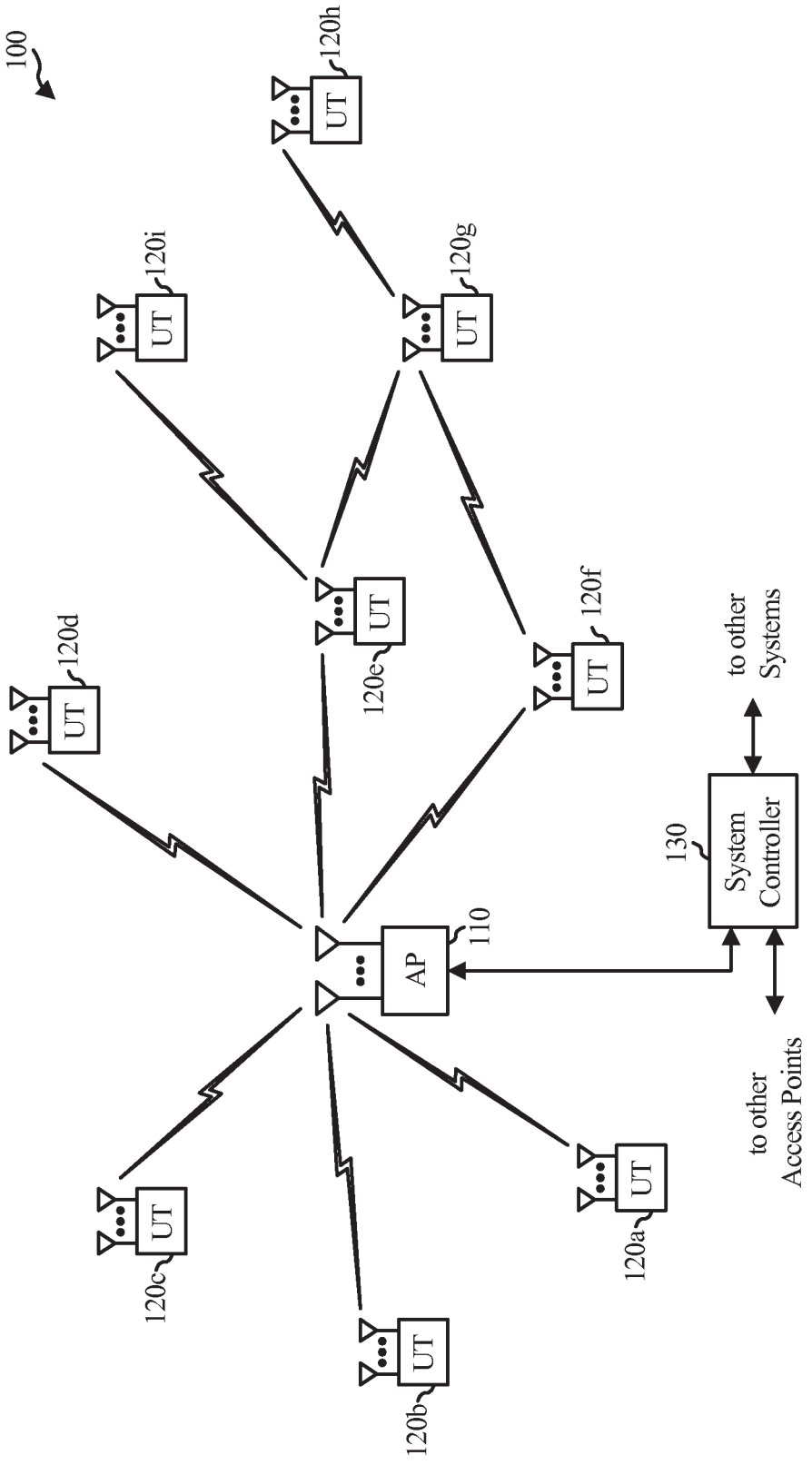
100
UT
120h
UT
120i
UT
120g
UT
120d
UT
120e
UT
120f
UT
AP
110
130
System Controller
to other Systems
to other Access Points
UT
120c
UT
120b
UT
120a

FIG. 1

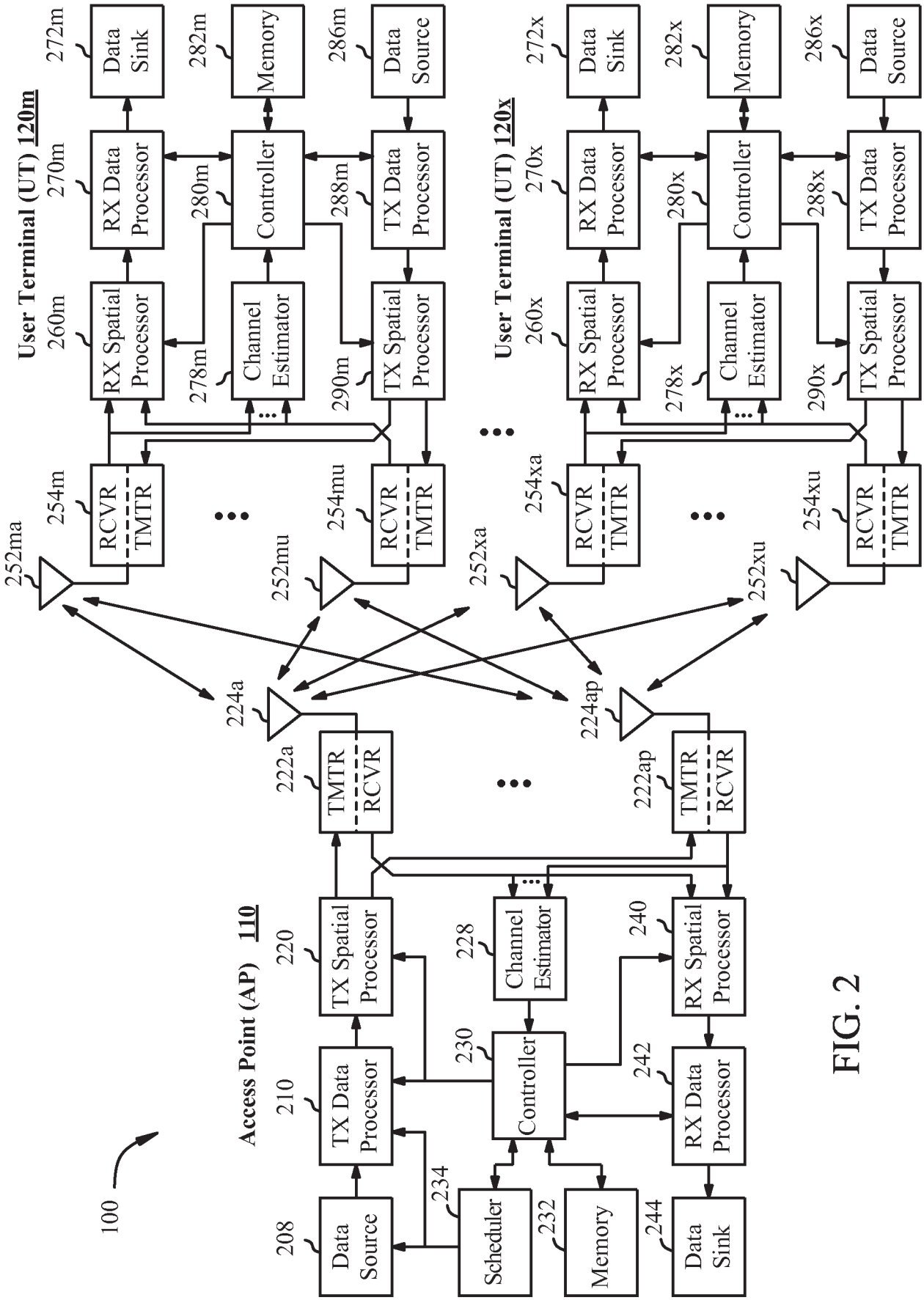
100
Access Point (AP) 110
208 Data Source
210 TX Data Processor
220 TX Spatial Processor
222a TMTR RCVR
222ap TMTR RCVR
224a
224ap
228 Channel Estimator
230 Controller
232 Memory
234 Scheduler
240 RX Spatial Processor
242 RX Data Processor
244 Data Sink
User Terminal (UT) 120m
252ma
252mu
254m RCVR TMTR
254mu RCVR TMTR
260m RX Spatial Processor
270m RX Data Processor
272m Data Sink
278m Channel Estimator
280m Controller
282m Memory
288m TX Data Processor
290m TX Spatial Processor
286m Data Source
User Terminal (UT) 120x
252xa
252xu
254xa RCVR TMTR
254xu RCVR TMTR
260x RX Spatial Processor
270x RX Data Processor
272x Data Sink
278x Channel Estimator
280x Controller
282x Memory
288x TX Data Processor
290x TX Spatial Processor
286x Data Source

FIG. 2

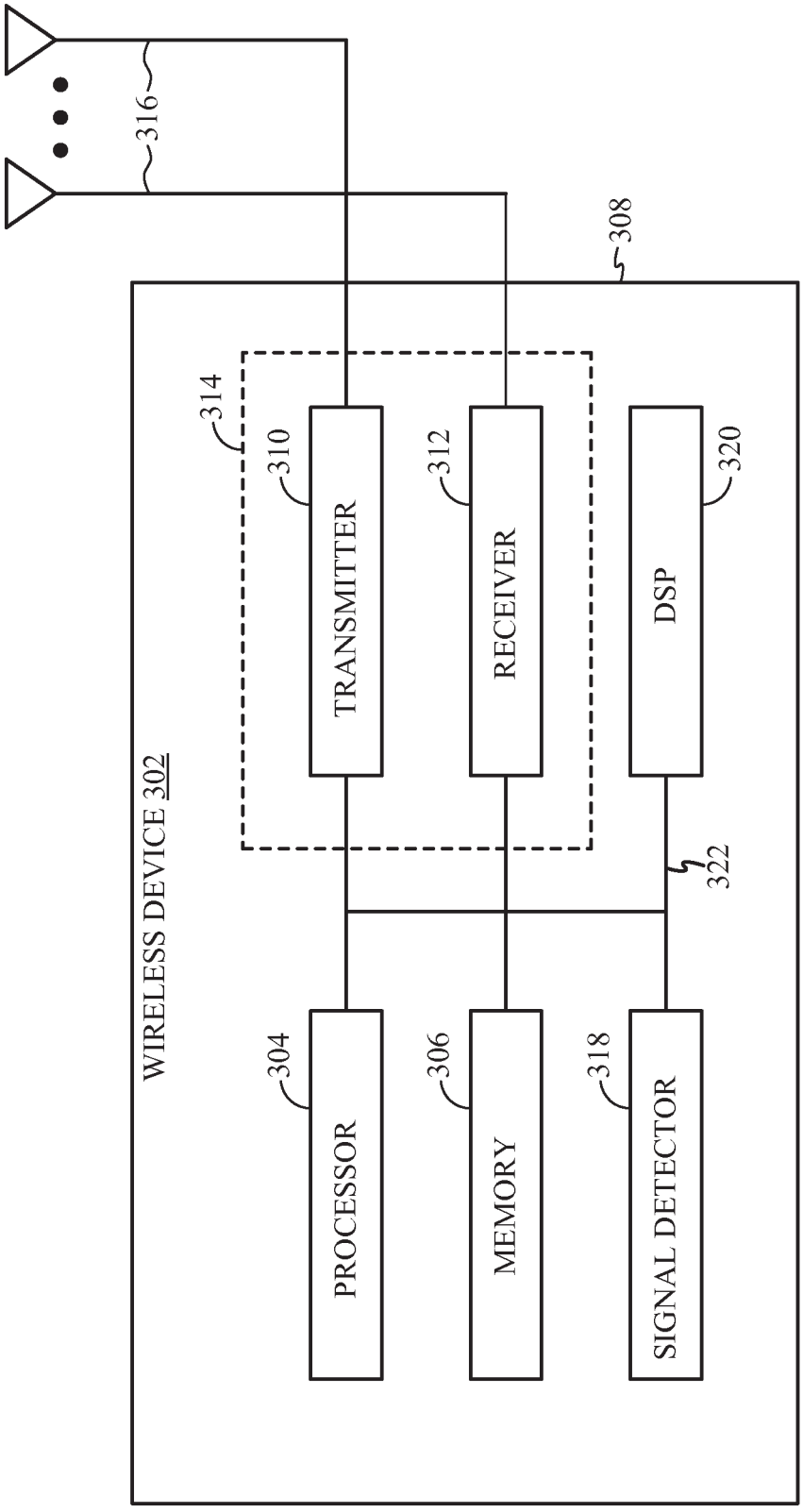
316
308
WIRELESS DEVICE 302
314
310
TRANSMITTER
312
RECEIVER
DSP
320
322
304
PROCESSOR
306
MEMORY
318
SIGNAL DETECTOR

FIG. 3

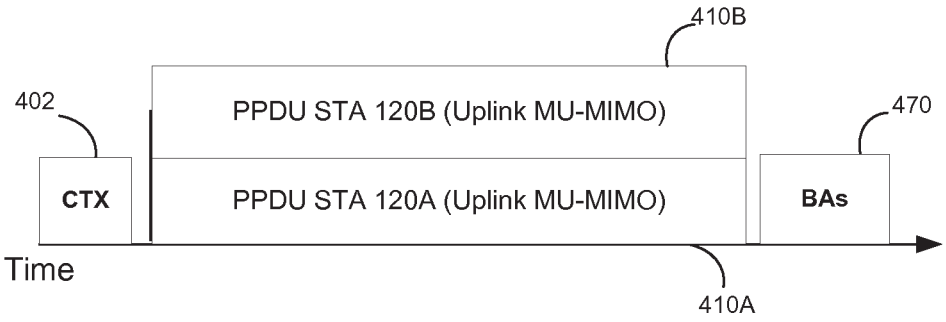

FIG. 4A

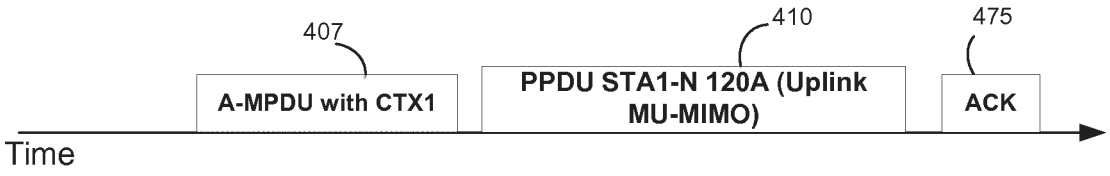

FIG. 4B

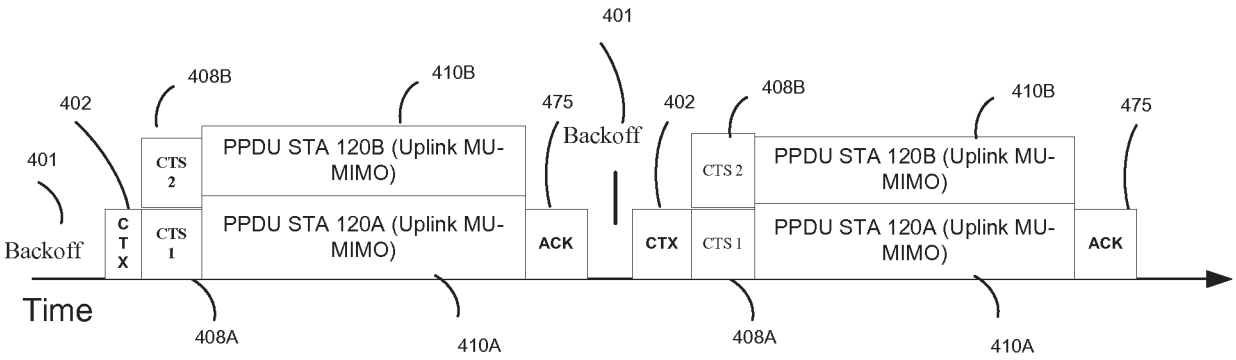

FIG. 5

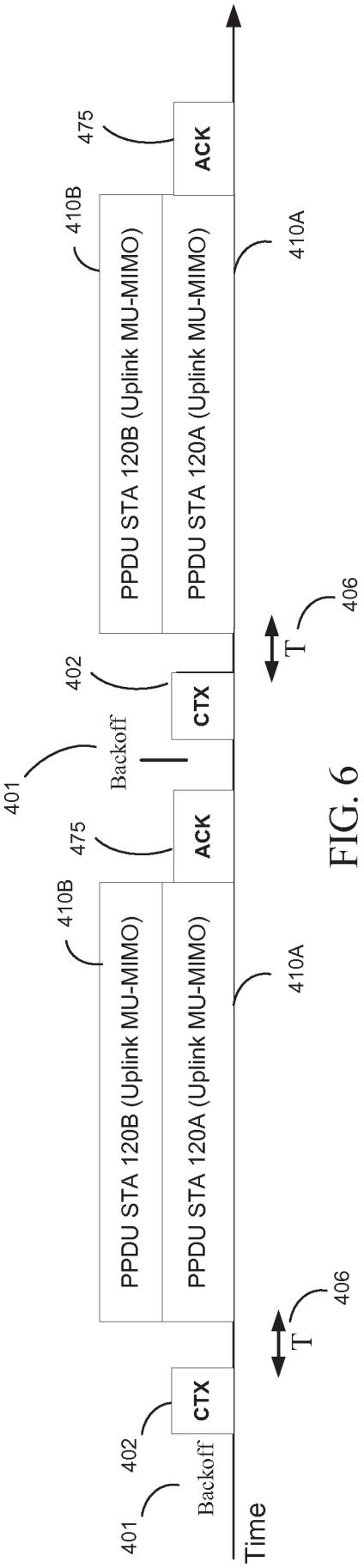
Time
401
Backoff
402
CTX
T
406
410B
PPDU STA 120B (Uplink MU-MIMO)
410A
PPDU STA 120A (Uplink MU-MIMO)
475
ACK
401
Backoff
402
CTX
T
406
410B
PPDU STA 120B (Uplink MU-MIMO)
410A
PPDU STA 120A (Uplink MU-MIMO)
475
ACK

FIG. 6

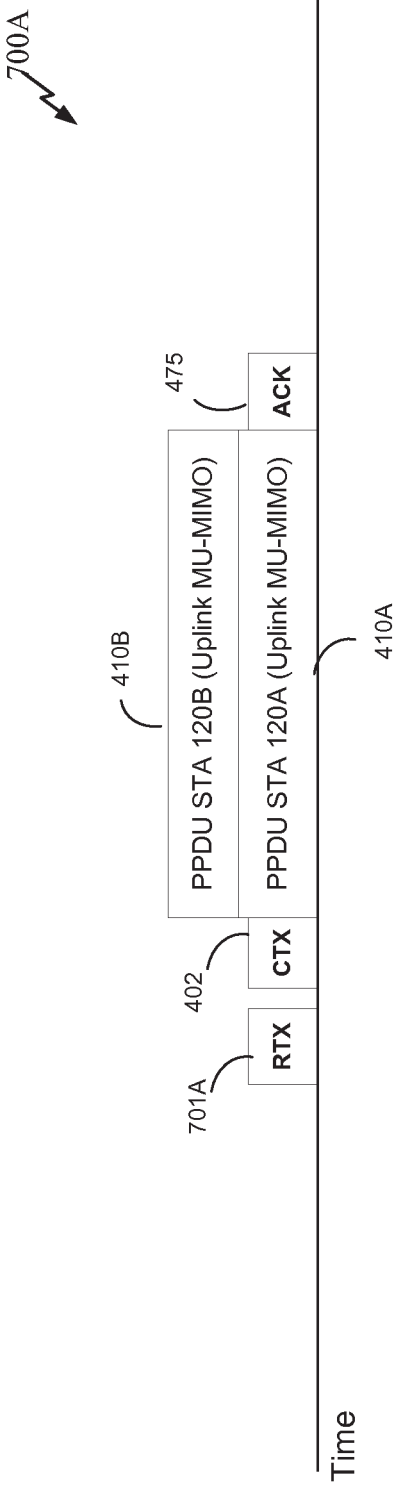
700A
701A
RTX
402
CTX
410B
PPDU STA 120B (Uplink MU-MIMO)
PPDU STA 120A (Uplink MU-MIMO)
410A
475
ACK
Time

FIG. 7A

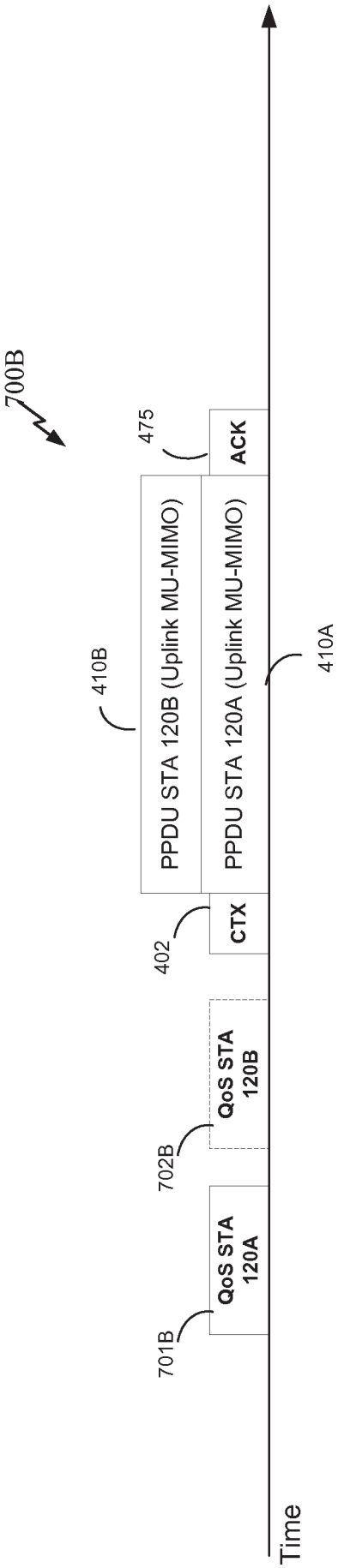
700B
701B
QoS STA 120A
702B
QoS STA 120B
402
CTX
410B
PPDU STA 120B (Uplink MU-MIMO)
PPDU STA 120A (Uplink MU-MIMO)
410A
475
ACK
Time

FIG. 7B

Bits: Type of frame	0-3	4	5-6	7	8	9	10	11-15
QoS data	TID	0	Ack policy	A-MSDU present	TXOP duration Requested			
QoS Data	TID	1	Ack policy	A-MSDU present	Queue size			
QoS null	TID	0	Ack policy	reserved	TXOP duration Requested			
QoS null	TID	1	Ack policy	reserved	Queue size			

700C1

700C2

FIG. 7C

700D

Bits: Type of frame	**0-3**	**4**	**5-6**	**7**	**8**	**9**	**10**	**11-15**
QoS null	Total TXOP duration requested for all TIDs	0	Ack policy	Indicates new mapping of QoS control	The ith bit in this 8 bit sequence indicates whether the TXOP duration Requested for that TID is above a certain threshold.			
QoS null	Total queue size for all TIDs	1	Ack policy	Indicates new mapping of QoS control	The ith bit in this 8 bit sequence indicates whether the TXOP duration Requested for that TID is above a certain threshold.			

FIG. 7D

700E

Bits: Type of Frame	0	1-3	4-8	9-11	12-15
QoS null	0	TID	Queue length for TID given in bits 1-3	TID	Queuelength for TID given in bits 9-11
QoS null	1	2bits of queue length for each of the 7 first TIDs, and 1 bit for the last TID			

FIG. 7E

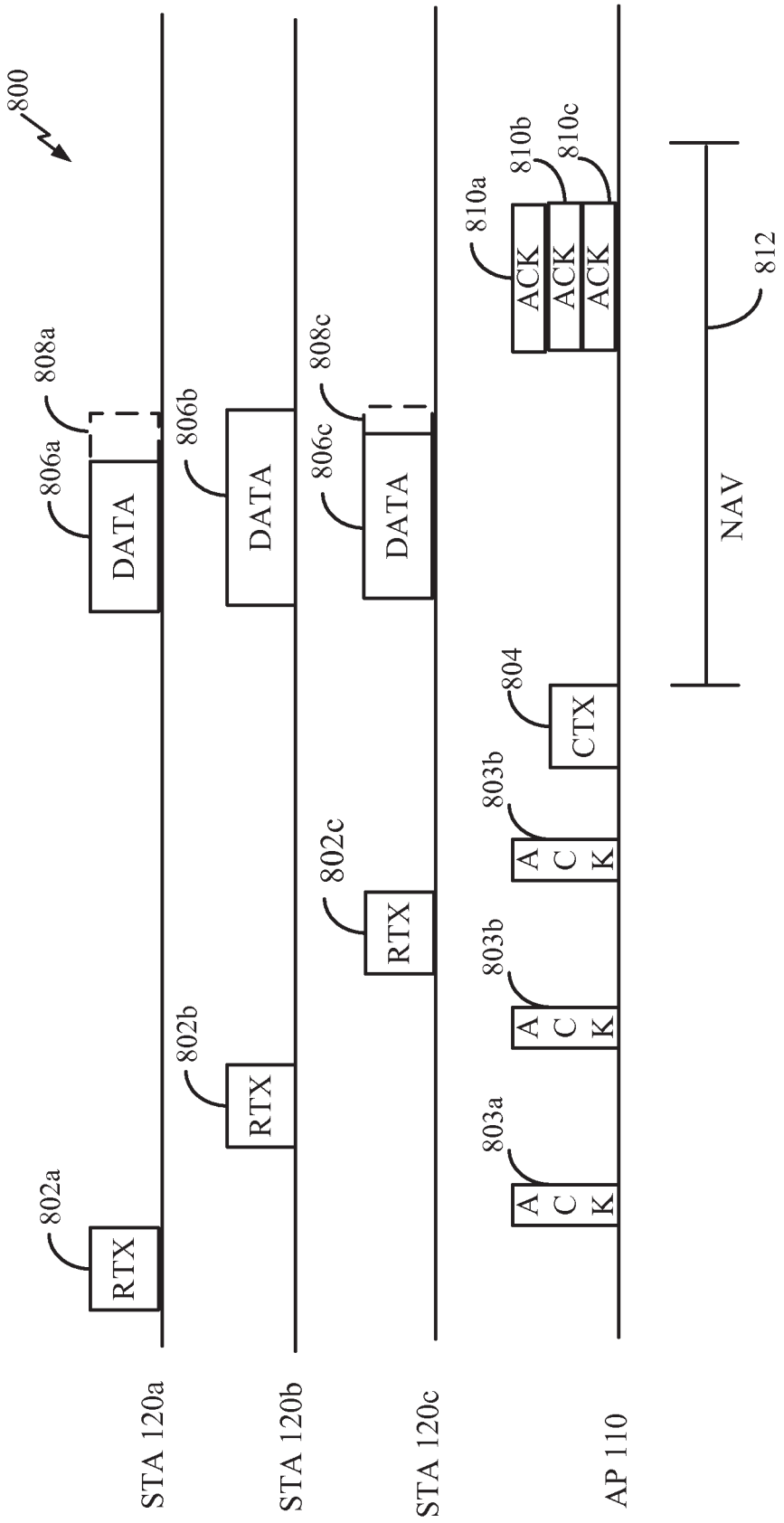
800
STA 120a
STA 120b
STA 120c
AP 110
RTX
802a
DATA
806a
808a
RTX
802b
DATA
806b
RTX
802c
DATA
806c
808c
ACK
803a
ACK
803b
CTX
804
ACK
803b
ACK
810a
ACK
810b
810c
NAV
812

FIG. 8

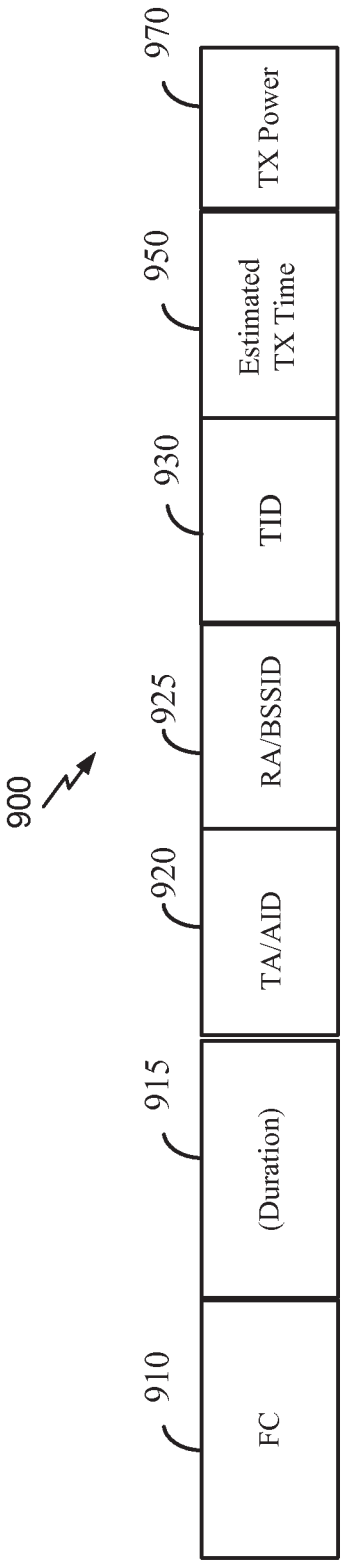
900
910
FC
915
(Duration)
920
TA/AID
925
RA/BSSID
930
TID
950
Estimated TX Time
970
TX Power

FIG. 9

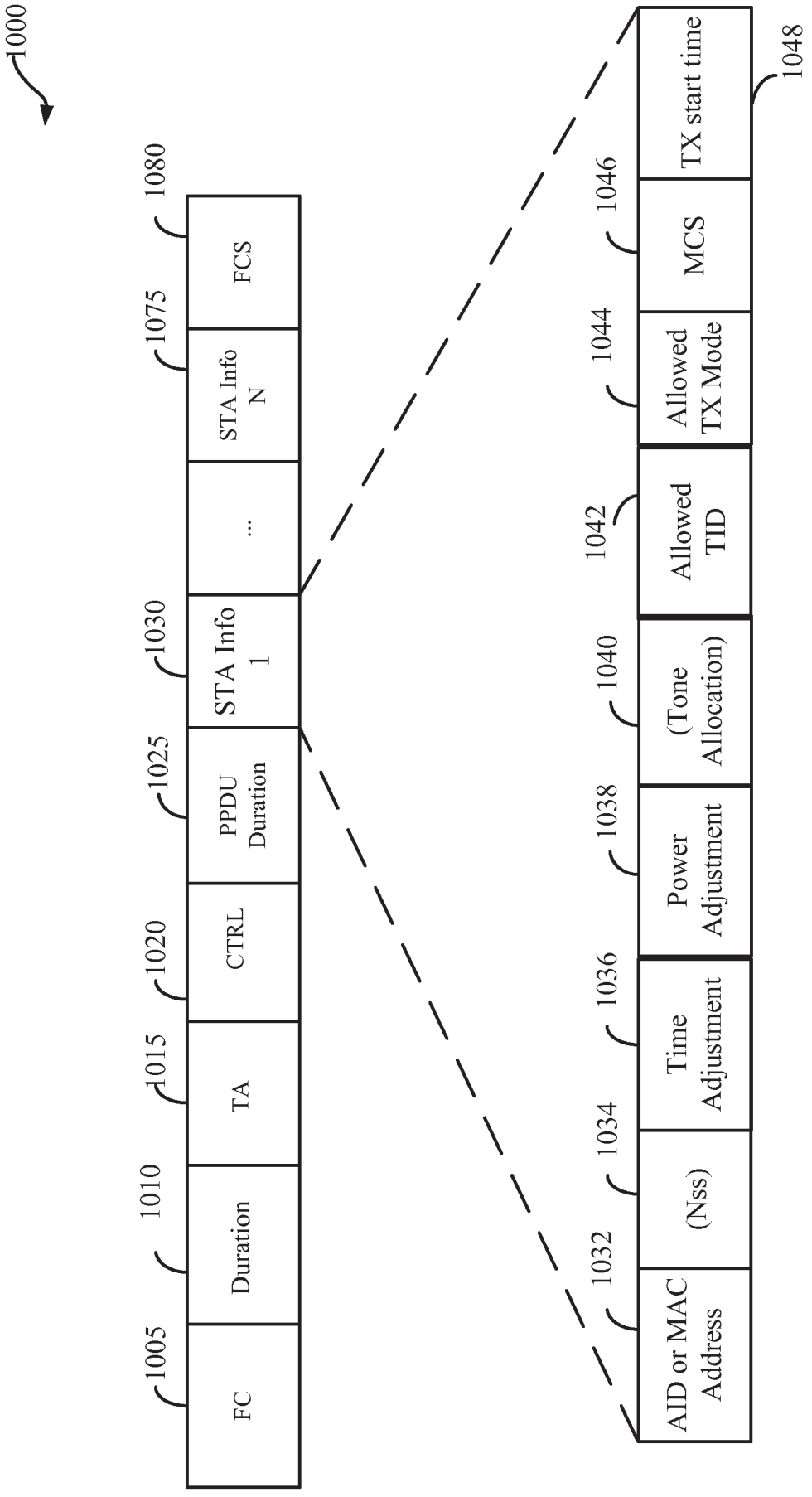
1000
1005
FC
1010
Duration
1015
TA
1020
CTRL
1025
PPDU Duration
1030
STA Info 1
...
1075
STA Info N
1080
FCS
1032
AID or MAC Address
1034
(Nss)
1036
Time Adjustment
1038
Power Adjustment
1040
(Tone Allocation)
1042
Allowed TID
1044
Allowed TX Mode
1046
MCS
1048
TX start time

FIG. 10

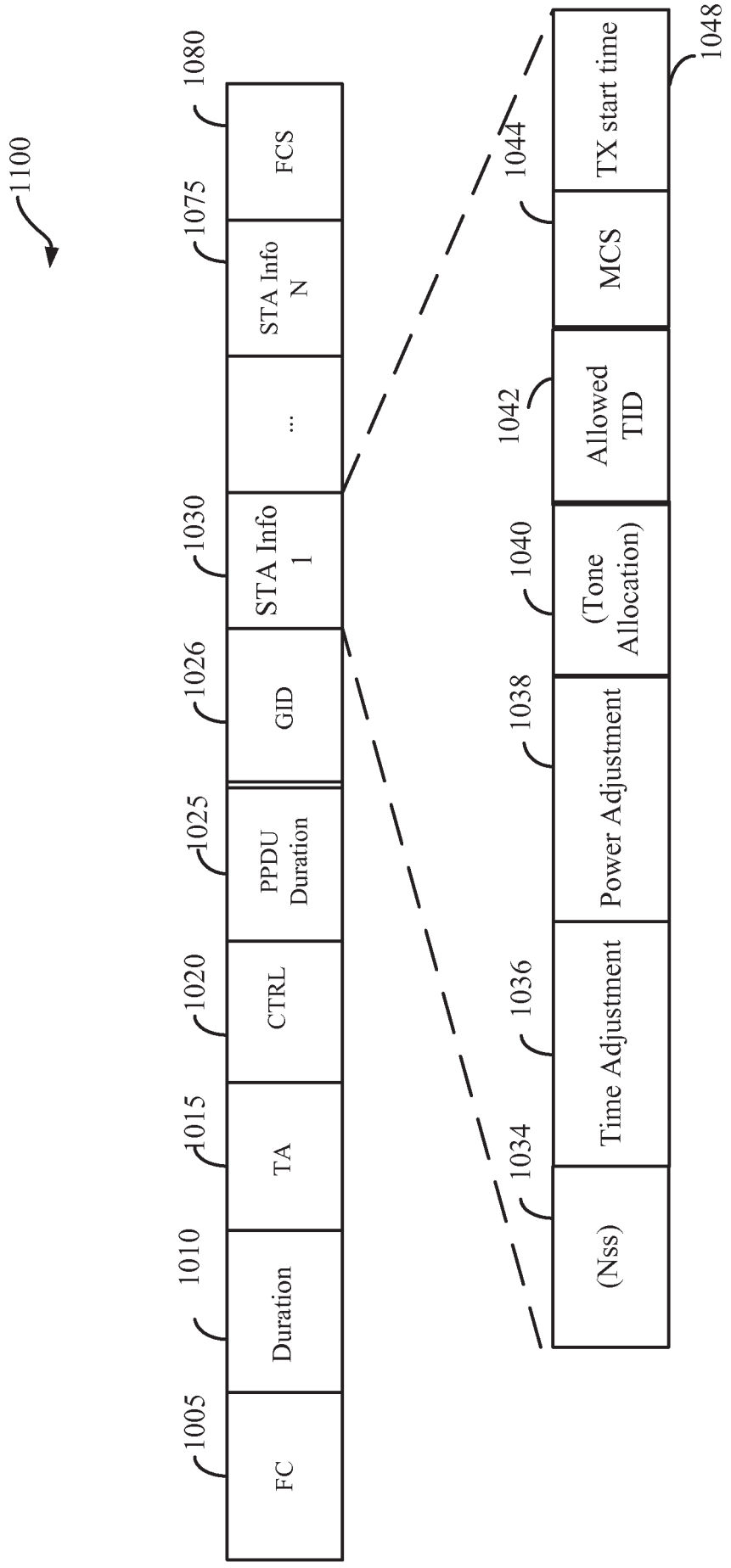
1100
FC
1005
Duration
1010
TA
1015
CTRL
1020
PPDU Duration
1025
GID
1026
STA Info 1
1030
...
STA Info N
1075
FCS
1080
(Nss)
1034
Time Adjustment
1036
Power Adjustment
1038
(Tone Allocation)
1040
Allowed TID
1042
MCS
1044
TX start time
1048

FIG. 11

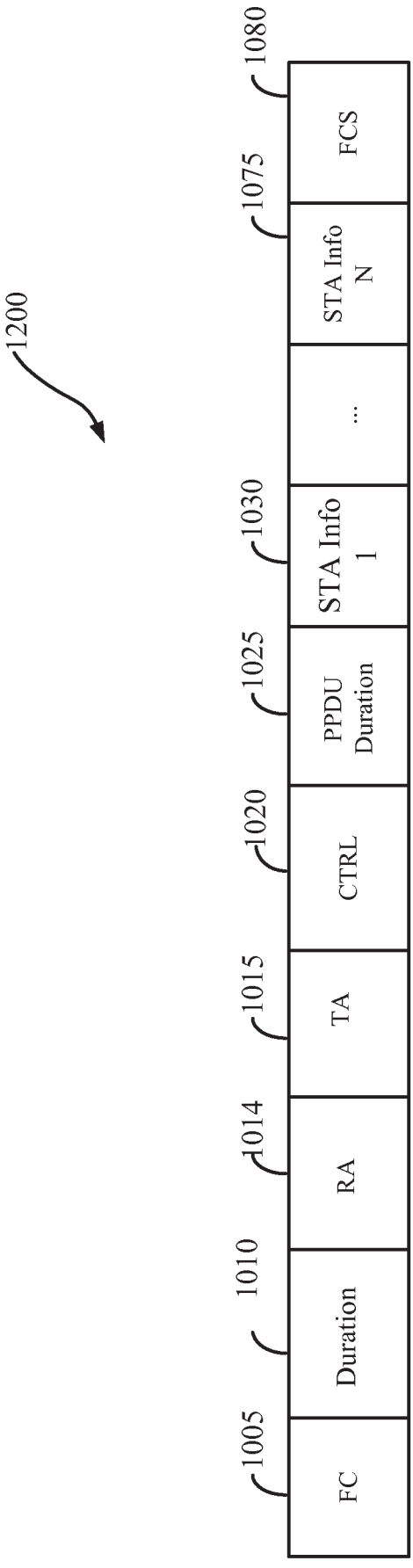
1200
1005
FC
1010
Duration
1014
RA
1015
TA
1020
CTRL
1025
PPDU Duration
1030
STA Info 1
...
1075
STA Info N
1080
FCS

FIG. 12

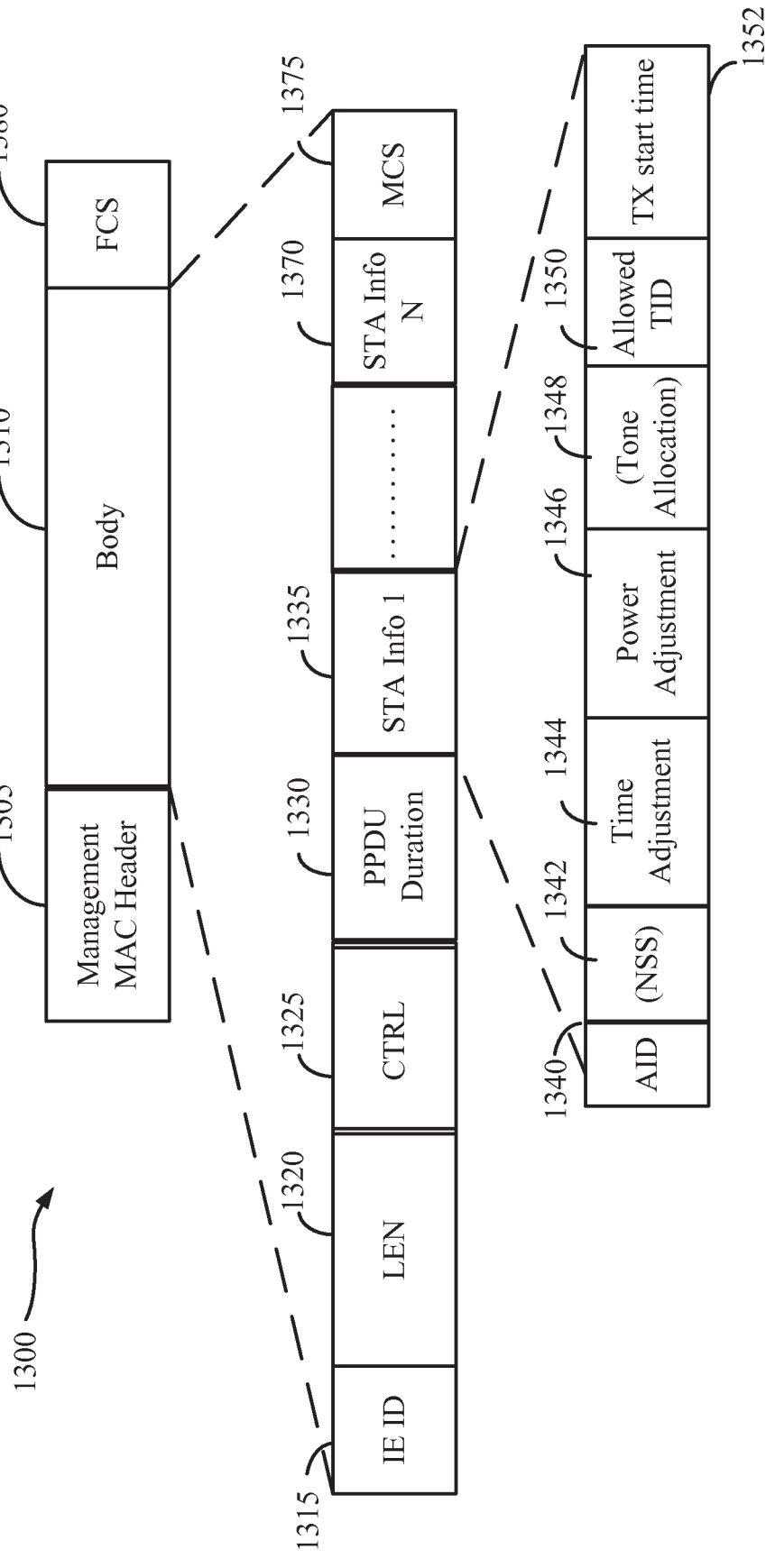
1300
1305
Management MAC Header
1310
Body
1380
FCS
1315
IE ID
1320
LEN
1325
CTRL
1330
PPDU Duration
1335
STA Info 1
1340
AID
1342
(NSS)
1344
Time Adjustment
1346
Power Adjustment
1348
(Tone Allocation)
1350
Allowed TID
1352
TX start time
1370
STA Info N
1375
MCS

FIG. 13

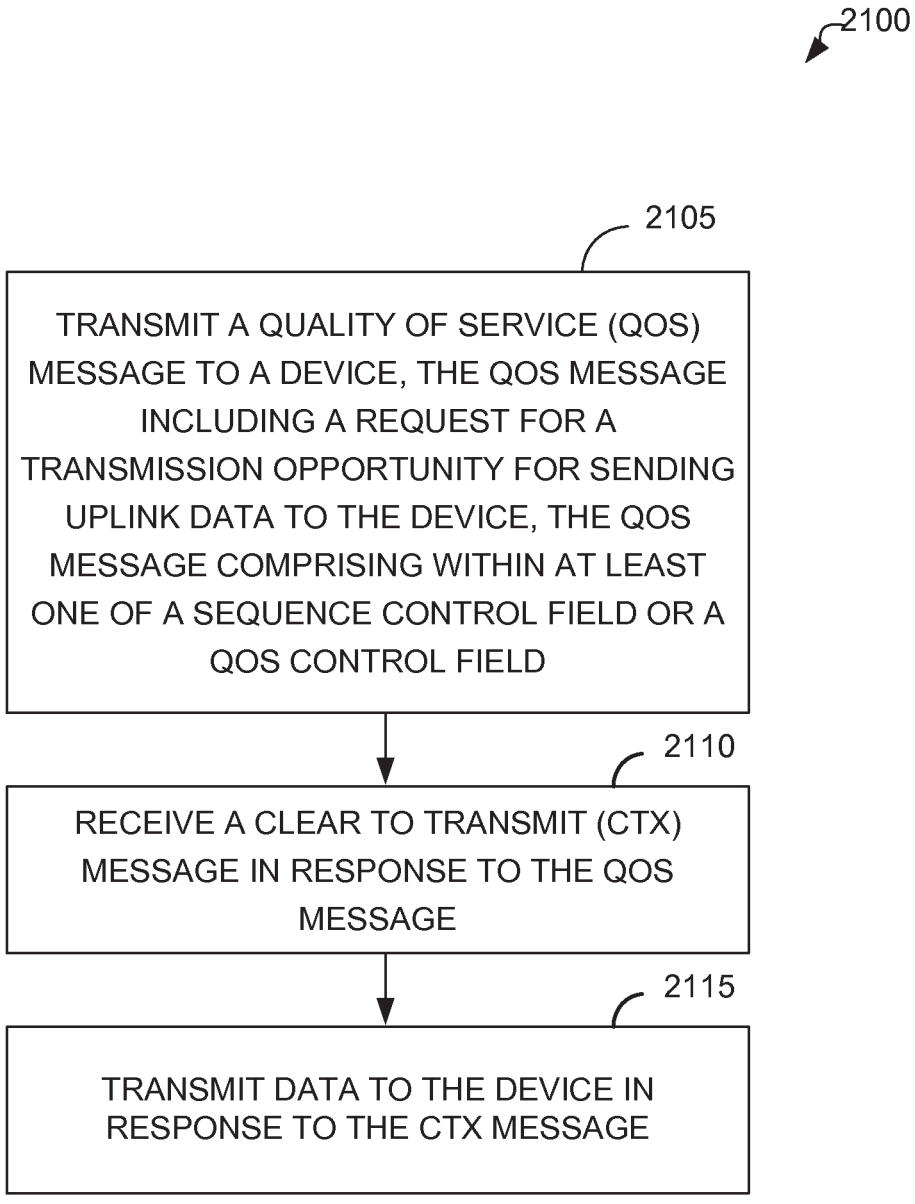
2100
2105
TRANSMIT A QUALITY OF SERVICE (QOS) MESSAGE TO A DEVICE, THE QOS MESSAGE INCLUDING A REQUEST FOR A TRANSMISSION OPPORTUNITY FOR SENDING UPLINK DATA TO THE DEVICE, THE QOS MESSAGE COMPRISING WITHIN AT LEAST ONE OF A SEQUENCE CONTROL FIELD OR A QOS CONTROL FIELD
2110
RECEIVE A CLEAR TO TRANSMIT (CTX) MESSAGE IN RESPONSE TO THE QOS MESSAGE
2115
TRANSMIT DATA TO THE DEVICE IN RESPONSE TO THE CTX MESSAGE

FIG. 14