LEG: GSM Mobile Originated Call

This scenario describes the call setup for a GSM originating call. A mobile user calling a land line subscriber is covered here.

Begin RR Connection Establishment

Call related information needs to be transported from the mobile phone to the Mobile Switching Center (MSC). This requires the establishment of a Radio Resource (RR) connection to MSC. The first phase of the call setup just sets up this RR connection.

Note: The RR CHANNEL REQUEST is sent on a Random Access Channel (RACH). This is a slotted aloha channel that can be used at random, without any coordination between the mobiles. Any mobile can transmit on this channel whenever it wishes. If two mobiles transmit on the channel at the same time, their messages will be lost in a collision. The mobiles will detect the collision via a timeout and retransmit the message after a random back off.

SCCP CONNECTION REQUEST + MM CM SERVICE REQUEST (SS7)

The BSS receives the CM Service Request 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: Skip Authentication Procedure

Check subscriber authentication

MSC checks if the subscriber has been authenticated. In this case, the subscriber has already been authenticated, so the authentication procedure is skipped.

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.

BSSMAP CIPHER MODE COMPLETE

BSS replies back to the MSC, indicating that ciphering has been successfully enabled.

RR Connection Establishment Completed

At this point a connection has been setup between the Mobile and the MSC. From this point onward, the BSS is just acting as a conduit for transporting the signaling messages between the Mobile and the MSC.

Call Setup

CC SETUP (Dialed Digits)

The Mobile sends the setup message to establish a voice call. The message contains the dialed digits and other information needed for call establishment.

CC CALL PROCEEDING

The mobile is informed that the call setup is in progress.

Mode Modify

allocate Voice circuit towards BSS

The MSC allocates a voice circuit on one the digital trunks between the MSC and the BSS.

BSSMAP ASSIGNMENT REQUEST (Voice circuit)

MSC informs the BSS about the allocated voice circuit. The call is also switched from signaling to voice.

BSSMAP ASSIGNMENT COMPLETE

The BSS responds back to the MSC.

ISUP INITIAL ADDRESS MESSAGE (SS7, Dialed Digits)

The MSC routes the call and sends the call towards the called subscriber

ISUP ADDRESS COMPLETE MESSAGE (SS7)

The PSTN indicates to the MSC that it has received all the digits and the called subscriber is being rung.

CC ALERTING — The MSC informs the mobile that the called subscriber is being alerted via a ring

ISUP ANSWER (SS7) — The called subscriber answers the call.

CC CONNECT — The MSC informs the mobile that the call has been answered.

CC CONNECT ACKNOWLEDGE — Acknowledge the recipt of CC CONNECT.

Conversation

Call Release

LEG: Mobile initiates call release

CC DISCONNECT — The mobile sends the disconnect message to the MSC.

ISUP RELEASE (SS7) — The MSC initiates release on the PSTN side.

Disconnect Voice Path — The MSC disconnects the voice path and also releases the voice circuit between the BSS and the MSC.

free / Voice circuit towards BSS

CC RELEASE — The MSC informs the Mobile that it has initiated call release

ISUP RELEASED (SS7) — The MSC informs the PSTN that the call release has been completed.

ISUP RELEASE COMPLETE (SS7) — The PSTN informs that call release has been completed at its end.

CC RELEASE COMPLETE — Mobile indicates that the call has been released.

RR Connection Release

BSSMAP CLEAR COMMAND — Call release has been completed, now the RR connection is released by the MSC.

BSSMAP CLEAR COMPLETE — The BSS informs the the MSC that the RR connection has been released.