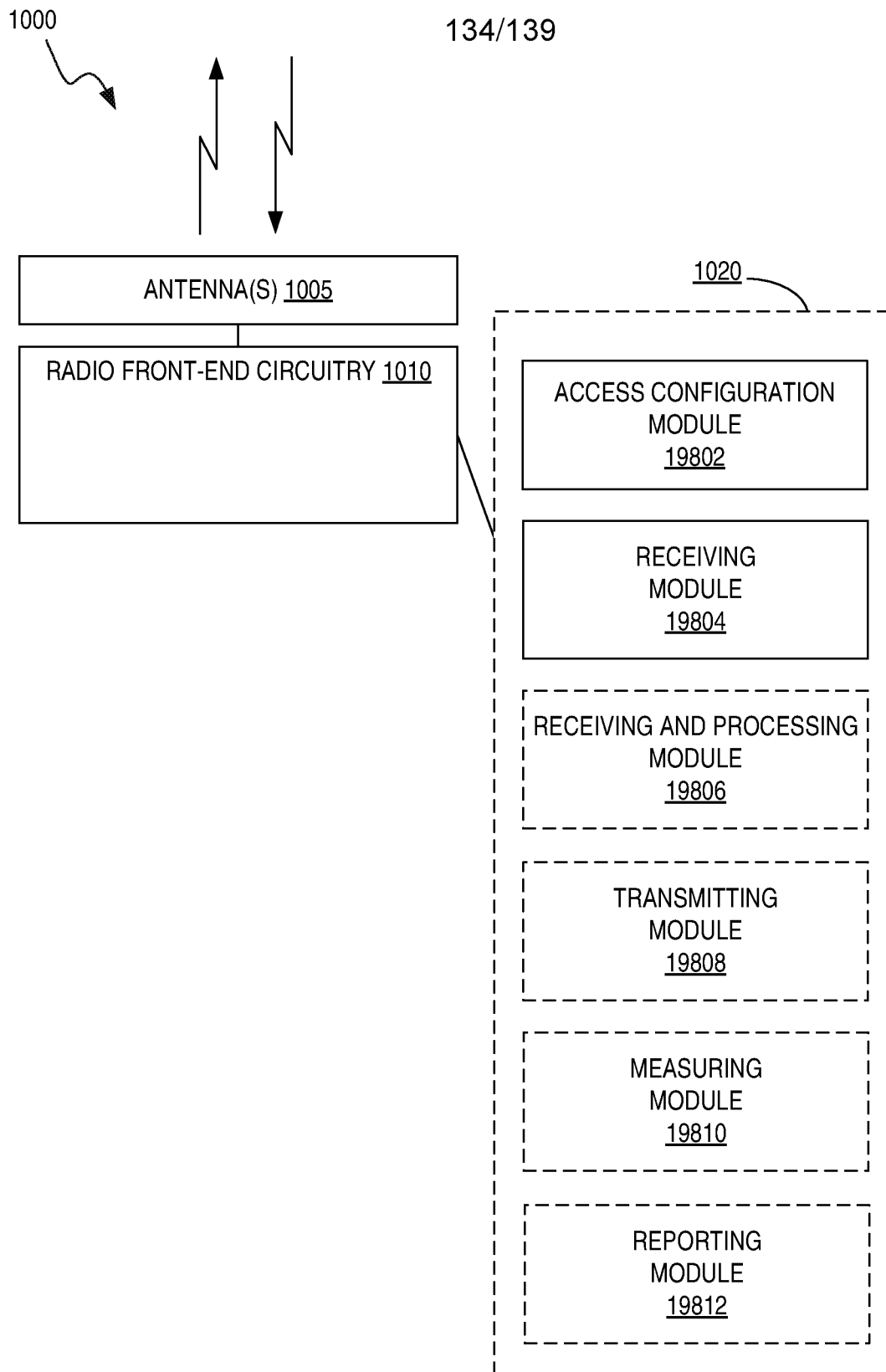
**FIG. 195**

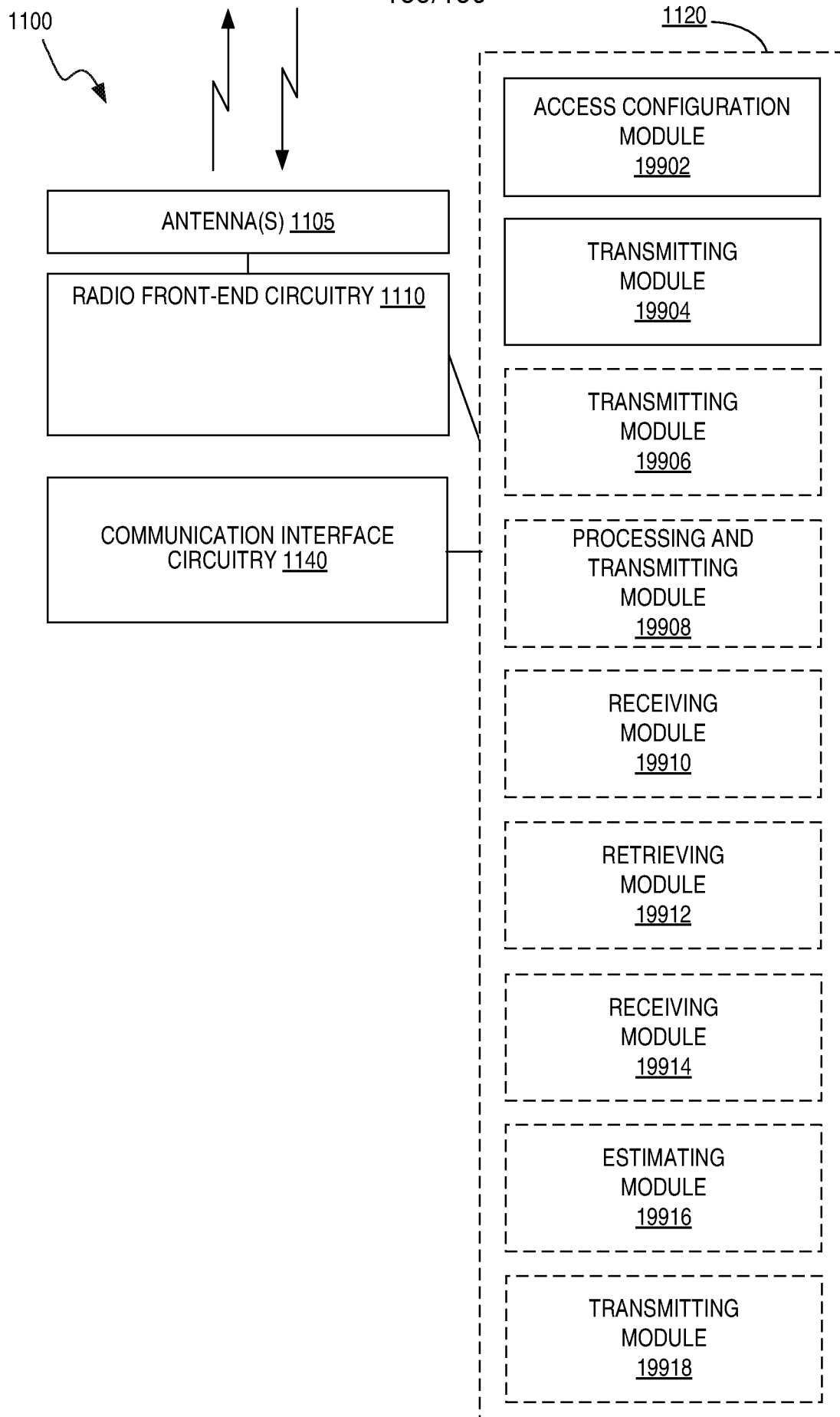
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**FIG. 196**

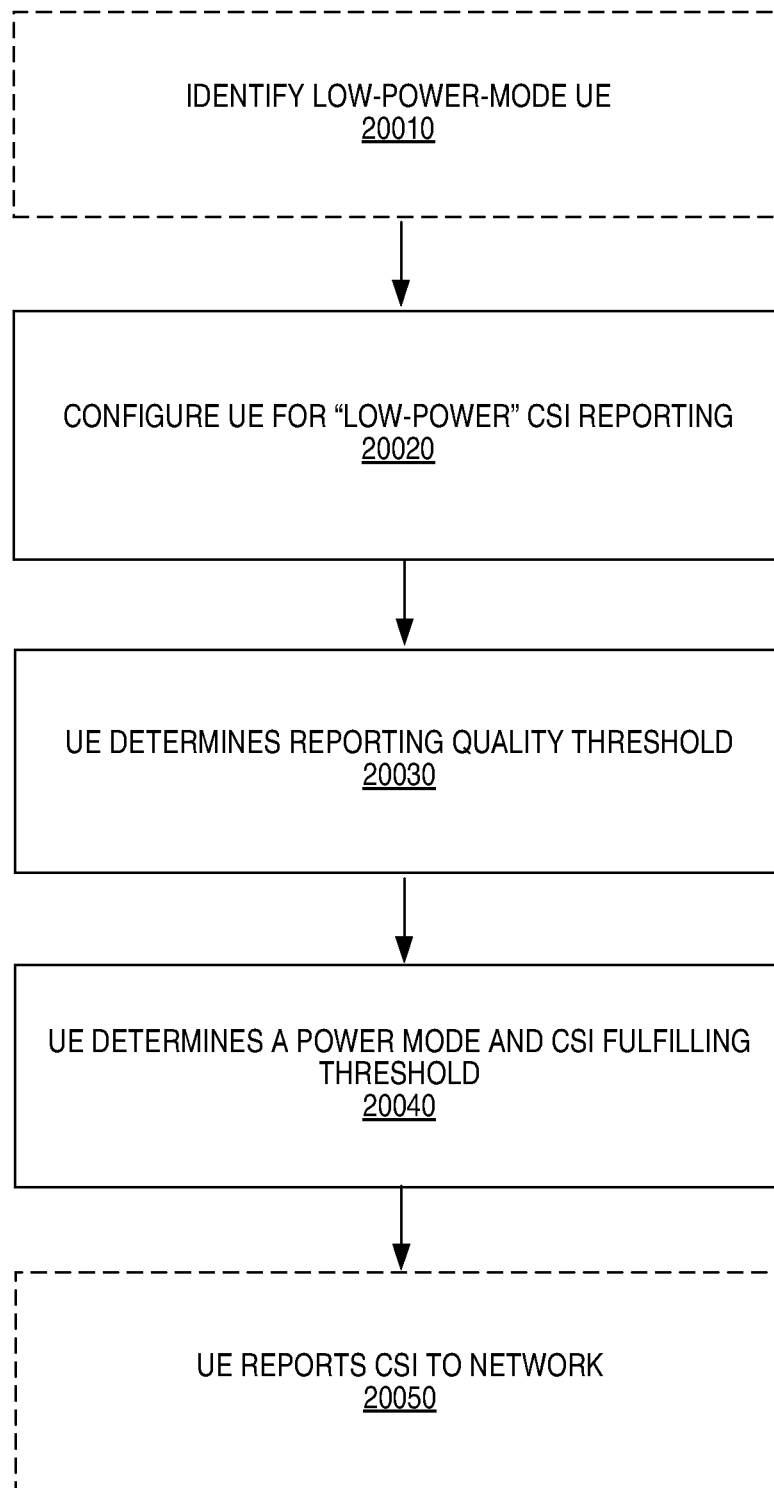
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**FIG. 197**

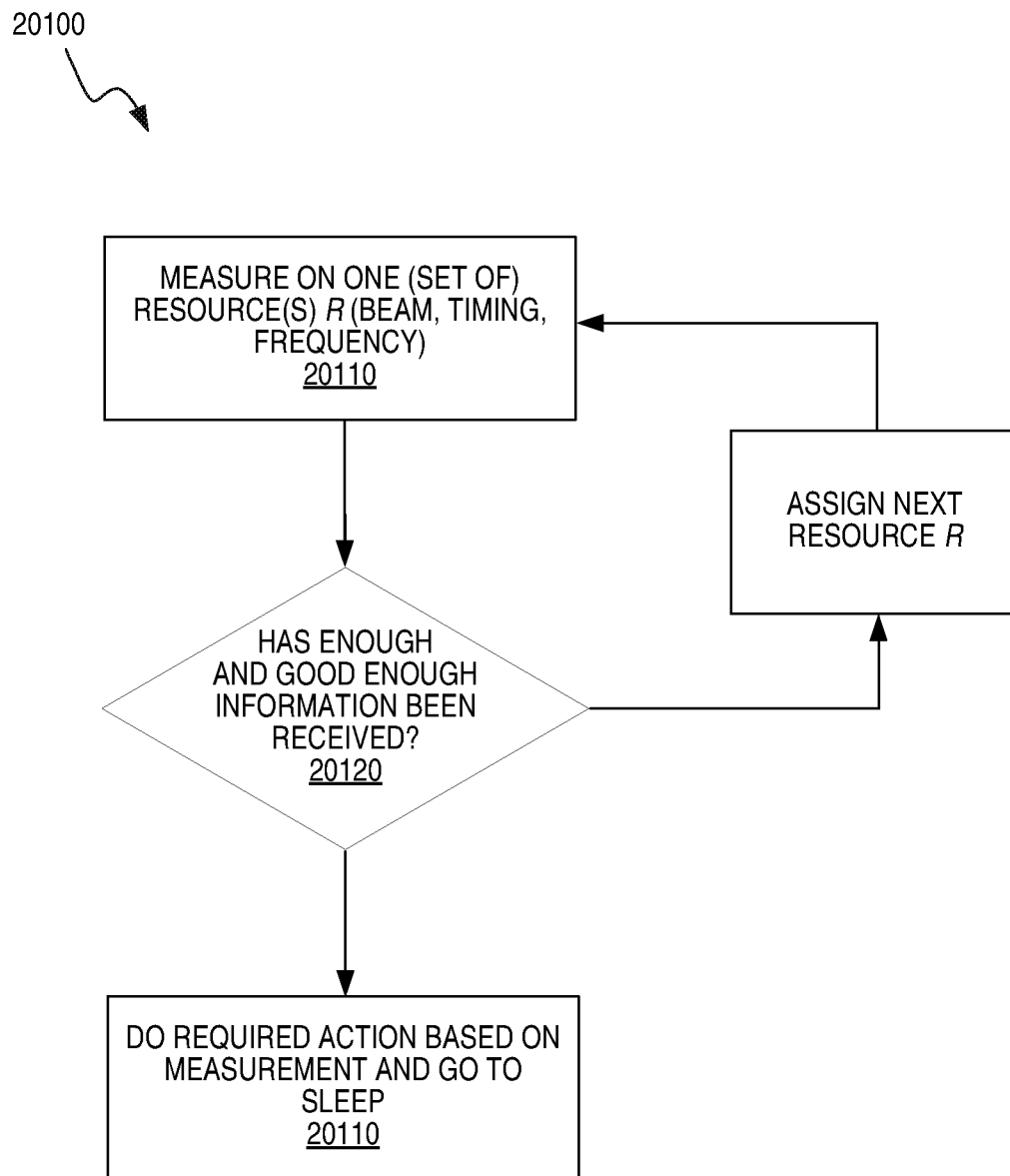
**FIG. 198**

**FIG. 199**

20000

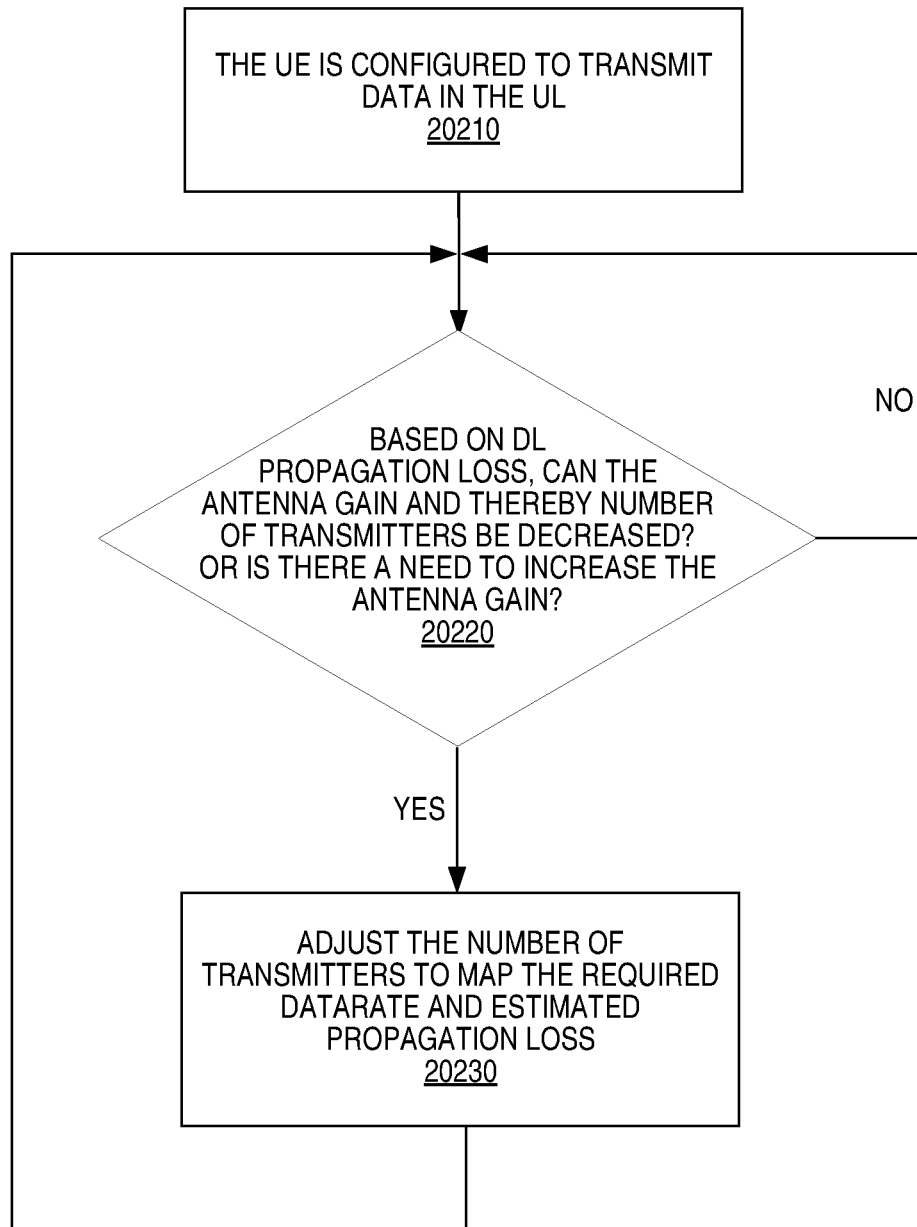
**FIG. 200**

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**FIG. 201**

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**FIG. 202**

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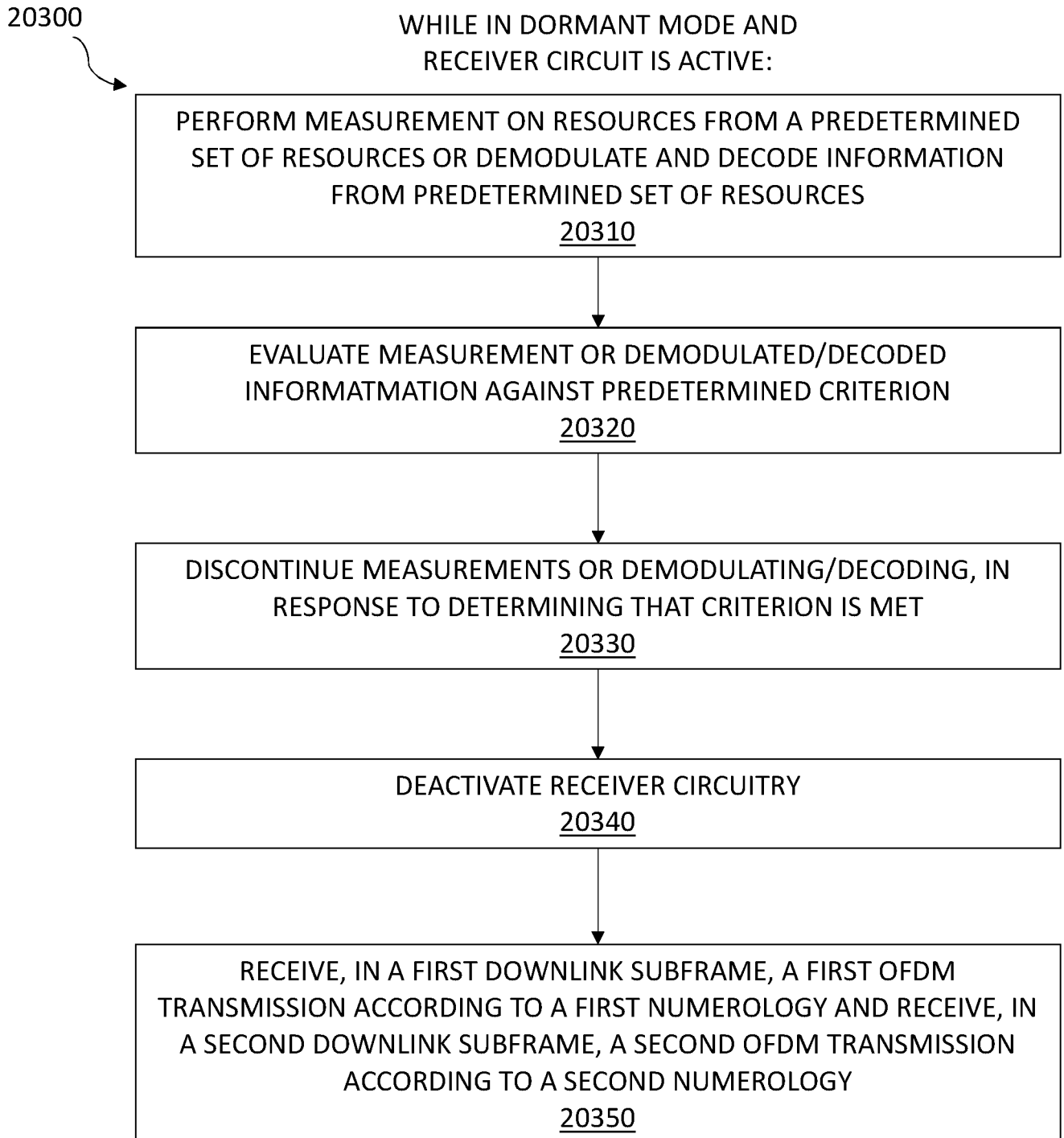


Figure 203