Module Interfaces (GSM Mobile Terminated GSM)

Cell	Mobile Network		EventStudio System Designer 6
Mobile Station	Base Stations	NSS	

In this call flow we will look at how a terminating SMS is handled in GSM. Setting up a terminating SMS session is a multi-step process.

(1) Interrogate the MSC to locate the subscriber

(2)Setting SMS session setup and acquiring radio resources

(3) Sending the SMS.

(4) Releasing the session and associated radio resources.

Short Message Transfer

Mobile Number,
Short message data,
Send status report

Received as SMS message for transfer to a destination number.

Interrogate the MSC to locate the subscriber

Paging Procedure

The network pages the MS with the standard paging procedure.

BSSMAP PAGING

TMSI

Now the MSC VLR needs to locate the subscriber in the location area. Since the location area might spawn several cells, a paging mechanism is used to locate the subscriber. The MSC uses a TMSI (Temporary Mobile Subscriber Identify) to address the mobile phone. The TMSI is used so as to protect the privacy of the called subscriber. Note that, the BSSMAP PAGING message will be sent to all the BSCs that handle the Maryland Location Area.

RR PAGING REQUEST

TMSI

All cells in the location area will broadcast the Page message on the Paging Channel (PCH). All mobile phones listen to this channel every few seconds. The mobile is located in the Bethesda cell. It receives this page message.

Begin RR Connection Establishment

RR CHANNEL REQUEST

RACH

RR connection establishment is triggered by sending the Channel Request message. This message requests the Base Station System (BSS) for allocation for radio resources for the RR connection setup. The mobile now waits for an assignment on the Access Grant Channel (AGCH). At this point the mobile is listening to the AGCH for a reply.

RR IMMEDIATE ASSIGNMENT

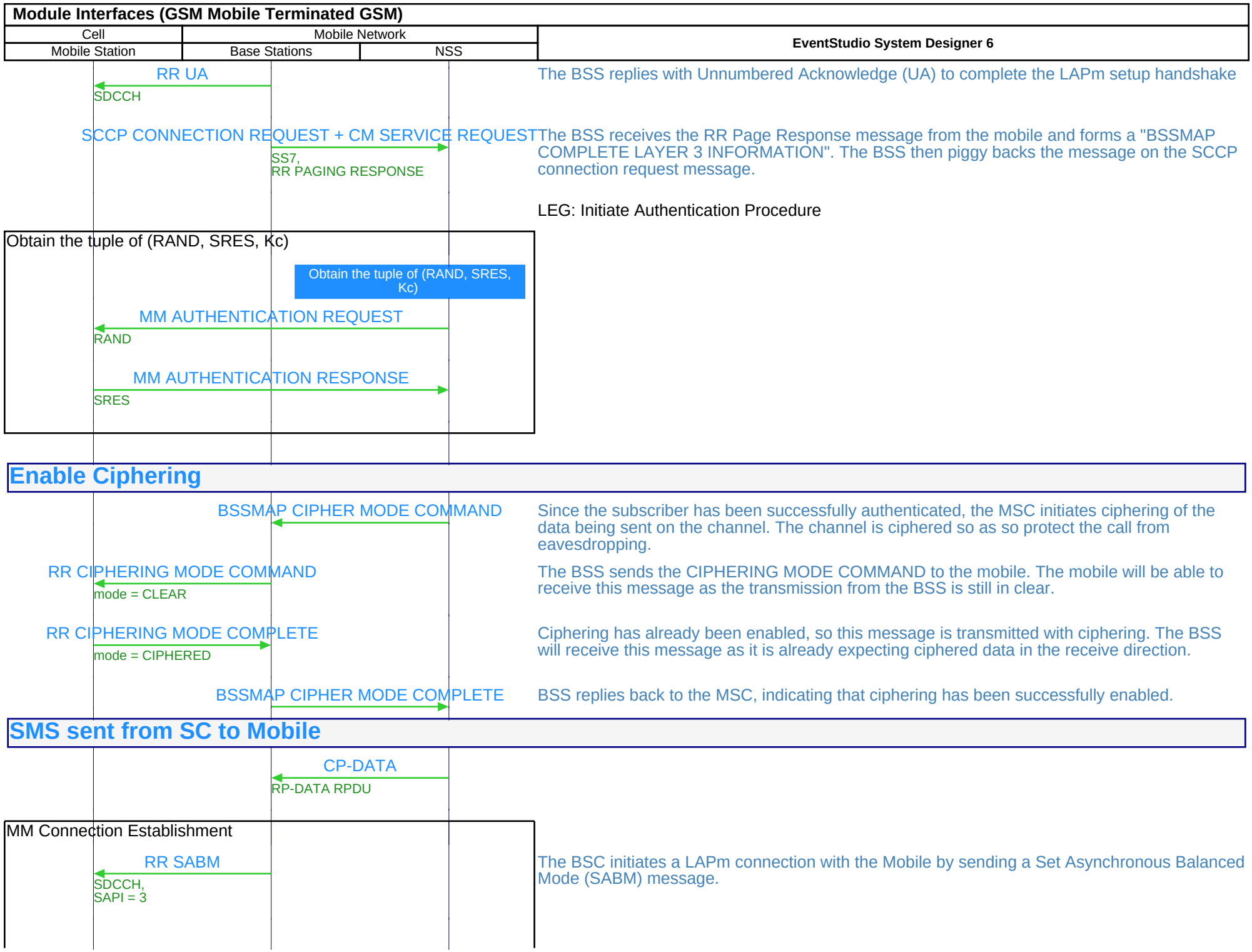
AGCH,
Radio_Resource = (SDCCH, Frequency, Timeslot),
Time Correction,
Frequency Correction

The BSS transmits the radio resource assignment to the Mobile via the AGCH channel. The message also contains the time and frequency corrections. The time corrections allow the mobile to time it's transmissions so that they reach the BSS only in the specified slot. The frequency corrections correct for the Doppler shift caused by the mobile's motion.

RR SABM + MM CM SERVICE REQUEST

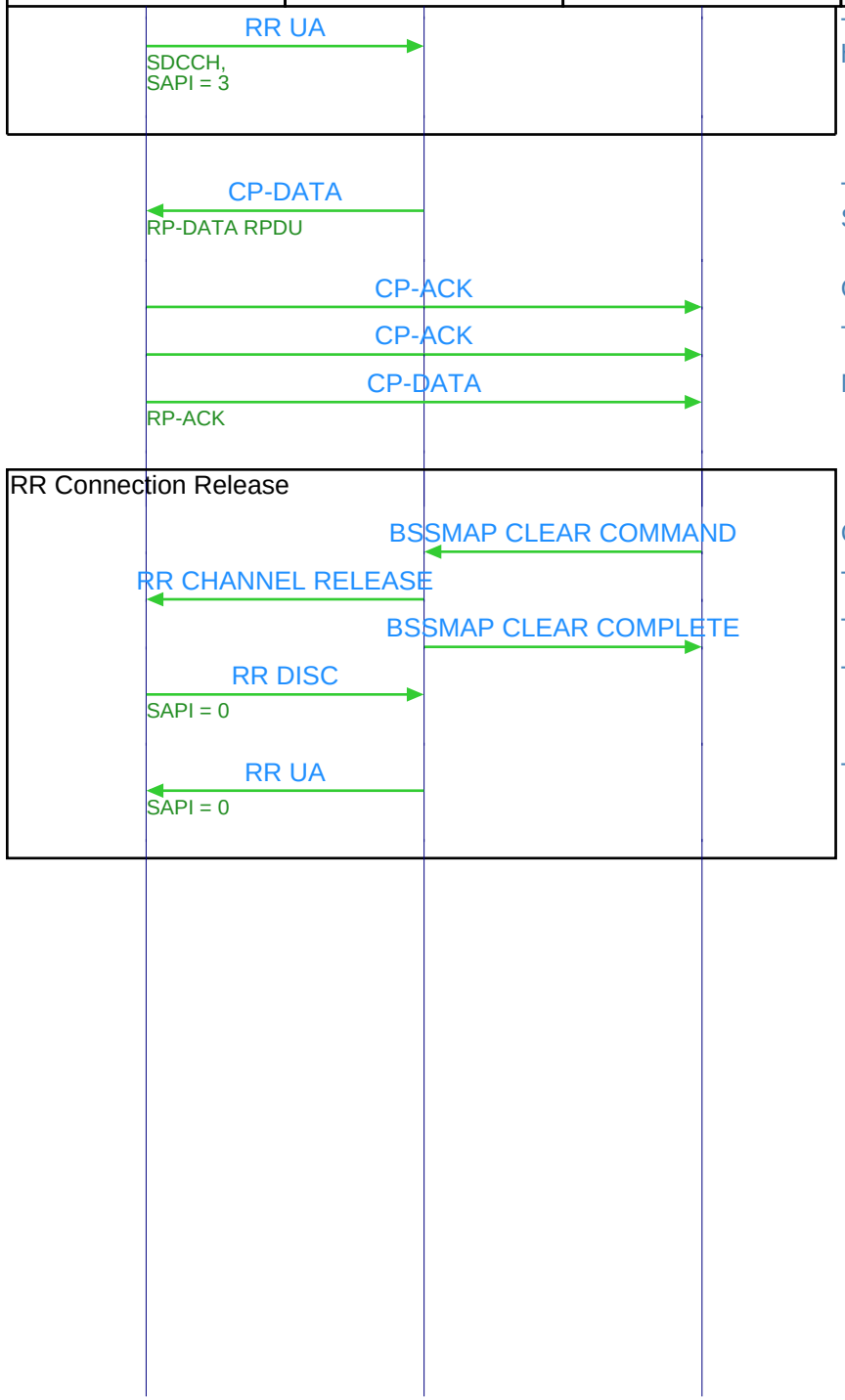
SDCCH,
RR PAGING RESPONSE

This is the first message that is sent after tuning to the channel. The Mobile initiates a LAPm connection with the BSC by sending a Set Asynchronous Balanced Mode (SABM) message. The service request message meant for the MSC is also sent in this message.


Module Interfaces (GSM Mobile Terminated GSM)
Cell
Mobile Network
Mobile Station
Base Stations
NSS
EventStudio System Designer 6
RR UA
SDCCH
The BSS replies with Unnumbered Acknowledge (UA) to complete the LAPm setup handshake
SCCP CONNECTION REQUEST + CM SERVICE REQUEST
SS7,
RR PAGING RESPONSE
The BSS receives the RR Page Response message from the mobile and forms a "BSSMAP COMPLETE LAYER 3 INFORMATION". The BSS then piggy backs the message on the SCCP connection request message.
LEG: Initiate Authentication Procedure
Obtain the tuple of (RAND, SRES, Kc)
Obtain the tuple of (RAND, SRES, Kc)
MM AUTHENTICATION REQUEST
RAND
MM AUTHENTICATION RESPONSE
SRES
Enable Ciphering
BSSMAP CIPHER MODE COMMAND
Since the subscriber has been successfully authenticated, the MSC initiates ciphering of the data being sent on the channel. The channel is ciphered so as so protect the call from eavesdropping.
RR CIPHERING MODE COMMAND
mode = CLEAR
The BSS sends the CIPHERING MODE COMMAND to the mobile. The mobile will be able to receive this message as the transmission from the BSS is still in clear.
RR CIPHERING MODE COMPLETE
mode = CIPHERED
Ciphering has already been enabled, so this message is transmitted with ciphering. The BSS will receive this message as it is already expecting ciphered data in the receive direction.
BSSMAP CIPHER MODE COMPLETE
BSS replies back to the MSC, indicating that ciphering has been successfully enabled.
SMS sent from SC to Mobile
CP-DATA
RP-DATA RPDU
MM Connection Establishment
RR SABM
SDCCH,
SAPI = 3
The BSC initiates a LAPm connection with the Mobile by sending a Set Asynchronous Balanced Mode (SABM) message.

Module Interfaces (GSM Mobile Terminated GSM)

Cell	Mobile Network		EventStudio System Designer 6
Mobile Station	Base Stations	NSS	



The Mobile replies with Unnumbered Acknowledge (UA) to complete the LAPm setup handshake

The SMS content is being carried in CP-DATA message sent from the MSC to the Mobile. The SMS payload is carried in the RPDU contained in the RPDATA.

On successful transmission over Radio Connection CP-ACK is sent.

The CP-DATA is now acknowledged from the Mobile to the MSC.

Mobile confirms the delivery of the SMS.

Call release has been completed, now the RR connection is released by the MSC.

The BSS initiates RR release with the mobile.

The BSS informs the MSC that the RR connection has been released.

The mobile sends a disconnect message to release the LAPm connection.

The BSS replies with an Unnumbered Acknowledge message.