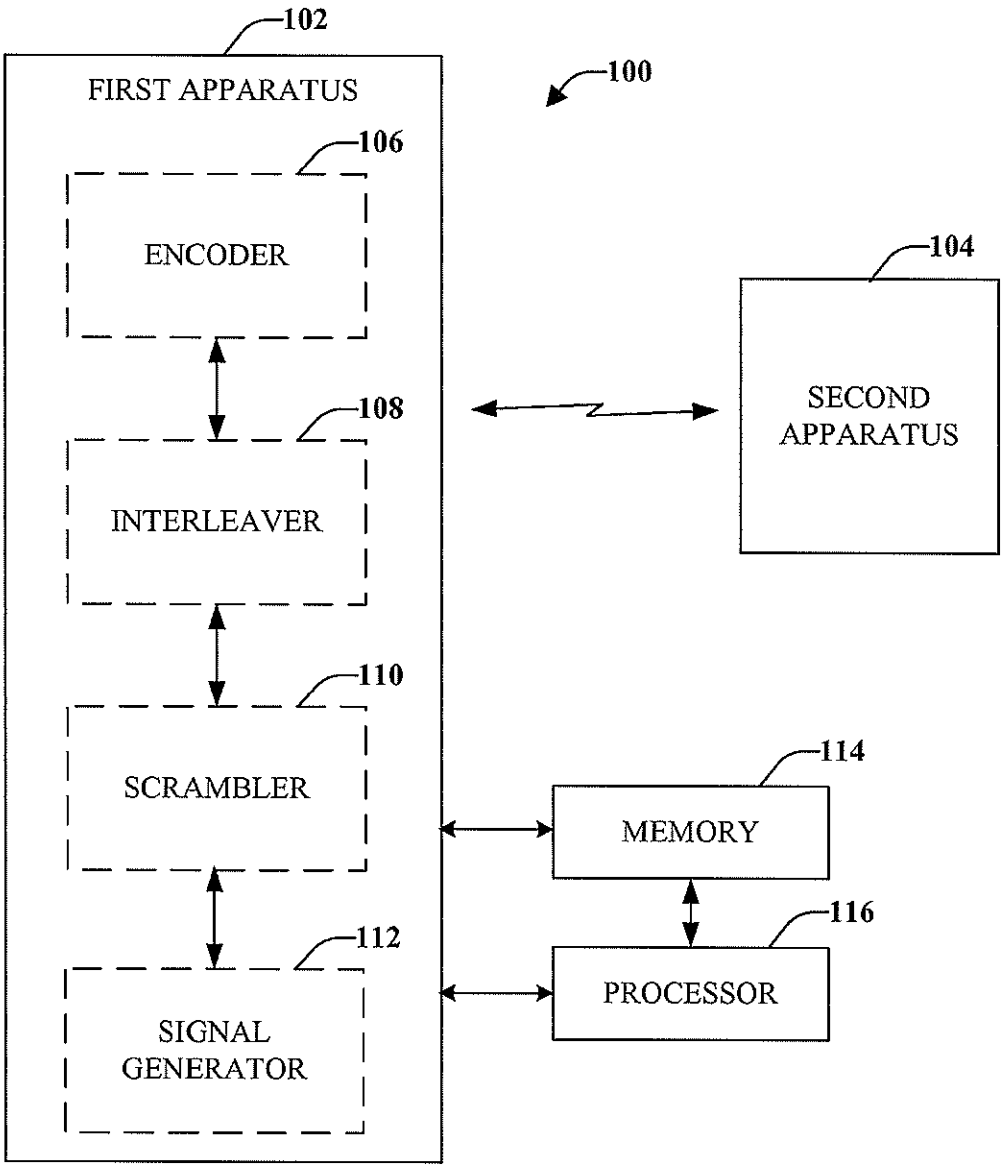
102
FIRST APPARATUS
100
106
ENCODER
104
SECOND APPARATUS
108
INTERLEAVER
110
SCRAMBLER
114
MEMORY
116
PROCESSOR
112
SIGNAL GENERATOR

FIG. 1

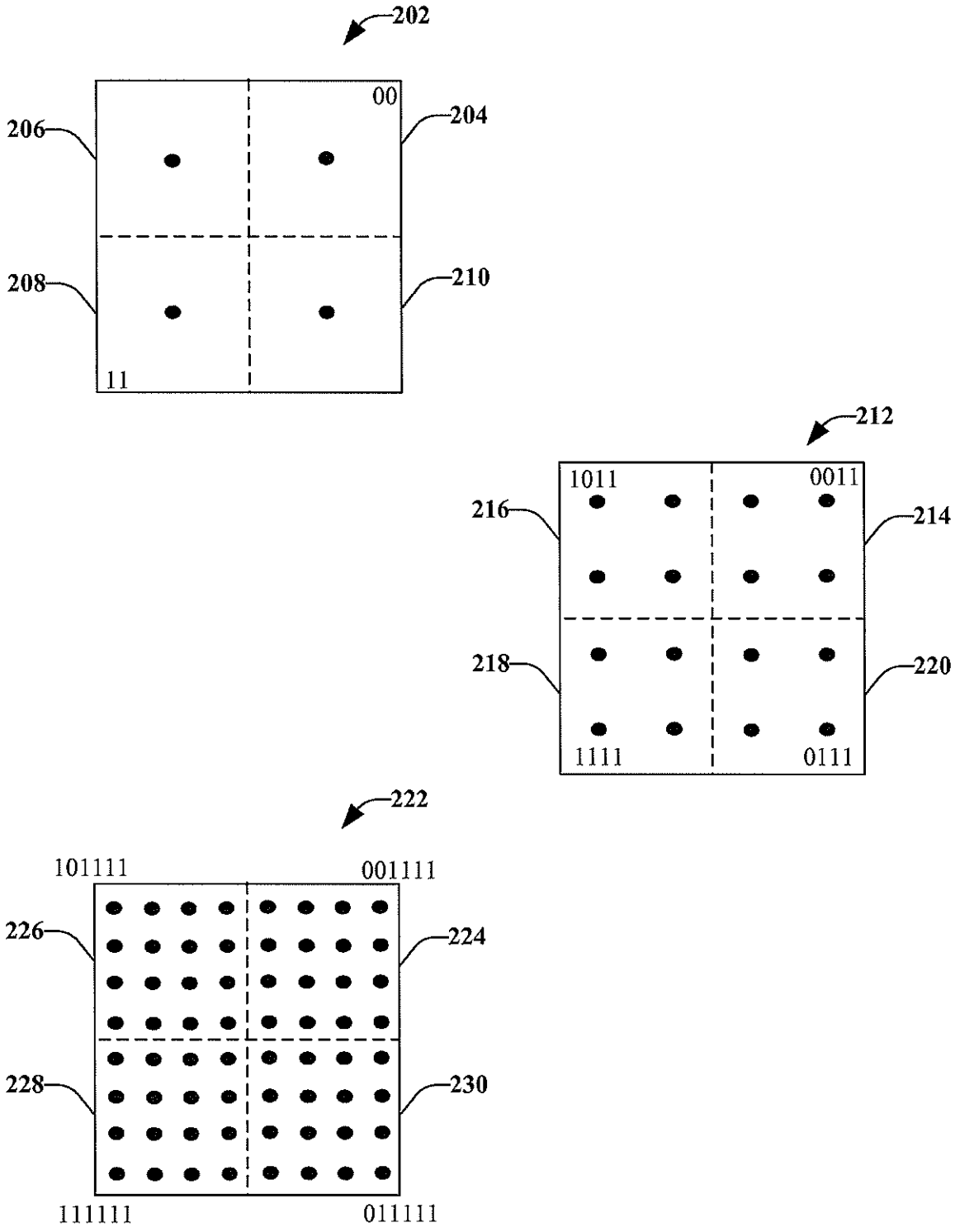
202
00
204
206
208
210
11
212
1011
0011
216
214
218
220
1111
0111
222
101111
001111
226
224
228
230
111111
011111

FIG. 2

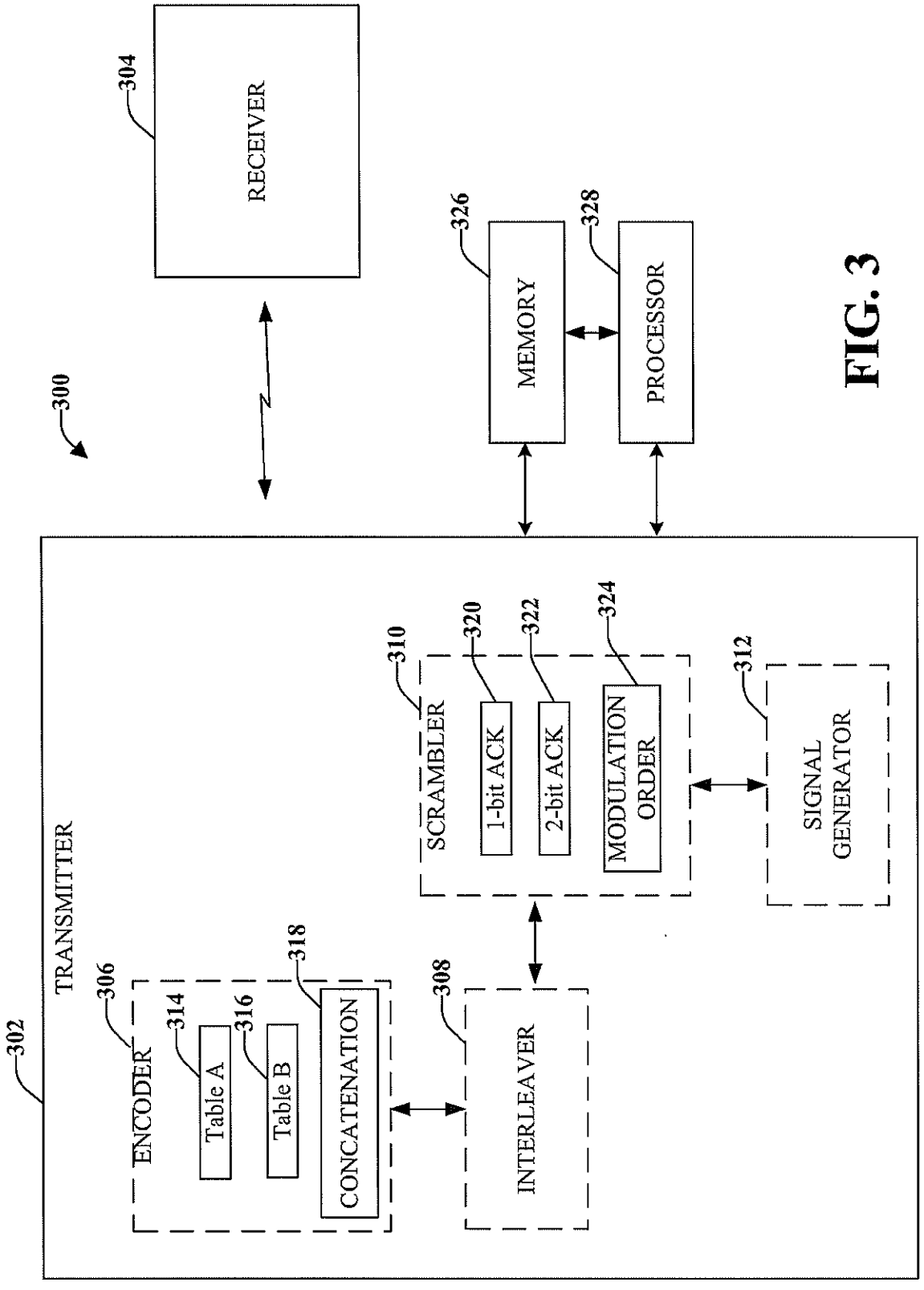
300
302
TRANSMITTER
304
RECEIVER
306
ENCODER
314
Table A
316
Table B
318
CONCATENATION
308
INTERLEAVER
310
SCRAMBLER
320
1-bit ACK
322
2-bit ACK
324
MODULATION ORDER
312
SIGNAL GENERATOR
326
MEMORY
328
PROCESSOR

FIG. 3

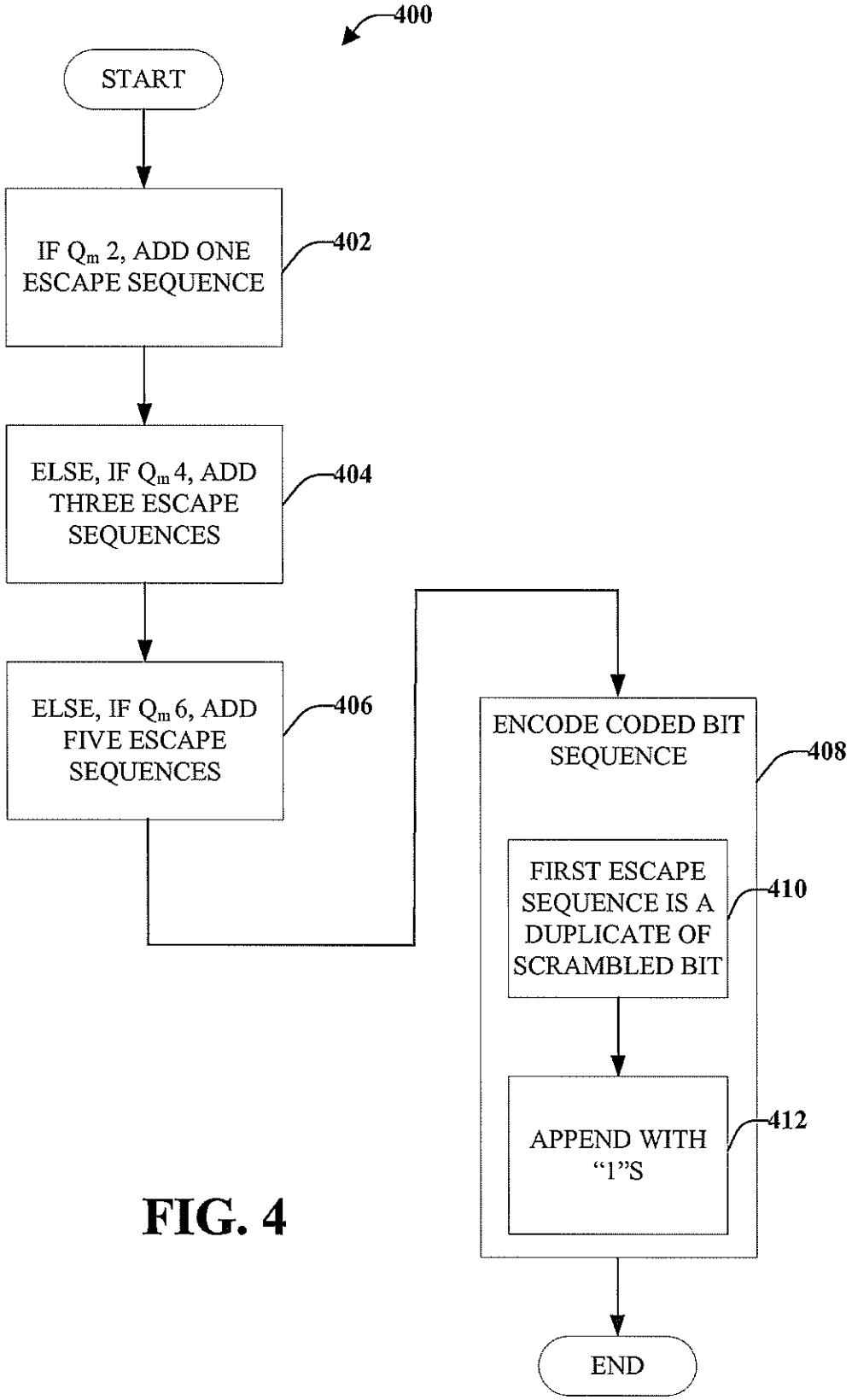
400
START
IF Q_m 2, ADD ONE ESCAPE SEQUENCE
402
ELSE, IF Q_m 4, ADD THREE ESCAPE SEQUENCES
404
ELSE, IF Q_m 6, ADD FIVE ESCAPE SEQUENCES
406
ENCODE CODED BIT SEQUENCE
408
FIRST ESCAPE SEQUENCE IS A DUPLICATE OF SCRAMBLED BIT
410
APPEND WITH "1"S
412
END

FIG. 4

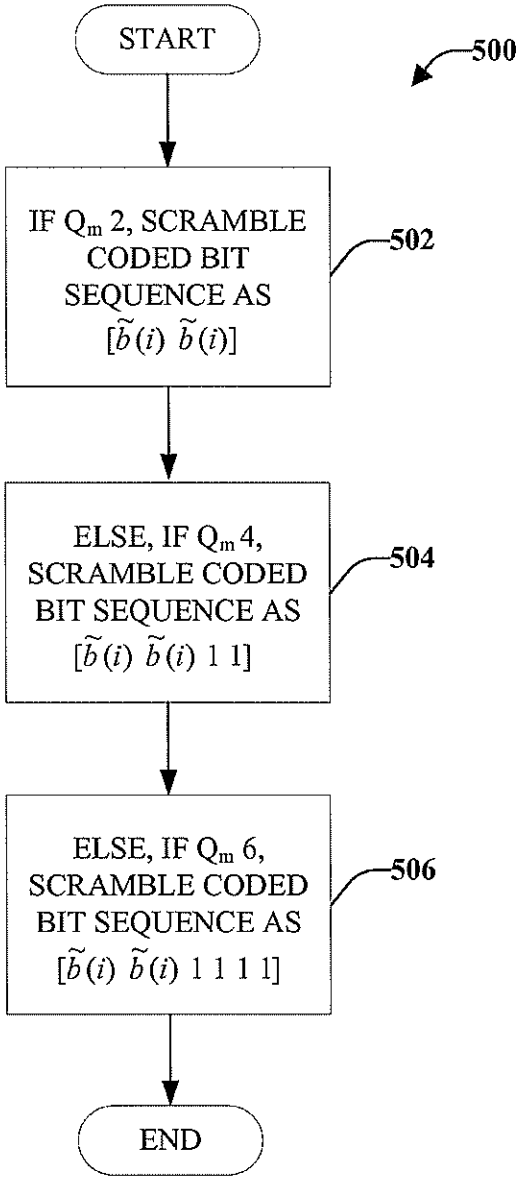
START
500
IF Q_m 2, SCRAMBLE CODED BIT SEQUENCE AS $[\tilde{b}(i)\ \tilde{b}(i)]$
502
ELSE, IF Q_m 4, SCRAMBLE CODED BIT SEQUENCE AS $[\tilde{b}(i)\ \tilde{b}(i)\ 1\ 1]$
504
ELSE, IF Q_m 6, SCRAMBLE CODED BIT SEQUENCE AS $[\tilde{b}(i)\ \tilde{b}(i)\ 1\ 1\ 1\ 1]$
506
END

FIG. 5

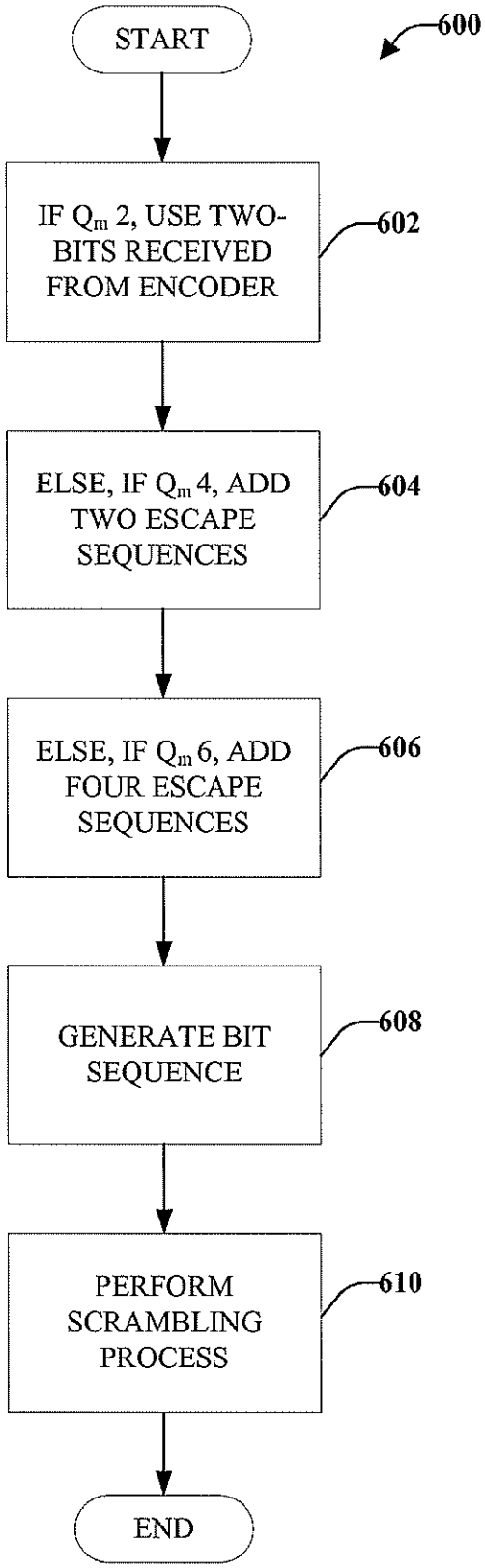
START
600
IF Q_m 2, USE TWO-BITS RECEIVED FROM ENCODER
602
ELSE, IF Q_m 4, ADD TWO ESCAPE SEQUENCES
604
ELSE, IF Q_m 6, ADD FOUR ESCAPE SEQUENCES
606
GENERATE BIT SEQUENCE
608
PERFORM SCRAMBLING PROCESS
610
END

FIG. 6

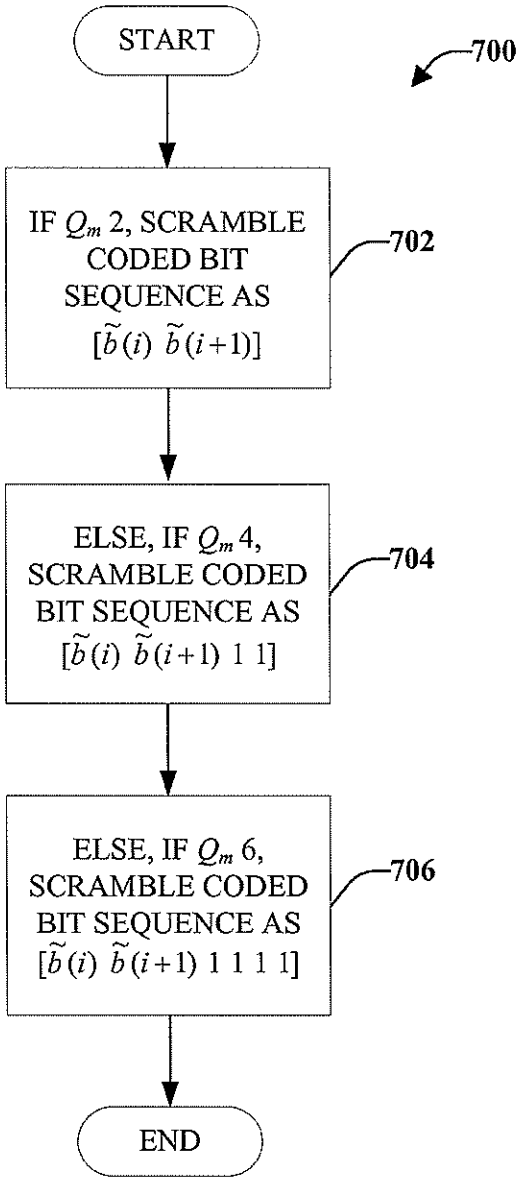
START
700
IF Q_m 2, SCRAMBLE CODED BIT SEQUENCE AS $[\tilde{b}(i)\ \tilde{b}(i+1)]$
702
ELSE, IF Q_m 4, SCRAMBLE CODED BIT SEQUENCE AS $[\tilde{b}(i)\ \tilde{b}(i+1)\ 1\ 1]$
704
ELSE, IF Q_m 6, SCRAMBLE CODED BIT SEQUENCE AS $[\tilde{b}(i)\ \tilde{b}(i+1)\ 1\ 1\ 1\ 1]$
706
END

FIG. 7

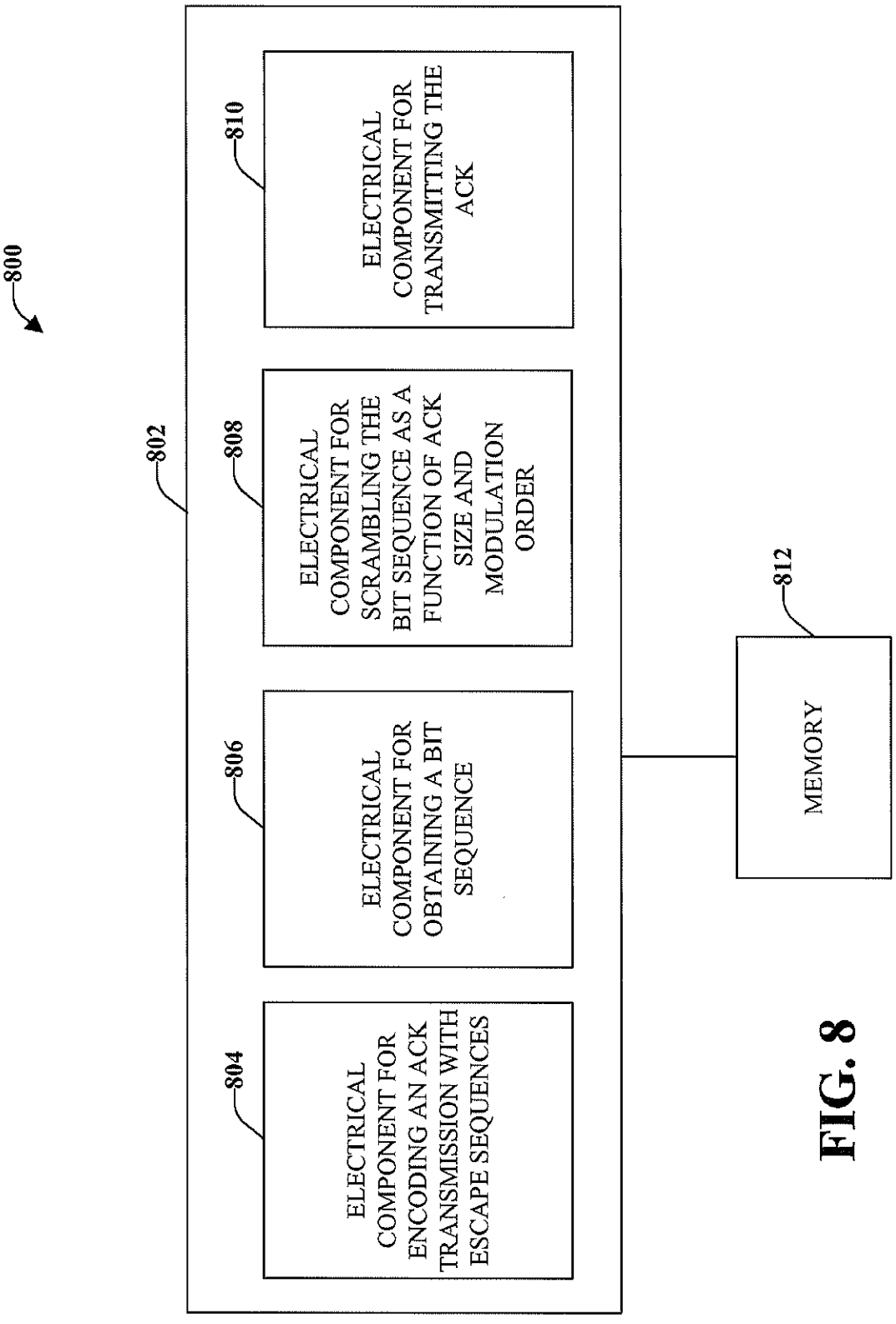
800
802
804
ELECTRICAL COMPONENT FOR ENCODING AN ACK TRANSMISSION WITH ESCAPE SEQUENCES
806
ELECTRICAL COMPONENT FOR OBTAINING A BIT SEQUENCE
808
ELECTRICAL COMPONENT FOR SCRAMBLING THE BIT SEQUENCE AS A FUNCTION OF ACK SIZE AND MODULATION ORDER
810
ELECTRICAL COMPONENT FOR TRANSMITTING THE ACK
812
MEMORY

FIG. 8

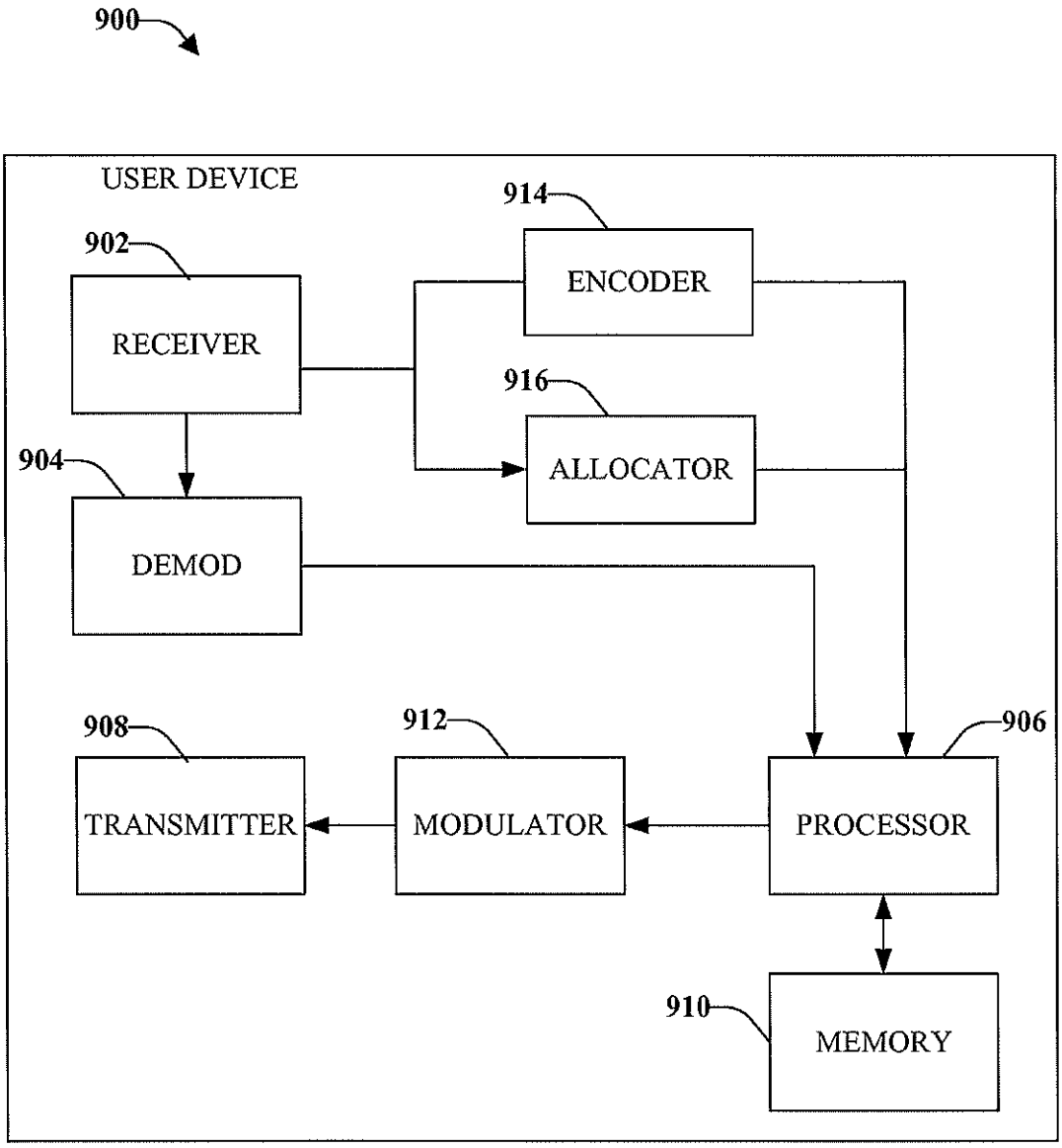
900
USER DEVICE
914
ENCODER
902
RECEIVER
916
ALLOCATOR
904
DEMOD
908
TRANSMITTER
912
MODULATOR
906
PROCESSOR
910
MEMORY

FIG. 9

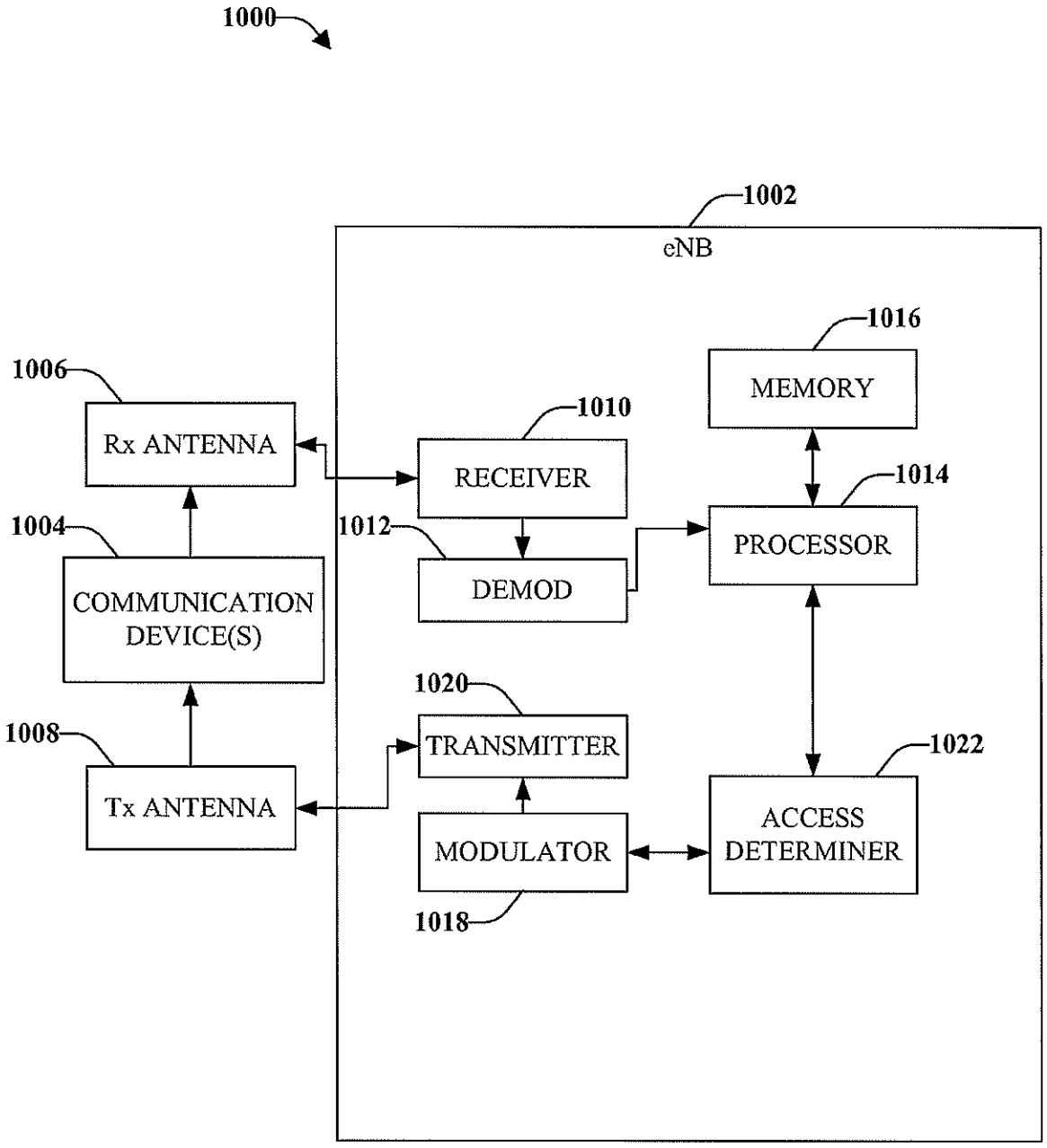
1000
1002
eNB
1016
MEMORY
1006
Rx ANTENNA
1010
RECEIVER
1014
PROCESSOR
1004
COMMUNICATION DEVICE(S)
1012
DEMOD
1020
TRANSMITTER
1008
Tx ANTENNA
1022
ACCESS DETERMINER
MODULATOR
1018

FIG. 10

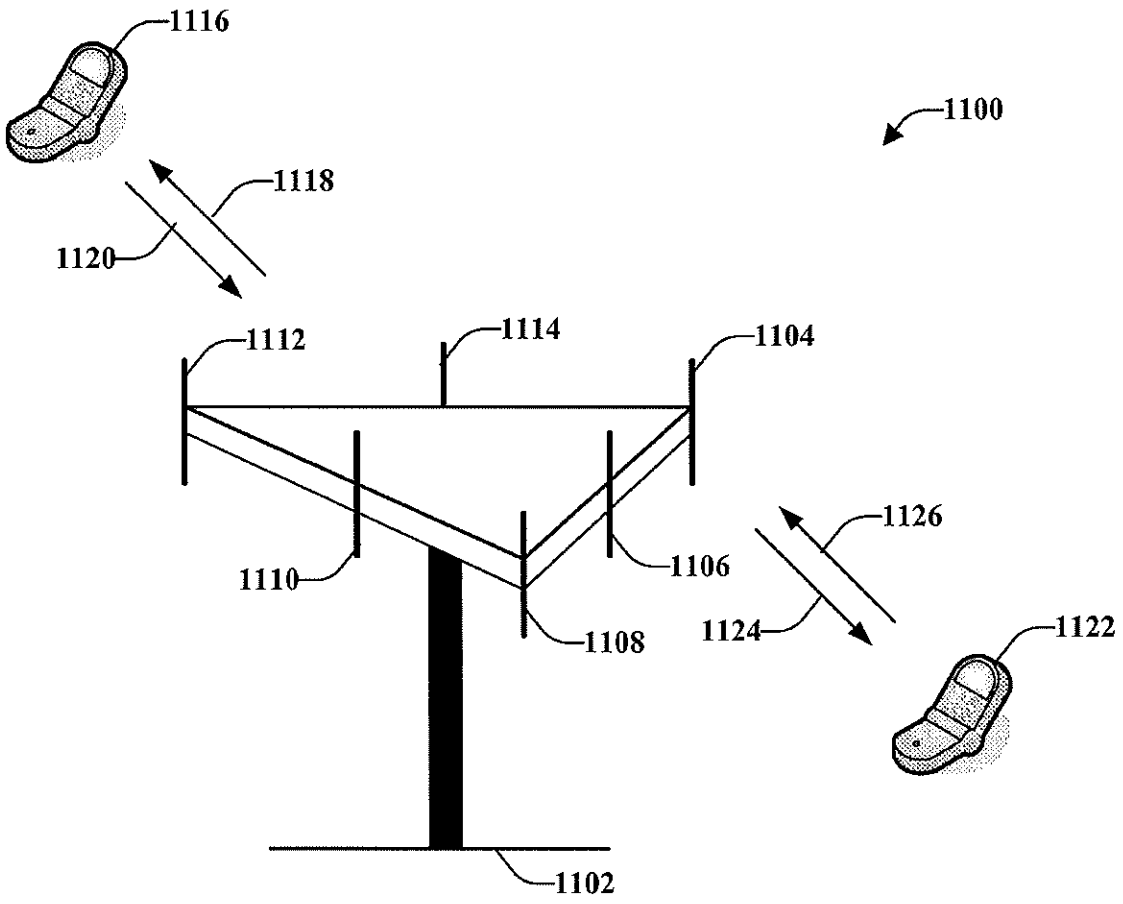
1116
1100
1118
1120
1112
1114
1104
1126
1110
1106
1124
1122
1108
1102

FIG. 11

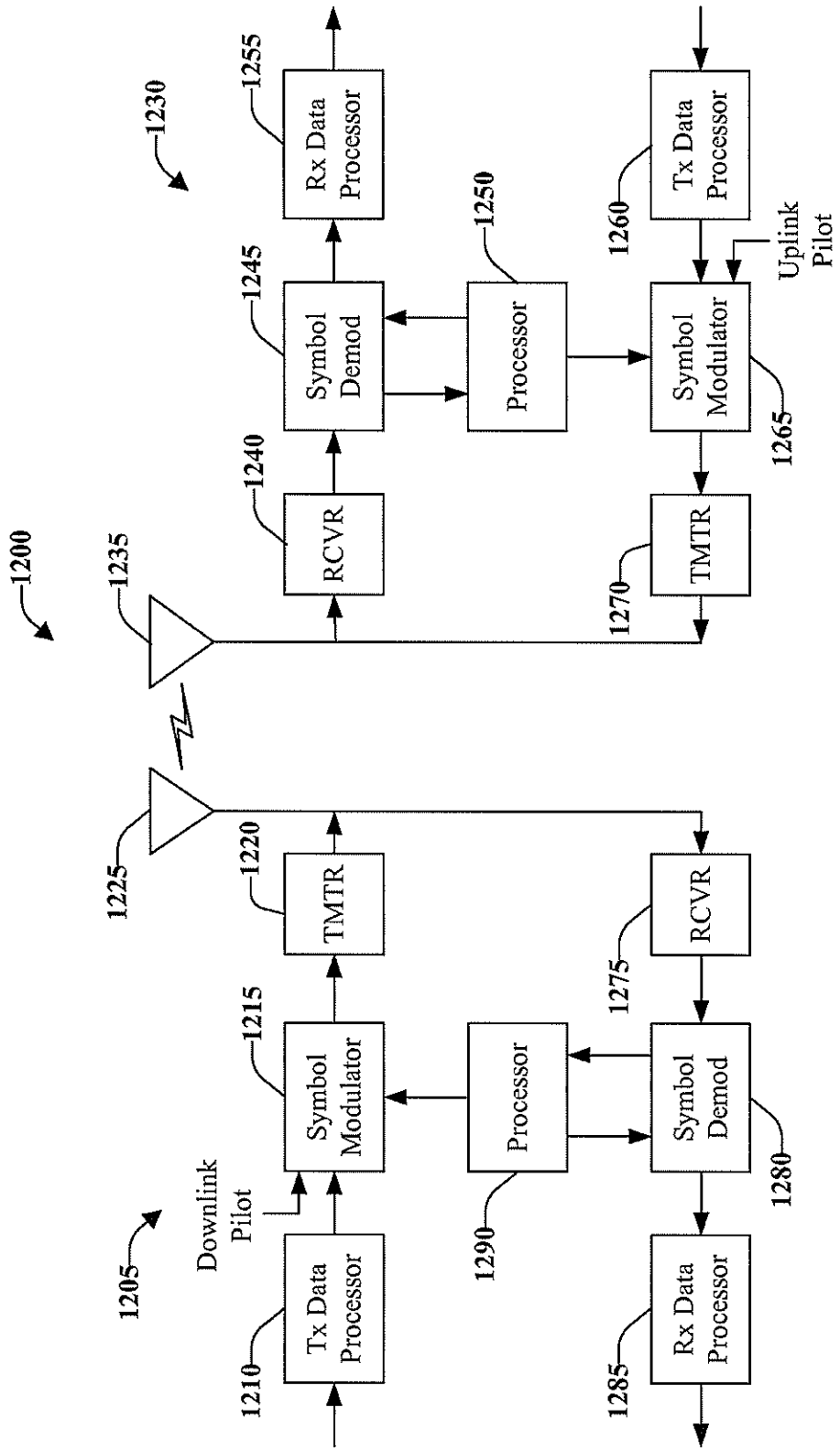
1200
1205
1210
Tx Data Processor
Downlink Pilot
1215
Symbol Modulator
1220
TMTR
1225
1230
1235
1240
RCVR
1245
Symbol Demod
1250
Processor
1255
Rx Data Processor
1260
Tx Data Processor
Uplink Pilot
1265
Symbol Modulator
1270
TMTR
1275
RCVR
1280
Symbol Demod
1285
Rx Data Processor
1290
Processor

FIG. 12