This scenario describes the call setup for a GSM originating call. A mobile user calling a landline 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.

**RR CHANNEL REQUEST**

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 its 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.

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.

**RR IMMEDIATE ASSIGNMENT**

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.

**RR SABM + MM CM SERVICE REQUEST**

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

Enable Ciphering

**RR CIPHERING MODE COMMAND**

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**

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.

RR Connection Establishment Completed

At this point a connection has been set up 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**

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

**RR CHANNEL MODE MODIFY**

The BSS notifies the Mobile about the changeover to voice mode.

**RR CHANNEL MODE MODIFY ACKNOWLEDGE**

Mobile acknowledges.

**ISUP INITIAL ADDRESS MESSAGE**

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

**ISUP ADDRESS COMPLETE MESSAGE**

The PSTN indicates to the MSC that it has received all the digits and the called subscriber is being rung.
Module Interfaces (GSM Originating Call)

<table>
<thead>
<tr>
<th>Call</th>
<th>Mobile Network</th>
<th>Fixed Network</th>
<th>EventStudio System Designer 4.0</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CC ALERTING</strong></td>
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</tr>
<tr>
<td>ISUP ANSWER</td>
<td>SS7</td>
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<tr>
<td><strong>CC CONNECT</strong></td>
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<tr>
<td><strong>CC CONNECT ACKNOWLEDGE</strong></td>
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</table>

**Conversation**

The call has entered the conversation phase. The speech path has been setup between the mobile subscriber and the land-line subscriber.

**Call Release**

<table>
<thead>
<tr>
<th>CC DISCONNECT</th>
<th>ISUP RELEASE</th>
<th>SS7</th>
</tr>
</thead>
<tbody>
<tr>
<td>CC RELEASE</td>
<td>ISUP RELEASED</td>
<td>SS7</td>
</tr>
<tr>
<td>ISUP RELEASE COMPLETE</td>
<td>SS7</td>
<td></td>
</tr>
</tbody>
</table>

**Leg: Mobile initiates call release**
The mobile sends the disconnect message to the MSC.

**Call Release**
The MSC initiates release on the PSTN side.

**Mobile initiates call release**
The MSC informs the Mobile that it has initiated call release.

**MSC informs the PSTN that the call release has been completed.**
The PSTN informs that call release has been completed at its end.

**Mobile indicates that the call has been released.**

**RR Connection Release**

<table>
<thead>
<tr>
<th>RR CHANNEL RELEASE</th>
<th>RR DISC</th>
<th>RR UA</th>
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The BSS initiates RR release with the mobile.

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

The BSS replies with an Unnumbered Acknowledge message.