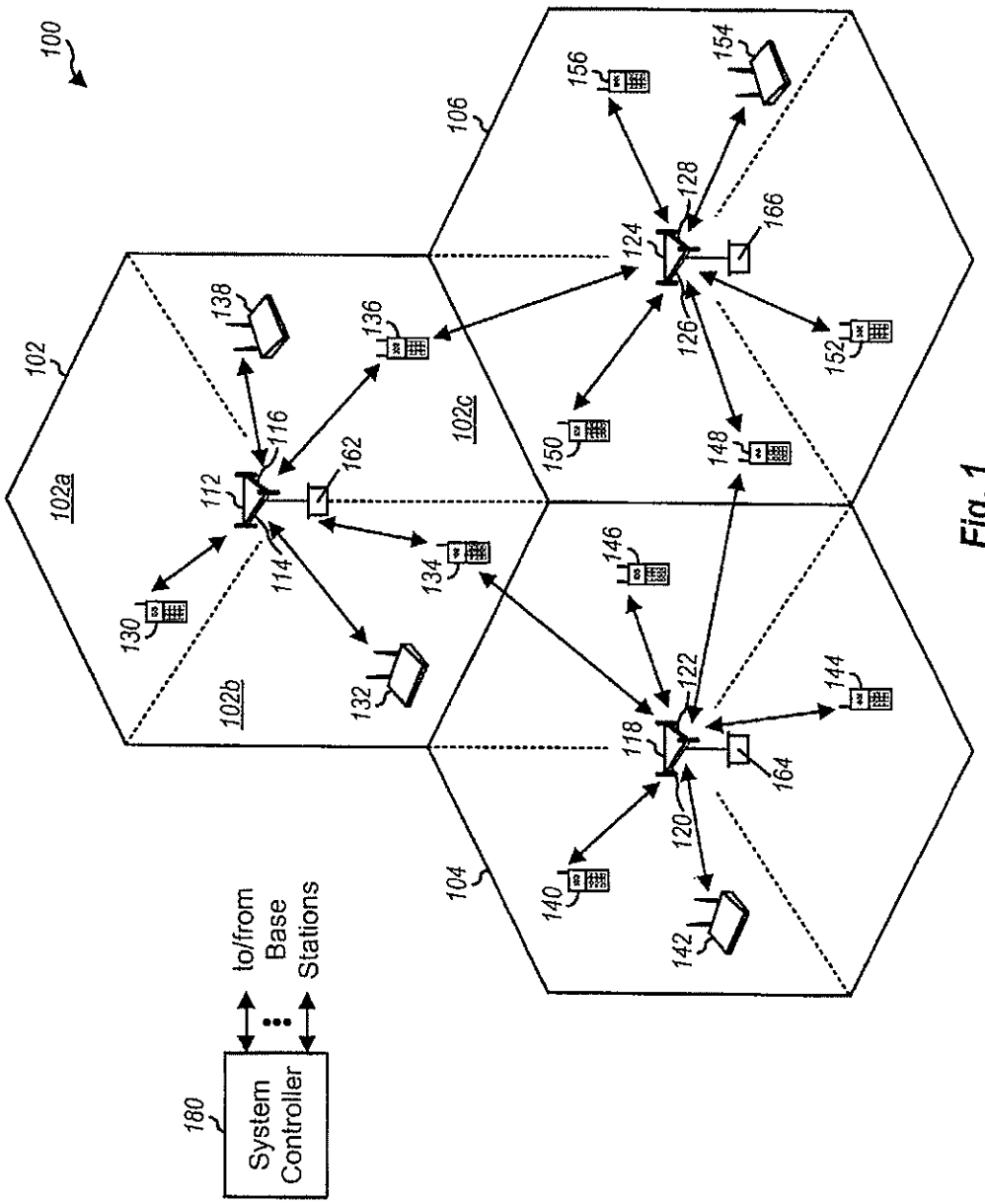

100
102
102a
102b
102c
104
106
112
114
116
118
120
122
124
126
128
130
132
134
136
138
140
142
144
146
148
150
152
154
156
162
164
166
180
System Controller
to/from Base Stations

Fig. 1

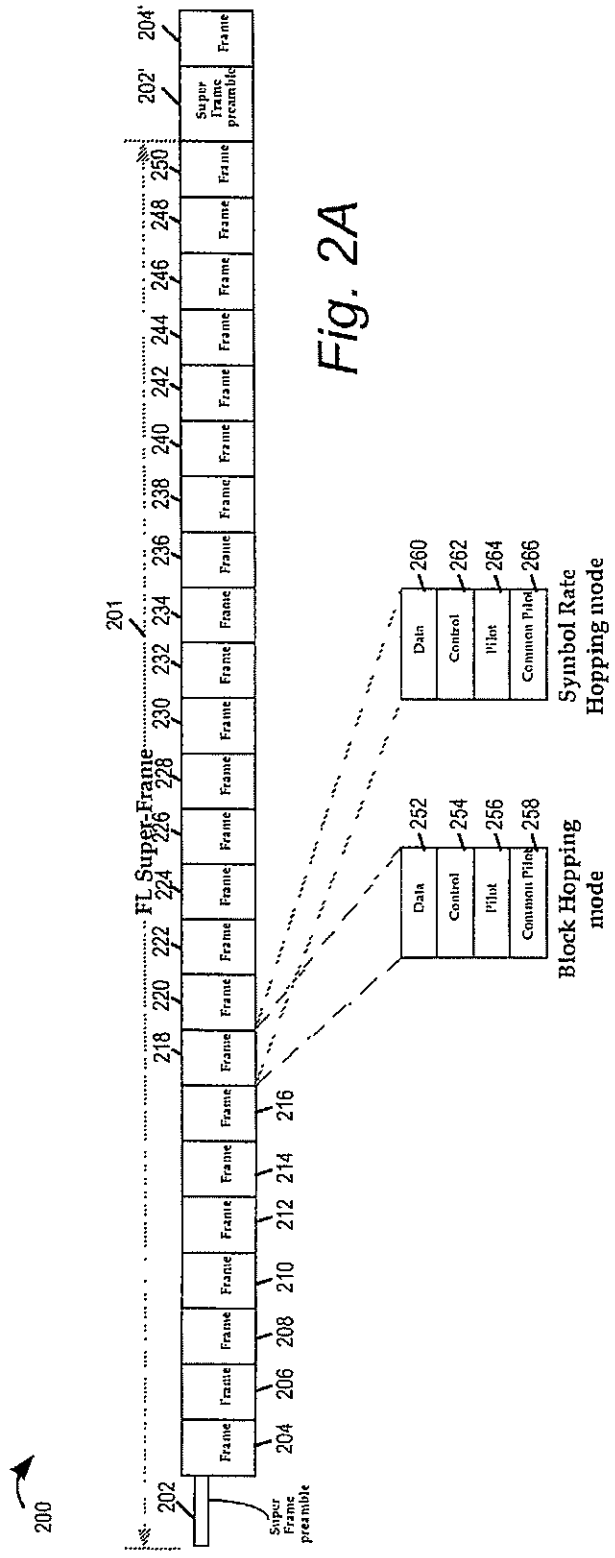

200
202
Super Frame preamble
Frame
204
206
208
210
212
214
216
218
220
222
224
226
228
230
232
234
236
238
240
242
244
246
248
250
202'
Super Frame preamble
204'
FL Super-Frame
201
Data
Control
Pilot
Common Pilot
252
254
256
258
Block Hopping mode
260
262
264
266
Symbol Rate Hopping mode

Fig. 2A

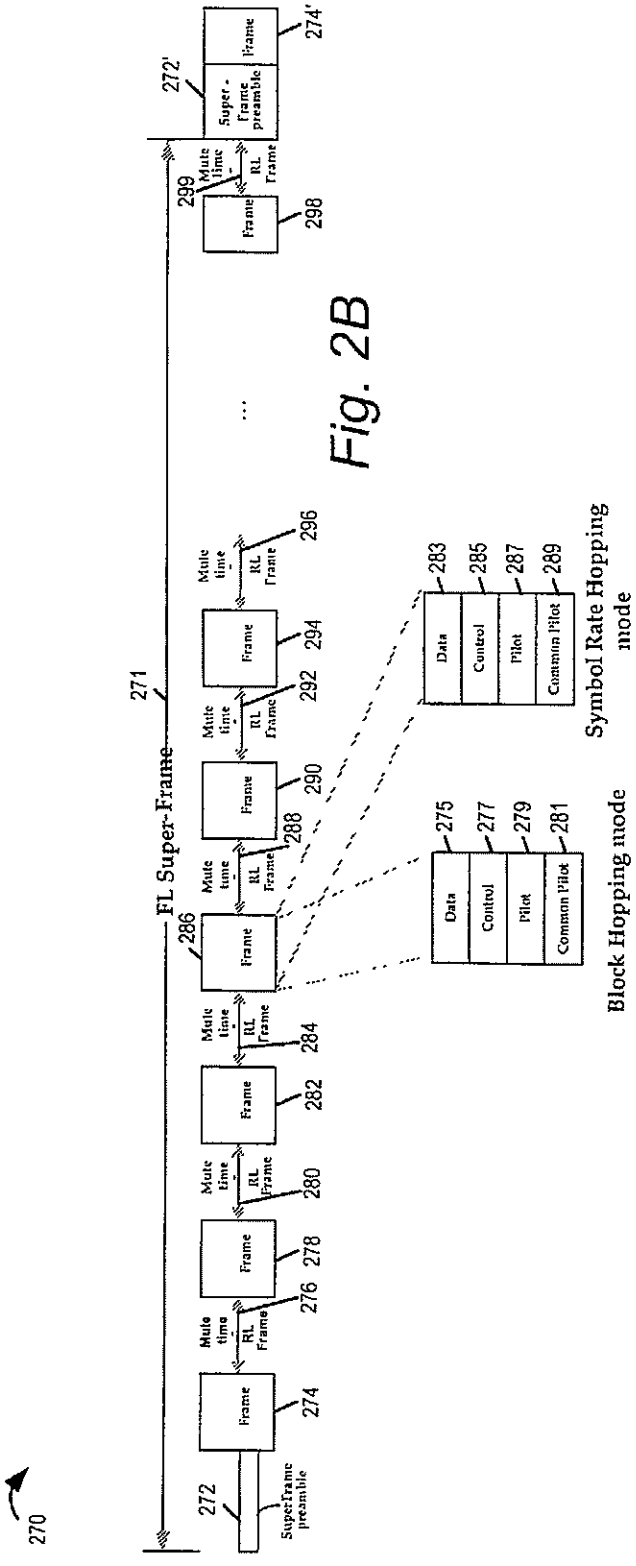
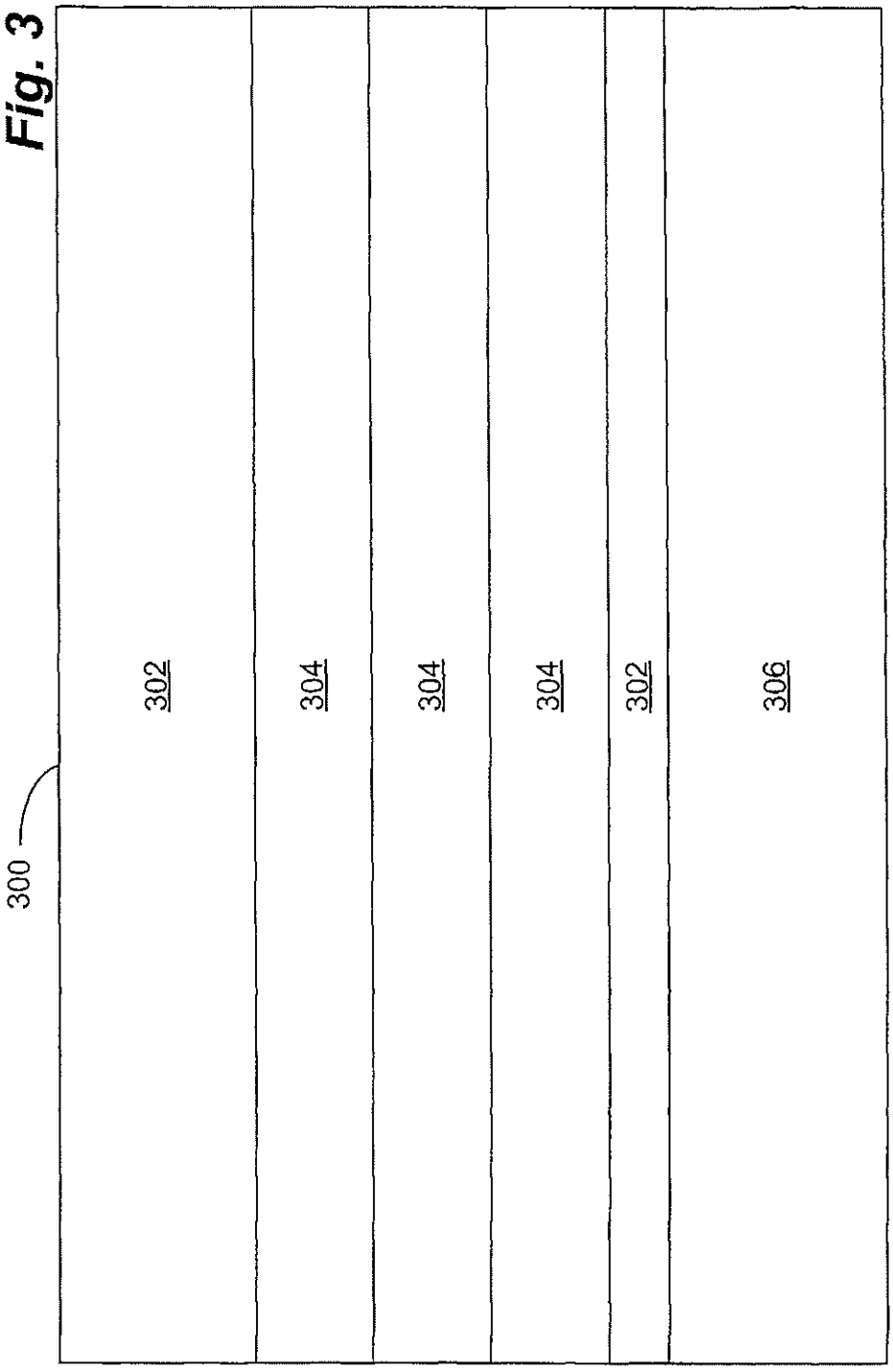

270
272
SuperFrame preamble
274
Frame
Mute time
RL Frame
276
278
280
282
284
286
288
290
292
294
296
298
299
272'
Super-Frame preamble
274'
FL Super-Frame
271
Data
Control
Pilot
Common Pilot
283
285
287
289
275
277
279
281
Symbol Rate Hopping mode
Block Hopping mode

Fig. 2B

Fig. 3



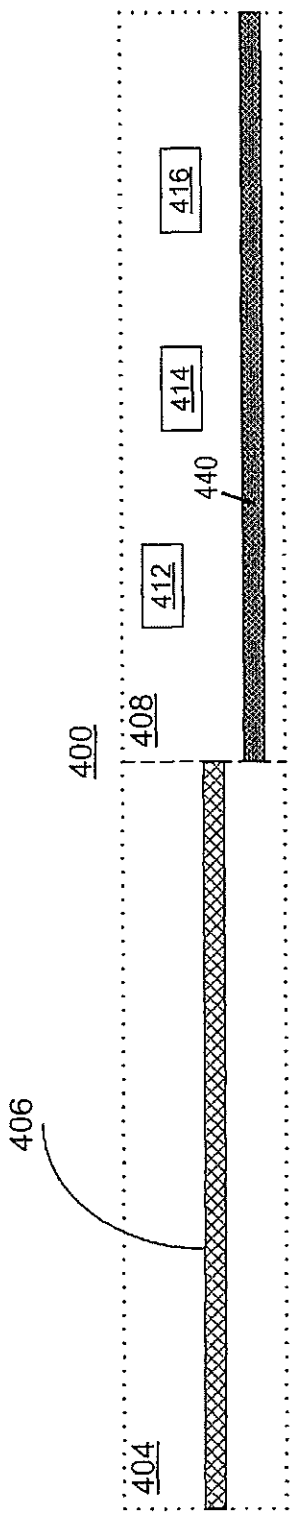


Fig. 4

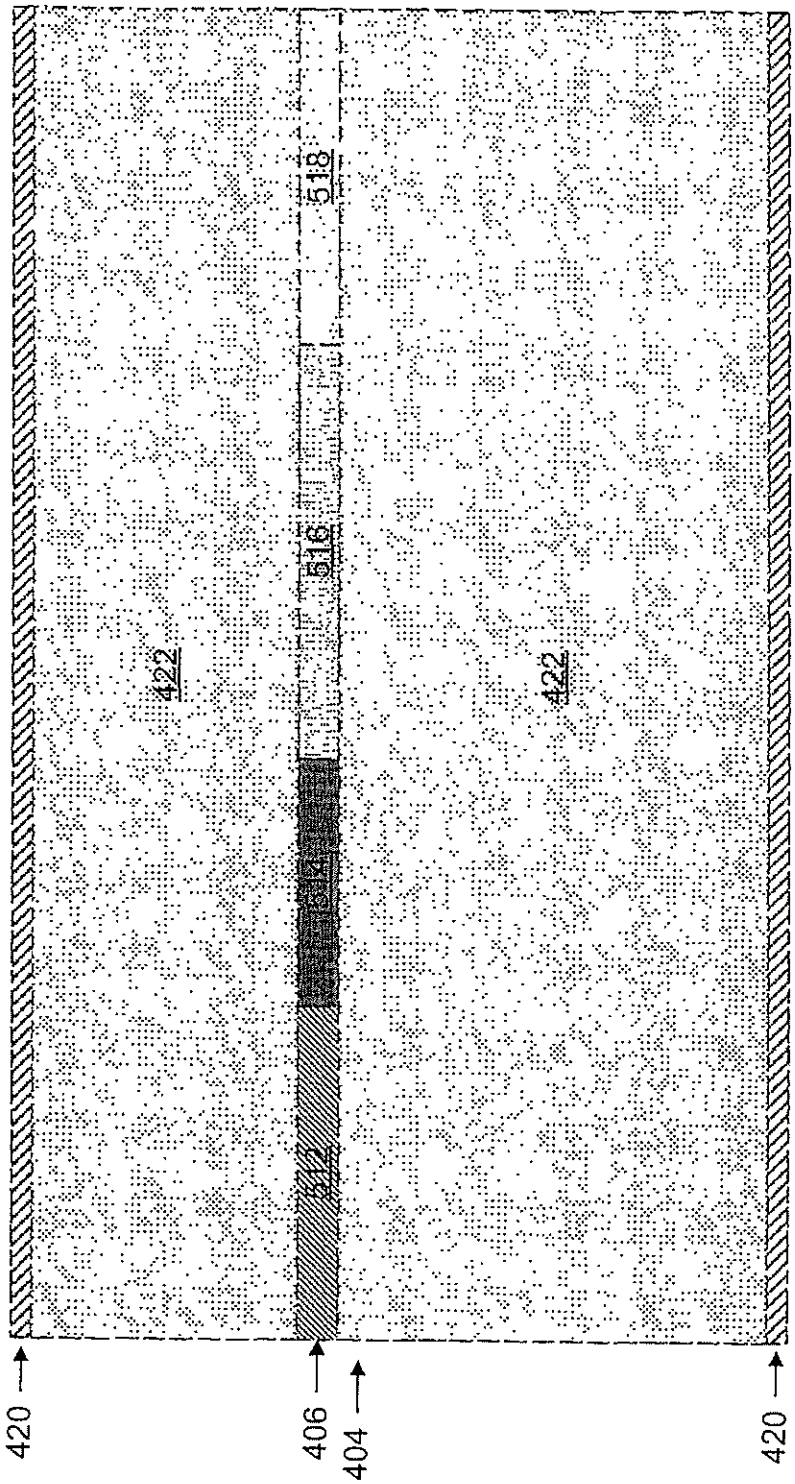


Fig. 5A

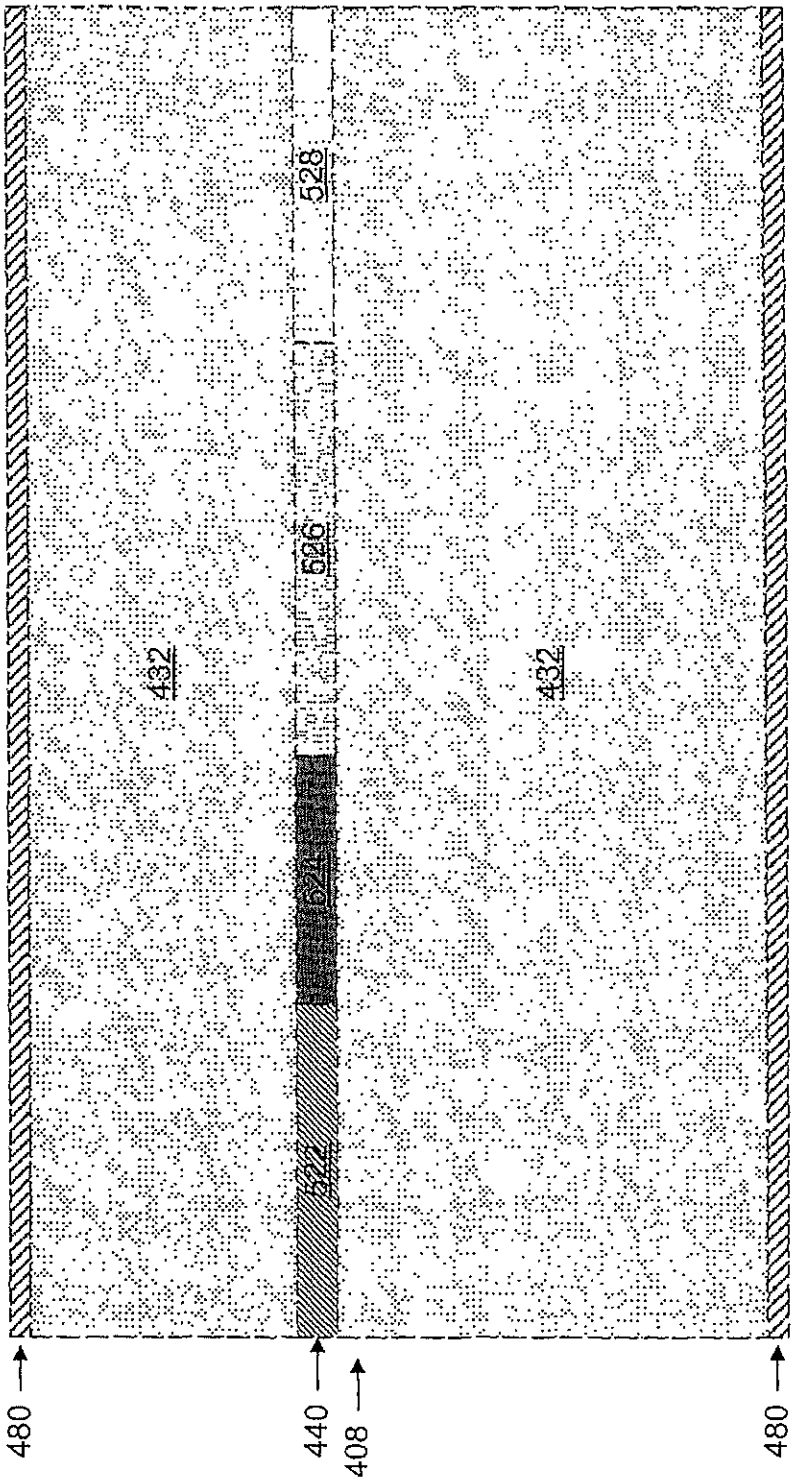


Fig. 5B

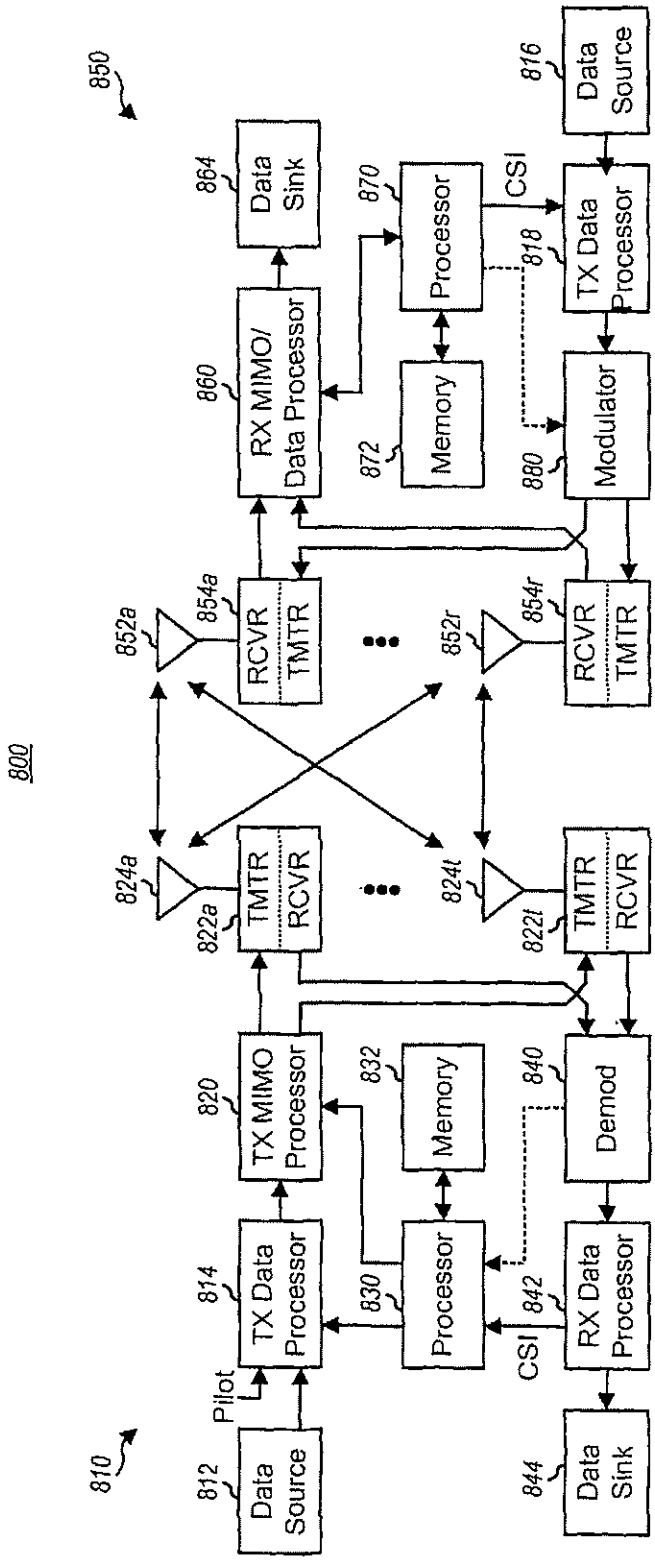

800
810
850
812
Data Source
Pilot
814
TX Data Processor
820
TX MIMO Processor
822a
TMTR
RCVR
824a
824t
822t
TMTR
RCVR
830
Processor
832
Memory
840
Demod
842
CSI
RX Data Processor
844
Data Sink
852a
852r
854a
RCVR
TMTR
854r
RCVR
TMTR
860
RX MIMO/ Data Processor
864
Data Sink
870
Processor
872
Memory
880
Modulator
CSI
818
TX Data Processor
816
Data Source

Fig. 6

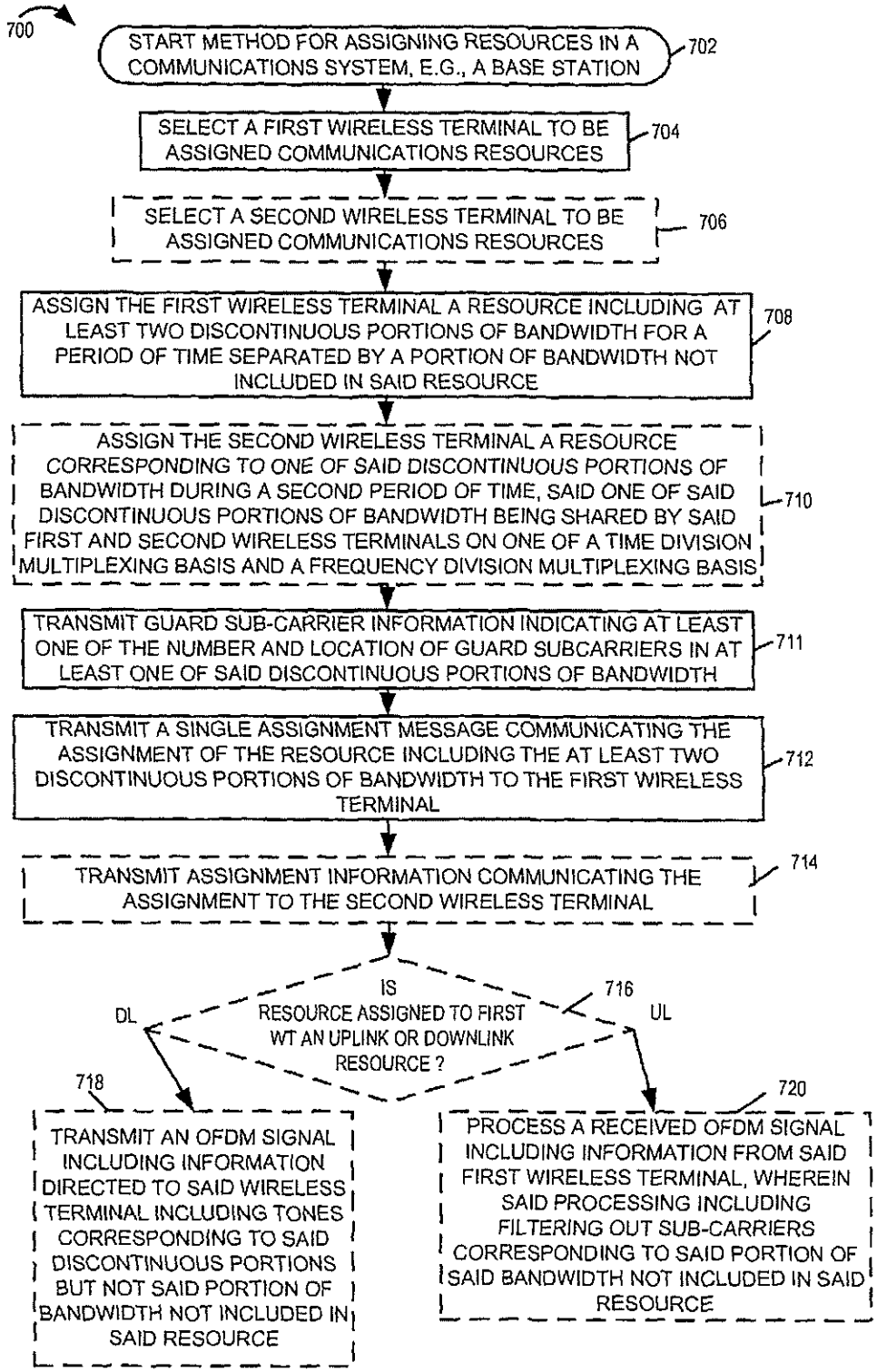

700
START METHOD FOR ASSIGNING RESOURCES IN A COMMUNICATIONS SYSTEM, E.G., A BASE STATION
702
SELECT A FIRST WIRELESS TERMINAL TO BE ASSIGNED COMMUNICATIONS RESOURCES
704
SELECT A SECOND WIRELESS TERMINAL TO BE ASSIGNED COMMUNICATIONS RESOURCES
706
ASSIGN THE FIRST WIRELESS TERMINAL A RESOURCE INCLUDING AT LEAST TWO DISCONTINUOUS PORTIONS OF BANDWIDTH FOR A PERIOD OF TIME SEPARATED BY A PORTION OF BANDWIDTH NOT INCLUDED IN SAID RESOURCE
708
ASSIGN THE SECOND WIRELESS TERMINAL A RESOURCE CORRESPONDING TO ONE OF SAID DISCONTINUOUS PORTIONS OF BANDWIDTH DURING A SECOND PERIOD OF TIME, SAID ONE OF SAID DISCONTINUOUS PORTIONS OF BANDWIDTH BEING SHARED BY SAID FIRST AND SECOND WIRELESS TERMINALS ON ONE OF A TIME DIVISION MULTIPLEXING BASIS AND A FREQUENCY DIVISION MULTIPLEXING BASIS
710
TRANSMIT GUARD SUB-CARRIER INFORMATION INDICATING AT LEAST ONE OF THE NUMBER AND LOCATION OF GUARD SUBCARRIERS IN AT LEAST ONE OF SAID DISCONTINUOUS PORTIONS OF BANDWIDTH
711
TRANSMIT A SINGLE ASSIGNMENT MESSAGE COMMUNICATING THE ASSIGNMENT OF THE RESOURCE INCLUDING THE AT LEAST TWO DISCONTINUOUS PORTIONS OF BANDWIDTH TO THE FIRST WIRELESS TERMINAL
712
TRANSMIT ASSIGNMENT INFORMATION COMMUNICATING THE ASSIGNMENT TO THE SECOND WIRELESS TERMINAL
714
IS RESOURCE ASSIGNED TO FIRST WT AN UPLINK OR DOWNLINK RESOURCE ?
716
DL
UL
718
TRANSMIT AN OFDM SIGNAL INCLUDING INFORMATION DIRECTED TO SAID WIRELESS TERMINAL INCLUDING TONES CORRESPONDING TO SAID DISCONTINUOUS PORTIONS BUT NOT SAID PORTION OF BANDWIDTH NOT INCLUDED IN SAID RESOURCE
720
PROCESS A RECEIVED OFDM SIGNAL INCLUDING INFORMATION FROM SAID FIRST WIRELESS TERMINAL, WHEREIN SAID PROCESSING INCLUDING FILTERING OUT SUB-CARRIERS CORRESPONDING TO SAID PORTION OF SAID BANDWIDTH NOT INCLUDED IN SAID RESOURCE

FIGURE 7

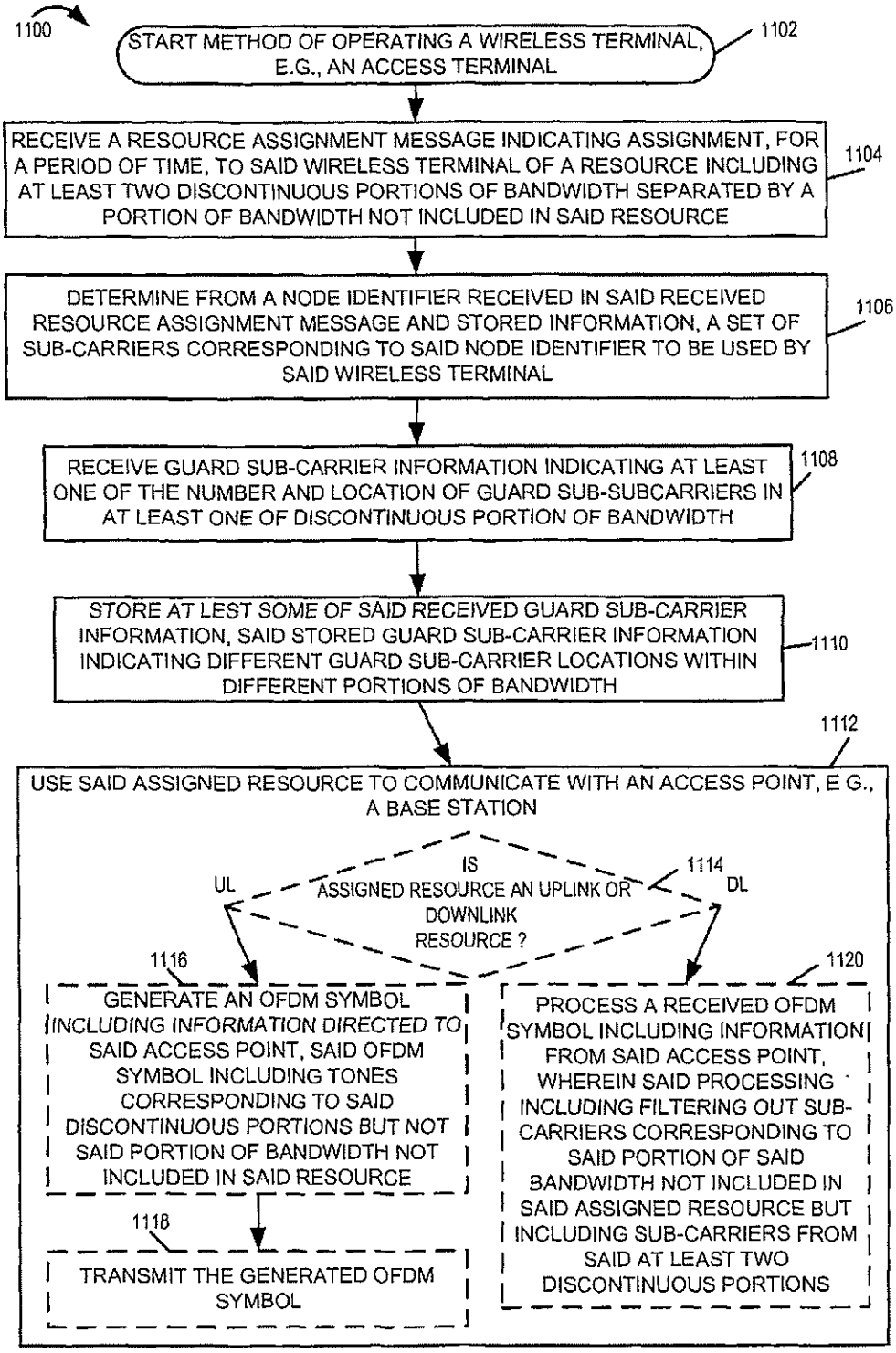

1100
START METHOD OF OPERATING A WIRELESS TERMINAL, E.G., AN ACCESS TERMINAL
1102
RECEIVE A RESOURCE ASSIGNMENT MESSAGE INDICATING ASSIGNMENT, FOR A PERIOD OF TIME, TO SAID WIRELESS TERMINAL OF A RESOURCE INCLUDING AT LEAST TWO DISCONTINUOUS PORTIONS OF BANDWIDTH SEPARATED BY A PORTION OF BANDWIDTH NOT INCLUDED IN SAID RESOURCE
1104
DETERMINE FROM A NODE IDENTIFIER RECEIVED IN SAID RECEIVED RESOURCE ASSIGNMENT MESSAGE AND STORED INFORMATION, A SET OF SUB-CARRIERS CORRESPONDING TO SAID NODE IDENTIFIER TO BE USED BY SAID WIRELESS TERMINAL
1106
RECEIVE GUARD SUB-CARRIER INFORMATION INDICATING AT LEAST ONE OF THE NUMBER AND LOCATION OF GUARD SUB-SUBCARRIERS IN AT LEAST ONE OF DISCONTINUOUS PORTION OF BANDWIDTH
1108
STORE AT LEST SOME OF SAID RECEIVED GUARD SUB-CARRIER INFORMATION, SAID STORED GUARD SUB-CARRIER INFORMATION INDICATING DIFFERENT GUARD SUB-CARRIER LOCATIONS WITHIN DIFFERENT PORTIONS OF BANDWIDTH
1110
1112
USE SAID ASSIGNED RESOURCE TO COMMUNICATE WITH AN ACCESS POINT, E G., A BASE STATION
IS ASSIGNED RESOURCE AN UPLINK OR DOWNLINK RESOURCE ?
1114
UL
DL
1116
GENERATE AN OFDM SYMBOL INCLUDING INFORMATION DIRECTED TO SAID ACCESS POINT, SAID OFDM SYMBOL INCLUDING TONES CORRESPONDING TO SAID DISCONTINUOUS PORTIONS BUT NOT SAID PORTION OF BANDWIDTH NOT INCLUDED IN SAID RESOURCE
1118
TRANSMIT THE GENERATED OFDM SYMBOL
1120
PROCESS A RECEIVED OFDM SYMBOL INCLUDING INFORMATION FROM SAID ACCESS POINT, WHEREIN SAID PROCESSING INCLUDING FILTERING OUT SUB-CARRIERS CORRESPONDING TO SAID PORTION OF SAID BANDWIDTH NOT INCLUDED IN SAID ASSIGNED RESOURCE BUT INCLUDING SUB-CARRIERS FROM SAID AT LEAST TWO DISCONTINUOUS PORTIONS

FIGURE 8

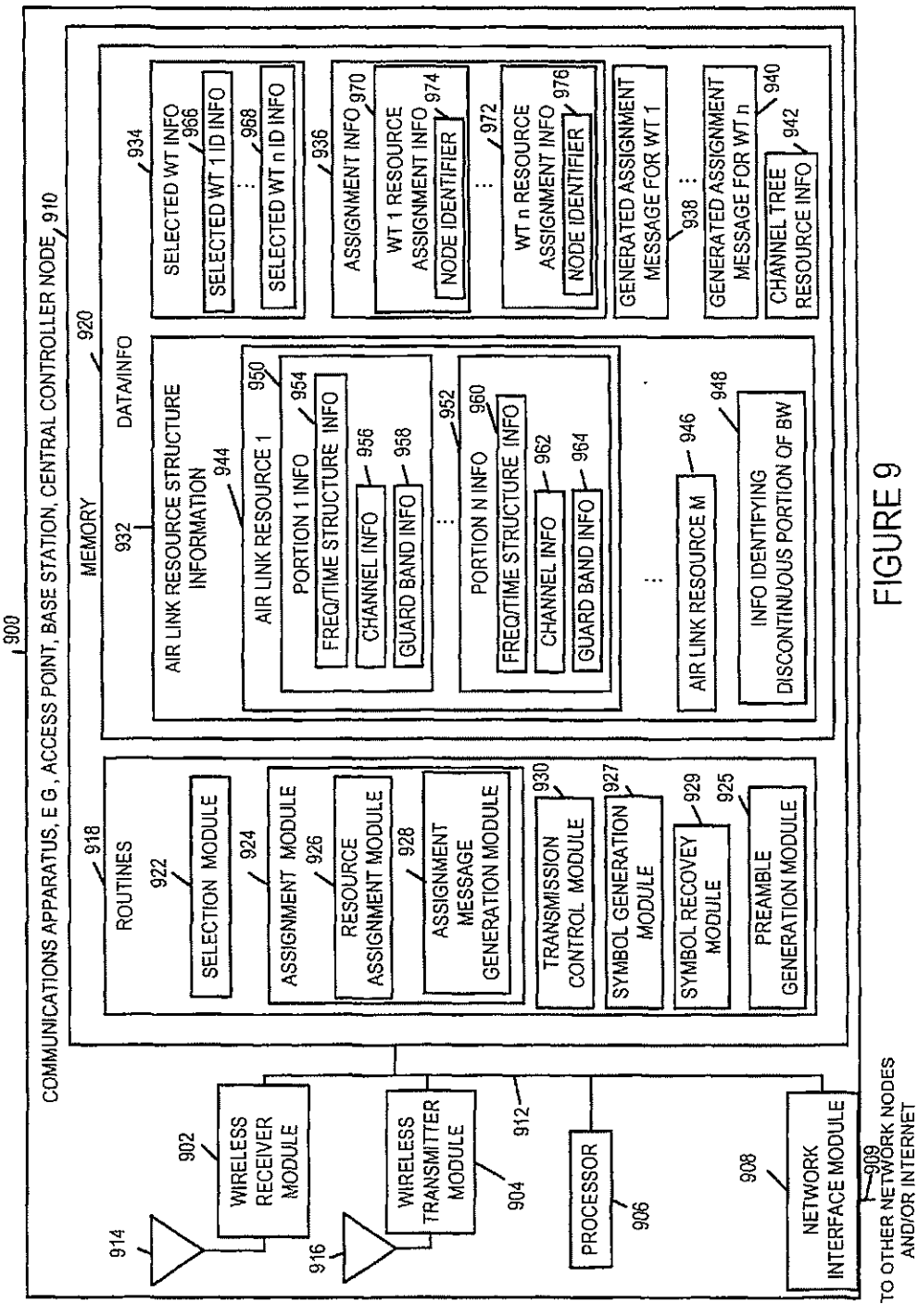

900
COMMUNICATIONS APPARATUS, E G, ACCESS POINT, BASE STATION, CENTRAL CONTROLLER NODE 910
MEMORY 920
ROUTINES 918
SELECTION MODULE 922
ASSIGNMENT MODULE 924
RESOURCE ASSIGNMENT MODULE 926
ASSIGNMENT MESSAGE GENERATION MODULE 928
TRANSMISSION CONTROL MODULE 930
SYMBOL GENERATION MODULE 927
SYMBOL RECOVEY MODULE 929
PREAMBLE GENERATION MODULE 925
DATA/INFO 932
AIR LINK RESOURCE STRUCTURE INFORMATION 944
AIR LINK RESOURCE 1 950
PORTION 1 INFO 954
FREQ/TIME STRUCTURE INFO 956
CHANNEL INFO 958
GUARD BAND INFO 952
PORTION N INFO 960
FREQ/TIME STRUCTURE INFO 962
CHANNEL INFO 964
GUARD BAND INFO
AIR LINK RESOURCE M 946
INFO IDENTIFYING DISCONTINUOUS PORTION OF BW 948
SELECTED WT INFO 934
SELECTED WT 1 ID INFO 966
SELECTED WT n ID INFO 968 936
ASSIGNMENT INFO 970
WT 1 RESOURCE ASSIGNMENT INFO 974
NODE IDENTIFIER
WT n RESOURCE ASSIGNMENT INFO 976 972
NODE IDENTIFIER
GENERATED ASSIGNMENT MESSAGE FOR WT 1 938
GENERATED ASSIGNMENT MESSAGE FOR WT n 940
CHANNEL TREE RESOURCE INFO 942
WIRELESS RECEIVER MODULE 902
WIRELESS TRANSMITTER MODULE 904
PROCESSOR 906
NETWORK INTERFACE MODULE 908
914
916
912
909
TO OTHER NETWORK NODES AND/OR INTERNET

FIGURE 9

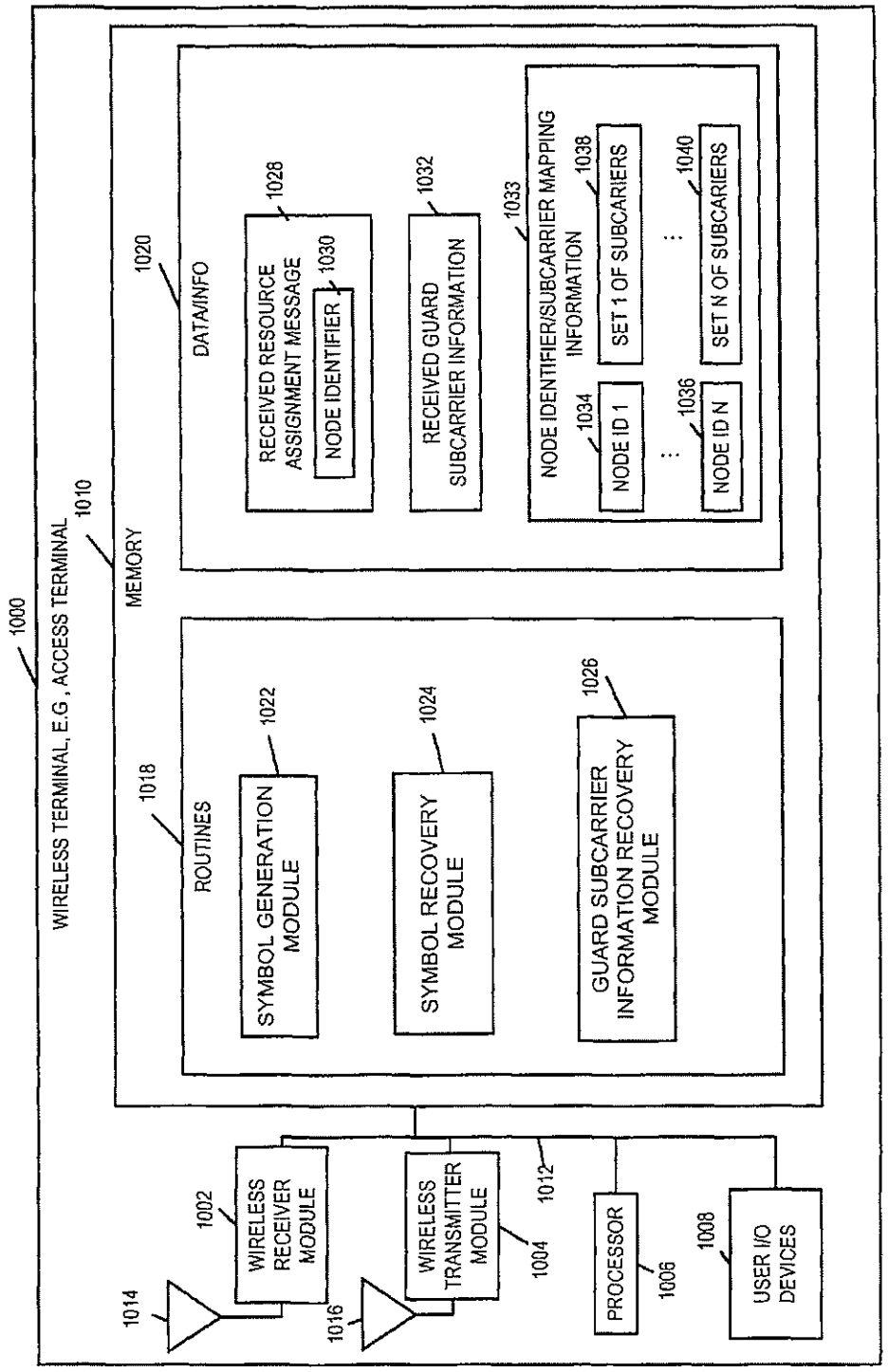

1000
WIRELESS TERMINAL, E.G., ACCESS TERMINAL
1010
MEMORY
1020
DATA/INFO
1028
RECEIVED RESOURCE ASSIGNMENT MESSAGE
1030
NODE IDENTIFIER
1032
RECEIVED GUARD SUBCARRIER INFORMATION
1033
NODE IDENTIFIER/SUBCARRIER MAPPING INFORMATION
1034
NODE ID 1
1036
NODE ID N
1038
SET 1 OF SUBCARIERS
1040
SET N OF SUBCARIERS
1018
ROUTINES
1022
SYMBOL GENERATION MODULE
1024
SYMBOL RECOVERY MODULE
1026
GUARD SUBCARRIER INFORMATION RECOVERY MODULE
1002
WIRELESS RECEIVER MODULE
1004
WIRELESS TRANSMITTER MODULE
1012
PROCESSOR
1006
1008
USER I/O DEVICES
1014
1016

FIGURE 10