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WIN Call Delivery

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Revision History

| Revision | Initial Publication | Date |
|----------|---------------------|------------|
| Rev. 0 | Initial Publication | March 2004 |

PART 790

Annex A: Call Delivery Using the BCSM

Note: The content of this annex has been changed from *IS-771* annex B.

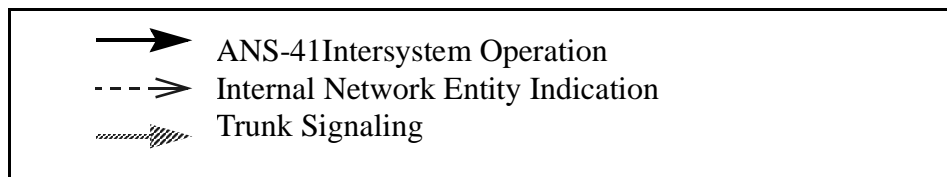
This annex is informative and is not considered part of this standard.

This annex describes how MS-to-MS call delivery can be modeled using the WIN Basic Call State Models (BCSMs). The message sequences shown in this annex are as in *TIA-41*.

A.1 Introduction

This annex illustrates how the BCSMs interact with *TIA-41* signaling to complete an MS-to-MS call involving two WIN subscribers. Not all of the information exchanges that take place between half-call segments in the same WIN MSC are shown. Details of trunk signaling have been minimized.

This annex uses extended signaling message flow diagrams to illustrate how *TIA-41* messages may interact with the BCSMs. The following conventions are used in the BCSM and *TIA-41* interaction diagrams:



Mapping *TIA-41* signaling to a BCSM should not be viewed as a specific requirement for implementation.

A.2 Scope

This Annex describes the following call delivery scenarios:

- a. normal MS - MS call delivery, with both MSs served by the same MSC (see Figure 4)
- b. normal MS - MS call delivery, with MSs served by different Serving MSCs (see Figure 5)

These scenarios provide guidance on the intended functioning of the call model with respect to *TIA/EIA-41* intersystem operations.

A.3 *TIA-41* Signaling for MS-MS Call

Figures 1 and 2 below illustrate the basic *TIA-41* information flows to support an MS-to-MS call. Both the calling and called parties are WIN subscribers whose trigger profile information is sent to their respective serving systems upon registration confirmation. This is shown for the calling party in Figure 1. The subscriber profile will cause a trigger to be armed in the O-BCSM that causes the MSC/SSF to launch a WIN query (ORREQ) during call setup. Associated with the armed trigger is the address to which the ORREQ is to be sent. (The ORREQ is typically sent to an SCP, but the ORREQ may also be sent to the subscriber's HLR.) The SCP performs service logic processing and

returns information in the `orreq` instructing the MSC to proceed with the call. Note that service logic processing may involve the exchange of additional messages, such as `SRFDIR`, between the `ORREQ` and the `orreq`; these are not illustrated.

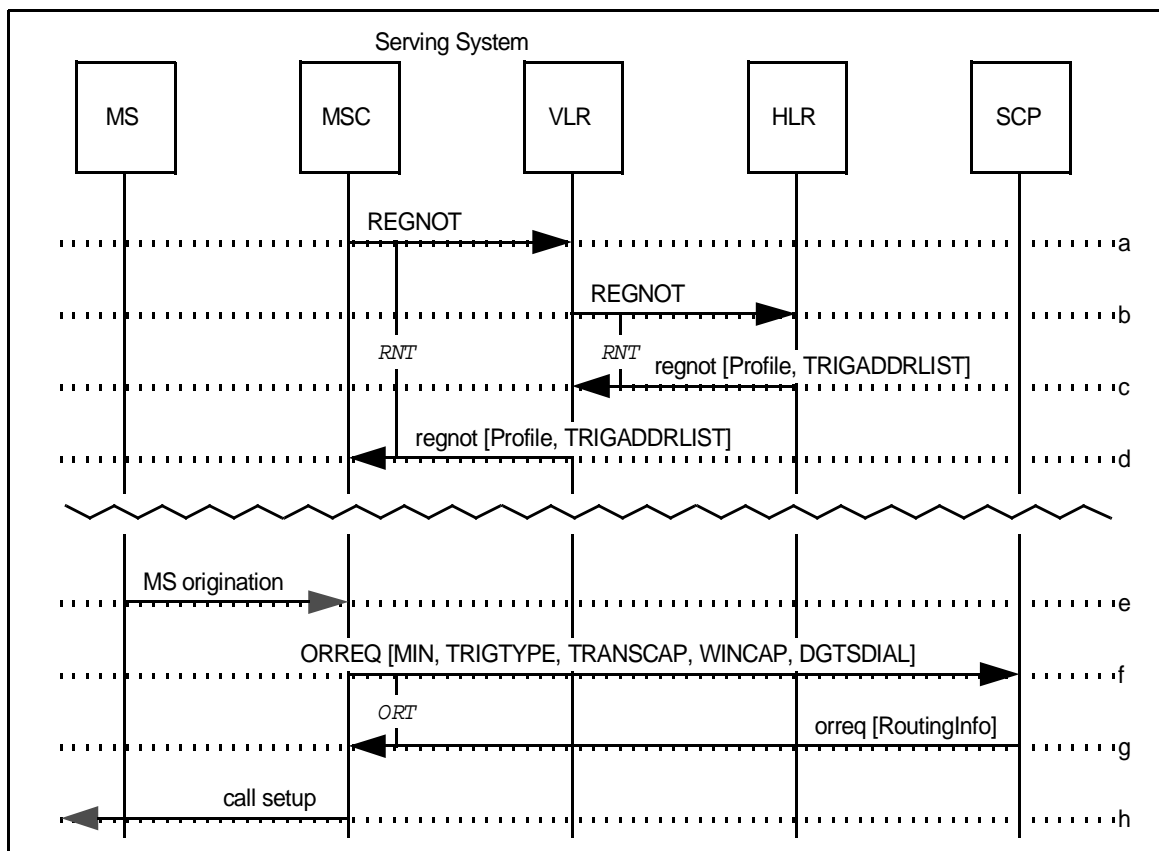


Figure 1 TIA-41 Registration and "Call From" Signaling

Call setup continues, and the call is delivered to the Originating MSC. The message sequence in Figure 2 illustrates the subsequent message exchange that may occur for a WIN subscriber, with optional messages shown in the shaded boxes.

On determining the call is to a mobile subscriber, the MSC/SSF sends a `LOCREQ` to the HLR, with the `TRANSCAP` and `WINCAP` parameters set to indicate the capabilities of the MSC/SSF, such as whether the MSC/SSF is capable of handling WIN triggers and if it is capable of sending a subsequent `LOCREQ` message. If a service is to be executed in an SCP, the HLR may send a `SERVREQ` message requesting the SCP to execute a service. Upon receipt of the `servreq`, the HLR may send a `ROUTREQ` to obtain a `TLDN`. A second `SERVREQ` may then be sent to the SCP for further service processing after the `routreq` is received. The `locreq` is then returned to the MSC/SSF. Note that this `locreq` may contain destination information, trigger profile information, or both.

- In the case where the `locreq` has returned trigger profile information only, this is used to arm detection points in the BCSM at the O-MSC. Upon encountering an armed detection point and satisfying associated criteria, the MSC/SSF sends an `ANLYZD` to the Network Entity (NE) address associated with the trigger, typically an SCP, to invoke a service. In this example, instructions returned in the `anlyzd` provide information to proceed with call processing. Upon encountering the *Location* trigger and satisfying the conditions, a second `LOCREQ` is sent to

1 the HLR with the TRIGTYPE parameter set to indicate the *Location* trigger was encountered
2 and thereby requesting routing information. The HLR proceeds to obtain destination
3 information and to pass this information back to the MSC/SSF in the second `locreq`.
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- 5 • In the case where `locreq` has returned both trigger profile information *and* destination
6 information together, both pieces of information are used by the MSC/SSF. The trigger
7 information is used to arm detection points in the BCSM at the O-MSC later in the call; the
8 destination information is used to deliver the call.
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10 After call setup, call processing continues, and further calls to service logic are performed when
11 armed detection points are encountered and appropriate criteria are satisfied.
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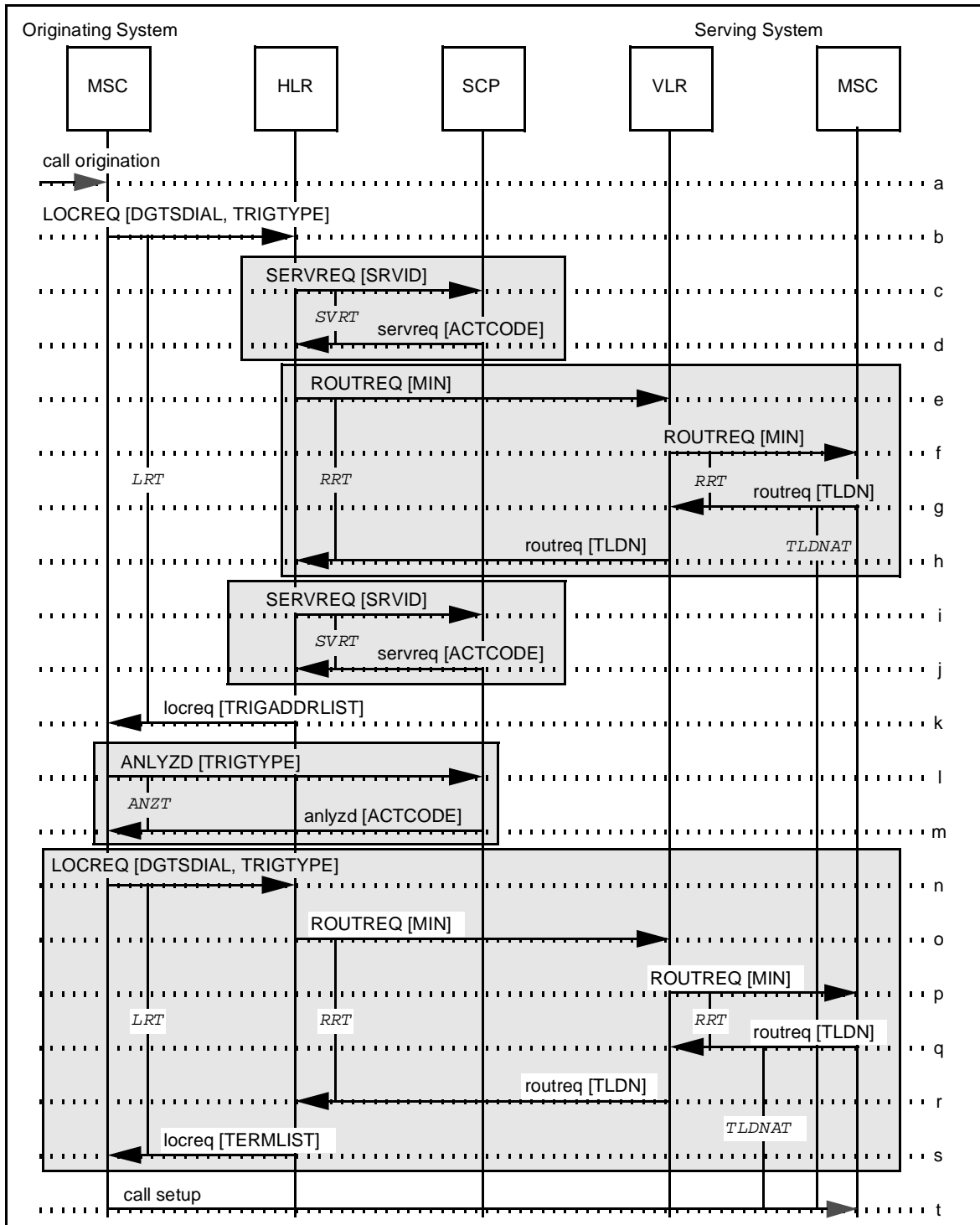


Figure 2 TIA-41 "Call To" Signaling

A.4 Normal Intrasystem Call Delivery

For this scenario, the calling and called MSs are in the same MSC. The Originating MSC determines that the destination is an MS and proceeds with normal *TIA-41* call delivery.

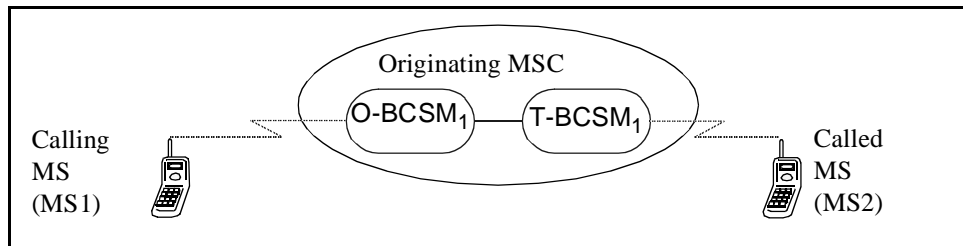
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1 A.4.1 TIA-41 Signaling for Normal Intrasystem Call Delivery

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3 *CD Invocation to an idle, Local MS* in Chapter 3 of *TIA-41-E* describes call delivery invocation to
4 an idle MS that is served by the MSC where the call originates.
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6 A.4.2 Call Segments

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8 The following figure illustrates the call segments for this intrasystem call delivery scenario.
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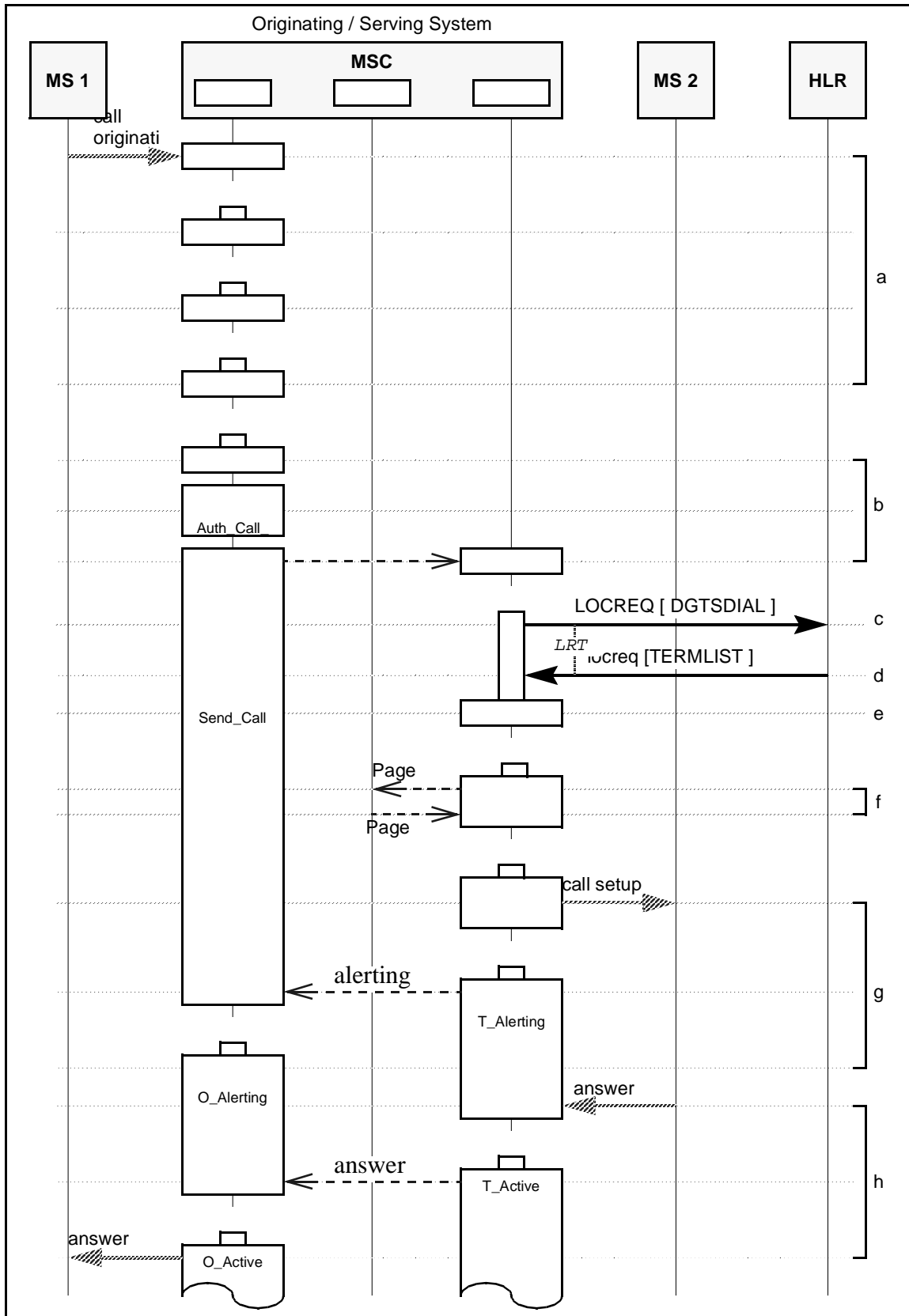


20
21 **Figure 3 Call Segments for Intrasystem MS to MS Call**

22 A.4.3 BCSM and TIA-41 Interactions

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25 Figure 4 illustrates the BCSM and *TIA-41* interactions for normal call delivery invocation to an idle
26 MS that is served by the MSC where the call originates.
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Figure 4 BCSMs for Normal Intrasystem Call Delivery (1 of 2)



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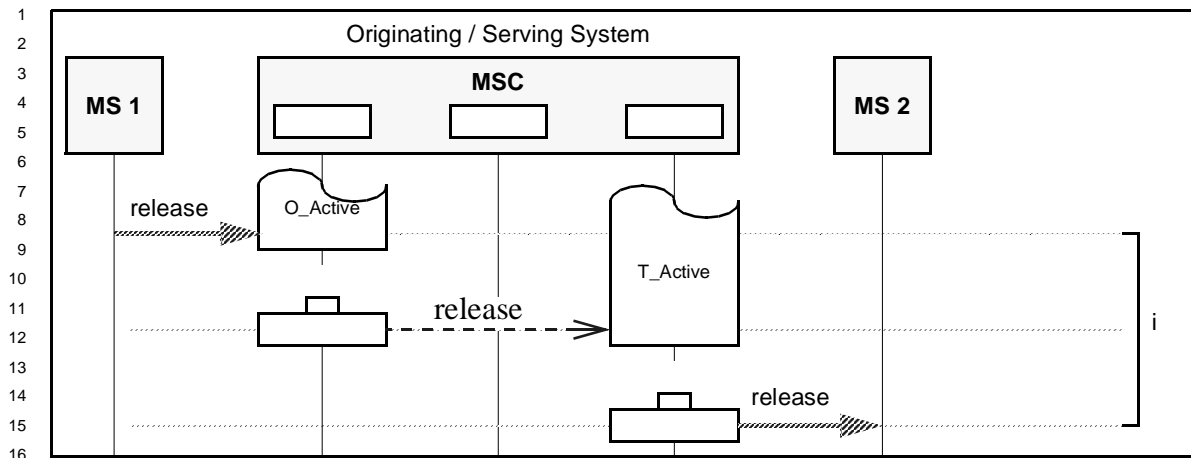


Figure 4 — BCSMs for Normal Intrasystem Call Delivery (2 of 2)

Notes:

- a. MS 1 sends an indication that it wishes to originate a call. (Dialed digits are included in the call origination indication.) The MSC assigns a radio channel to MS 1. The MSC authorizes the call origination and arms originating triggers for the subscriber. MSC call processing (via O-BCSM₁) progresses through the Collect_Information PIC and the dialed digits are analyzed.
- b. The MSC determines that this call is to a MS served by this MSC and selects an internal route (internal to the MSC) for the call. The originating MSC initiates terminating call processing (via instantiation of T-BCSM₁) on behalf of that MS (MS 2).
- c. The Mobile_Termination trigger is detected at the Termination_Attempt DP. The MSC sends a LOCREQ to the HLR.
- d. The HLR determines that the subscriber is currently served by the Originating MSC, and sends a locreq to the Originating MSC. The TERMLIST parameter is set to indicate Local Termination.
- e. The Originating MSC, recognizing itself as the Serving MSC and that the call is a local termination, initiates procedures to set up the call to the MS. It determines that the MS termination is authorized.
- f. The MSC pages MS 2. MS 2 responds and is assigned to a voice channel.
- g. MS 2 is alerted. T-BCSM₁ transits to the T_Alerting PIC and notifies O-BCSM₁. O BCSM₁ transits to the O_Alerting PIC.
- h. MS 2 answers the call. T-BCSM₁ transits to the T_Active PIC and notifies O-BCSM₁. O BCSM₁ transits to the O_Active PIC.
- i. MS 1 disconnects. O-BCSM₁ transits to the O_Null PIC and notifies T-BCSM₁. T-BCSM₁ transits to the T_Null PIC.

A.5 Normal Intersystem Call Delivery

For this scenario, the calling and called MSs are in different MSCs. The Originating MSC determines that the destination is an MS and proceeds with normal *TIA-41* call delivery.

A.5.4 TIA-41 Signaling for Normal Intersystem Call Delivery

CD Invocation to an Idle MS or Another MSC in Chapter 3 of *TIA-41* describes call delivery invocation to an idle MS that is outside the serving area of the MSC where the call originates.

A.5.5 Call Segments

The following figure illustrates the call segments for this intersystem call delivery scenario.

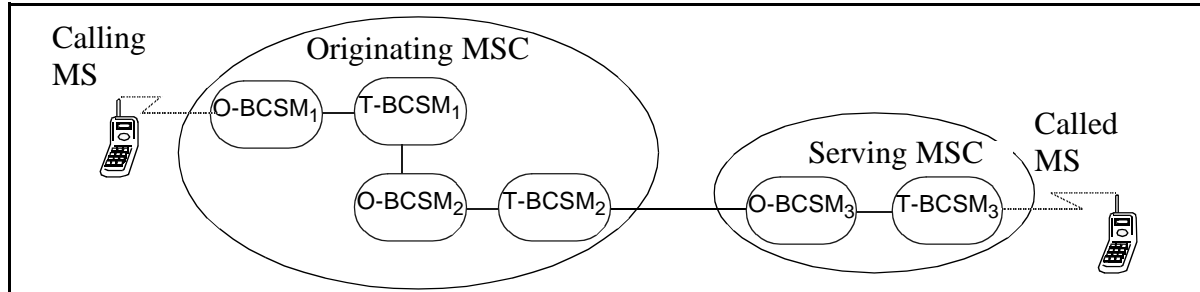


Figure 5 Call Segments for Intersystem MS to MS Call

A.5.6 BCSM and TIA-41 Interactions

The following figures illustrate the BCSM and *TIA-41* interactions for normal call delivery invocation to an idle MS that is outside the serving area of the MSC where the call originates. Figure 6 depicts the processing at the Originating MSC. The associated processing at the Serving MSC is illustrated in Figure 7.

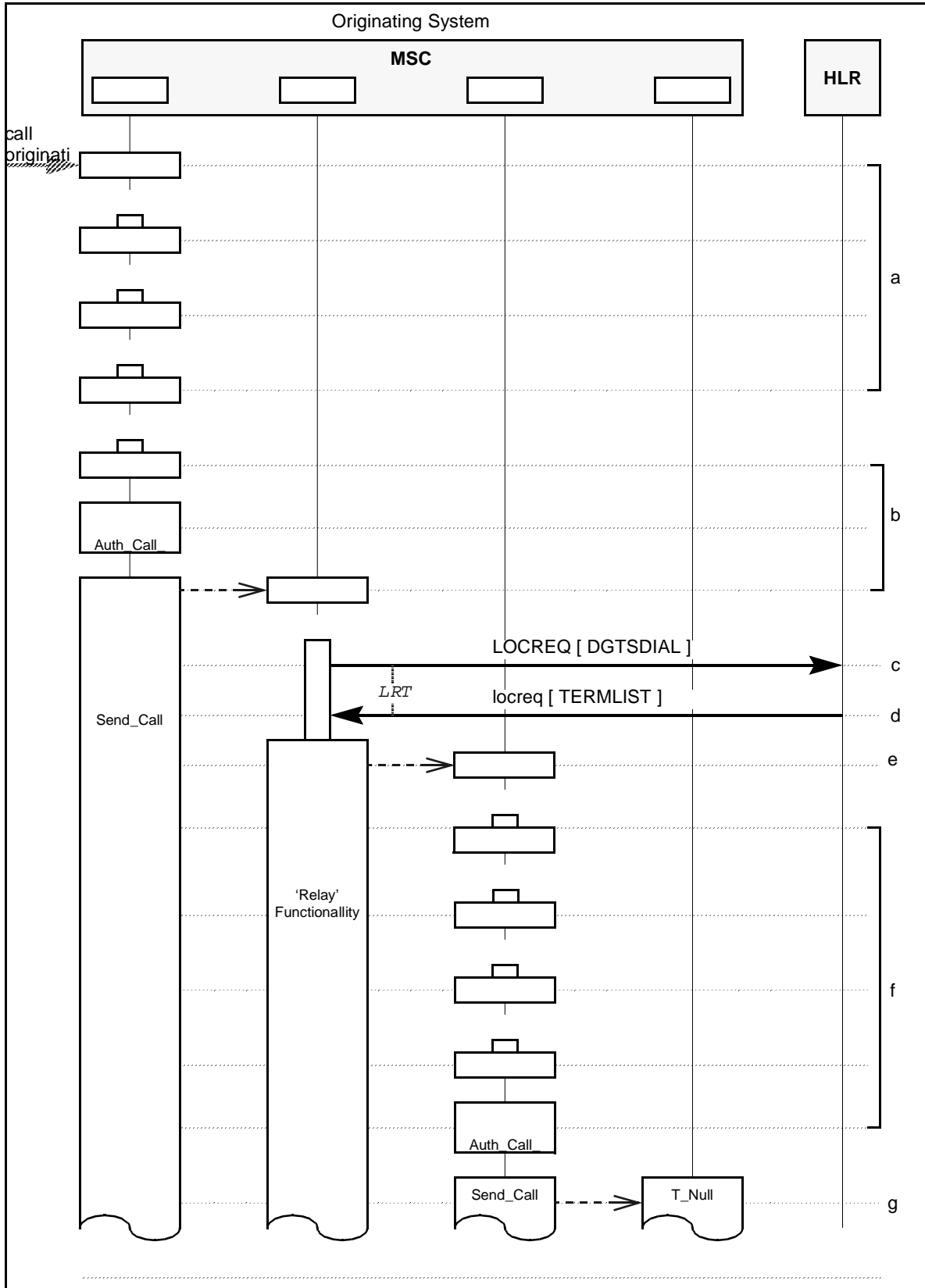
A.5.6.1 Originating MSC Processing

Figure 6 depicts the processing at the Originating MSC for an intersystem call delivery to an idle MS.

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Figure 6 Originating System BCSMs for Normal Intersystem Call Delivery (1 of 2)

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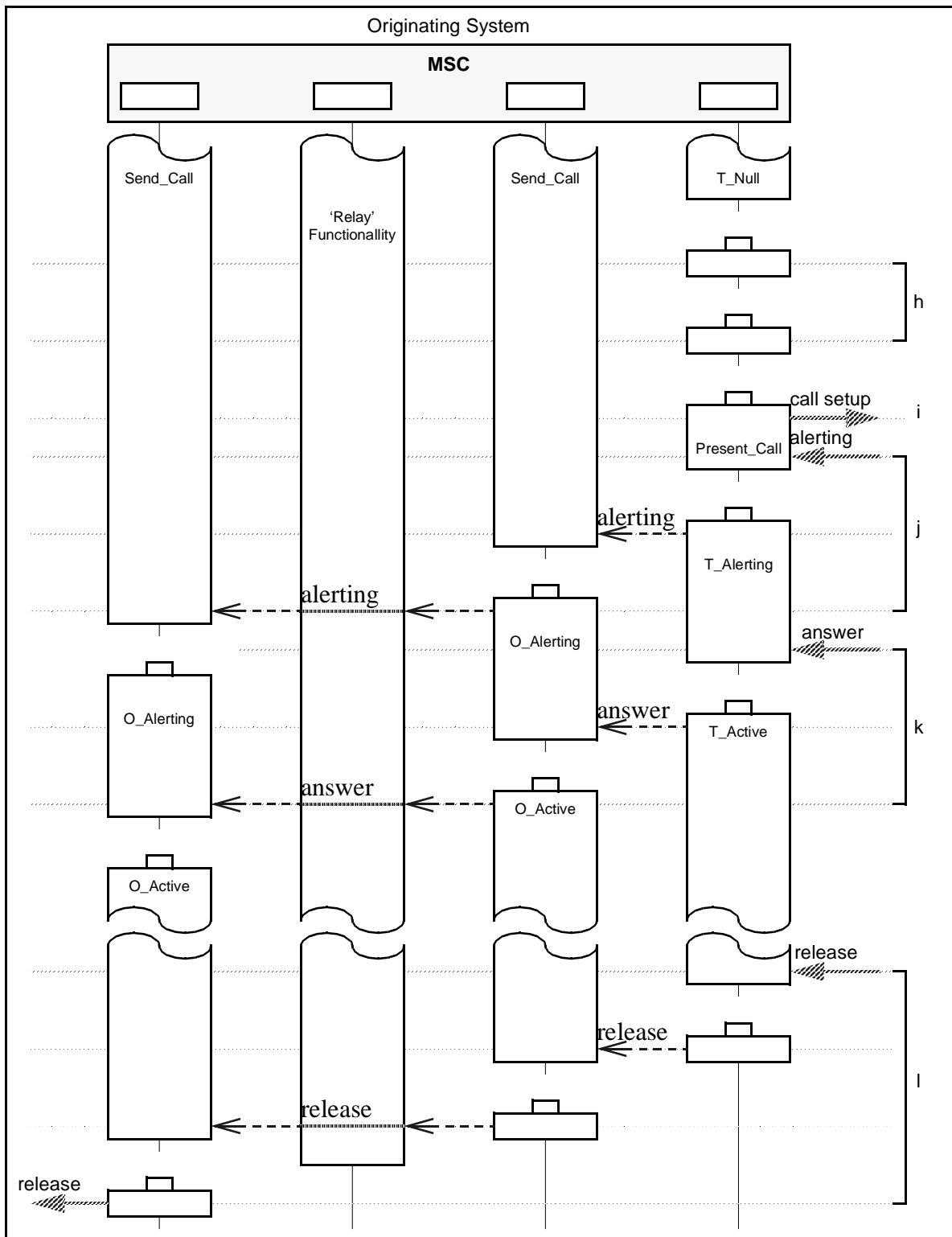


Figure 6 — Originating System BCSMs for Normal Intersystem Call Delivery (2 of 2)

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- a. MS 1 sends an indication that it wishes to originate a call. (Dialed digits are included in the call origination indication.) The MSC assigns a radio channel to MS 1. The MSC authorizes the call origination and arms originating triggers for the subscriber. MSC call processing (via O-BCSM₁) progresses through the Collect_Information PIC and the dialed digits are analyzed.
 - b. The MSC determines that this call is to a MS served by this MSC and selects an internal route (internal to the MSC) for the call. The originating MSC initiates terminating call processing (via instantiation of T-BCSM₁) on behalf of that MS (MS 2).
 - c. The Mobile_Termination trigger is detected at the Termination_Attempt DP. The MSC sends a LOCREQ to the HLR.

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Note: The HLR determines the current Serving MSC for the called MS and sends a ROUTREQ to the serving system. The serving system assigns a routing alias (i.e., TLDN) to the called MS and returns it to the HLR. This processing is illustrated in Figure 7.

- d. The HLR returns the destination digits to the Originating MSC in the locreq. The TERMLIST parameter is set to indicate Intersystem Termination.
- e. Since the call is destined for an intersystem termination, the Originating MSC determines that an OBCSM should be established on behalf of MS 2. The Originating MSC instantiates O-BCSM₂. At this point, any subsequent triggers are disarmed in T-BCSM₁, and T-BCSM₁ merely relays subsequent indications between O-BCSM₁ and O-BCSM₂.
- f. O-BCSM₂ call processing progresses through the Analyze_Information PIC and the destination digits are analyzed. Using the destination digits (i.e. TLDN) populated in the locreq, O-BCSM₂ selects a route for call delivery.
- g. The Originating MSC instantiates T-BCSM₂.

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Note: The Mobile_Termination trigger is used to detect when the destination is a mobile directory number. Since TLDNs are distinct from mobile DNs, the Mobile_Termination trigger is not detected in T-BCSM₂ for this scenario.

- h. The intersystem termination is authorized. T-BCSM₂ selects an outgoing trunk facility for call routing.
 - i. The Originating MSC initiates call setup signaling to the Serving MSC using existing interconnection protocols (e.g., SS7) and the routing information specified in the locreq.
 - j. When the called MS is alerted, an alerting indication is provided to the Originating MSC. When the Originating MSC receives the alerting indication, T-BCSM₂ transits to the T_Alerting PIC and notifies O-BCSM₂ of alerting. O-BCSM₂ transits to the O_Alerting PIC and notifies T-BCSM₁. This indication is relayed to O-BCSM₁. O-BCSM₁ transits to the O_Alerting PIC.
 - k. When the called MS answers the call, an answer indication is provided to the Originating MSC. When the Originating MSC receives the answer indication, T-BCSM₂ transits to the T_Active PIC and notifies O-BCSM₂ of answer. O-BCSM₂ transits to the O_Active PIC and notifies T-BCSM₁. This indication is relayed to O-BCSM₁. O-BCSM₁ transits to the O_Active PIC. Conversation occurs between the calling and called parties.
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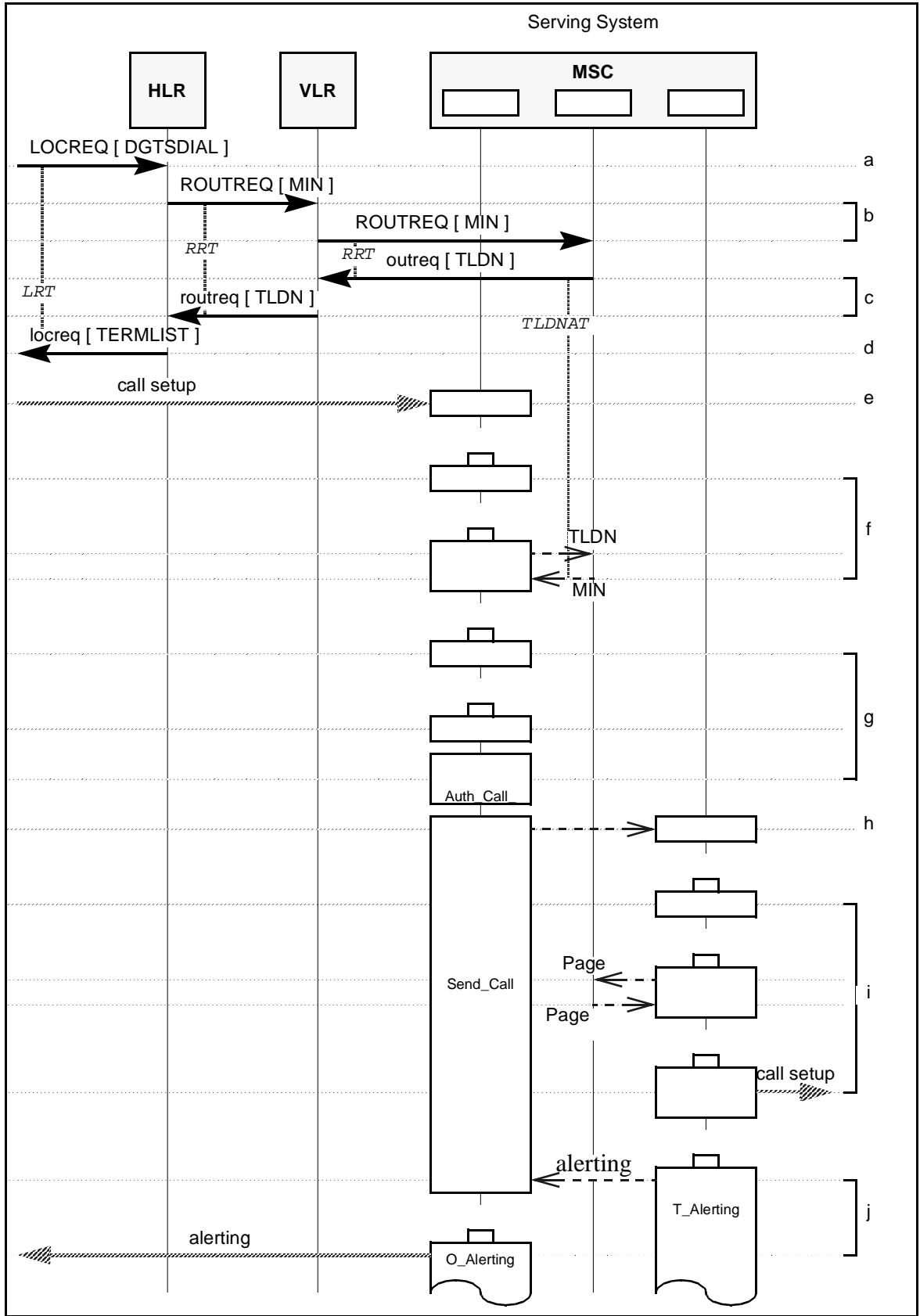
1. In this scenario, the called party releases first. When the Originating MSC receives the release indication, T-BCSM₂ transits to the T_Null PIC and notifies O-BCSM₂ of release. O-BCSM₂ transits to the O_Null PIC and notifies T-BCSM₁. This indication is relayed to O-BCSM₁. O-BCSM₁ transits to the O_Null PIC. The call is released.

A.5.6.2 Serving MSC Processing

Figure 7 depicts the processing at the Serving MSC for intersystem call delivery to an idle MS.

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Figure 7 Serving System BCSMs for Normal Intersystem Call Delivery (1 of 2)



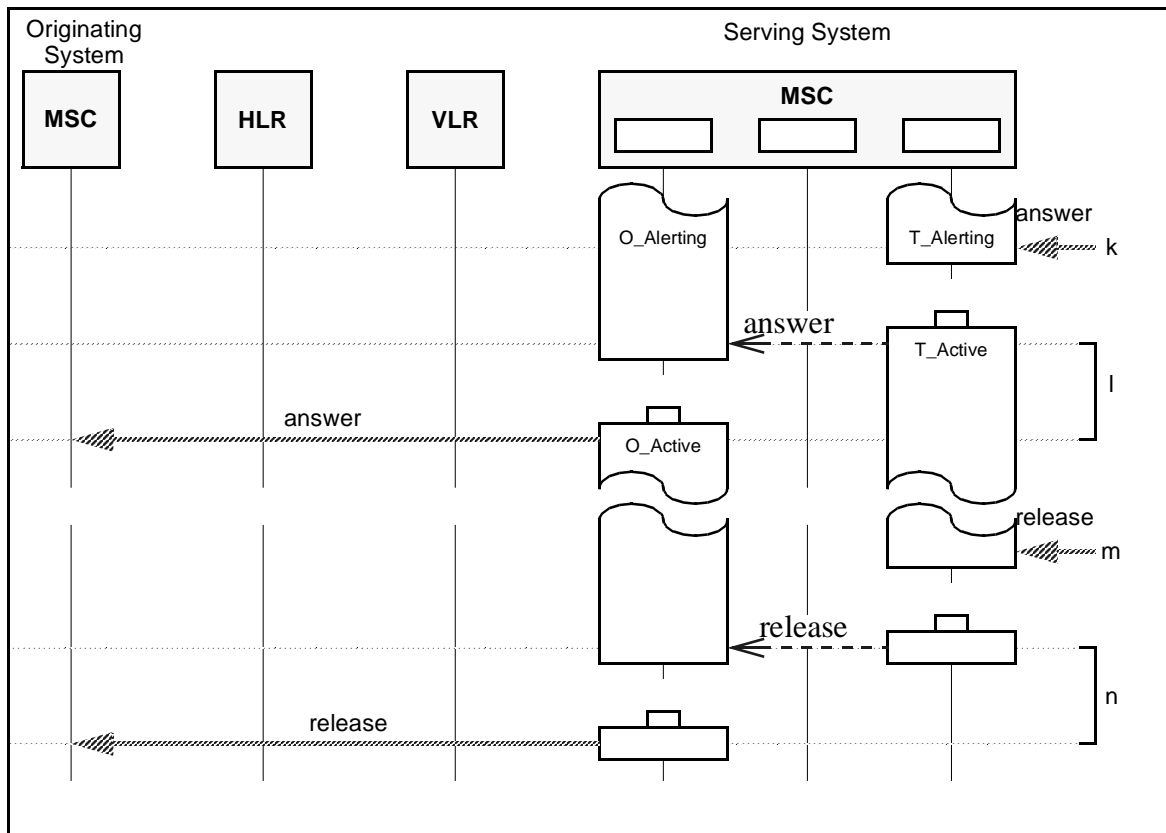


Figure 7 — Serving System BCSMs for Normal Intersystem Call Delivery (2 of 2)

Notes:

- a. The Originating MSC sends a `LOCREQ` to the HLR, as indicated in step c of Figure 6.
- b. The HLR sends a `ROUTREQ` to the VLR where the MS is registered. The VLR forwards the `ROUTREQ` to the current Serving MSC.
- c. The MACF of the Serving MSC receives the `ROUTREQ` and starts handling the request for a routing alias (i.e., TLDN).

Note: The Serving MSC may obtain the service profile of the MS from its VLR by sending it a `QUALREQ`. This step is excluded from the current scenario, which assumes that the Serving MSC already has the profile available when the `ROUTREQ` arrives.

The MACF assigns a TLDN to the called MS and returns the destination digits in the `roureq` to the VLR. The VLR forwards the `roureq` to the HLR.

- d. When the `roureq` is received by the HLR, it returns a `locreq` to the Originating MSC. The `locreq` includes routing information in the form of the `TERMLIST` parameter, along with an indication of the reason for extending the incoming call (i.e., for CD) in the `DMH_RedirectionIndicator` parameter. The `TERMLIST` parameter is set to indicate Intersystem Termination.

Note: For the particular scenario that is depicted here, no WIN triggers are armed on behalf of the called MS.

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- 1 e. The Originating MSC establishes a voice path to the Serving MSC using existing
2 interconnection protocols (e.g. SS7) and the routing information specified in the `locreq`.
3 When the Serving MSC receives the incoming call setup signaling, it instantiates
4 O-BCSM₃.
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- 6 f. O-BCSM₃ processes the incoming call. O-BCSM₃ determines that the called number is a
7 TLDN and requests the MIN for the TLDN call from the MACF. The MACF provides the
8 MIN corresponding to the TLDN.
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- 10 g. O-BCSM₃ determines the call can be presented to the called MS.
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- 12 h. The Serving MSC instantiates T-BCSM₃.
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- 14 i. The Serving MSC determines that the MS termination is authorized, and pages the MS. The
15 MS responds and is assigned to a voice channel.
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- 17 j. The MS is alerted. T-BCSM₃ transits to the T_Alerting PIC and notifies O-BCSM₃ of
18 alerting. An alerting indication is provided to the Originating MSC. O-BCSM₃ transits to
19 the O_Alerting PIC.
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- 21 k. The MS answers the call.
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- 23 l. T-BCSM₃ transits to the T_Active PIC and notifies O-BCSM₃ of answer. An answer
24 indication is provided to the Originating MSC. O-BCSM₃ transits to the O_Active PIC.
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- 26 m. The called MS disconnects.
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- 28 n. T-BCSM₃ transits to the T_Null PIC and notifies O-BCSM₃ of MS disconnect. A release
29 indication is provided to the Originating MSC. O-BCSM₃ transits to the O_Null PIC.
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Annex B: Mapping of WIN Functional Entities to Network Entities

This annex is informative and is not considered part of this Interim Standard.

This annex provides an example of how the Wireless Intelligent Network (WIN) functional entities (FEs) can be mapped to the TR-45 network entities (NEs).

This example is for informational purposes only. This annex is not intended to restrict or prejudice in any way other possible allocations of FEs or possible interfaces. In addition, it is possible to create new network entities not listed and assign FEs to them.

Within the service logic model of the HLR, there is a close coupling of the SCF and LRF_H functional entities (FEs). Current HLR implementations do not permit the separation of these FEs. Thus these two FEs will be shown together in the HLR. There is no requirement to separate this SCF/LRF coupling in the HLR at this time. These FEs may reside on other NEs independently.

B.1 Introduction

Functional modeling is a valuable tool for identifying the functions to be performed by network entities. It provides the basis for developing information flows without restricting the physical configuration of the network or possible implementations.

Ultimately, network implementations require that the FEs be allocated to specific network entities. This annex describes a possible mapping of the WIN FEs onto the TR-45 network entities and the reference points between the network entities.

B.2 Mapping WIN FEs to TR-45 NEs

The following figure shows an example of a possible functional relationship between the WIN FEs and TR-45 NEs.

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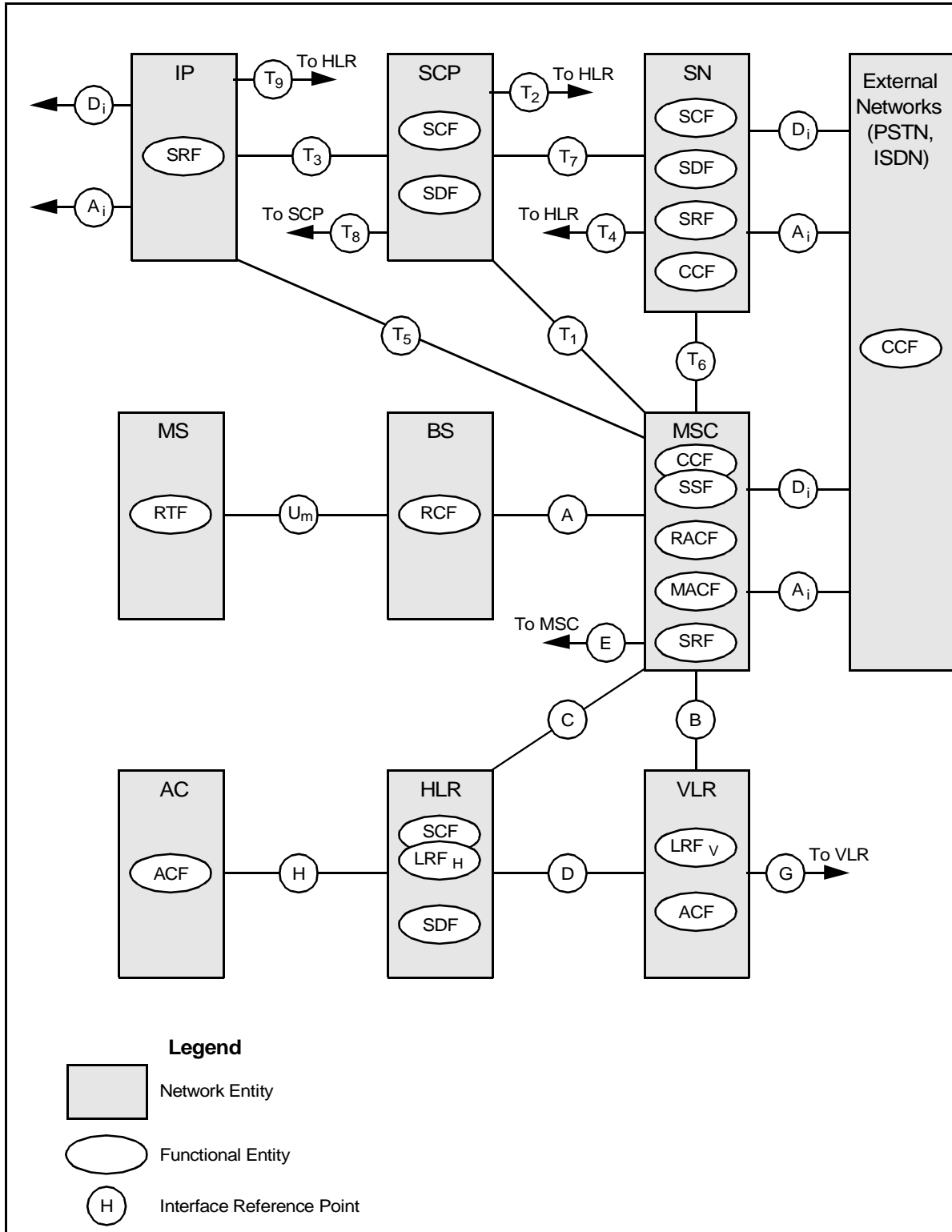


Figure 8 Mapping WIN Functional Entities to Network Entities

Table 1 presents the same information contained in Figure 8 in tabular form.

Table 1 Mapping of WIN Functional Entities to Network Entities

| | | NEs | | | | | | | | |
|------------|------------------------|-----|----|-----|----|----|-----|-----|----|-----|
| | | AC | BS | HLR | IP | MS | MSC | SCP | SN | VLR |
| | ACF | X | | | | | | | | X |
| | CCF | | | | | | X | | X | |
| | LRF_H | | | X | | | | | | |
| | LRF_V | | | | | | | | | X |
| | MACF | | | | | | X | | | |
| | RACF | | | | | | X | | | |
| FEs | RCF | | X | | | | | | | |
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| | SRF | | | | X | | X | | X | |
| | SSF | | | | | | X | | | |

The SMAF and SCEF FEs are found in the Service Management System (SMS) and Service Creation Environment (SCE) network entities. The SMS and SCE network entities are not yet included in the TR-45 network reference model. Requirements for the SMS, the SCE and their associated interfaces are for further study.

Annex C: Notes on Trigger Concepts and Usage

This annex is informative and is not considered part of this Interim Standard.

C.1 Purpose

The purpose of this informative annex is to provide guidance on trigger usage through an informal discussion of some essential elements of trigger arming and processing within WIN. This discussion also addresses usage of the *TIA-41* trigger parameters in relation to usage of the WIN trigger parameter.

C.2 Introduction

This Annex begins with a discussion of some principles and concepts. It then develops trigger usage and application guidelines based on these principles and concepts.

Most of these principles are covered in the WIN DFP specification but they are gathered here in order to provide a concise discussion of important considerations in their usage.

TIA-41 specifies the OriginationTriggers (ORIGTRIG) and TerminationTriggers (TERMTRIG) parameters. WIN provides a TriggerAddressList (TRIGADDRLIST) parameter. The relationships between these parameters is explored following the discussion of the principles.

A key issue in transitioning from *TIA-41* triggering to WIN triggering will be the availability of WIN capabilities. This aspect is also examined.

C.3 Triggers are Service Independent

A fundamental concept of triggering is that triggers are service independent. This means that when an armed trigger is encountered and its criteria satisfied, the MSC does not know which service or services will be invoked as a result of the message it sends to the Service Logic Program (SLP) at the SCF.

C.4 Triggers Include Service Logic Address Information

In *TIA-41* triggers defined for use with, the OriginationTriggers and TerminationTriggers implicitly indicate that the SLP to be consulted is located at the HLR for the subscriber.

WIN provides a significant new degree of freedom for service providers in that the WIN TRIGADDRLIST parameter explicitly points to an SLP at a node supporting an SCF. The addressable nodes now include SCPs as well as HLRs, and potentially others such as Service Nodes (SNs).

C.5 The SLP Will Respond with an Executable Instruction

The MSC expects that the SLP will respond with an appropriate instruction on how to process the call. The MSC must consider the received instruction for appropriateness considering its current view of the call. In some circumstances, call-related events may have occurred between the query to the SLP and the response from the SLP that make the instruction received inappropriate. One example is caller abandon.

C.6 Triggered Services Take Precedence Over Known Services

In general, trigger processing should take precedence over switch-based service processing within a DP. This precedence enables service providers to offer extended or enhanced services that provide more functionality.

Service providers may choose to offer alternatives to this precedence. For example, some locally allowed numbers (e.g., 9-1-1) may escape trigger processing. Any exceptions to this precedence must be well defined to avoid confusion in precedence ordering.

C.7 Triggers Are Only Acted Upon When They Are Encountered in the BCSM

Some circumstances provide information earlier than when the BCSM looks for it. The most notable instance is when the `locreq` Return Result indicates the called subscriber is busy. The O-BCSM model does not recognize this busy condition until call processing has progressed to a point where a T-BCSM is instantiated and the T-BCSM has progressed to the point where it encounters the `T_Busy` DP. If the busy status is not consumed there, the T-BCSM propagates it back to the O-BCSM for potential use there.¹

C.8 Triggers Take Precedence in Order: Subscriber, Group, Office

This sequence enables service providers to offer selected subscribers the use of services that are not available to the general subscriber base. An example is access to enhanced services such as conference calling. Similarly, this trigger precedence order allows service providers to deny selected subscribers services available to the general subscriber base. An example is restricting calling parties to certain area codes.

C.9 Each Trigger is Fully Considered Before the Next Trigger

Triggers are listed in precedence order in Table 4 and Table 5 in the WIN DFP specification. This principle indicates that a given trigger type is considered for subscriber, group and office applicability before proceeding to the next trigger type in the precedence order.

C.10 More Specific Triggers Take Precedence Over Less Specific Triggers

Among triggers of a particular type, more specific triggers take precedence over less specific triggers (e.g., an NPA-NXX trigger takes precedence over an NPA trigger). This ensures that more detailed criteria are not missed through consideration of less specific criteria. For example, if a caller is allowed access to some NPA-NXX codes but not to all of that NPA, a trigger used to block calls to that NPA would bypass the allowed NPA-NXXs if the NPA-based trigger was considered first.

¹ The discussion here describes the modeling used in ITU IN and elsewhere. An implementation is free to consider the busy information as soon as it is available in order to optimize its performance, but must remain cognizant of the possibility of other services being invoked between the time when the busy information is received, and when the modeling indicates it should be considered.

C.11 An SLP Instruction Other Than “Continue” or “User Interaction” Will Cause Triggers to be Bypassed

When an SLP returns an instruction other than “Continue” or “User Interaction”¹, this instruction is used if possible, and any further trigger criteria at the DP from which this SLP was consulted are not considered. Any trigger criteria at any DPs that may be bypassed as a result of the instruction are also not processed.

C.12 Relationship Between *TIA-41* and WIN Triggers

There is overlap between the *TIA-41* trigger parameters and the WIN trigger parameter. Service providers must take this overlap into account when using this technology to provide services to subscribers.

Call processing procedures for mobile subscribers must take into account the fact that a given mobile subscriber’s location is not deterministic. Significant specification effort has been applied to this problem in *TIA-41* with a view to optimizing usage of bearer connection resources. This optimization includes handling certain functions for called subscribers on a proxy basis near the origination of the call. Since a mobile call origination or termination can occur anywhere and the roaming subscriber may be anywhere in the roaming areas available to the called mobile subscriber, it is necessary to distribute service processing in an optimal manner.

It is anticipated that service providers may offer services using network infrastructure supporting OriginationTriggers and TerminationTriggers in advance of the availability of equipment supporting TriggerAddressList. When network infrastructure supporting TriggerAddressList become available, service providers must either port all of their OriginationTriggers and TerminationTriggers based services to use the TriggerAddressList as soon as they start to apply it, or the two approaches must co-exist. Co-existence requires an understanding of the relationships between OriginationTriggers, TerminationTriggers and TriggerAddressList .

C.13 Issues in Selecting Overlapping Trigger Arming Parameters

When a service provider offers a set of services to a subscriber, the service provider should ensure that the services are an appropriate, coherent, and internally consistent set that will interact with each other in a manner desired by and acceptable to the subscriber. Hence, the same service should not, in general², be triggered by both the OriginationTriggers and the TriggerAddressList parameters to avoid the service running twice on the same call. The same applies to use of the TerminationTriggers and TriggerAddressList parameters.

¹ “User Interaction” does not advance the state of the BCSM: on completion of the user interaction, the BCSM is returned precisely to the state it was in when the user interaction instruction was received. In other words, user interaction is orthogonal to the BCSM.

² Exceptions may always be found, but the principle applies since the exception is likely of the form of an enhancement to the service, whether triggered through the ORIGTRIG/TERMTRIG parameters, or through the TRIGADDRLIST parameter.

C.14 Distributed Triggers

Since wireless subscribers are inherently mobile, it is necessary to consider how the triggers for their services should be distributed. The options for the dynamic geographic placement of statically armed originating and terminating triggers are at the Originating MSC and at the Serving MSC.

If identical trigger profiles are placed at both the Originating MSC and the Serving MSC, then some services may be executed twice leading to undesirable results. Given that identical trigger profiles should not be placed everywhere, criteria are needed for use in deciding where to place triggers.

For outgoing calls, originating triggers should be placed as close as practicable to the calling subscriber. In general, this means that the subscriber's originating triggers should be placed at the Serving MSC when the MS registers.

For calls to a subscriber, in order to ensure optimal use of network bearer connection resources, it is desirable to place triggers for services that may prevent call completion, as close to the originating point of the call as possible. Hence, a set of terminating triggers may be placed at the Originating MSC for use in a T-BCSM being run as a proxy for the called subscriber. These triggers should be indicated in the information returned with the LocationRequest RETURN RESULT.

Similarly, if the call may be deflected to another destination, this should be done as close to the source of the call as possible. This represents a proxy origination from the originally called subscriber, and hence requires originating triggers for the called subscriber be placed at the Originating MSC. These triggers should also be indicated in the information returned with the LocationRequest RETURN RESULT.

For call handling that may involve additional functionality not directly related to call completion through the network between the Originating and Serving MSCs, a terminating trigger profile in addition to the originating trigger profile may be placed at the Serving MSC as part of the registration process.

The triggers armed at an Originating MSC on behalf of a called party are not necessarily the same as the triggers armed at the Serving MSC on behalf of the called party.

C.15 Distributed Triggers Example

Subscriber A at Originating MSC-1 calls subscriber B who is served by MSC-2. Subscriber B has a service where some calling parties (e.g., an excessively persistent salesperson) are screened out: denied call completion. Triggers for this incoming call screening service should be set at the Originating MSC. Calls from other parties may be routed to voice mail at certain times but would complete normally at other times. Triggers for forwarding to voice mail should be set close to the origin of the call to avoid extending the call from the Originating MSC to the Serving MSC to the voice mail system. This is illustrated in Figure 9 by the "proxy trigger profile" set for subscriber B at the Originating MSC. When a call has passed incoming call screening, it may be desirable to enhance the presentation of the call for certain calling parties (e.g., special alerting tone for the boss, another for the spouse). Triggering for these should be placed at the terminating end of the call since they do not affect call completion through the network. This is illustrated in Figure 9 by the trigger profile for terminating call presentation at the Serving MSC. If subscriber B wants to forward calls to another destination but has limited permission for which destinations may be used, then a set of triggers should be placed at the Originating MSC so that a proxy BCSM may be run to ensure these services apply properly. This is illustrated in Figure 9 by the "proxy trigger profile" for subscriber B originations placed at the Originating MSC. Finally, subscriber B may have some dialing plan

related service (e.g., network provided speed calling) which are not relevant at the proxy BCSM. Triggers for speed calling would not be included in the trigger profile placed at the Originating MSC. Figure 9 also indicates subscriber A's originating trigger profile placement.

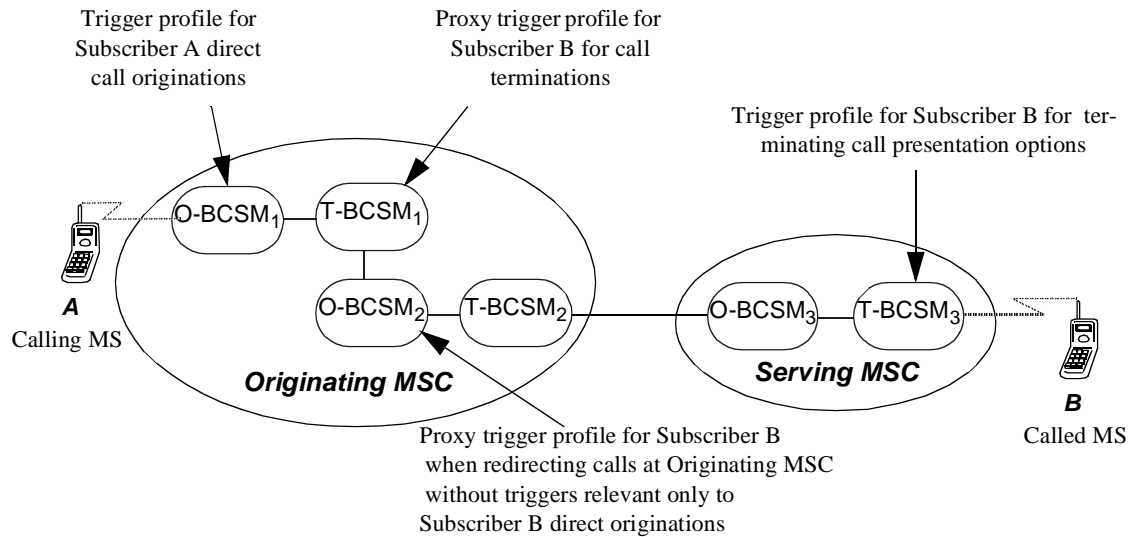


Figure 9 Distributed Trigger Profiles

C.16 Dynamic Trigger Arming Mechanism

A subscriber's trigger profile is stored in the HLR. This profile is considered to be "static" because it changes "slowly" if at all. That is, it remains the same unless the subscriber adds or deletes a triggered service from the profile, or turns on or off one of the services that are subscribed to. It is this "static" profile that is dynamically geographically placed as the subscriber roams and is served by different MSCs.

A subscriber's trigger profile may be modified for a given call instance without affecting the "static" profile. These modifications to the profile do not survive after the current call. On release of the call, all such modifications disappear. This is called "dynamic" trigger arming. This may be done in two ways. In pre-WIN systems, it is done using the ORIGTRIG and TERMTRIG parameters. In WIN-capable systems, it may also be done using the TRIGADDRLIST parameter.

C.17 Dynamic Trigger Arming Can Readily Be Misused

Dynamic trigger arming is a powerful capability. A powerful capability can also be readily misused. It is incumbent on service providers using this capability to understand and deal with the potential side-effects of the use of this capability.

In pre-WIN systems, the network architecture is relatively simple compared to what is anticipated for WIN-capable networks. A pre-WIN network consists of HLRs, VLRs and MSCs. For a given subscriber, all the subscribed services are handled on one HLR and the serving MSC based on the profile information provided to the VLR. Thus, service logic and profile management are

concentrated in one place, making it unlikely that inadvertent undesired interactions between statically armed and dynamically armed triggers occurs. In other words, it is a relatively straightforward task to manage and control the use of the dynamic trigger arming capability.

In WIN-capable systems, the problem becomes more complex. WIN adds SCPs to the network architecture. These are discrete from the HLR and therefore substantially further distribute service logic compared to the HLR and MSC pre-WIN situation described in the previous paragraph. A further dimension of complexity is added in that the interaction between SCPs and MSCs does not necessarily include the HLR, hence the HLR is not in a position to provide any oversight of the dynamic trigger arming process. Finally, the evolving business and regulatory environment enables multiple service providers to provide service logic on multiple platforms, all of which must be integrated by the “primary” service provider who provides the HLR, the source of the static trigger profile for roaming subscribers.

With multiple SCPs providing services, inappropriate use of the dynamic trigger arming capability may cause undesired service interactions or failures from the end-user’s point of view. If not well-coordinated, a service logic program on one SCP may overwrite triggers armed for a service logic program on another SCP. This may cause the other service to fail, or to not run at all, or to run incorrectly. With multiple service providers involved, they are unlikely to be aware of the full suite of services subscribed to and the effects they may have on these other unknown-to-them services.

The above situation may be expected to lead to subscribers reporting troubles to their “primary” service provider who may be faced with an intractable problem in trouble-shooting this situation. The strong possibility of such difficulties requires that service providers, especially when integrating services from multiple providers as a “primary service provider”, take considerable care in the handling and use of dynamic trigger arming.

C.18 Evolution to WIN

In general, the lack of WIN capabilities at an Originating or Serving MSC will mean that services dependent on WIN triggering will not be available to the subscriber. When service providers sell services to their subscribers, they will need to periodically update them on the serving areas where these services will be available. Sometimes, it may be appropriate to allow certain bearer connection inefficiencies (e.g., “tromboning”) in order to allow services to be supported from a suitably capable node. The nature of subscriber mobility means that MSC capabilities must be communicated when obtaining subscriber profile information. This is provided through parameters such as TransactionCapability and WINCapability.

C.19 General Responsibility of Service Providers

Triggering provides a powerful mechanism for enabling services external to the MSC to be applied to a mobile subscriber’s calls. The service independent nature of triggering, and the other principles that are a corollary to this, require that service providers take responsibility for ensuring that an appropriate suite of services is enabled for any given subscriber. Poor choices will lead to undesired effects. MSCs will not know the nature of the services invoked, and therefore cannot ensure that good choices will have been made.