Interrogation procedure

1. **ISUP INITIAL ADDRESS MESSAGE**
   - A PSTN subscriber calls the mobile phone by dialing the GSM phone number (MSISDN). The PSTN will use the MSISDN to locate the GMSC (Gateway Mobile Switching Center) for the service provider. Once the GMSC has been identified, the PSTN sends the ISUP Initial Address Message to the GMSC.
   - The GMSC requests routing information for the GSM subscriber from the HLR (Home Location Register).
   - The HLR uses the dialed number to locate the HLR entry for the subscriber. The SS7 address for the MSC VLR serving the subscriber is obtained from this record. (Recall that the SS7 address of the serving MSC VLR was updated via an inter VLR location update.)
   - The HLR has identified the subscriber is currently being served by the Maryland MSC VLR. The HLR then asks the MSC VLR to assign a temporary roaming phone number to the subscriber.
   - The Maryland MSC VLR allocates a temporary roaming phone number (MSRN - Mobile Station Roaming Number)
   - The MSRN is then passed to the HLR.

2. **MAP/C SEND ROUTING INFORMATION**
   - The GMSC uses the MSRN to route the call to the Maryland MSC VLR.
   - The Maryland MSC VLR receives the call. At this point, the MSRN is marked free and may be reassigned for other calls. (This...
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 VLR uses a TMSI (Temporary Mobile Subscriber Identity) 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.

The Maryland BSC receives the page message. The BSC will send the Page message to all the cells that serve the subscriber's location area.

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.

The mobile finds that the TMSI specified in the page message matches its own TMSI. The mobile decides to respond to the page. An RR connection establishment is initiated by sending a channel request to the network.

The network assigns a channel to the terminal and sends the assignment and time/frequency corrections in the immediate assignment message.

The mobile tunes to the assigned channel and transmits the page response and the SABM to initiate the RR session.

The BSC sends a SCCP connection request to the MSC VLR. The page response message is piggy backed with the request.
The BSC acknowledges the SABM to establish the RR connection. Note that UA messages are used in the entire session for acknowledging packets. They will be omitted here for clarity.

Enable Ciphering

Call setup

16

The MSC VLR receives the page response and sends a call setup to the mobile.

17

The mobile acknowledges the receipt of the setup by sending the call confirmed message.

18

Ring the subscriber.

19

The mobile notifies the MSC that the subscriber is being alerted.

20

The MSC receives the alert indication and sends an ISUP address complete message to the GMSC.

21

The subscriber answers the call by hitting the "OK" button.

22

Notify the MSC that the subscriber has answered the call.

23

The call has now entered the conversation phase.

24

The mobile subscriber hits End to clear the call.

25

The mobile sends the disconnect message to the MSC.

26

The MSC initiates release on the PSTN side.

The MSC disconnects the voice path and also releases the voice circuit between the BSC and the MSC.

The MSC informs the mobile that it has initiated call release.

The 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

- RR CHANNEL RELEASE
- RR DISC
- RR UA
- Call Released Indication

BSSMAP CLEAR COMMAND
BSSMAP CLEAR COMPLETE

Call release has been completed, now the RR connection is released by the MSC.
The BSC initiates RR release with the mobile.
The BSC informs the MSC that the RR connection has been released.
The mobile sends a disconnect message to release the LAPm connection.
The BSC replies with an Unnumbered Acknowledge message.
Mobile goes back to the default display to indicate that call has been completely released.