

GSM Call Flow (GSM Originating Call)					
Cell		Mobile Network		Fixed Network	
Mobile Station		Base Stations	NSS	PSTN	
User	Mobile	BSS	MSC VLR	PSTN	
EventStudio System Designer 4.0					
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**LEG: GSM Mobile Originated Call**

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

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The user keys in the phone number for the landline subscriber and ..  
.. presses the Send button

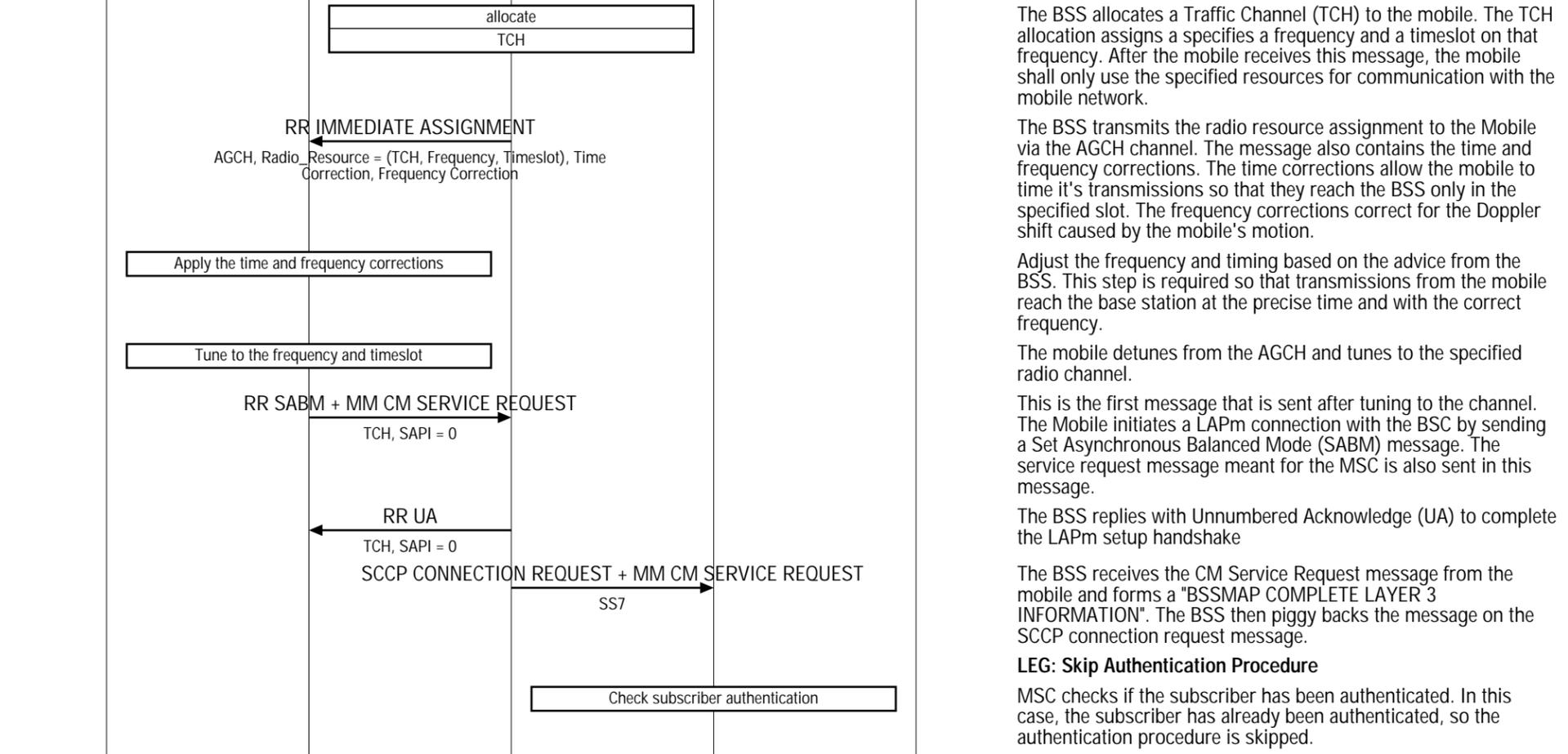
**Begin RR Connection Establishment**

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 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.

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.



The BSS allocates a Traffic Channel (TCH) to the mobile. The TCH allocation assigns a specifies a frequency and a timeslot on that frequency. After the mobile receives this message, the mobile shall only use the specified resources for communication with the mobile network.

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.

Adjust the frequency and timing based on the advice from the BSS. This step is required so that transmissions from the mobile reach the base station at the precise time and with the correct frequency.

The mobile detunes from the AGCH and tunes to the specified radio channel.

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.

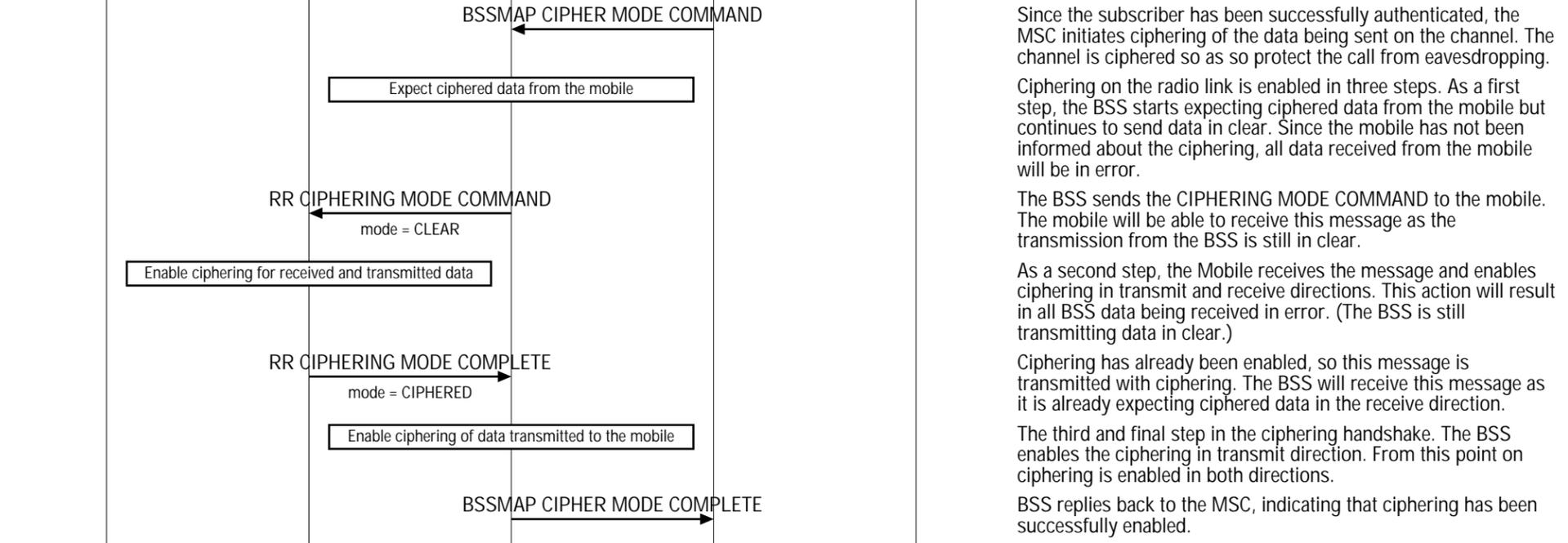
The BSS replies with Unnumbered Acknowledge (UA) to complete the LAPm setup handshake

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**

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**



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 to protect the call from eavesdropping.

Ciphering on the radio link is enabled in three steps. As a first step, the BSS starts expecting ciphered data from the mobile but continues to send data in clear. Since the mobile has not been informed about the ciphering, all data received from the mobile will be in error.

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.

As a second step, the Mobile receives the message and enables ciphering in transmit and receive directions. This action will result in all BSS data being received in error. (The BSS is still transmitting data in clear.)

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.

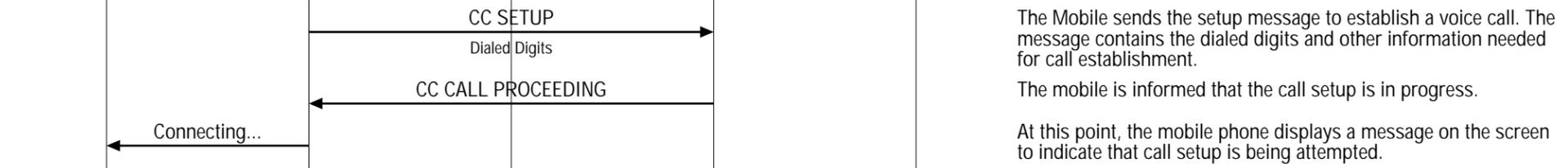
The third and final step in the ciphering handshake. The BSS enables the ciphering in transmit direction. From this point on ciphering is enabled in both directions.

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**

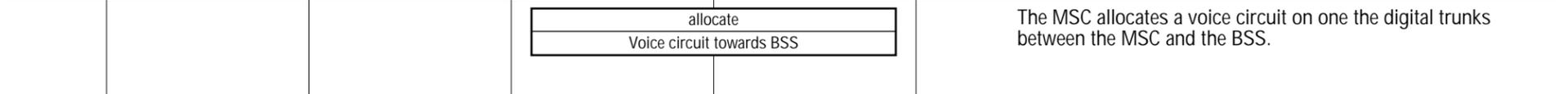


The Mobile sends the setup message to establish a voice call. The message contains the dialed digits and other information needed for call establishment.

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

At this point, the mobile phone displays a message on the screen to indicate that call setup is being attempted.

**Mode Modify**



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

