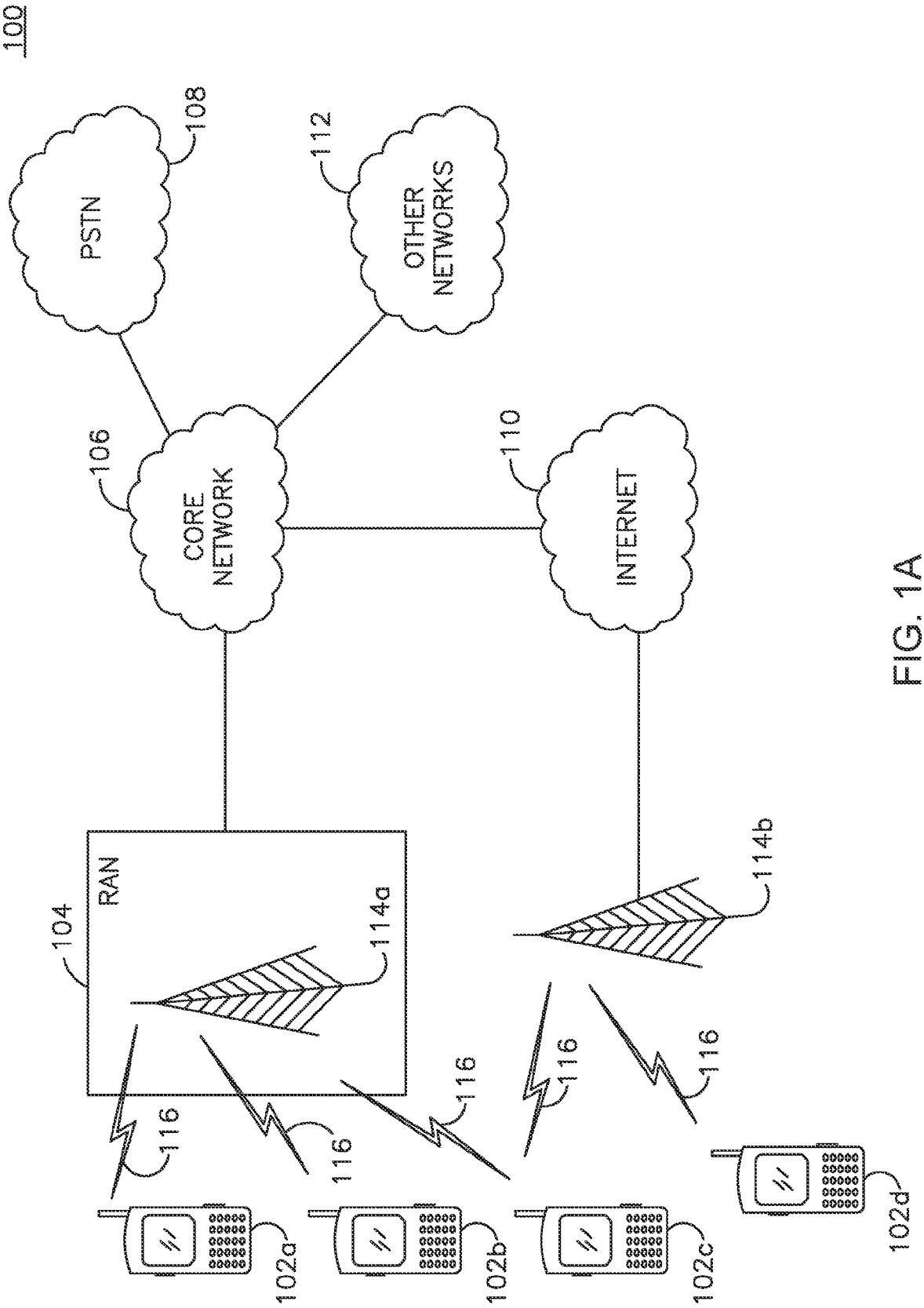

100
PSTN
108
OTHER NETWORKS
112
CORE NETWORK
106
INTERNET
110
RAN
104
114a
114b
116
116
116
116
102a
102b
102c
102d

FIG. 1A

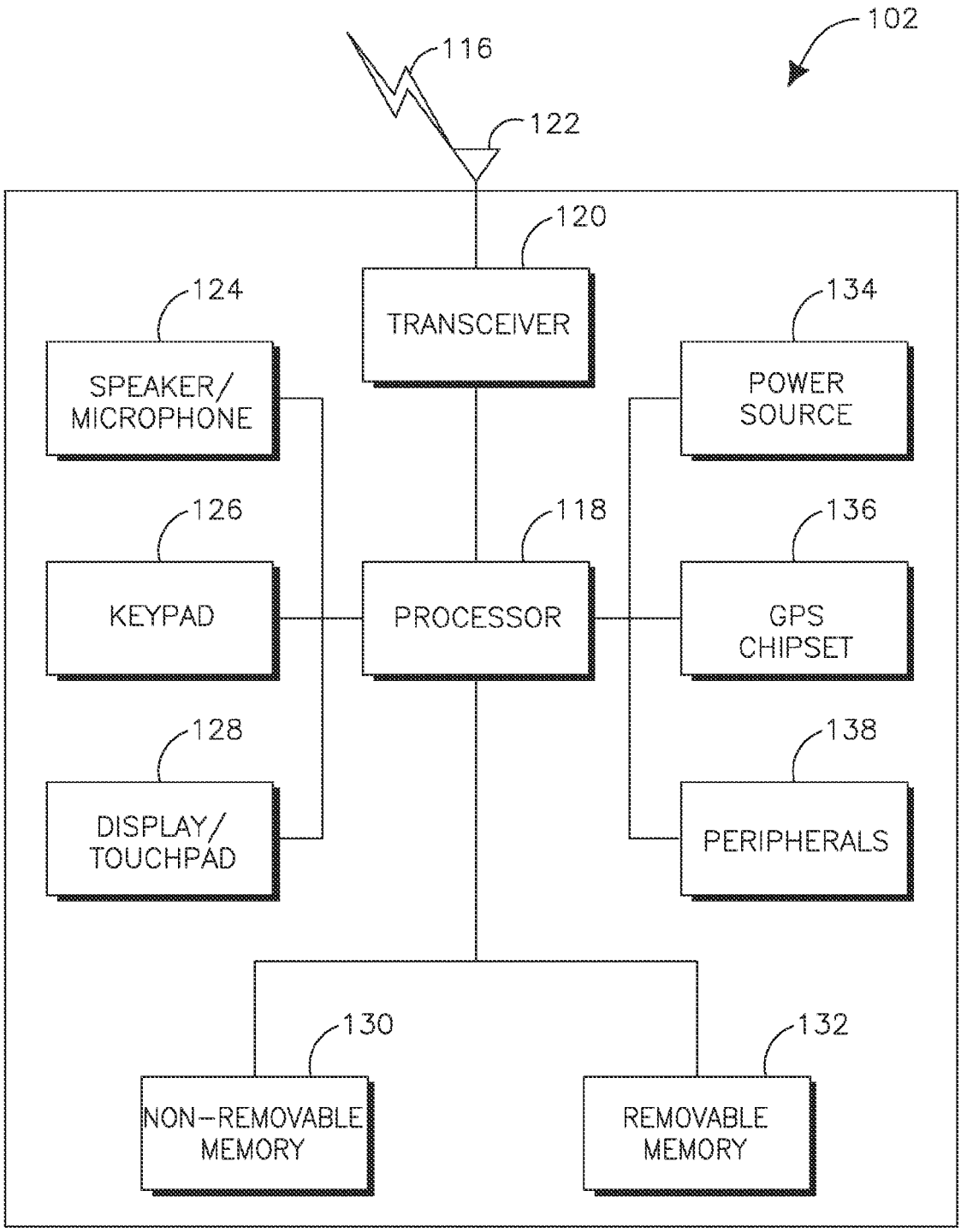

102
116
122
120
TRANSCEIVER
124
SPEAKER/
MICROPHONE
134
POWER
SOURCE
126
KEYPAD
118
PROCESSOR
136
GPS
CHIPSET
128
DISPLAY/
TOUCHPAD
138
PERIPHERALS
130
NON-REMOVABLE
MEMORY
132
REMOVABLE
MEMORY

FIG. 1B

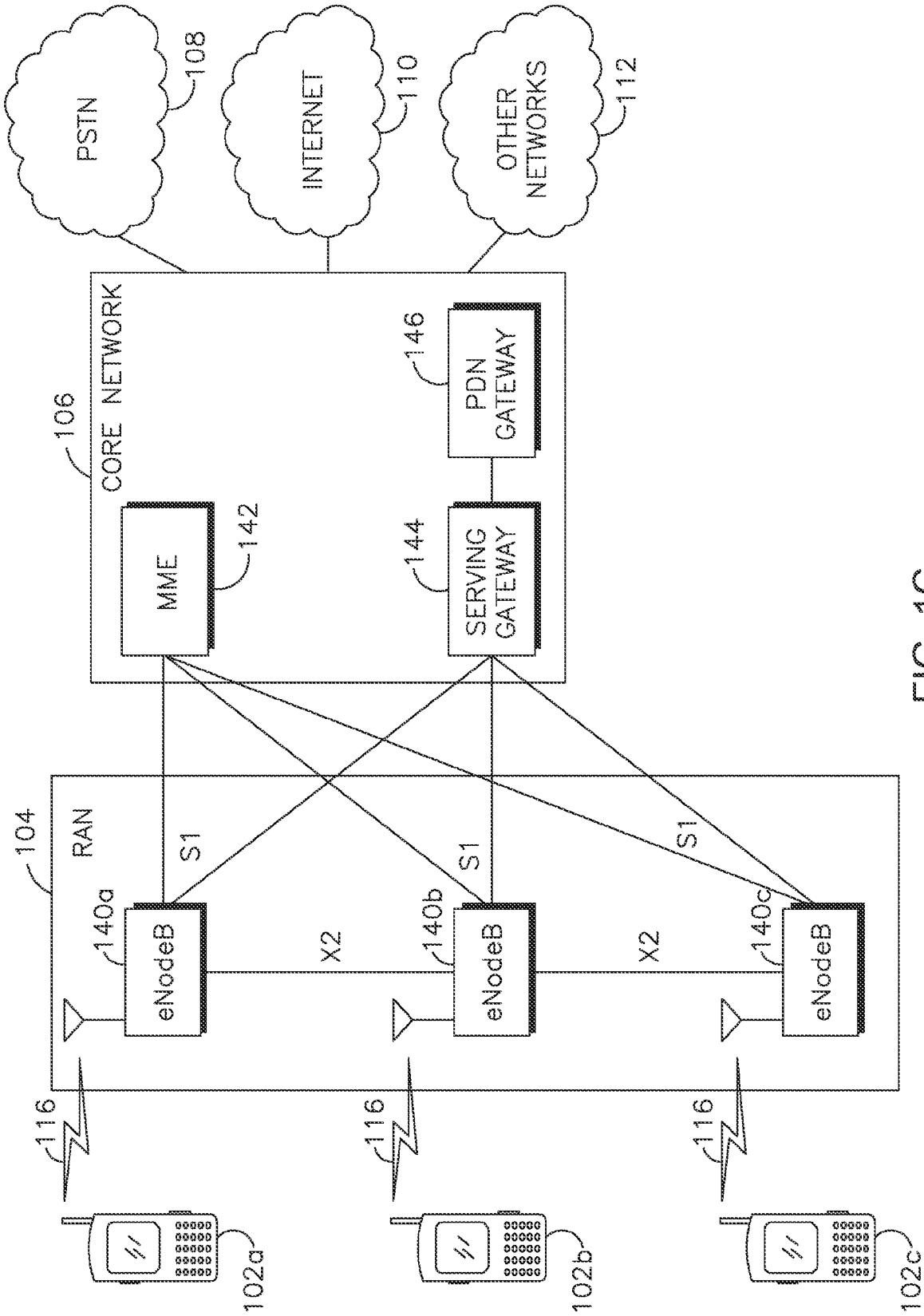

PSTN
108
INTERNET
110
OTHER NETWORKS
112
CORE NETWORK
106
PDN GATEWAY
146
MME
142
SERVING GATEWAY
144
RAN
104
S1
S1
S1
140a
eNodeB
X2
140b
eNodeB
X2
140c
eNodeB
116
116
116
102a
102b
102c

FIG. 1C

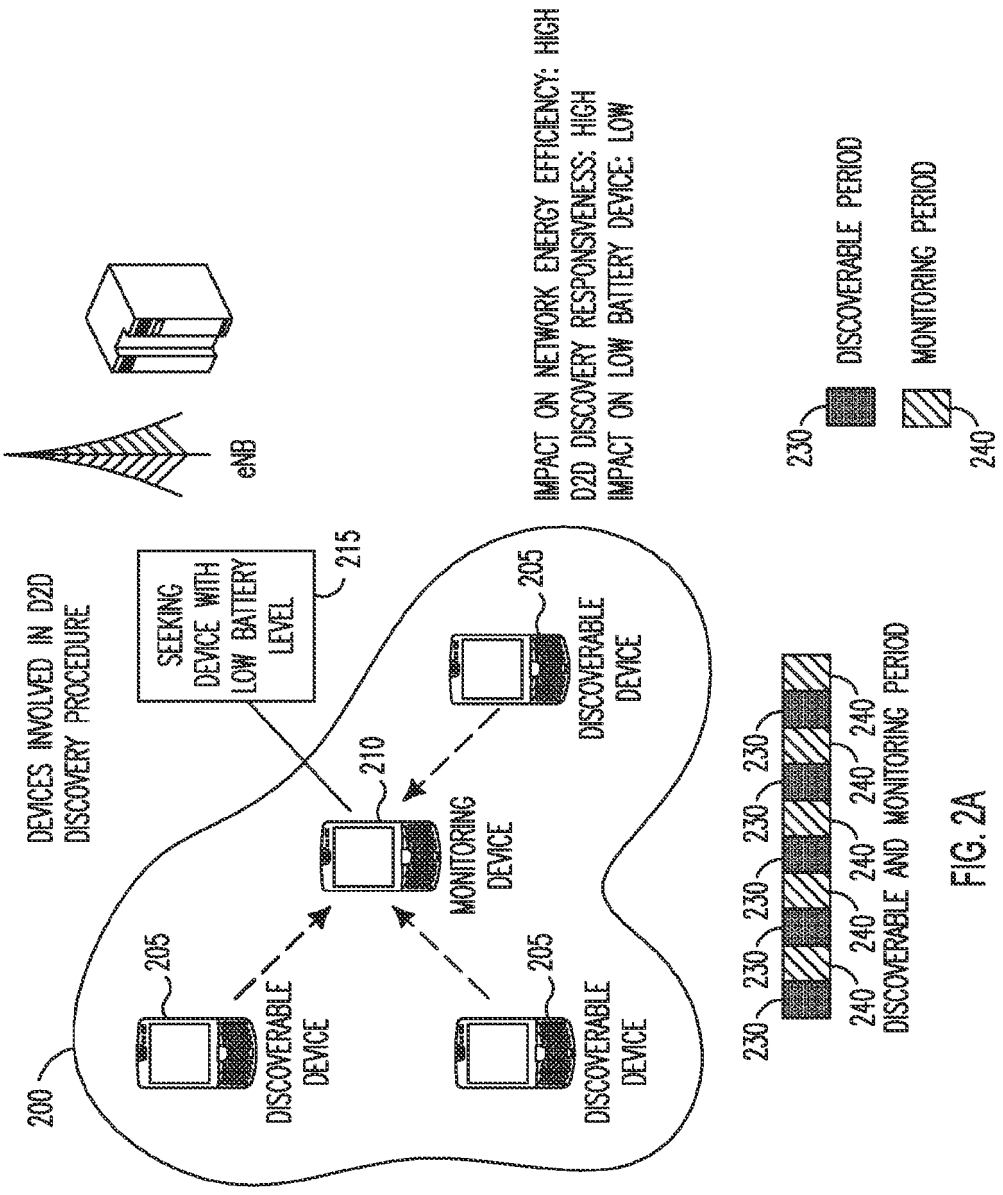

DEVICES INVOLVED IN D2D DISCOVERY PROCEDURE
eNB
IMPACT ON NETWORK ENERGY EFFICIENCY: HIGH
D2D DISCOVERY RESPONSIVENESS: HIGH
IMPACT ON LOW BATTERY DEVICE: LOW
DISCOVERABLE PERIOD
MONITORING PERIOD
SEEKING DEVICE WITH LOW BATTERY LEVEL
215
210
MONITORING DEVICE
205
DISCOVERABLE DEVICE
205
DISCOVERABLE DEVICE
205
DISCOVERABLE DEVICE
200
230
240
DISCOVERABLE AND MONITORING PERIOD

FIG. 2A

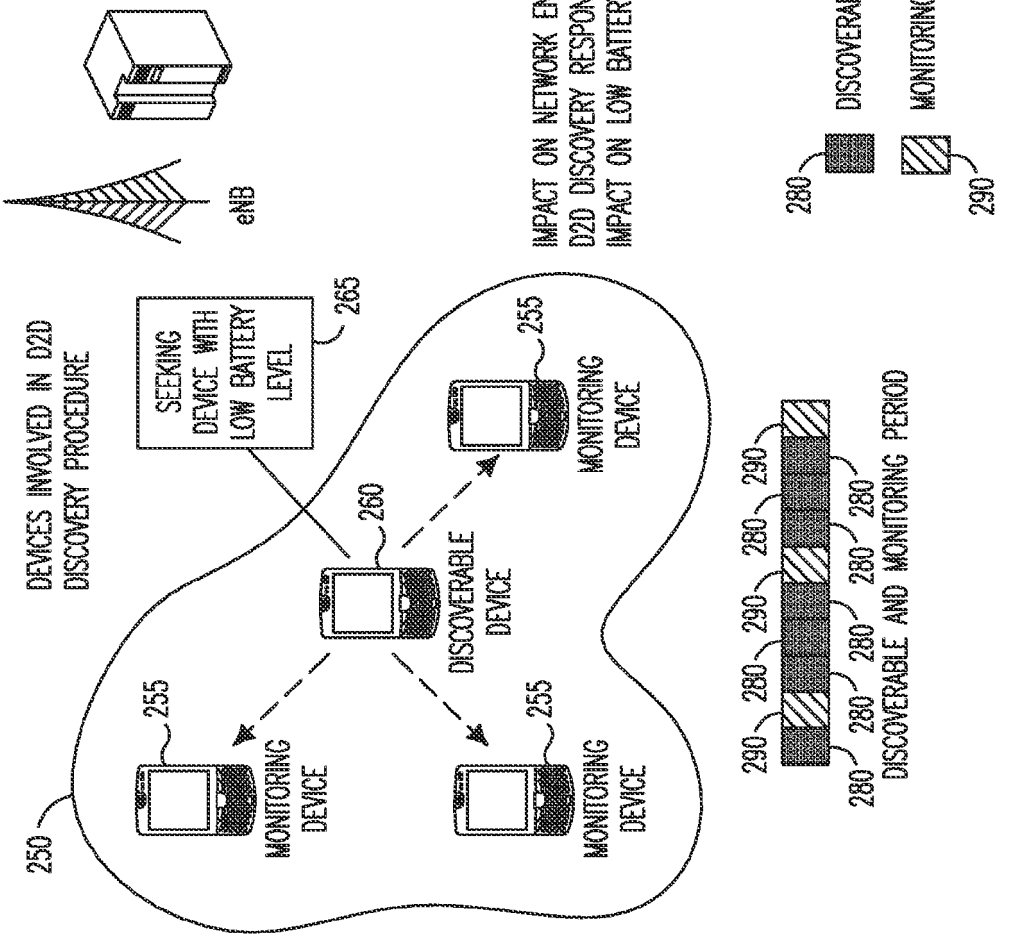

DEVICES INVOLVED IN D2D DISCOVERY PROCEDURE
eNB
SEEKING DEVICE WITH LOW BATTERY LEVEL
265
260
DISCOVERABLE DEVICE
255
MONITORING DEVICE
255
MONITORING DEVICE
255
MONITORING DEVICE
250
IMPACT ON NETWORK ENERGY EFFICIENCY: HIGH
D2D DISCOVERY RESPONSIVENESS: LOW
IMPACT ON LOW BATTERY DEVICE: MEDIUM
280
DISCOVERABLE PERIOD
290
MONITORING PERIOD
DISCOVERABLE AND MONITORING PERIOD

FIG. 2B

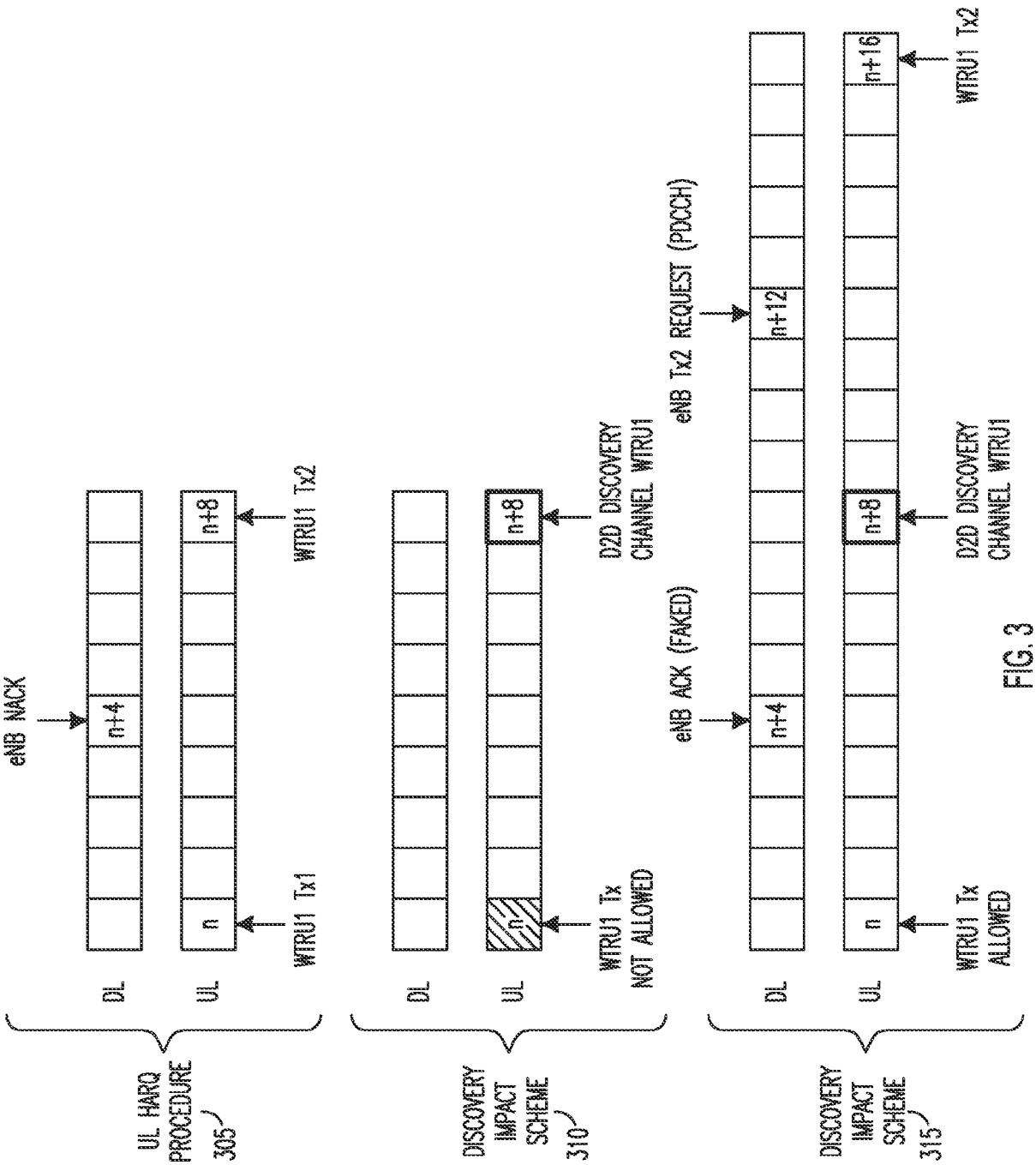

UL HARQ PROCEDURE 305
DL
UL
eNB NACK
n+4
n
n+8
WTRU1 Tx1
WTRU1 Tx2
DISCOVERY IMPACT SCHEME 310
D2D DISCOVERY CHANNEL WTRU1
WTRU1 Tx NOT ALLOWED
DISCOVERY IMPACT SCHEME 315
eNB ACK (FAKED)
eNB Tx2 REQUEST (PDCCH)
n+12
n+16
WTRU1 Tx ALLOWED

FIG. 3

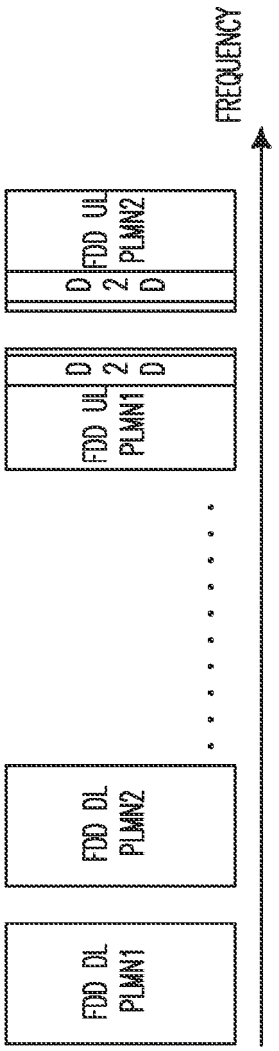

FREQUENCY
FDD DL PLMN1
FDD DL PLMN2
FDD UL PLMN1
D 2 D
FDD UL PLMN2
D 2 D

FIG. 4

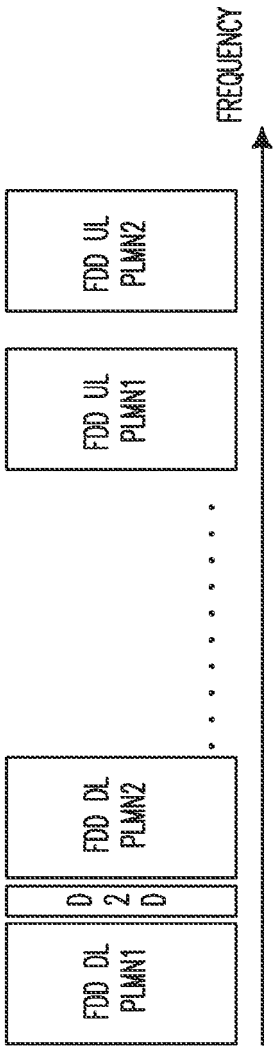

FREQUENCY
FDD DL PLMN1
D 2 D
FDD DL PLMN2
FDD UL PLMN1
FDD UL PLMN2

FIG. 5

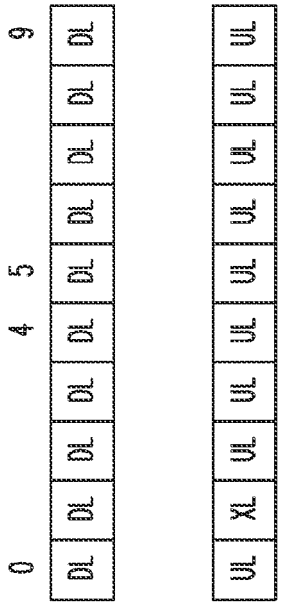


FIG. 6

SIGNAL TYPE	SYNCHRONIZATION REQUIREMENTS	EMBEDDED TIMING INFORMATION	EMBEDDED GUARD BAND/TIME	SIGNAL CONTENT (PAYLOAD/ INDEXING)	FLEXIBILITY (LENGTH/ BANDWIDTH	SCALABILITY	ROBUSTNESS	DL (OFDMA)/UL (SC-FDMA) SIGNAL
PSS/SSS	NO	YES	YES (10 SUBCARRIERS)	INDEX	6 RBs	YES, 504 CELL ID, ZADOFF-CHU BASED	HIGH	DL
PSS/SSS + PBCH	NO	YES	YES (10 SUBCARRIERS)	INDEX + PAYLOAD	6 RBs	504 CELL ID, ZADOFF-CHU BASED	MEDIUM/HIGH	DL
PCFICH	FINE SNYCH.	NO	NO	CODE	4 REGs 1 SYMBOL	REQUIRES ORTHOGONAL RESOURCES	HIGH	DL
PHICH	FINE SNYCH.	NO	NO	CODE	ceil(N_PRB/4) GROUPS OF 8 PHICH EACH	REQUIRES ORTHOGONAL RESOURCES	HIGH	DL
PDCCH	FINE SNYCH.	NO	NO	INDEX + PAYLOAD	1, 2, 4 OR 8 CCEs	REQUIRES ORTHOGONAL RESOURCES	MEDIUM (FOR 8 CCEs)	DL
PDSCH	FINE SNYCH.	NO	NO	PAYLOAD	YES	REQUIRES ORTHOGONAL RESOURCES	MEDIUM	DL
PRACH	COARSE SNYCH.	YES	YES	INDEX	YES	YES, CAN BE CONTENTION BASED	HIGH	UL

CONTINUED ON FIG. 7B

FIG. 7A

FROM FIG. 7A

SRS	COARSE SNYCH.	NO	NO	INDEX	8 SRS CONFIG. (4 TO 96 RBs)	YES, ZADOFF-CHU BASED	HIGH	UL
UL-DMRS	COARSE SNYCH.	NO	NO	INDEX	YES	YES, ZADOFF-CHU BASED	HIGH	UL
PUCCH	FINE SNYCH.	NO	NO	INDEX + PAYLOAD	NO	REQUIRES ORTHOGONAL RESOURCES	MEDIUM	UL
PUSCH	FINE SNYCH.	NO	NO	PAYLOAD	YES	REQUIRES ORTHOGONAL RESOURCES	MEDIUM	UL

FIG. 7B

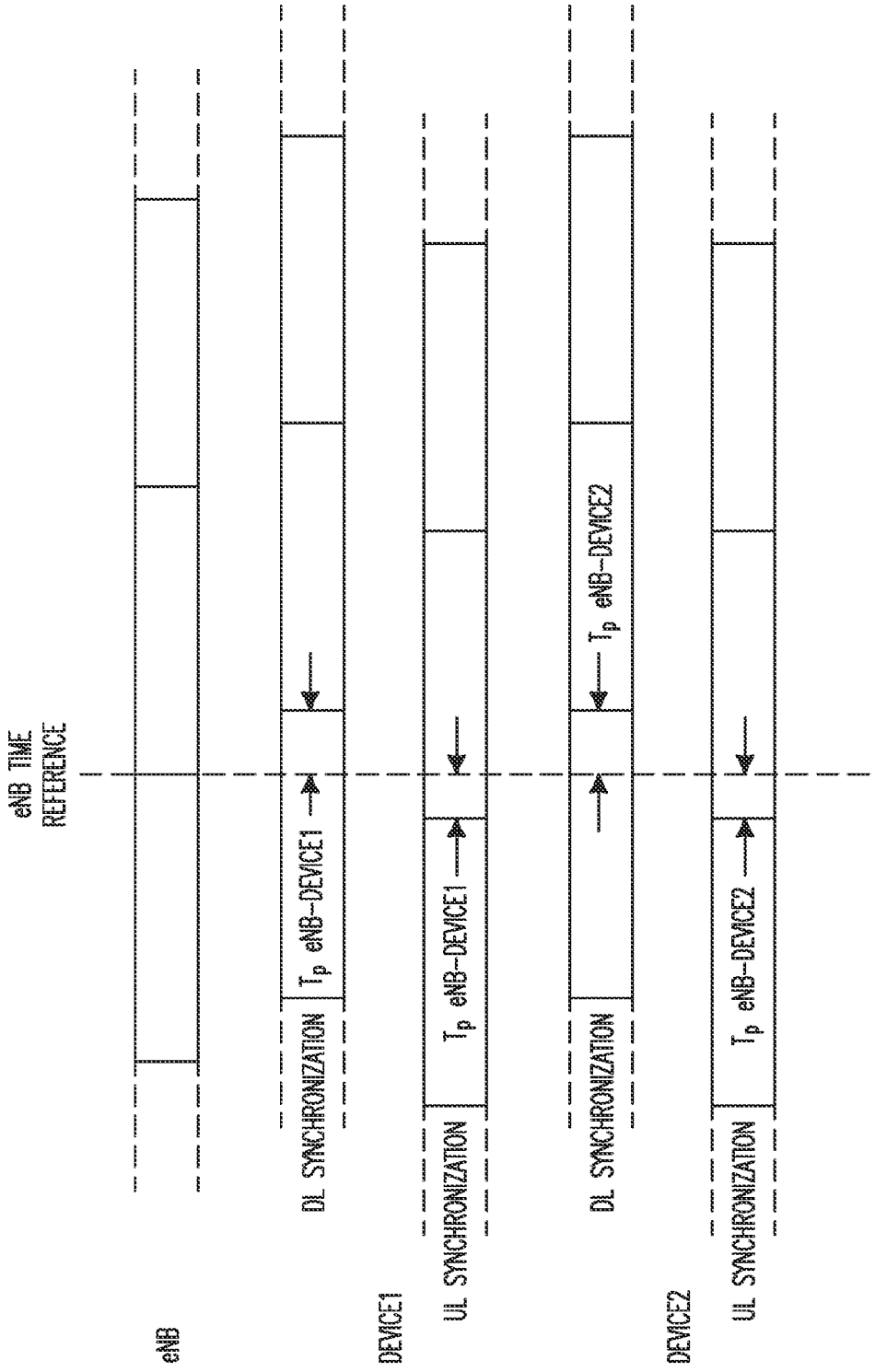
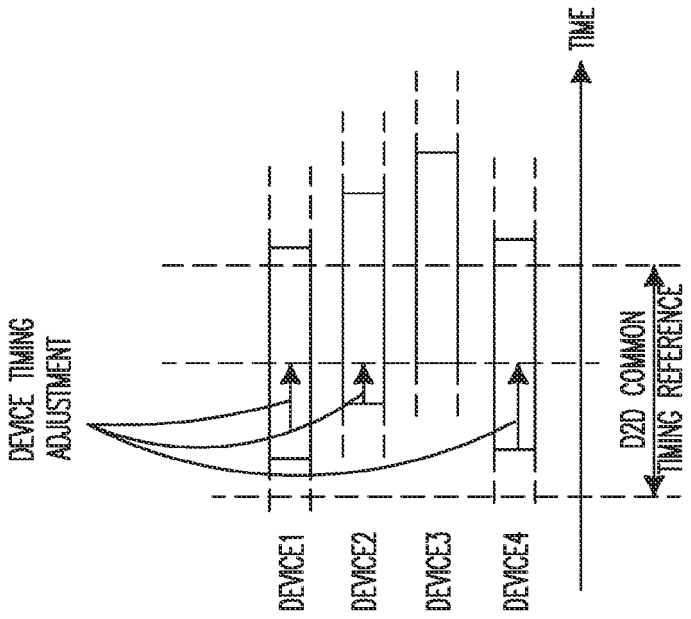

eNB TIME REFERENCE
eNB
DL SYNCHRONIZATION
T_p eNB-DEVICE1
DEVICE1
UL SYNCHRONIZATION
T_p eNB-DEVICE1
DL SYNCHRONIZATION
T_p eNB-DEVICE2
DEVICE2
UL SYNCHRONIZATION
T_p eNB-DEVICE2

FIG. 8


DEVICE TIMING ADJUSTMENT
TIME
D2D COMMON TIMING REFERENCE
DEVICE1
DEVICE2
DEVICE3
DEVICE4

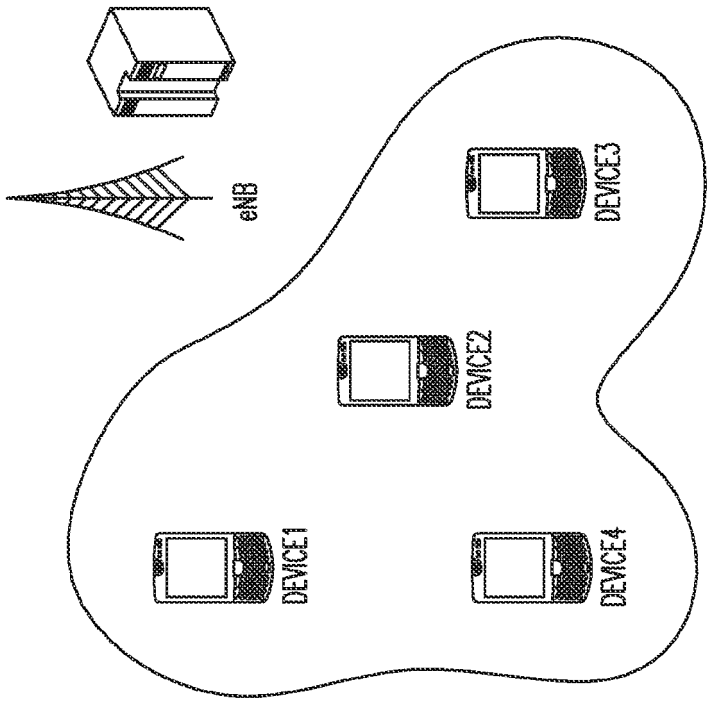

eNB
DEVICE1
DEVICE2
DEVICE3
DEVICE4

FIG. 9

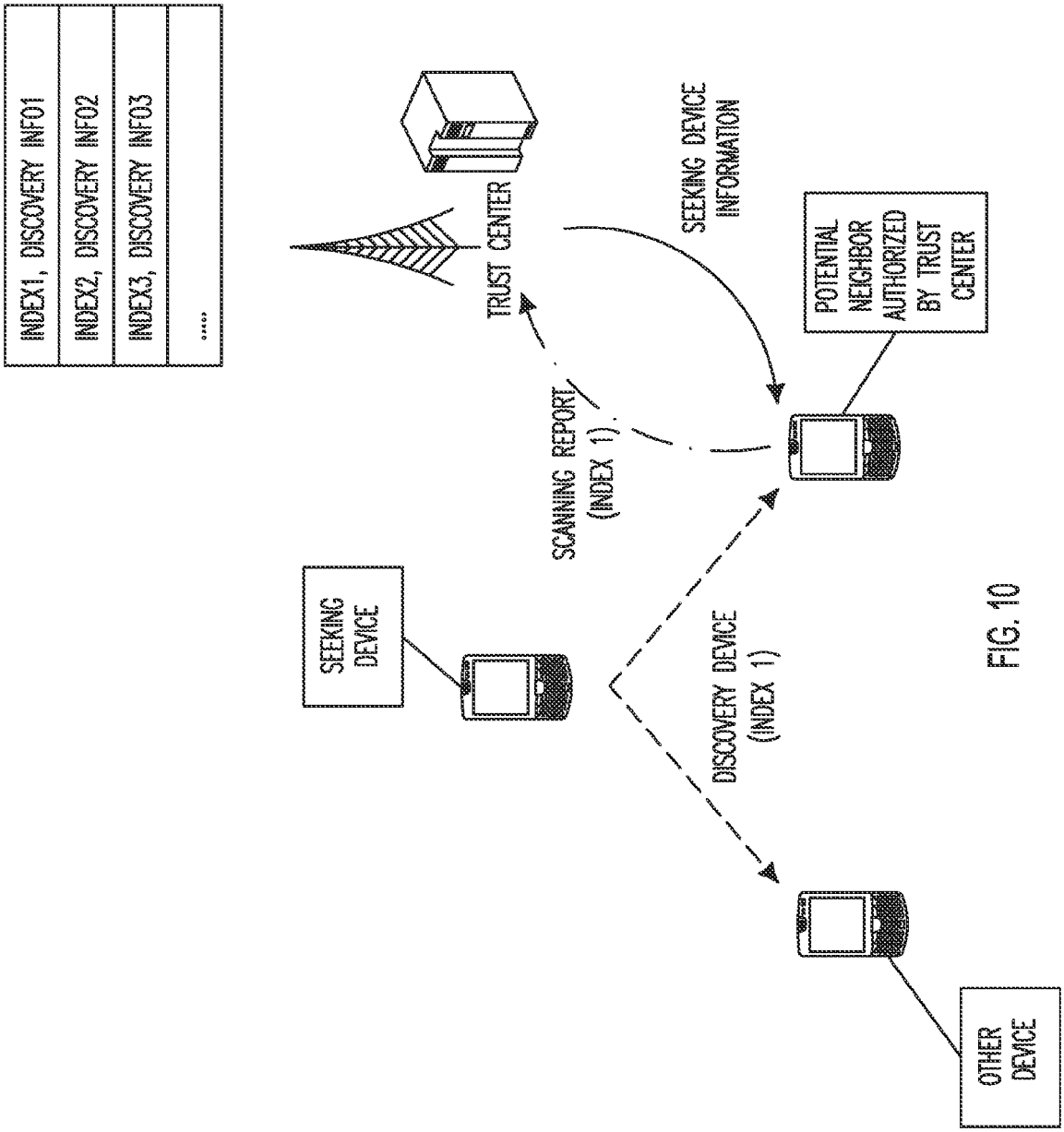

INDEX1, DISCOVERY INFO1
INDEX2, DISCOVERY INFO2
INDEX3, DISCOVERY INFO3
....
TRUST CENTER
SEEKING DEVICE INFORMATION
POTENTIAL NEIGHBOR AUTHORIZED BY TRUST CENTER
SCANNING REPORT (INDEX 1)
SEEKING DEVICE
DISCOVERY DEVICE (INDEX 1)
OTHER DEVICE

FIG. 10