Figure 1 - GSM1x System Architecture using the MSN

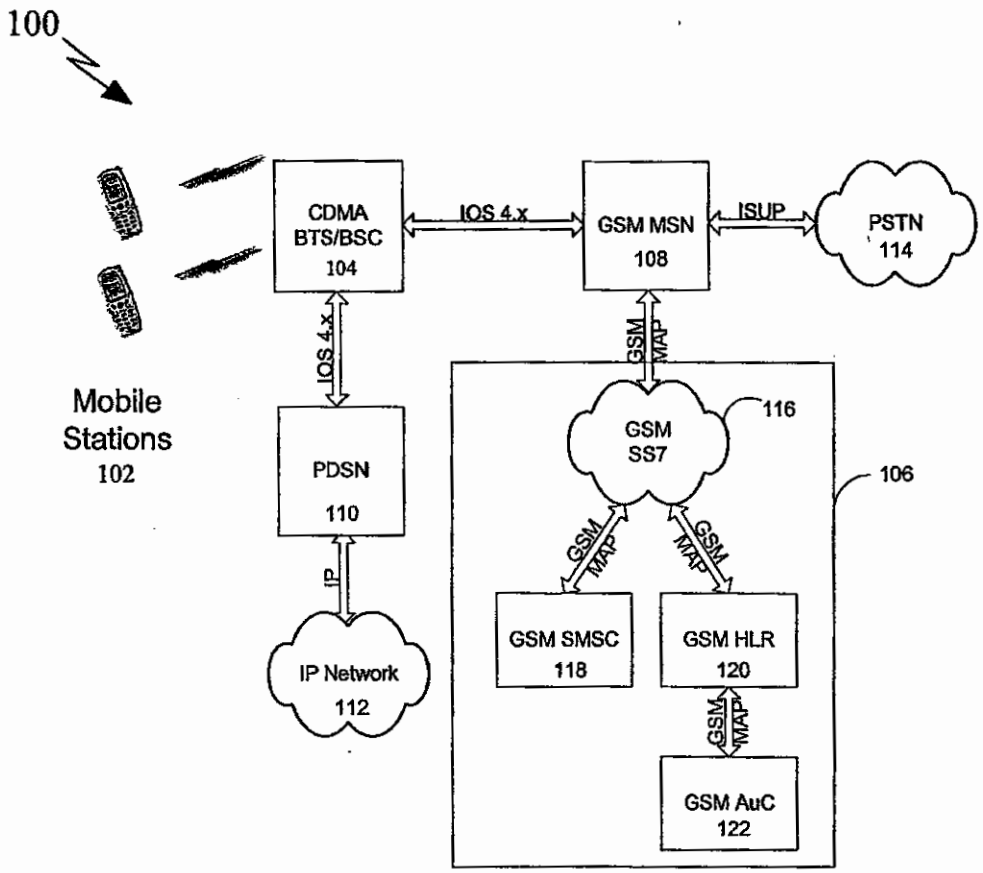

FIGURE 1

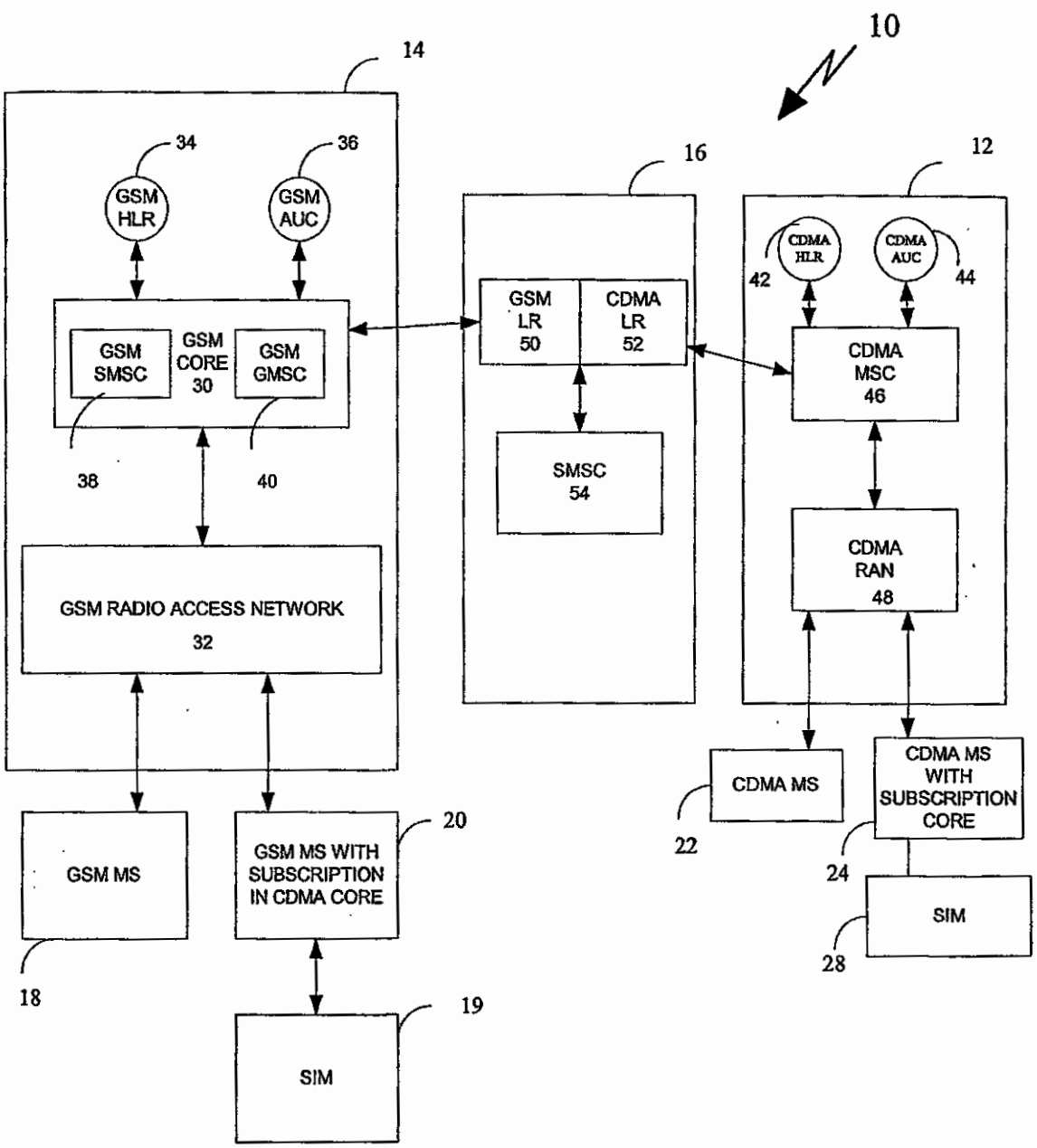
10
14
34
36
GSM HLR
GSM AUC
GSM SMSC
GSM CORE 30
GSM GMSC
38
40
GSM RADIO ACCESS NETWORK 32
GSM MS
18
GSM MS WITH SUBSCRIPTION IN CDMA CORE
20
SIM
19
16
GSM LR 50
CDMA LR 52
SMSC 54
12
CDMA HLR
CDMA AUC
42
44
CDMA MSC 46
CDMA RAN 48
CDMA MS
22
CDMA MS WITH SUBSCRIPTION CORE
24
SIM
28

FIGURE 2

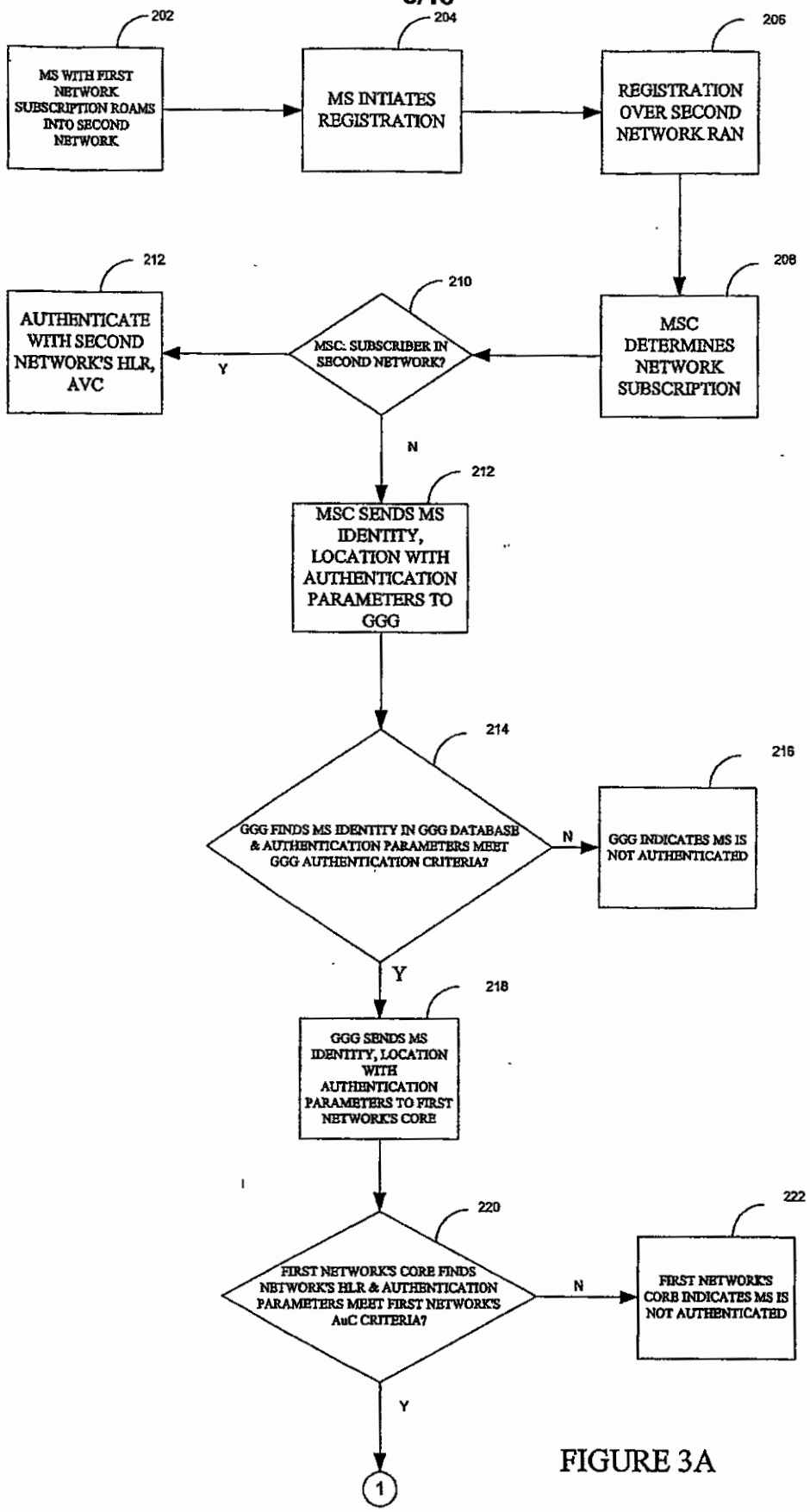
202
MS WITH FIRST NETWORK SUBSCRIPTION ROAMS INTO SECOND NETWORK
204
MS INTIATES REGISTRATION
206
REGISTRATION OVER SECOND NETWORK RAN
208
MSC DETERMINES NETWORK SUBSCRIPTION
210
MSC: SUBSCRIBER IN SECOND NETWORK?
Y
212
AUTHENTICATE WITH SECOND NETWORK'S HLR, AVC
N
212
MSC SENDS MS IDENTITY, LOCATION WITH AUTHENTICATION PARAMETERS TO GGG
214
GGG FINDS MS IDENTITY IN GGG DATABASE & AUTHENTICATION PARAMETERS MEET GGG AUTHENTICATION CRITERIA?
N
216
GGG INDICATES MS IS NOT AUTHENTICATED
Y
218
GGG SENDS MS IDENTITY, LOCATION WITH AUTHENTICATION PARAMETERS TO FIRST NETWORK'S CORE
220
FIRST NETWORK'S CORE FINDS NETWORK'S HLR & AUTHENTICATION PARAMETERS MEET FIRST NETWORK'S AuC CRITERIA?
N
222
FIRST NETWORK'S CORE INDICATES MS IS NOT AUTHENTICATED
Y
1

FIGURE 3A

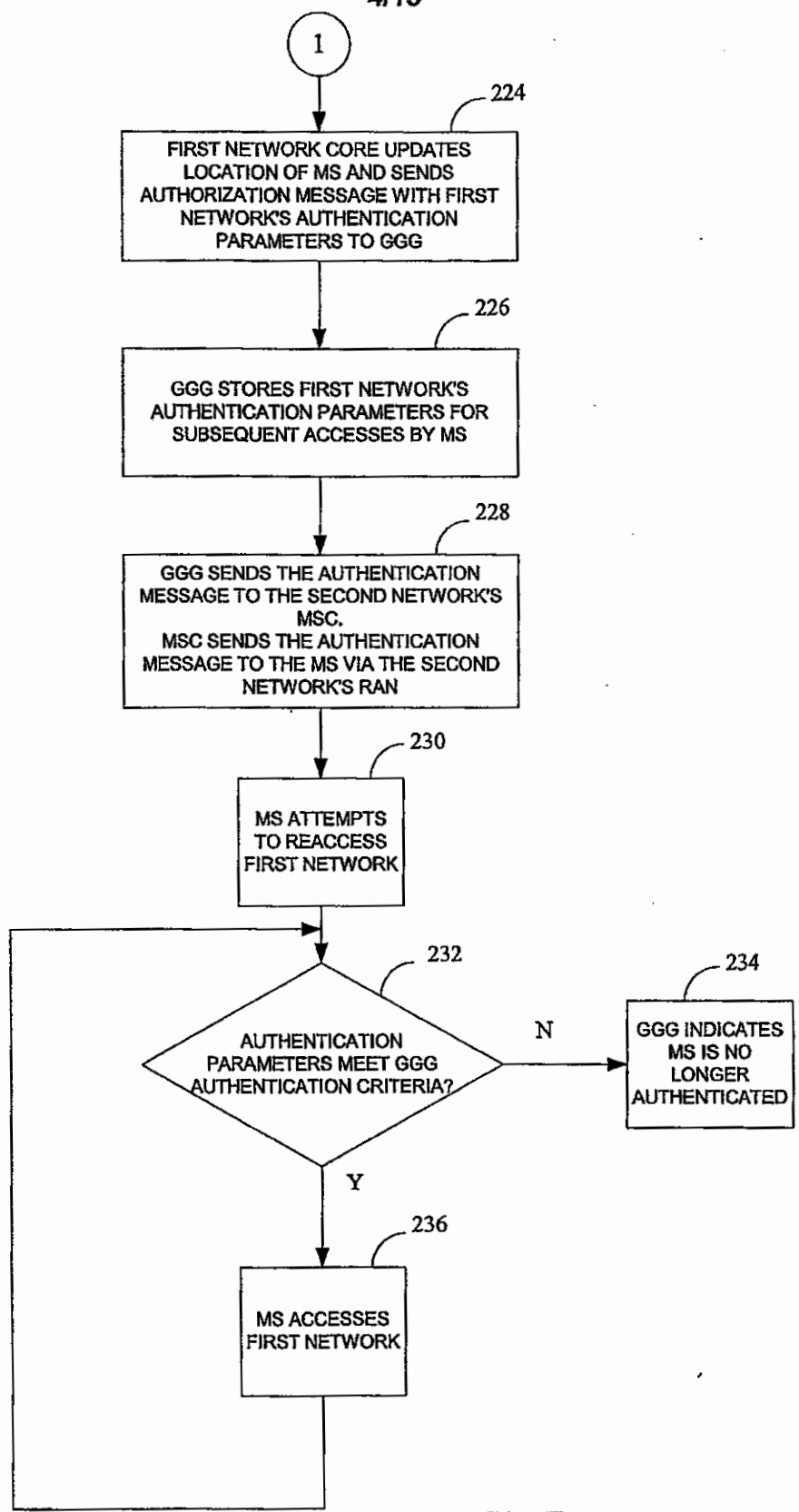
1
224
FIRST NETWORK CORE UPDATES LOCATION OF MS AND SENDS AUTHORIZATION MESSAGE WITH FIRST NETWORK'S AUTHENTICATION PARAMETERS TO GGG
226
GGG STORES FIRST NETWORK'S AUTHENTICATION PARAMETERS FOR SUBSEQUENT ACCESSES BY MS
228
GGG SENDS THE AUTHENTICATION MESSAGE TO THE SECOND NETWORK'S MSC.
MSC SENDS THE AUTHENTICATION MESSAGE TO THE MS VIA THE SECOND NETWORK'S RAN
230
MS ATTEMPTS TO REACCESS FIRST NETWORK
232
AUTHENTICATION PARAMETERS MEET GGG AUTHENTICATION CRITERIA?
N
234
GGG INDICATES MS IS NO LONGER AUTHENTICATED
Y
236
MS ACCESSES FIRST NETWORK

FIGURE 3B

Figure 4

ANSI-41 method of producing authentication keys

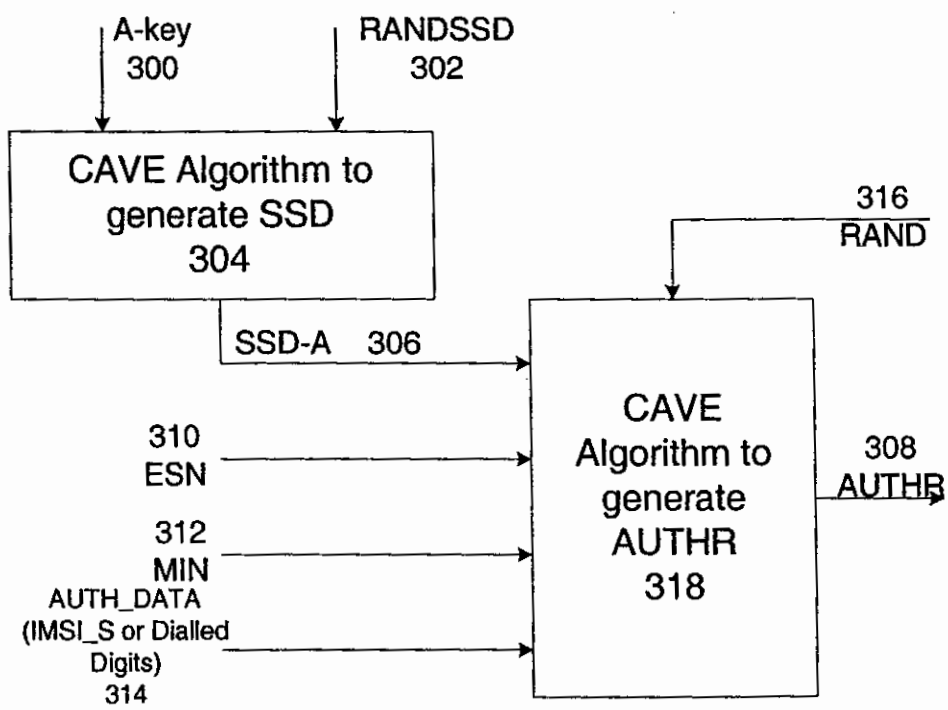

Figure 5

Using Kc as SSD-A

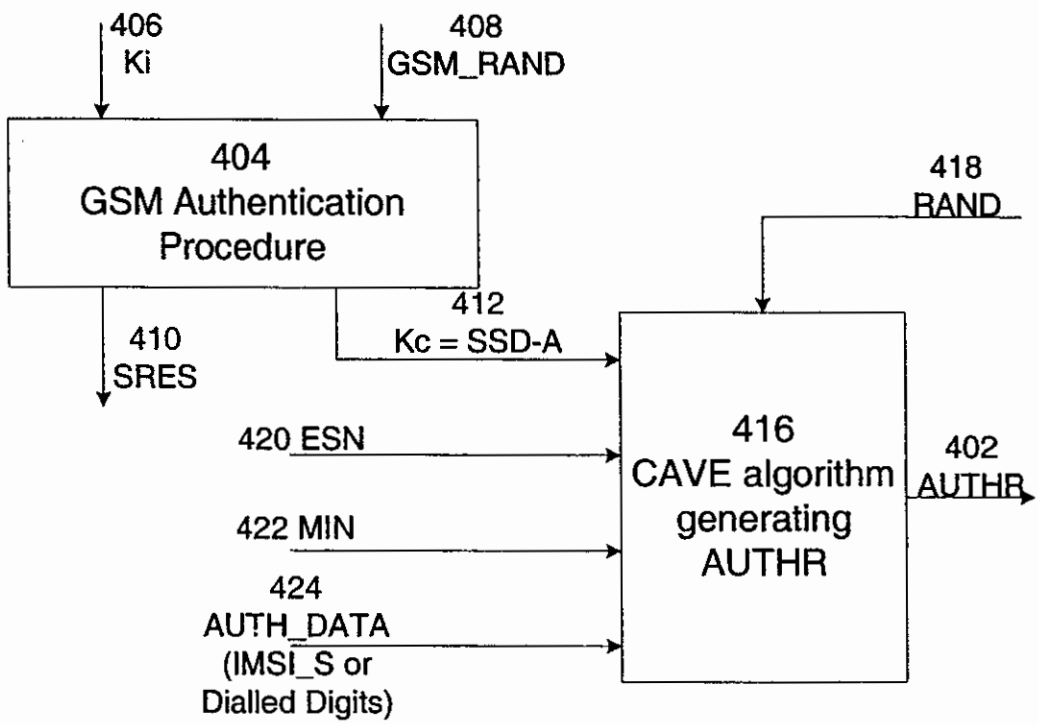

Figure 6

Successful SSD update procedure

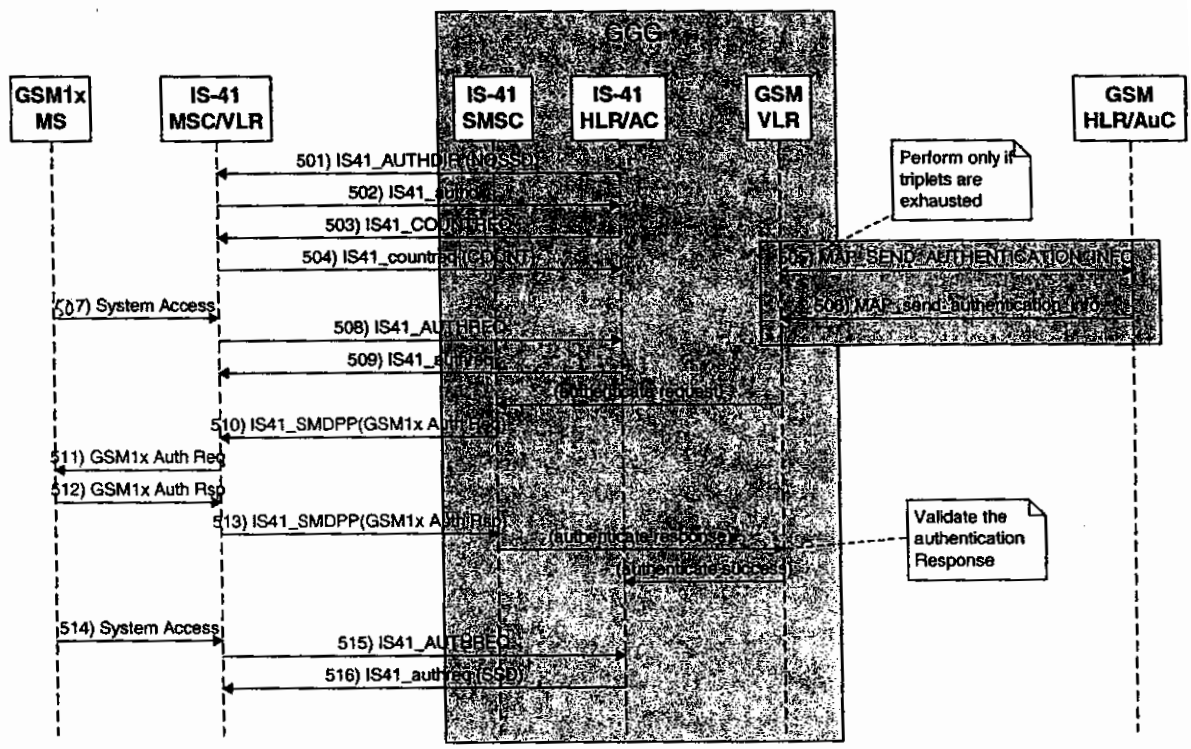

Figure 7

Initial registration with SSD sharing

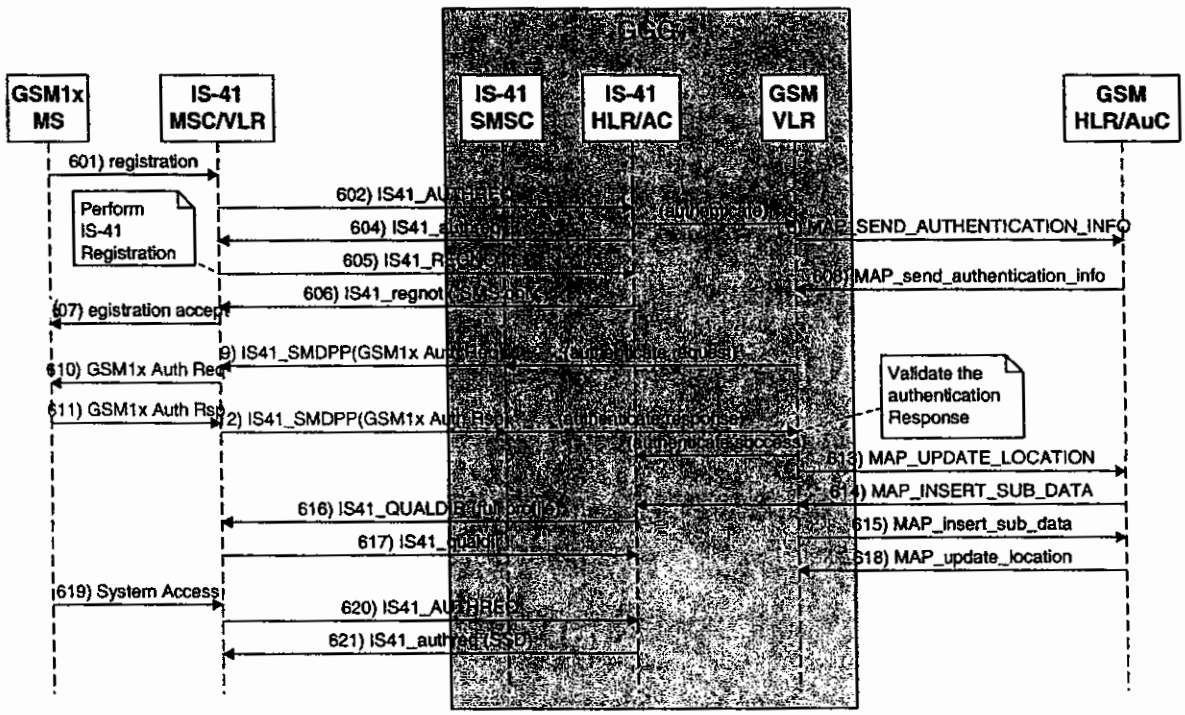

FIGURE 8

Successful registration with new MSC/VLR with SSD sharing.

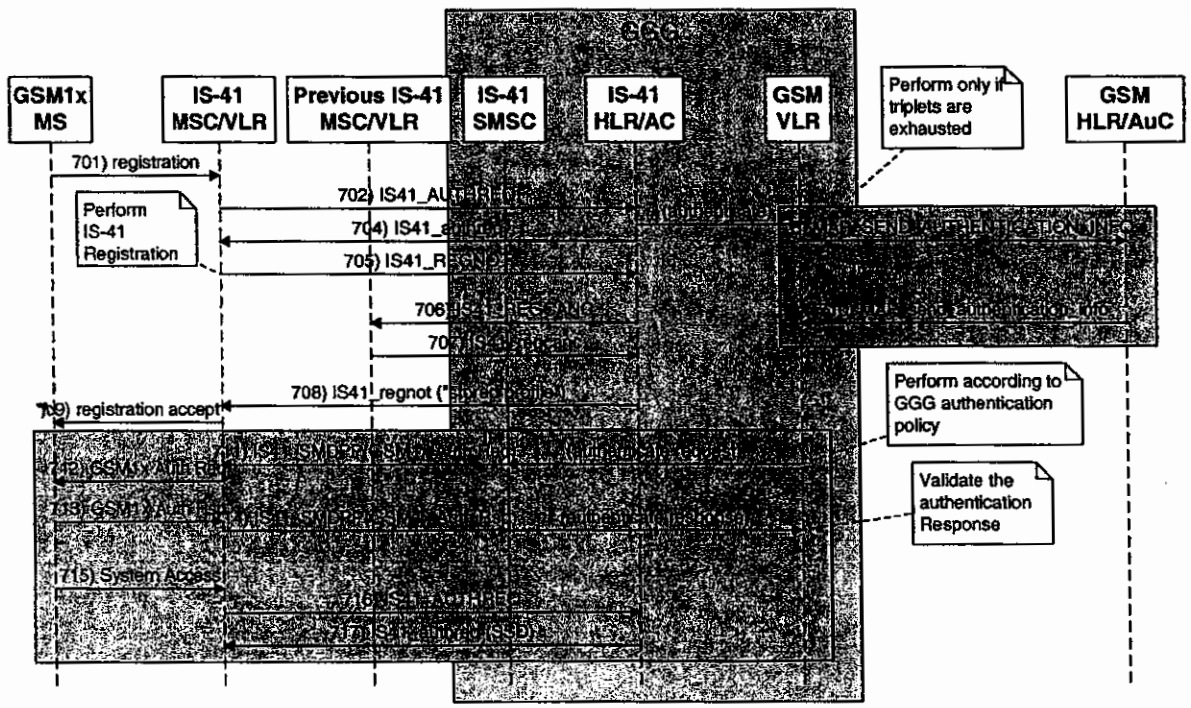

Figure 9 - Outline of Authentication Procedure

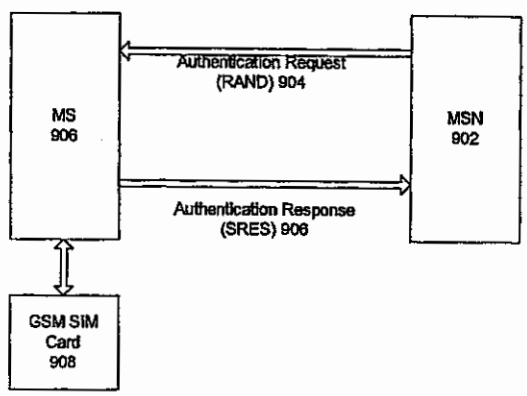

Figure 10 - GSM Key Generation

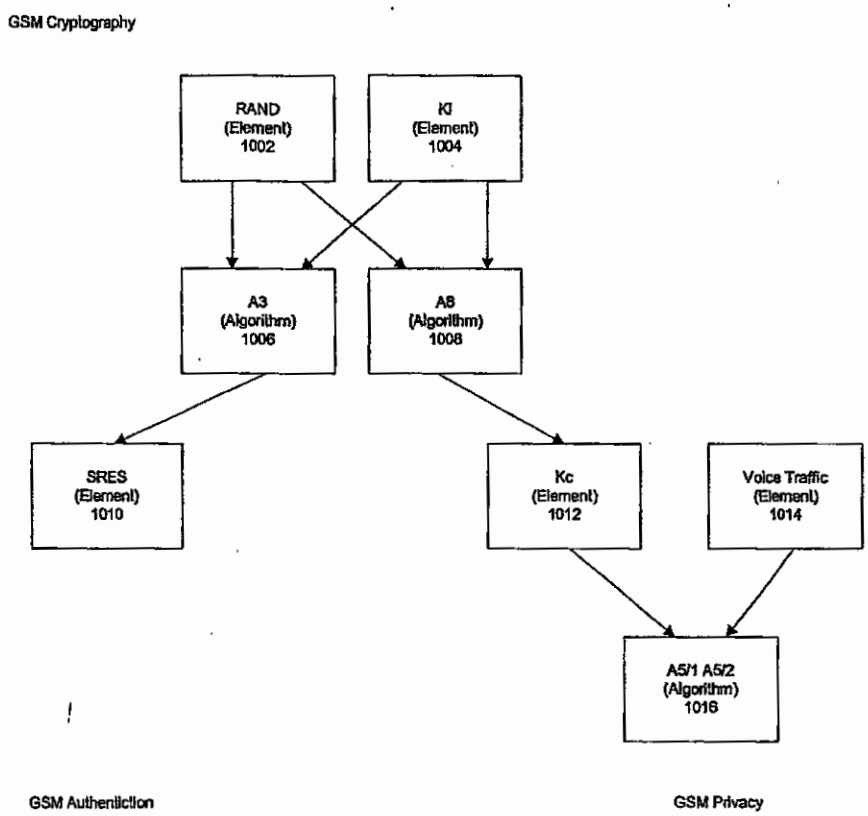

Figure 11 - CDMA Key Generation

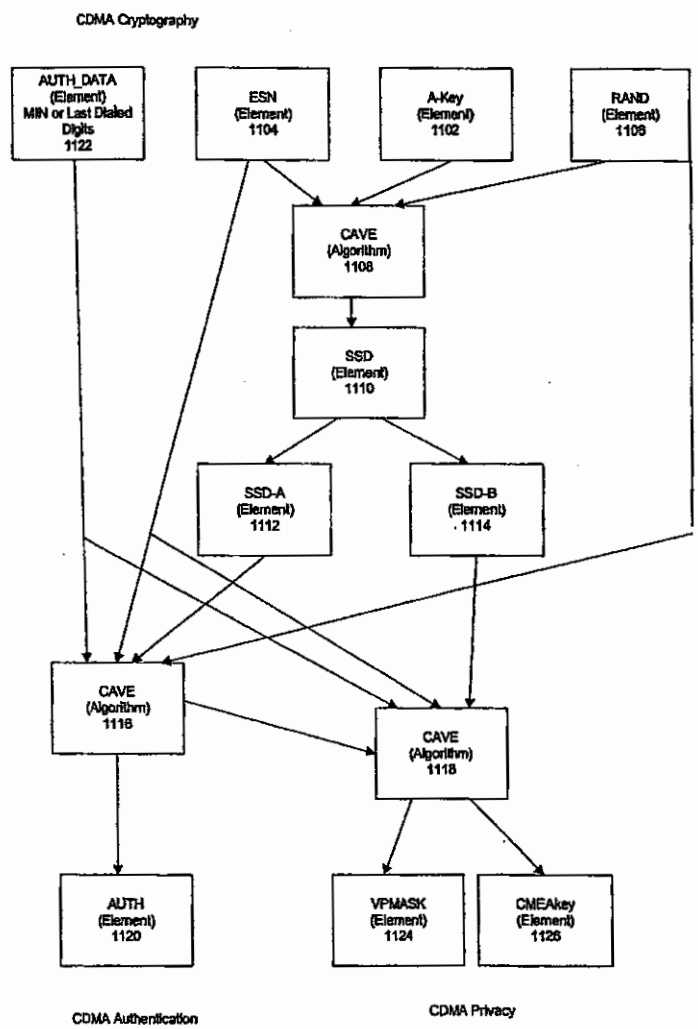

Figure 12 - Message Flow during Registration

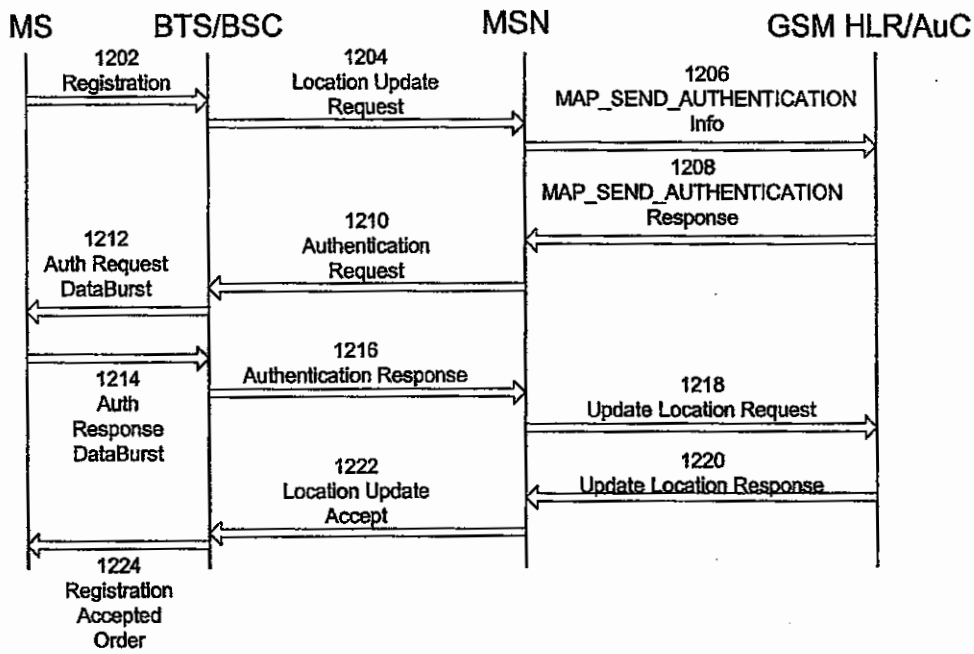

Figure 13 - Message Flow during MO Call

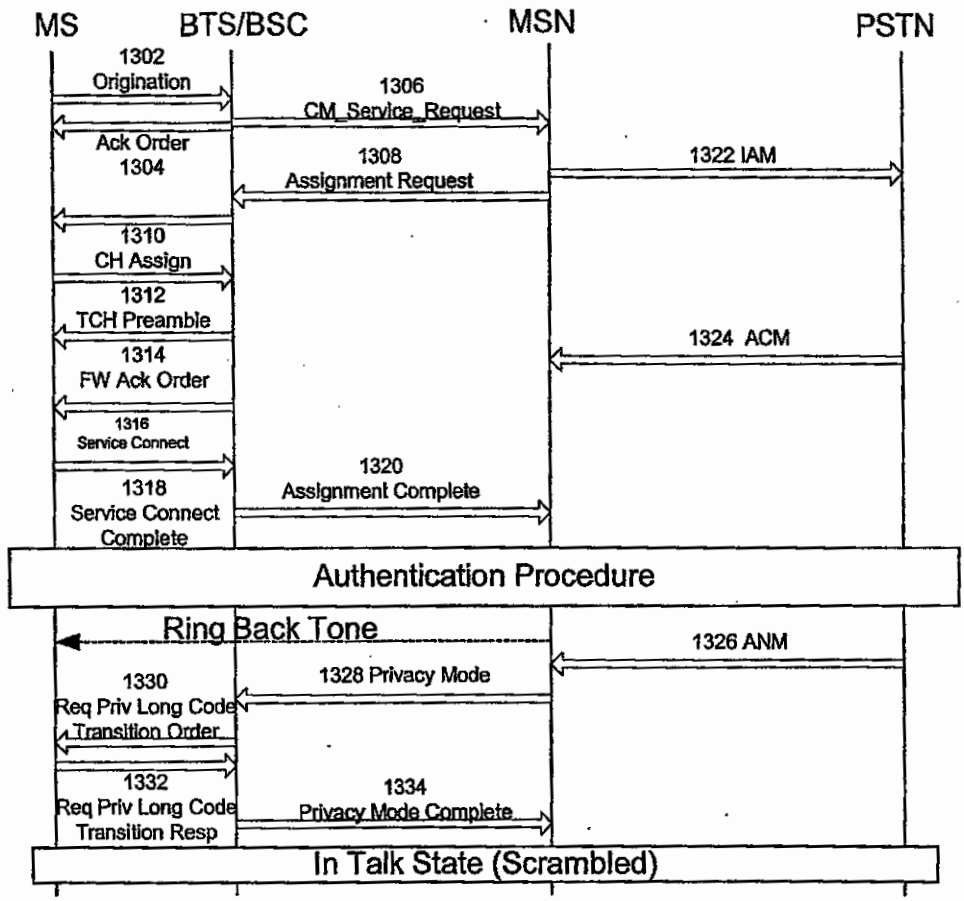
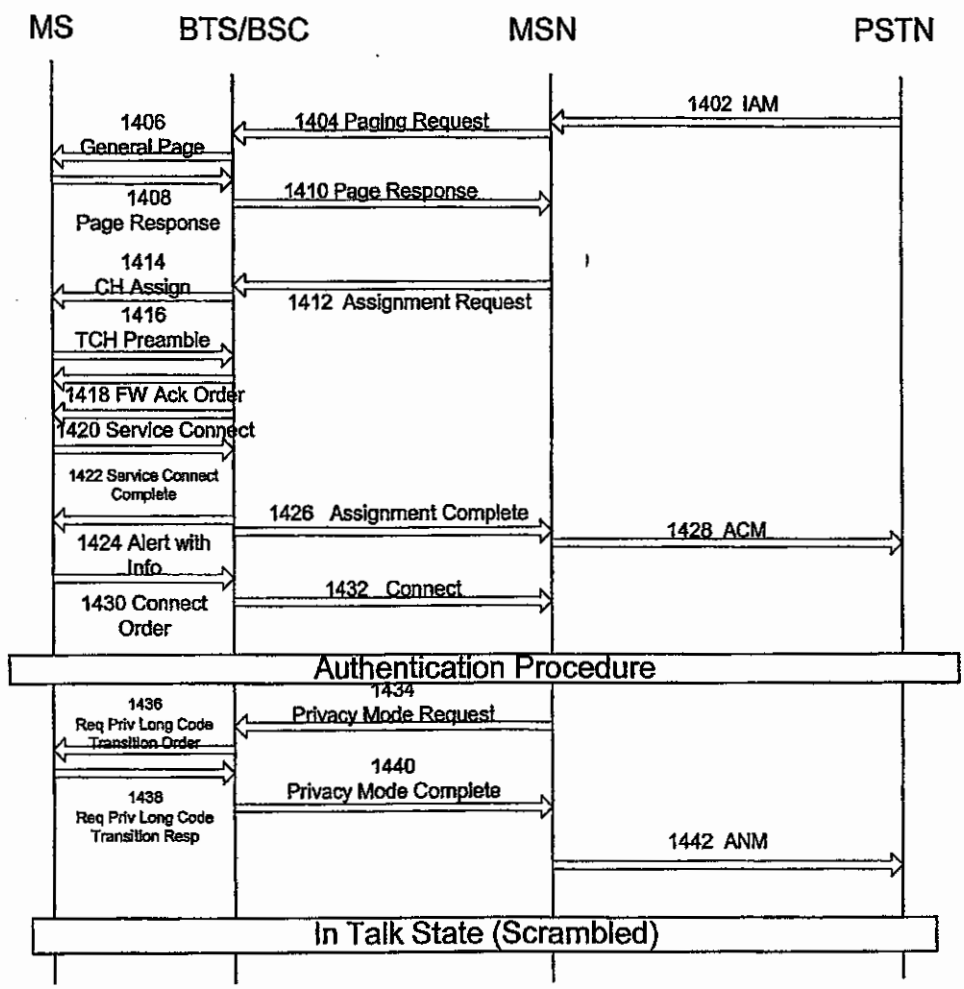
Figure 14 - Message Flow during MT Call