Inter MSC Handover Call Flow (GSM Inter MSC Handover Call Flow)

Highway	GSM Coverage						EventStudio System Designer 4.0
GSM Mobile	Vienna (Target)			Bethesda (Source)			
Mobile	Vienna Cell	Vienna BSC	Vienna MSC VLR	Bethesda MSC VLR	Bethesda BSC	Bethesda Cell	25-Jan-08 07:26 (Page 1)

This call flow was generated with EventStudio System Designer 4.0 (http://www.EventHelix.com/EventStudio). The EventStudio source files for this document can be downloaded from http://www.eventhelix.com/call-flow/gsm-inter-msc-handover.zip.

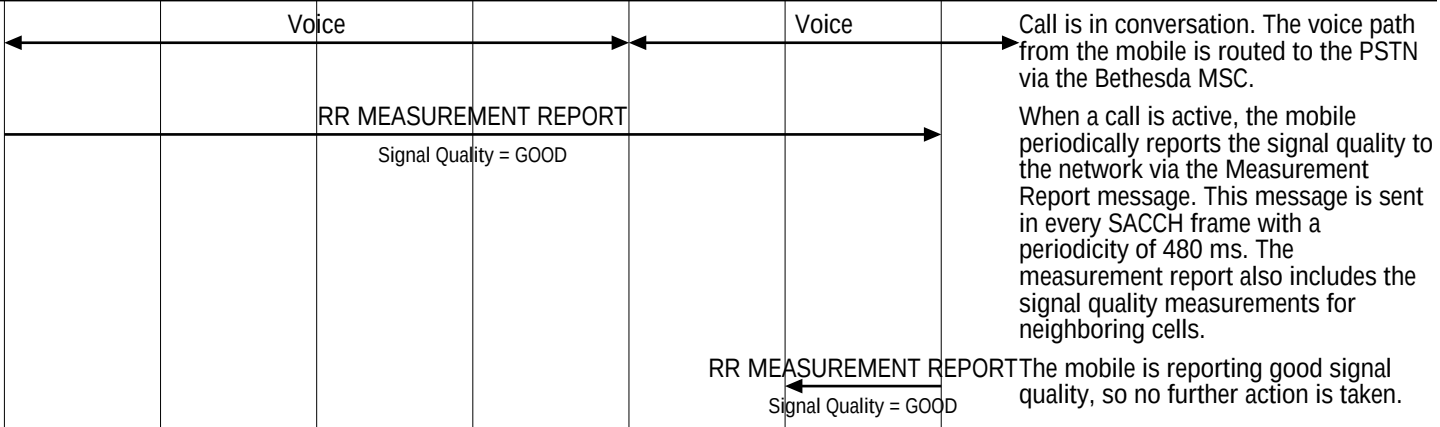
How does a GSM mobile phone maintain a call even when moving from a cell controlled by one MSC to a cell controlled by a different MSC?

The calls are maintained by handing over the call from the source MSC to the target MSC. The MAP protocol is used to manage the interactions between the source MSC and the target MSC.

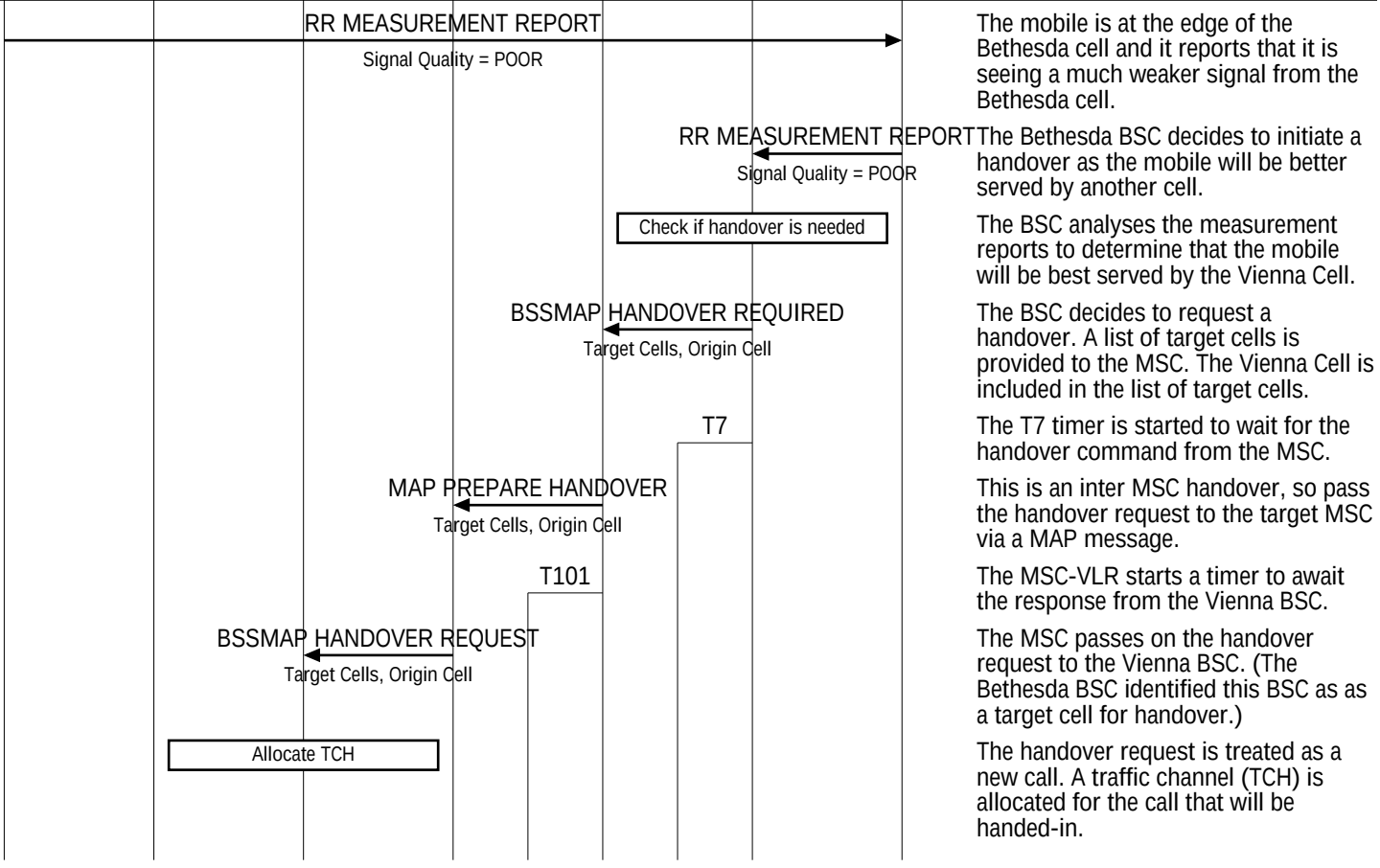
In this example, a user has an active call and is moving from the Bethesda Cell to the Vienna Cell. As the user moves, the call will be handed over by the Bethesda Cell to the Vienna Cell. The Vienna cell and the Bethesda cell are controlled by different MSCs, thus an Inter-MSC handover will be performed from the Bethesda MSC to the Vienna MSC. (Please refer to the diagram at:

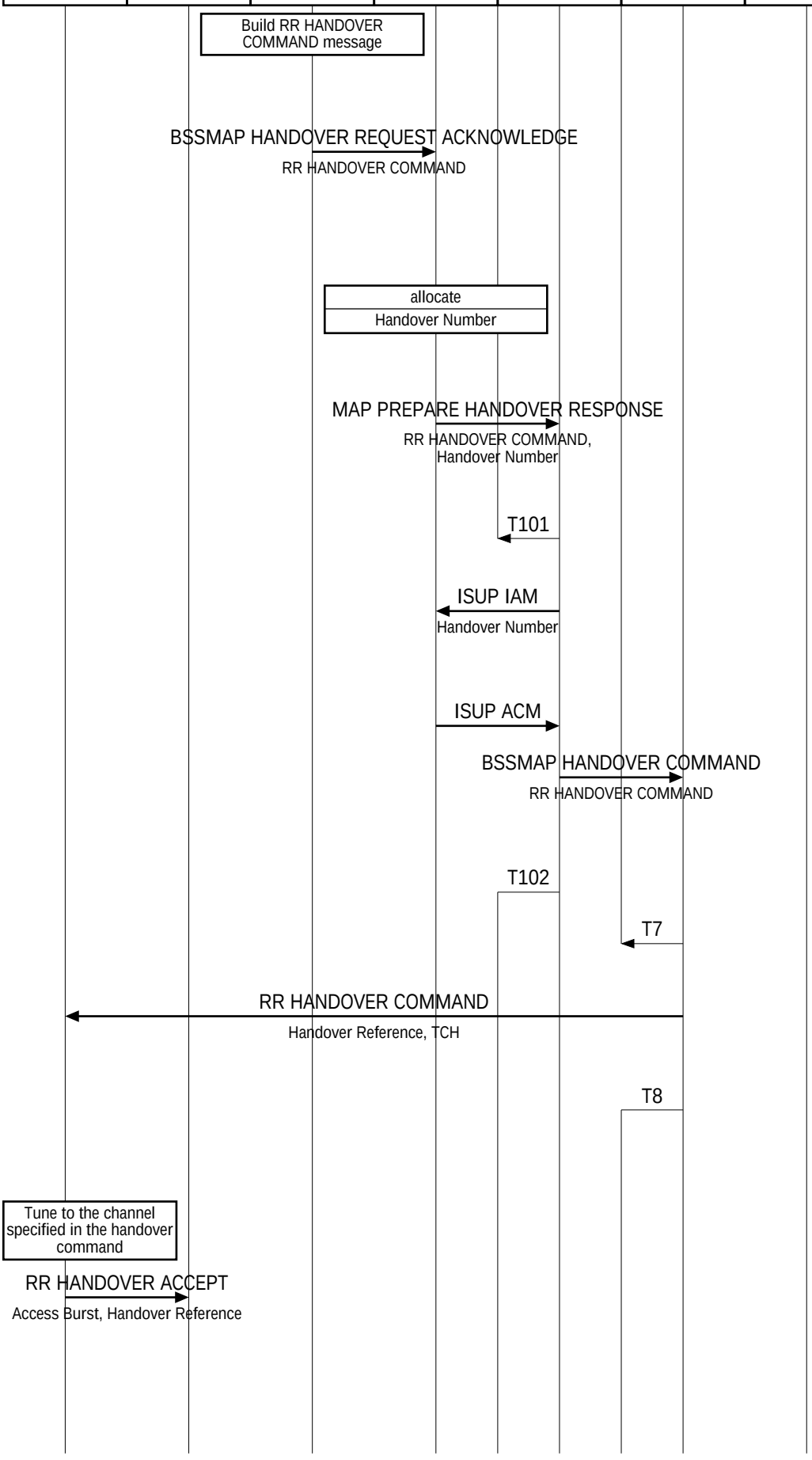
http://www.eventhelix.com/RealtimeMantra/Telecom/GSM_network_example.htm

The GSM Mobile has an active call in the Bethesda Cell.



The user reaches the boundary between the Bethesda Cell and Vienna cell.





At this point the Vienna BSC prepares the handover command that needs to be sent to the mobile. This message contains all the information the mobile will need to handover to this cell.

The Vienna BSC includes the RR HANDOVER COMMAND message as a payload in the HANDOVER REQUEST ACK that is sent back to the MSC. The RR HANDOVER COMMAND will be delivered to the mobile via the Bethesda BSC.

The Vienna MSC obtains a handover number from the VLR. The Bethesda MSC will use this number to initiate an inter-MSC call to carry the voice from the Bethesda MSC to the Vienna MSC.

Pass the handover request acknowledgement from the target MSC to the source MSC. The message also includes the handover number to call for the inter-MSC voice call.

The MSC has heard back from the destination MSC, thus the T101 timer is stopped.

The Bethesda MSC initiates a voice call to the Vienna MSC. The call is initiated with the ISUP Initial Address Message (IAM) addressed to the "Handover Number".

The Vienna MSC accepts the call with the Address Complete (ACM) message.

The MSC delivers the handover command to the Bethesda BSC. This command encapsulates the RR HANDOVER COMMAND from the destination BSC.

T102 is started to track the completion of the handover.

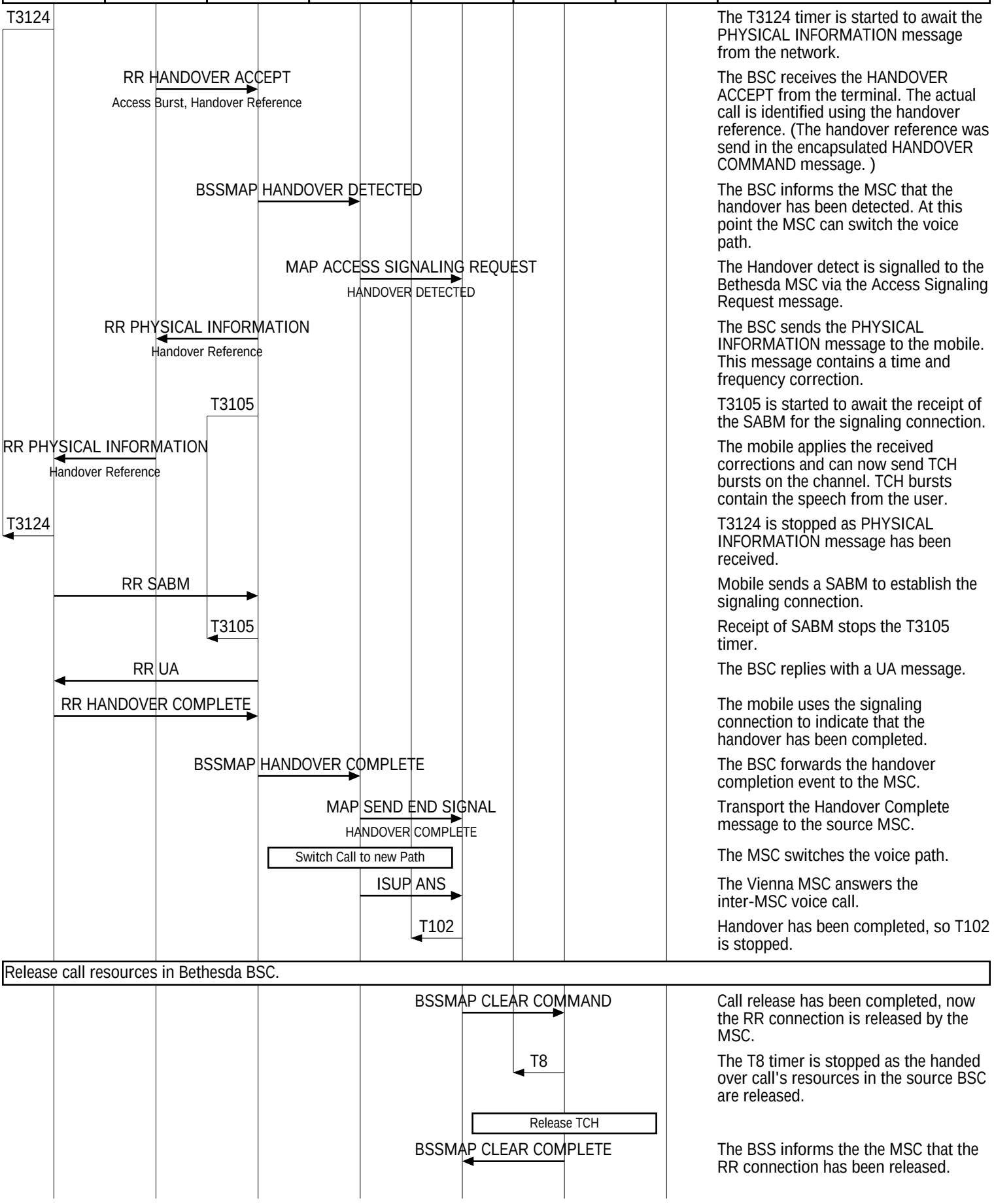
The handover command has been received. So the T7 timer can now be stopped.

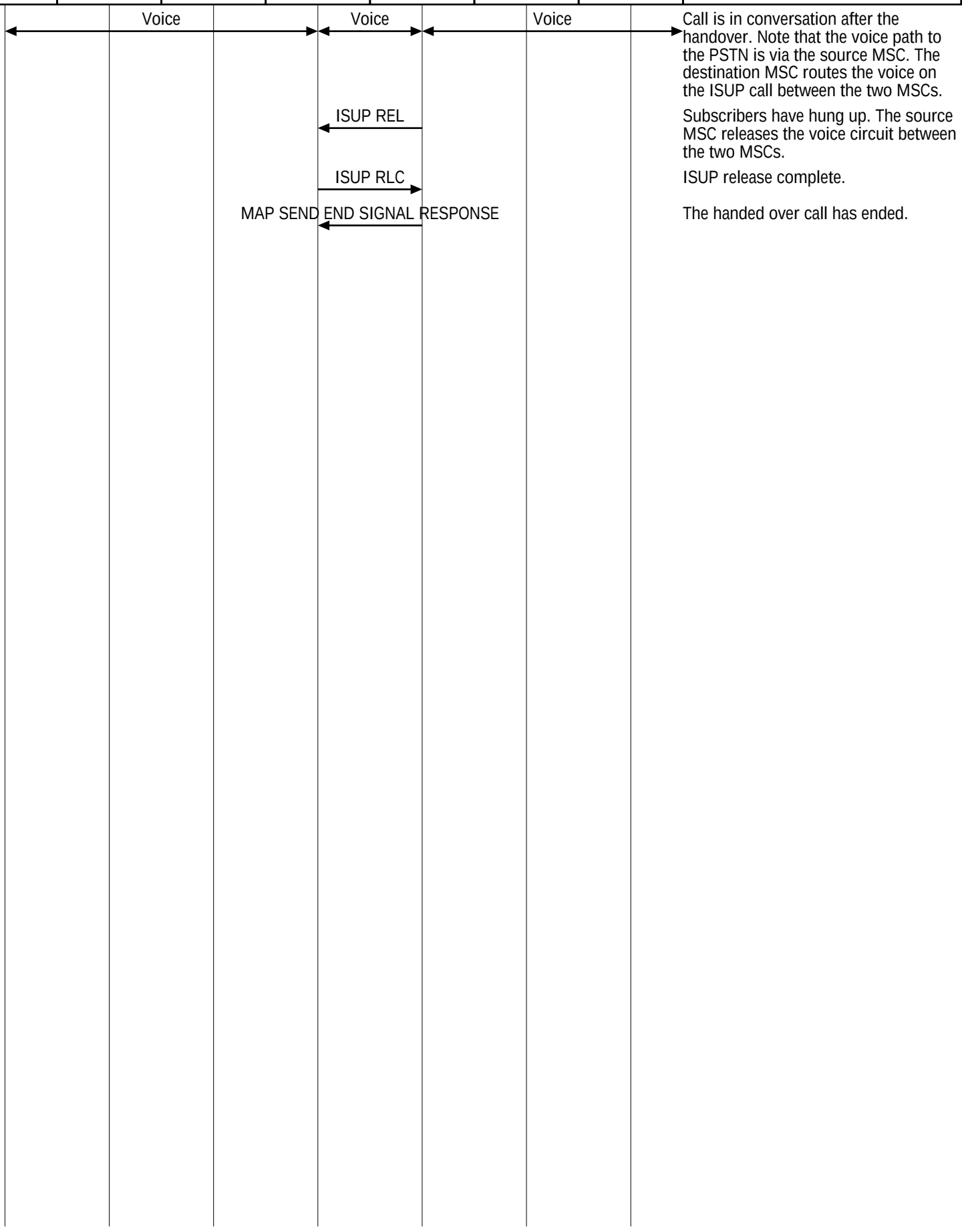
The Bethesda BSC extracts the RR HANDOVER COMMAND message from the BSSMAP message and sends it to the mobile.

T8 is started to await the clear of this call from the MSC. If the handover to the target cell is successful, the MSC will initiate a resource release to the source BSC.

The extracts the destination channel information from the message and tunes to the assigned channel.

After tuning to the assigned channel, the mobile starts sending the handover accept message. Note that this message is sent as an access burst as the mobile is not completely synchronized to send normal bursts.


T3124
The T3124 timer is started to await the PHYSICAL INFORMATION message from the network.
RR HANDOVER ACCEPT
Access Burst, Handover Reference
The BSC receives the HANDOVER ACCEPT from the terminal. The actual call is identified using the handover reference. (The handover reference was send in the encapsulated HANDOVER COMMAND message.)
BSSMAP HANDOVER DETECTED
The BSC informs the MSC that the handover has been detected. At this point the MSC can switch the voice path.
MAP ACCESS SIGNALING REQUEST
HANDOVER DETECTED
The Handover detect is signalled to the Bethesda MSC via the Access Signaling Request message.
RR PHYSICAL INFORMATION
Handover Reference
The BSC sends the PHYSICAL INFORMATION message to the mobile. This message contains a time and frequency correction.
T3105
T3105 is started to await the receipt of the SABM for the signaling connection.
RR PHYSICAL INFORMATION
Handover Reference
The mobile applies the received corrections and can now send TCH bursts on the channel. TCH bursts contain the speech from the user.
T3124
T3124 is stopped as PHYSICAL INFORMATION message has been received.
RR SABM
Mobile sends a SABM to establish the signaling connection.
T3105
Receipt of SABM stops the T3105 timer.
RR UA
The BSC replies with a UA message.
RR HANDOVER COMPLETE
The mobile uses the signaling connection to indicate that the handover has been completed.
BSSMAP HANDOVER COMPLETE
The BSC forwards the handover completion event to the MSC.
MAP SEND END SIGNAL
HANDOVER COMPLETE
Transport the Handover Complete message to the source MSC.
Switch Call to new Path
The MSC switches the voice path.
ISUP ANS
The Vienna MSC answers the inter-MSC voice call.
T102
Handover has been completed, so T102 is stopped.
Release call resources in Bethesda BSC.
BSSMAP CLEAR COMMAND
Call release has been completed, now the RR connection is released by the MSC.
T8
The T8 timer is stopped as the handed over call's resources in the source BSC are released.
Release TCH
BSSMAP CLEAR COMPLETE
The BSS informs the the MSC that the RR connection has been released.


Voice
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Call is in conversation after the handover. Note that the voice path to the PSTN is via the source MSC. The destination MSC routes the voice on the ISUP call between the two MSCs.
ISUP REL
Subscribers have hung up. The source MSC releases the voice circuit between the two MSCs.
ISUP RLC
ISUP release complete.
MAP SEND END SIGNAL RESPONSE
The handed over call has ended.