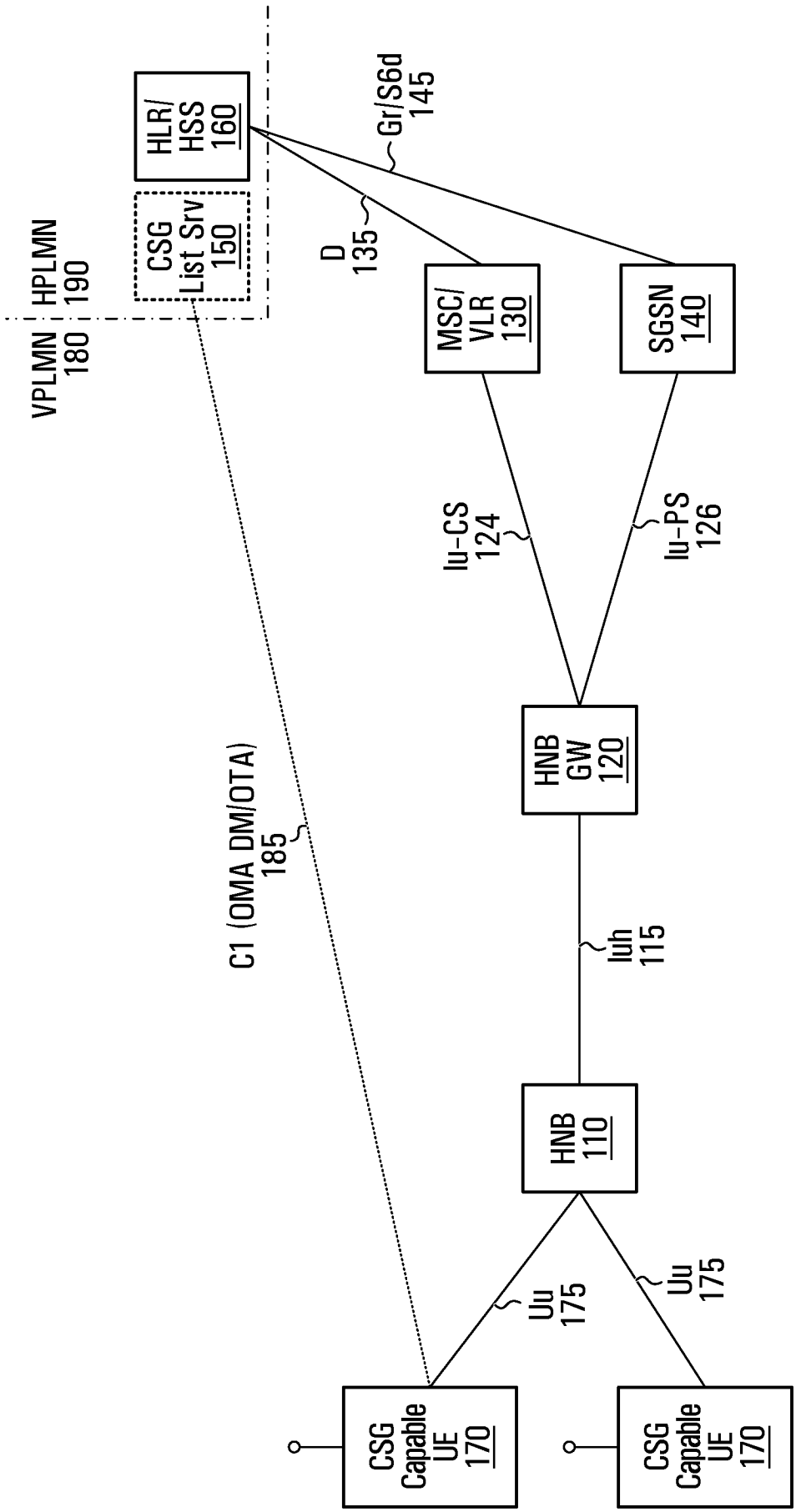

HLR/
HSS
160
CSG
List Srv
150
HPLMN
190
VPLMN
180
Gr/S6d
145
D
135
MSC/
VLR
130
SGSN
140
Iu-CS
124
Iu-PS
126
HNB
GW
120
C1 (OMA DM/OTA)
185
Iuh
115
HNB
110
Uu
175
Uu
175
CSG
Capable
UE
170
CSG
Capable
UE
170

FIG. 1

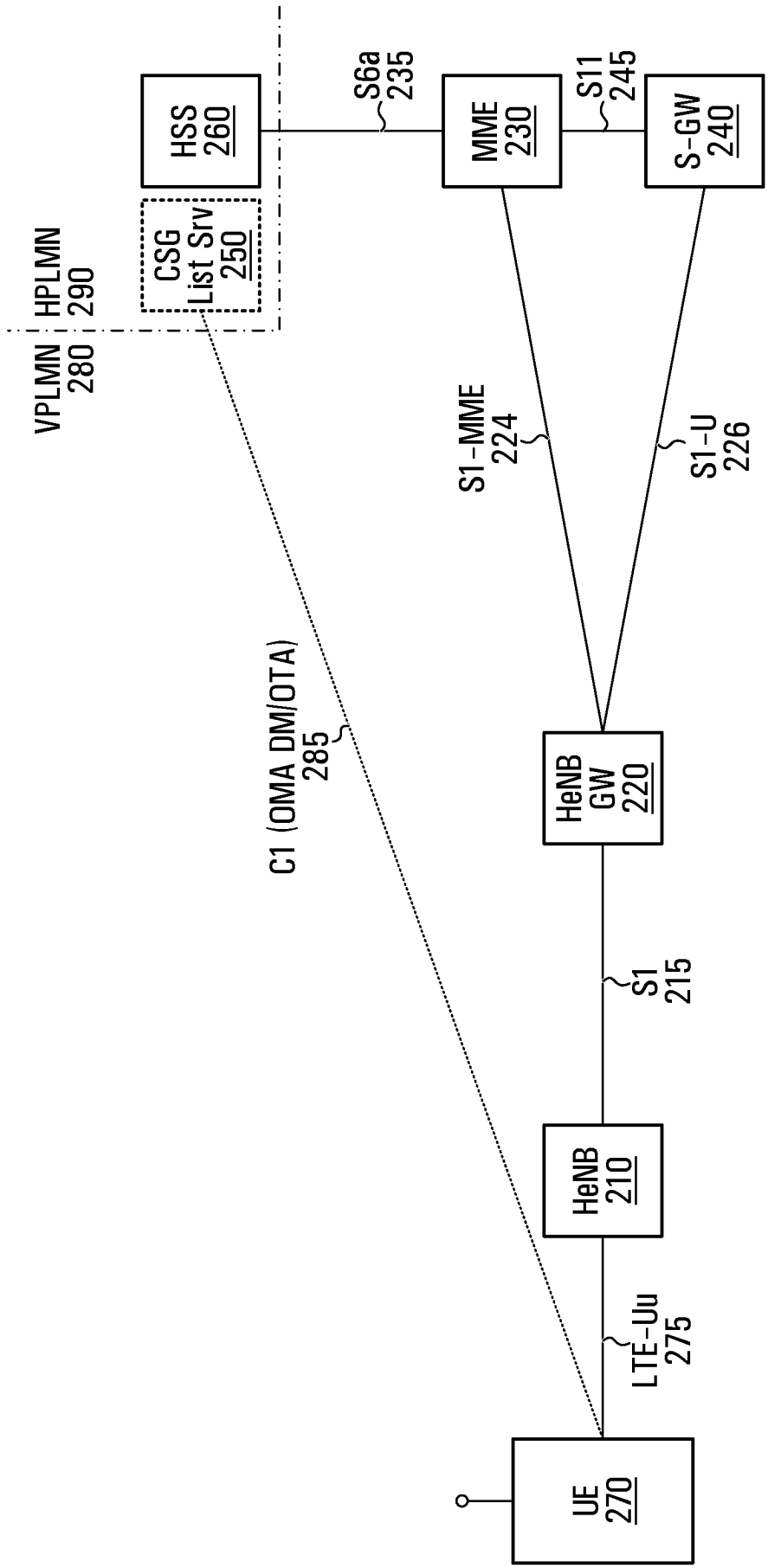

HSS 260
S6a 235
MME 230
S11 245
S-GW 240
CSG List Srv 250
HPLMN 290
VPLMN 280
S1-MME 224
S1-U 226
C1 (OMA DM/OTA) 285
HeNB GW 220
S1 215
HeNB 210
LTE-Uu 275
UE 270

FIG. 2

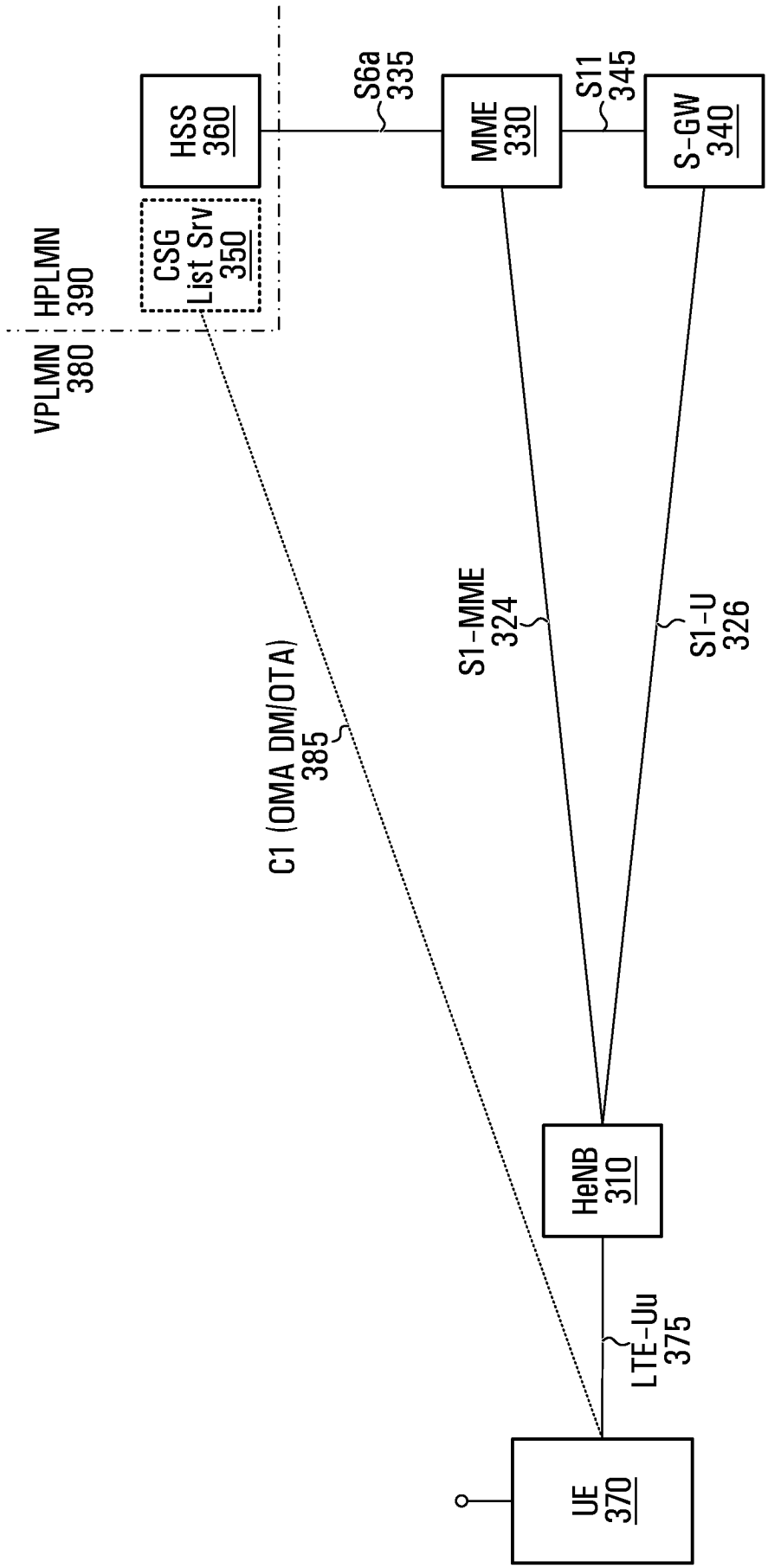

HSS
360
S6a
335
MME
330
S11
345
S-GW
340
CSG
List Srv
350
HPLMN
390
VPLMN
380
S1-MME
324
S1-U
326
C1 (OMA DM/OTA)
385
HeNB
310
LTE-Uu
375
UE
370

FIG. 3

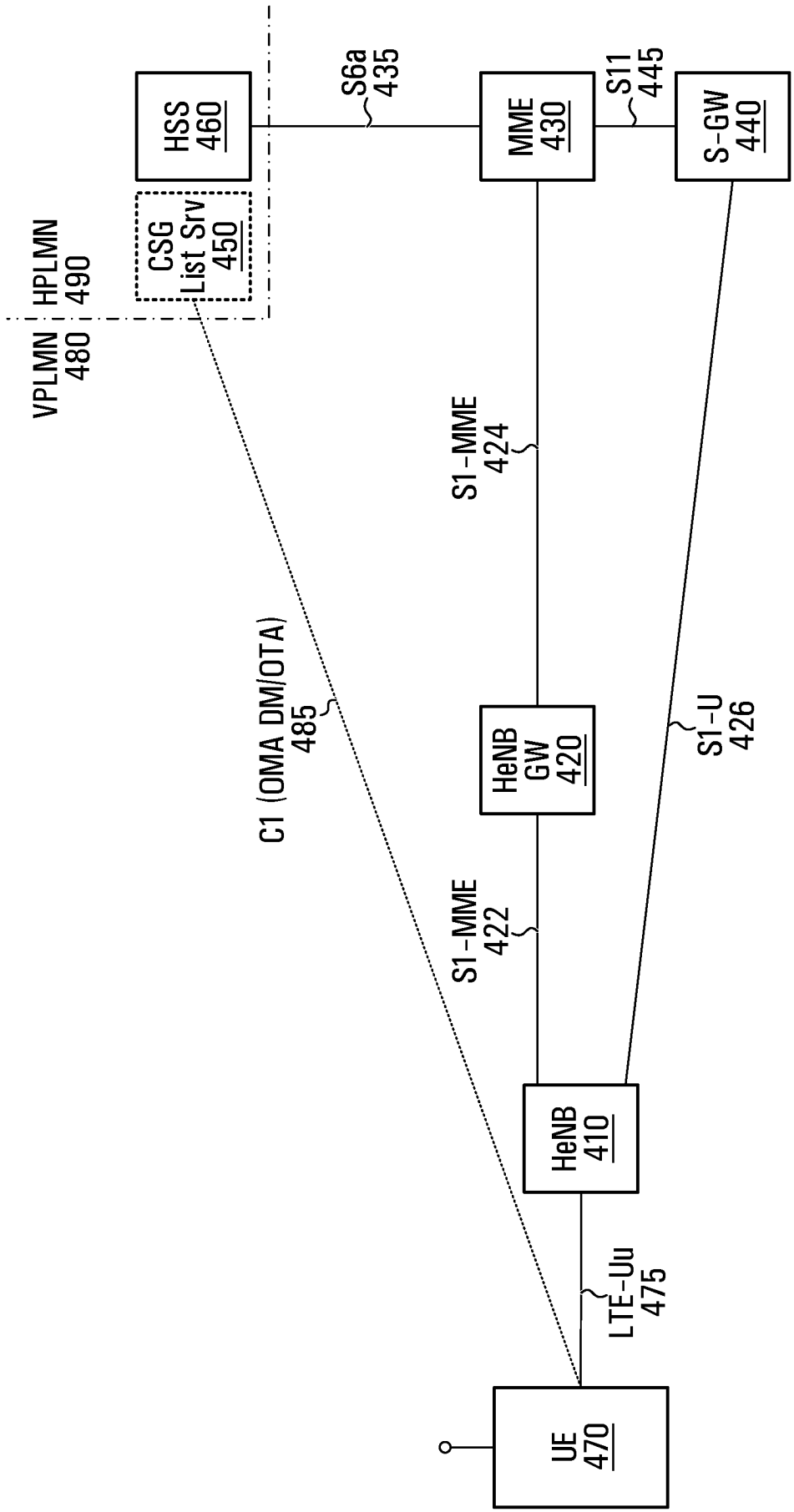

HSS 460
S6a 435
MME 430
S11 445
S-GW 440
CSG List Srv 450
HPLMN 490
VPLMN 480
S1-MME 424
C1 (OMA DM/OTA) 485
HeNB GW 420
S1-U 426
S1-MME 422
HeNB 410
LTE-Uu 475
UE 470

FIG. 4

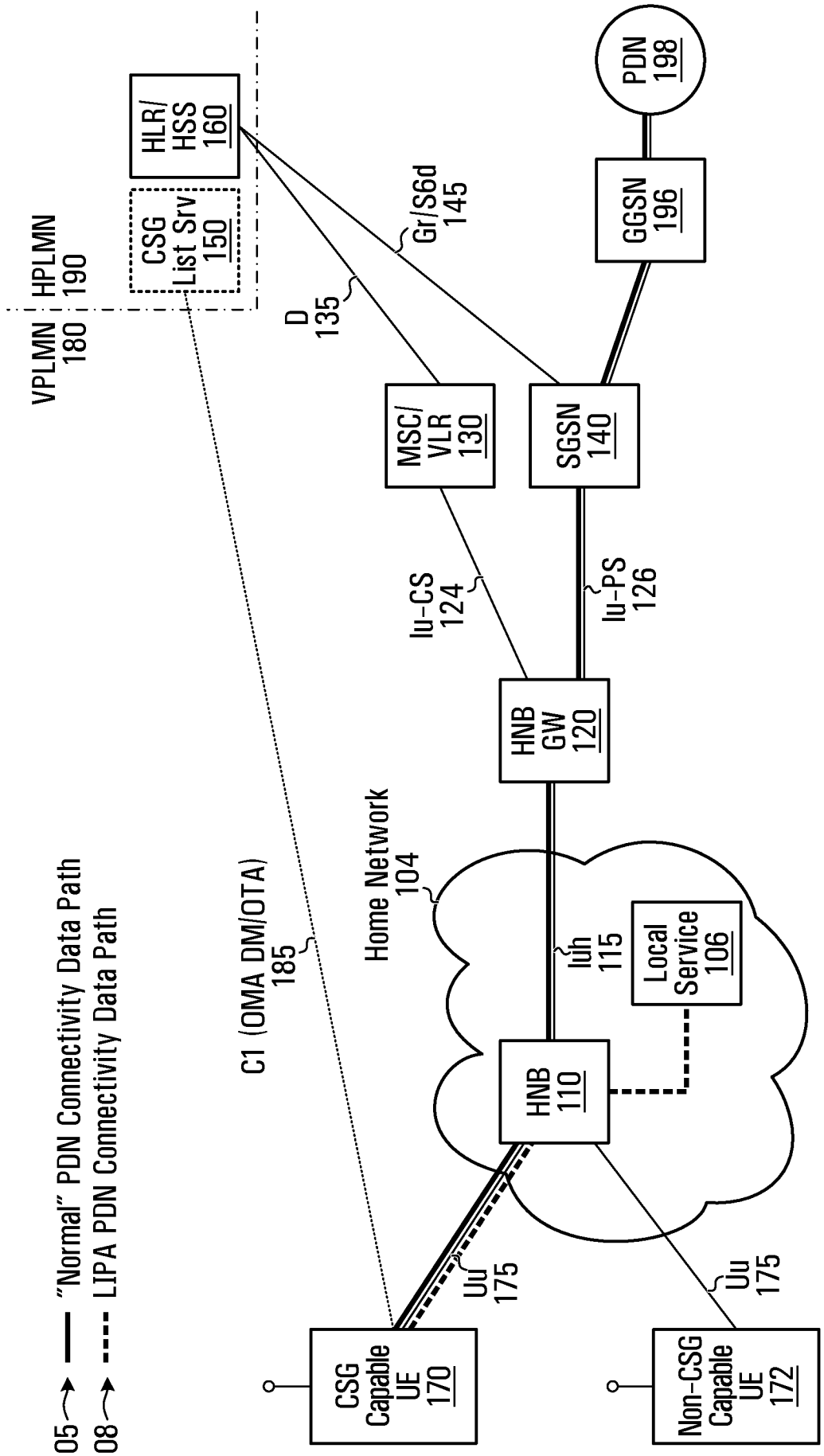

105 "Normal" PDN Connectivity Data Path
108 LIPA PDN Connectivity Data Path
VPLMN 180
HPLMN 190
HLR/ HSS 160
CSG List Srv 150
D 135
Gr/S6d 145
PDN 198
GGSN 196
MSC/ VLR 130
SGSN 140
Iu-CS 124
Iu-PS 126
HNB GW 120
Home Network 104
C1 (OMA DM/OTA) 185
Iuh 115
Local Service 106
HNB 110
Uu 175
Uu 175
CSG Capable UE 170
Non-CSG Capable UE 172

FIG. 5

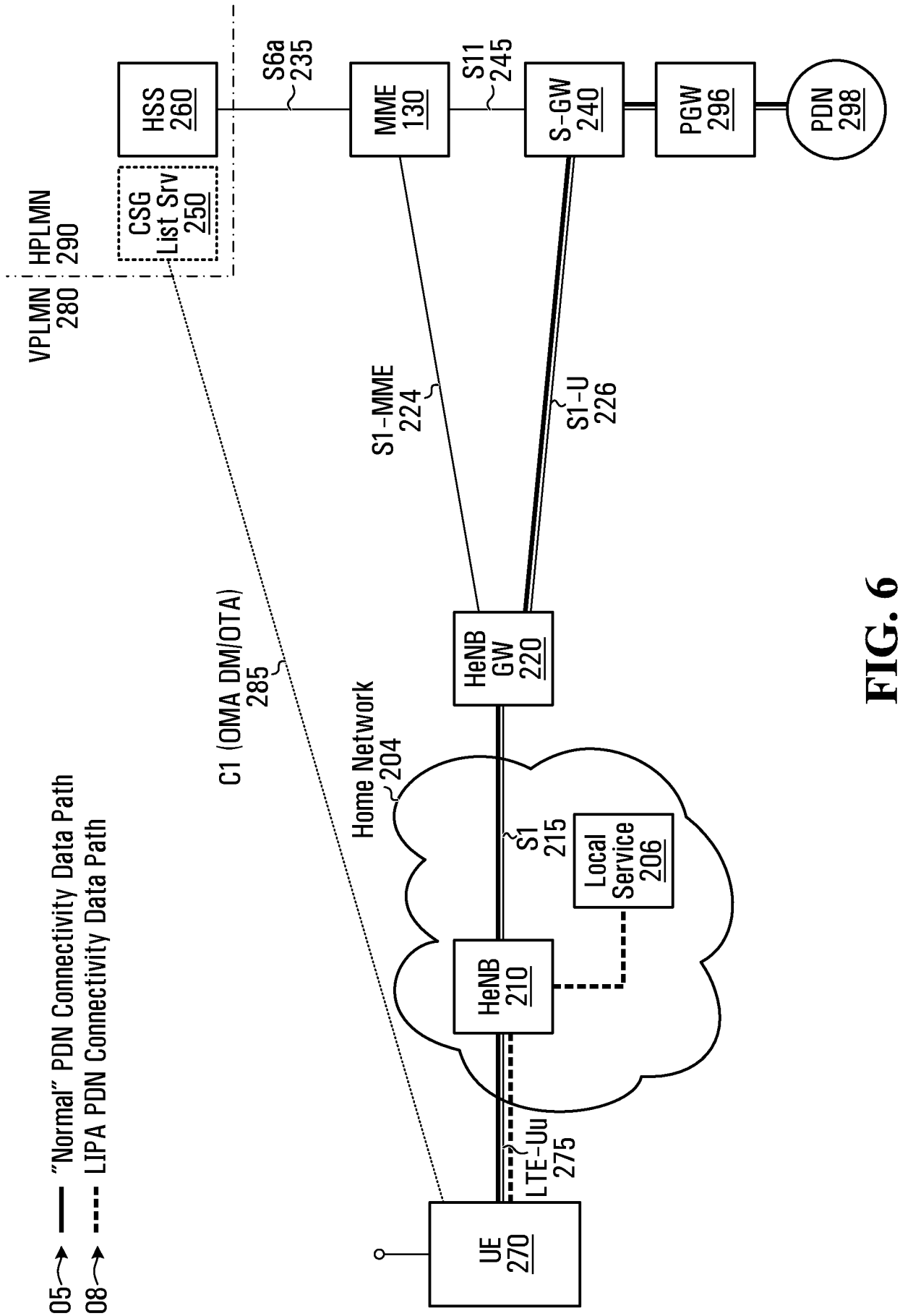

205 "Normal" PDN Connectivity Data Path
208 LIPA PDN Connectivity Data Path
VPLMN 280
HPLMN 290
HSS 260
CSG List Srv 250
S6a 235
MME 130
S11 245
S-GW 240
PGW 296
PDN 298
S1-MME 224
S1-U 226
C1 (OMA DM/OTA) 285
HeNB GW 220
Home Network 204
S1 215
Local Service 206
HeNB 210
LTE-Uu 275
UE 270

FIG. 6

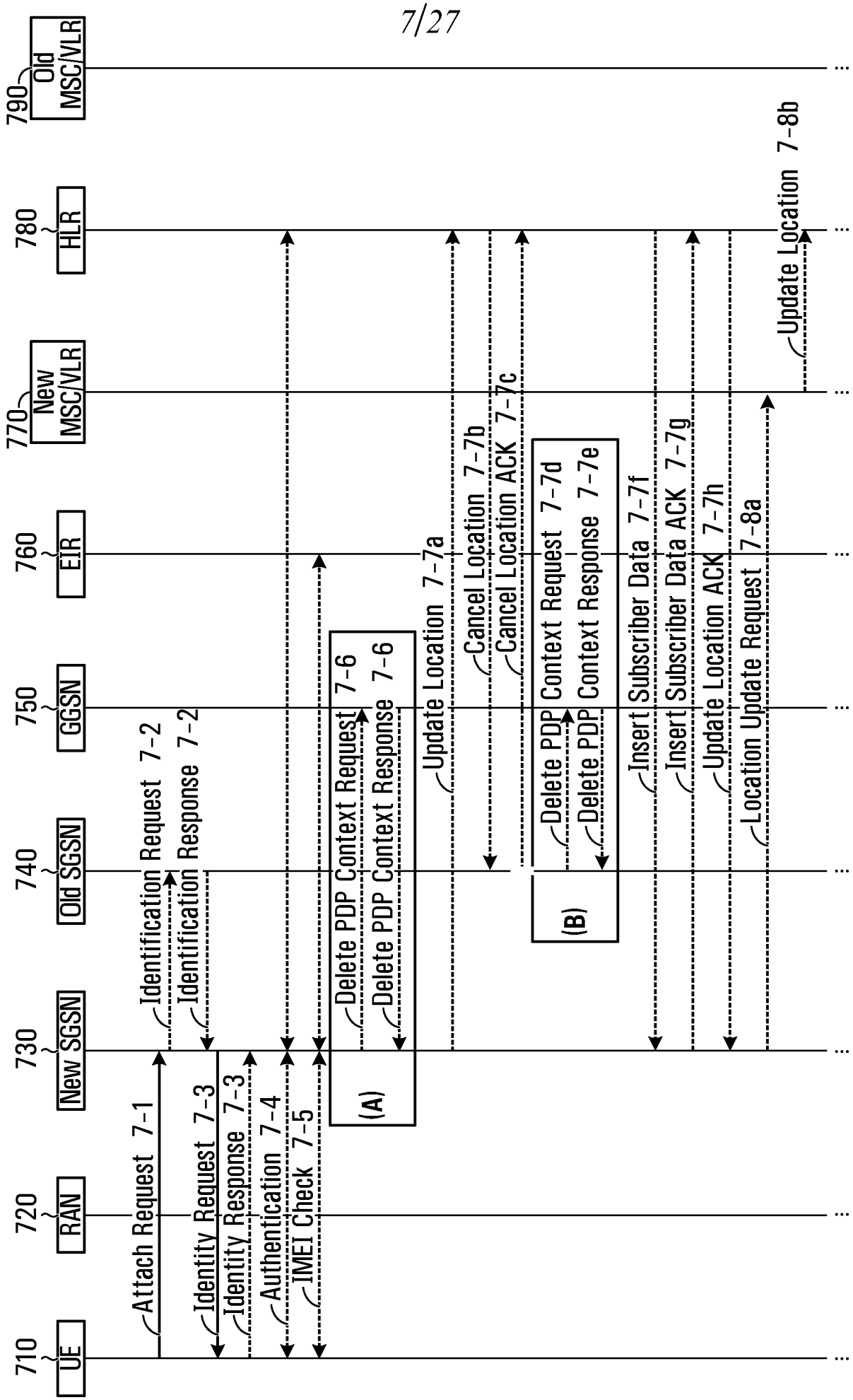

710 UE
720 RAN
730 New SGSN
740 Old SGSN
750 GGSN
760 EIR
770 New MSC/VLR
780 HLR
790 Old MSC/VLR
Attach Request 7-1
Identity Request 7-3
Identity Response 7-3
Authentication 7-4
IMEI Check 7-5
Identification Request 7-2
Identification Response 7-2
(A)
Delete PDP Context Request 7-6
Delete PDP Context Response 7-6
Update Location 7-7a
Cancel Location 7-7b
Cancel Location ACK 7-7c
(B)
Delete PDP Context Request 7-7d
Delete PDP Context Response 7-7e
Insert Subscriber Data 7-7f
Insert Subscriber Data ACK 7-7g
Update Location ACK 7-7h
Location Update Request 7-8a
Update Location 7-8b

FIG. 7A

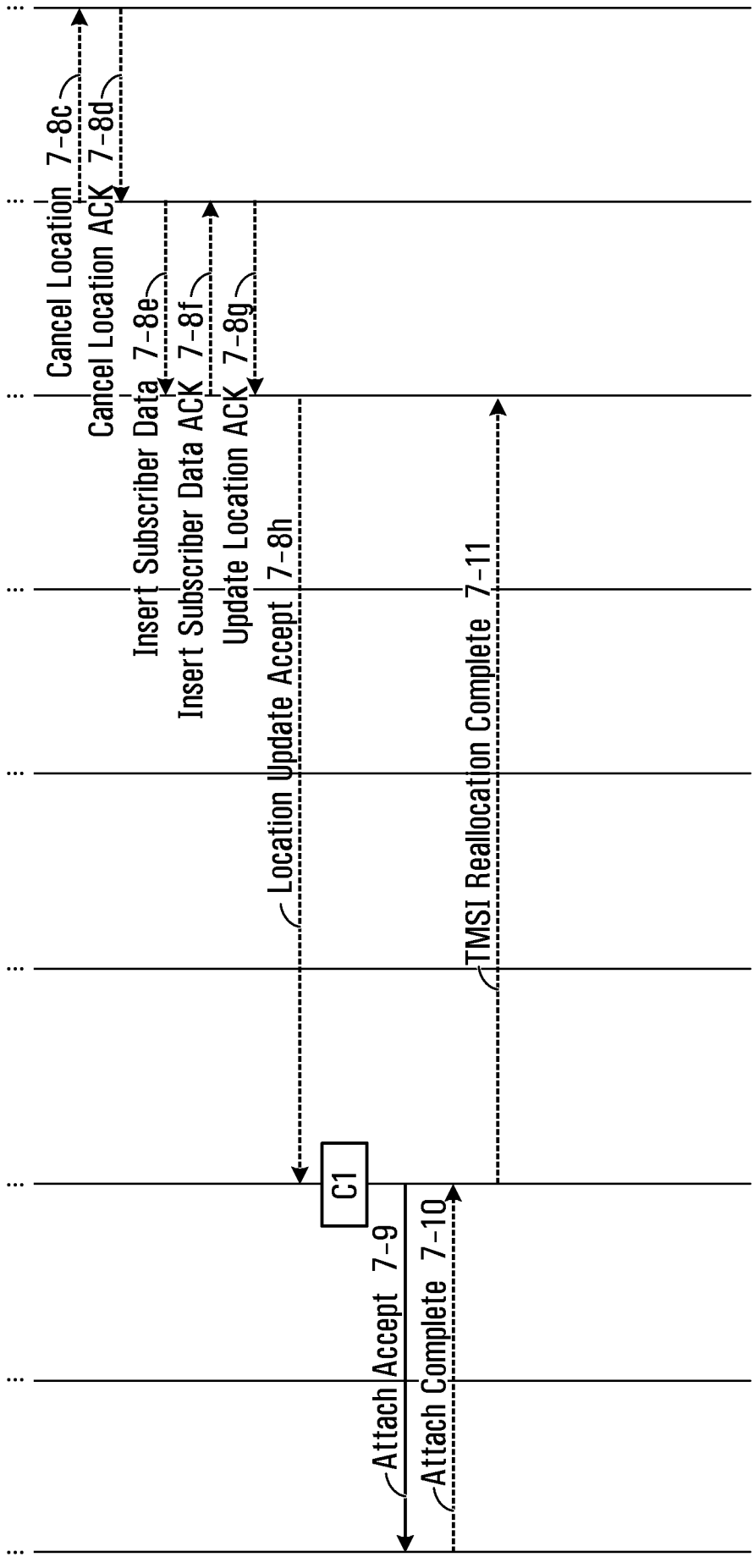

Cancel Location 7-8c
Cancel Location ACK 7-8d
Insert Subscriber Data 7-8e
Insert Subscriber Data ACK 7-8f
Update Location ACK 7-8g
Location Update Accept 7-8h
TMSI Reallocation Complete 7-11
C1
Attach Accept 7-9
Attach Complete 7-10

FIG. 7B

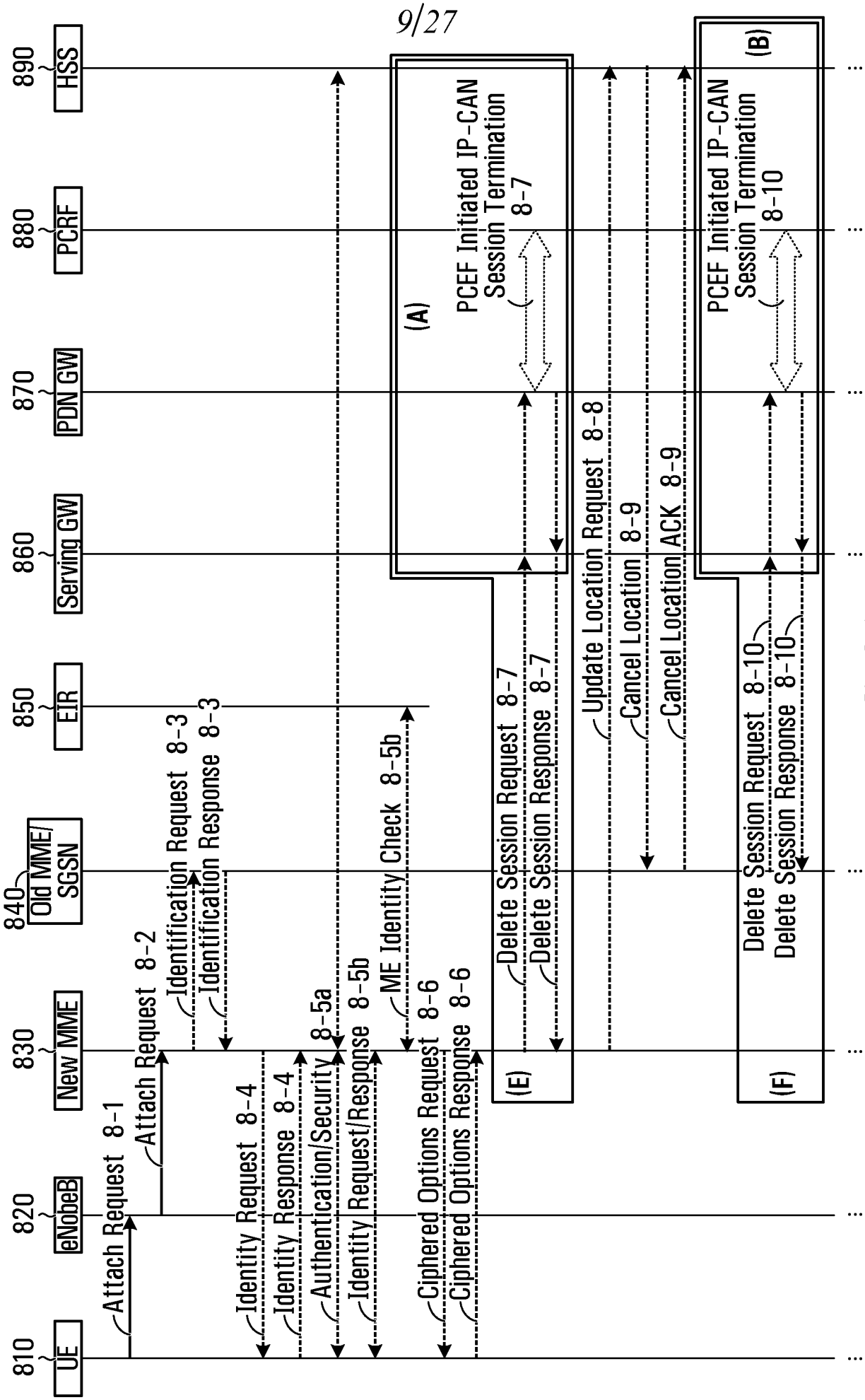

810 UE
820 eNobeB
830 New MME
840 Old MME/ SGSN
850 EIR
860 Serving GW
870 PDN GW
880 PCRF
890 HSS
Attach Request 8-1
Attach Request 8-2
Identification Request 8-3
Identification Response 8-3
Identity Request 8-4
Identity Response 8-4
Authentication/Security 8-5a
Identity Request/Response 8-5b
ME Identity Check 8-5b
Ciphered Options Request 8-6
Ciphered Options Response 8-6
(A)
PCEF Initiated IP-CAN Session Termination 8-7
Delete Session Request 8-7
Delete Session Response 8-7
(E)
Update Location Request 8-8
Cancel Location 8-9
Cancel Location ACK 8-9
(B)
PCEF Initiated IP-CAN Session Termination 8-10
Delete Session Request 8-10
Delete Session Response 8-10
(F)

FIG. 8A

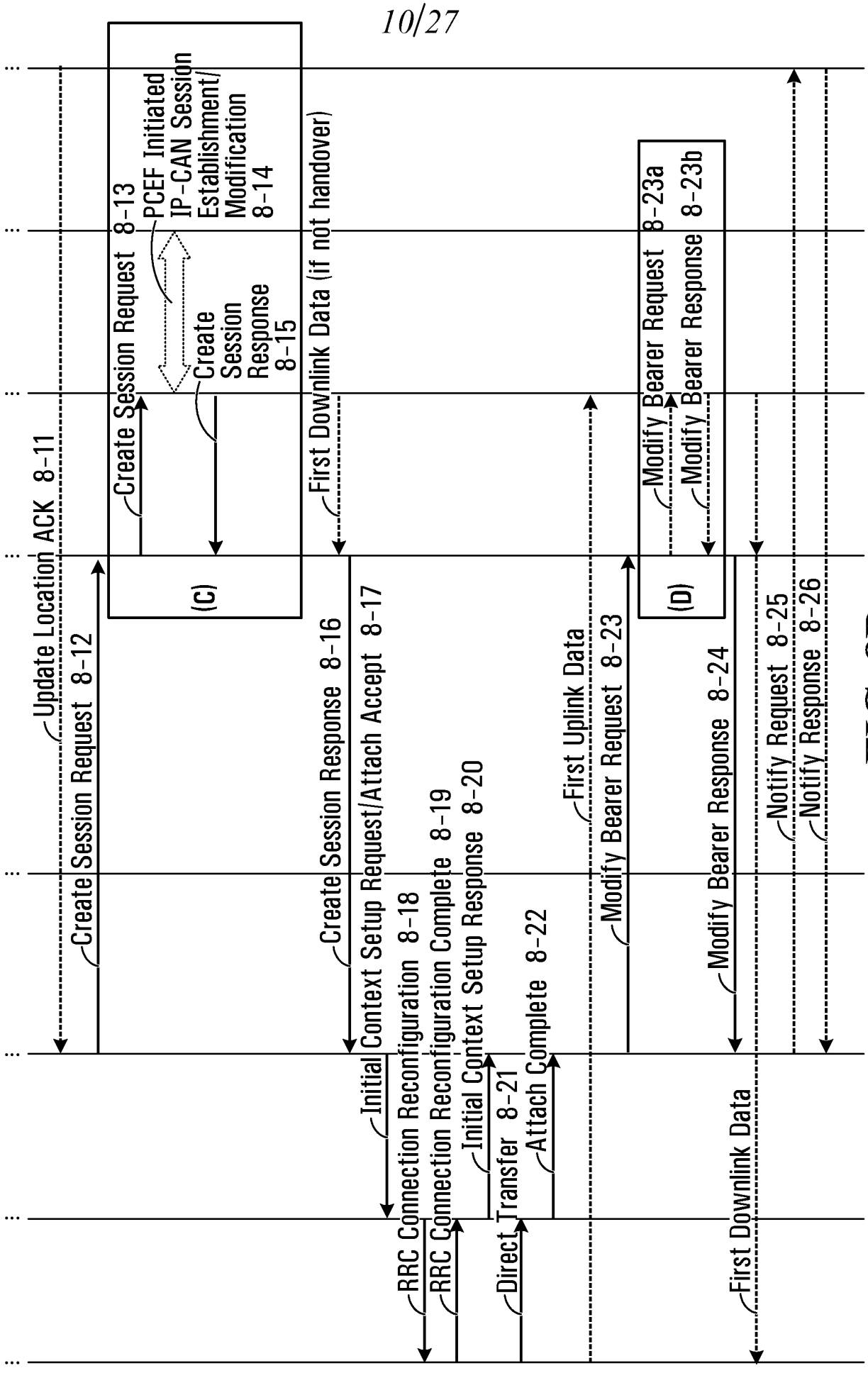

Update Location ACK 8-11
Create Session Request 8-12
Create Session Request 8-13
PCEF Initiated IP-CAN Session Establishment/ Modification 8-14
Create Session Response 8-15
(C)
First Downlink Data (if not handover)
Create Session Response 8-16
Initial Context Setup Request/Attach Accept 8-17
RRC Connection Reconfiguration 8-18
RRC Connection Reconfiguration Complete 8-19
Initial Context Setup Response 8-20
Direct Transfer 8-21
Attach Complete 8-22
First Uplink Data
Modify Bearer Request 8-23
Modify Bearer Request 8-23a
Modify Bearer Response 8-23b
(D)
Modify Bearer Response 8-24
Notify Request 8-25
Notify Response 8-26
First Downlink Data

FIG. 8B

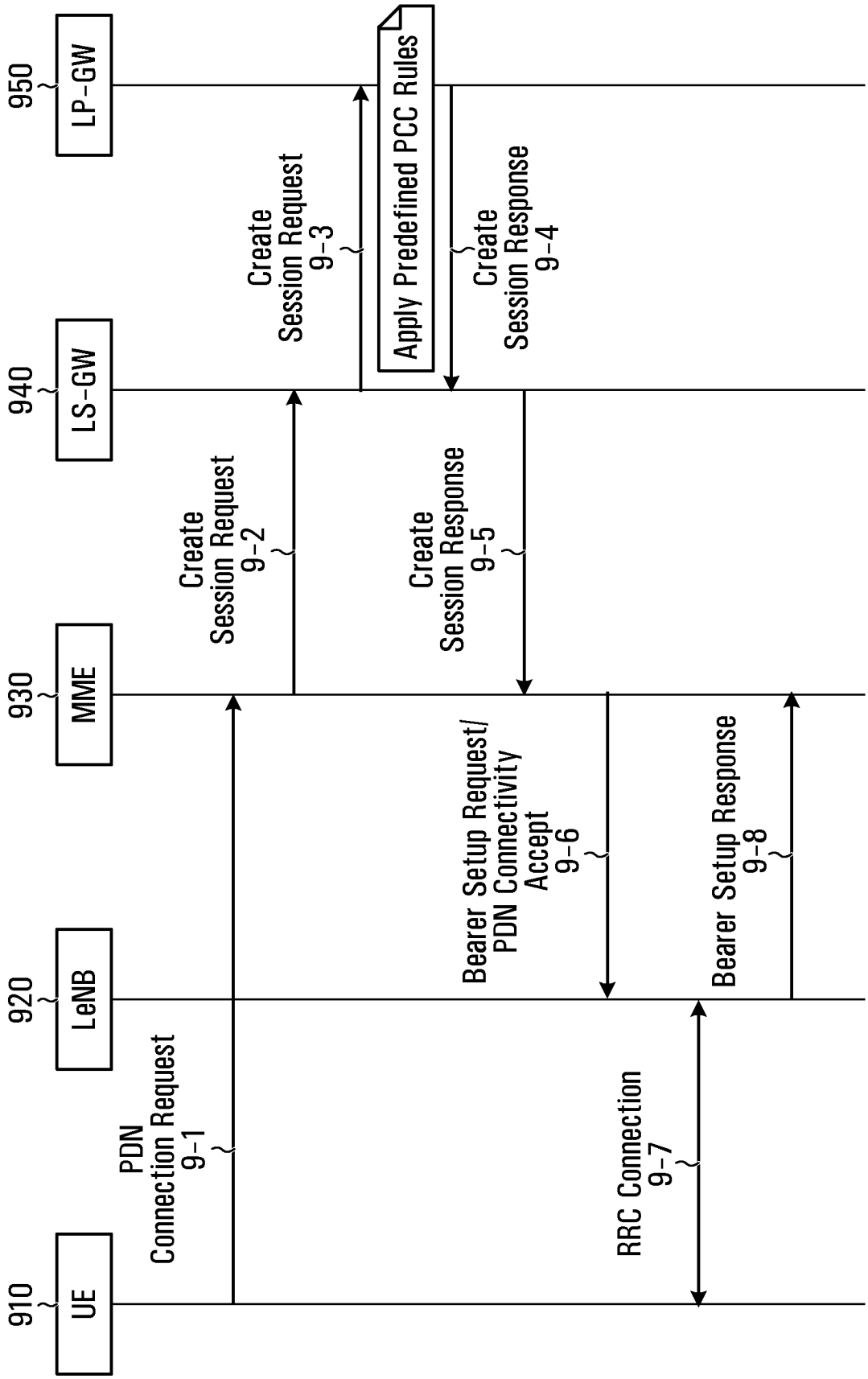

910
UE
920
LeNB
930
MME
940
LS-GW
950
LP-GW
PDN Connection Request 9-1
Create Session Request 9-2
Create Session Request 9-3
Apply Predefined PCC Rules
Create Session Response 9-4
Create Session Response 9-5
Bearer Setup Request/ PDN Connectivity Accept 9-6
RRC Connection 9-7
Bearer Setup Response 9-8

FIG. 9

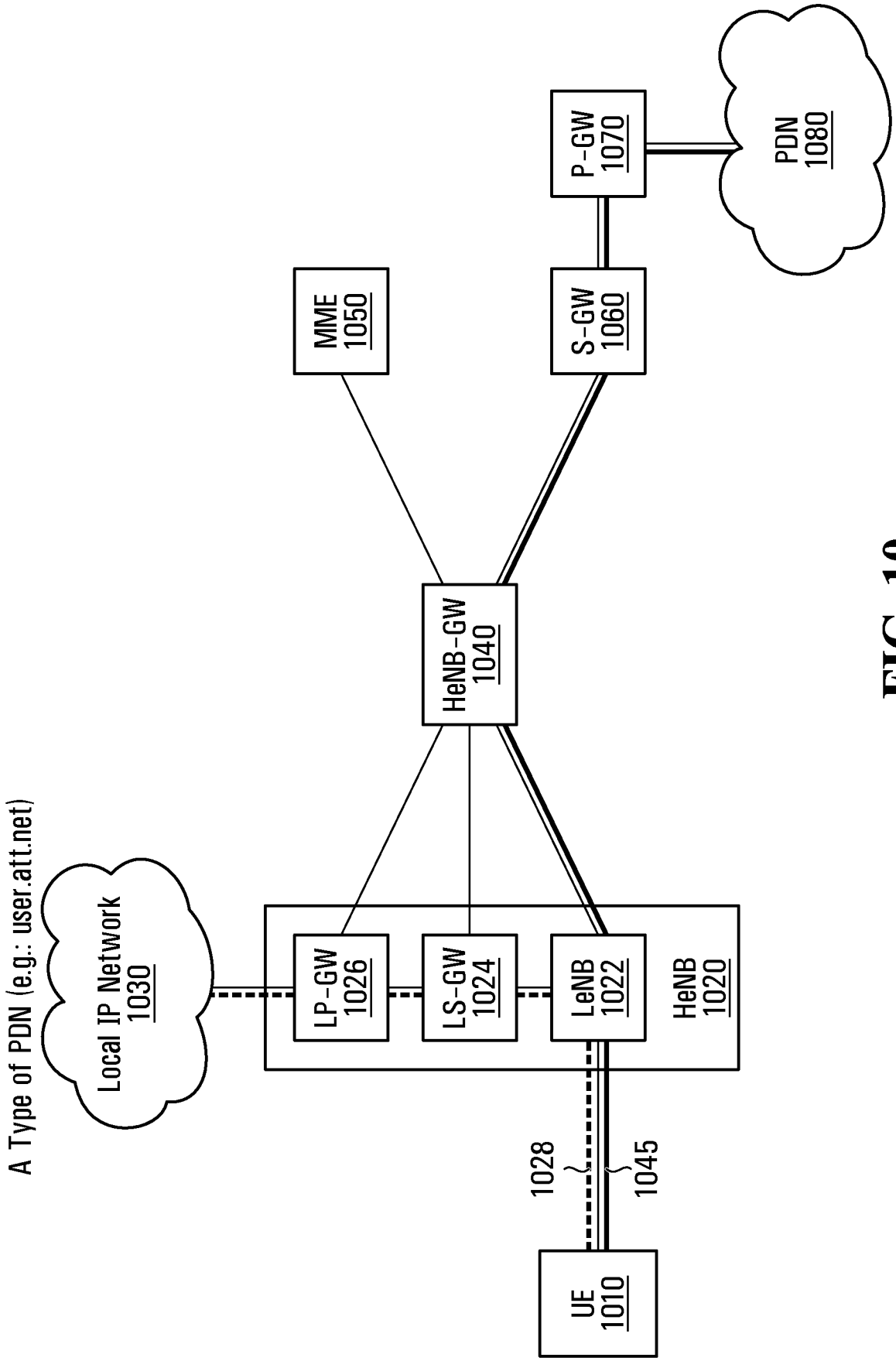

A Type of PDN (e.g.: user.att.net)
Local IP Network
1030
LP-GW
1026
LS-GW
1024
LeNB
1022
HeNB
1020
HeNB-GW
1040
MME
1050
S-GW
1060
P-GW
1070
PDN
1080
1028
1045
UE
1010

FIG. 10

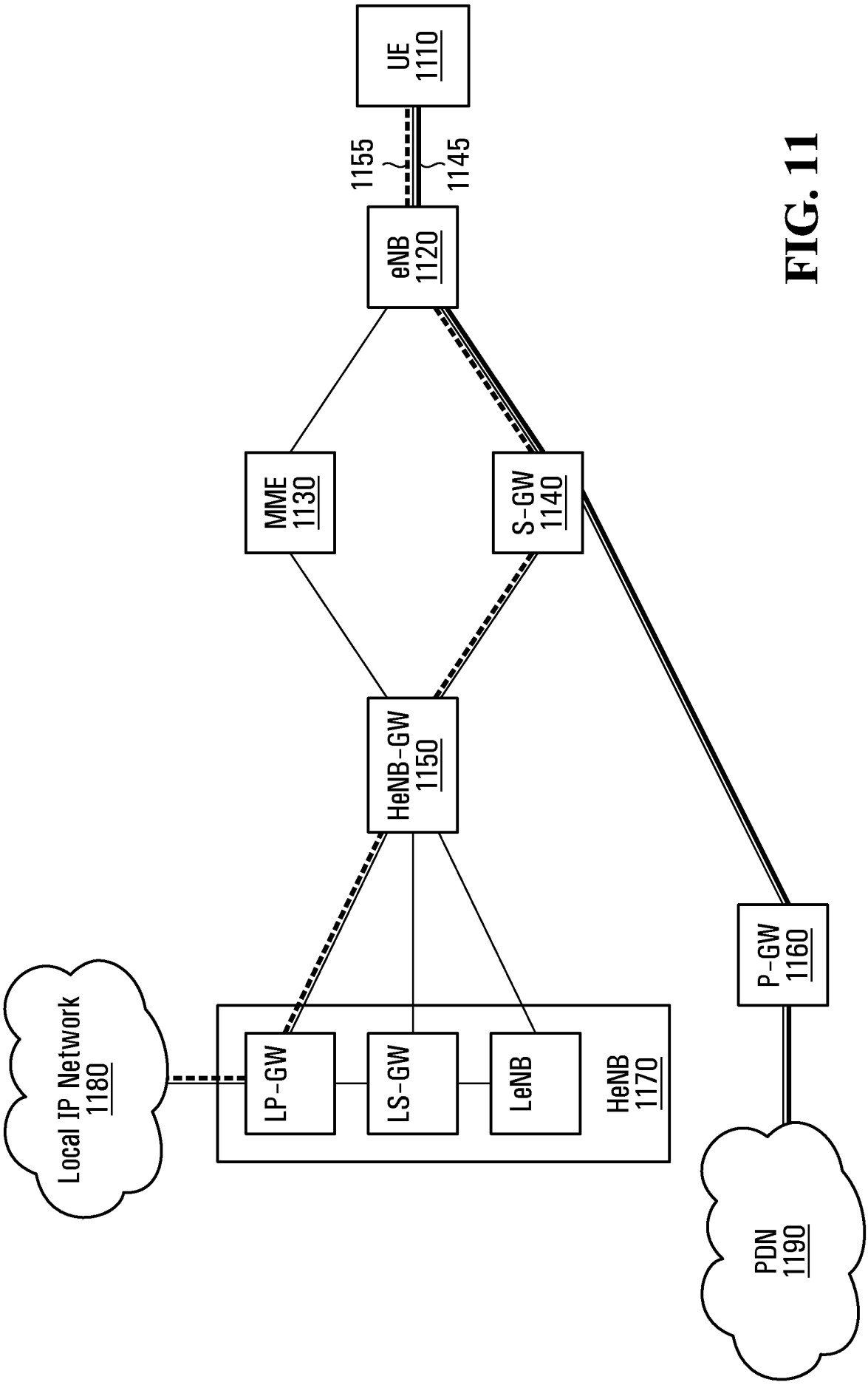

UE
1110
1155
1145
eNB
1120
MME
1130
S-GW
1140
HeNB-GW
1150
P-GW
1160
Local IP Network
1180
LP-GW
LS-GW
LeNB
HeNB
1170
PDN
1190

FIG. 11

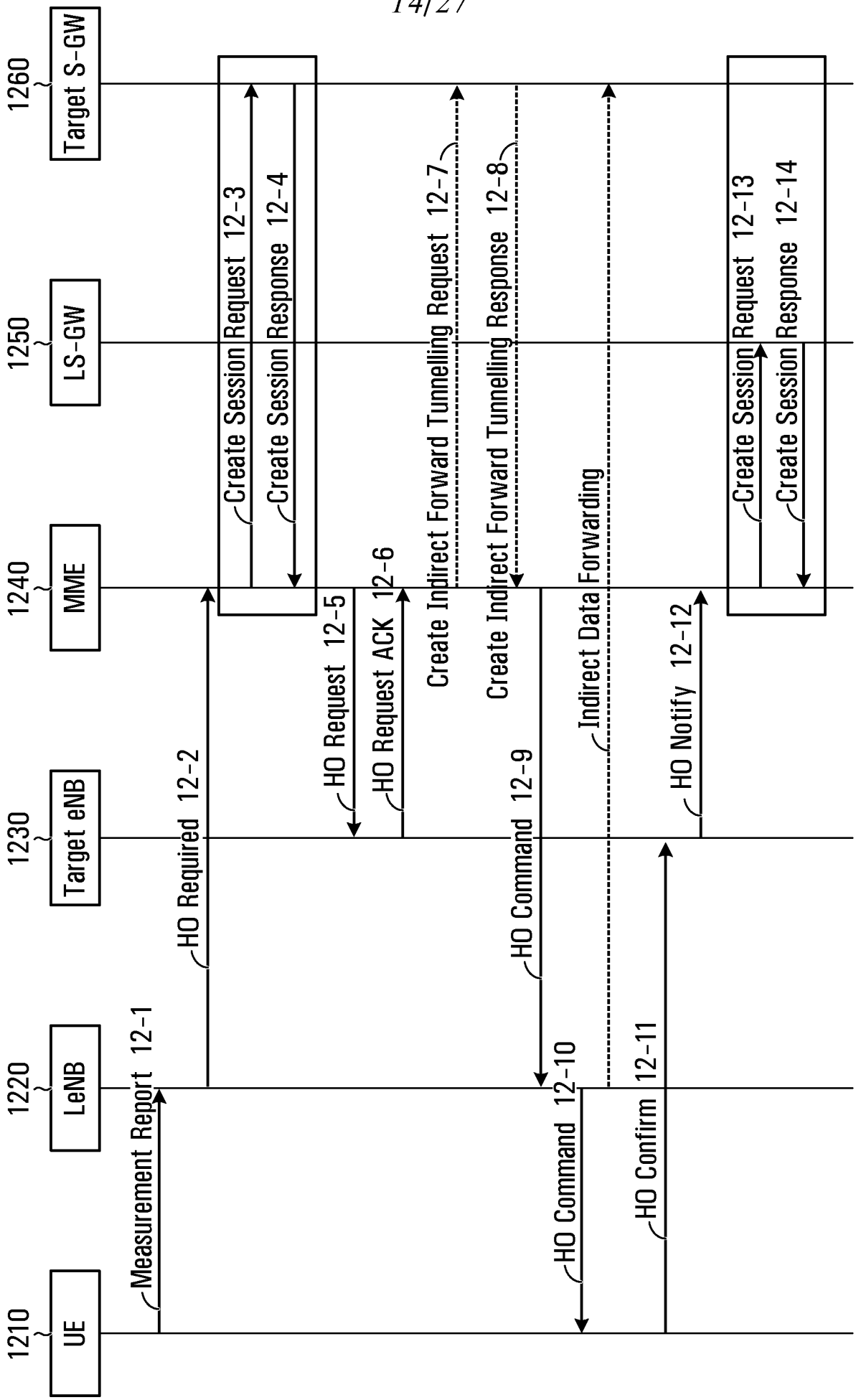

1210
UE
1220
LeNB
1230
Target eNB
1240
MME
1250
LS-GW
1260
Target S-GW
Measurement Report 12-1
HO Required 12-2
Create Session Request 12-3
Create Session Response 12-4
HO Request 12-5
HO Request ACK 12-6
Create Indirect Forward Tunnelling Request 12-7
Create Indirect Forward Tunnelling Response 12-8
HO Command 12-9
HO Command 12-10
HO Confirm 12-11
Indirect Data Forwarding
HO Notify 12-12
Create Session Request 12-13
Create Session Response 12-14

FIG. 12

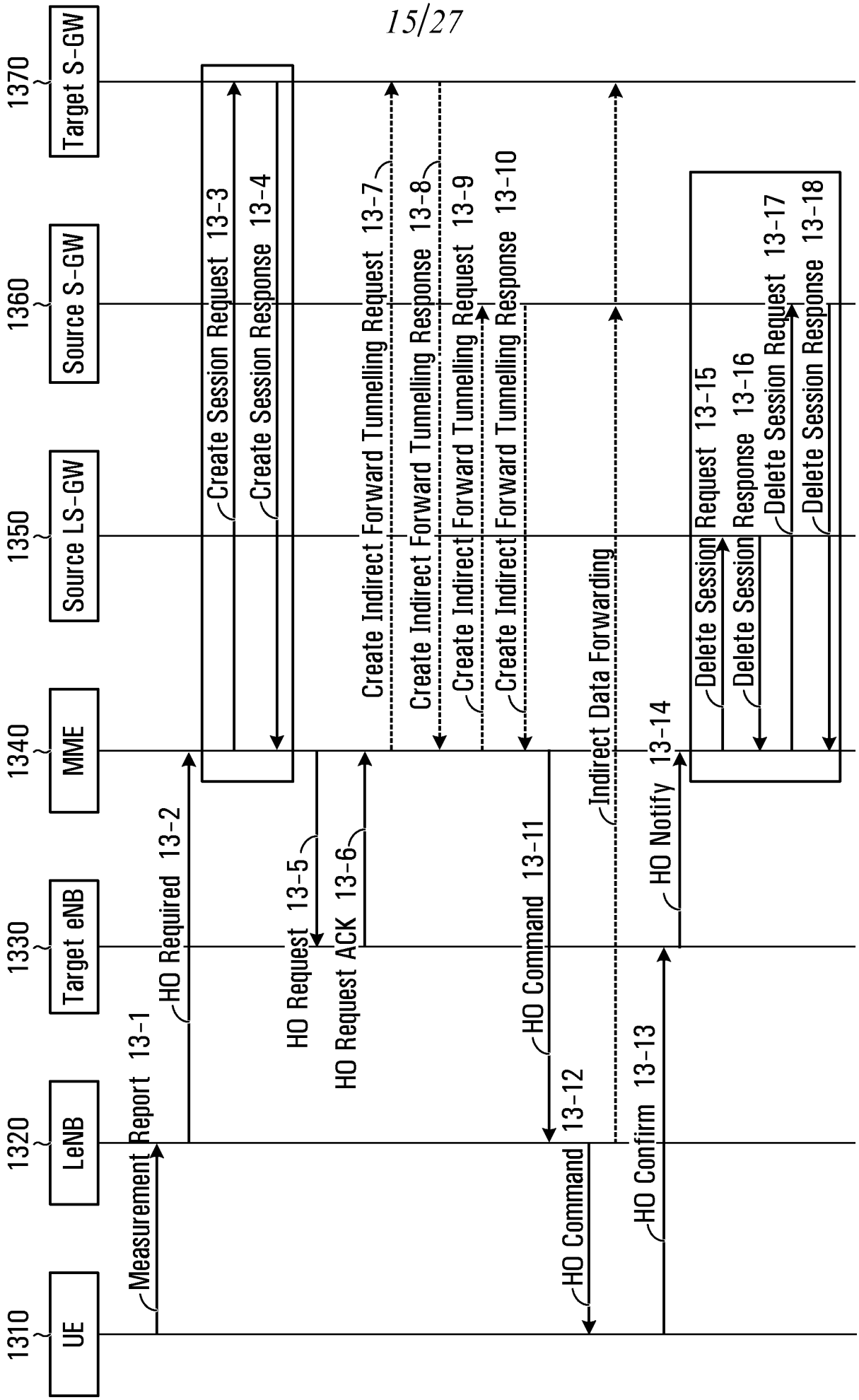

1310
UE
1320
LeNB
1330
Target eNB
1340
MME
1350
Source LS-GW
1360
Source S-GW
1370
Target S-GW
Measurement Report 13-1
HO Required 13-2
Create Session Request 13-3
Create Session Response 13-4
HO Request 13-5
HO Request ACK 13-6
Create Indirect Forward Tunnelling Request 13-7
Create Indirect Forward Tunnelling Response 13-8
Create Indirect Forward Tunnelling Request 13-9
Create Indirect Forward Tunnelling Response 13-10
HO Command 13-11
HO Command 13-12
Indirect Data Forwarding
HO Confirm 13-13
HO Notify 13-14
Delete Session Request 13-15
Delete Session Response 13-16
Delete Session Request 13-17
Delete Session Response 13-18

FIG. 13

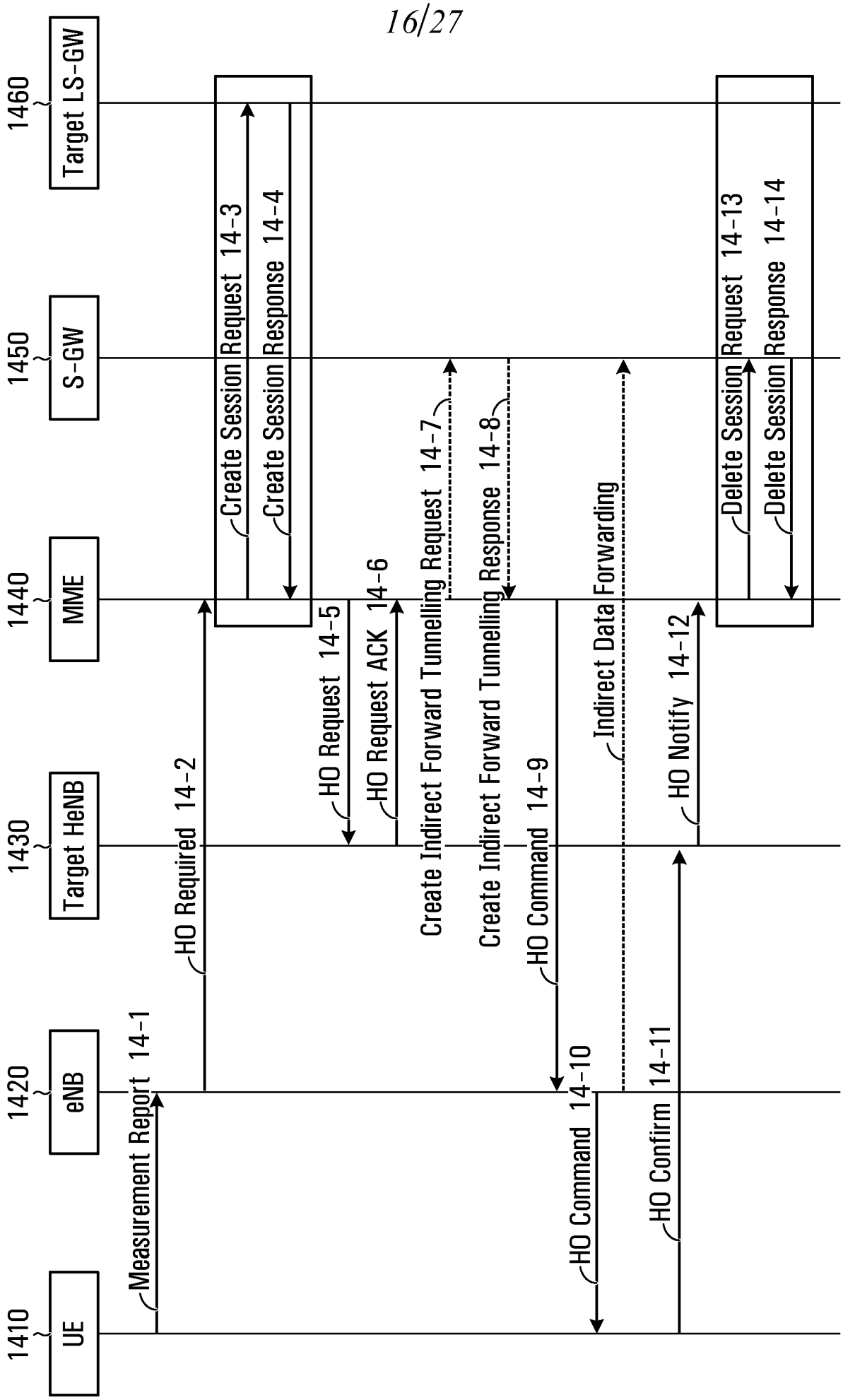

1410
UE
1420
eNB
1430
Target HeNB
1440
MME
1450
S-GW
1460
Target LS-GW
Measurement Report 14-1
HO Required 14-2
Create Session Request 14-3
Create Session Response 14-4
HO Request 14-5
HO Request ACK 14-6
Create Indirect Forward Tunnelling Request 14-7
Create Indirect Forward Tunnelling Response 14-8
HO Command 14-9
HO Command 14-10
Indirect Data Forwarding
HO Confirm 14-11
HO Notify 14-12
Delete Session Request 14-13
Delete Session Response 14-14

FIG. 14

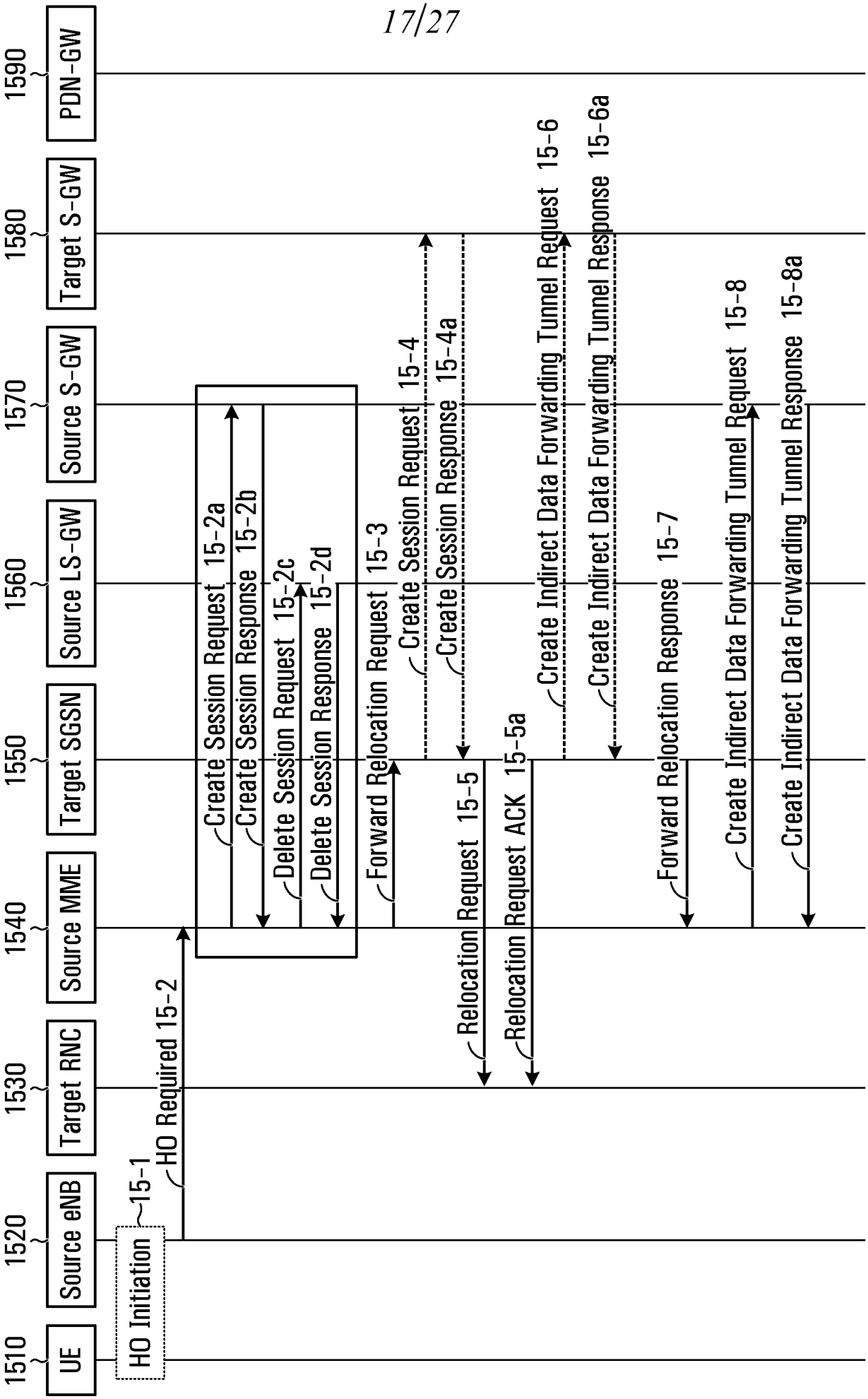

1510
UE
1520
Source eNB
1530
Target RNC
1540
Source MME
1550
Target SGSN
1560
Source LS-GW
1570
Source S-GW
1580
Target S-GW
1590
PDN-GW
HO Initiation
15-1
HO Required 15-2
Create Session Request 15-2a
Create Session Response 15-2b
Delete Session Request 15-2c
Delete Session Response 15-2d
Forward Relocation Request 15-3
Create Session Request 15-4
Create Session Response 15-4a
Relocation Request 15-5
Relocation Request ACK 15-5a
Create Indirect Data Forwarding Tunnel Request 15-6
Create Indirect Data Forwarding Tunnel Response 15-6a
Forward Relocation Response 15-7
Create Indirect Data Forwarding Tunnel Request 15-8
Create Indirect Data Forwarding Tunnel Response 15-8a

FIG. 15

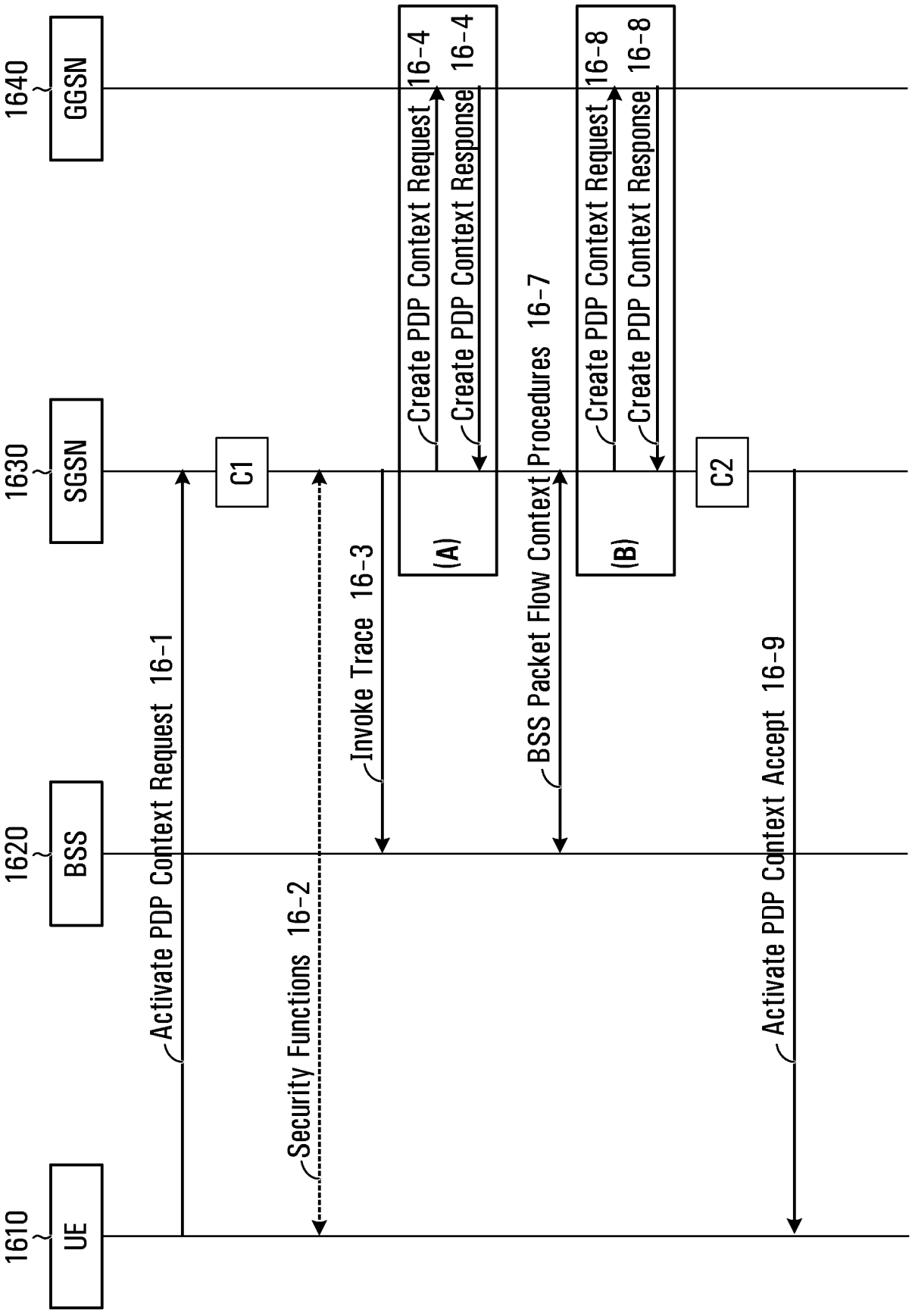

1610
UE
1620
BSS
1630
SGSN
1640
GGSN
C1
C2
Activate PDP Context Request 16-1
Security Functions 16-2
Invoke Trace 16-3
Create PDP Context Request 16-4
Create PDP Context Response 16-4
(A)
BSS Packet Flow Context Procedures 16-7
Create PDP Context Request 16-8
Create PDP Context Response 16-8
(B)
Activate PDP Context Accept 16-9

FIG. 16

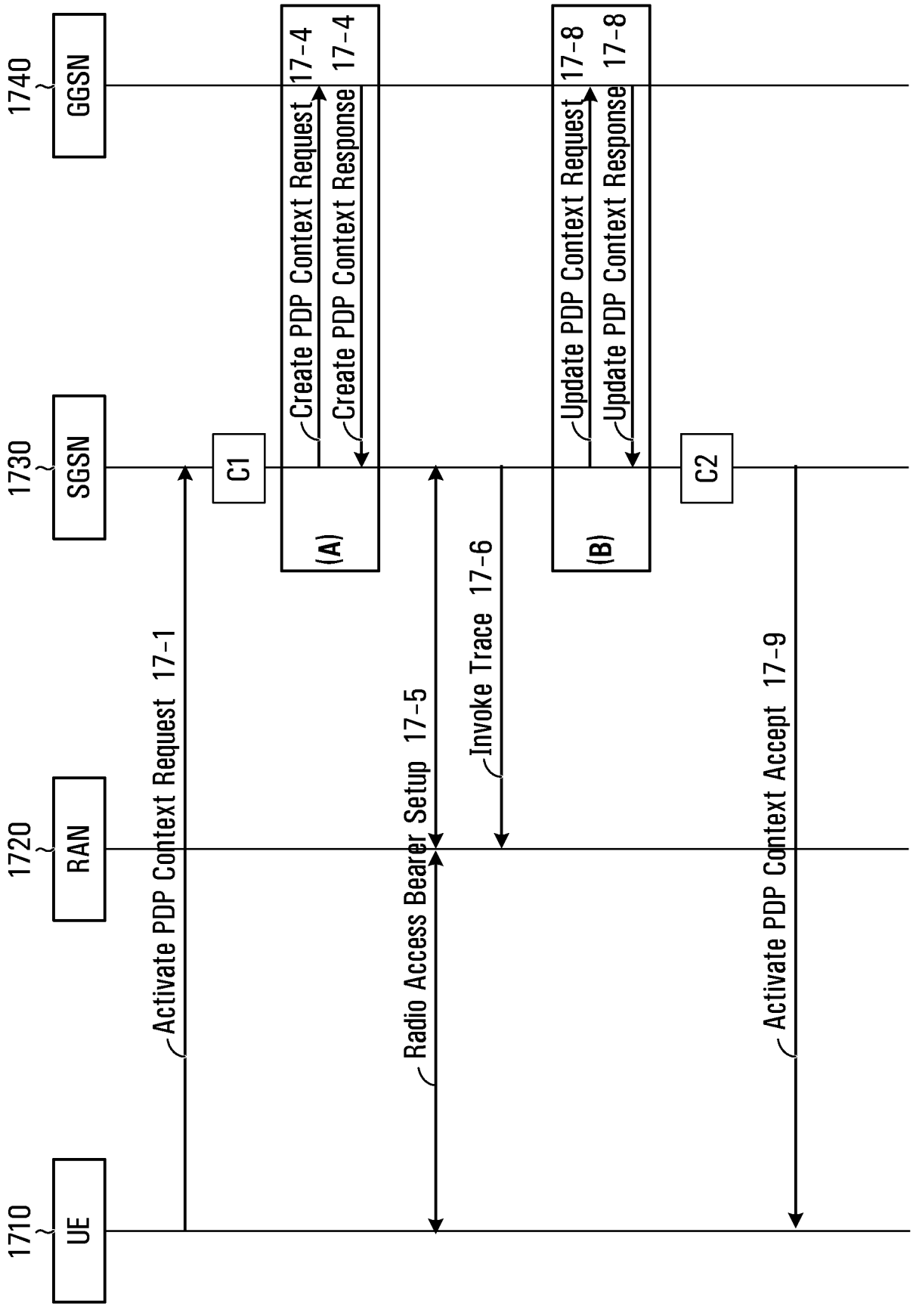

1710
UE
1720
RAN
1730
SGSN
1740
GGSN
C1
C2
(A)
(B)
Activate PDP Context Request 17-1
Create PDP Context Request 17-4
Create PDP Context Response 17-4
Radio Access Bearer Setup 17-5
Invoke Trace 17-6
Update PDP Context Request 17-8
Update PDP Context Response 17-8
Activate PDP Context Accept 17-9

FIG. 17

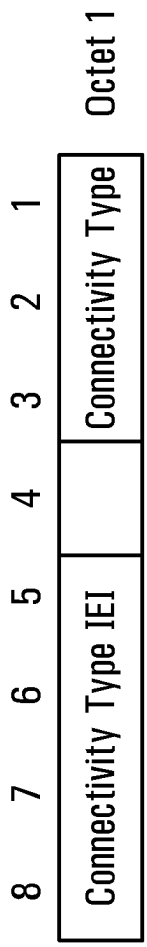



FIG. 18

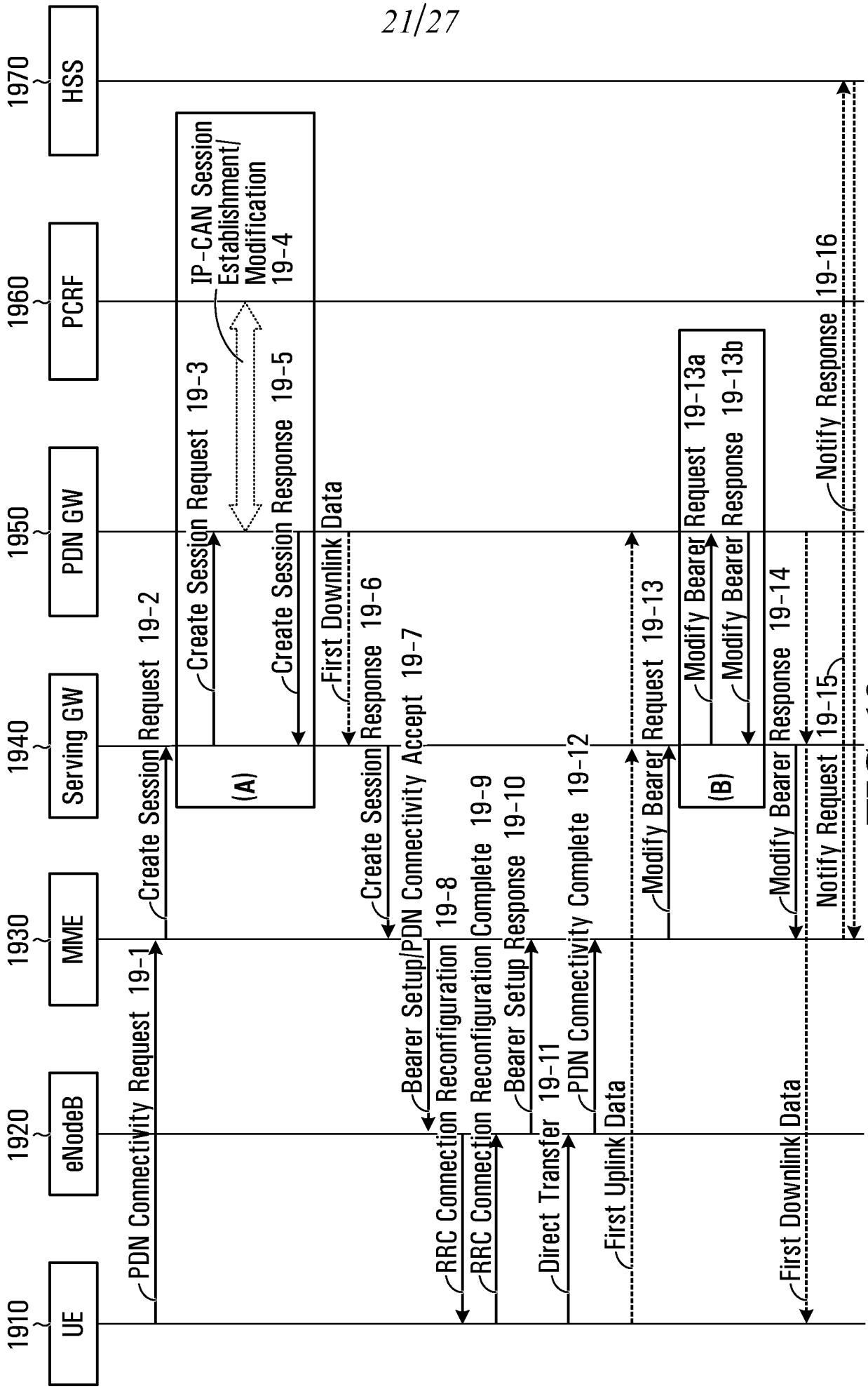

1910
UE
1920
eNodeB
1930
MME
1940
Serving GW
1950
PDN GW
1960
PCRF
1970
HSS
PDN Connectivity Request 19-1
Create Session Request 19-2
Create Session Request 19-3
IP-CAN Session Establishment/ Modification 19-4
Create Session Response 19-5
First Downlink Data
(A)
Create Session Response 19-6
PDN Connectivity Accept 19-7
Bearer Setup/PDN Connectivity Accept 19-8
RRC Connection Reconfiguration 19-8
RRC Connection Reconfiguration Complete 19-9
Bearer Setup Response 19-10
Direct Transfer 19-11
PDN Connectivity Complete 19-12
First Uplink Data
Modify Bearer Request 19-13
Modify Bearer Request 19-13a
Modify Bearer Response 19-13b
(B)
Modify Bearer Response 19-14
Notify Request 19-15
Notify Response 19-16
First Downlink Data

FIG. 19

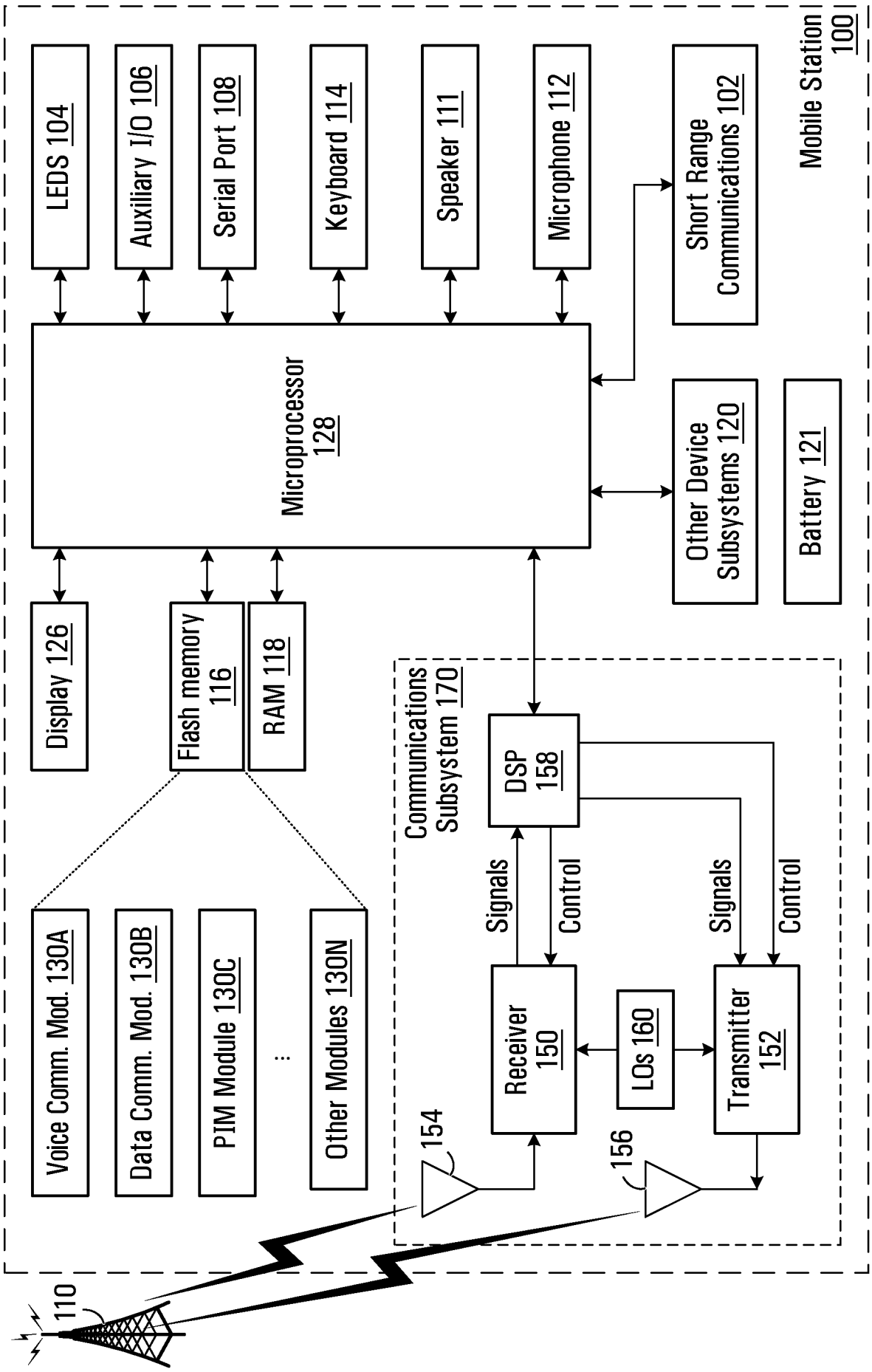

Mobile Station 100
LEDS 104
Auxiliary I/O 106
Serial Port 108
Keyboard 114
Speaker 111
Microphone 112
Short Range Communications 102
Microprocessor 128
Other Device Subsystems 120
Battery 121
Display 126
Flash memory 116
RAM 118
Voice Comm. Mod. 130A
Data Comm. Mod. 130B
PIM Module 130C
Other Modules 130N
Communications Subsystem 170
DSP 158
Signals
Control
Signals
Control
Receiver 150
LOs 160
Transmitter 152
154
156
110

FIG. 20

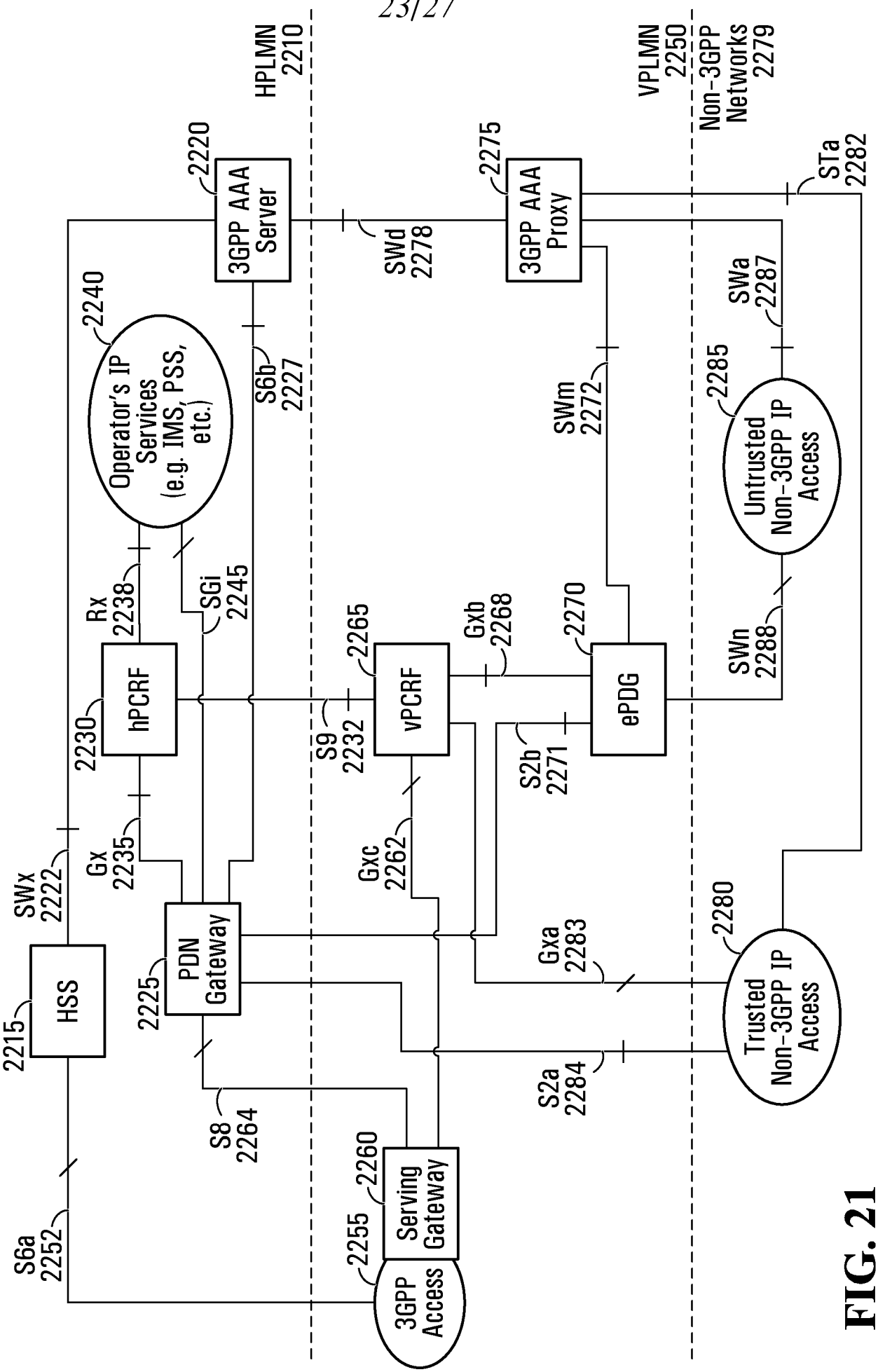

HPLMN 2210
VPLMN 2250
Non-3GPP Networks 2279
3GPP AAA Server 2220
3GPP AAA Proxy 2275
STa 2282
SWd 2278
S6b 2227
SWa 2287
SWm 2272
Operator's IP Services (e.g. IMS, PSS, etc.) 2240
Untrusted Non-3GPP IP Access 2285
Rx 2238
SGi 2245
hPCRF 2230
vPCRF 2265
Gxb 2268
ePDG 2270
SWn 2288
S9 2232
S2b 2271
Gx 2235
Gxc 2262
SWx 2222
PDN Gateway 2225
Gxa 2283
Trusted Non-3GPP IP Access 2280
HSS 2215
S8 2264
S2a 2284
S6a 2252
Serving Gateway 2260
2255
3GPP Access

FIG. 21

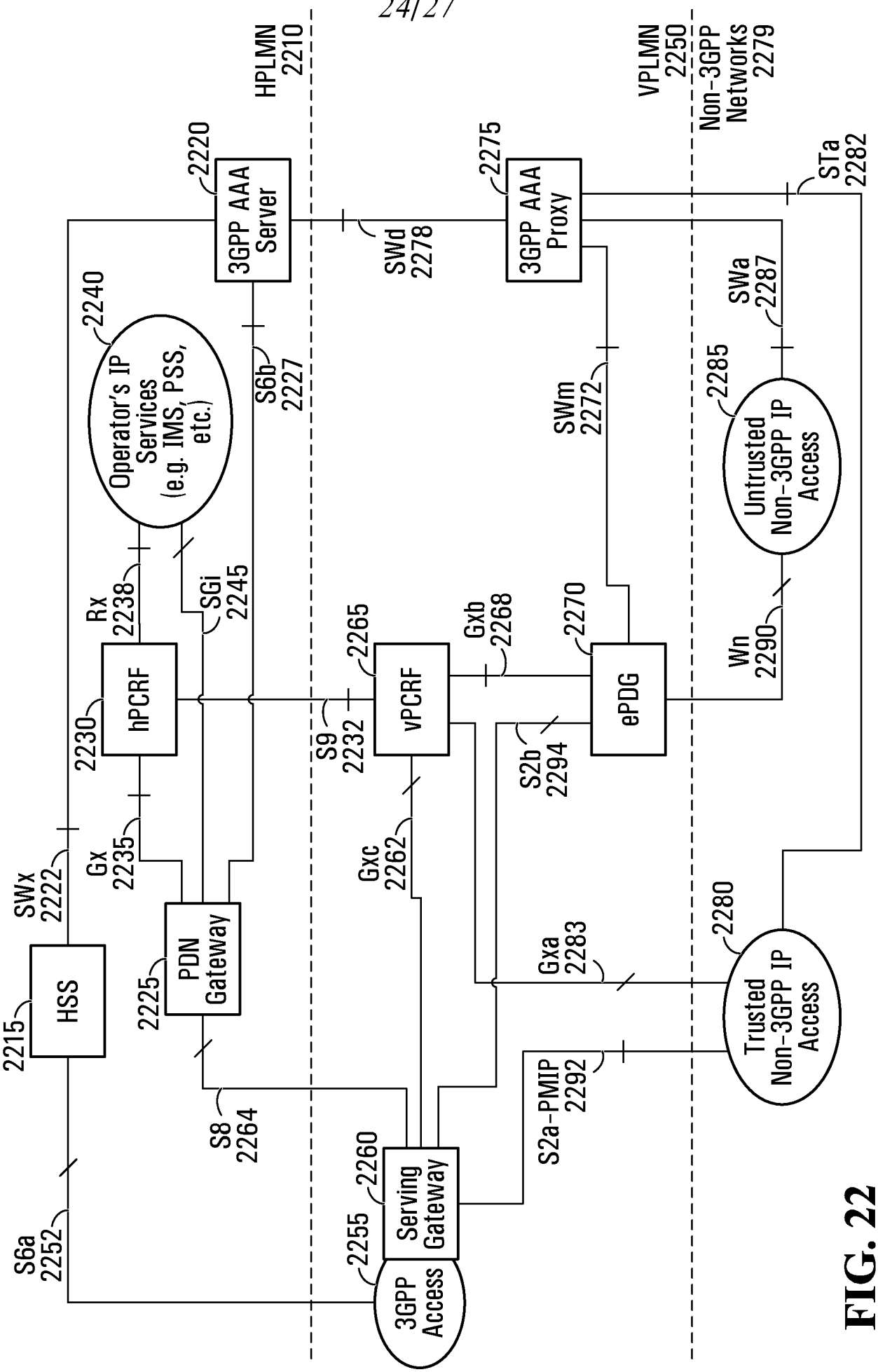

HPLMN 2210
VPLMN 2250
Non-3GPP Networks 2279
3GPP AAA Server 2220
3GPP AAA Proxy 2275
STa 2282
SWd 2278
SWa 2287
SWm 2272
Operator's IP Services (e.g. IMS, PSS, etc.) 2240
S6b 2227
Rx 2238
SGi 2245
hPCRF 2230
vPCRF 2265
Gxb 2268
ePDG 2270
Untrusted Non-3GPP IP Access 2285
Wn 2290
S9 2232
S2b 2294
Gx 2235
Gxc 2262
SWx 2222
HSS 2215
PDN Gateway 2225
Gxa 2283
Trusted Non-3GPP IP Access 2280
S8 2264
S2a-PMIP 2292
S6a 2252
Serving Gateway 2255 2260
3GPP Access

FIG. 22

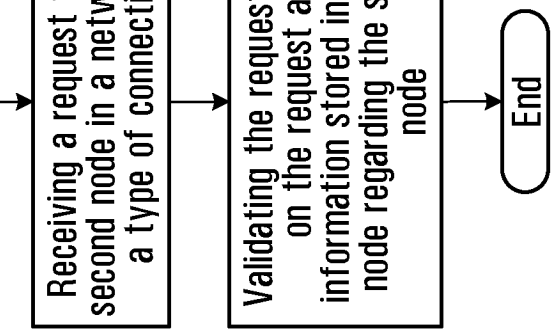



FIG. 23

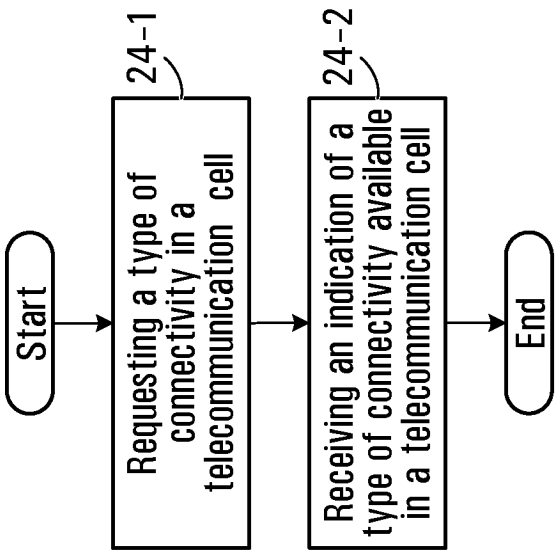



FIG. 24




FIG. 25

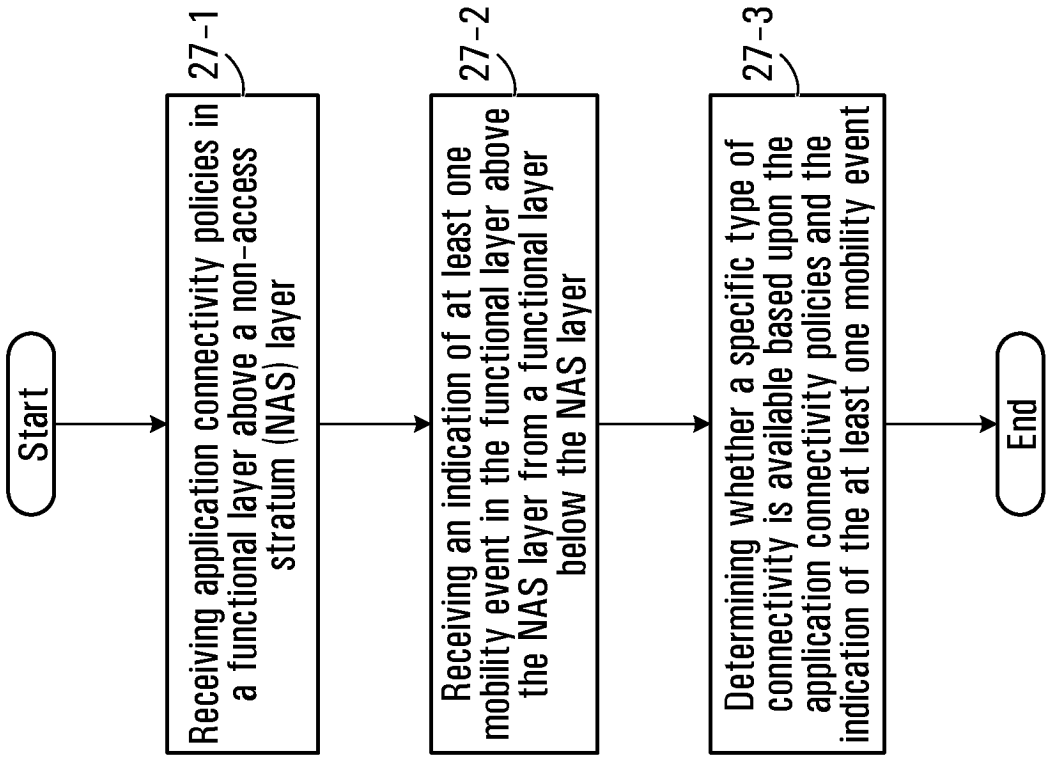

Start
Receiving application connectivity policies in a functional layer above a non-access stratum (NAS) layer
27-1
Receiving an indication of at least one mobility event in the functional layer above the NAS layer from a functional layer below the NAS layer
27-2
Determining whether a specific type of connectivity is available based upon the application connectivity policies and the indication of the at least one mobility event
27-3
End

FIG. 27

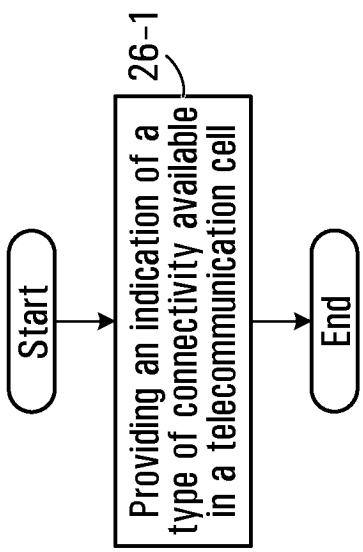

Start
Providing an indication of a type of connectivity available in a telecommunication cell
26-1
End

FIG. 26

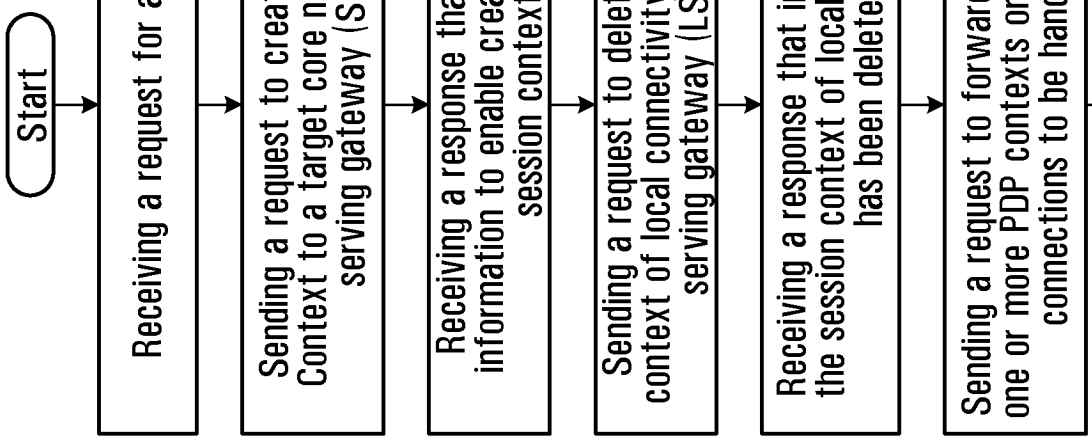

Start
28-1
Receiving a request for a handover
28-2
Sending a request to create a session Context to a target core network (CN) serving gateway (S-GW)
28-3
Receiving a response that includes information to enable creation of the session context
28-4
Sending a request to delete a session context of local connectivity with a local serving gateway (LS-GW)
28-5
Receiving a response that indicates that the session context of local connectivity has been deleted
28-6
Sending a request to forward relocation of one or more PDP contexts or PDN network connections to be handed over
End

FIG. 28

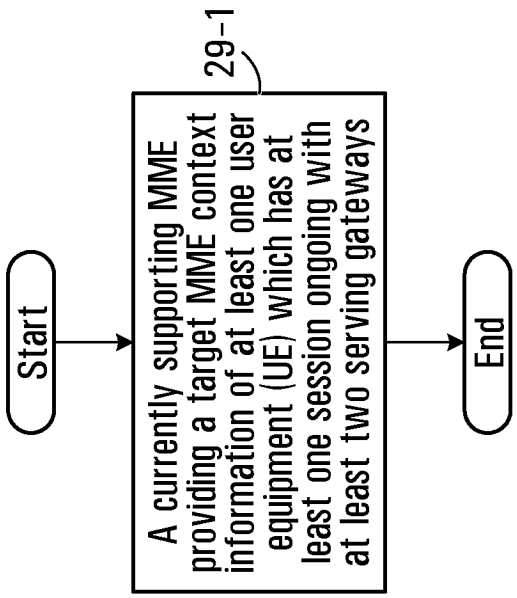

Start
29-1
A currently supporting MME providing a target MME context information of at least one user equipment (UE) which has at least one session ongoing with at least two serving gateways
End

FIG. 29