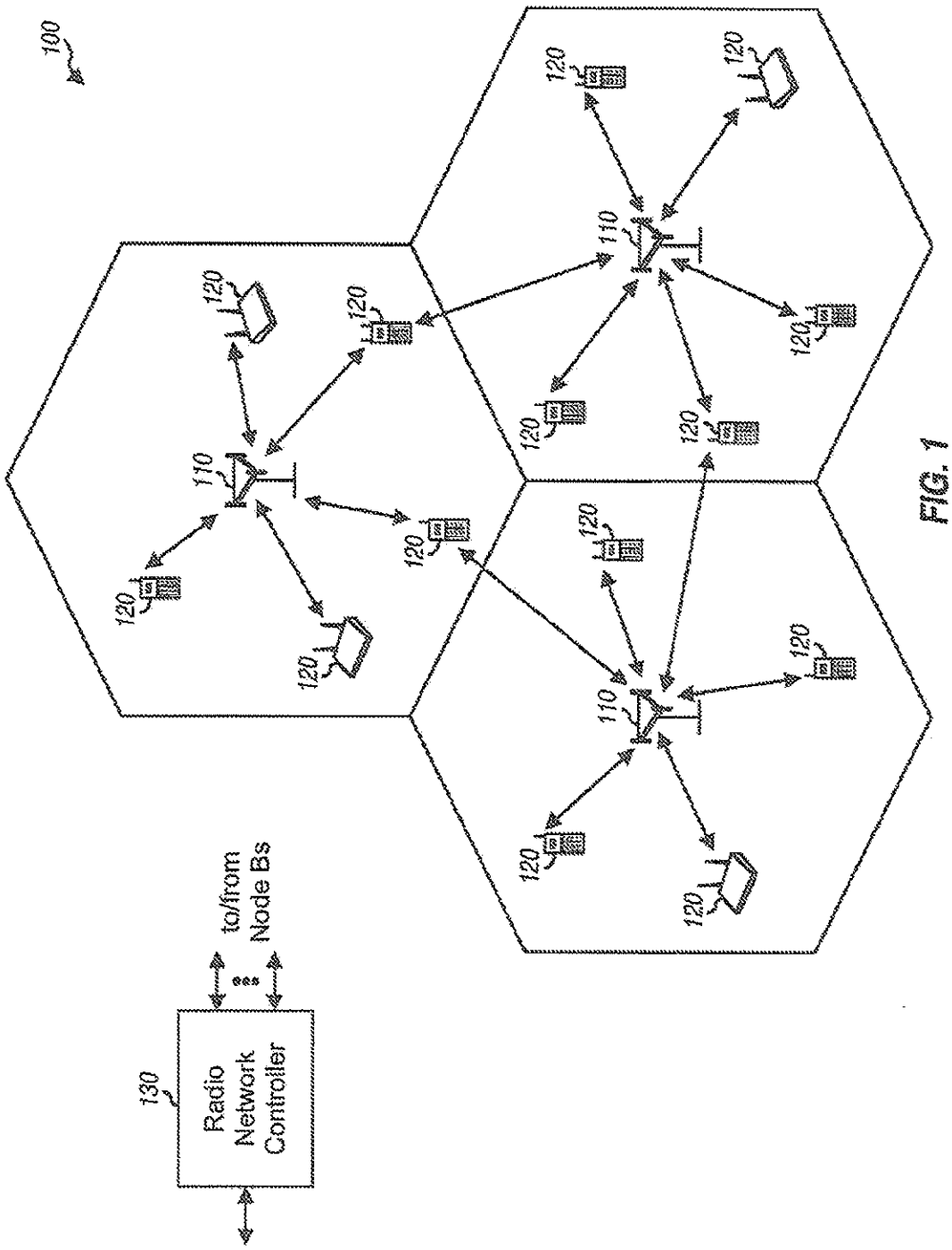

FIG. 1

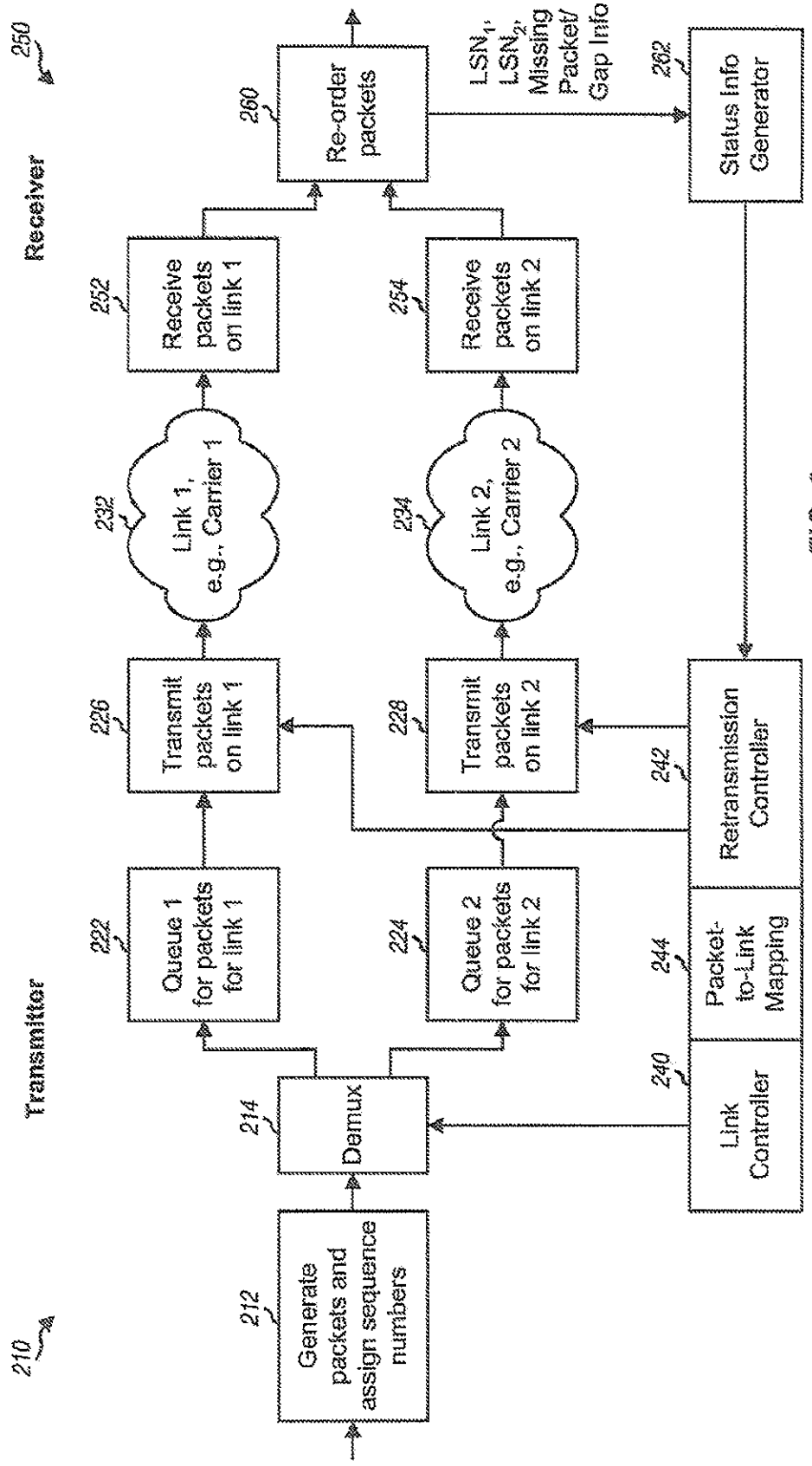
Transmitter
210
Receiver
250
212
Generate packets and assign sequence numbers
214
Demux
222
Queue 1 for packets for link 1
224
Queue 2 for packets for link 2
226
Transmit packets on link 1
228
Transmit packets on link 2
232
Link 1, e.g., Carrier 1
234
Link 2, e.g., Carrier 2
240
Link Controller
242
Retransmission Controller
244
Packet-to-Link Mapping
252
Receive packets on link 1
254
Receive packets on link 2
260
Re-order packets
262
Status Info Generator
LSN1, LSN2, Missing Packet/ Gap Info

FIG. 2

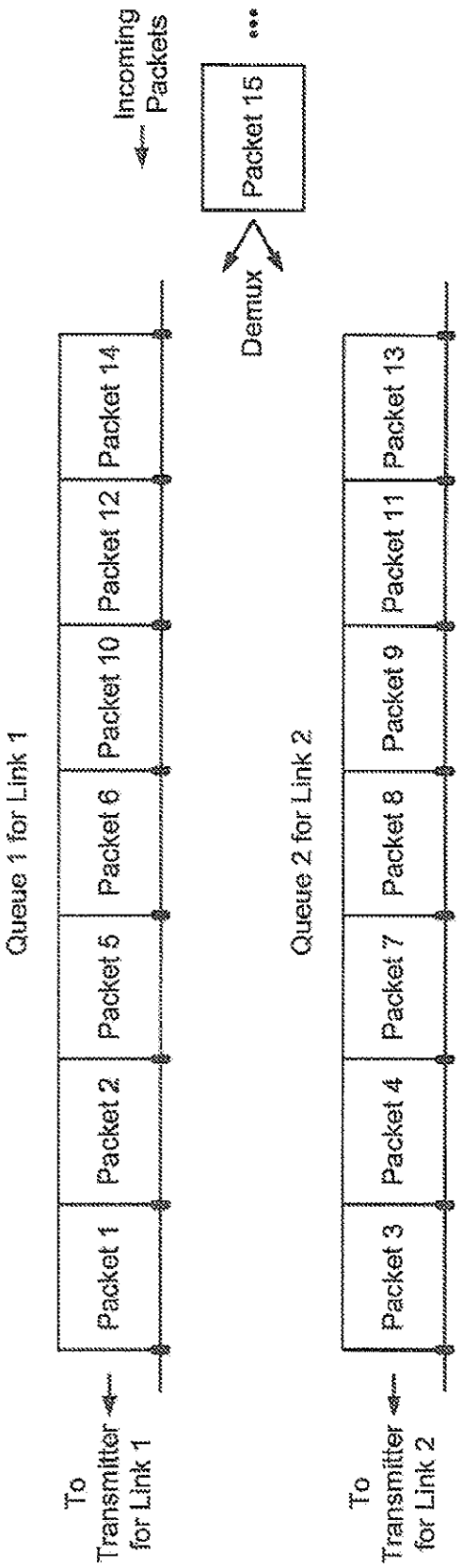
Incoming Packets
Packet 15
Demux
Queue 1 for Link 1
Packet 1
Packet 2
Packet 5
Packet 6
Packet 10
Packet 12
Packet 14
To Transmitter for Link 1
Queue 2 for Link 2
Packet 3
Packet 4
Packet 7
Packet 8
Packet 9
Packet 11
Packet 13
To Transmitter for Link 2

FIG. 3

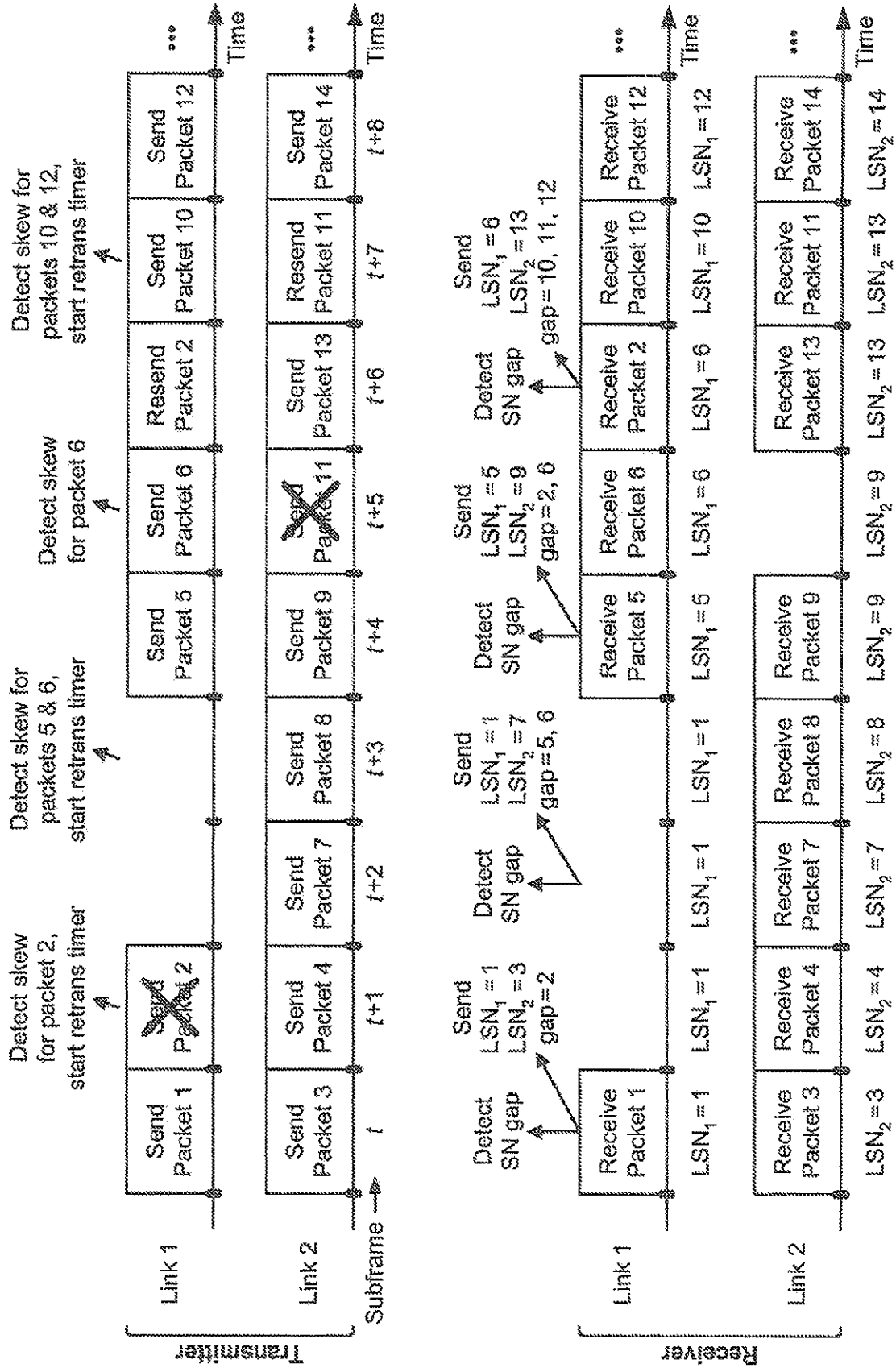
Transmitter
Link 1
Link 2
Send Packet 1
Send Packet 2
Send Packet 3
Send Packet 4
Send Packet 5
Send Packet 6
Send Packet 7
Send Packet 8
Send Packet 9
Send Packet 10
Send Packet 11
Send Packet 12
Send Packet 13
Send Packet 14
Resend Packet 2
Resend Packet 11
Detect skew for packet 2, start retrans timer
Detect skew for packets 5 & 6, start retrans timer
Detect skew for packet 6
Detect skew for packets 10 & 12, start retrans timer
Subframe
t
t+1
t+2
t+3
t+4
t+5
t+6
t+7
t+8
Time
Receiver
Receive Packet 1
Receive Packet 3
Receive Packet 4
Receive Packet 5
Receive Packet 6
Receive Packet 7
Receive Packet 8
Receive Packet 9
Receive Packet 10
Receive Packet 11
Receive Packet 12
Receive Packet 13
Receive Packet 14
Detect SN gap
Send LSN1 = 1 LSN2 = 3 gap = 2
Send LSN1 = 1 LSN2 = 7 gap = 5, 6
Send LSN1 = 5 LSN2 = 9 gap = 2, 6
Send LSN1 = 6 LSN2 = 13 gap = 10, 11, 12
LSN1 = 1
LSN2 = 3
LSN1 = 1
LSN2 = 4
LSN1 = 1
LSN2 = 7
LSN1 = 1
LSN2 = 8
LSN1 = 5
LSN2 = 9
LSN1 = 6
LSN2 = 9
LSN1 = 6
LSN2 = 13
LSN1 = 10
LSN2 = 13
LSN1 = 12
LSN2 = 14

FIG. 4

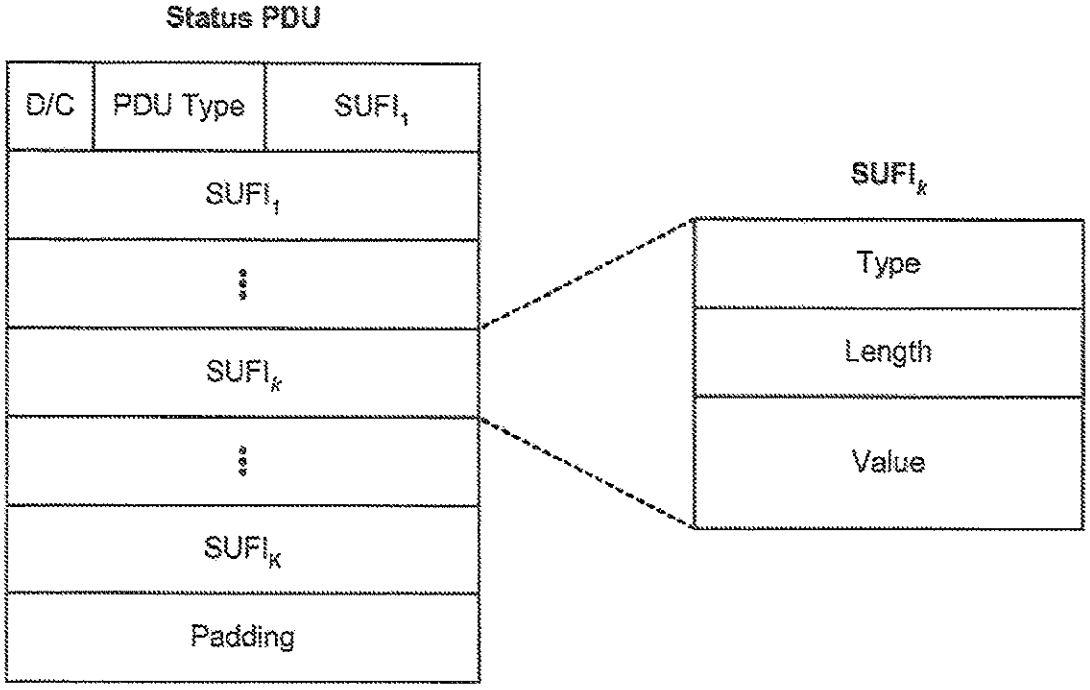

FIG. 5A

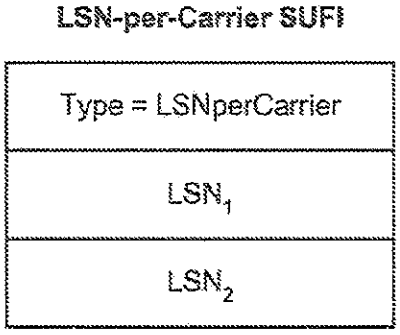

FIG. 5B

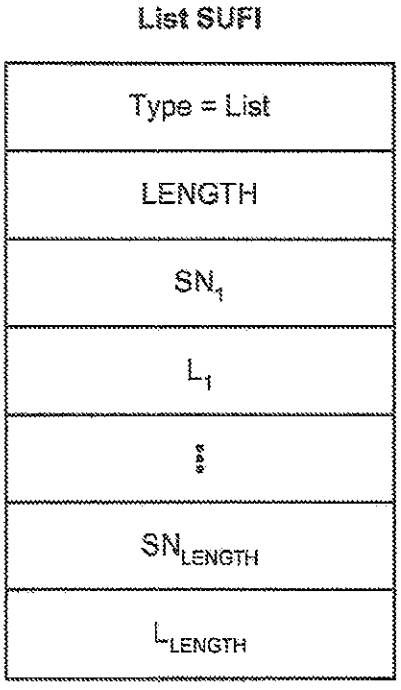

FIG. 5C

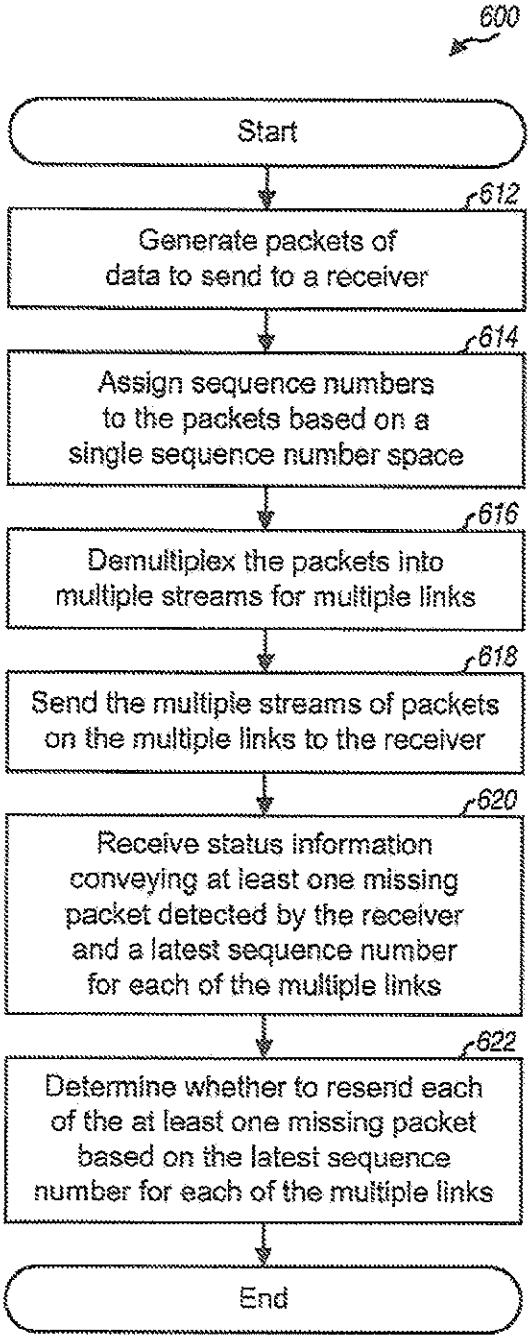
600
Start
612
Generate packets of data to send to a receiver
614
Assign sequence numbers to the packets based on a single sequence number space
616
Demultiplex the packets into multiple streams for multiple links
618
Send the multiple streams of packets on the multiple links to the receiver
620
Receive status information conveying at least one missing packet detected by the receiver and a latest sequence number for each of the multiple links
622
Determine whether to resend each of the at least one missing packet based on the latest sequence number for each of the multiple links
End

FIG. 6

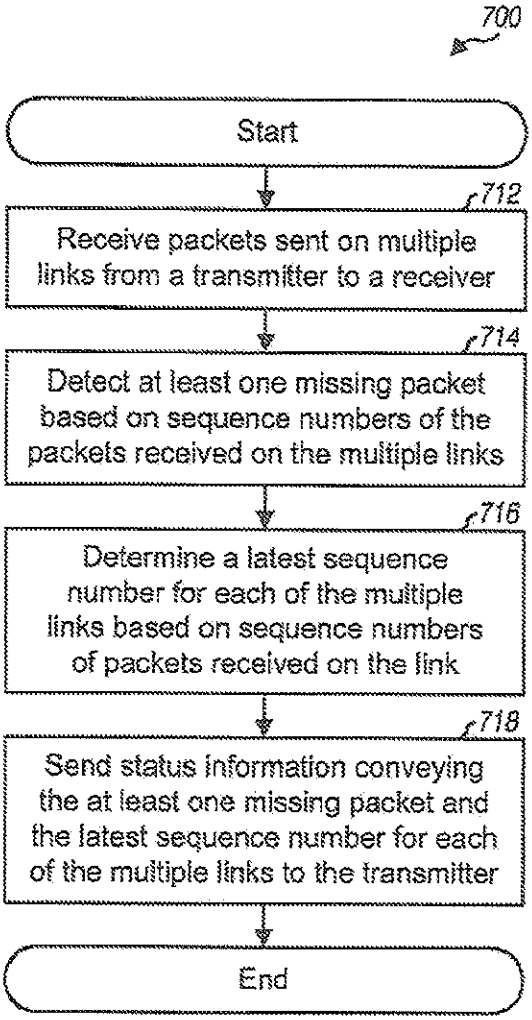
700
Start
712
Receive packets sent on multiple links from a transmitter to a receiver
714
Detect at least one missing packet based on sequence numbers of the packets received on the multiple links
716
Determine a latest sequence number for each of the multiple links based on sequence numbers of packets received on the link
718
Send status information conveying the at least one missing packet and the latest sequence number for each of the multiple links to the transmitter
End

FIG. 7

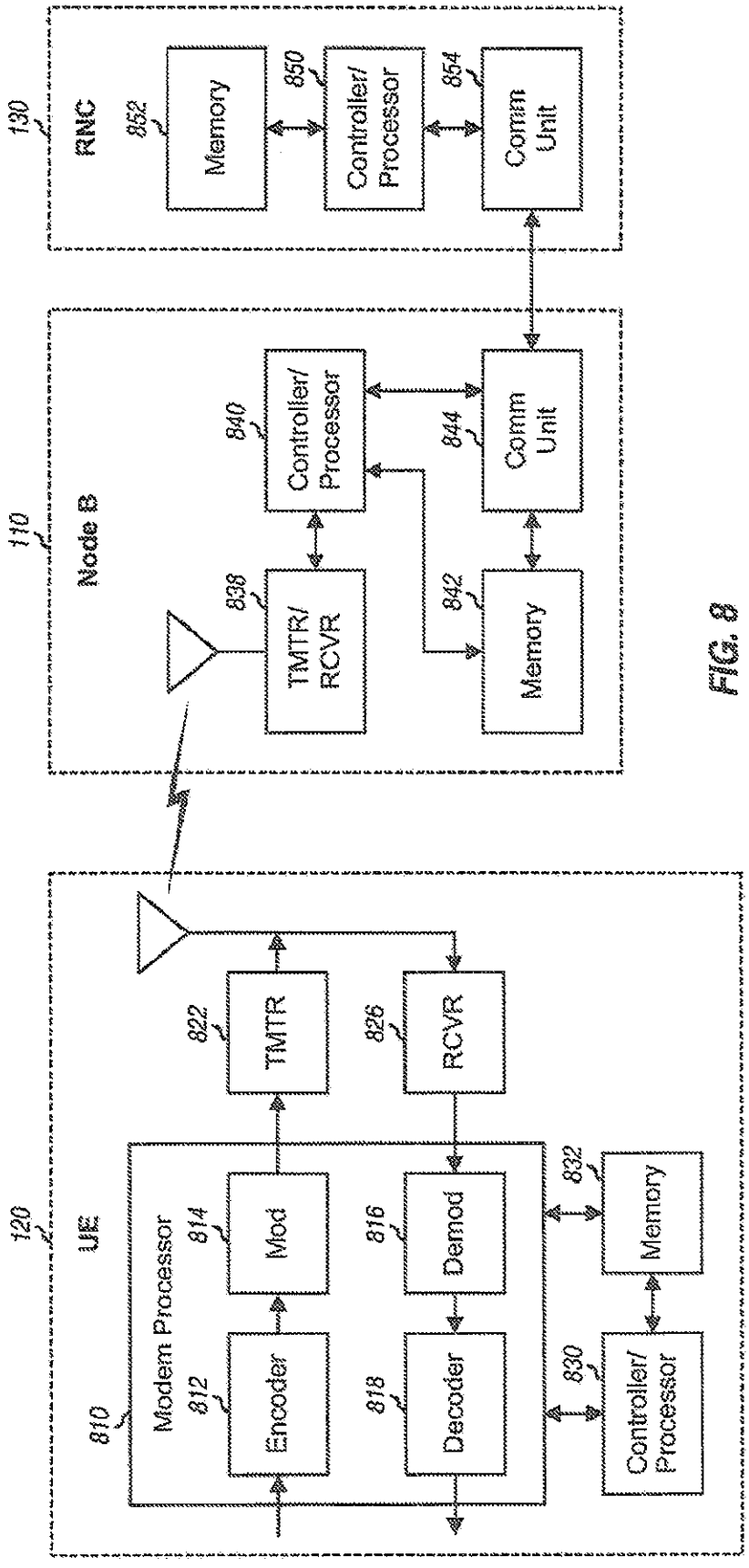
130
RNC
852
Memory
850
Controller/
Processor
854
Comm
Unit
110
Node B
840
Controller/
Processor
844
Comm
Unit
838
TMTR/
RCVR
842
Memory
120
UE
822
TMTR
826
RCVR
810
Modem Processor
812
Encoder
814
Mod
816
Demod
818
Decoder
832
Memory
830
Controller/
Processor

FIG. 8