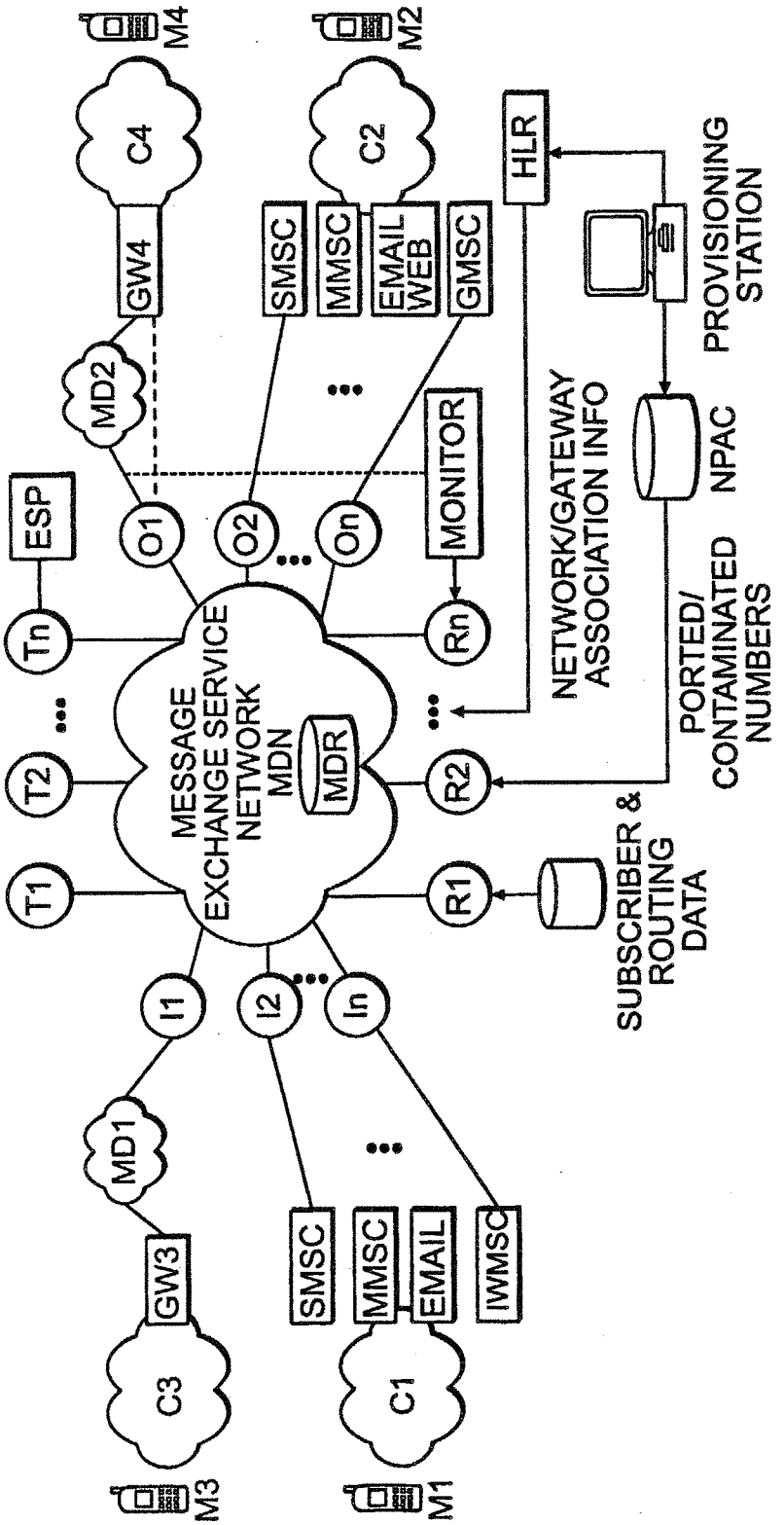

M4
M2
C4
C2
GW4
SMSC
MMSC
EMAIL WEB
GMSC
HLR
PROVISIONING STATION
MD2
MONITOR
NETWORK/GATEWAY ASSOCIATION INFO
ESP
O1
O2
On
NPAC
Tn
Rn
MESSAGE EXCHANGE SERVICE NETWORK MDN
MDR
PORTED/ CONTAMINATED NUMBERS
T2
R2
T1
R1
SUBSCRIBER & ROUTING DATA
I1
I2
In
MD1
GW3
SMSC
MMSC
EMAIL
IWMSC
C3
C1
M3
M1

FIG. 1

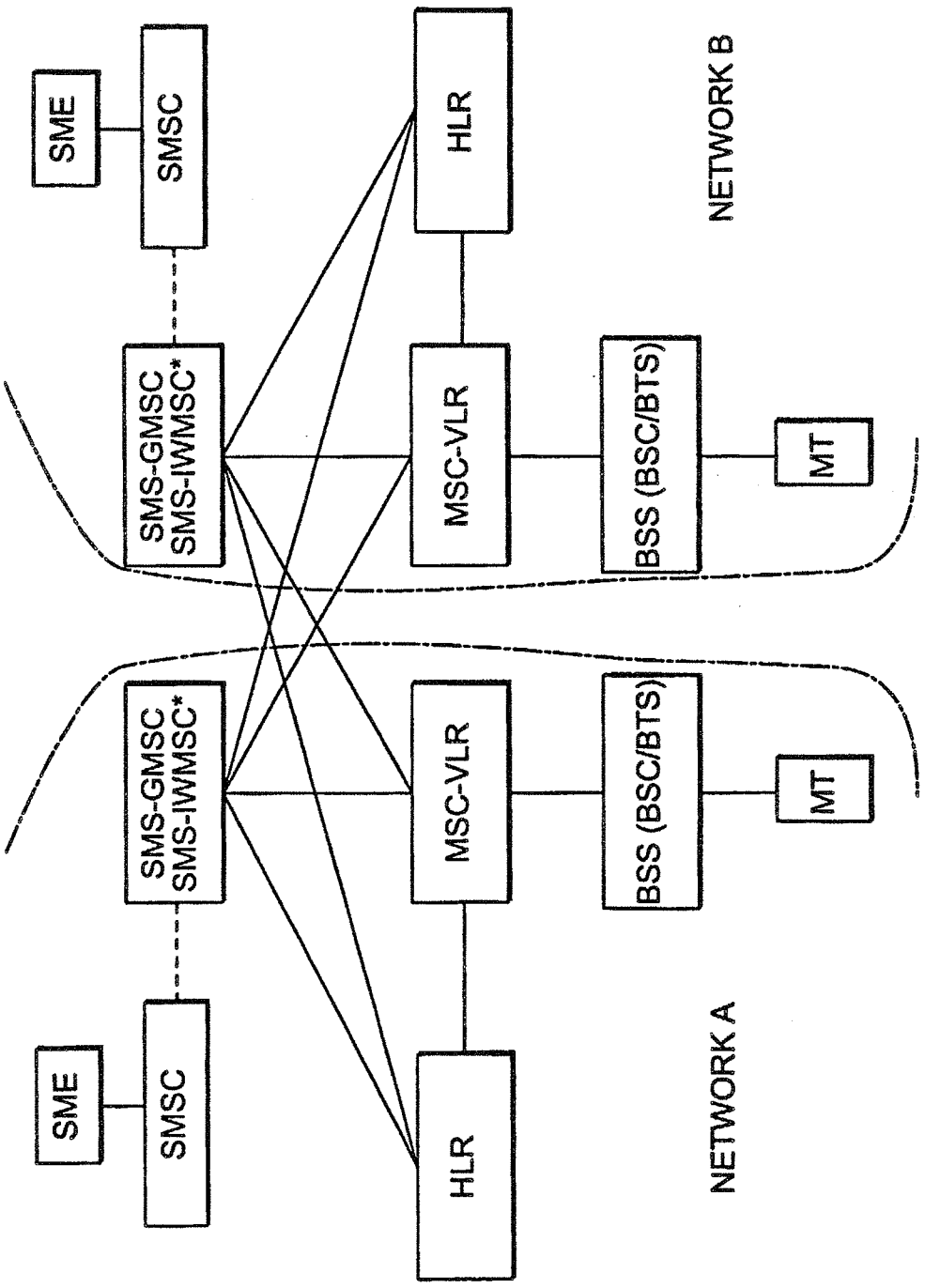

SME
SMSC
HLR
NETWORK B
SMS-GMSC
SMS-IWMSC*
MSC-VLR
BSS (BSC/BTS)
MT
SMS-GMSC
SMS-IWMSC*
MSC-VLR
BSS (BSC/BTS)
MT
SME
SMSC
HLR
NETWORK A

FIG. 2

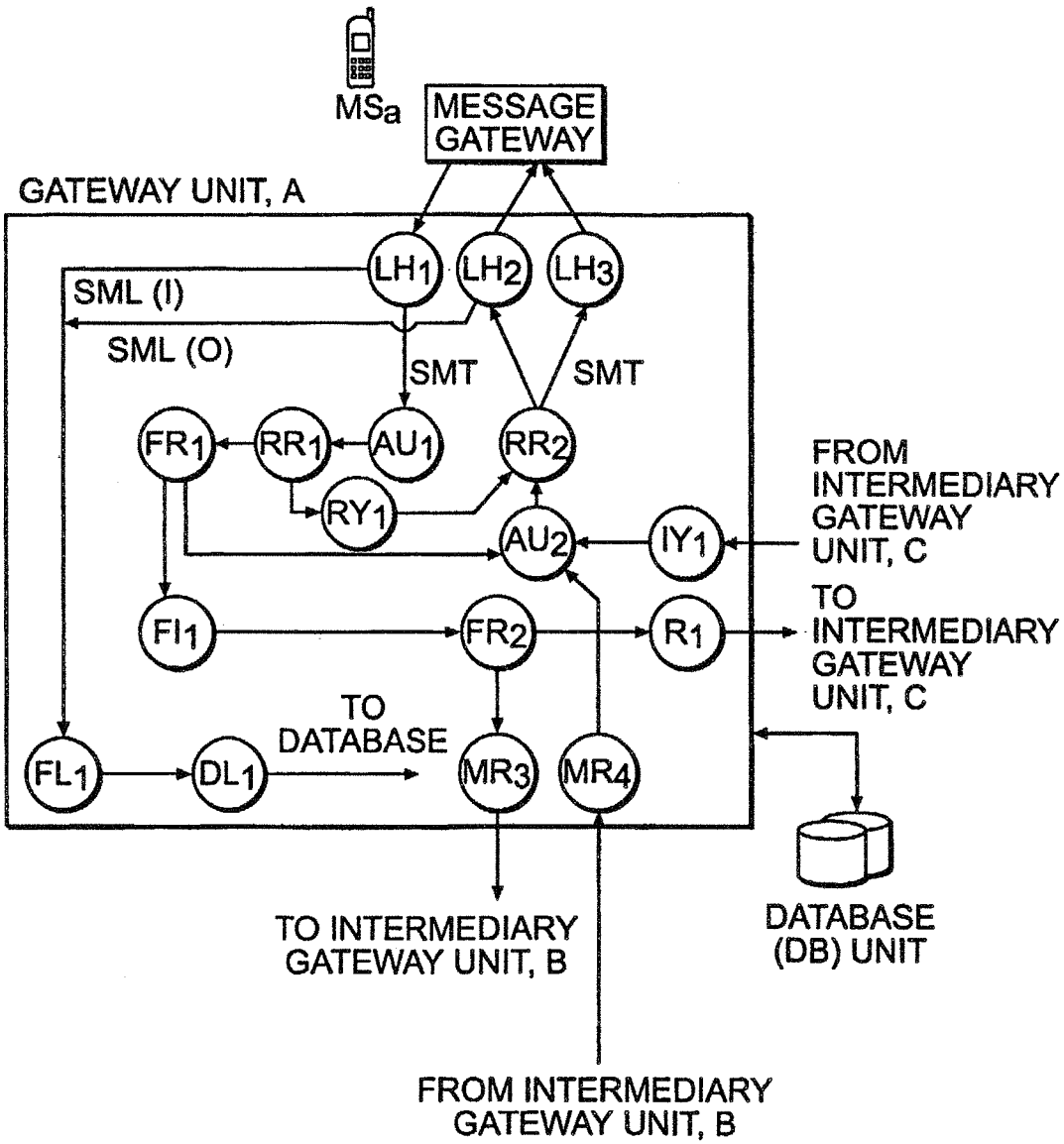

MSa
MESSAGE GATEWAY
GATEWAY UNIT, A
LH1
LH2
LH3
SML (I)
SML (O)
SMT
SMT
FR1
RR1
AU1
RR2
RY1
AU2
IY1
FROM INTERMEDIARY GATEWAY UNIT, C
FI1
FR2
R1
TO INTERMEDIARY GATEWAY UNIT, C
TO DATABASE
FL1
DL1
MR3
MR4
TO INTERMEDIARY GATEWAY UNIT, B
DATABASE (DB) UNIT
FROM INTERMEDIARY GATEWAY UNIT, B

FIG. 3

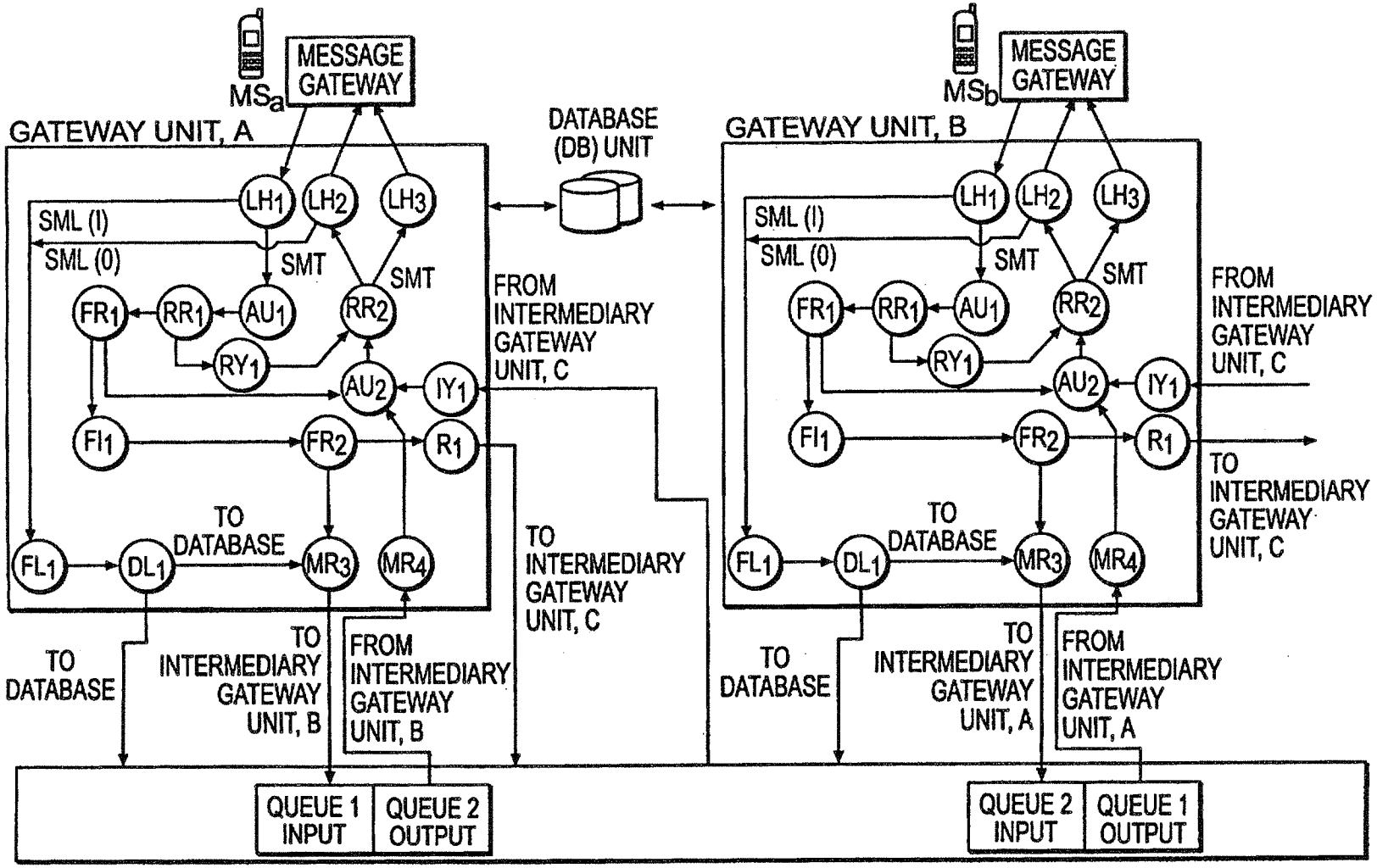

MS$_a$
MESSAGE GATEWAY
GATEWAY UNIT, A
DATABASE (DB) UNIT
MS$_b$
MESSAGE GATEWAY
GATEWAY UNIT, B
LH1
LH2
LH3
SML (I)
SML (0)
SMT
SMT
FR1
RR1
AU1
RR2
RY1
AU2
IY1
FI1
FR2
R1
FL1
DL1
TO DATABASE
MR3
MR4
FROM INTERMEDIARY GATEWAY UNIT, C
TO INTERMEDIARY GATEWAY UNIT, C
TO DATABASE
TO INTERMEDIARY GATEWAY UNIT, B
FROM INTERMEDIARY GATEWAY UNIT, B
TO INTERMEDIARY GATEWAY UNIT, A
FROM INTERMEDIARY GATEWAY UNIT, A
QUEUE 1 INPUT
QUEUE 2 OUTPUT
QUEUE 2 INPUT
QUEUE 1 OUTPUT
DISTRIBUTED QUEUING SYSTEM

FIG. 4

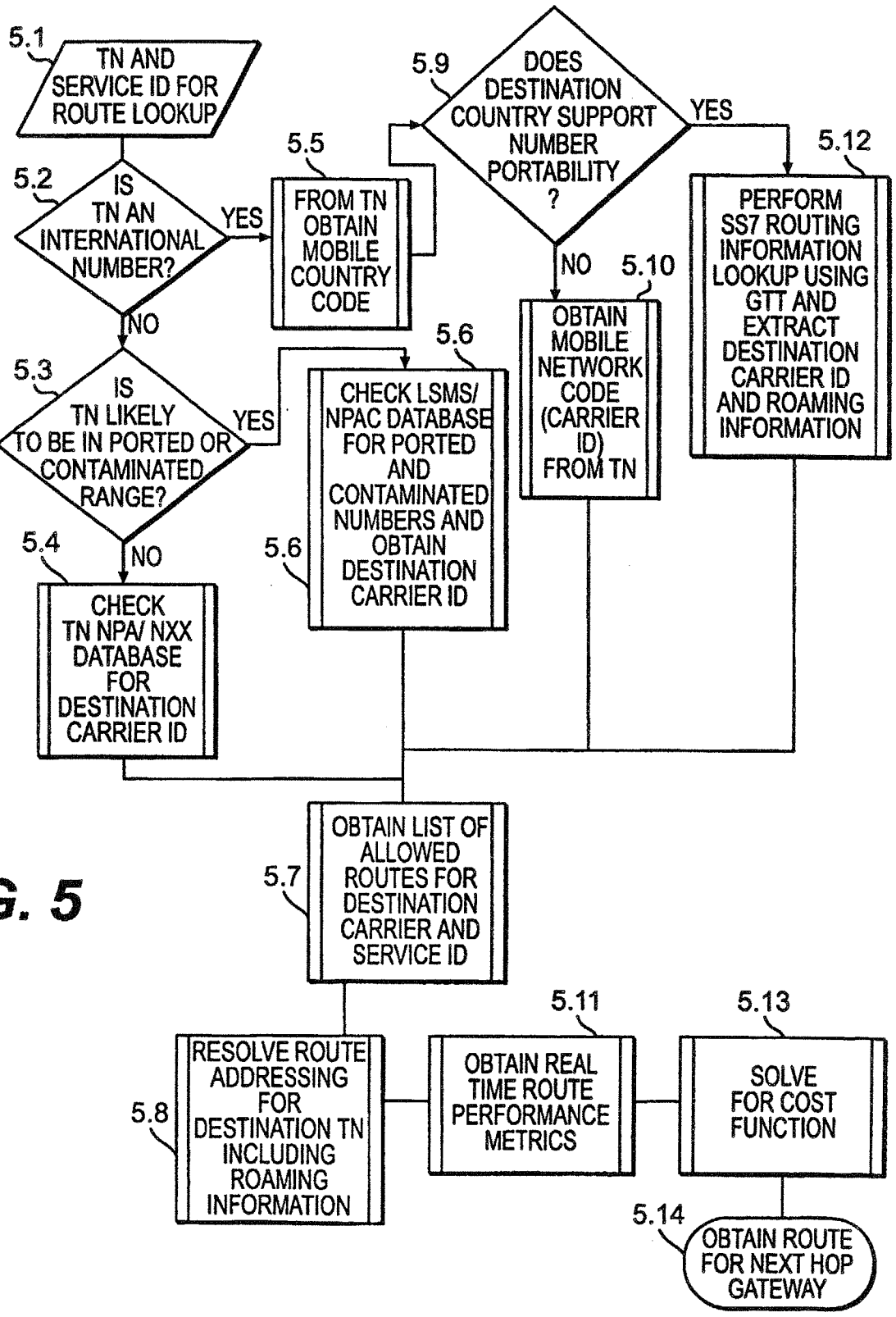

5.1
TN AND SERVICE ID FOR ROUTE LOOKUP
5.2
IS TN AN INTERNATIONAL NUMBER?
YES
NO
5.3
IS TN LIKELY TO BE IN PORTED OR CONTAMINATED RANGE?
YES
NO
5.4
CHECK TN NPA/ NXX DATABASE FOR DESTINATION CARRIER ID
5.5
FROM TN OBTAIN MOBILE COUNTRY CODE
5.6
CHECK LSMS/ NPAC DATABASE FOR PORTED AND CONTAMINATED NUMBERS AND OBTAIN DESTINATION CARRIER ID
5.6
5.9
DOES DESTINATION COUNTRY SUPPORT NUMBER PORTABILITY ?
YES
NO
5.10
OBTAIN MOBILE NETWORK CODE (CARRIER ID) FROM TN
5.12
PERFORM SS7 ROUTING INFORMATION LOOKUP USING GTT AND EXTRACT DESTINATION CARRIER ID AND ROAMING INFORMATION
5.7
OBTAIN LIST OF ALLOWED ROUTES FOR DESTINATION CARRIER AND SERVICE ID
5.8
RESOLVE ROUTE ADDRESSING FOR DESTINATION TN INCLUDING ROAMING INFORMATION
5.11
OBTAIN REAL TIME ROUTE PERFORMANCE METRICS
5.13
SOLVE FOR COST FUNCTION
5.14
OBTAIN ROUTE FOR NEXT HOP GATEWAY

FIG. 5

COMMAND LENGTH
COMMAND ID
COMMAND STATUS
SEQUENCE NUMBER
SERVICE TYPE
SOURCE ADDRESS TON
SOURCE ADDRESS NPI
SOURCE ADDRESS
DESTINATION ADDRESS TON
DESTINATION ADDRESS NPI
DESTINATION ADDRESS
ESM CLASS
PROTOCOL ID
PRIORITY FLAG
SCHEDULE DELIVERY TIME
VALIDITY PERIOD
REGISTERED DELIVERY
REPLACE IF PRESENT FLAG
DATA CODING
MESSAGE LENGTH
SHORT MESSAGE
OPTIONAL PARAMETERS

SMPP 3.4 MESSAGE FORMAT

FIG. 5A

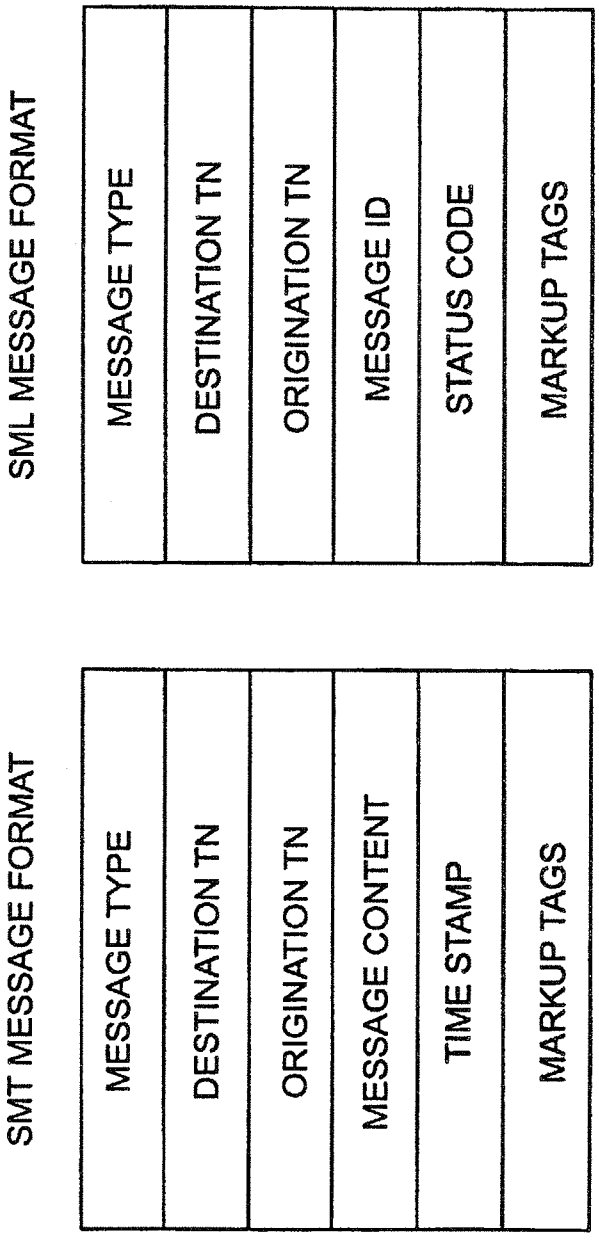

SML MESSAGE FORMAT
MESSAGE TYPE
DESTINATION TN
ORIGINATION TN
MESSAGE ID
STATUS CODE
MARKUP TAGS
SMT MESSAGE FORMAT
MESSAGE TYPE
DESTINATION TN
ORIGINATION TN
MESSAGE CONTENT
TIME STAMP
MARKUP TAGS

FIG. 6

7.1 2
7.2 +13017284941
7.3 +17036082119
7.4 NEXTE020827225432772
7.5 N
7.6 in_agent=INAGN
7.7 mc=3
7.8 dp=SS7
7.9 dm=direct
7.10 out_agent=SS7TX
7.11 rsn=1105

FIG. 7

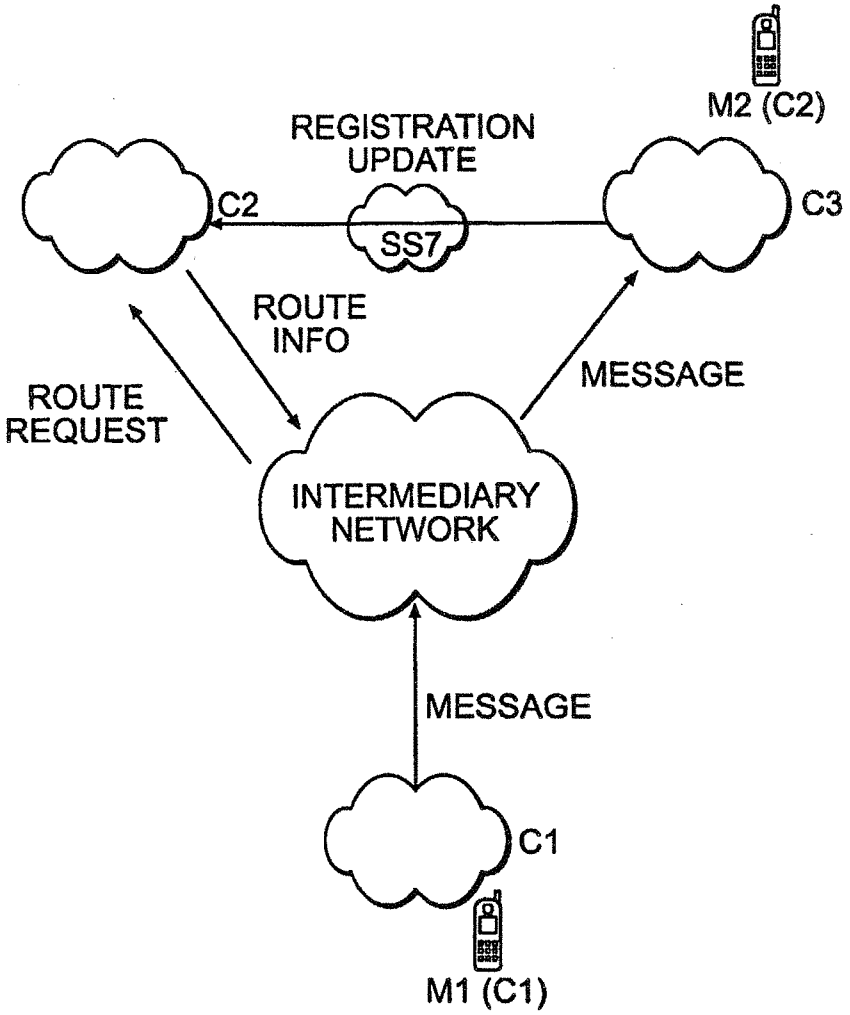

M2 (C2)
REGISTRATION
UPDATE
C2
SS7
C3
ROUTE
INFO
ROUTE
REQUEST
MESSAGE
INTERMEDIARY
NETWORK
MESSAGE
C1
M1 (C1)

FIG. 8

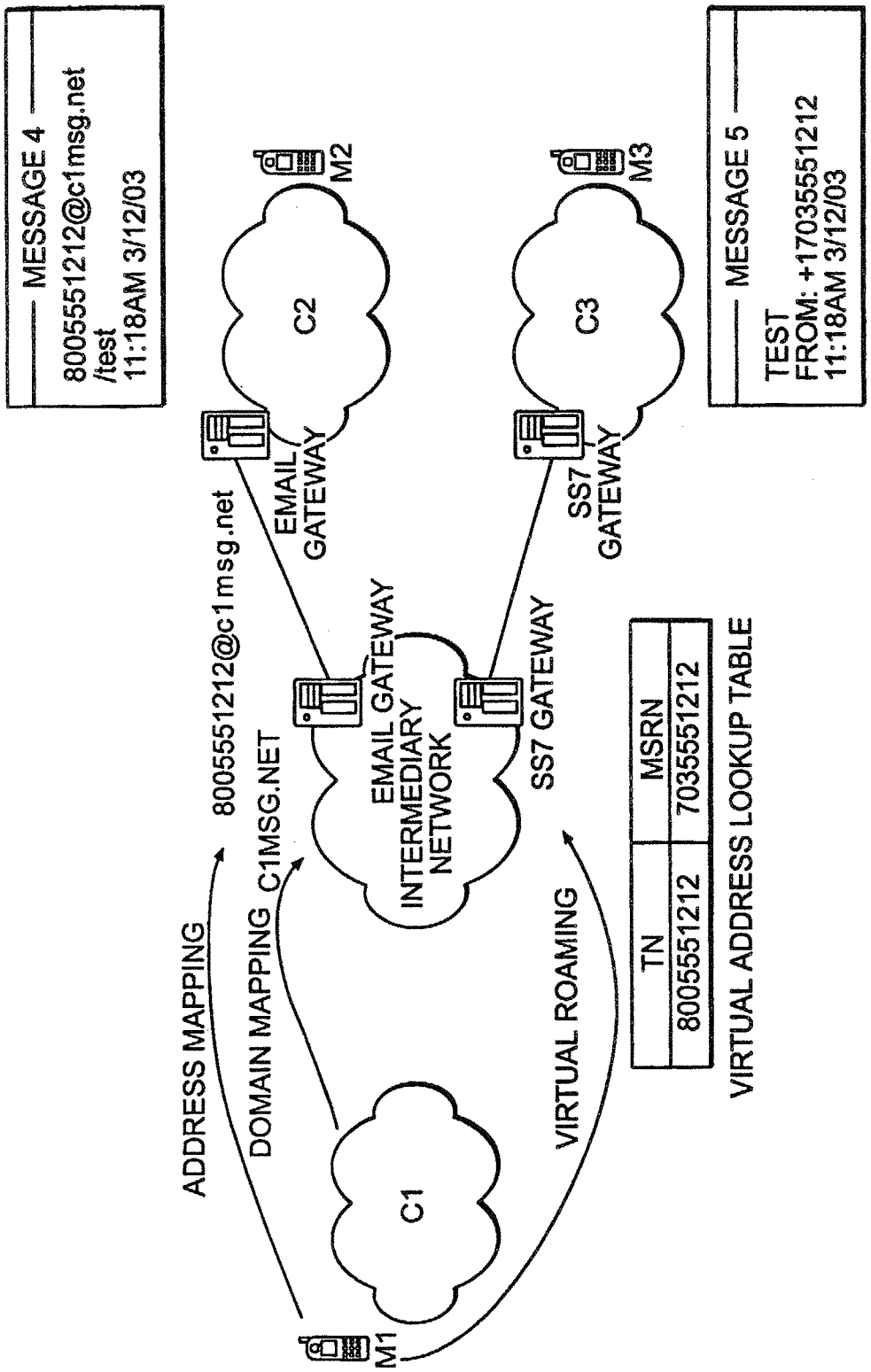

MESSAGE 4
8005551212@c1msg.net
/test
11:18AM 3/12/03
MESSAGE 5
TEST
FROM: +17035551212
11:18AM 3/12/03
M1
M2
M3
C1
C2
C3
EMAIL GATEWAY
SS7 GATEWAY
EMAIL GATEWAY
INTERMEDIARY NETWORK
SS7 GATEWAY
8005551212@c1msg.net
C1MSG.NET
ADDRESS MAPPING
DOMAIN MAPPING
VIRTUAL ROAMING
TN
MSRN
8005551212
7035551212
VIRTUAL ADDRESS LOOKUP TABLE

FIG. 9

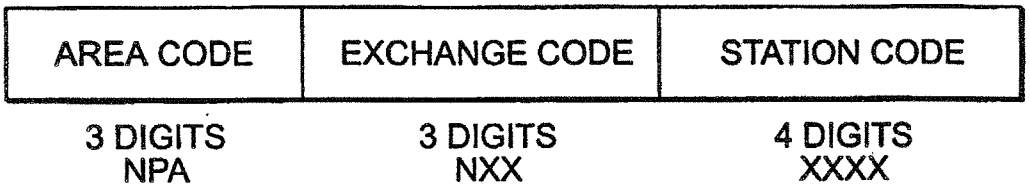

AREA CODE
EXCHANGE CODE
STATION CODE
3 DIGITS
NPA
3 DIGITS
NXX
4 DIGITS
XXXX

FIG. 10

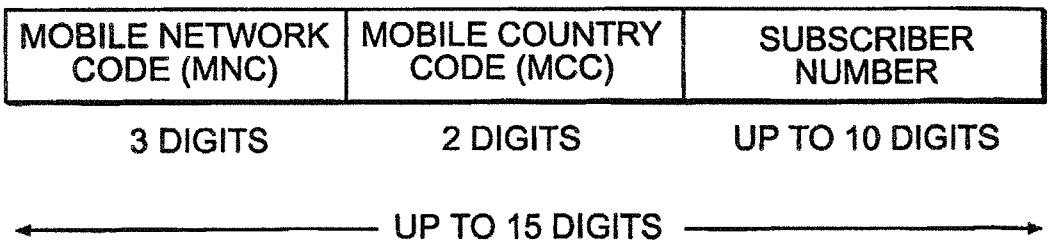

MOBILE NETWORK CODE (MNC)
MOBILE COUNTRY CODE (MCC)
SUBSCRIBER NUMBER
3 DIGITS
2 DIGITS
UP TO 10 DIGITS
UP TO 15 DIGITS

FIG. 11

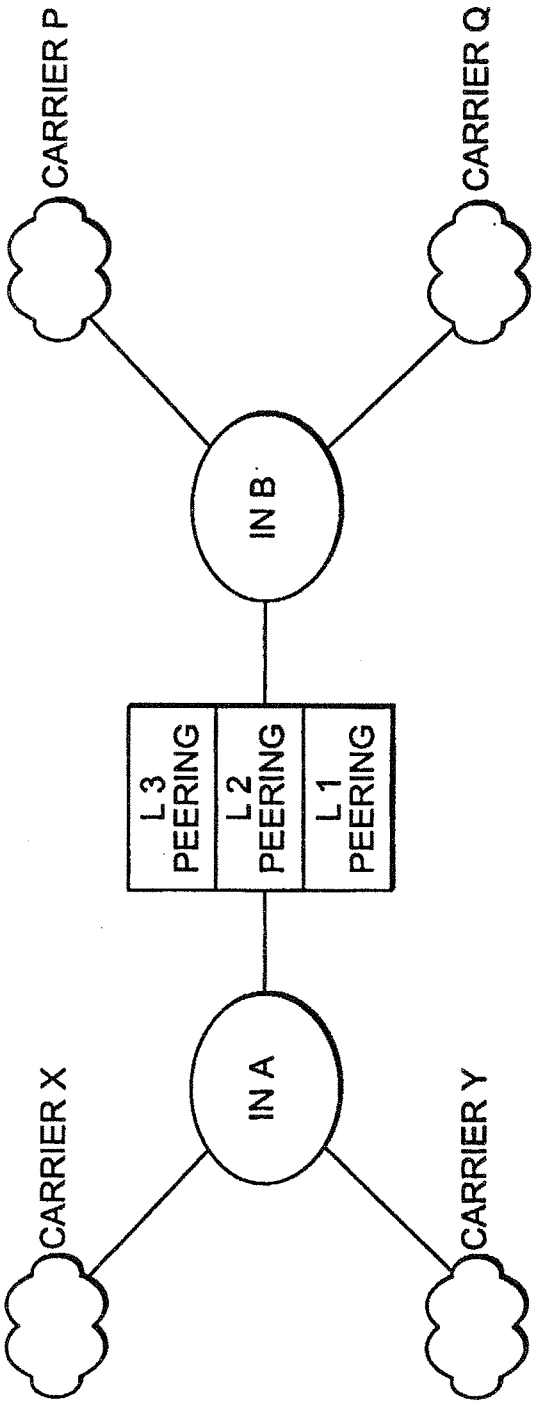

CARRIER P
CARRIER Q
IN B
L 3 PEERING
L 2 PEERING
L 1 PEERING
IN A
CARRIER X
CARRIER Y

FIG. 12

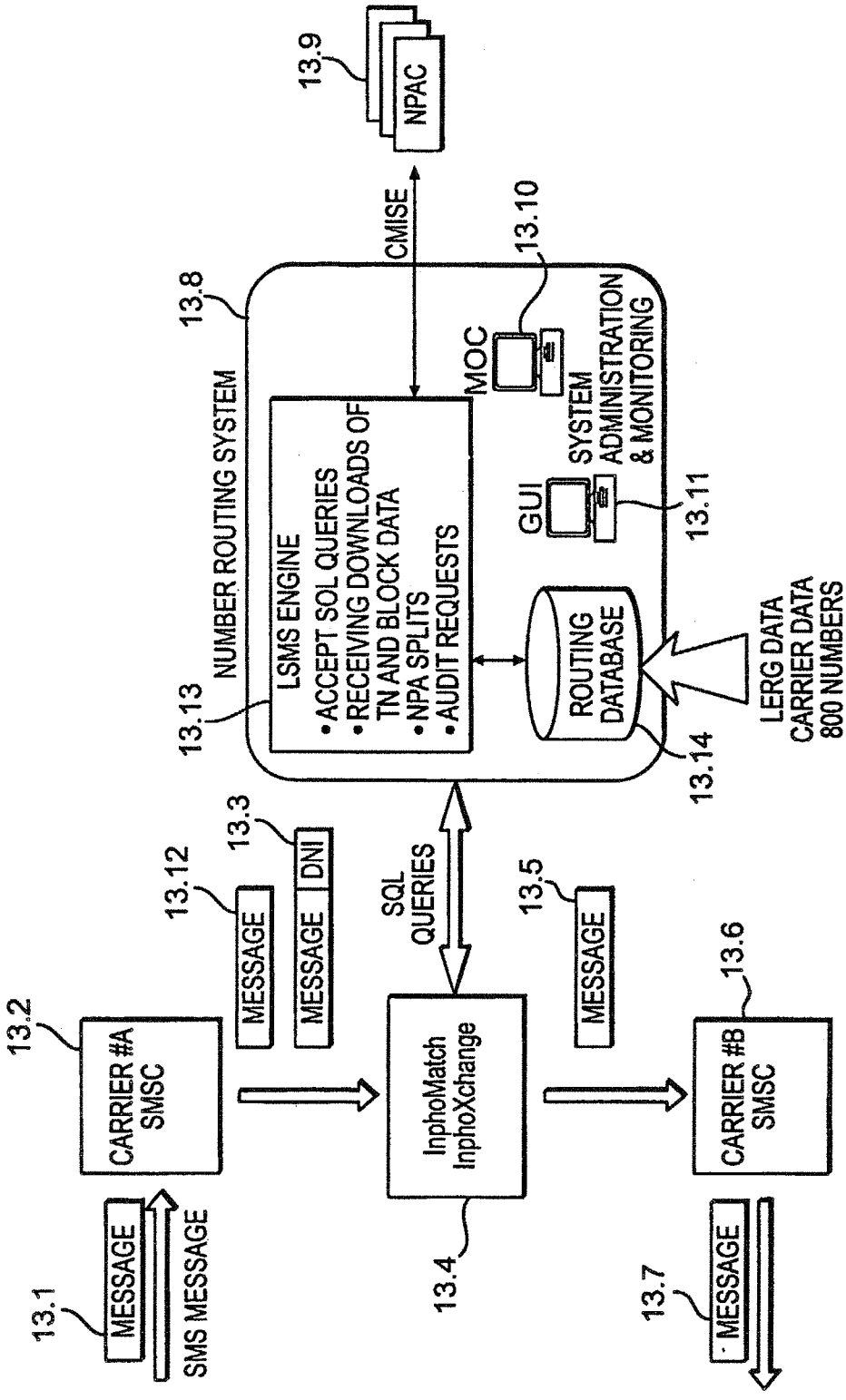

13.1
MESSAGE
SMS MESSAGE
13.2
CARRIER #A SMSC
13.3
DNI
13.12
MESSAGE
MESSAGE
13.4
InphoMatch InphoXchange
SQL QUERIES
13.5
MESSAGE
13.6
CARRIER #B SMSC
13.7
MESSAGE
13.8
NUMBER ROUTING SYSTEM
13.9
NPAC
CMISE
13.10
MOC
SYSTEM ADMINISTRATION & MONITORING
13.11
GUI
13.13
LSMS ENGINE
• ACCEPT SOL QUERIES
• RECEIVING DOWNLOADS OF TN AND BLOCK DATA
• NPA SPLITS
• AUDIT REQUESTS
ROUTING DATABASE
13.14
LERG DATA
CARRIER DATA
800 NUMBERS
INTERNATIONAL
NUMBER RANGES
TEST RANGES
PSEUDO NUMBER RANGES

FIG. 13

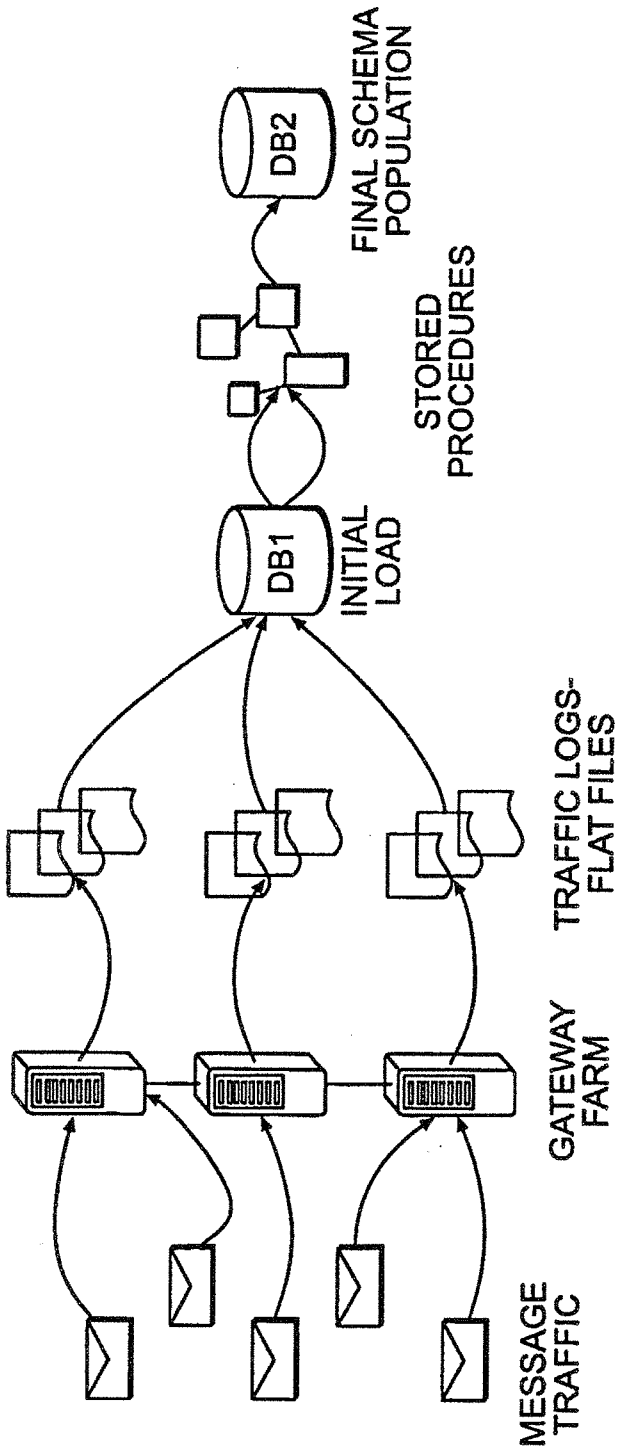

MESSAGE TRAFFIC
GATEWAY FARM
TRAFFIC LOGS-FLAT FILES
DB1
INITIAL LOAD
STORED PROCEDURES
DB2
FINAL SCHEMA POPULATION

FIG. 14

EXAMPLE OF GSM 7 BIT TO ASCII TRANSLATION
(SAMPLE NUMBER OF ENTRIES SHOWN)

HEX	DEC	CHARACTER NAME	CHARACTER	ASCII CODE
0x00	0	COMMERCIAL AT	@	64
0x01	1	POUND SIGN	£	156
0x02	2	DOLLAR SIGN	$	36
0x03	3	YEN SIGN	¥	157
0x04	4	LATIN SMALL LETTER E WITH GRAVE	è	138
0x05	5	LATIN SMALL LETTER E WITH ACUTE	é	130
0x06	6	LATIN SMALL LETTER U WITH GRAVE	ù	151
0x07	7	LATIN SMALL LETTER I WITH GRAVE	ì	141
0x08	8	LATIN SMALL LETTER O WITH GRAVE	ò	149
0x09	9	LATIN SMALL LETTER C WITH CEDILLA	Ç	128
0x0A	10	LINE FEED		10
0x0B	11	LATIN CAPITAL LETTER O WITH STROKE	Ø	237
0x0C	12	LATIN SMALL LETTER O WITH STROKE	ø	248
0x0D	13	CARRIAGE RETURN		13
0x0E	14	LATIN CAPITAL LETTER A WITH RING ABOVE	Å	143
0x0F	15	LATIN SMALL LETTER A WITH RING ABOVE	å	134
0x10	16	GREEK CAPITAL LETTER DELTA	Δ	
0x11	17	LOW LINE	_	95
0x12	18	GREEK CAPITAL LETTER PHI	Φ	232
0x13	19	GREEK CAPITAL LETTER GAMMA	Γ	226
0x14	20	GREEK CAPITAL LETTER LAMBDA	Λ	
0x15	21	GREEK CAPITAL LETTER OMEGA	Ω	234
0x16	22	GREEK CAPITAL LETTER PI	Π	227
0x17	23	GREEK CAPITAL LETTER PSI	Ψ	
0x18	24	GREEK CAPITAL LETTER SIGMA	Σ	228
0x19	25	GREEK CAPITAL LETTER THETA	Θ	
0x1A	26	GREEK CAPITAL LETTER XI	Ξ	
0x1B	27	ESCAPE TO EXTENSION TABLE		

FIG. 15

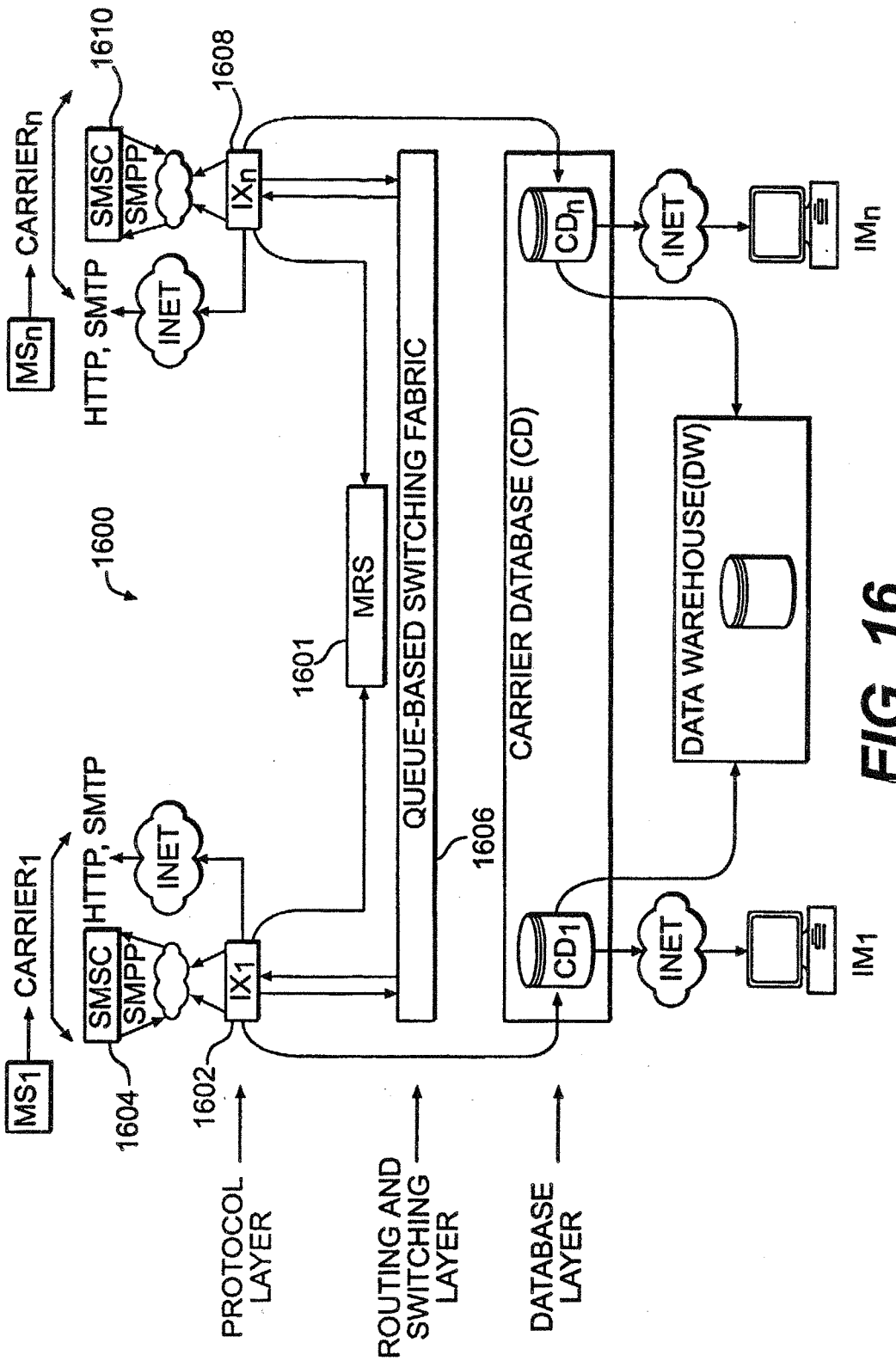

MS1
CARRIER1
HTTP, SMTP
SMSC
SMPP
1604
IX1
1602
INET
MRS
1601
QUEUE-BASED SWITCHING FABRIC
1606
CARRIER DATABASE (CD)
CD1
CDn
INET
INET
IM1
IMn
DATA WAREHOUSE(DW)
1600
MSn
CARRIERn
HTTP, SMTP
SMSC
SMPP
1610
IXn
1608
INET
PROTOCOL LAYER
ROUTING AND SWITCHING LAYER
DATABASE LAYER

FIG. 16

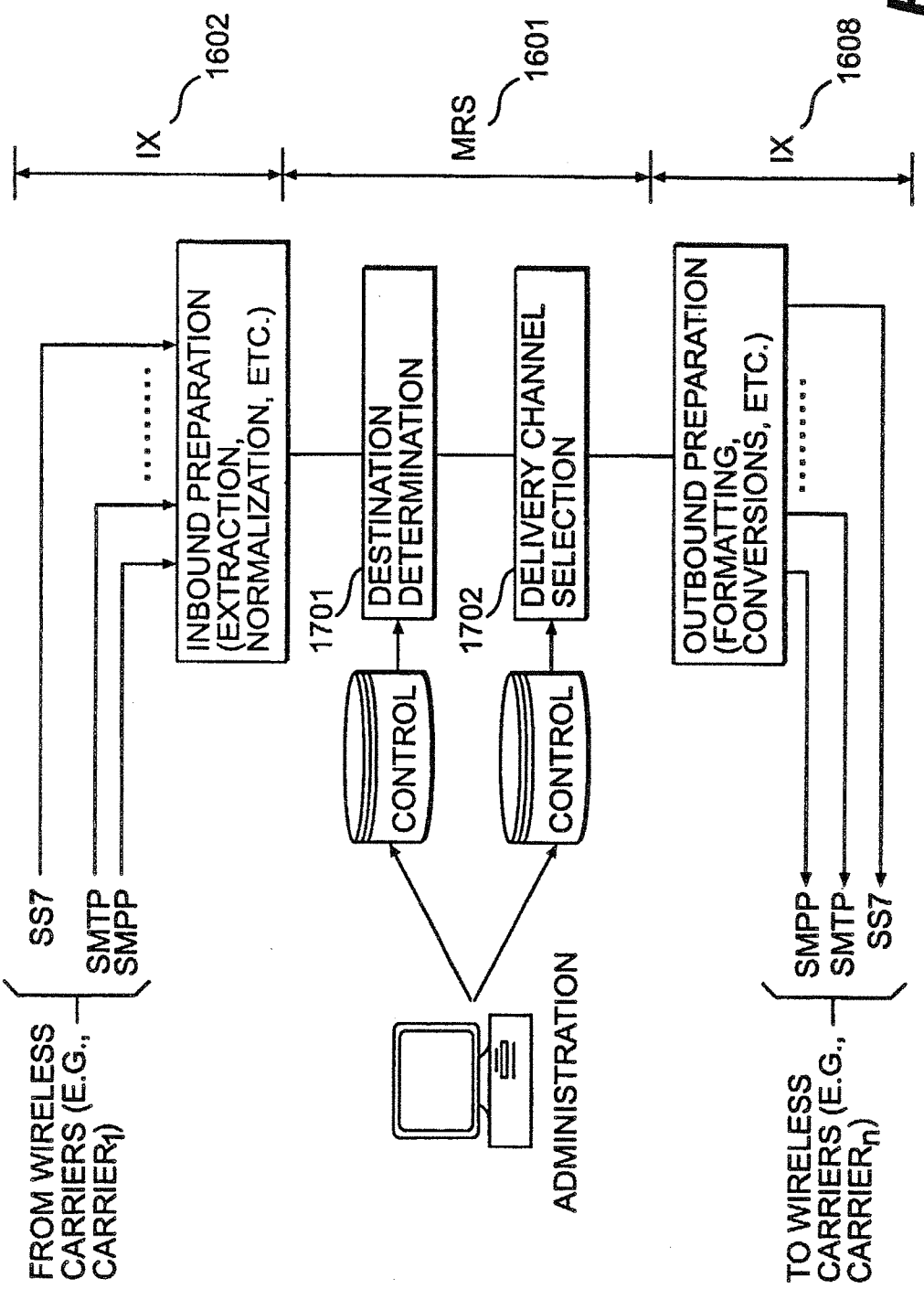

IX
1602
MRS
1601
IX
1608
FROM WIRELESS CARRIERS (E.G., CARRIER1)
SS7
SMTP
SMPP
INBOUND PREPARATION (EXTRACTION, NORMALIZATION, ETC.)
1701
DESTINATION DETERMINATION
1702
DELIVERY CHANNEL SELECTION
OUTBOUND PREPARATION (FORMATTING, CONVERSIONS, ETC.)
CONTROL
CONTROL
ADMINISTRATION
TO WIRELESS CARRIERS (E.G., CARRIERn)
SMPP
SMTP
SS7

FIG. 17

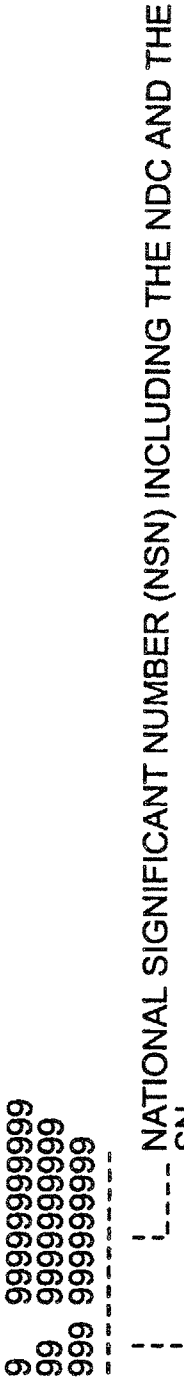


FIG. 18

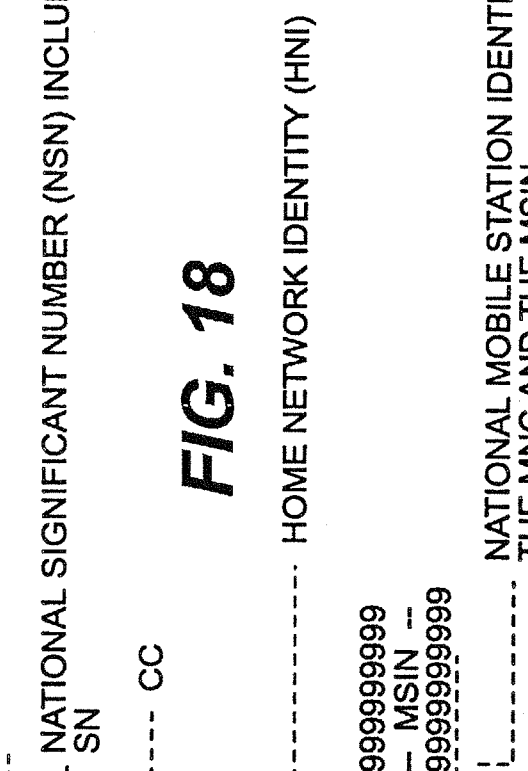


FIG. 19

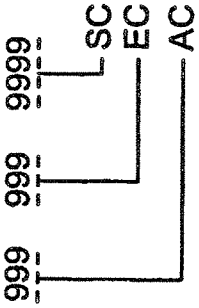


FIG. 20

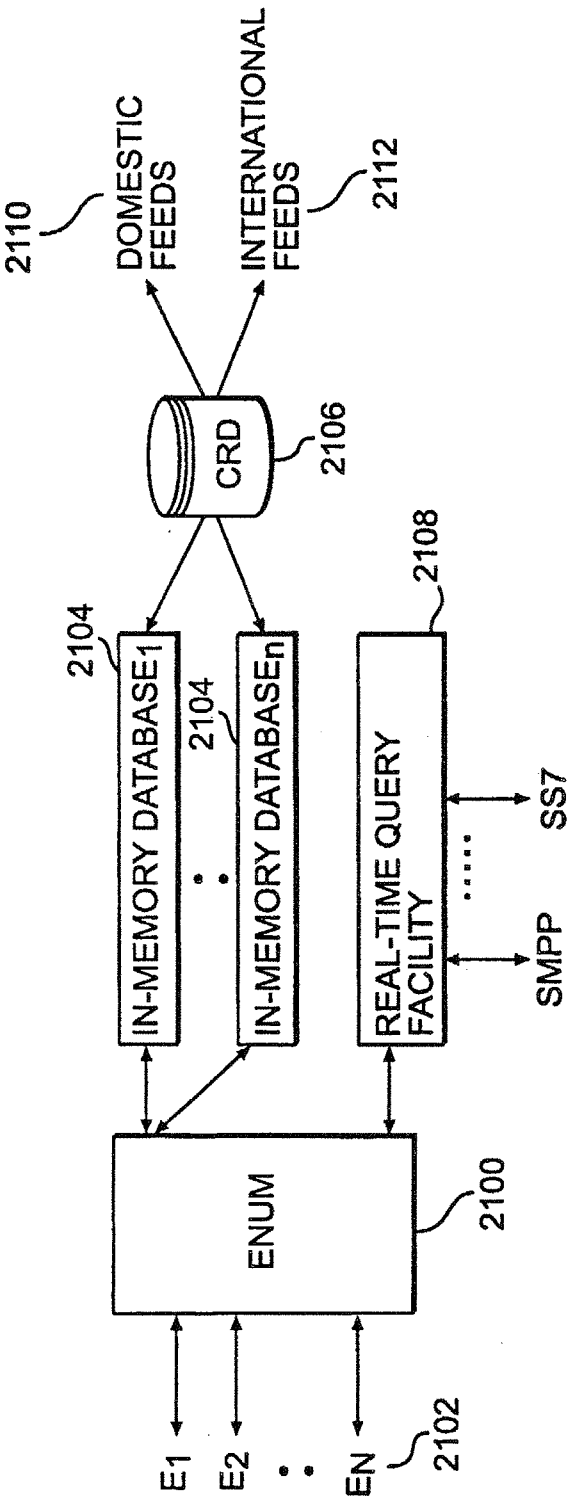

2110
DOMESTIC FEEDS
INTERNATIONAL FEEDS
2112
CRD
2106
2104
IN-MEMORY DATABASE1
2104
IN-MEMORY DATABASEn
2108
REAL-TIME QUERY FACILITY
SS7
SMPP
ENUM
2100
E1
E2
EN
2102

FIG. 21

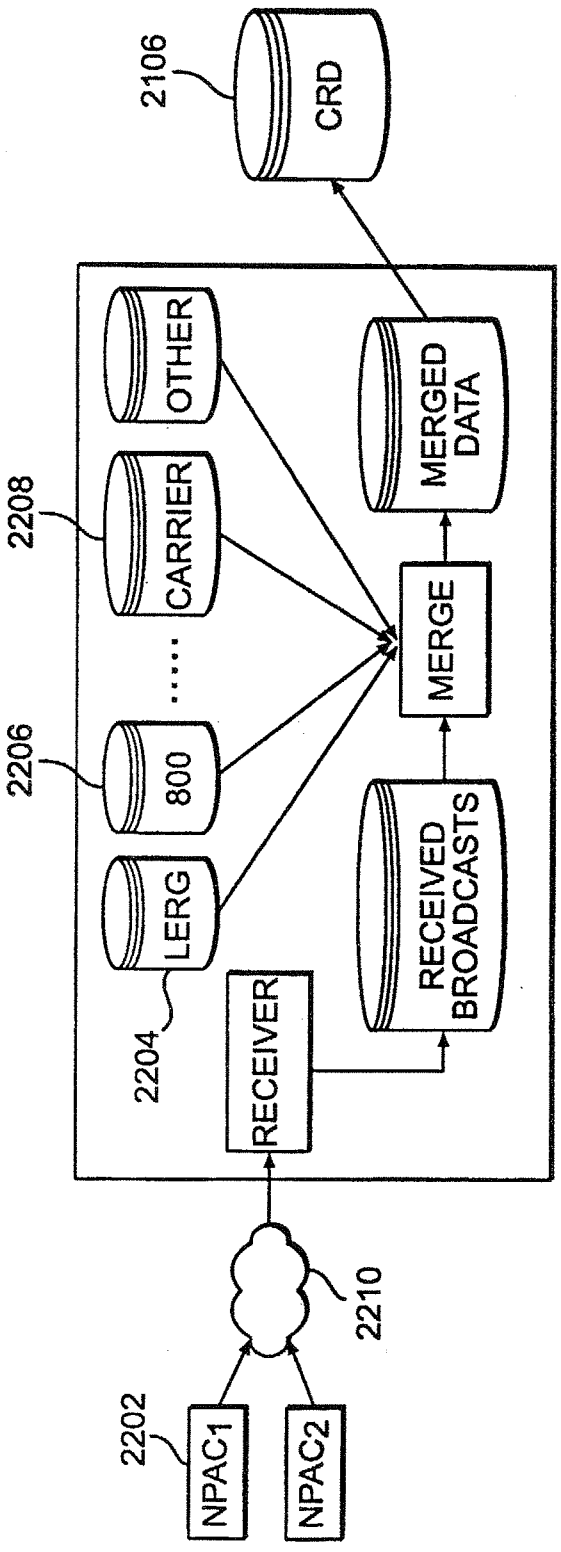

2106
CRD
OTHER
2208
CARRIER
.....
2206
800
LERG
2204
RECEIVER
MERGE
MERGED DATA
RECEIVED BROADCASTS
2210
2202
NPAC1
NPAC2

FIG. 22