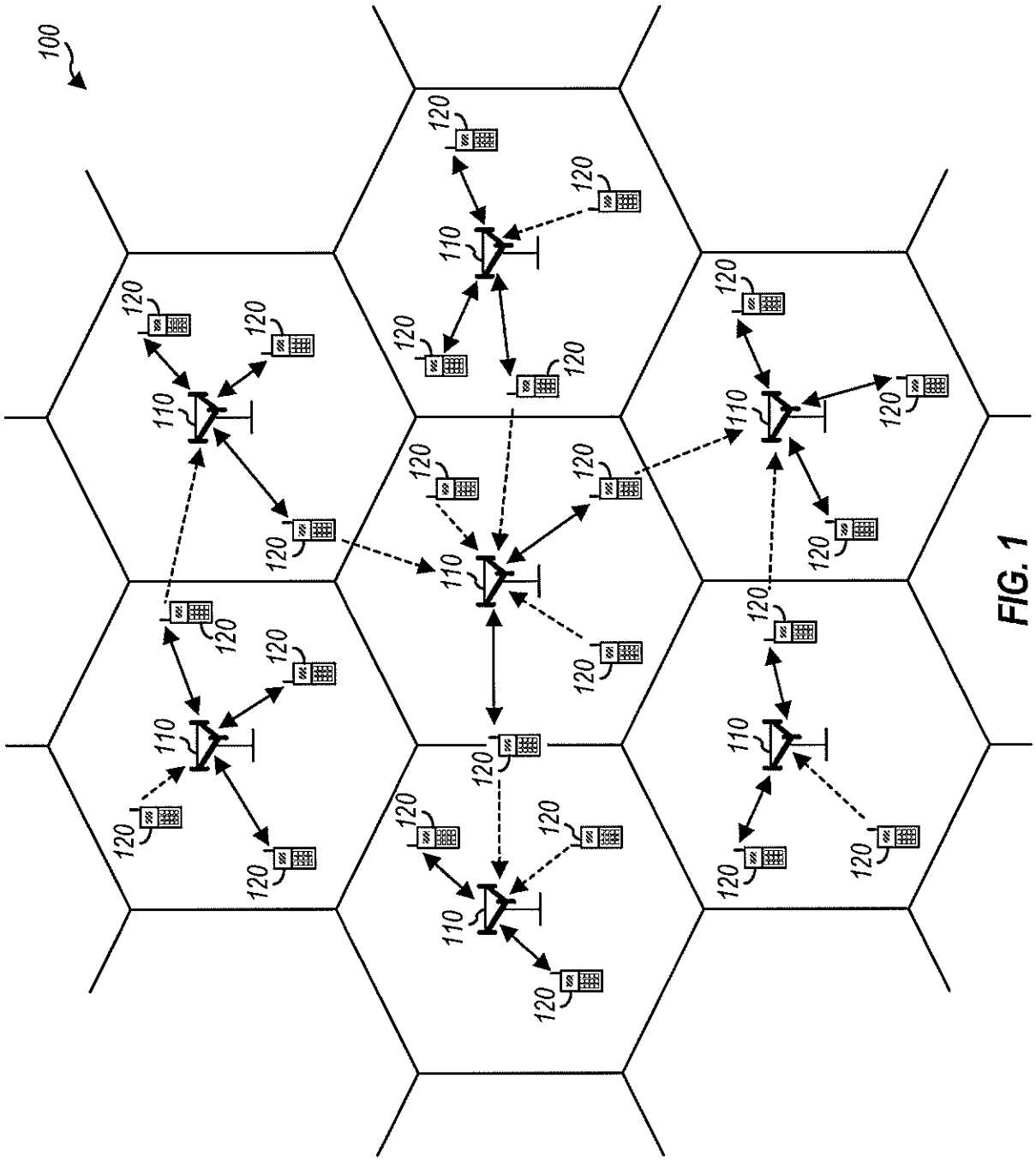


FIG. 1

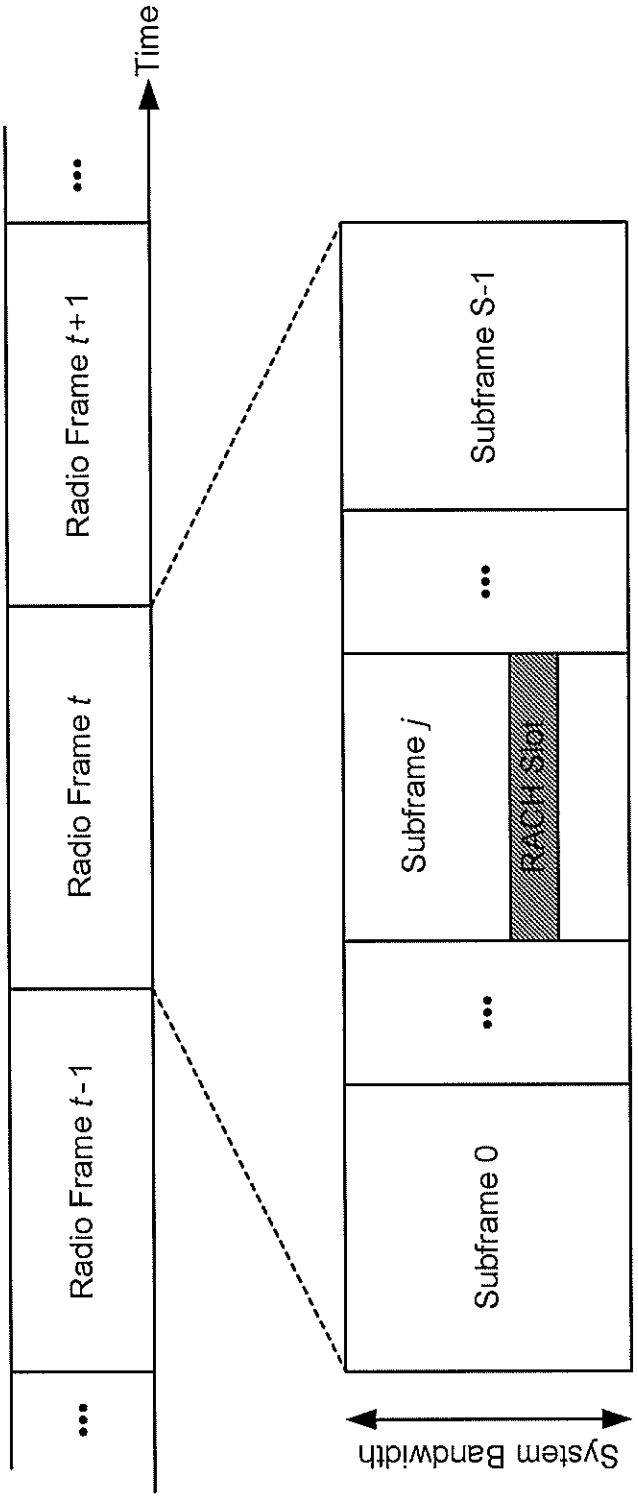

Time
Radio Frame t-1
Radio Frame t
Radio Frame t+1
Subframe 0
Subframe j
RACH Slot
Subframe S-1
System Bandwidth

FIG. 2

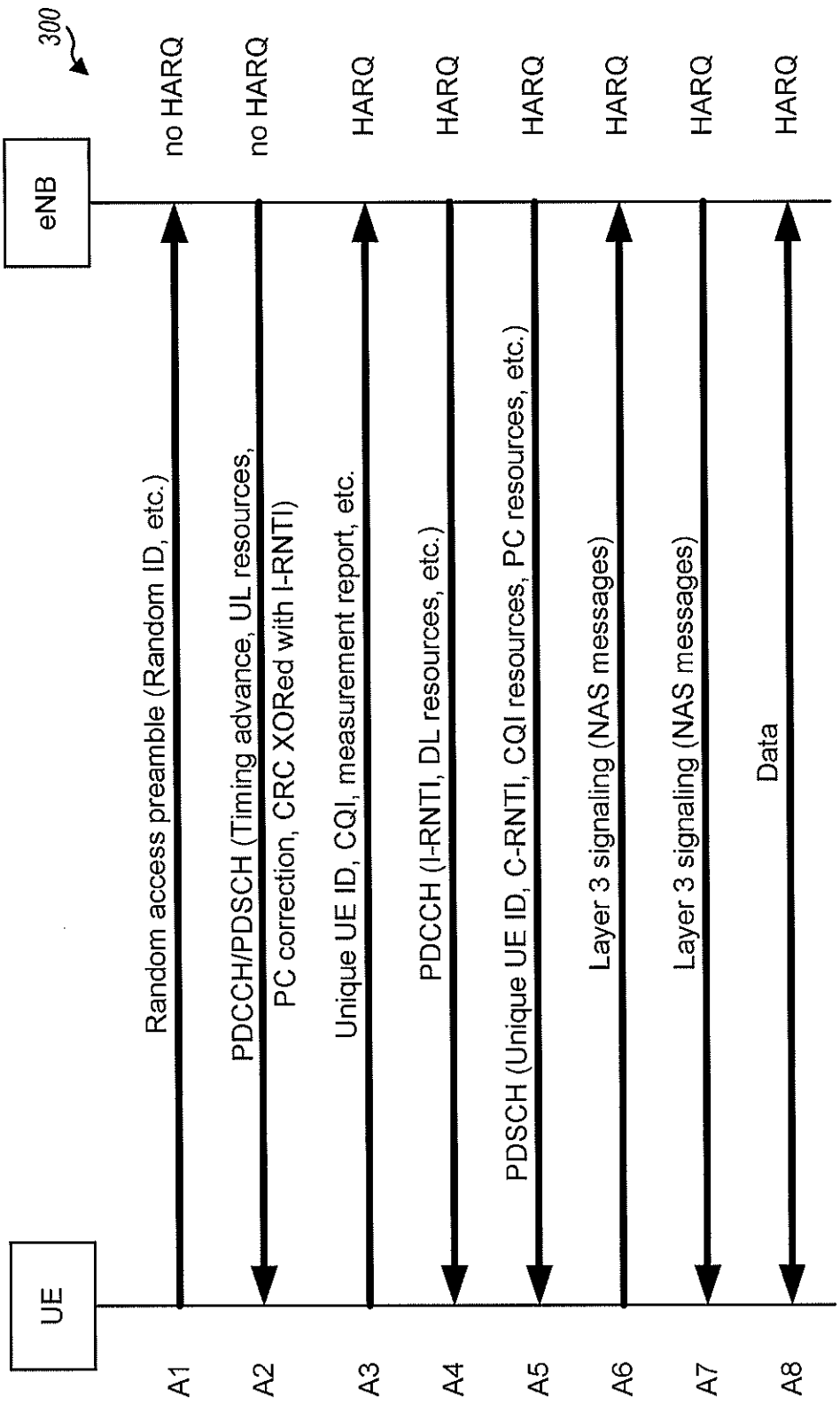

300
eNB
UE
no HARQ
no HARQ
HARQ
HARQ
HARQ
HARQ
HARQ
HARQ
Random access preamble (Random ID, etc.)
PDCCH/PDSCH (Timing advance, UL resources,
PC correction, CRC XORed with I-RNTI)
Unique UE ID, CQI, measurement report, etc.
PDCCH (I-RNTI, DL resources, etc.)
PDSCH (Unique UE ID, C-RNTI, CQI resources, PC resources, etc.)
Layer 3 signaling (NAS messages)
Layer 3 signaling (NAS messages)
Data
A1
A2
A3
A4
A5
A6
A7
A8

FIG. 3

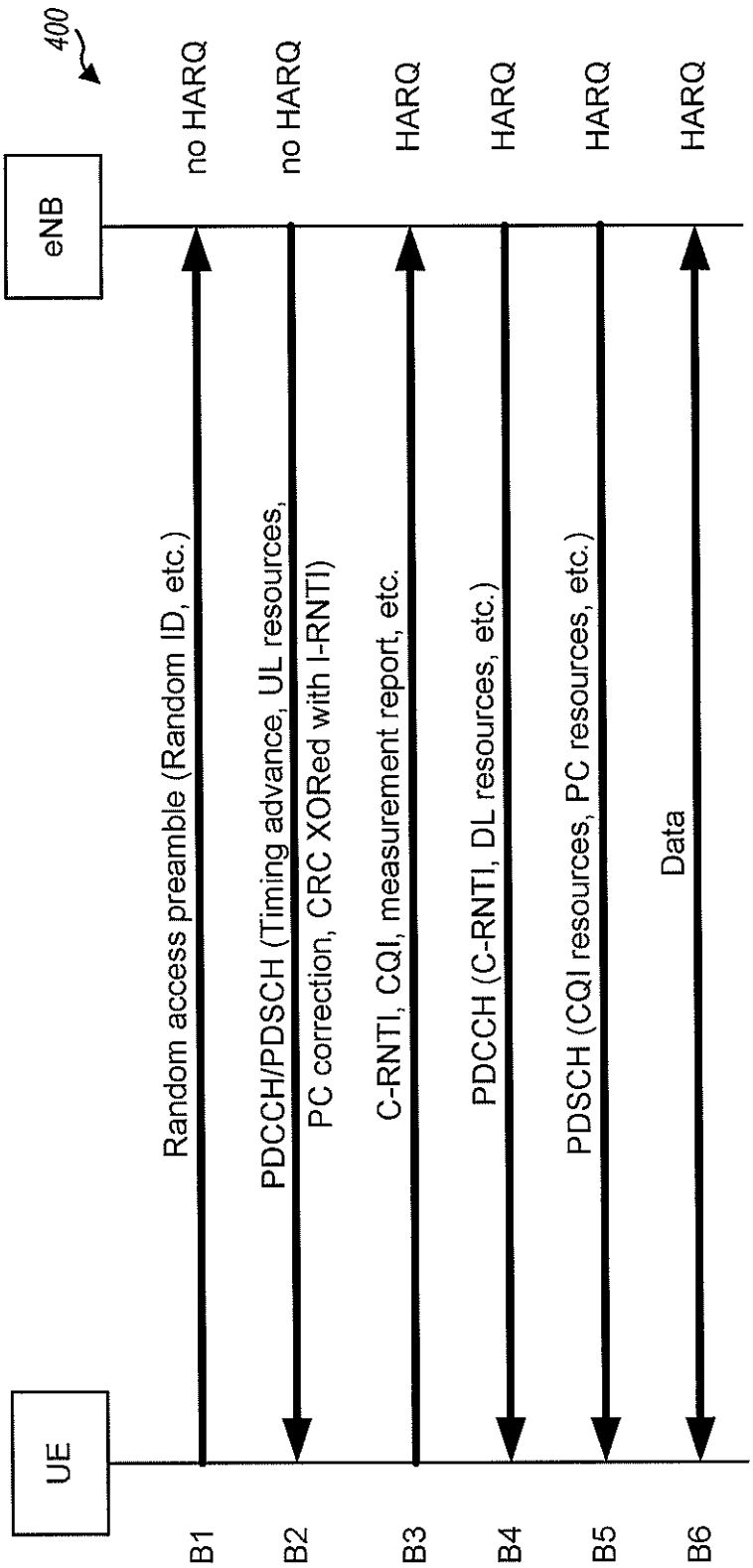

400
eNB
UE
no HARQ
no HARQ
HARQ
HARQ
HARQ
HARQ
Random access preamble (Random ID, etc.)
PDCCH/PDSCH (Timing advance, UL resources,
PC correction, CRC XORed with I-RNTI)
C-RNTI, CQI, measurement report, etc.
PDCCH (C-RNTI, DL resources, etc.)
PDSCH (CQI resources, PC resources, etc.)
Data
B1
B2
B3
B4
B5
B6

FIG. 4

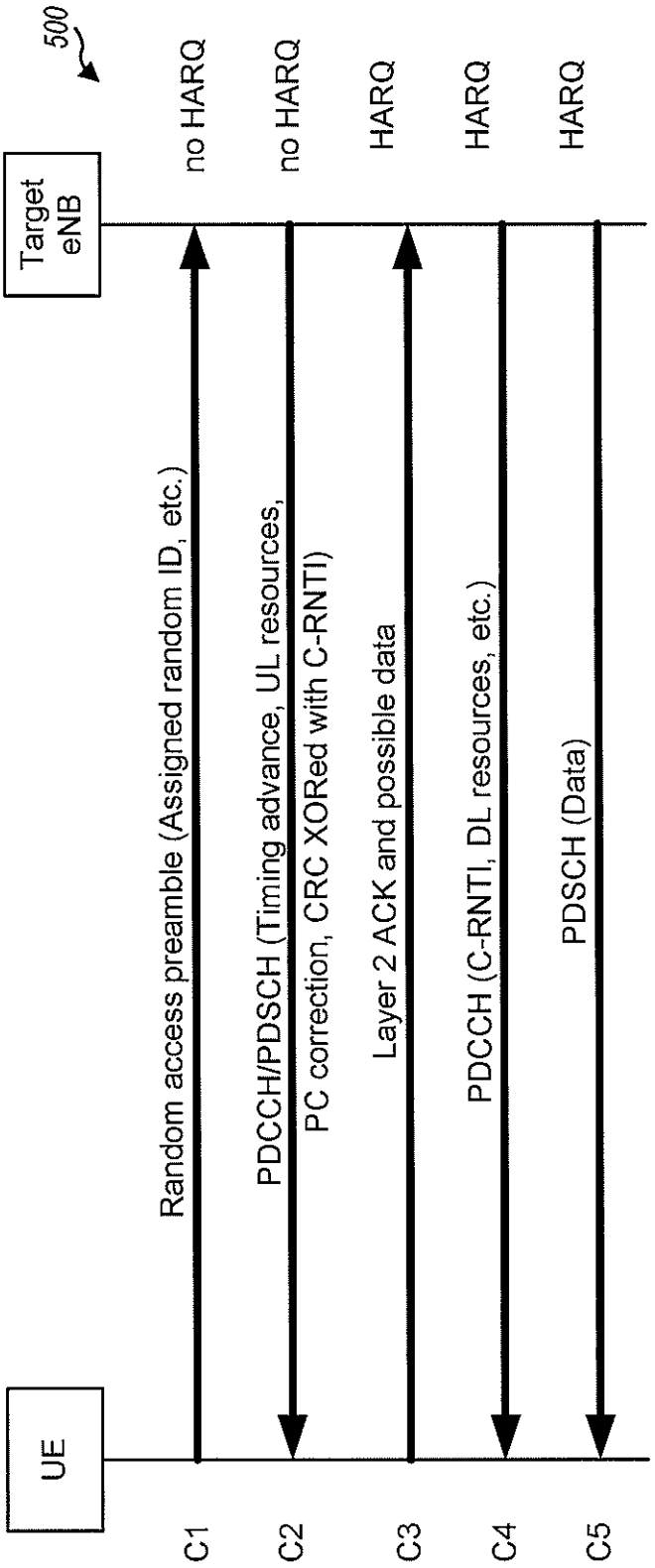

500
Target eNB
UE
no HARQ
no HARQ
HARQ
HARQ
HARQ
Random access preamble (Assigned random ID, etc.)
PDCCH/PDSCH (Timing advance, UL resources,
PC correction, CRC XORed with C-RNTI)
Layer 2 ACK and possible data
PDCCH (C-RNTI, DL resources, etc.)
PDSCH (Data)
C1
C2
C3
C4
C5

FIG. 5

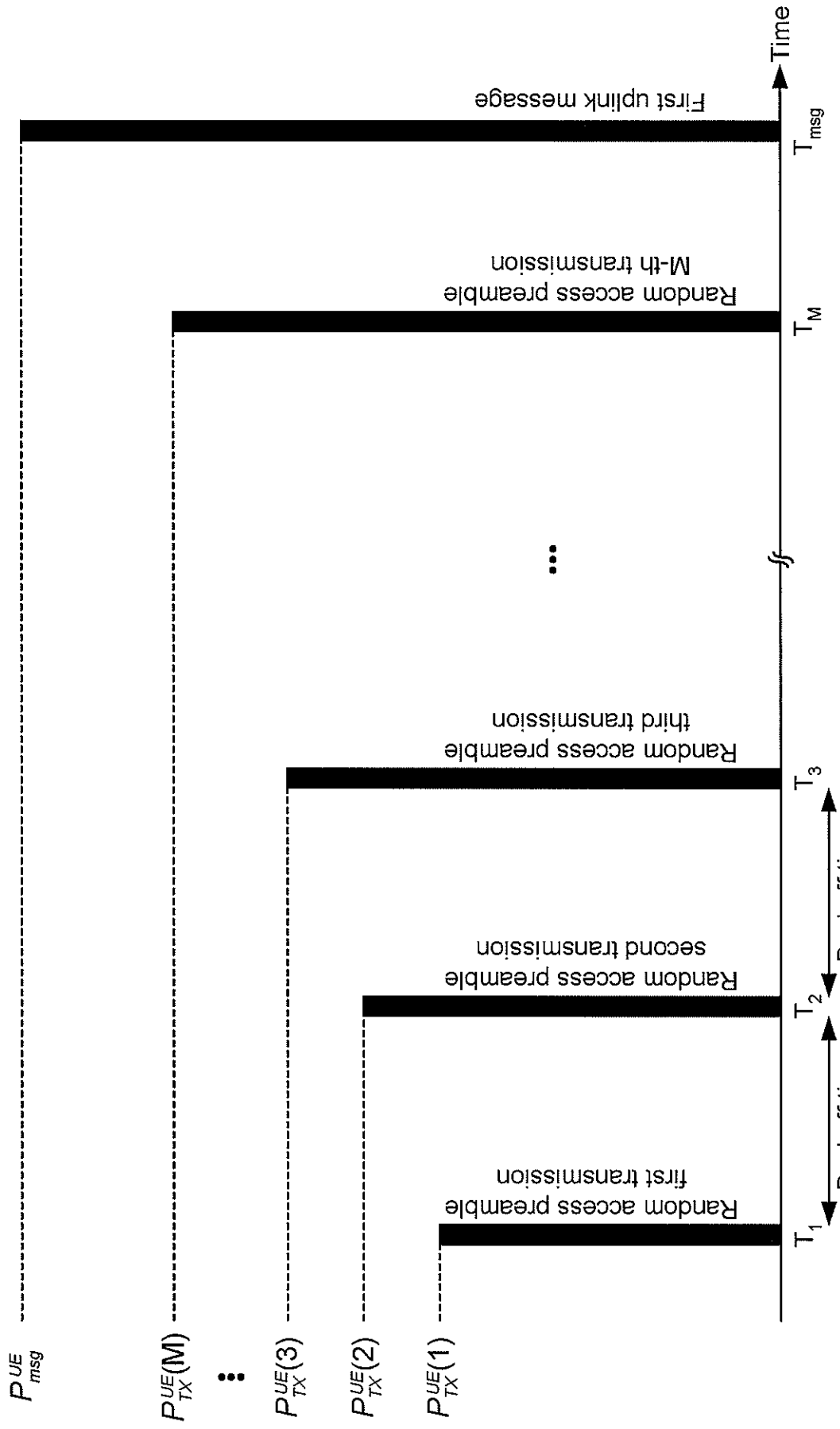

Time
First uplink message
Random access preamble
M-th transmission
Random access preamble
third transmission
Random access preamble
second transmission
Random access preamble
first transmission
Backoff time
Backoff time
T_{msg}
T_M
T_3
T_2
T_1
P^{UE}_{msg}
$P^{UE}_{TX}(M)$
$P^{UE}_{TX}(3)$
$P^{UE}_{TX}(2)$
$P^{UE}_{TX}(1)$

FIG. 6

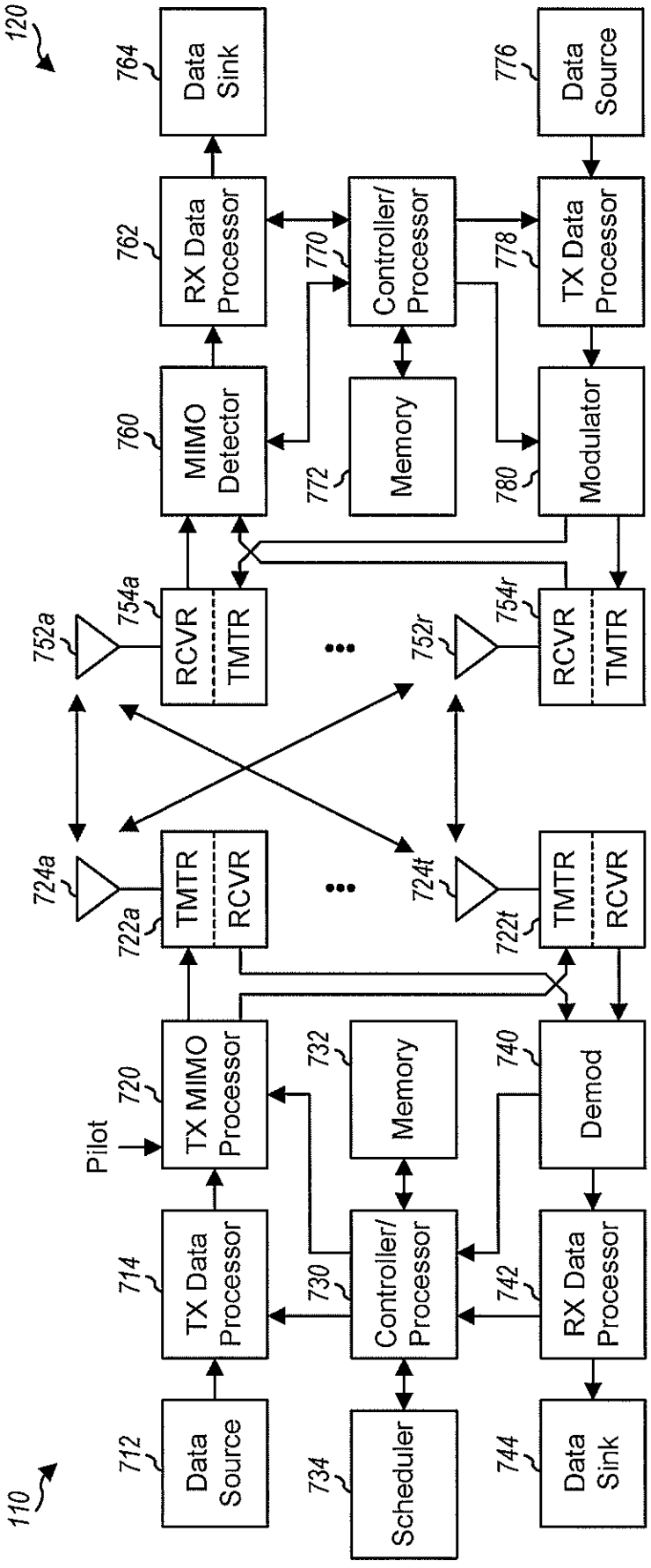

120
764
Data Sink
776
Data Source
762
RX Data Processor
770
Controller/ Processor
778
TX Data Processor
760
MIMO Detector
772
Memory
780
Modulator
752a
754a
RCVR
TMTR
752r
754r
RCVR
TMTR
724a
722a
TMTR
RCVR
724t
722t
TMTR
RCVR
Pilot
720
TX MIMO Processor
732
Memory
740
Demod
714
TX Data Processor
730
Controller/ Processor
742
RX Data Processor
712
Data Source
734
Scheduler
744
Data Sink
110

FIG. 7

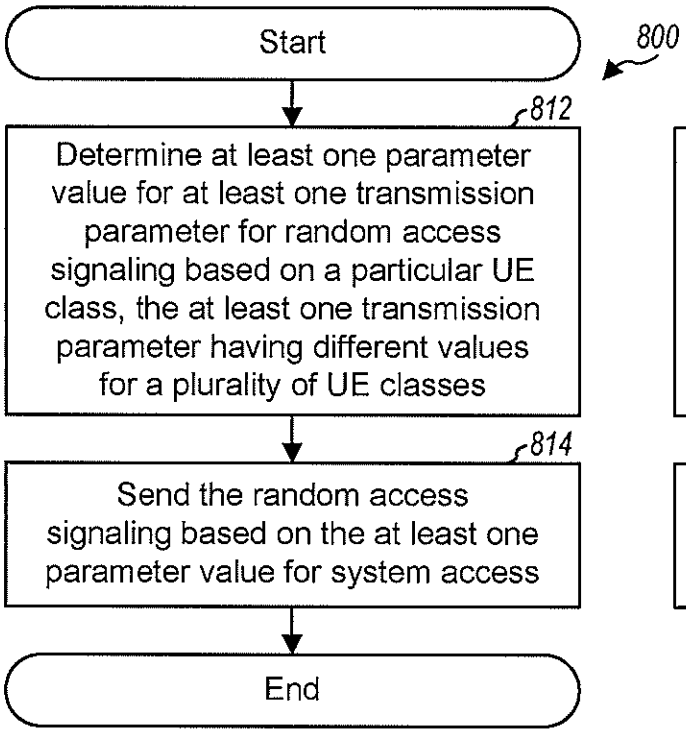


FIG. 8

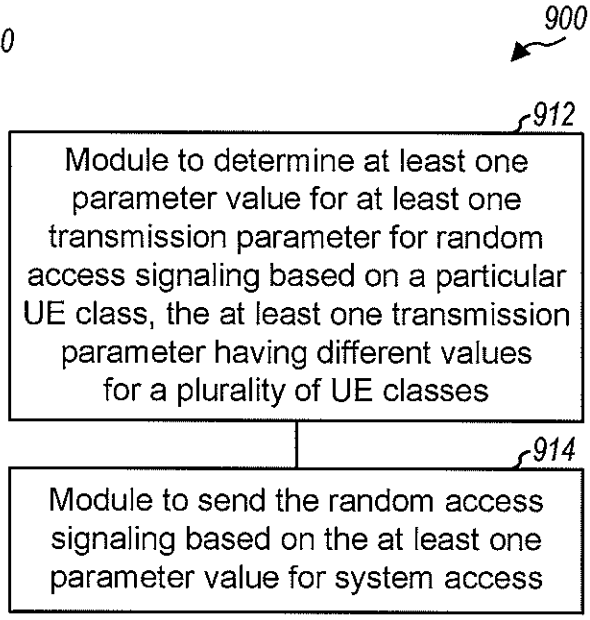


FIG. 9

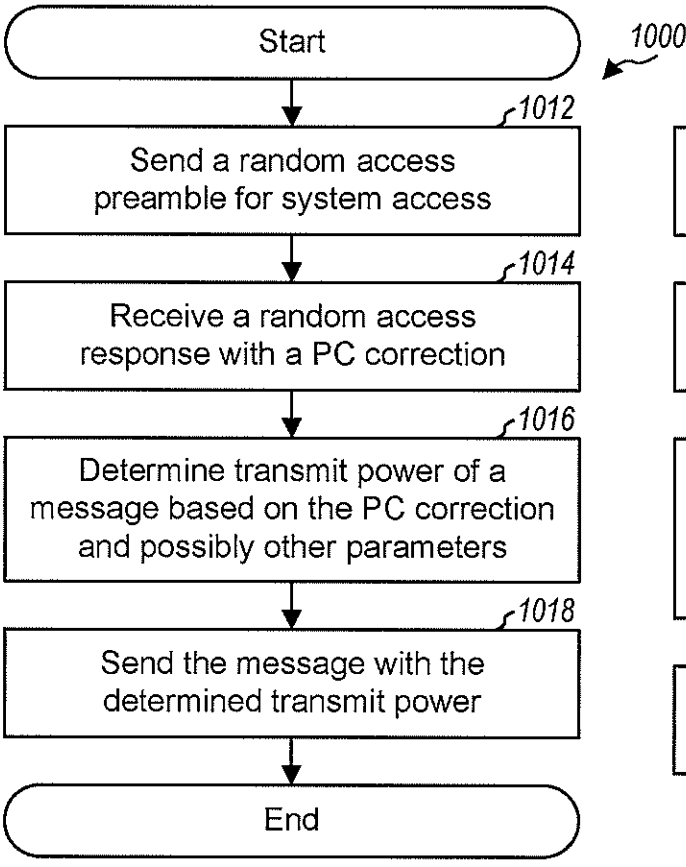


FIG. 10

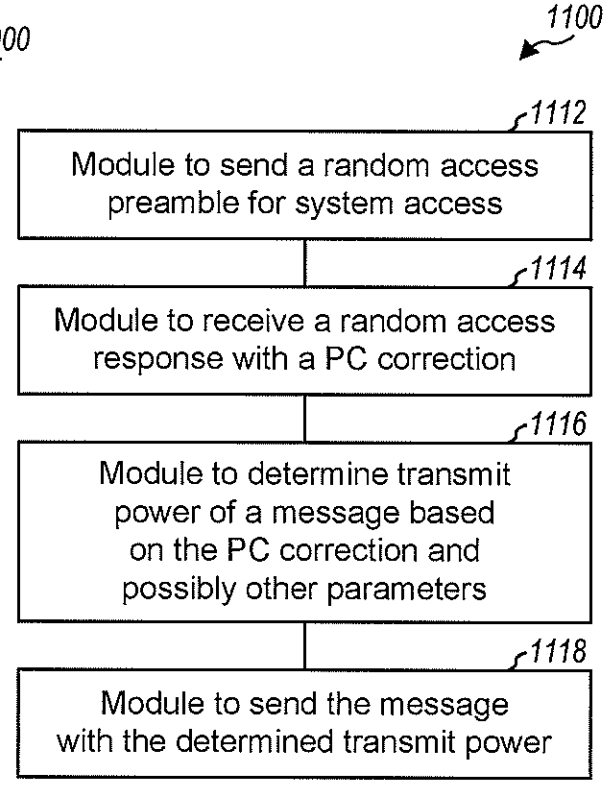


FIG. 11