

FIG. 8

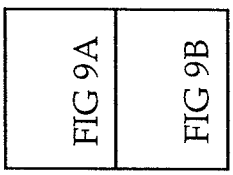


FIG. 9

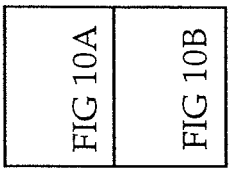


FIG. 10

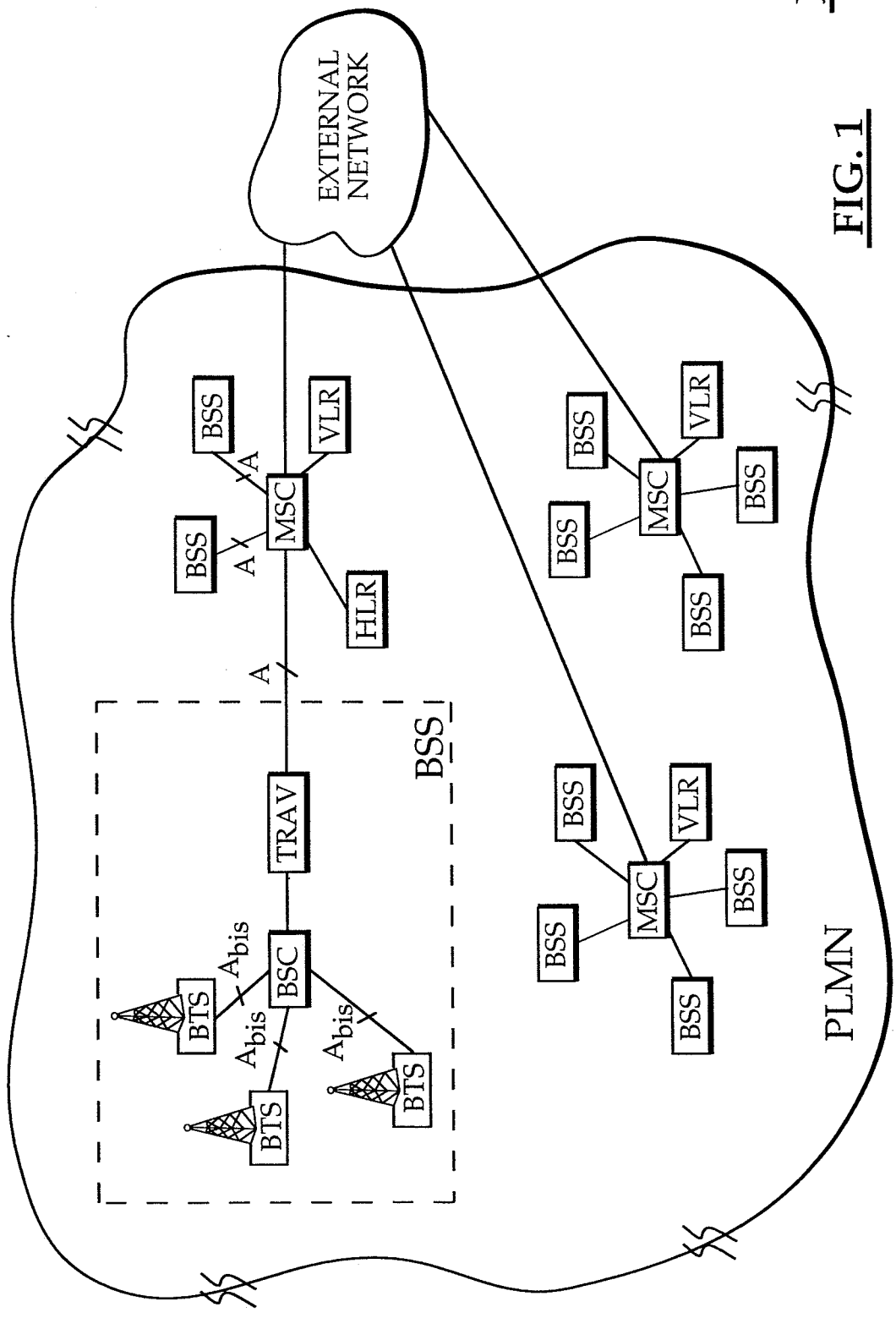


FIG. 1

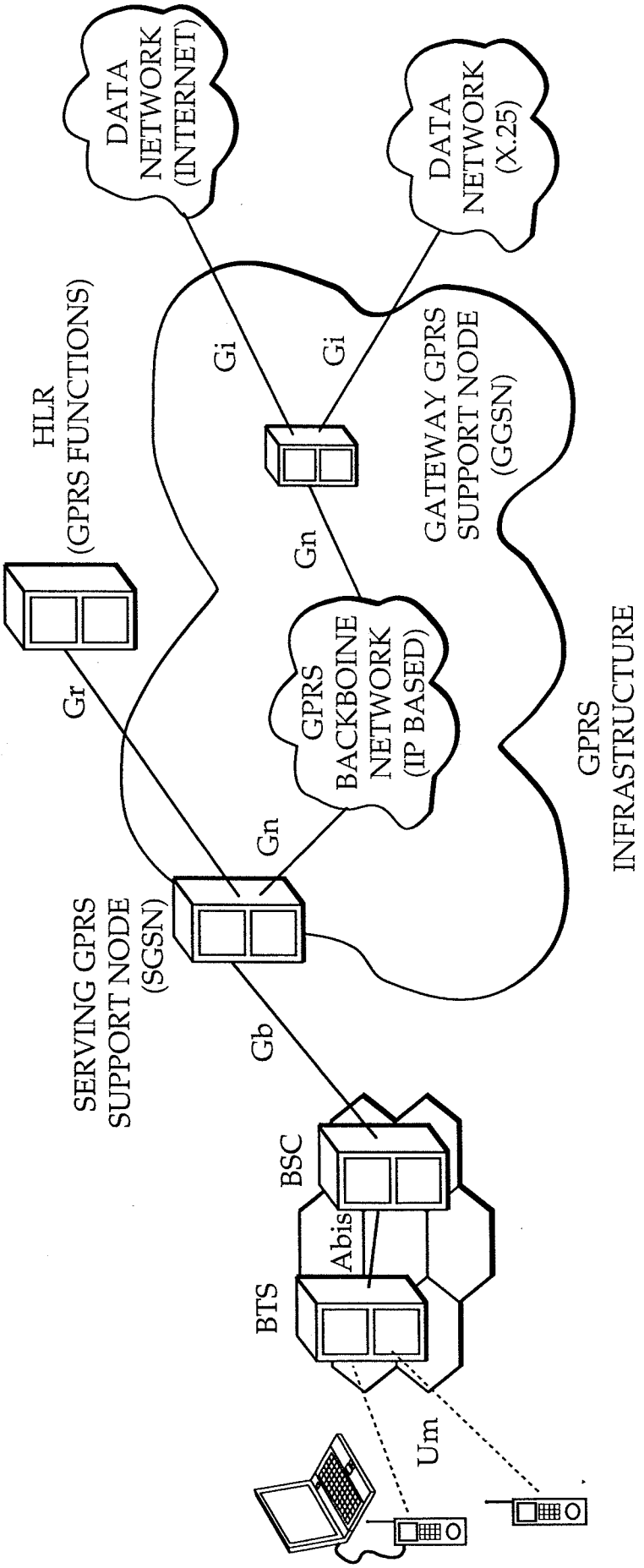

DATA NETWORK (INTERNET)
DATA NETWORK (X.25)
Gi
Gi
HLR (GPRS FUNCTIONS)
GATEWAY GPRS SUPPORT NODE (GGSN)
Gn
GPRS BACKBOINE NETWORK (IP BASED)
Gr
Gn
GPRS INFRASTRUCTURE
SERVING GPRS SUPPORT NODE (SGSN)
Gb
BSC
Abis
BTS
Um

FIG. 2

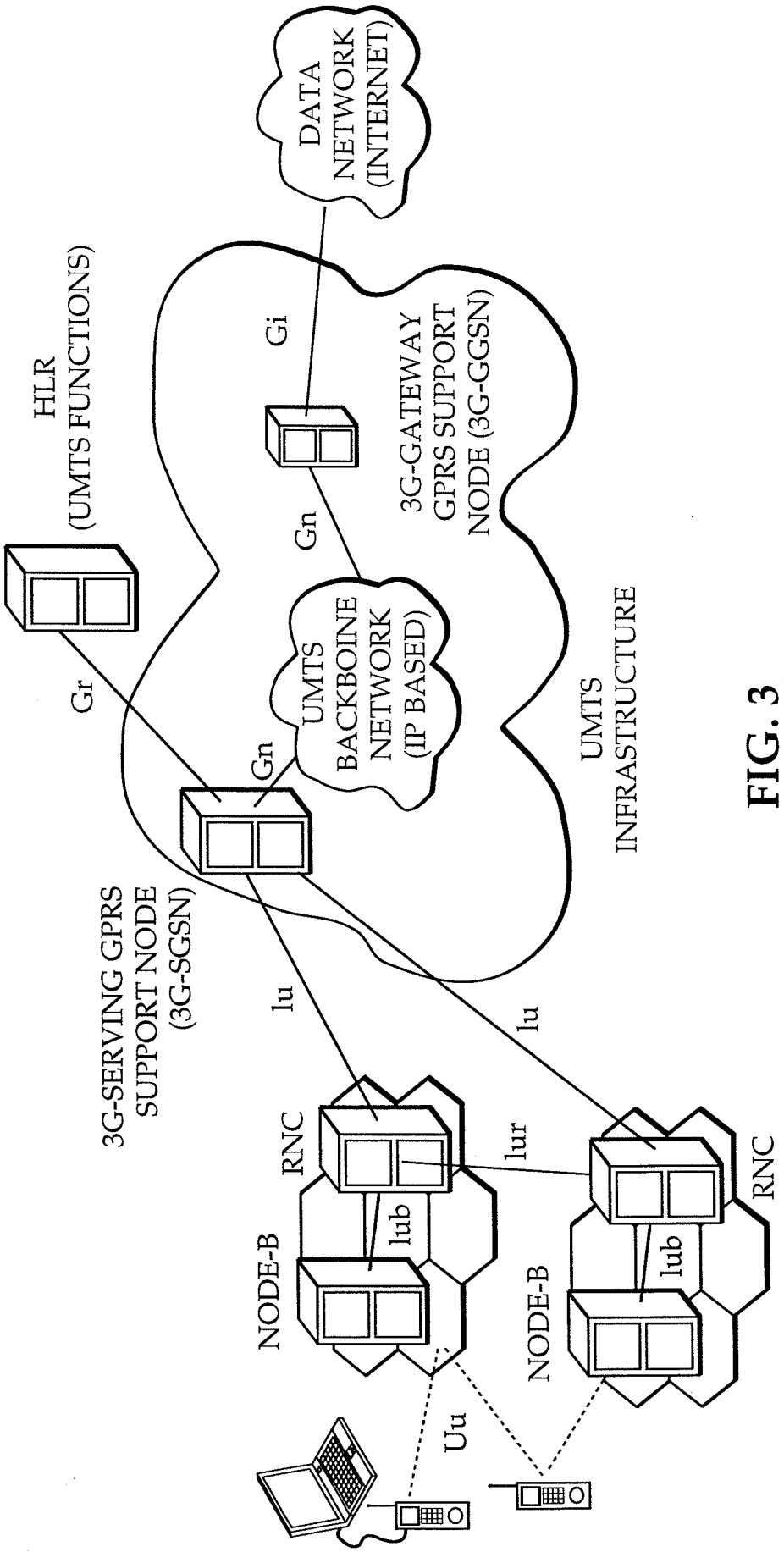

DATA NETWORK (INTERNET)
HLR (UMTS FUNCTIONS)
Gi
3G-GATEWAY GPRS SUPPORT NODE (3G-GGSN)
Gn
Gr
UMTS BACKBOINE NETWORK (IP BASED)
Gn
UMTS INFRASTRUCTURE
3G-SERVING GPRS SUPPORT NODE (3G-SGSN)
Iu
Iu
RNC
Iur
RNC
Iub
Iub
NODE-B
NODE-B
Uu

FIG. 3

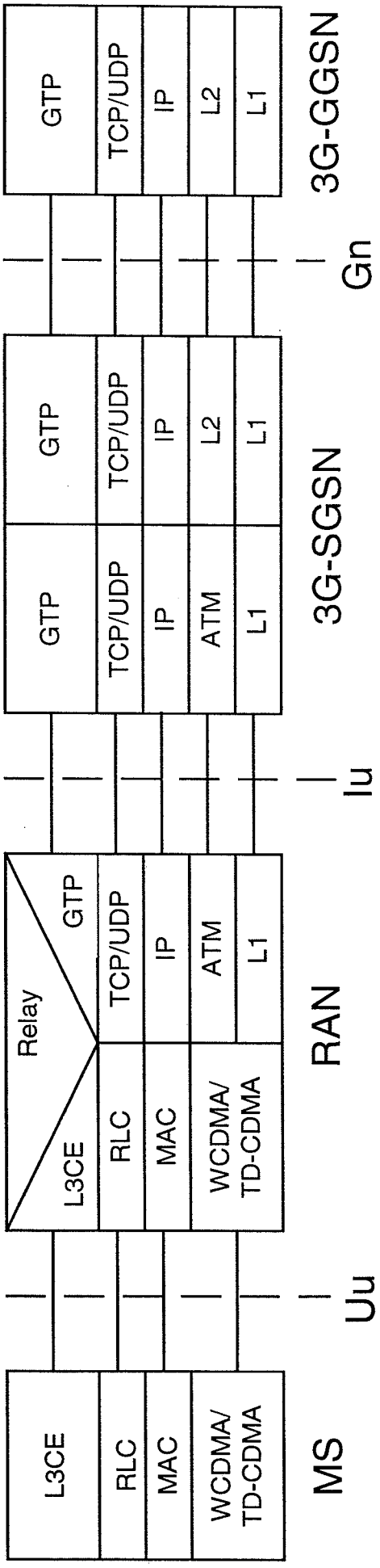

L3CE
RLC
MAC
WCDMA/
TD-CDMA
MS
Uu
Relay
L3CE
GTP
RLC
TCP/UDP
MAC
IP
WCDMA/
TD-CDMA
ATM
L1
RAN
Iu
GTP
TCP/UDP
IP
ATM
L1
GTP
TCP/UDP
IP
L2
L1
3G-SGSN
Gn
GTP
TCP/UDP
IP
L2
L1
3G-GGSN

FIG. 4

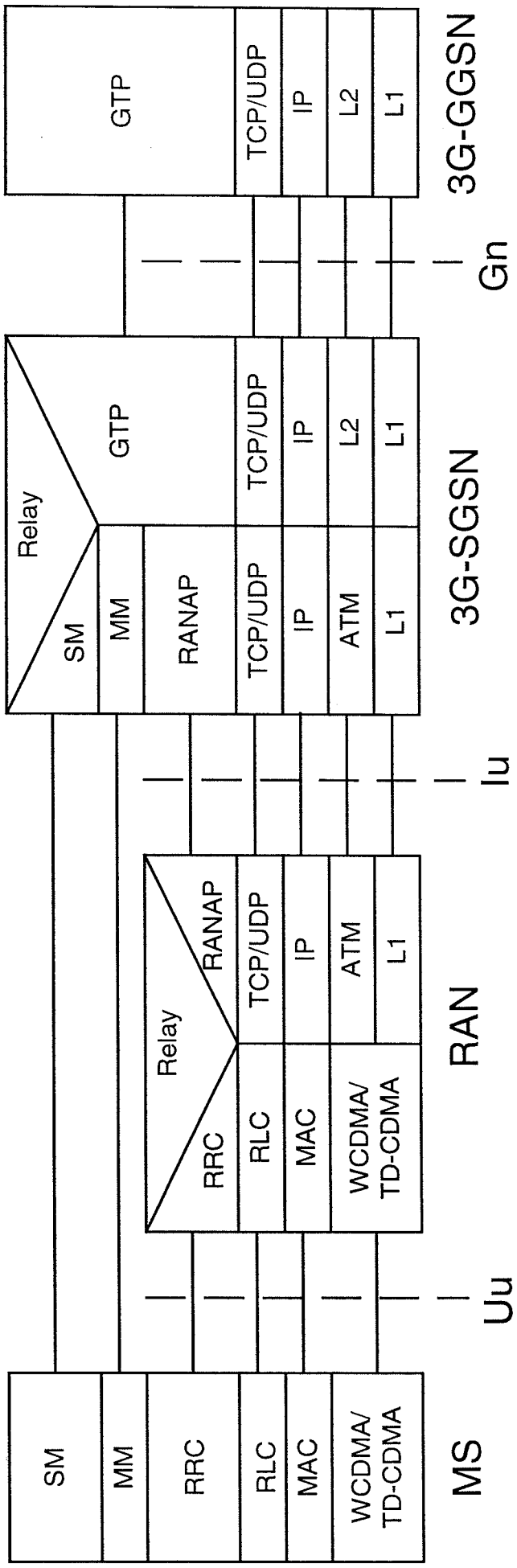

SM
MM
RRC
RLC
MAC
WCDMA/
TD-CDMA
MS
Uu
Relay
RRC
RANAP
RLC
TCP/UDP
MAC
IP
WCDMA/
TD-CDMA
ATM
L1
RAN
Iu
Relay
SM
MM
GTP
RANAP
TCP/UDP
IP
ATM
L1
3G-SGSN
Gn
GTP
TCP/UDP
IP
L2
L1
3G-GGSN

FIG. 5

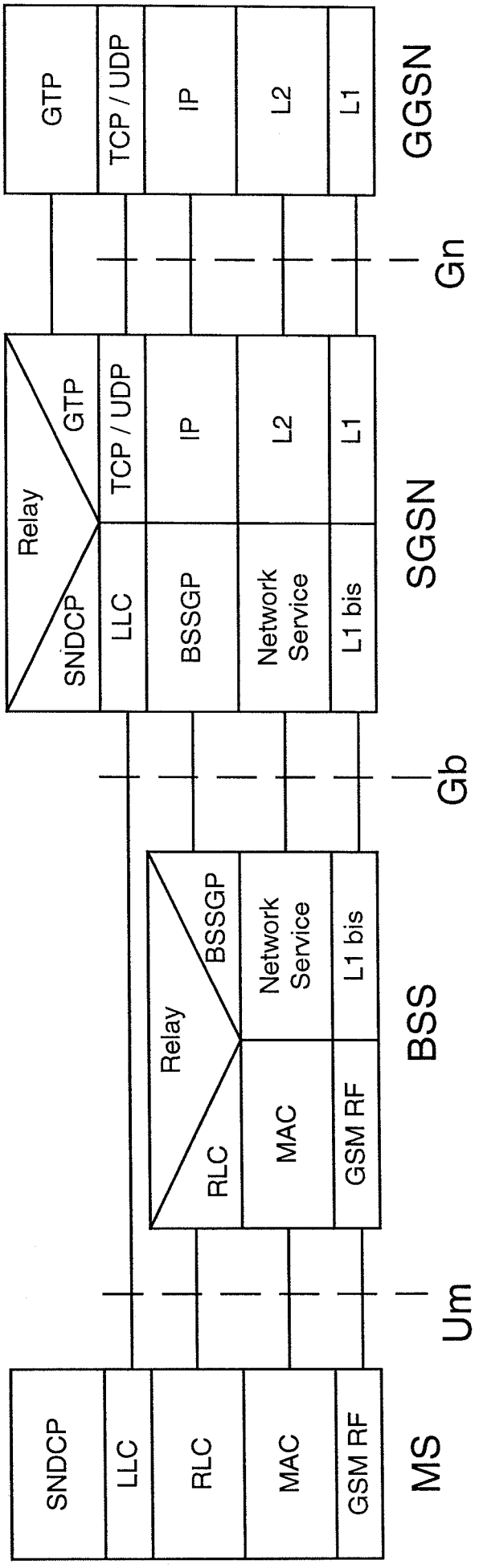

GTP
TCP / UDP
IP
L2
L1
GGSN
Gn
Relay
GTP
SNDCP
LLC
TCP / UDP
BSSGP
IP
Network Service
L2
L1 bis
L1
SGSN
Gb
Relay
BSSGP
RLC
MAC
Network Service
L1 bis
GSM RF
BSS
Um
SNDCP
LLC
RLC
MAC
GSM RF
MS

FIG. 6

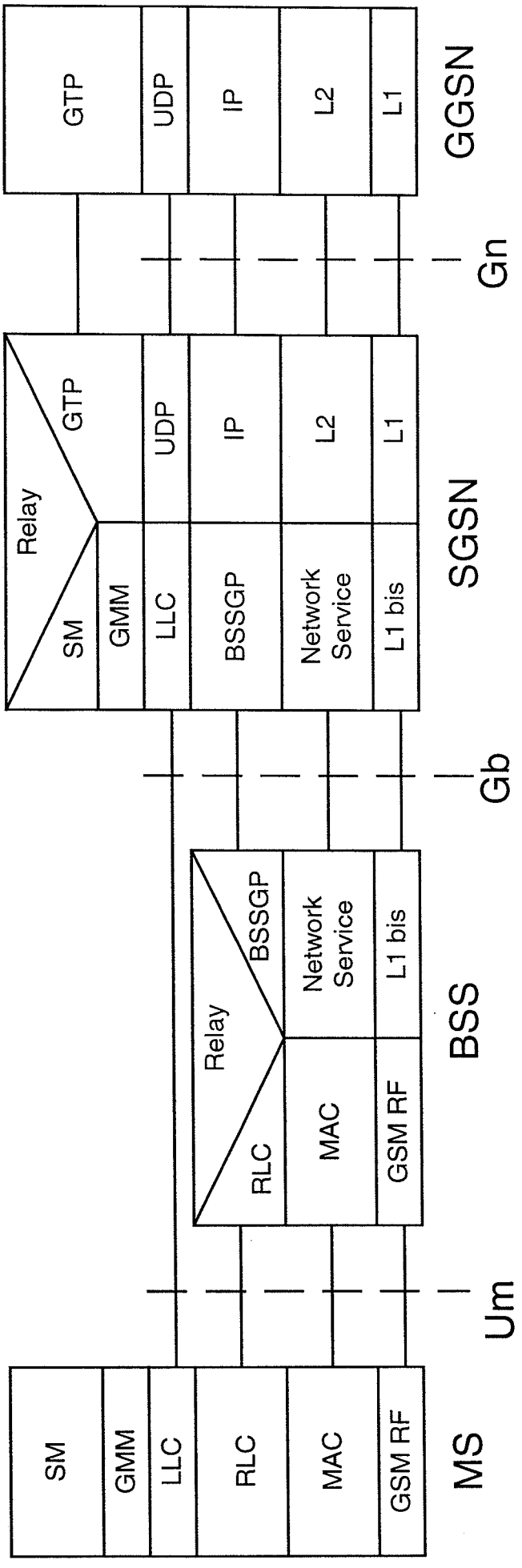

GTP
UDP
IP
L2
L1
GGSN
Gn
Relay
GTP
SM
GMM
LLC
UDP
IP
L2
L1
BSSGP
Network Service
L1 bis
SGSN
Gb
Relay
BSSGP
RLC
MAC
Network Service
L1 bis
GSM RF
BSS
Um
SM
GMM
LLC
RLC
MAC
GSM RF
MS

FIG. 7

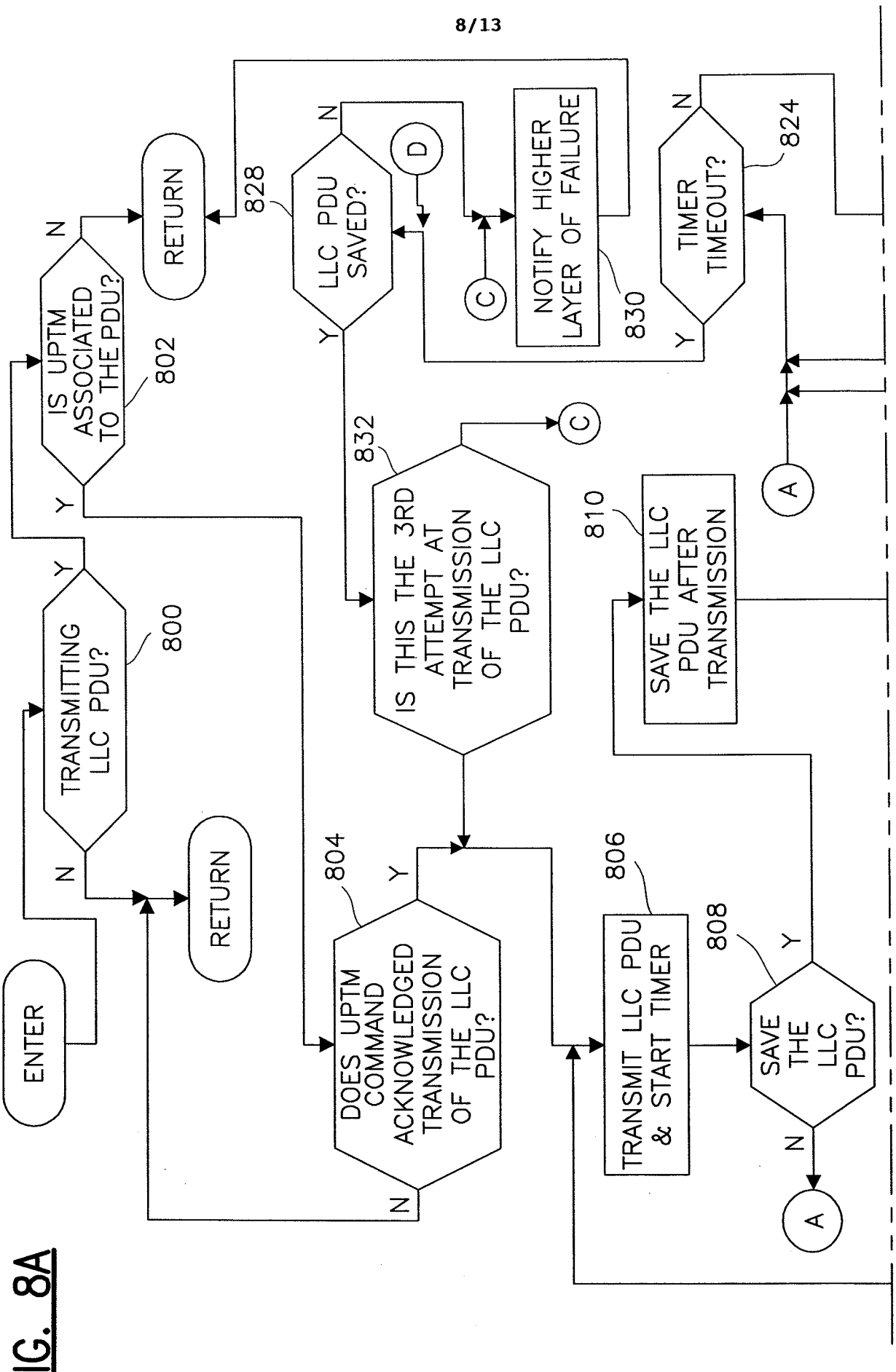

ENTER
TRANSMITTING LLC PDU?
800
N
Y
RETURN
IS UPTM ASSOCIATED TO THE PDU?
802
N
Y
RETURN
LLC PDU SAVED?
828
N
Y
D
C
NOTIFY HIGHER LAYER OF FAILURE
830
TIMER TIMEOUT?
824
N
Y
A
IS THIS THE 3RD ATTEMPT AT TRANSMISSION OF THE LLC PDU?
832
C
SAVE THE LLC PDU AFTER TRANSMISSION
810
DOES UPTM COMMAND ACKNOWLEDGED TRANSMISSION OF THE LLC PDU?
804
N
Y
TRANSMIT LLC PDU & START TIMER
806
SAVE THE LLC PDU?
808
N
Y
A

FIG. 8A

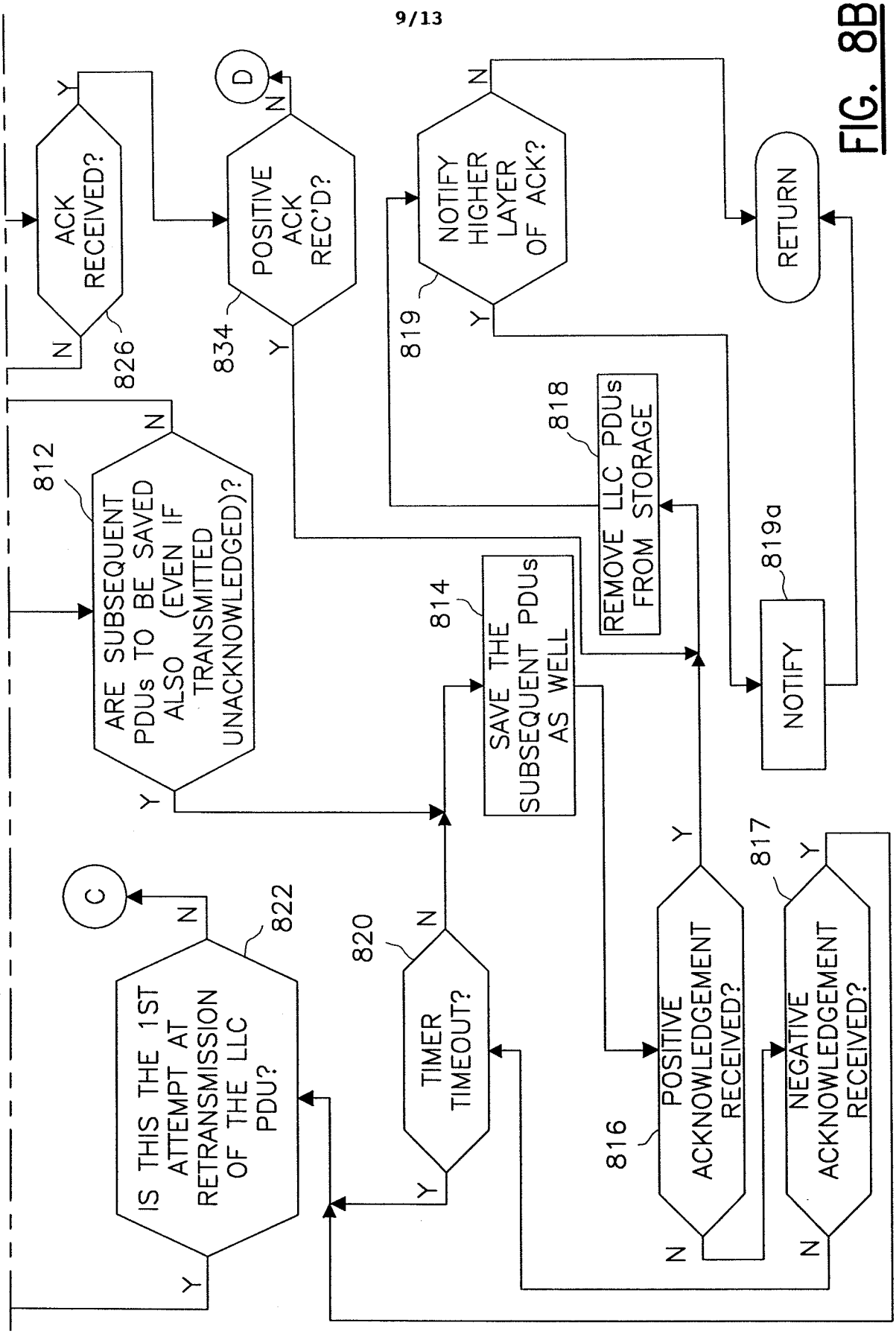
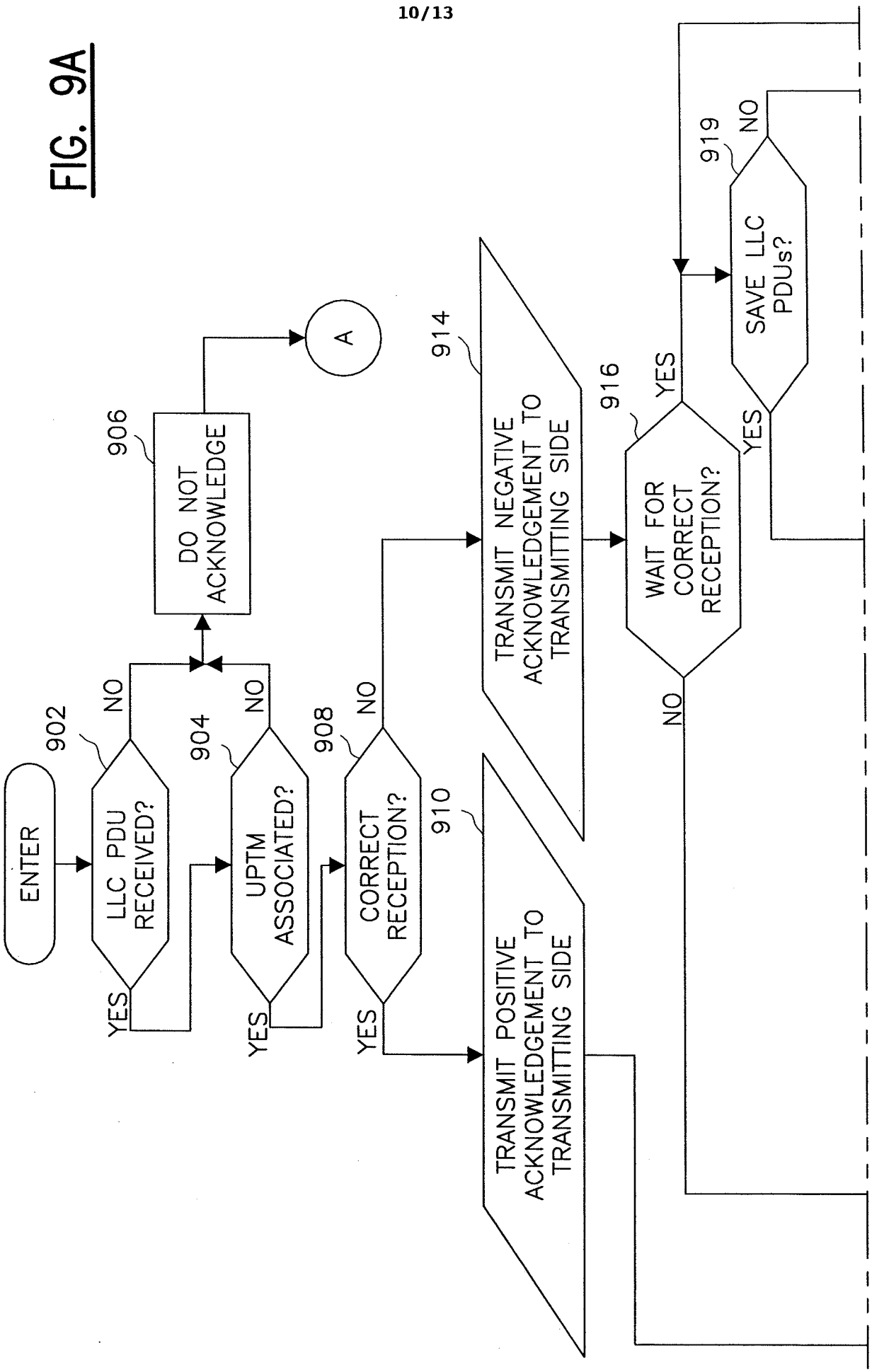

ACK RECEIVED?
826
POSITIVE ACK REC'D?
834
D
NOTIFY HIGHER LAYER OF ACK?
819
RETURN
ARE SUBSEQUENT PDUs TO BE SAVED ALSO (EVEN IF TRANSMITTED UNACKNOWLEDGED)?
812
REMOVE LLC PDUs FROM STORAGE
818
SAVE THE SUBSEQUENT PDUs AS WELL
814
NOTIFY
819a
C
IS THIS THE 1ST ATTEMPT AT RETRANSMISSION OF THE LLC PDU?
822
TIMER TIMEOUT?
820
POSITIVE ACKNOWLEDGEMENT RECEIVED?
816
NEGATIVE ACKNOWLEDGEMENT RECEIVED?
817
Y
N

FIG. 8B

FIG. 9A


ENTER
902
LLC PDU RECEIVED?
NO
YES
904
UPTM ASSOCIATED?
NO
YES
906
DO NOT ACKNOWLEDGE
A
908
CORRECT RECEPTION?
NO
YES
910
TRANSMIT POSITIVE ACKNOWLEDGEMENT TO TRANSMITTING SIDE
914
TRANSMIT NEGATIVE ACKNOWLEDGEMENT TO TRANSMITTING SIDE
916
WAIT FOR CORRECT RECEPTION?
YES
NO
919
SAVE LLC PDUs?
NO
YES

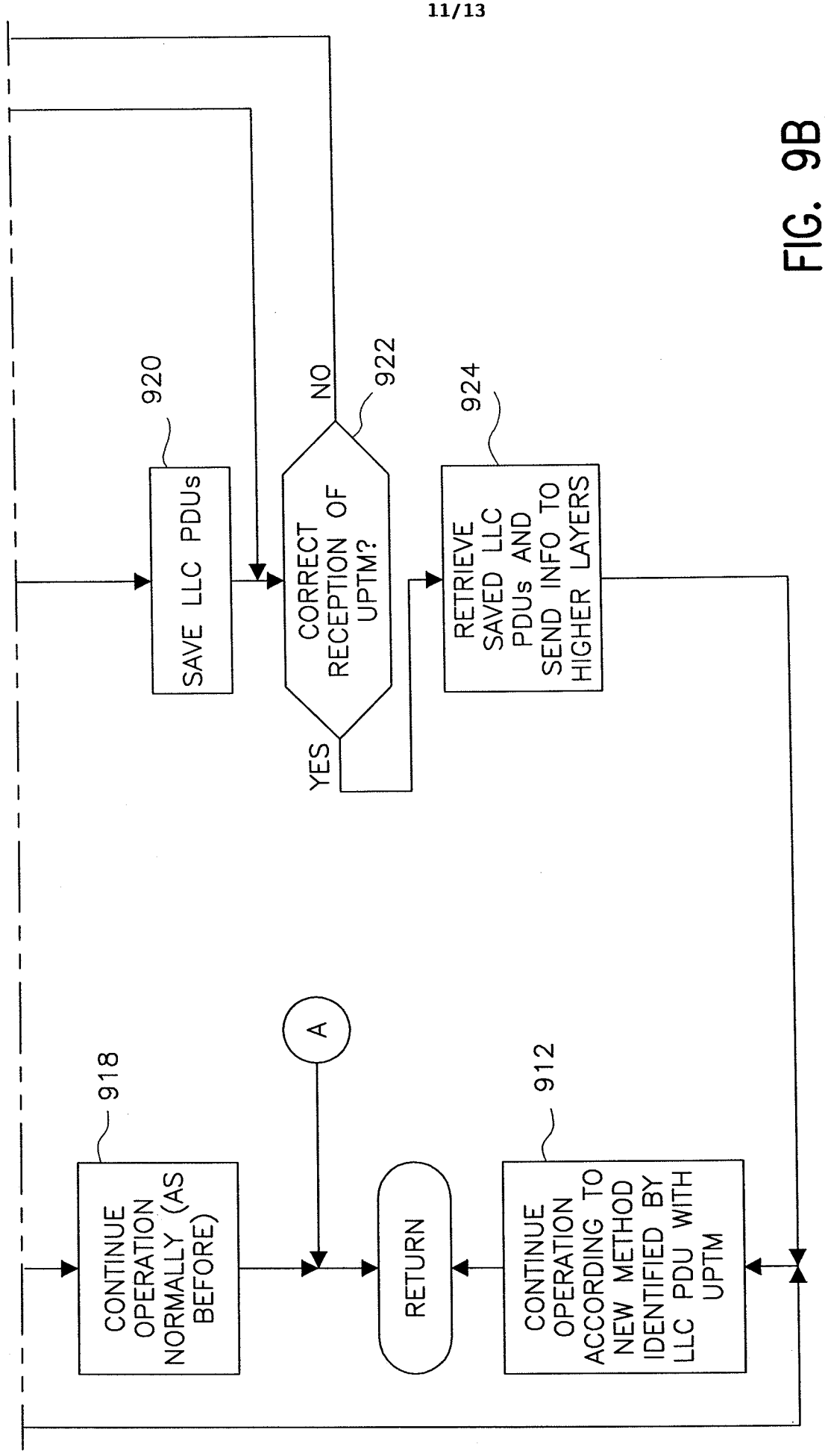

CONTINUE OPERATION NORMALLY (AS BEFORE)
918
A
RETURN
CONTINUE OPERATION ACCORDING TO NEW METHOD IDENTIFIED BY LLC PDU WITH UPTM
912
SAVE LLC PDUs
920
CORRECT RECEPTION OF UPTM?
922
NO
YES
RETRIEVE SAVED LLC PDUs AND SEND INFO TO HIGHER LAYERS
924

FIG. 9B

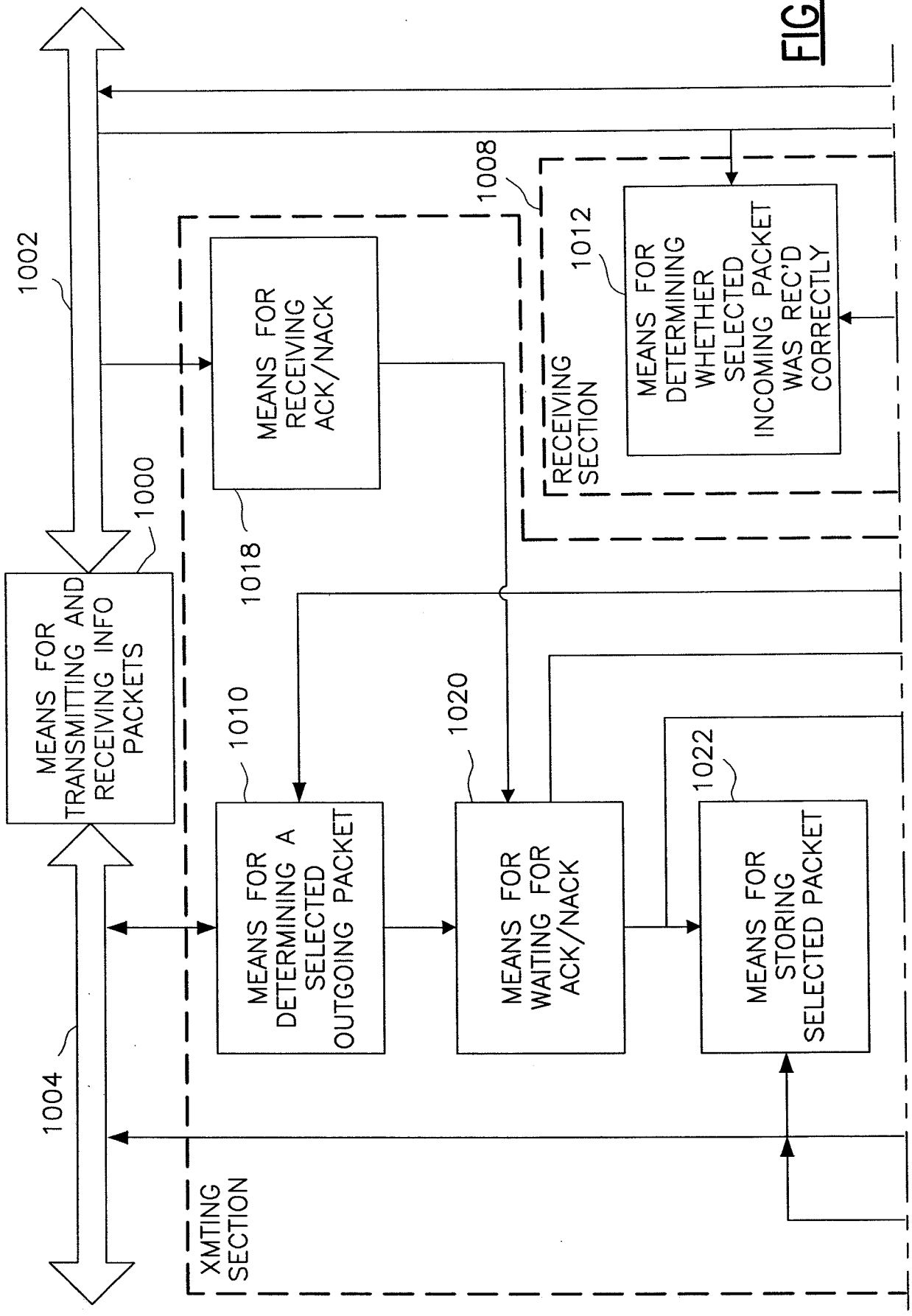
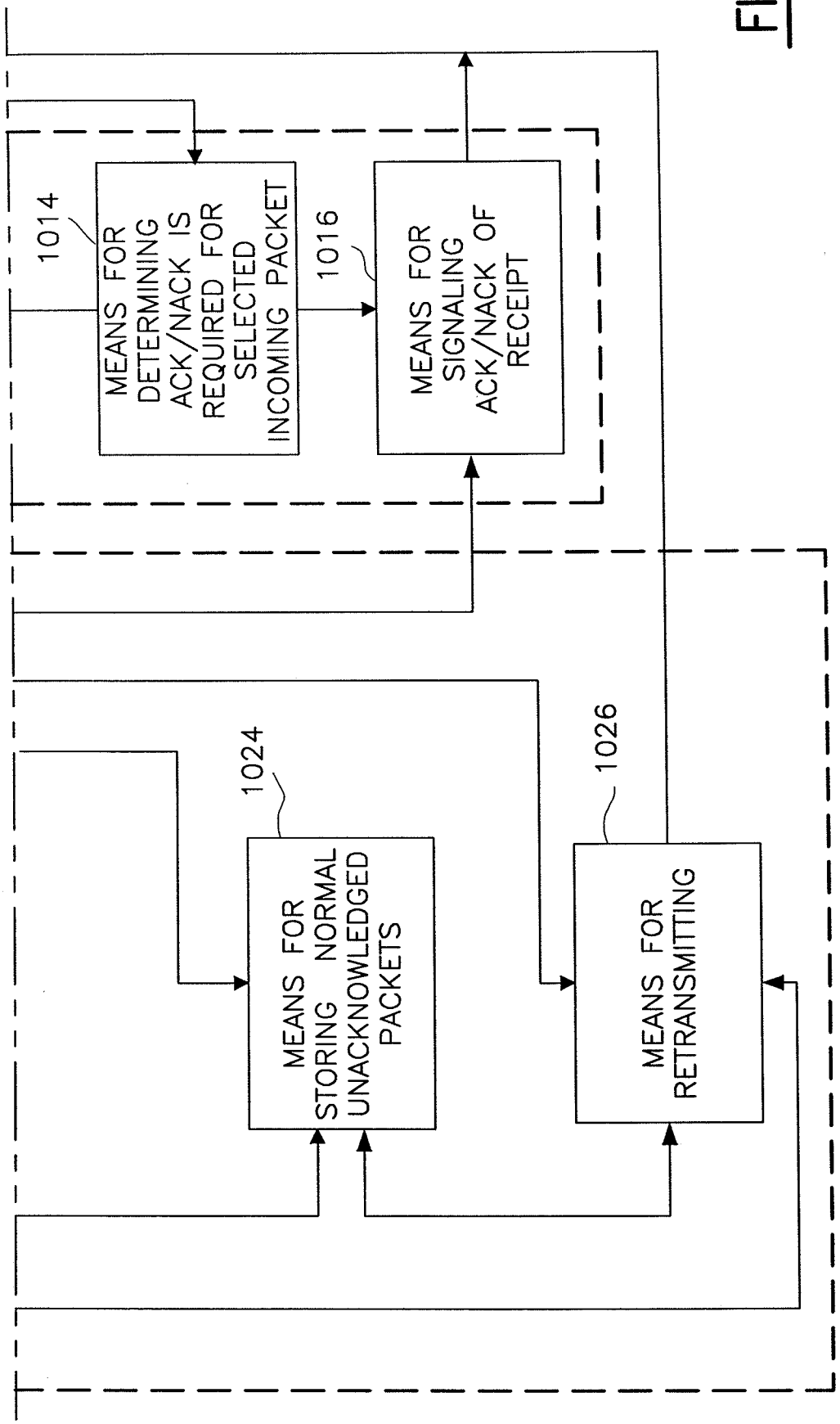

1002
1000
MEANS FOR TRANSMITTING AND RECEIVING INFO PACKETS
1004
XMTING SECTION
1018
MEANS FOR RECEIVING ACK/NACK
1008
RECEIVING SECTION
1012
MEANS FOR DETERMINING WHETHER SELECTED INCOMING PACKET WAS REC'D CORRECTLY
1010
MEANS FOR DETERMINING A SELECTED OUTGOING PACKET
1020
MEANS FOR WAITING FOR ACK/NACK
1022
MEANS FOR STORING SELECTED PACKET

FIG. 10A

FIG. 10B


1014
MEANS FOR DETERMINING ACK/NACK IS REQUIRED FOR SELECTED INCOMING PACKET
1016
MEANS FOR SIGNALING ACK/NACK OF RECEIPT
1024
MEANS FOR STORING NORMAL UNACKNOWLEDGED PACKETS
1026
MEANS FOR RETRANSMITTING