

3GPP2 N.S0025-B

Version 1.0.0

Version Date: October 2002



3RD GENERATION
PARTNERSHIP
PROJECT 2
"3GPP2"

Roamer Database Verification

Revision: B

COPYRIGHT

3GPP2 and its Organizational Partners claim copyright in this document and individual Organizational Partners may copyright and issue documents or standards publications in individual Organizational Partner's name based on this document. Requests for reproduction of this document should be directed to the 3GPP2 Secretariat at secretariat@3gpp2.org. Requests to reproduce individual Organizational Partner's documents should be directed to that Organizational Partner. See www.3gpp2.org for more information.

Revision History

Revision		Date
Rev. 0	Initial Publication	January 2001
Rev. A	Version Update	June 2002
Rev. B	Version Update	October 2002

Note

This specification is modified per TIA TR-45.2 IS-847-A-errata.

INTRODUCTION

This document presents a recommended plan for the implementation of Roamer Database Verification (RDV) for use in the Wireless Radiotelephone Service.

Several types of network entities (NE) can initiate RDV service queries to verify the contents of databases relating to roaming in other network entities.

RDV enables a home system to verify that a roaming partner's VLR database is correctly loaded for the MSID number ranges that "belong" to the home service provider. At the request of the HLR, the VLR examines its roamer database to verify that subscribers within the requested MSID range are allowed to roam in the visited system.

RDV may also be used to verify other message routing databases that may be used to support newer capabilities introduced in IS-41-C or in subsequent intersystem standards, including three message routing databases that may be maintained at an MSC and two message routing databases that may be maintained at an MC.

The message routing databases message routing databases that may be maintained at an MSC are:

- An MSID-based database used for indirectly routing an MS-originated SMS message to the originating MS's MC.
- An MSID-based database used for routing an ORREQ or a FEATREQ to the appropriate HLR.
- An MDN-based database used for directly routing an MS-originated SMS message to the destination's MC.

The message routing databases message routing databases that may be maintained at an MC are:

- An MDN-based database used for routing an SMSREQ to the the MS's HLR.
- An MDN-based database that it uses in its role as originating MC to route MS-originated SMS messages to the destination's MC.

RDV provides a tool to assist in resolving problems experienced by home system subscribers when roaming in the visited system as well as other message routing database related problems.

1 GENERAL

This document describes the RDV network capability and the intersystem operations to enable a wireless system to use RDV.

2 OBJECTIVE

The purpose of this document is to describe the RDV network capability and to specify the operation of RDV so that wireless systems can use RDV.

3 REFERENCES

This Interim Standard builds on the following standards:

- ANSI/TIA/EIA-664, Cellular Features Description; Telecommunications Industry Association; June 1996
- ANSI/TIA/EIA-41-D, Cellular Radiotelecommunications Intersystem Operations; Telecommunications Industry Association; 1997
- TIA/EIA/IS-751, TIA/EIA-41-D Modifications to Support IMSI; Telecommunications Industry Association; February 1998
- TIA/EIA/IS-847, Roamer Database Verification, Telecommunications Industry Association; January 2001

4 ORGANIZATION

This document is organized as follows:

- The TIA/EIA-664 Modifications sections provides the modifications and additions to TIA/EIA-664 “Cellular Features Description” for RDV.
- The TIA/EIA-41.1-D Modifications section provides the modifications and additions to TIA/EIA-41-D Chapter 1 “Functional Overview” for RDV.
- The TIA/EIA/41.4-D Modifications sections provides the modifications and additions to TIA/EIA-41-D Chapter 3 “Automatic Roaming Information Flows” for RDV.
- The TIA/EIA-41.5-D Modifications section provides the modifications and additions to TIA/EIA-41-D Chapter 5 “Signaling Protocol” for the RDV.
- The TIA/EIA-41.6-D Modifications section provides the modifications and additions to TIA/EIA-41-D Chapter 6 “Signaling Procedures” for RDV.

5 EDITORIAL CONVENTIONS

The following editorial conventions are used for this Interim Standard:

- underline: additions
- ~~cross out~~: deletion
- change bar: indicates additions or deletions
- new sub-sections are identified in the sub-section heading

TIA/EIA-664 MODIFICATIONS

This section provides wireless features descriptions for Roamer Database Verification (RDV) according to the structure of *TIA/EIA-664*.

Y NETWORK CAPABILITIES

Y.1 ROAMER DATABASE VERIFICATION (RDV)

(New Section for TIA/EIA-664)

Roamer Database Verification (RDV) enables a home system to verify that a roaming partner's VLR database is correctly loaded for the MSID number ranges that "belong" to the home service provider. At the request of the HLR, the VLR examines its roamer database to verify that subscribers within the requested MSID range are allowed to roam in the visited system.

RDV may also be used to verify other message routing databases that may be used to support newer capabilities introduced in IS-41-C or in subsequent intersystem standards, including three message routing databases that may be maintained at an MSC and two message routing databases that may be maintained at an MC.

The message routing databases message routing databases that may be maintained at an MSC are:

- An MSID-based database used for indirectly routing an MS-originated SMS message to the originating MS's MC.
- An MSID-based database used for routing an ORREQ or a FEATREQ to the appropriate HLR.
- An MDN-based database used for directly routing an MS-originated SMS message to the destination's MC.

The message routing databases message routing databases that may be maintained at an MC are:

- An MDN-based database used for routing an SMSREQ to the the MS's HLR.
- An MDN-based database that it uses in its role as originating MC to route MS-originated SMS messages to the destination's MC.

RDV provides a tool to assist in resolving problems experienced by home system subscribers when roaming in the visited system as well as other message routing database related problems.

Applicability to Network Configurations

RDV is applicable to all network configurations.

Y.1.1 Normal Operation

Invocation

RDV is initiated by any of the following:

- An HLR query to a VLR regarding an MSID range.
- An MC query to an MSC regarding an MSID range.
- An HLR query to an MSC regarding an MSID range.
- An MC query to an MSC regarding an MDN range.
- An HLR query to an MC regarding an MDN range.
- An MC query to an MC regarding an MDN range.

In any of these cases, the INVOKING NE ~~The HLR~~ requests the RESPONDING NE ~~VLR~~ to examine ~~its roamer~~ the indicated message routing database and to verify that the data stored for the indicated MSID or MDN range enables the routing of MAP messages to the INVOKING NE. ~~roaming subscribers from the requesting service provider's system to obtain wireless telecommunications service.~~ The INVOKING NE ~~HLR~~ can request that a range from one to 10,000 contiguous MSID or MDN entries be examined by the RESPONDING NE. ~~VLR.~~

Normal Operation With Successful Outcome

When an RDV query is received ~~by a VLR~~, the RESPONDING NE ~~VLR~~ authorizes the INVOKING NE ~~HLR~~ request. If the INVOKING NE ~~HLR~~ is authorized, the RESPONDING NE ~~VLR~~ determines which message routing database is to be examined, based on the NE type of the INVOKING NE and the type of range (MSID or MDN) that has been provided for examination.

The RESPONDING NE then examines ~~its roamer~~ that message routing database for the indicated range of MSIDs or MDNs to determine whether the data needed to send a MAP message to the INVOKING NE is stored in the entries corresponding to that range. ~~in the range indicated by the HLR to verify that roaming subscribers from the requesting service provider's system can obtain service.~~ The RESPONDING NE ~~VLR~~ responds with a positive confirmation if every entry corresponding to that range ~~MSID in the range is~~ populated for the INVOKING NE, ~~requesting HLR,~~ or if an ~~MSID~~ entry is not populated, global title addressing is used for communication with the INVOKING NE. ~~roaming subscriber's HLR.~~

Call Detail Record

RDV does not require call detail information to be recorded.

Y.1.2 Security

The RESPONDING NE ~~VLR~~ authorizes the INVOKING NE ~~HLR~~ request to determine whether the requested MSID or MDN information shall be provided. Upon receipt of the RDV query, the RESPONDING NE ~~VLR~~ determines if the INVOKING NE ~~HLR~~ is

associated with the received MSID or MDN range. A positive acknowledgment is only returned if there is no mismatch.

A negative response from the RESPONDING NE ~~VLR~~ only indicates that the MSID or MDN range does not match the ~~roamer~~ message routing database entries for the INVOKING NE. ~~requesting HLR~~. No indication shall be sent as to whether the MSID or MDN range exists in the database or not. The RESPONDING NE ~~VLR~~ does not provide any indication that would lead to a conclusion about MSID or MDN ranges that are not associated with the INVOKING NE. ~~HLR~~.

VLR Roamer Database		VLR Response
MSID_or MDN range is populated	HLR mismatch Mismatch with INVOKING NE not detected	Positive
MSID_or MDN range is populated	HLR mismatch Mismatch with INVOKING NE detected	Negative
MSID_or MDN range is not populated –global title addressing is used		Positive
MSID_or MDN range is not populated –global title addressing is not used		Negative

Y.1.3 Exception Procedures or Unsuccessful Outcome

The RESPONDING NE ~~VLR~~ provides a negative response to the INVOKING NE ~~HLR~~ if the INVOKING NE ~~HLR~~ is not authorized for the RDV query. The RESPONDING NE ~~VLR~~ responds with a RETURN ERROR. The Error Code is set to indicate *OperationNotSupported*.

The RESPONDING NE ~~VLR~~ provides a negative response to the INVOKING NE ~~HLR~~ if the MSID or MDN range (the entire range or any part of the range) is not populated for the INVOKING NE. ~~HLR~~. The RESPONDING NE ~~VLR~~ responds with a RETURN ERROR. The Error Code is set to indicate *MSID/HLRMismatch*.

Y.1.4 Alternate Procedures

None identified.

Y.1.5 Interactions With Other Network Services

None identified.

TIA/EIA-41.1-D MODIFICATIONS

This section provides modifications and additions to *TIA/EIA-41-D* Chapter 1 needed for Roamer Database Verification.

4 SYMBOLS AND ABBREVIATIONS

INVNE	InvokingNEType parameter
RANGE	Range parameter
RDV	Roamer Database Verification
RDVREQ	RoamerDatabaseVerificationRequest INVOKE
rdvreq	RoamerDatabaseVerificationRequest RETURN RESULT
RDVRT	Roamer Database Verification Request Timer

TIA/EIA-41.4-D MODIFICATIONS

This section provides new Operations, Administration, and Maintenance information flows for Roamer Database Verification according to the structure of TIA/EIA-41-D Chapter 4.

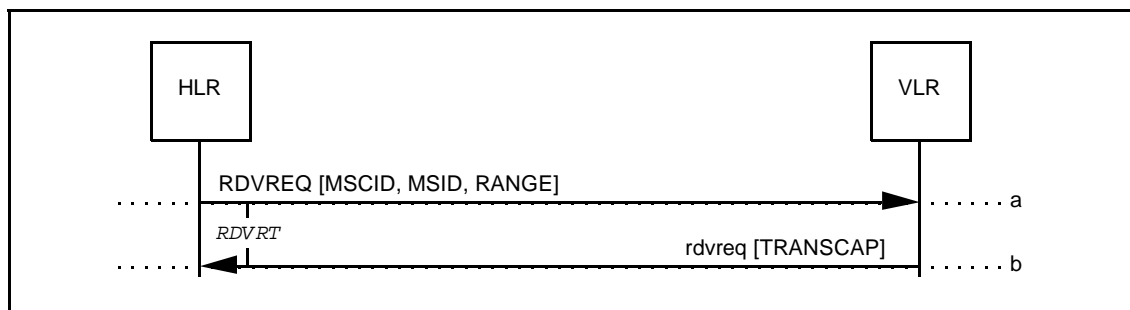
Y ROAMER DATABASE VERIFICATION (RDV) SCENARIOS

(New Section for TIA/EIA-41.4-D)

This section depicts the interactions between network entities in various situations related to RDV. These scenarios are for illustrative purposes only.

25.1 RDV QUERY: BY HLR OF MSID RANGE IN VLR DATABASE

This scenario describes an RDV query when the MSID range indicated by the HLR is loaded in the VLR database.



RDV Query: by HLR of MSID Range in VLR Database

- a. The HLR determines that an RDV query shall be initiated to a VLR. The HLR sends an RDVREQ to the VLR.

Parameters	Usage	Type
MSCID	HLR MSCID.	R
MSID	Starting point of the range of MSIDs to examine.	R
RANGE	Number of MSIDs to examine (1 to 10,000).	O

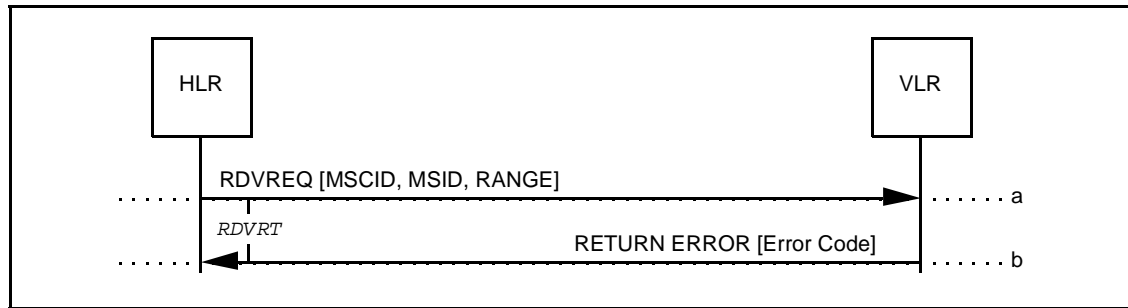
- b. The VLR examines its roamer database and verifies that the specified range of MSIDs is associated with the requesting HLR. The VLR sends an rdvreq to the HLR.

Parameters	Usage	Type
TRANSCAP	VLR's transaction capability. Include if applicable.	O

25.2 RDV QUERY: BY HLR OF MSID RANGE NOT IN VLR

DATABASE

This scenario describes an RDV query when the MSID range indicated by the HLR is not associated with that HLR.



RDV Query by HLR of MSID Range Not in VLR Database

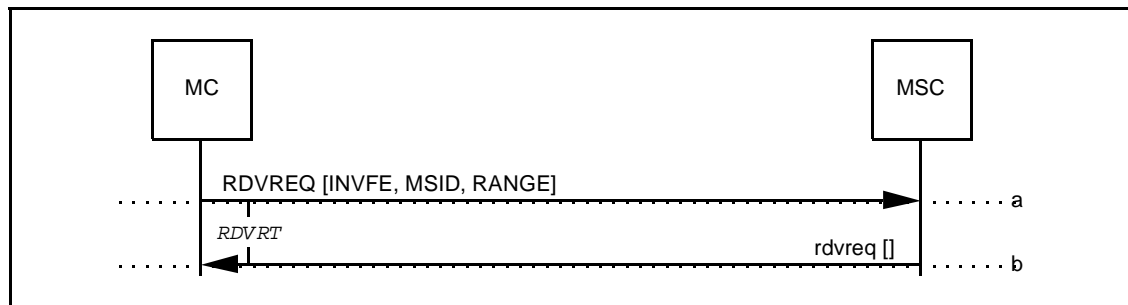
- a. The HLR determines that an RDV query shall be initiated to a VLR. The HLR sends an RDVREQ to the VLR.

Parameters	Usage	Type
MSCID	HLR MSCID.	R
MSID	Starting point of the range of MSIDs to examine.	R
RANGE	Number of MSIDs to examine (1 to 10,000).	O

- b. The VLR examines its roamer database and determines that the entire MSID range or any part of the MSID range is not associated with the requesting HLR. The VLR sends a RETURN ERROR to the HLR with the Error Code set to indicate *MSID/HLRMismatch*.

25.3 RDV QUERY BY MC OF MSID RANGE IN MSC DATABASE

This scenario describes an RDV query when the MSID range indicated by the MC is loaded in the MSC database.



RDV Query by MC of MSID Range in MSC Database

- a. The MC determines that an RDV query shall be initiated to an MSC to verify the database used by the MSC to indirectly route MS-originated SMS messages. The

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

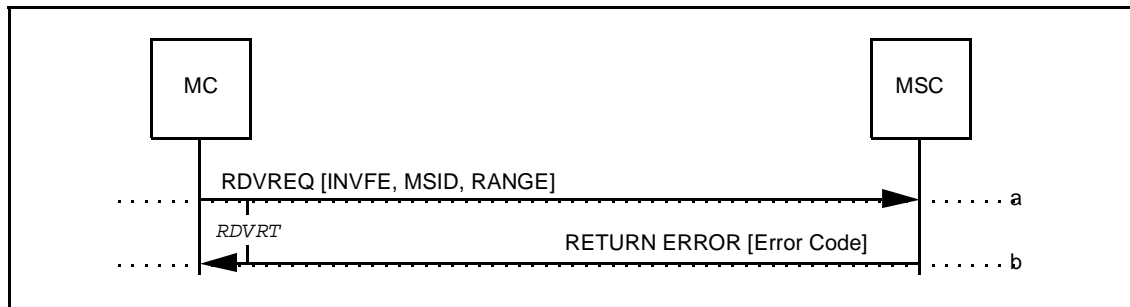
MC sends an RDVREQ to the MSC.

Parameters	Usage	Type
INVNE	Indicates that the query was initiated by an MC.	R
MSID	Starting point of the range of MSIDs to examine.	R
RANGE	Number of MSIDs to examine (1 to 10,000).	O

- b. The MSC examines the message routing database used for indirect routing of MS-originated SMS messages to the originating MS's MC and verifies that the specified range of MSIDs is associated with the requesting MC. The MSC sends an empty rdvreq to the MC.

25.4 RDV QUERY BY MC OF MSID RANGE NOT IN MSC DATABASE

This scenario describes an RDV query when the MSID range indicated by the MC is not associated with that MC.



RDV Query by MC of MSID Range Not in MSC Database

- a. The MC determines that an RDV query shall be initiated to an MSC to verify the database used by the MSC to indirectly route MS-originated SMS messages. The MC sends an RDVREQ to the MSC.

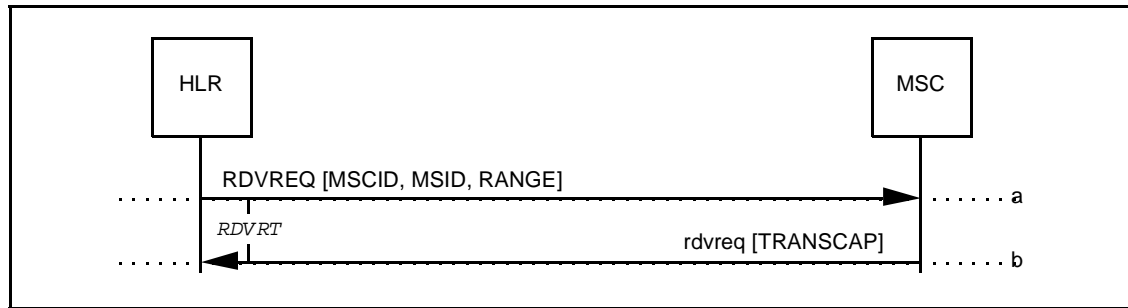
Parameters	Usage	Type
INVNE	Indicates that the query was initiated by an MC.	R
MSID	Starting point of the range of MSIDs to examine.	R
RANGE	Number of MSIDs to examine (1 to 10,000).	O

- b. The MSC examines the message routing database used for indirect routing of MS-originated SMS messages to the originating MS's MC and determines that the entire MSID range or any part of the MSID range is not associated with the requesting MC. The MSC sends a RETURN ERROR to the MC with the Error Code set to indicate *MSID/HLRMismatch*.

25.5 RDV QUERY BY HLR OF MSID RANGE IN MSC

DATABASE

This scenario describes an RDV query when the MSID range indicated by the HLR is loaded in the MSC database.



RDV Query by HLR of MSID Range in MSC Database

- a. The HLR determines that an RDV query shall be initiated to an MSC. The HLR sends an RDVREQ to the MSC.

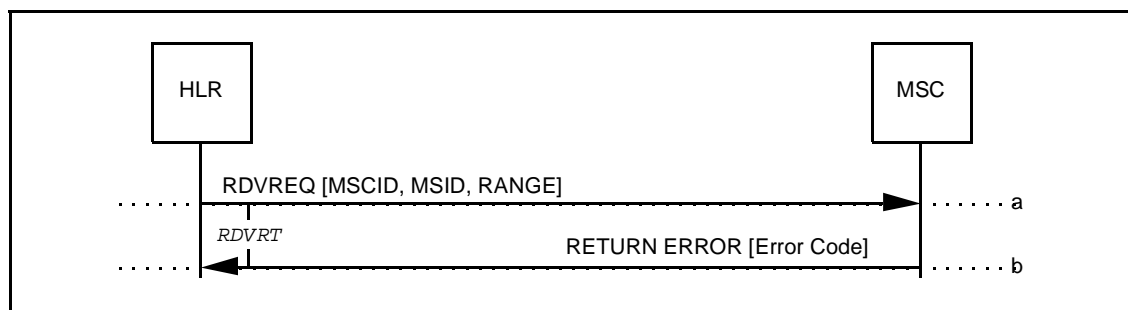
Parameters	Usage	Type
MSCID	HLR MSCID.	R
MSID	Starting point of the range of MSIDs to examine.	R
RANGE	Number of MSIDs to examine (1 to 10,000).	O

- b. The MSC examines the message routing database that it uses to route FEATREQs and ORREQs to HLRs and verifies that the specified range of MSIDs is associated with the requesting HLR. The MSC sends an rdvreq to the HLR.

Parameters	Usage	Type
TRANSCAP	MSC's transaction capability. Include if applicable.	O

25.6 RDV QUERY BY HLR OF MSID RANGE NOT IN MSC DATABASE

This scenario describes an RDV query when the MSID range indicated by the HLR is not associated with that HLR.



RDV Query by HLR of MSID Range Not in MSC Database

- a. The HLR determines that an RDV query shall be initiated to a MSC. The HLR sends

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

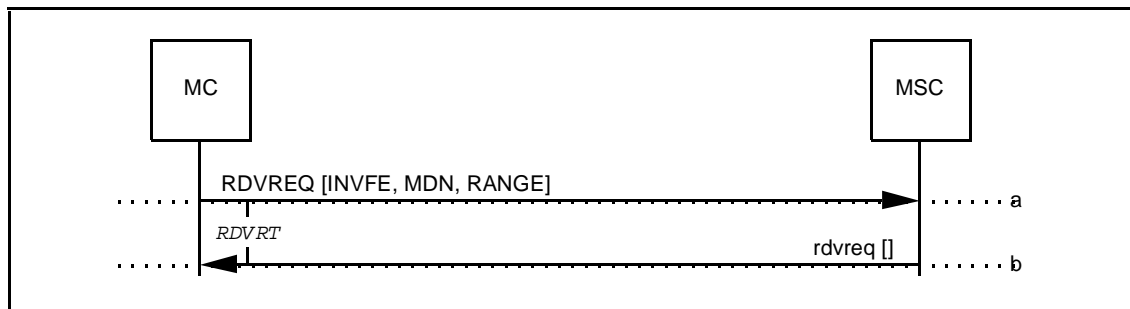
an RDVREQ to the MSC.

Parameters	Usage	Type
MSCID	HLR MSCID.	R
MSID	Starting point of the range of MSIDs to examine.	R
RANGE	Number of MSIDs to examine (1 to 10,000).	O

- b. The MSC examines the message routing database that it uses to route FEATREQs and ORREQs to HLRs and determines that the entire MSID range or any part of the MSID range is not associated with the requesting HLR. The MSC sends a RETURN ERROR to the HLR with the Error Code set to indicate *MSID/HLRMismatch*.

25.7 RDV QUERY BY MC OF MDN RANGE IN MSC DATABASE

This scenario describes an RDV query when the MDN range indicated by the MC is loaded in the MSC database.



RDV Query by MC of MDN Range in MSC Database

- a. The MC determines that an RDV query shall be initiated to an MSC to verify the database used by the MSC for direct routing of MS-originated SMS messages. The MC sends an RDVREQ to the MSC.

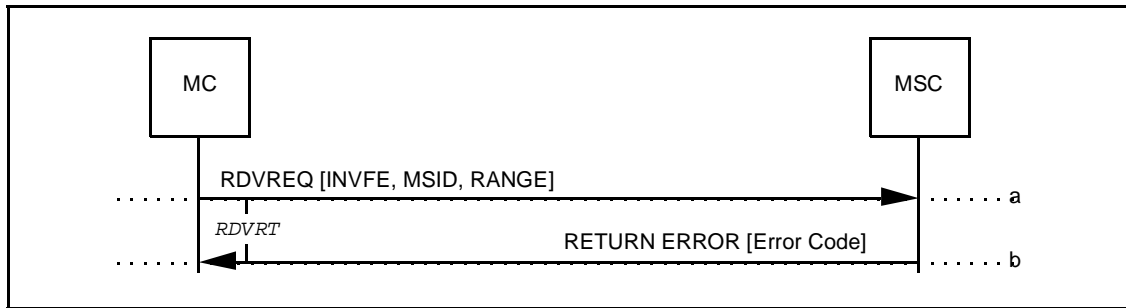
Parameters	Usage	Type
INVNE	Indicates that the query was initiated by an MC.	R
MDN	Starting point of the range of MDNs to examine.	R
RANGE	Number of MDNs to examine (1 to 10,000).	O

- b. The MSC examines the message routing database used for direct routing of MS-originated SMS messages to the destination MS's MC and verifies that the specified range of MDNs is associated with the requesting MC. The MSC sends an empty rdvreq to the MC.

25.8 RDV QUERY BY MC OF MDN RANGE NOT IN MSC

DATABASE

This scenario describes an RDV query when the MDN range indicated by the MC is not associated with that MC.



RDV Query by MC of MDN Range Not in MSC Database

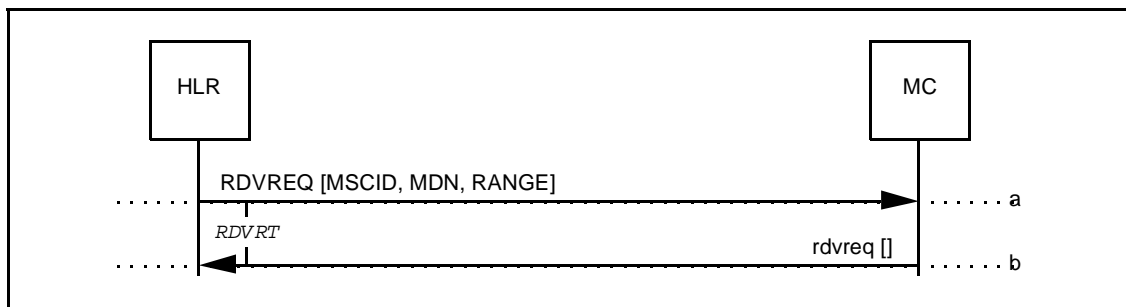
- a. The MC determines that an RDV query shall be initiated to an MSC to verify the database used by the MSC for direct routing of MS-originated SMS messages. The MC sends an RDVREQ to the MSC.

Parameters	Usage	Type
INVNE	Indicates that the query was initiated by an MC.	R
MDN	Starting point of the range of MDNs to examine.	R
RANGE	Number of MDNs to examine (1 to 10,000).	O

- b. The MSC examines the message routing database used for direct routing of MS-originated SMS messages to the destination MS's MC and determines that the entire MDN range or any part of the MDN range is not associated with the requesting MC. The MSC sends a RETURN ERROR to the MC with the Error Code set to indicate MSID/HLRMismatch.

25.9 RDV QUERY BY HLR OF MDN RANGE IN MC DATABASE

This scenario describes an RDV query when the MDN range indicated by the HLR is loaded in the MC database.



RDV Query by HLR of MDN Range in MC Database

- a. The HLR determines that an RDV query shall be initiated to an MC. The HLR sends

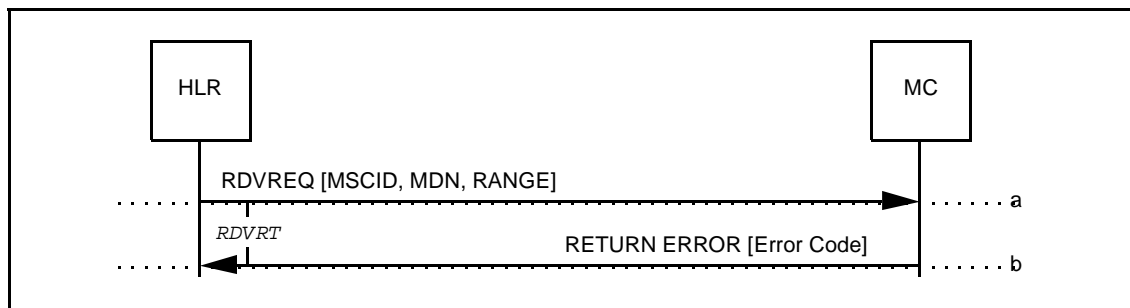
an RDVREQ to the MC.

Parameters	Usage	Type
MSCID	HLR MSCID.	R
MDN	Starting point of the range of MDNs to examine.	R
RANGE	Number of MDNs to examine (1 to 10,000).	O

- b. The MC examines the message routing database that it uses to route SMSREQs to HLRs and verifies that the specified range of MDNs is associated with the requesting HLR. The MC sends an empty `rdvreq` to the HLR.

25.10 RDV QUERY BY HLR OF MDN RANGE NOT IN MC DATABASE

This scenario describes an RDV query when the MDN range indicated by the HLR is not associated with that HLR.



RDV Query by HLR of MDN Range Not in MC Database

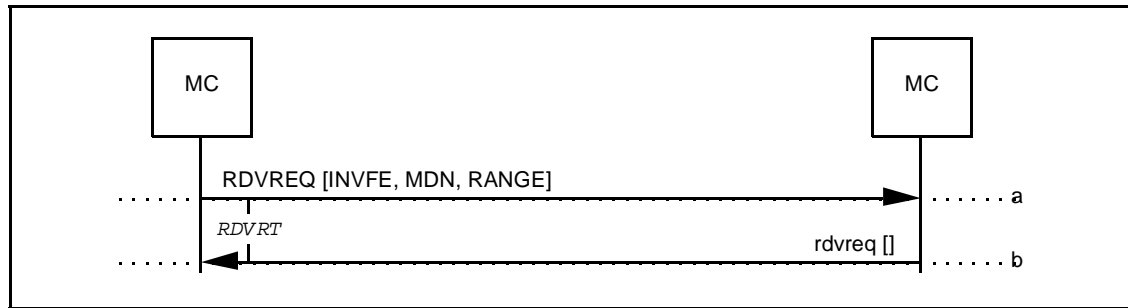
- a. The HLR determines that an RDV query shall be initiated to a MC. The HLR sends an RDVREQ to the MC.

Parameters	Usage	Type
MSCID	HLR MSCID.	R
MDN	Starting point of the range of MDNs to examine.	R
RANGE	Number of MDNs to examine (1 to 10,000).	O

- b. The MC examines the message routing database that it uses to route SMSREQs to HLRs and determines that the entire MDN range or any part of the MDN range is not associated with the requesting HLR. The MC sends a `RETURN ERROR` to the HLR with the Error Code set to indicate *MSID/HLRMismatch*.

25.11 RDV QUERY BY MC OF MDN RANGE IN MC DATABASE

This scenario describes an RDV query when the MDN range indicated by the MC is loaded in the queried MC database.



RDV Query by MC of MDN Range in MC Database

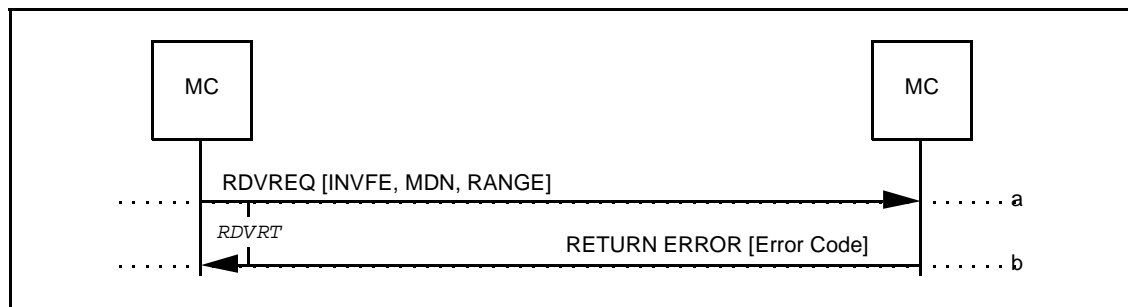
- a. The MC determines that an RDV query shall be initiated to another MC to verify the database used by that MC to relay indirectly routed MS-originated SMS messages to the destination MS's MC. The MC sends an RDVREQ to the MC.

Parameters	Usage	Type
INVNE	Indicates that the query was initiated by an MC.	R
MDN	Starting point of the range of MDNs to examine.	R
RANGE	Number of MDNs to examine (1 to 10,000).	O

- b. The queried MC examines the message routing database used to relay indirectly routed MS-originated SMS messages to the destination MS's MC and verifies that the specified range of MDNs is associated with the requesting MC. The queried MC sends an empty *rdvreq* to the requesting MC.

25.12 RDV QUERY BY MC OF MDN RANGE NOT IN MC DATABASE

This scenario describes an RDV query when the MDN range indicated by the MC is not associated with that MC.



RDV Query by MC of MDN Range Not in MC Database

- a. The MC determines that an RDV query shall be initiated to another MC to verify the database used by that MC to relay indirectly routed MS-originated SMS messages to

1 the destination MS's MC. The MC sends an RDVREQ to the MC.
 2
 3

Parameters	Usage	Type
INVNE	Indicates that the query was initiated by an MC.	R
MDN	Starting point of the range of MDNs to examine.	R
RANGE	Number of MDNs to examine (1 to 10,000).	O

- 4
 5
 6
 7
 8
 9
 10
 11 b. The queried MC examines the message routing database used to relay indirectly
 12 routed MS-originated SMS messages to the destination MS's MC and determines
 13 that the entire MDN range or any part of the MDN range is not associated with the
 14 requesting MC. The queried MC sends a RETURN ERROR to the requesting MC
 15 with the Error Code set to indicate *MSID/HLRMismatch*.
 16
 17
 18
 19
 20
 21
 22
 23
 24
 25
 26
 27
 28
 29
 30
 31
 32
 33
 34
 35
 36
 37
 38
 39
 40
 41
 42
 43
 44
 45
 46
 47
 48
 49
 50
 51
 52
 53
 54
 55
 56
 57
 58
 59
 60

TIA/EIA-41.5-D MODIFICATIONS

This section provides modifications and additions to *TIA/EIA-41-D* Chapter 5 needed for Roamer Database Verification.

5 DATA TRANSFER SERVICES

5.1 SS7-BASED DATA TRANSFER SERVICES

5.1.1 Message Transfer Part

(TIA/EIA-41.5-D, page 5-6)

MTP Message Priority Values for *TIA/EIA-41* Operations

<i>TIA/EIA-41</i> Operation	MTP Message Priority
RoamerDatabaseVerificationRequest	0

1 APPLICATION SERVICES

5.4 MAP OPERATIONS

5.4.1 General

5.4.1.2 Operation Specifiers

(TIA/EIA-41.5-D, page 5-24)

TIA/EIA-41 MAP Operation Specifiers

Operation Name	Operation Specifier								Decimal
	H	G	F	E	D	C	B	A	
RoamerDatabaseVerificationRequest	0	1	1	0	0	0	1	0	98

Operation Definitions

(TIA/EIA-41.5-D, page 5-27)

Summary of MAP Operations

Operation	Reference
RoamerDatabaseVerificationRequest	6.4.2.aq

RoamerDatabaseVerificationRequest

(New for TIA/EIA-41.5-D Section 6.4.2)

The RoamerDatabaseVerificationRequest (RDVREQ) operation is used ~~by an HLR to~~ verify that a message routing ~~roaming partner's VLR~~ database at the RESPONDING NE is correctly loaded for the MSID or MobileDirectoryNumber number range associated with the INVOKING NE, with the database to be verified being identified by the RESPONDING NE based on the NE type of the INVOKING NE and the type of number range (MSID or MobileDirectoryNumber) to be checked. ~~home service provider.~~

The following table lists the valid combinations of invoking and responding NEs.

	INVOKING NE	RESPONDING NE
Case 1	HLR	VLR
Case 2	MC	MSC
Case 3	HLR	MSC
Case 4	HLR	MC
Case 5	MC	MC

The RoamerDatabaseVerificationRequest operation is initiated with a TCAP INVOKE (LAST). This is carried by a TCAP QUERY WITH PERMISSION package. The Parameter Set is encoded as follows:

RoamerDatabaseVerificationRequest INVOKE Parameters			Timer: RDVRT	
Field	Value	Type	Reference	Notes
Identifier	SET [NATIONAL 18]	M	6.3.2.1	
Length	variable octets	M	6.3.2.1	
Comments				
InvokingNEType		O	6.5.2.gj	g
MobileDirectoryNumber		O	6.5.2.80	e, f
MSCID (HLR)		O	6.5.2.82	a
MSID		O	6.5.2.bv	b, f
Range		O	6.5.2.gj	c, d

Notes:

Include to indicate HLR's MSCID, if the INVOKING NE is an HLR.

Include to indicate the starting point of the range of MSIDs to examine if the message routing database to be examined is MSID-based.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1 Include to indicate the number of MSIDs or MobileDirectoryNumbers to examine (1
2 to 10,000).

3
4 If this parameter is not included, one MSID or MobileDirectoryNumber number shall
5 be examined.

6
7 Include to indicate the starting point of the range of MobileDirectoryNumbers to
8 examine if the message routing database to be examined is
9 MobileDirectoryNumber-based.

10 One and only one of these parameters should be included.

- 11
12 a. Include if the INVOKING NE is not an HLR to indicate the NE type of the
13 INVOKING NE.
14

15
16 The RoamerDatabaseVerificationRequest operation success is reported with a TCAP
17 RETURN RESULT (LAST). This is carried by a TCAP RESPONSE package. The
18 Parameter Set is encoded as follows:
19

RoamerDatabaseVerificationRequest RETURN RESULT Parameters				
Field	Value	Type	Reference	Notes
Identifier	SET [NATIONAL 18]	M	6.3.2.2	
Length	variable octets	M	6.3.2.2	
Comments				
TransactionCapability		O	6.5.2.160	a

20
21
22
23
24
25
26
27
28 Notes:

- 29
30 a. Included when this response is sent to an HLR by a VLR or MSC if the
31 TransactionCapability parameter is included in all the RegistrationNotification
32 INVOKE operations sent for MSIDs in the specified Range. (The parameter value
33 shall be set to the value used for all the RegistrationNotification INVOKE
34 operations.)
35
36
37

38 **1.1 MAP PARAMETERS**
39

40
41
42
43 **5.4.2 General**
44

45
46
47
48 **5.4.2.2 Parameter Identifiers**
49

(TIA/EIA-41.5-D, page 5-119)

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

TIA/EIA-41 MAP Parameter Identifiers

Parameter Identifier Name	Parameter Identifier Code								Reference
	H	G	F	E	D	C	B	A	
Range	1	0	0	1	1	1	1	1	6.5.2.gj
	1	0	0	0	0	0	1	0	
	0	1	1	0	0	0	0	1	
InvokingNEType	1	0	0	1	1	1	1	1	6.5.2.gk
	1	0	0	0	0	0	1	0	
	0	x	x	x	x	x	x	x	

Parameter Definitions

6.5.2.gk InvokingNEType

The InvokingNEType (INVNE) parameter may be used to specify the type of the NE invoking an operation..

Field	Value	Type	Reference	Notes						
Identifier	InvokingNEType IMPLICIT Unsigned Integer	M	6.5.1.2							
	variable octets	M	6.5.1.1							
Comments										
	H	G	F	E	D	C	B	A	Octet	Notes
	NE Type								1	a
	...								n	

Notes:

- a. Ignore extra octets, if received. Send only defined (or significant) octets.

Table 112

NE Type (octet 1)	
Value	Meaning
0	Not used.
1	HLR.
2	MC.
3 through 127	Reserved. Treat the same as value 0, Not used.
128 through 255	Reserved for TIA/EIA-41 protocol extension. If unknown, treat the same as value 0, Not used.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

6.5.2.gj Range

(New for TIA/EIA-41.5-D Section 6.5.2)

The Range (RANGE) parameter is used to specify the length of a range of consecutive numbers.

Field		Value					Type	Reference	Notes
Identifier		Range IMPLICIT Unsigned Integer					M	6.5.1.2	
		variable octets					M	6.5.1.1	
Comments									
H	G	F	E	D	C	B	A	Octet	Notes
MSB								1	a
Range								...	
LSB								n	

Notes:

- a. The length of the range is the value indicated.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

TIA/EIA-41.6-D MODIFICATIONS

This section provides the additions to *TIA/EIA-41-D* Chapter 6 needed for Roamer Database Verification.

4 INTERSYSTEM PROCEDURES

4.ZZ Roamer Database Verification Request

(new for TIA/EIA-41.6-D Section 4)

4.ZZ.1 HLR Initiating a Roamer Database Verification Request to a VLR

When an HLR determines that an MSID range at a VLR database shall be verified, it shall perform the following:

- 1 Include the MSCID parameter set to the HLR identity.
- 2 Include the MSID parameter set to the starting point of the range of MSIDs to examine.
- 3 Include the Range parameter set to the number of MSIDs in the range to be examined, if applicable.
- 4 Send a RoamerDatabaseVerificationRequest INVOKE to the VLR.
- 5 Start the Roamer Database Verification Request Timer (RDVRT).
- 6 WAIT for a Roamer Database Verification Request response.
- 7 WHEN a RETURN RESULT is received:
 - 7-1 Stop the timer (RDVRT).
 - 7-2 IF the message cannot be processed:
 - 7-2-1 Execute the “Local Recovery Procedures” task (see 3.5.1).
 - 7-3 ENDIF.
- 8 WHEN a RETURN ERROR or REJECT is received
 - 8-1 Stop the timer (RDVRT).
 - 8-2 Execute the “Local Recovery Procedures” task (see 3.5.1).
- 9 WHEN the timer (RDVRT) expires:
 - 9-1 Execute the “Local Recovery Procedures” task (see 3.5.1).
- 10 ENDWAIT.
- 11 Exit this task.

4.ZZ.2 VLR Receiving RoamerDatabaseVerificationRequest INVOKE

When a VLR receives a RoamerDatabaseVerificationRequest INVOKE, it shall perform the following:

- 1 IF the received message can be processed:
 - 1-1 IF any part of the received MSID range is not associated with the requesting HLR:

- 1-1-1 Send a RETURN ERROR with the Error Code set to indicate *MSID/HLRmismatch* to the requesting HLR.
- 1-2 ELSE:
- 1-2-1 Include applicable parameters.
- 1-2-2 Send a RETURN RESULT to the requesting HLR.
- 1-3 ENDIF.
- 2 ELSE (the received message cannot be processed):
- 2-1 Send a RETURN ERROR with a proper Error Code value (see the following table) to the requesting HLR.
- 3 ENDIF.
- 4 Exit this task.

VLR RoamerDatabaseVerificationRequest Response

Problem Detection and Recommended Response from VLR to HLR	
RETURN ERROR Error Code	Problem Definition
<i>MSID/HLRMismatch</i>	All or part of the received MSID range is not associated with the requesting HLR.
<i>ResourceShortage</i>	A required VLR resource (e.g., internal memory record, VLR is fully occupied) is temporarily not available (e.g., congestion).
<i>OperationNotSupported</i>	The requested MAP operation is recognized, but not supported, by the receiving VLR, or the requesting HLR is not authorized.
<i>ParameterError</i>	A supplied parameter has an encoding problem.
<i>SystemFailure</i>	A required resource (e.g., data base access, functional entity) is not presently accessible due to a failure. Human intervention may be required for resolution.
<i>UnrecognizedParameterValue</i>	A supplied parameter value is unrecognized or has nonstandard values (e.g., Range=0, Range>10,000).

4.ZZ.3 HLR Initiating a Roamer Database Verification Request to an MSC

When an MC determines that the message routing database used by an MSC to route FEATREQs and ORREQs to HLRs shall be verified, it shall perform the following:

- 1 Include the MSCID parameter set to the HLR identity.
- 2 Include the MSID parameter set to the starting point of the range of MSIDs to examine.
- 3 Include the Range parameter set to the number of MSIDs in the range to be examined, if applicable.
- 4 Send a RoamerDatabaseVerificationRequest INVOKE to the MSC.
- 5 Start the Roamer Database Verification Request Timer (RDVRT).
- 6 WAIT for a Roamer Database Verification Request response.
- 7 WHEN a RETURN RESULT is received:
 - 7-1 Stop the timer (RDVRT).
 - 7-2 IF the message cannot be processed:
 - 7-2-1 Execute the “Local Recovery Procedures” task (see 3.5.1).
 - 7-3 ENDIF.
- 8 WHEN a RETURN ERROR or REJECT is received
 - 8-1 Stop the timer (RDVRT).
 - 8-2 Execute the “Local Recovery Procedures” task (see 3.5.1).
- 9 WHEN the timer (RDVRT) expires:

- 9-1 Execute the “Local Recovery Procedures” task (see 3.5.1).
- 10 ENDWAIT.
- 11 Exit this task.

4.ZZ.4 MC Initiating a Roamer Database Verification Request to an MSC

When an MC determines that one of the message routing database used by an MSC to route MS-originated SMS messages shall be verified, it shall perform the following:

- 1 Include the InvokingFE Type parameter set to indicate that the INVOKING NE is an MC.
- 2 IF the database to be verified is the database used for indirect routing of MS-originated SMS messages to the originating MS’s MC:
 - 2-1 Include the MSID parameter set to the starting point of the range of MSIDs to examine.
 - 2-2 Include the Range parameter set to the number of MSIDs in the range to be examined, if applicable.
- 3 ELSE (the database to be verified is the database used for direct routing of MS-originated SMS messages to the destination MS’s MC):
 - 3-1 Include the MobileDirectoryNumber parameter set to the starting point of the range of MobileDirectoryNumbers to examine.
 - 3-2 Include the Range parameter set to the number of MobileDirectoryNumbers in the range to be examined, if applicable.
- 4 ENDIF.
- 5 Send a RoamerDatabaseVerificationRequest INVOKE to the MSC.
- 6 Start the Roamer Database Verification Request Timer (RDVRT).
- 7 WAIT for a Roamer Database Verification Request response.
- 8 WHEN a RETURN RESULT is received:
 - 8-1 Stop the timer (RDVRT).
 - 8-2 IF the message cannot be processed:
 - 8-2-1 Execute the “Local Recovery Procedures” task (see 3.5.1).
 - 8-3 ENDIF.
- 9 WHEN a RETURN ERROR or REJECT is received
 - 9-1 Stop the timer (RDVRT).
 - 9-2 Execute the “Local Recovery Procedures” task (see 3.5.1).
- 10 WHEN the timer (RDVRT) expires:
 - 10-1 Execute the “Local Recovery Procedures” task (see 3.5.1).
- 11 ENDWAIT.
- 12 Exit this task.

4.ZZ.5 MSC Receiving RoamerDatabaseVerificationRequest INVOKE

When an MSC receives a RoamerDatabaseVerificationRequest INVOKE, it shall perform the following:

- 1 IF the received message can be processed:
 - 1-1 IF the message was received from an HLR:
 - 1-1-1 IF any part of the received MSID range is not associated with the requesting HLR:
 - 1-1-1-1 Send a RETURN ERROR with the Error Code set to indicate *MSID/HLRmismatch* to the requesting HLR.
 - 1-1-1-2 ELSE:
 - 1-1-1-2-1 Include applicable parameters.
 - 1-1-1-2-2 Send a RETURN RESULT to the requesting HLR.
 - 1-1-1-3 ENDIF.
 - 1-2 ELSE (the message was received from an MC):
 - 1-2-1 IF an MSID range was received AND IF any part of that range is not associated with the requesting MC in the message routing database used for indirect routing of MS-originated SMS messages:
 - 1-2-1-1 Send a RETURN ERROR with the Error Code set to indicate *MSID/HLRmismatch* to the requesting MC.
 - 1-2-2 ELSEIF a MobileDirectoryNumber range was received AND IF any part of that range is not associated with the requesting MC in the message routing database used for direct routing of MS-originated SMS messages:
 - 1-2-2-1 Send a RETURN ERROR with the Error Code set to indicate *MSID/HLRmismatch* to the requesting MC.
 - 1-2-2-3 ELSE:
 - 1-2-2-3-1 Send a RETURN RESULT to the requesting MC.
 - 1-2-2-4 ENDIF.
 - 2 ELSE (the received message cannot be processed):
 - 2-1 Send a RETURN ERROR with a proper Error Code value (see the following table) to the requesting NE.
- 3 ENDIF.
- 4 Exit this task.

MSC RoamerDatabaseVerificationRequest Response

Problem Detection and Recommended Response from VLR to HLR	
RETURN ERROR Error Code	Problem Definition
<i>MSID/HLRMismatch</i>	All or part of the received MSID or MobileDirectoryNumber range is not associated with the requesting NE.
<i>ResourceShortage</i>	A required MSC resource (e.g., internal memory record, MSC is fully occupied) is temporarily not available (e.g., congestion).
<i>OperationNotSupported</i>	The requested MAP operation is recognized, but not supported, by the receiving MSC, or the requesting NE is not authorized.
<i>ParameterError</i>	A supplied parameter has an encoding problem.
<i>SystemFailure</i>	A required resource (e.g., data base access, functional entity) is not presently accessible due to a failure. Human intervention may be required for resolution.
<i>UnrecognizedParameterValue</i>	A supplied parameter value is unrecognized or has nonstandard values (e.g., Range=0, Range>10,000).

4.ZZ.6 HLR Initiating a Roamer Database Verification Request to an MC

When an HLR determines that the message routing database used by an MC to route SMSREQs to HLRs shall be verified, it shall perform the following:

- 1 Include the MSCID parameter set to the HLR identity.
- 2 Include the MobileDirectoryNumber parameter set to the starting point of the range of MobileDirectoryNumbers to examine.
- 3 Include the Range parameter set to the number of MobileDirectoryNumbers in the range to be examined, if applicable.
- 4 Send a RoamerDatabaseVerificationRequest INVOKE to the MC.
- 5 Start the Roamer Database Verification Request Timer (RDVRT).
- 6 WAIT for a Roamer Database Verification Request response.
- 7 WHEN a RETURN RESULT is received:
 - 7-1 Stop the timer (RDVRT).
 - 7-2 IF the message cannot be processed:
 - 7-2-1 Execute the “Local Recovery Procedures” task (see 3.5.1).
 - 7-3 ENDIF.
- 8 WHEN a RETURN ERROR or REJECT is received
 - 8-1 Stop the timer (RDVRT).
 - 8-2 Execute the “Local Recovery Procedures” task (see 3.5.1).
- 9 WHEN the timer (RDVRT) expires:
 - 9-1 Execute the “Local Recovery Procedures” task (see 3.5.1).
- 10 ENDWAIT.
- 11 Exit this task.

4.ZZ.7 MC Initiating a Roamer Database Verification Request to an MC

When an MC determines that the message routing database used by another MC to relay indirectly routed MS-originated SMS messages to the destination MS’s MC shall be verified, it shall perform the following:

- 1 Include the InvokingFE Type parameter set to indicate that the INVOKING NE is an MC.
- 2 Include the MobileDirectoryNumber parameter set to the starting point of the range of MobileDirectoryNumbers to examine.
- 3 Include the Range parameter set to the number of MobileDirectoryNumbers in the range to be examined, if applicable.
- 4 Send a RoamerDatabaseVerificationRequest INVOKE to the MC.
- 5 Start the Roamer Database Verification Request Timer (RDVRT).
- 6 WAIT for a Roamer Database Verification Request response.
- 7 WHEN a RETURN RESULT is received:
 - 7-1 Stop the timer (RDVRT).
 - 7-2 IF the message cannot be processed:
 - 7-2-1 Execute the “Local Recovery Procedures” task (see 3.5.1).

- 7-3 ENDIF.
- 8 WHEN a RETURN ERROR or REJECT is received
- 8-1 Stop the timer (RDVRT).
- 8-2 Execute the “Local Recovery Procedures” task (see 3.5.1).
- 9 WHEN the timer (RDVRT) expires:
- 9-1 Execute the “Local Recovery Procedures” task (see 3.5.1).
- 10 ENDWAIT.
- 11 Exit this task.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

4.ZZ.8 MC Receiving RoamerDatabaseVerificationRequest INVOKE

When an MC receives a RoamerDatabaseVerificationRequest INVOKE, it shall perform the following:

- 1 IF the received message can be processed:
 - 1-1 IF the message was received from an HLR:
 - 1-1-1 IF any part of the received MobileDirectoryNumber range is not associated with the requesting HLR:
 - 1-1-1-1 Send a RETURN ERROR with the Error Code set to indicate *MSID/HLRmismatch* to the requesting HLR.
 - 1-1-1-2 ELSE:
 - 1-1-1-2-1 Send a RETURN RESULT to the requesting HLR.
 - 1-1-1-3 ENDIF.
 - 1-2 ELSE (the message was received from an MC):
 - 1-2-1 IF any part of the received MobileDirectoryNumber range is not associated with the requesting MC:
 - 1-2-1-1 Send a RETURN ERROR with the Error Code set to indicate *MSID/HLRmismatch* to the requesting MC.
 - 1-2-1-2 ELSE:
 - 1-2-1-2-1 Send a RETURN RESULT to the requesting MC.
 - 1-2-1-3 ENDIF.
 - 2 ELSE (the received message cannot be processed):
 - 2-1 Send a RETURN ERROR with a proper Error Code value (see the following table) to the requesting NE.
- 3 ENDIF.
- 4 Exit this task.

MC RoamerDatabaseVerificationRequest Response

Problem Detection and Recommended Response from VLR to HLR	
RETURN ERROR Error Code	Problem Definition
MSID/HLRMismatch	All or part of the received MSID or MobileDirectoryNumber range is not associated with the requesting NE.
ResourceShortage	A required MSC resource (e.g., internal memory record, MSC is fully occupied) is temporarily not available (e.g., congestion).

MC RoamerDatabaseVerificationRequest Response

Problem Detection and Recommended Response from VLR to HLR

RETURN ERROR Error Code	Problem Definition
OperationNotSupported	The requested MAP operation is recognized, but not supported, by the receiving MSC, or the requesting NE is not authorized.
ParameterError	A supplied parameter has an encoding problem.
SystemFailure	A required resource (e.g., data base access, functional entity) is not presently accessible due to a failure. Human intervention may be required for resolution.
UnrecognizedParameter-Value	A supplied parameter value is unrecognized or has nonstandard values (e.g., Range=0, Range>10,000).

8 OPERATION TIMER VALUES

(see TIA/EIA-41.6-D, page 6-400)

Operation Timer Values

Timer	Default (sec.)	Started when	Normally stopped when	Action when timer expires
RDVRT Roamer Database Verification Request Timer	6	RoamerDatabase-VerificationRequest INVOKE is sent	RoamerDatabase-VerificationRequest RETURN RESULT or RETURN ERROR is received	Execute recovery procedures