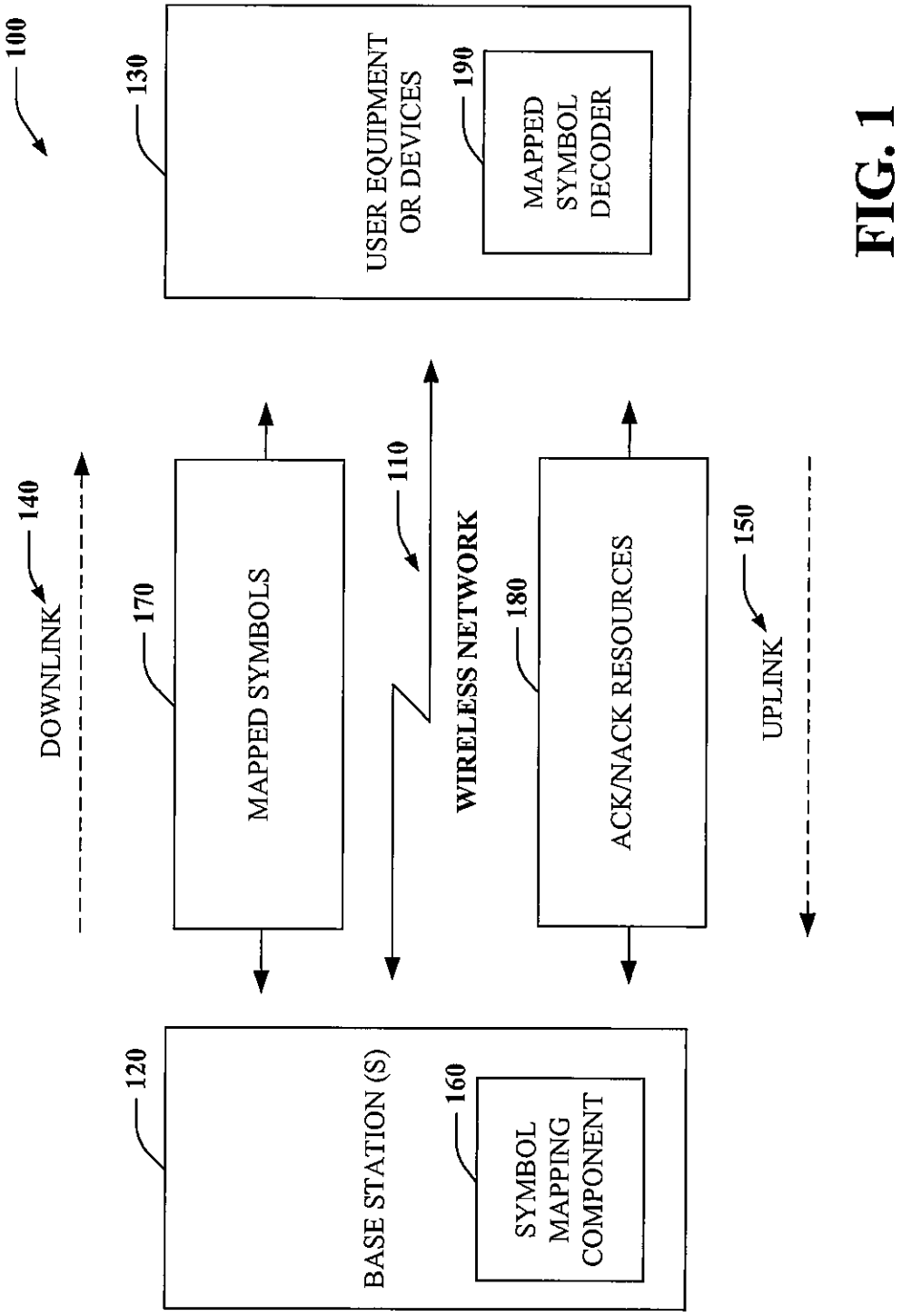

100
130
USER EQUIPMENT OR DEVICES
190
MAPPED SYMBOL DECODER
140
DOWNLINK
170
MAPPED SYMBOLS
110
WIRELESS NETWORK
180
ACK/NACK RESOURCES
150
UPLINK
120
BASE STATION (S)
160
SYMBOL MAPPING COMPONENT

FIG. 1

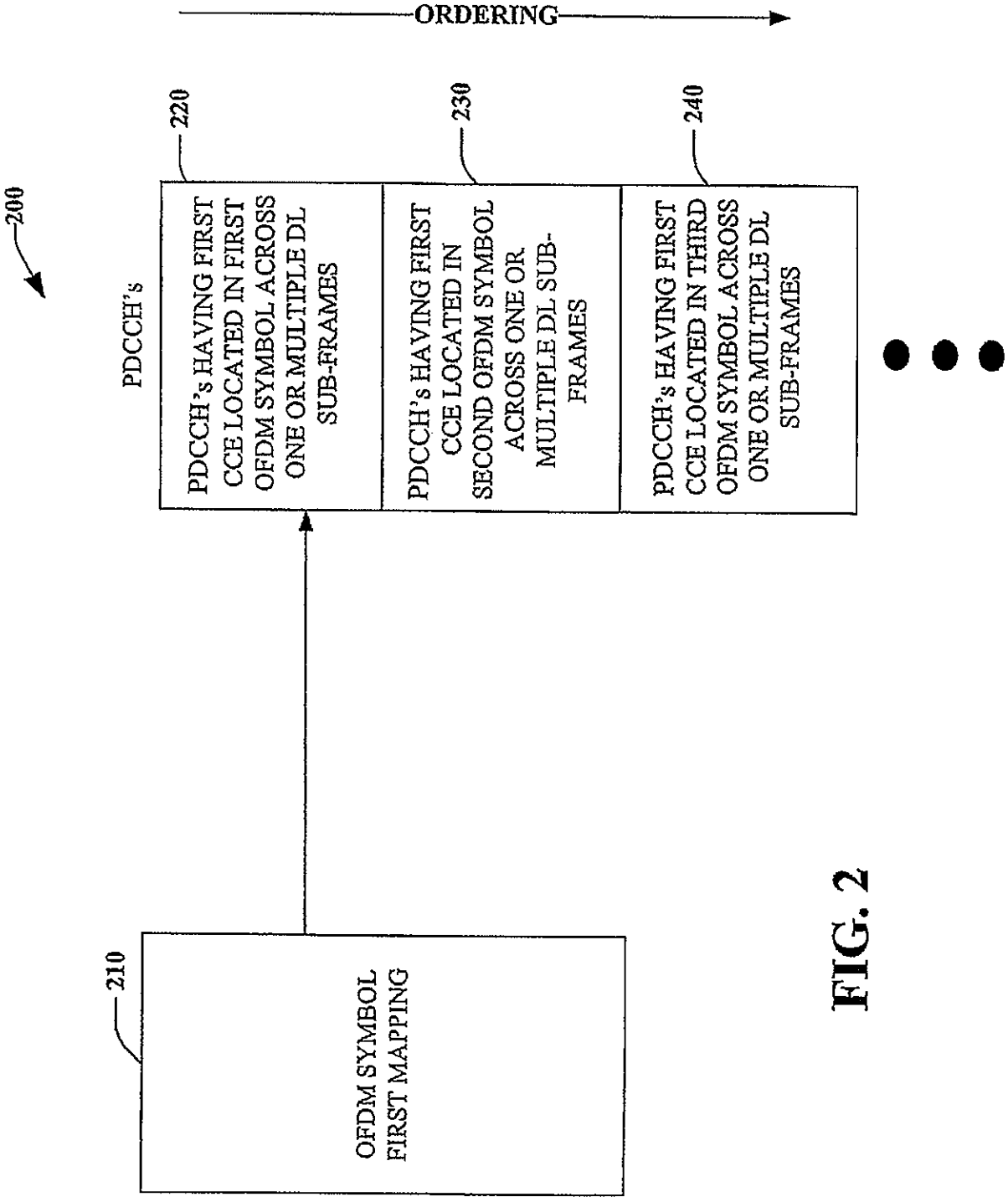

200
ORDERING
PDCCH's
220
230
240
PDCCH's HAVING FIRST CCE LOCATED IN FIRST OFDM SYMBOL ACROSS ONE OR MULTIPLE DL SUB-FRAMES
PDCCH's HAVING FIRST CCE LOCATED IN SECOND OFDM SYMBOL ACROSS ONE OR MULTIPLE DL SUB-FRAMES
PDCCH's HAVING FIRST CCE LOCATED IN THIRD OFDM SYMBOL ACROSS ONE OR MULTIPLE DL SUB-FRAMES
210
OFDM SYMBOL FIRST MAPPING

FIG. 2

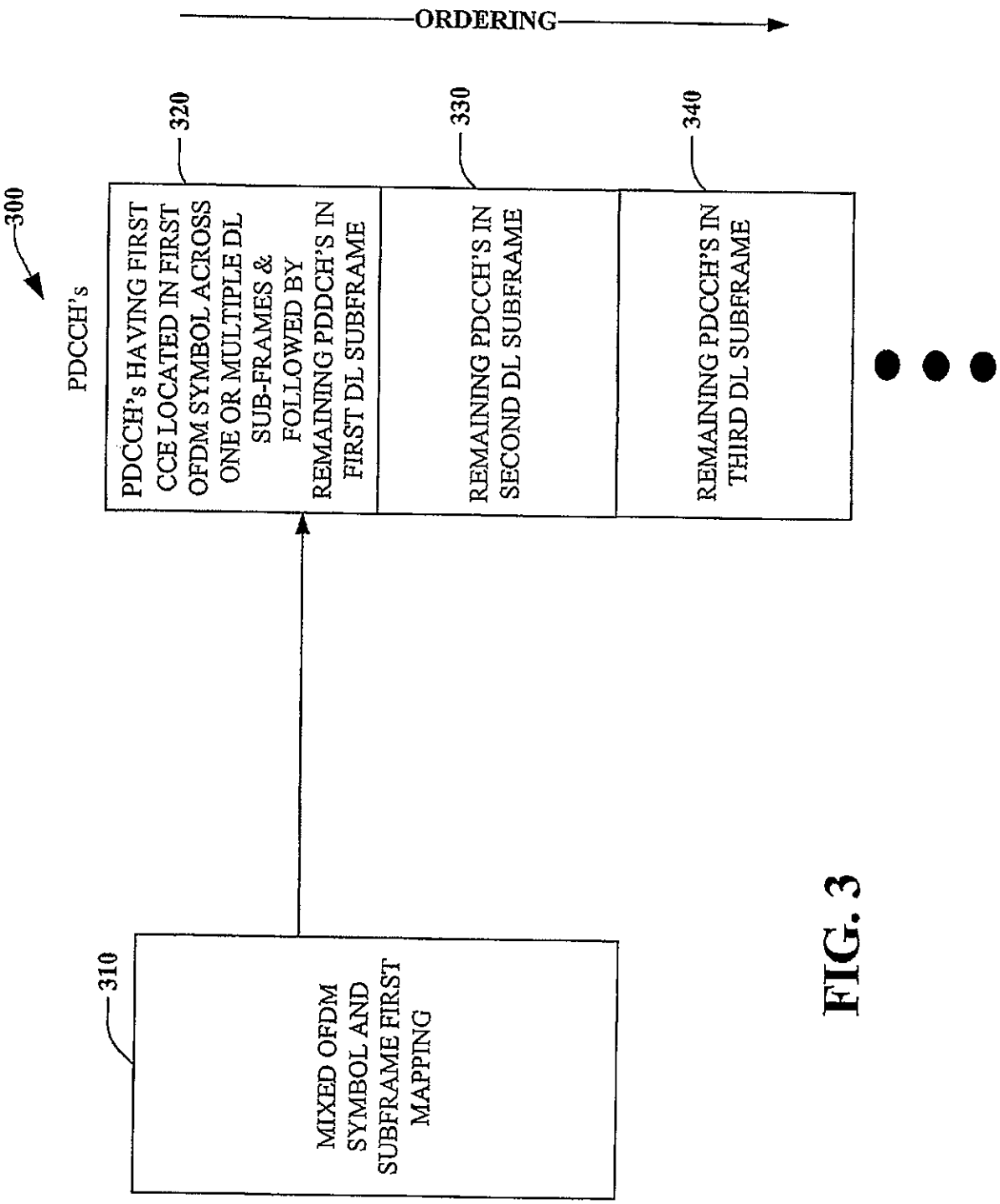

ORDERING
300
PDCCH's
320
330
340
PDCCH's HAVING FIRST CCE LOCATED IN FIRST OFDM SYMBOL ACROSS ONE OR MULTIPLE DL SUB-FRAMES & FOLLOWED BY REMAINING PDDCH'S IN FIRST DL SUBFRAME
REMAINING PDCCH'S IN SECOND DL SUBFRAME
REMAINING PDCCH'S IN THIRD DL SUBFRAME
310
MIXED OFDM SYMBOL AND SUBFRAME FIRST MAPPING

FIG. 3

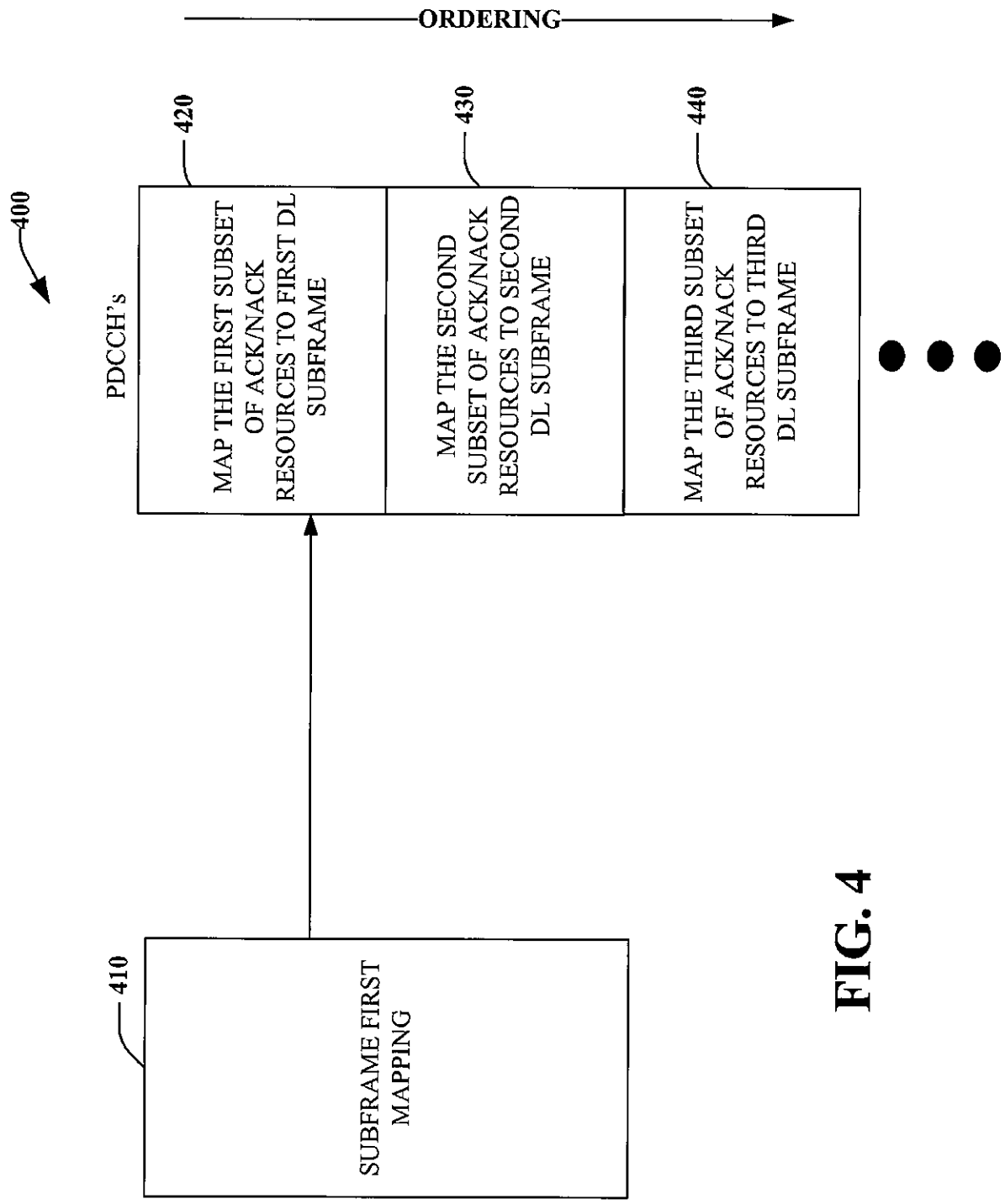

ORDERING
400
PDCCH's
420
MAP THE FIRST SUBSET OF ACK/NACK RESOURCES TO FIRST DL SUBFRAME
430
MAP THE SECOND SUBSET OF ACK/NACK RESOURCES TO SECOND DL SUBFRAME
440
MAP THE THIRD SUBSET OF ACK/NACK RESOURCES TO THIRD DL SUBFRAME
410
SUBFRAME FIRST MAPPING

FIG. 4

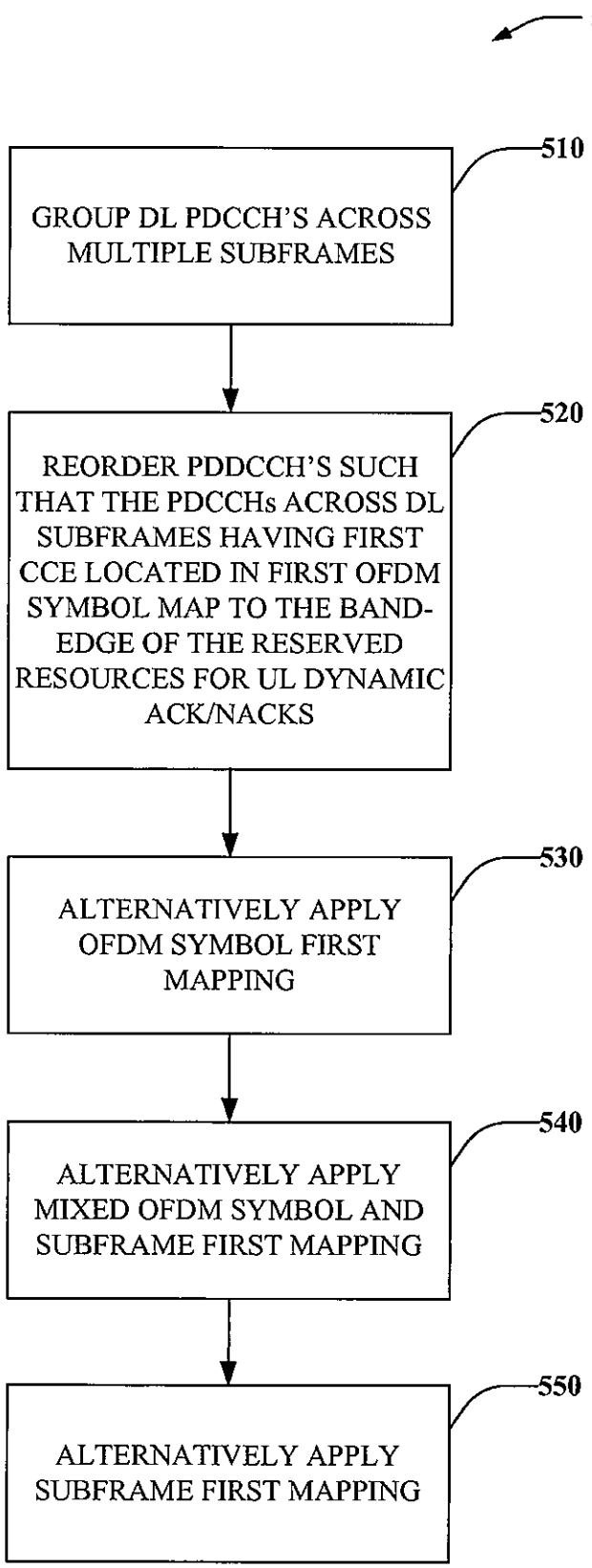

500
510
GROUP DL PDCCH'S ACROSS MULTIPLE SUBFRAMES
520
REORDER PDDCCH'S SUCH THAT THE PDCCHs ACROSS DL SUBFRAMES HAVING FIRST CCE LOCATED IN FIRST OFDM SYMBOL MAP TO THE BAND-EDGE OF THE RESERVED RESOURCES FOR UL DYNAMIC ACK/NACKS
530
ALTERNATIVELY APPLY OFDM SYMBOL FIRST MAPPING
540
ALTERNATIVELY APPLY MIXED OFDM SYMBOL AND SUBFRAME FIRST MAPPING
550
ALTERNATIVELY APPLY SUBFRAME FIRST MAPPING

FIG. 5

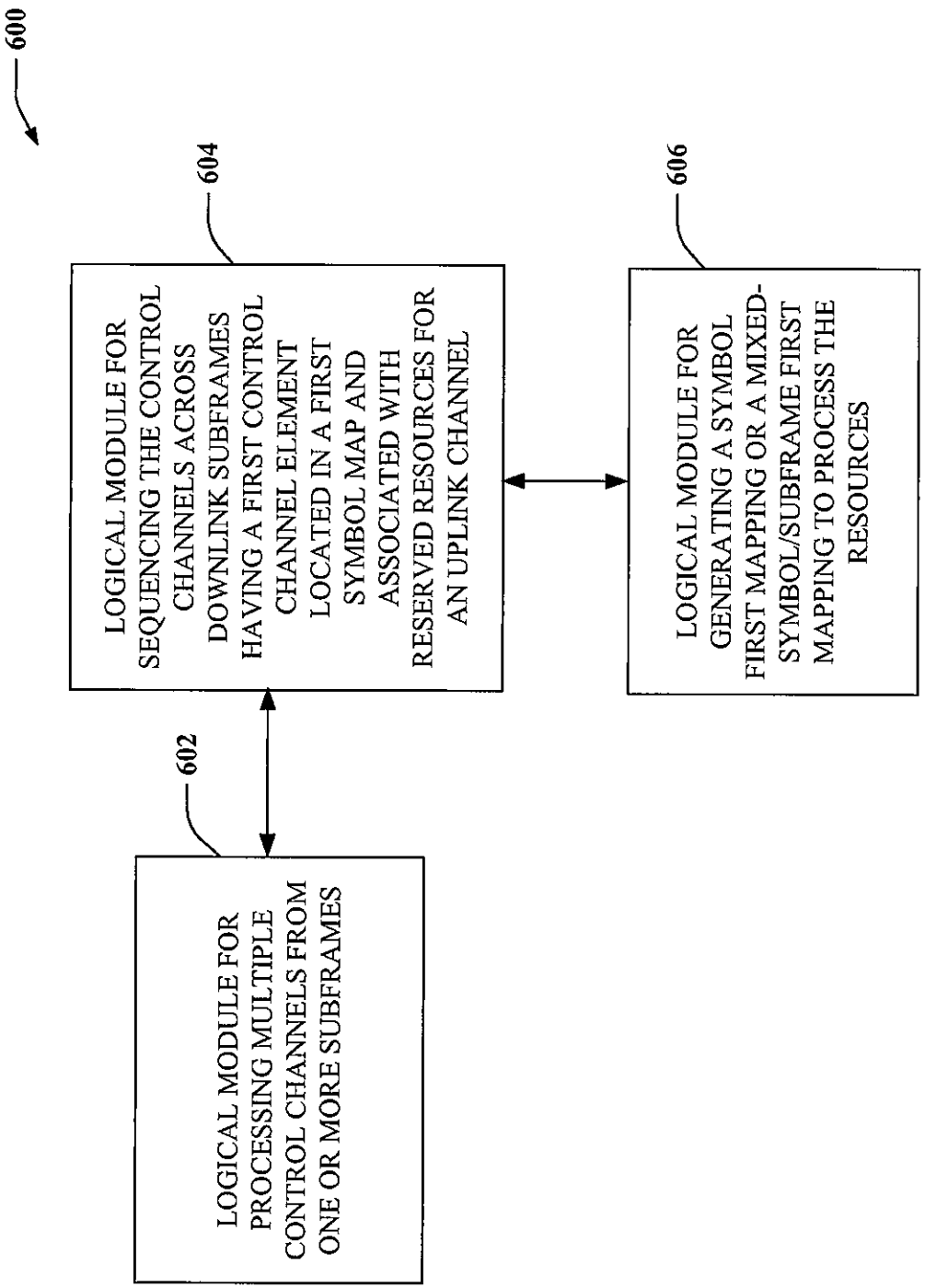

600
604
606
602
LOGICAL MODULE FOR SEQUENCING THE CONTROL CHANNELS ACROSS DOWNLINK SUBFRAMES HAVING A FIRST CONTROL CHANNEL ELEMENT LOCATED IN A FIRST SYMBOL MAP AND ASSOCIATED WITH RESERVED RESOURCES FOR AN UPLINK CHANNEL
LOGICAL MODULE FOR GENERATING A SYMBOL FIRST MAPPING OR A MIXED-SYMBOL/SUBFRAME FIRST MAPPING TO PROCESS THE RESOURCES
LOGICAL MODULE FOR PROCESSING MULTIPLE CONTROL CHANNELS FROM ONE OR MORE SUBFRAMES

FIG. 6

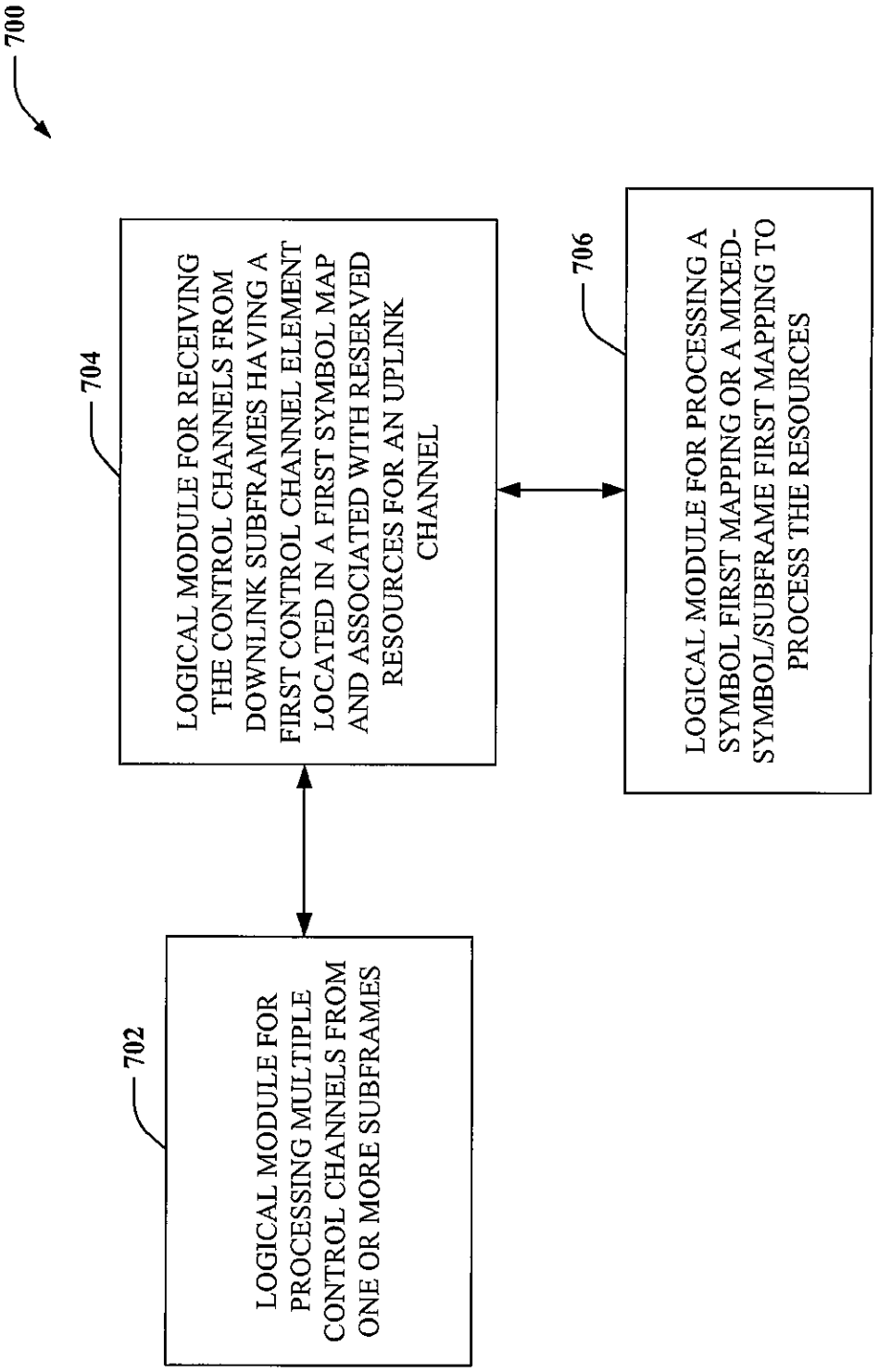

700
LOGICAL MODULE FOR RECEIVING THE CONTROL CHANNELS FROM DOWNLINK SUBFRAMES HAVING A FIRST CONTROL CHANNEL ELEMENT LOCATED IN A FIRST SYMBOL MAP AND ASSOCIATED WITH RESERVED RESOURCES FOR AN UPLINK CHANNEL
704
LOGICAL MODULE FOR PROCESSING A SYMBOL FIRST MAPPING OR A MIXED-SYMBOL/SUBFRAME FIRST MAPPING TO PROCESS THE RESOURCES
706
LOGICAL MODULE FOR PROCESSING MULTIPLE CONTROL CHANNELS FROM ONE OR MORE SUBFRAMES
702

FIG. 7

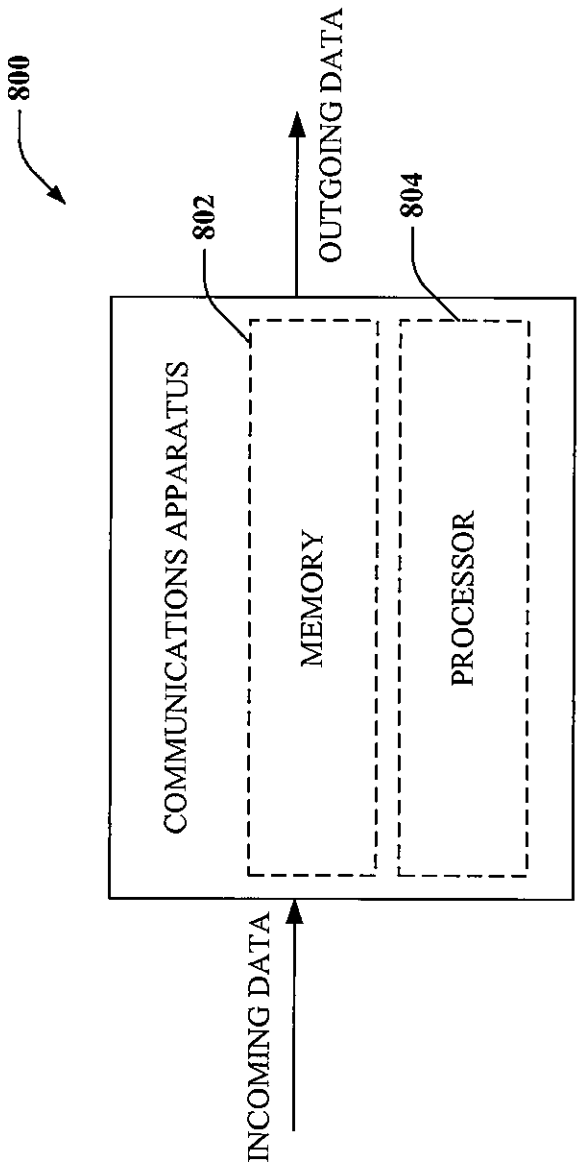

800
OUTGOING DATA
802
804
COMMUNICATIONS APPARATUS
MEMORY
PROCESSOR
INCOMING DATA

FIG. 8

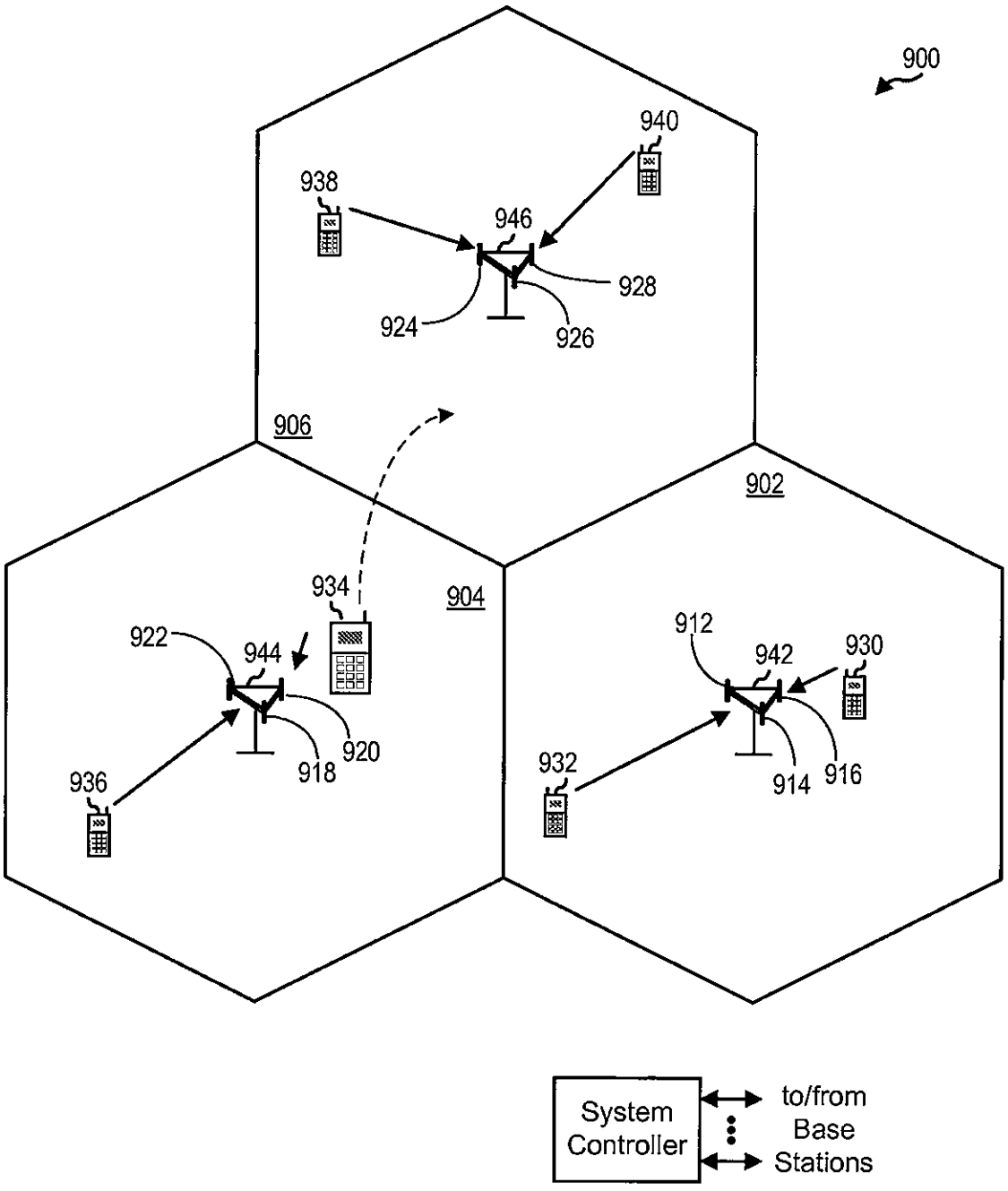

900
940
938
946
928
924
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906
902
904
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920
918
936
912
942
930
932
914
916
System Controller
to/from Base Stations

FIG. 9

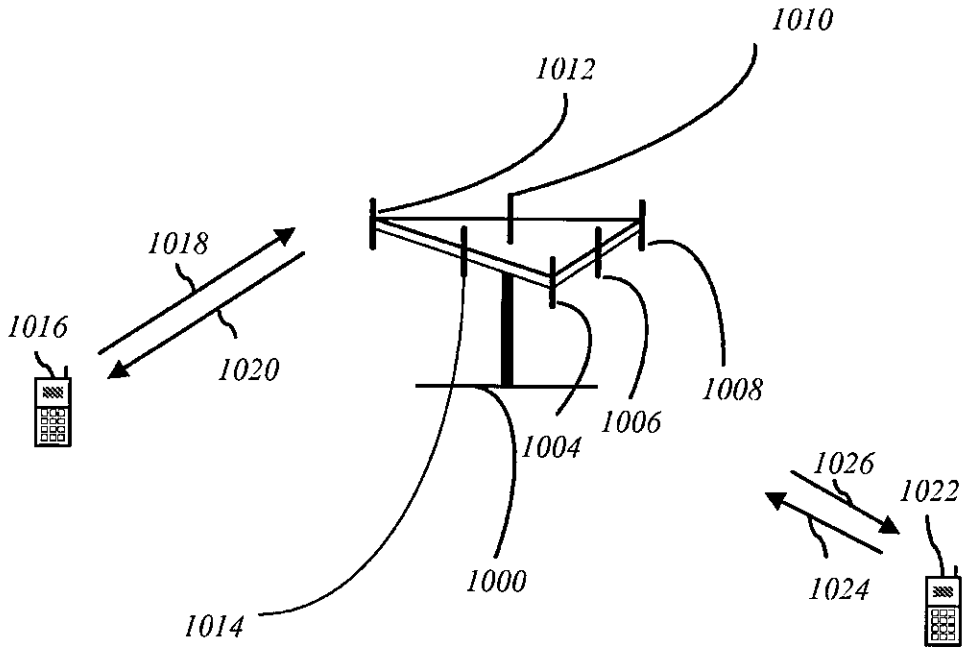

1010
1012
1018
1016
1020
1008
1006
1004
1026
1022
1000
1024
1014

FIG. 10

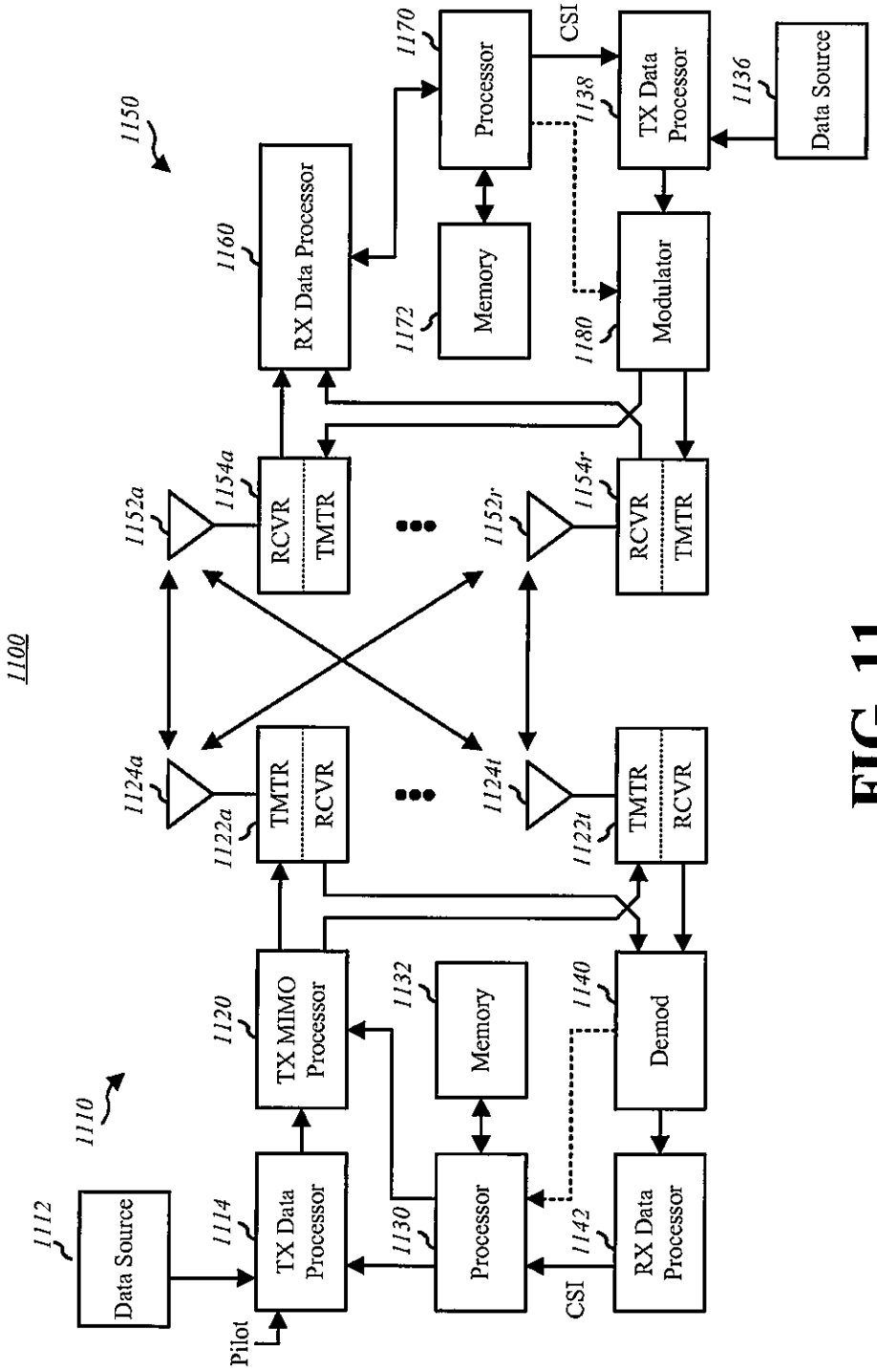

1100
1110
1112
Data Source
1114
TX Data Processor
Pilot
1120
TX MIMO Processor
1122a
TMTR
RCVR
1124a
1130
Processor
1132
Memory
1140
Demod
1142
RX Data Processor
CSI
1122t
TMTR
RCVR
1124t
1150
1152a
1154a
RCVR
TMTR
1152r
1154r
RCVR
TMTR
1160
RX Data Processor
1170
Processor
CSI
1172
Memory
1180
Modulator
1138
TX Data Processor
1136
Data Source

FIG. 11