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v 1.0

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3RD GENERATION
PARTNERSHIP
PROJECT 2
"3GPP2"

Mobile Application Part (MAP) -

VOICE FEATURE SCENARIOS: MOBILE ACCESS HUNTING

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REVISION HISTORY

Revision	Date	Remarks
X.S0004-328-E v1.0	April 2008	Initial publication.

1 INTRODUCTION

Unless otherwise noted, the scenarios in this section depict features operating individually; i.e., feature interactions are not considered unless specifically noted.

The scenarios in this part do not include a complete listing of operation parameters, either in the figures or in the accompanying text descriptions. Parameters are included where they are deemed necessary to improve the understanding of the scenario. For a complete description of the parameters associated with each operation, refer to Parts 540 and 550.

2 Mobile Access Hunting

This section depicts the interactions between network entities in various situations related to automatic roaming and Mobile Access Hunting (MAH). These scenarios are for illustrative purposes only.

2.1 MAH Membership Activation or De-Activation

The information flows required for the activation or de-activation of membership in the member's default or specified MAH group by an authorized MS are described in *Part 311 Section 2.1*.

2.2 MAH Ordering Change Request

The information flows required for a request to change the member's order in its default or specified MAH group, by an authorized MS, are described in *Part 311 Section 2.1*.

2.3 MAH Invocation

This scenario describes the invocation of MAH. The MAH group is comprised of three members: one member is a PSTN DN, MAH-DN1; the other two members are MSs, served by the same HLR and currently served by the same MSC. These two MSs will be referred to as MIN1 and MIN2 throughout this part.

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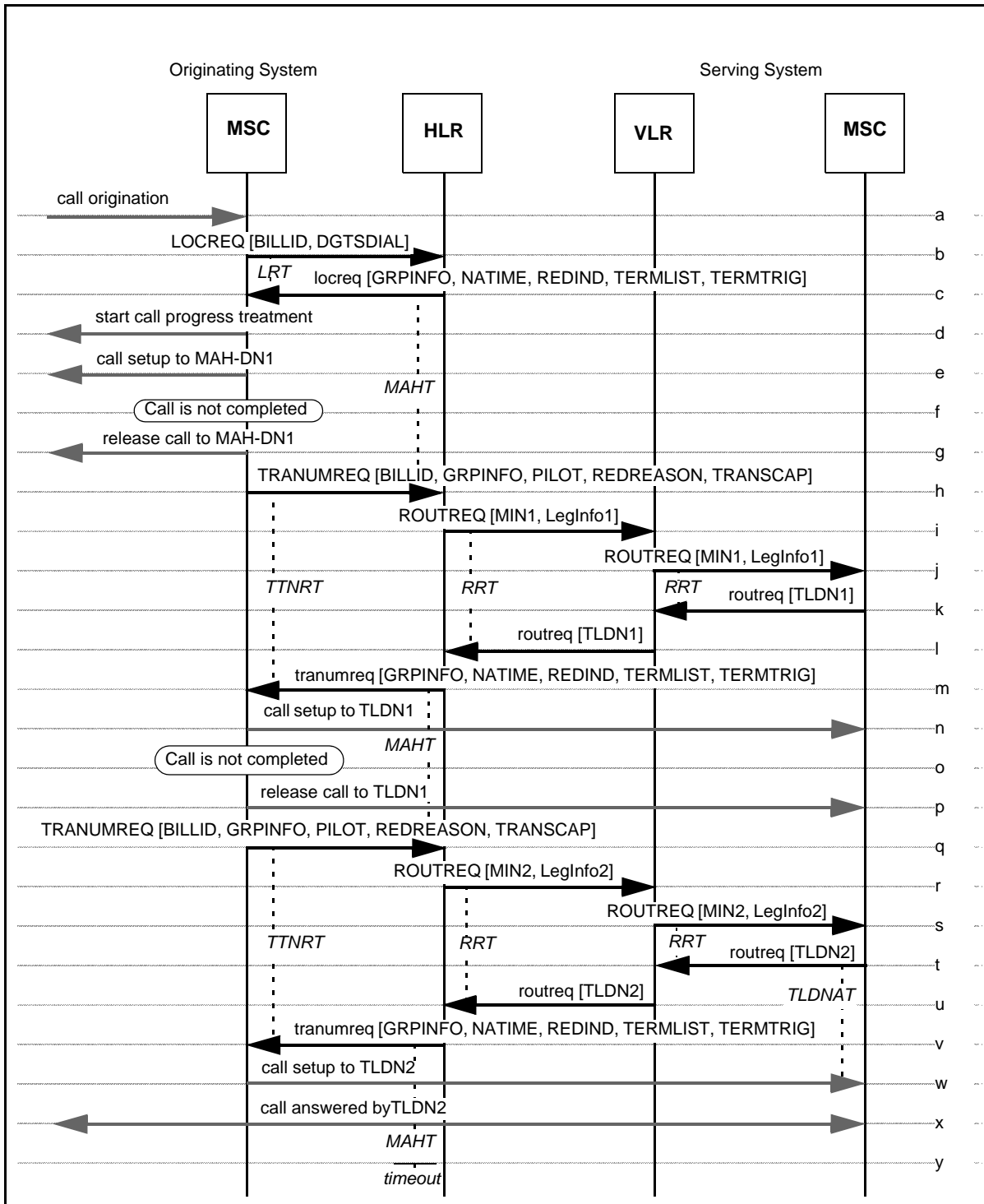


Figure 1 — MAH Invocation

- a. A call origination and the dialed MS address digits (i.e., directory number) are received by the Originating MSC.
- b. The Originating MSC sends a LOCREQ to the MS's HLR and includes the BillingID and Digits (Dialed) parameters.

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- c. The HLR recognizes the called number as an MAH Pilot DN. The HLR sends a `locreq` to the Originating MSC, containing the first MAH group member's routing information in the form of the `TerminationList` parameter, along with an indication of the reason for extending the incoming call (i.e., for MAH) in the `DMH_RedirectionIndicator` parameter.

Additional Parameters	Usage	Type
GRPINFO	Information associated with the MAH Pilot DN.	O
NATIME	Indication of how long, in seconds, the Originating MSC should wait before applying no answer treatment. Include to override Originating MSC default.	O
TERMTRIG	Indicates active termination trigger points for members not having <code>TerminationTriggers</code> inside the <code>TerminationList</code> .	O

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- d. On receipt of the `locreq`, the Originating MSC may start call progress treatment to the calling party, if it has not already done so.
- e. The Originating MSC provides call treatment as indicated in the `locreq`. In this case, the treatment is to attempt to establish a call to the first DN in the MAH group, `MAHDN1`. For each call attempt, the Originating MSC monitors call progress; based on this information, it applies appropriate call progress treatment to the calling party.
- f. The call to `MAH-DN1` is not completed due to busy, no answer time-out or other causes.
- g. The Originating MSC releases the call to `MAH-DN1`.
- h. Based on the instructions in the `TerminationTriggers` parameter received in Step-c, the Originating MSC sends a `TRANUMREQ` to the HLR, containing the `BillingID` associated with the original MAH call (step b) and the `RedirectionReason` parameter.

Additional Parameters	Usage	Type
BILLID	May be used by HLR to relate the transfer request to the original MAH call invocation.	R
PILOT	May be used by the HLR to relate the transfer request to the original MAH invocation.	R
GRPINFO	May be used by HLR for further processing of the MAH call. Include if available.	O
TRANSCAP	Indicates the Originating MSC's transaction capability at the current time. (Allow routing information.)	O

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- i. The HLR may use the BillingID or the PilotNumber and LegInformation to relate the transfer request to the original MAH call. It sends a ROUTREQ to the VLR where the MS corresponding to the next entry in the MAH group list is registered, that of MIN1.

Additional Parameters	Usage	Type
LegInfo1:	MAH parameters for call leg to MIN1:	
[AlertCode]	Include for distinctive alerting of MS.	O
[LegInformation]	Used for HLR identification of call leg to MIN1. Include at HLR option.	O
[OneTimeFeature-Indicator]	Modify feature processing for the duration of this call leg.	O
[TerminationTriggers]	Include if termination trigger points are active for call leg.	O

- j. The VLR forwards the ROUTREQ to the current Serving MSC.
- k. In reaction to the ROUTREQ, the Serving MSC checks its internal data structures and determines that the MS is currently idle. The Serving MSC allocates TLDN1 and returns this information to the VLR in a routreq.
- l. The VLR sends the routreq to the HLR.
- m. The HLR sends a tranumreq to the Originating MSC, including TLDN1 in the TerminationList parameter, along with an indication of the reason for extending the incoming call (i.e., for MAH) in the DMH_RedirectionIndicator parameter.

Additional Parameters	Usage	Type
GRPINFO	See description in Step-c.	O
NATIME	See description in Step-c.	O
TERMTRIG	See description in Step-c.	R

- n. The Originating MSC provides call treatment as indicated in the tranumreq. In this case, the treatment is to attempt to establish a call to TLDN1.
- o. The call to TLDN1 is not completed due to busy, no answer time-out or other causes.
- p. The Originating MSC releases the call to TLDN1.
- q. Based on the instructions in the TerminationTriggers parameter received in Step-c, the Originating MSC sends a TRANUMREQ to the HLR, containing the BillingID associated with the original MAH call (step b) and the RedirectionReason parameter.

Additional Parameters	Usage	Type
BILLID	See description in Step-h.	R
PILOT	See description in Step-h.	R
GRPINFO	See description in Step-h.	O
TRANSCAP	See description in Step-h.	O

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- r. The HLR may use the BillingID or PilotNumber and GroupInformation to relate the transfer request to the original MAH call. It sends a ROUTREQ to the VLR where the MS corresponding to the next entry in the MAH group list is registered, that of MIN2.s.

Additional Parameters	Usage	Type
LegInfo2:	MAH parameters for call leg to MIN2:	
[AlertCode]	See description in Step-i.	O
[LegInformation]	Used for HLR identification of call leg to MIN2. Include at HLR option.	O
[OneTimeFeature-Indicator]	Modify feature processing for the duration of this call leg.	O
[TerminationTriggers]	See description in Step-i.	O

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- s. The VLR forwards the ROUTREQ to the current Serving MSC.
- t. In reaction to the ROUTREQ, the Serving MSC checks its internal data structures and determines that the MS is currently idle. The Serving MSC allocates TLDN2 and returns this information to the VLR in a routreq.
- u. The VLR sends the routreq to the HLR.
- v. The HLR sends a tranumreq to the Originating MSC, including TLDN2 in the TerminationList parameter, along with an indication of the reason for extending the incoming call (i.e., for MAH) in the DMH_RedirectionIndicator parameter.

Additional Parameters	Usage	Type
GRPINFO	See description in Step-c.	O
NATIME	See description in Step-c.	O
TERMTRIG	See description in Step-c.	R

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- w. The Originating MSC provides call treatment as indicated in the tranumreq case, the treatment is to attempt to establish a call to TLDN2.
- x. The party at TLDN2 answers. The Originating MSC connects the calling party at TLDN2.
- y. On MAHT timer time-out, the HLR concludes MAH processing.

2.4 MAH Invocation with a Busy MAH Group Member (Single-User Type)

This scenario describes an invocation of MAH where a member busy condition is encountered. The MAH group is comprised of MSs. The MAH group is the single-user type (i.e., the MAH group is considered busy when a member of the MAH group is busy).

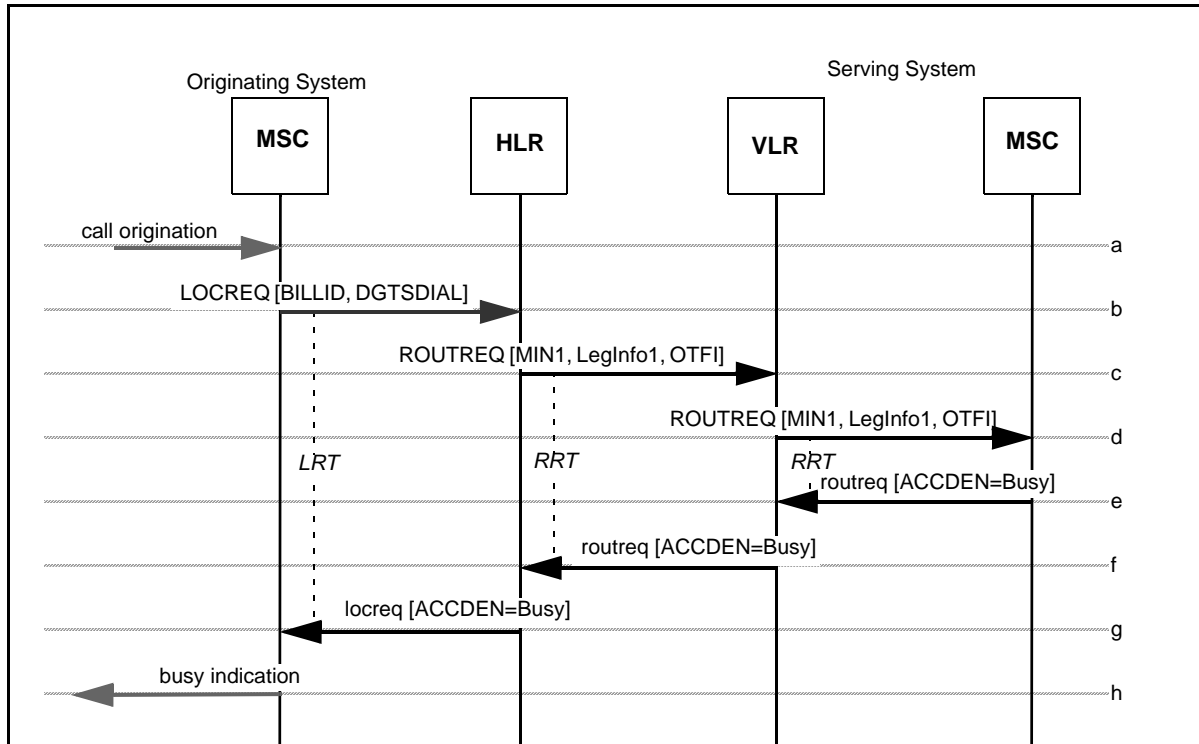


Figure 2 — MAH Invocation with a Busy MAH Group Member(Single-User Type)

- a-b. Same as MAH, Section 2.3, Steps a-b.
- c-d. Same as MAH, Section 2.3, Steps i-j, respectively.

Parameters are as in Section 2.3, Steps i-j, with the following addition:		
Additional Parameters	Usage	Type
OTFI (Next Call) [OneTimeFeatureIndicator]	Modify feature processing for duration of next call received by MS. Include if applicable.	O

- e. In reaction to the ROUTREQ, the Serving MSC checks its internal data structures and determines that the MS is currently busy. The Serving MSC returns this information to the VLR in a routreq.
- f. The VLR sends the routreq to the HLR.
- g. The HLR determines from the service profile that the MAH group is a single-user type; therefore, the group is considered busy (i.e., since MIN1 is busy). The HLR returns the busy status to the Originating MSC in the locreq.
- h. The Originating MSC then returns a busy indication to the calling party. Note that failure on this call will not generate any MAH-specific feature processing.

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2.5 MAH Invocation with a Busy MAH Group Member (Multiple-User Type)

This scenario describes an invocation of MAH where a member busy condition is encountered. The MAH group is comprised of MSs. The MAH group is the multiple-user type (i.e., the MAH group is considered busy when all accessible members of the MAH group are busy).

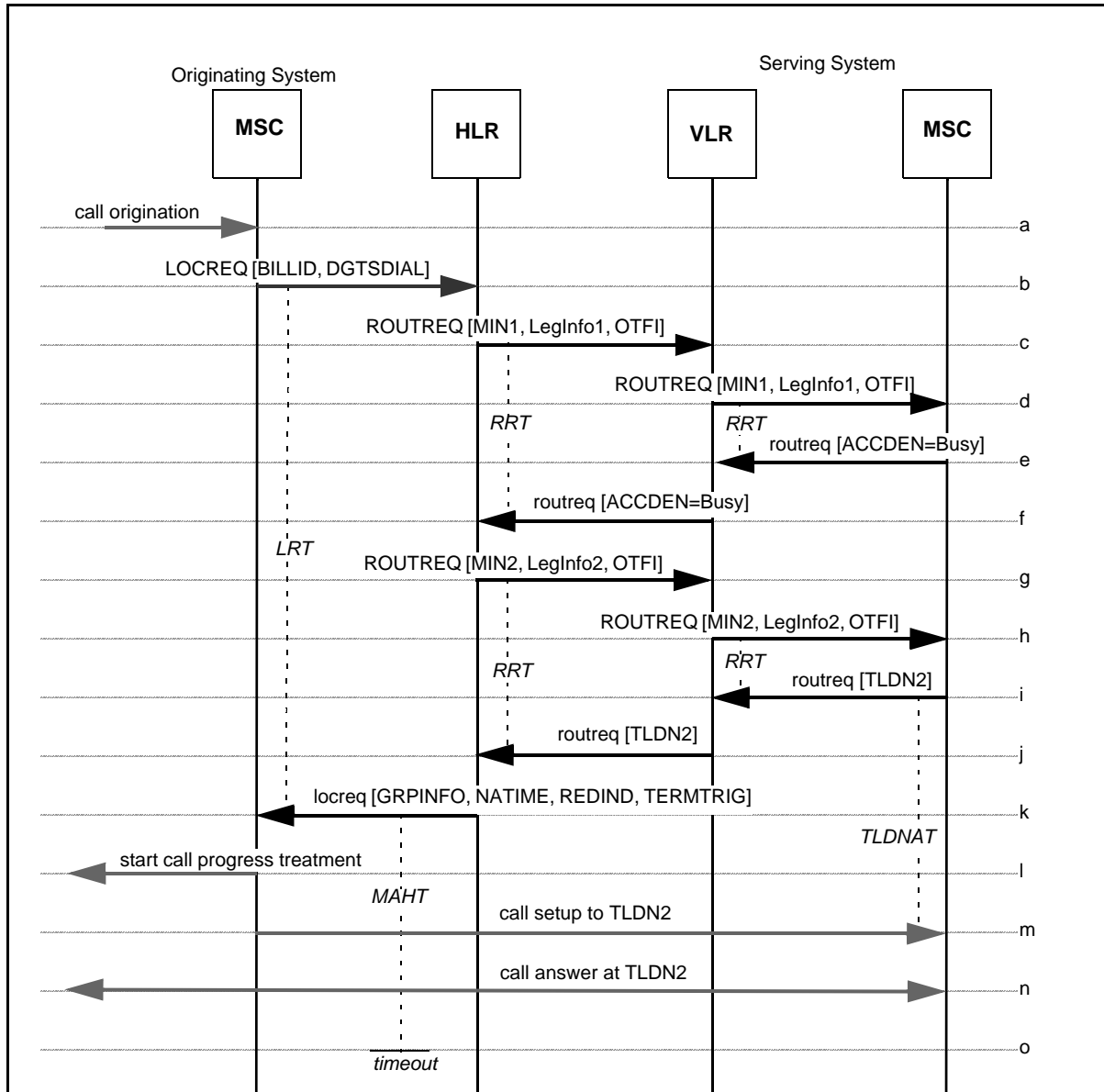


Figure 3 — MAH Invocation with a Busy MAH Group Member (Multiple-User Type)

a-f. Same as MAH, Section 2.4, Steps a-f.

- g. The HLR determines from the service profile that the MAH group is a multiple-user type; therefore, the group is not considered busy even though MIN1 is busy. Therefore, the HLR skips over MIN1 to the next entry in the MAH group, MIN2. It sends a ROUTREQ to the VLR where the MS corresponding to MIN2 is registered.

Parameters are as in Section 2.3, Step r, with the following addition:

Additional Parameters	Usage	Type
LegInfo2: [AlertCode]	MAH parameters for call leg to MIN2: Include for distinctive alerting of MS.	O
[LegInformation]	Used for HLR identification of call leg. Include at HLR option.	O
[TerminationTriggers]	Include if termination trigger points are active for call leg.	O
OTFI (Next Call) [OneTimeFeatureIndicator]	Modify feature processing for duration of next call received by MS. Include if applicable.	O

- h. The VLR forwards the ROUTREQ to the current Serving MSC.
- i. In reaction to the ROUTREQ, the Serving MSC checks its internal data structures and determines that the MS is currently idle. The Serving MSC allocates TLDN2 and returns this information to the VLR in a routreq.
- j. The VLR sends the routreq to the HLR.
- k. The HLR sends a locreq to the Originating MSC, including TLDN2 in the TerminationList parameter, along with an indication of the reason for extending the incoming call (i.e., for MAH) in the DMH_RedirectionIndicator parameter.

Additional Parameters	Usage	Type
GRPINFO [GroupInformation]	Information associated with the MAH Pilot DN.	O
NATIME [NoAnswerTime]	Indication of how long, in seconds, the Originating MSC should wait before applying no answer treatment. Include to override Originating MSC default.	R
TERMTRIG [TerminationTriggers]	Indicates active termination trigger points for members not having TerminationTriggers inside the TerminationList.	O

- l. On receipt of the locreq, the Originating MSC may start call progress treatment to the calling party, if it has not already done so.
- m. The Originating MSC provides call treatment as indicated in the locreq. In this case, the treatment is to attempt to establish a call to TLDN2.
- n. The party at TLDN2 answers. The Originating MSC connects the calling party to the party at TLDN2.
- o. On MAHT timer time-out, the HLR concludes MAH processing.

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2.6 MAH Invocation with a No Answer MAH Group Member

This scenario describes an invocation of MAH where a member no answer condition is encountered. The MAH group is comprised of MSs.

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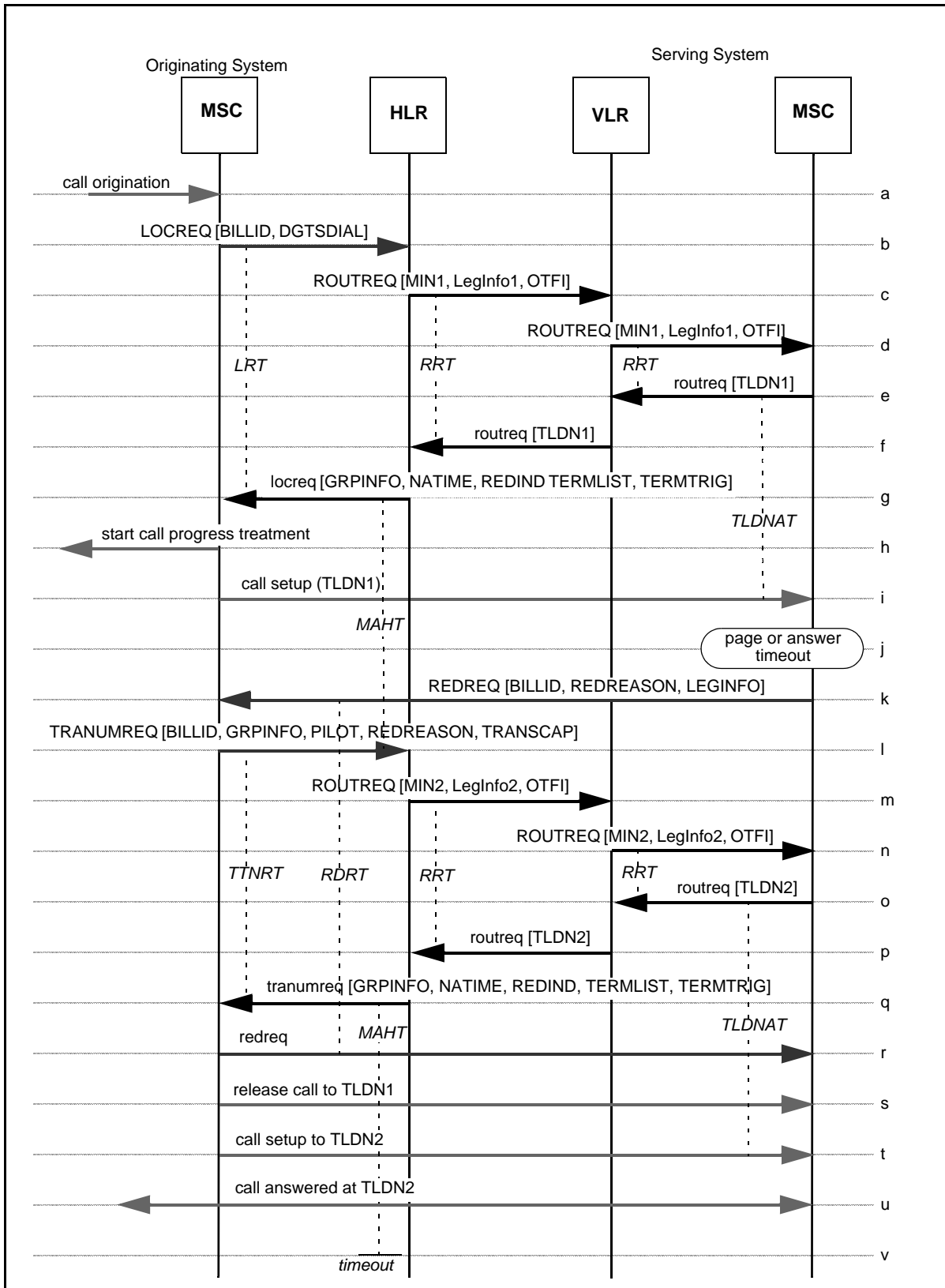


Figure 4 — MAH Invocation with a No Answer MAH Group Member

- 1 a-d. Same as MAH, Section 2.4, Steps a-d.
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 3 e. In reaction to the ROUTREQ, the Serving MSC checks its internal data structures and
 4 determines that the MS is currently idle. The Serving MSC allocates TLDN1 and
 5 returns this information to the VLR in a routreq.
 6
 7 f. The VLR sends the routreq to the HLR.
 8
 9 g. The HLR sends a locreq to the Originating MSC, including TLDN1 in the
 10 TerminationList parameter, along with an indication of the reason for extending the
 11 incoming call (i.e., for MAH) in the DMH_RedirectionIndicator parameter. .

Additional Parameters	Usage	Type
GRPINFO [GroupInformation]	Information associated with the MAH Pilot DN.	O
NATIME [NoAnswerTime]	Indication of how long, in seconds, the Originating MSC should wait before applying no answer treatment. Include to override Originating MSC default.	O
TERMTRIG [TerminationTriggers]	Indicates active termination trigger point for members not having TerminationTriggers inside the TerminationList.	O

- 23 h. On receipt of the locreq, the Originating MSC may start call progress treatment to
 24 the calling party, if it has not already done so.
 25
 26 i. The Originating MSC provides call treatment as indicated in the locreq. In this case,
 27 the treatment is to attempt to establish a call to TLDN1.
 28
 29 j. When the call for MIN1 is received at the Serving MSC, the MS is paged and, if a page
 30 response is received, subsequently alerted. The MS fails to respond to the page or does
 31 not answer after alerting; the Serving MSC determines from the service profile
 32 (including the profile overrides based on the TerminationTriggers parameter) that
 33 MIN1 has call forwarding active on no answer or no response to page conditions.
 34
 35 k. The Serving MSC sends a REDREQ containing the BillingID and RedirectionReason
 36 parameters to the Originating MSC, indicating that the call is being redirected due to
 37 a *no answer* or *no page response* condition..

Additional Parameters	Usage	Type
LEGINFO	Used for HLR identification of call leg to MIN1. Include if available.	O

- 42 l. Based on the instructions in the TerminationTriggers parameter received in Step-g, the
 43 Originating MSC sends a TRANUMREQ to the HLR that contains the BillingID
 44 associated with the original MAH call (step b) and the RedirectionReason parameter.
 45

Additional Parameters	Usage	Type
BILLID	Used by HLR to relate the transfer request to the original MAH call invocation.	R
PILOT	May be used by the HLR to relate the transfer request to the original MAH invocation.	R
REDREASON	Indicates the reason for requesting a transfer to number.	R
GRPINFO	May be used by HLR for further processing of the MAH call. Include if available.	O
TRANSCAP	Indicates the Originating MSC's transaction capability at the current time.	O

- m. The HLR may use the BillingID or the PilotNumber and GroupInformation to relate the transfer request to the original MAH call. The HLR sends a ROUTREQ to the VLR where the MS corresponding to MIN2 is registered..

Parameters are as in Section 2.3, Step r, with the following addition:		
Additional Parameters	Usage	Type
LegInfo2: [AlertCode] [LegInformation] [TerminationTriggers]	MAH parameters for call leg to MIN2: Calling number digits (network-provided), incl. presentation restriction information. Calling number digits (user-provided), incl. presentation restriction information. Indicates active termination trigger point for members not having TerminationTriggers inside the TerminationList.	O O O
OTFI (Next Call) [OneTimeFeatureIndicator]	Modify feature processing for duration of next call received by MS. Include if applicable.	O

- n. The VLR forwards the ROUTREQ to the current Serving MSC.
- o. In reaction to the ROUTREQ, the Serving MSC checks its internal data structures and determines that the MS is currently idle. The Serving MSC allocates TLDN2 and returns this information to the VLR in a routreq.
- p. The VLR sends the routreq to the HLR.
- q. The HLR sends a tranumreq to the Originating MSC, including the appropriate forward-to number in the TerminationList parameter, along with an indication of the reason for extending the incoming call (i.e., for CFNA) in the DMH_RedirectionIndicator parameter.

Additional Parameters	Usage	Type
GRPINFO	See description in Step-g.	O
NATIME	See description in Step-g.	O
TERMTRIG	See description in Step-g.	R

- r. When the tranumreq is received from the HLR, the Originating MSC sends a redreq to the Serving MSC.
- s. The Originating MSC releases the call to TLDN1.
- t. The Originating MSC attempts to establish a call to TLDN2.
- u. The party at TLDN2 answers. The Originating MSC connects the calling party to the party at TLDN2.
- v. On MAHT timer time-out, the HLR concludes MAH processing.

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2.7 MAH Invocation on Revertive Call to MAH Pilot DN

This scenario describes the invocation of MAH when the call is originated by a member of the MAH group whose MDN is the MAH Pilot-DN. The other (two) termination addresses in the MAH group are directory numbers (DNs). An `ORREQ` is used because the *Revertive Call* trigger in the `OriginationTriggers` parameter is set.

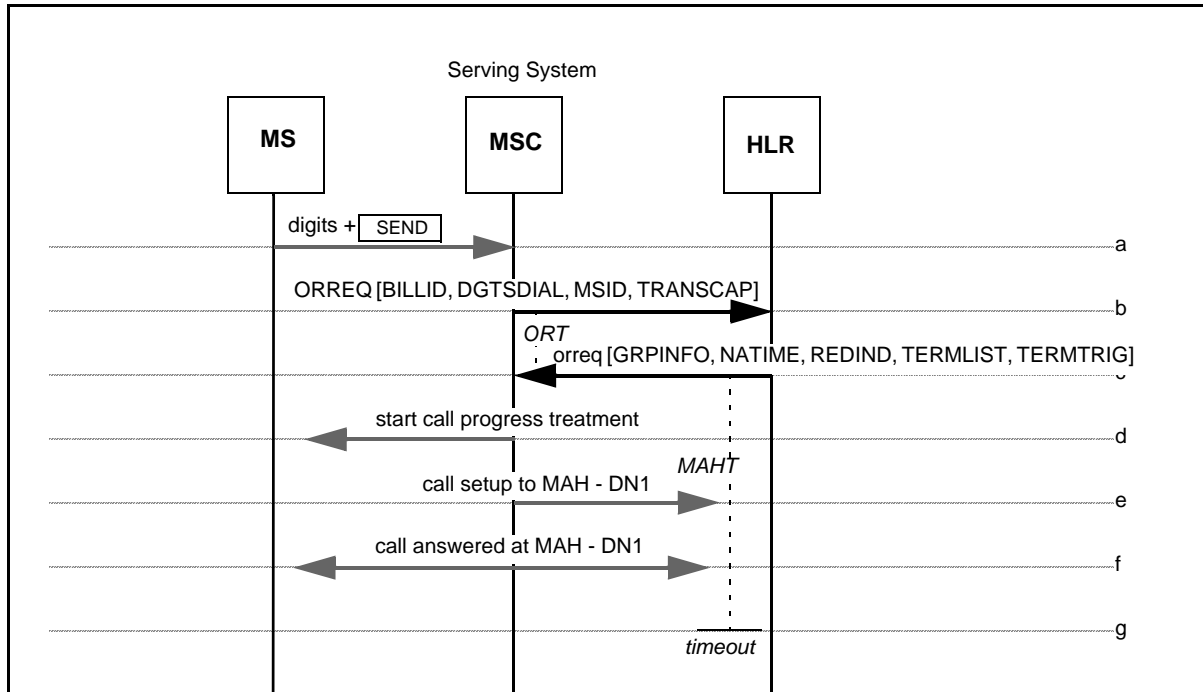


Figure 5 — MAH Invocation on Revertive Call to MAH Pilot DN

- a. Dialed digits are received by the Serving MSC. The Serving MSC detects that the dialed digits correspond to the served MS's MDN and the *Revertive Call* `OriginationTriggers` is set.
- b. The Digits Dialed are included in a `ORREQ` and sent from the Serving MSC to the HLR associated with the MS.

Additional Parameters	Usage	Type
BILLID	Used by HLR to relate the transfer request to the original MAH call invocation.	R
TRANSCAP	Indicates the Originating MSC's transaction capability at the current time.	O

- c. The HLR recognizes the called number as an MAH Pilot DN. The MAH group contains three numbers: the MAH PILOT-DN, MAH-DN1, and MAH-DN2. The HLR recognizes the calling party as the MAH PILOT-DN (based on the MDN within the subscriber record as identified by the MSID in the `ORREQ`). Therefore, the HLR skips the MAH PILOT-DN and sends an `orreq` to the Originating MSC, containing the

next MAH group member's routing information in the form of the TerminationList parameter, along with an indication of the reason for extending the incoming call (i.e., for MAH) in the DMH_RedirectionIndicator parameter.

Additional Parameters	Usage	Type
GRPINFO [GroupInformation]	Information associated with the MAH Pilot DN.	O
NATIME [NoAnswerTime]	Indication of how long, in seconds, the Originating MSC should wait before applying no answer treatment. Include to override Originating MSC default.	O
TERMTRIG [TerminationTriggers]	Indicates active termination trigger points for members not having TerminationTriggers inside the TerminationList.	O

- d. On receipt of the `orreq`, the Serving MSC may start call progress treatment to the calling party, if it has not already done so.
- e. The Serving MSC provides call treatment as indicated in the `orreq`. In this case, the treatment is to attempt to establish a call to the second member of the MAH group, MAH-DN1. For each call attempt, the Serving MSC monitors call progress; based on this information, it applies appropriate call progress treatment to the calling party.
- f. The party at MAH-DN1 answers. The Serving MSC connects the calling party to the party at MAH-DN1 and concludes MAH feature processing.
- g. On MAHT timer time-out, the HLR concludes MAH processing.

2.8 MAH Invocation on Call from MAH Group Member

This scenario describes the invocation of MAH when the call is originated by a member of the MAH group. The other (two) termination addresses in the MAH group are directory numbers (DNs). The MAH group is the multiple-user type (i.e., the MAH group is considered busy when all accessible members of the MAH group are busy).

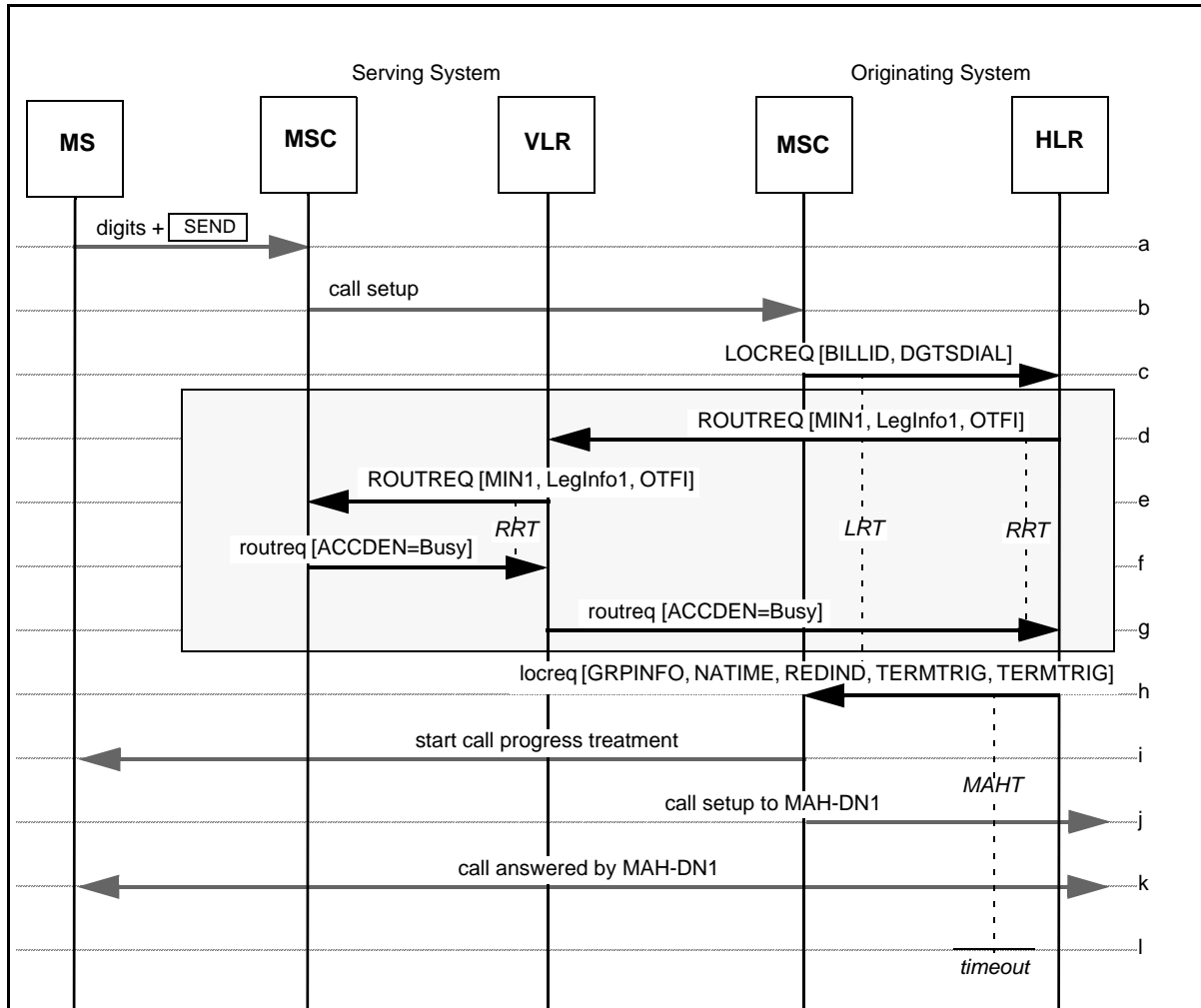


Figure 6 — MAH Invocation on Call from MAH Group Member

- Dialed digits are received by the Serving MSC.
- The Serving MSC establishes an call to the Originating MSC.
- The Digits (Dialed) and BillingID parameters are included in a LOCREQ and sent from the Originating MSC to the HLR associated with the MS.

- d. The HLR recognizes the called number as an MAH Pilot DN. The MAH group contains three members: MIN1, MAH-DN1, and MAH-DN2. If the HLR is aware that the calling party is MIN1 (e.g., via calling party number information in the call setup), it may skip to Step-h. Otherwise, the HLR constructs a ROUTREQ and sends it to the VLR where MIN1 is registered.

Parameters are as in Section 2.3, Step r, with the following addition:

Additional Parameters	Usage	Type
LegInfo1:	MAH parameters for call leg to MIN1:	
[AlertCode]	Include for distinctive alerting of MIN1.	O
[LegInformation]	Used for HLR identification of call leg to MIN1. Include at HLR option.	O
[TerminationTriggers]	Include if termination trigger points are active for call leg to MIN1.	O
OTFI (Next Call) [OneTimeFeatureIndicator]	Modify feature processing for duration of next call received by MS. Include if applicable.	O

- e. The VLR forwards the ROUTREQ to the current Serving MSC.
- f. In reaction to the ROUTREQ, the Serving MSC checks its internal data structures and determines that the MS is busy in another call. The status of the MS is returned to the VLR by the Serving MSC in the routreq.
- g. The VLR sends the routreq to the HLR.
- h. Since MIN1 is busy, and the MAH group is the multiple-user type (i.e., the MAH group is considered busy when all accessible members of the MAH group are busy), the HLR skips MIN1 and sends a locreq to the Originating MSC, containing the next MAH group member's routing information in the form of the TerminationList parameter, along with an indication of the reason for extending the incoming call (i.e., for MAH) in the DMH_RedirectionIndicator parameter.

Additional Parameters	Usage	Type
GRPINFO [GroupInformation]	Information associated with the MAH Pilot DN.	O
NATIME [NoAnswerTime]	Indication of how long, in seconds, the Originating MSC should wait before applying no answer treatment. Include to override Originating MSC default.	O
TERMTRIG [TerminationTriggers]	Indicates active termination trigger points for members not having TerminationTriggers inside the TerminationList.	O

- i. On receipt of the locreq, the Originating MSC may start call progress treatment to the calling party, if it has not already done so.
- j. The Originating MSC provides call treatment as indicated in the locreq. In this case, the treatment is to attempt to establish a call to the second member of the MAH group, MAH-DN1. For each call attempt, the Originating MSC monitors call progress; based on this information, it applies appropriate call progress treatment to the calling party.
- k. The party at MAH-DN1 answers. The Originating MSC connects the calling party to the party at MAH-DN1 and concludes MAH feature processing.
- l. On MAHT timer time-out, the HLR concludes MAH processing.

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