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Test specifications for GSM-R MI related requirements
Part 4: Network

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Modification History

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0.1	18/10/2015	all	First draft	Ecaterina Ganga
0.2	18/11/2015	all	Updated draft	Ecaterina Ganga
0.3	30/11/2015	all	Executive summary enhanced, TC numbering and descriptions consistent, doc id and footer modified	Ola Bergman
0.3.4	02/12/2015	all	95% consistent and aligned	Ola Bergman
0.3.5	03/12/2015	all	2 % more	Ola Bergman
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0.3.7	11/12/2015	all	Ulrich Geier review remarks incorporated	Ola Bergman
0.3.8	05/08/2016	All	Some Formatting Changes eREC and URNR included	Erich Seitz
0.3.9	15/09/2016	all	Introducing additional chapters to separate TC for MI and O features	Ecaterina Ganga
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0.4	27/09/2016	all	Including EIRENE 8/16 specific test cases	M. Lauwers/E. Ganga
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0.4.6	03/05/2017	all	Renumbering of test cases	Ulrich Geier
1.0.0	23/05/2017	Ch. 6.1	Correction	Ulrich Geier
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Table of Contents

1 Object

This document defines the test plan and the test cases for GSM-R network, i.e. track side infrastructure,   to allow its assessment to prove the fulfilment of EIRENE MI (Mandatory for Interoperability in EU) requirements for GSM-R Baseline 1 release 0, according to reference [1].

It is a guide for the tests to be used to prove a majority of requirements marked as Mandatory for Interoperability (MI) in the EIRENE specification, during the Notified Body process of certification of the GSM-R network elements.

A cross-reference table, mapping the EIRENE specification requirements for the Network towards the test cases identified to verify them, is indicated in ref [i4].

The test cases are grouped per MI requirements and each requirement is referred to the necessary test(s) case(s) which verify the corresponding correct implementation.

Some Test Cases, in particular addressing VBS, for which no corresponding MI requirements exist, are included. Besides representing important functionality and to make the document more useful as well as future proof, this inclusion has been done.

Many of the proposed test cases feasibility were verified by lab tests. These were performed with the purpose to validate that the test cases fulfil the objective of proving the MI requirements in EIRENE and that they can be executed efficiently.

The testing was carried out in the test labs of NOKIA and KCC between 10th of August 2013 and 25th of October 2013 according to [i2] and [i3].

2 References

2.1 Normative references

[1] EIRENE FRS 8.0.0 UIC 950-0.0.2 and EIRENE SRS 16.0.0 UIC 951-0.0.2

[2] ETSI EN 301 515 v2.3.0, "Global System for Mobile Communication (GSM); Requirements for GSM operation on railways"

[3] ETSI TS 102 281 v3.0.0 "Railways Telecommunications (RT); Global Systems for Mobile Communication (GSM); Detailed requirements for GSM operation on Railway"

[4] ETSI TS 103 169 'Railway Telecommunications (RT); ASCI Options for Interoperability for GSM operation on Railways version 1.1.1 (2011-09)

2.2 Informative references

[i1] GSM-R Network Assessment Test Plan; UIC document O- 3114 Version 1.0 dated 24.1.2013)

[i2] GSM-R IOT test cases as part of the TEN-T 2007-EU-60040-P project – "TP TEN Phase 9.1 v. 1.4 and TP TEN Phase 9.2 and 9.3 v. 1.4/ February 2012"

[i3] GSM-R IOT test results as part of the TEN-T 2007-EU-60040-P project – "IOT 9.1 report v.1.7, IOT 9.2 report v.1.7 and IOT 9.3 report v.1.7 / May 2012"

[i4] O-3295 Cross-Reference EIRENE FRS 8.0.0 and SRS 16.0.0 vs. Test Cases v1.0.0

3 Abbreviations

AM	Access Matrix
APN	Access Point Name
ATO	Automatic Train Operation
BAIC	Barring Incoming Call
BAOC	Barring Outgoing Call
BCCH	Broadcast Channel
BSC	Base Station Controller
BSS	Base Station Sub-system
BTS	Base Transceiver Station
CDR	Call Data Record
CF	Call Forwarding
CFB	Call Forwarding Busy Subscriber
CFU	Call Forwarding Unconditional
CLIP	Calling Line Identification Presentation
CLIR	Calling Line Identification Restriction
COO	Cell of Origin
COR	Class of Right
CT	Call Type
DCH	Dedicated Channel
DISP	Dispatcher
DMI	Driver Machine Interface
DNS	Domain Name Server
EDOR	ETCS Data Only Radio
eMLPP	enhanced Multi-Level Precedence and Pre-emption
ER	Extended Range
eREC	Enhanced Railway Emergency Call
ER-GSM band	Extended Railways GSM band
ETCS	European Train Control Service
EU	European Union
EVEA	Enhanced Very Early Assignment
FA	Functional Addressing
FC	Functional Code
FN	Functional Number
FNN	Follow Me Function Node
FRS	Functional Requirements Specification
GCA	Group Call Area
GCCH	Group Control Channel
GCH	Group Cannel
GCR	Group Call Register
GCRef	Group Call Reference

GGSN	Gateway GPRS Support Node
GID	Group ID
GID	Group Identity
GPRS	General Packet Radio Service
HLR	Home Location Register
HO	Handover
IC	International Code
IF	Interface
IMEI	International Mobile Equipment Identity
IMSI	International Mobile Subscriber Identity
IOT	Interoperability Test
KMS	Key Management System
LDA	Location Dependent Addressing
LU	Location Update
MI	Mandatory for Interoperability in EU
MMC	Mobile to Mobile Call
MPTY	Multi Party
MS	Mobile Station
MSC	Mobile services Switching Centre
MSG	Message
MSISDN	Mobile Station International ISDN Number
MSUB	Mobile Subscriber
MTC	Mobile Terminating Call
NSS	Network Sub-system
ODB	Operator determined barring
OM	Operational Measurement
OTDI	Originator to Dispatcher Information
PCU	Packet Control Unit
PEC	Public Emergency Call
PFN	Presentation of Functional Numbers
PLMN	Public Land Mobile Network
PtP	Point to Point
QoS	Quality of Service
RBC	Radio Block Center
REC	Railway Emergency Call
SA	Service Area
SGSN	Serving GPRS Support Node
SID	Sector ID
SIM	Subscriber Identity Module
SMS	Short Message
SMSC	Short Message Service Center

SRS	System Requirements Specification
SS	Service Subscriber
TCH	Traffic Channel
TCT	Train Controller Terminal
TCU	Transcoding Unit
TRX	Transceiver
UE	User Equipment
UIC	Union Internationale des Chemins de Fer
UL	Uplink
USSD	Unstructured Supplementary Service Data
UUS1	User-to-User Signaling type 1
VBS	Voice Broadcast Service
VGCS	Voice Group Call Service
VLR	Visitor Location Register

4 Test Configuration

4.1 Overview

Following components of the EIRENE GSM-R system are needed to execute the tests:
- GSM-R Network(s)
- Cab Radio
- General purpose radio (GPH) or operational purpose radio (OPH)
- Shunting radio (OPS)
- Dispatchers
- ISDN termination (RBC)
- SIM Cards

4.2 Equipment required

- GSM-R network(s) operating in the R-GSM 900 band
- GSM Abis-tracer or GSM A-tracer, in order to check the contents on the messages exchanged between mobiles and network when required.
- Cab Radio
- Fixed network controller (dispatcher)
- ISDN termination (RBC)
- Enough mobile stations (Cab Radio or handheld) to cover multiparty calls
- GSM-R SIM cards with all the services and features provisioned and configured for the appropriate mobile user and function.
- SIM card editor, in order to be able to modify the services and features provisioned and the configuration on the SIM cards for the different test requirements

4.3 Network configuration

The GSM-R network needs to be fully compliant to the requirements listed in EIRENE FRS and SRS [1] and to ETSI specifications referenced in [2], [3] and [4].

5 Test Cases List for MI features

5.1 Basic and Supplementary GSM Services

This test area covers a set of tests for basic and supplementary GSM voice and data services in a GSM-R system

This includes
- Location Update and Location Cancellation
- IMSI Attach and Detach
- Mobile Originated and Mobile Terminated Calls
- Data calls
- Subscription, Activation, Deactivation, Interrogation of supplementary services
- Call Hold, Call Waiting, CLIP, CLIR, notification of Call Forwarding
- Multi-Party, MPTY
- Closed user Group, CUG
- Public emergency calls

Test Id	Description
RINF_GSM_1	Successful Location Update after MS Power On
RINF_GSM_2	Supplementary Service Call Hold
RINF_GSM_3	Supplementary Service Call Waiting
RINF_GSM_4	Supplementary Service CLIP – MMC with Call Forwarding Unconditional
RINF_GSM_5	Supplementary Service MPTY
RINF_GSM_6	Establishment of several PtP calls with different priorities
RINF_GSM_7	Public Emergency Call – With SIM
RINF_GSM_8	Short and long SMS
RINF_GSM_9	Mobile subscriber receives a call from Subscriber on other Network

Number of test cases: 9

5.2 Handover

This test area verifies the correct functioning of handovers for different services in different scenarios in a GSM-R system

This is:
- Inter BTS handovers for Point to Point calls

Test id	Title
RINF_HO_1	Inter BTS handover of a point to point voice call
RINF_HO_2	Ongoing point to point voice call in the destination cell preempted by a inter BTS handover inwards of a point to point voice call

Number of test cases: 2

5.3 Functional Addressing (FA)

This test area verifies the correct functioning of the FA service in a GSM-R system

This includes:
- Registration Management
- Calls to Functional Numbers
- Failure cases (e.g. registration failure, party already registered)

Test Id	Description
RINF_FA_1	Registration of an FN Number
RINF_FA_2	Registration of an unknown FN fails
RINF_FA_3	Deregistration of an FN Number
RINF_FA_4	Deregistration of an FN fails
RINF_FA_5	Interrogation of an FA Number
RINF_FA_6	Interrogation of an FN fails
RINF_FA_7	FA Call - Successful Call
RINF_FA_8	FA Call – Call is not completed
RINF_FA_9	Verification of Functional Numbers previously registered in HPLMN (CT2/3/4)
RINF_FA_10	Deregistration of CT2 numbers while roaming
RINF_FA_11	Forced Deregistration
RINF_FA_12	Unsuccessful registration with Lead driver number (CT2 FC 01) because of wrong CoR (CT2 FC10 works)
RINF_FA_13	Register 3 function numbers to one user (non-roaming case)
RINF_FA_14	Registration of an FN fails - remote party already registered
RINF_FA_15	FA Call - Successful Call

Number of test cases: 15

5.4 Location Dependent Addressing (LDA)

This test area verifies the correct functioning of the LDA service in a GSM-R system

This includes:
- Successful LDA call, correct transfer of the Cell of Origination information
- Failure cases (e.g. LDA destination does not exist)

Test Id	Description
RINF_LDA_1	Successful LDA Call - Verify the cell format is correct
RINF_LDA_2	Unsuccessful LDA Call - Call to invalid Short Code

Number of test cases: 2

5.5 Enhanced Multi-Level Precedence and Pre-emption Service (eMLPP)

This test area verifies the correct functioning of the eMLPP service in a GSM-R system

This includes:
- Pre-emption of PtP, VBS, VGCS, data calls by PtP, VBS, VGCS, data calls of higher priority and REC calls
- Assigning and handling of priorities to different resources and passing the priority information through the system.
- Interaction of eMLPP with handovers
- Failure scenarios

Test Id	Description
RINF_eMLPP_1	MS in VGCS call on DCH, pre-emption on Air IF by higher prio PtP call
RINF_eMLPP_2	MS in VBS call as listener, pre-emption on Air IF by higher prio VBS call.
RINF_eMLPP_3	MS in VGCS call having the UL of the GCH, pre-emption on Air IF by higher prio VBS call.
RINF_eMLPP_4	MS in PtP call, pre-emption on MS by higher prio VGCS call (REC)
RINF_eMLPP_5	MS in VBS call as originator, pre-emption on Air IF by higher prio VGCS call (REC)
RINF_eMLPP_6	MS in VGCS call having the UL of the GCH, pre-emption on MS by higher prio VGCS call (REC)
RINF_eMLPP_7	MS in data call, pre-emption on Air IF by higher prio VGCS call (REC)
RINF_eMLPP_8	MS in PtP call, pre-emption on Air IF by higher prio data call (4800 baud, transparent)
RINF_eMLPP_9	eMLPP priority is preserved during CFU (Call Forwarding Unconditionally)

RINF_eMLPP_10	eMLPP prio is preserved during CFB (Call Forwarding Busy)

Number of test cases: 10

5.6 Voice Group Call Service (VGCS)

This test area verifies the correct functioning of the VGCS service in a GSM-R system

This includes:
- Uplink management between BSSs.
- Muting/Unmuting

Test Id	Description
RINF_VGCS_1	SS originates VGCS call
RINF_VGCS_2	MS Dispatcher originates VGCS call and takes it down with the kill Sequence
RINF_VGCS_3	SS originates VGCS call, leaves, rejoins and ends it.
RINF_VGCS_4	SS enters into VGCS broadcast area with ongoing VGCS call and is notified of it
RINF_VGCS_5	MS Dispatcher joins ongoing VGCS call
RINF_VGCS_6	Parallel group calls are possible in the same cell.
RINF_VGCS_7	GID delivered correctly to terminating SS in SS originated VGCS call

Number of test cases: 7

5.7 Voice Broadcast Service (VBS)

This test area verifies the correct functioning of the VBS service in a GSM-R system

Test Id	Description
RINF_VBS_1	SS originates VBS call
RINF_VBS_2	SS originates prio0 VBS call
RINF_VBS_3	MS Dispatcher originates VBS call and takes down the call by disconnecting
RINF_VBS_4	MS Dispatcher originates VBS call and takes down the call with the kill sequence
RINF_VBS_5	MS Dispatcher joins ongoing VBS call
RINF_VBS_6	SS enters into VBS broadcast area with ongoing VBS call and is notified of it, SS joins the VBS call

Number of test cases: 6

5.8 Railway Emergency Call (REC)

This test area verifies the REC functionality including the acknowledgement functionality in a GSM-R system

Test Id	Description
RINF_REC_1	SS originates a REC
RINF_REC_2	Subscriber initiated REC (no talker change, normal clear down of call)
RINF_REC_3	SS accepts an incoming REC
RINF_REC_4	MS Dispatcher originates a REC
RINF_REC_5	SS originates Acknowledgement Call
RINF_REC_6	REC in a GCA with a locked cell

Number of test cases: 6

5.9   Originator to Dispatcher Information (OTDI)

This test area verifies the correct functioning of the OTDI feature in a GSM-R system

This test will be performed using SAGEM MS as Mobile dispatcher. This only allow to show the functionality in the traces from protocol analyzers.

Test Id	Description
RINF_OTDI_1	SS originates VGCS call, terminating MS dispatcher receives the OTDI
RINF_OTDI_2	SS originates VGCS Immediate Setup 2 call, terminating MS dispatcher receives the OTDI

Number of test cases: 2

5.10   Late Entry

This test area verifies the correct functioning of the Late Entry feature in a GSM-R system

Test Id	Description
RINF_LE_1	SS active in a PtP (P4) call move in a cell with ongoing REC call
RINF_LE_2	Orig. SS active in a VBS (P4) call move in a cell with ongoing REC call
RINF_LE_3	Orig. SS active in a VGCS (P4) call on GCH (talker) move in a cell with ongoing REC call

Number of test cases: 3

5.11   Access Matrix

Test Id	Description
RINF_AM_1	National call - AM allows call
RINF_AM_2	National call - AM denies call

Number of test cases: 2

5.12 GPRS

Test Id	Description
RINF_GPRS_1	GPRS Connection Setup
RINF_GPRS_2	Contact an RBC in the ETCS domain
RINF_GPRS_3	QOS and priority test between ETCS and Background traffic

Number of test cases: 3

6 Test Cases List for O (Optional) features (testing MI Requirements for O features)

6.1 Uplink Reply/Notification response

This test area verifies the correct functioning of the feature uplink reply/notification response.

This includes:
- Allocation of a GCH when a subscriber involved in a VGCS call moves into the empty cell
- Allocation of a GCH when a subscriber involved in a VBS call moves into the empty cell
- Allocation of a GCH in all cells (even empty ones) when a subscriber originates a REC call

Test Id	Description
RINF_URNR_1	SS active in a VGCS call moves in empty cell
RINF_URNR_2	SS active in a VBS call moves in empty cell
RINF_URNR_3	SS active in a REC call moves in empty cell

Number of test cases: 3

6.2 Enhanced Railway Emergency Call (eREC)

This test area verifies the correct functioning of the eREC feature

This includes:
- Verify eREC terminals are joining an eREC call if the SID is same and eREC terminals are not joining an eREC call if the registered SID is different
- Verify eREC call and REC call are both joined by eREC capable (and registered) and non eREC capable terminals

Test Id	Description
RINF_eREC_1	eREC call with correct SID – eREC MS with same SID are joining, eREC MS with different SID will not be alerted
RINF_eREC_2	eREC call which involve with eREC capable and non eREC capable terminals

Number of test cases: 2

6.3 ER-GSM

Verify basic GSM functionality when the network utilizes the ER-GSM frequency band. Both types of UE with and without ER-GSM capability should be capable to accede to the network.

Test Id	Description
RINF_ER-GSM	Establishment of a PtP call in a ER-GSM network (Test case description moved to chapter 8)

Number of test cases: 1

7 Test Cases Description for MI (Mandatory for Interoperability) features

7.1 Basic and Supplementary GSM Services

RINF_GSM_1 Successful Update Location after MS Power On

Purpose:

Verify the correct data are inserted to VLR during LU

Initial conditions:

MS subscribed to Basic and Supplementary Services

Test Procedure:

ACTION	RESULT
1) Power on the MS	1) Location Update (LU) is performed
2) Verify the service subscriber data is inserted correctly to VLR	2) Subscriber data is inserted correctly into the VLR

RINF_GSM_2 Supplementary Service Call Hold

Purpose:

Verify the Supplementary Service Call Hold

Initial conditions:

Subscriber A is provisioned to the Call Hold supplementary service and has it activated

Subscriber A has an ongoing call with Subscriber B

Test Procedure:

ACTION	RESULT
1) Subscriber A puts Subscriber B on hold.	1) Subscriber B is put on hold, no speech path between Subscriber A and B. Subscriber A gets dial tone.
2) Subscriber A calls Subscriber C.	2) Call between Subscriber A and C is setup successfully.
3) Subscriber A toggles between Subscriber B and C by putting them on hold and retrieving them.	3) The subscriber that is on hold has no speech path to Subscriber A. The subscriber that is not on hold is able to communicate with Subscriber A.

RINF_GSM_3 Supplementary Service Call Waiting

Purpose:

Verify the Supplementary Service Call Waiting

Initial conditions:

Subscriber A is provisioned to the Call Waiting supplementary service

Subscriber A has an ongoing communication with Subscriber B

Higher priority than the default priority should be used

Test Procedure:

ACTION	RESULT
1) Subscriber C calls Subscriber A.	1) Subscriber A is notified of the incoming call from Subscriber C. Subscriber C gets ringing tone. Paging message have to be checked that the priority is included – priority to be reported.

RINF_GSM_4 Supplementary Service CLIP – MMC with Call Forwarding Unconditional

Purpose:

Verify the Supplementary Service Calling Line Identification Presentation (CLIP) with activated Call Forwarding Unconditional (CFU)

Initial conditions:

Subscriber B is provisioned to the CLIP and the CFU supplementary service and has his calls forwarded to Subscriber C

Test Procedure:

ACTION	RESULT
1) Subscriber A calls Subscriber B.	1) Subscriber A is forwarded to Subscriber C. Subscriber A's MSISDN is presented to Subscriber C.

RINF_GSM_5 Supplementary Service MPTY

Purpose:

Verify the Supplementary Service Multiparty (MPTY)

Initial conditions:

Subscriber A is provisioned to the MPTY supplementary service

Test Procedure:

ACTION	RESULT
1) Subscriber A builds MPTY call involving 6 subscribers.	1) MPTY call is setup to 6 subscribers.
2) Conferee Leaves and is joined back into the MPTY call for some subscribers.	2) The call is stable during the leaving and joining of the conferees of MPTY.
3) Subscriber A closes the MPTY call.	3) Call is taken down successfully, all resources are freed.

RINF_GSM_6 Establishment of several PtP calls with different priorities

Purpose:

Verify basic GSM functionality

Initial conditions:

Subscriber A and B are provisioned to the eMLPP service

Test Procedure:

ACTION	RESULT
1) Subscriber A calls Subscriber B with priority 0, 2, 3, 4 dialling *75<Priority>#<MSISDN>.	1) The calls are setup correctly and the priorities are transferred correctly through the network.

RINF_GSM_7 Public Emergency Call – With SIM

Purpose:

Verify Public Emergency Call – With SIM

Initial conditions:

- MS has a SIM
- Proper termination point for the 112 Emergency call is available

Test Procedure:

ACTION	RESULT
1) Make the 112 Public Emergency Call.	Call is established. No error logs.

RINF_GSM_8 Short and long SMS

Purpose:

Verify the following requirements:
FRS 2.3.4; 12.3.1; 12.3.3
SRS 12.2.1

- SMS with 160 characters

- The users can use the radio while receiving SMS.

Initial conditions:
- 3 GSM-R mobiles (MS A, MS B, MS C) with standard options, datafill and routing
- GSM-R mobiles support long text message
- 1 BTS
- 1 BSC
- 1 MSC
- SMSC available
- MS B is in active call with another subscriber

Test Procedure:

ACTION	RESULT
1) MS A sends a SMS to MS B using a message text with 160 characters.	1) MS B receives the SMS including the message text with 160 characters.
2) MS C sends a SMS to MS B using a message text with 300 characters.	2) MS B receives the SMS including the message text with 300 characters.

RINF_GSM_9 Mobile subscriber receives a call from Subscriber on other Network

Purpose:

Verify Mandatory Requirement

- Point-to-Point voice call external network

Initial conditions:

1 GSM-R mobiles (MS-A) with standard options, datafill and routing

1 BTS

1 BSC

1 MSC

1 Fixed Line phone on external Network

Routing established to route from external network subscriber

Test Procedure:

ACTION	RESULT
1) Fixed line dials the MS A number.	1) MS A answers the call.
2) MS A releases the call.	2) The call is released properly.

7.2 Handover

RINF_HO_1 Inter BTS handover of a point to point voice call

Purpose:

To verify that an Inter BTS handover of a point to point voice call functions as expected

Initial conditions:

- The BSS network is fully functional with correct reselection and handover datafill created.
- Analyzers are configured and capturing messaging for the duration of the test
- A test mobile MS A is used to decode and display the BCCH information of the serving and neighbor cells

Test Procedure:

ACTION	RESULT
1) MS A establishes a point to point call to MS B.	1) Verify that the MS A is engaged in a point to point voice call with MS B.
2) Move MS A from one cell of a BTS to a different BTS – the destination cell - on the same BSC.	2) Ensure that MS A camps onto the BCCH of the destination cell and that the call with MS B remains connected.
	3) The recorded message flow is analyzed and checked for correctness.

Further Handover Test cases are part of the O-2875 Version 2.0.0 Specification

RINF_HO_2   Ongoing point to point voice call in the destination cell preempted by a inter BTS handover inwards of a point to point voice call

Purpose:

To verify that an ongoing point to point voice call in the destination cell is preempted by a inter BTS handover inwards of a point to point voice call that has a higher priority

Initial conditions:

•The BSS network is fully functional with correct reselection and handover datafill created.

•Analyzers are configured and capturing messaging for the duration of the test.

•A debug mobile is used to decode and display the BCCH information of the serving and neighbor cells.

Lock all traffic channels except 2 TCH in the Destination Cell.

Originating and destination cells are located in different BTSs.

Test Procedure:

ACTION	RESULT
1) MS A establishes a point to point call – Call A - to MS B, both camping in the destination cell.	1) Ensure that there is an ongoing point to point call in the destination cell (Call A). 2) Ensure that Call A is the only call in the destination cell and that there are no free traffic channels on the Um interface of the destination cell.
3) MS C establishes a point to point call - Call B - to MS D, both camping in the originating cell. Ensure that this Call B has a higher eMLPP priority level than Call A.	3) Call B is established.
4) Move MS C from the originating cell to the destination cell.	4) MS C handovers to the destination cell, Call B is maintained, Call A is preempted.
	5) The recorded message flow is analyzed and checked for correctness.

Further Handover Test cases are part of the O-2875 Version 2.0.0 Specification

7.3 Functional Addressing (FA)

RINF_FA_1 Registration of an FN Number

Purpose:

Verify the registration of an FN

Initial conditions:

FN is in not registered.

Subscriber A is provisioned to the FA service.

Subscriber A can register/deregister COR A, B or C numbers.

Test Procedure:

ACTION	RESULT
1) Subscriber A initiates a registration.	1) The network response for a successful registration. The FN is activated and displayed.
2) Query FNN for the FN.	2) The MSISDN of Subscriber A is registered to the FN and the FN is in registered state.
3) Verify OMs Verify ERs	3) The correct OMs and ERs have been generated.

RINF_FA_2 Registration of an unknown FN fails

Purpose:

Verify a scenario for the registration of an invalid FN

Initial conditions:

FN is not registered.

Subscriber A is provisioned to the FA service.

Subscriber A can register/deregister COR A, B and C numbers.

Test Procedure:

ACTION	RESULT
1) Subscriber A initiates a registration to an FN that does not exist.	1) The request fails and the FN is neither activated nor displayed on the mobile.
2) Verify OMs Verify Event Records Verify the system for possible error logs	2) The correct OMs, Event Records have been generated. No error logs have been generated.

RINF_FA_3   Deregistration of an FN Number

Purpose:

Verify the deregistration of a FN

Initial conditions:

FN is registered and is assigned to the MSISDN of Subscriber A.

Subscriber A is provisioned to the FA service.

Subscriber A can register/deregister COR A, B or C numbers.

Test Procedure:

ACTION	RESULT
1) Subscriber A initiates a deregistration.	1) The network response for a successful deregistration. The FN is deactivated and is NOT displayed on the mobile anymore.
2) Query FNN for the FN.	2) The MSISDN of Subscriber A is NOT registered to the FN and the FN is not registered.
3) Verify OMs Verify ERs	3) The correct OMs, ERs have been generated. No error logs have been generated.

RINF_FA_4 Deregistration of a FN fails

Purpose:

Verify a failed deregistration scenario of a FN

Initial conditions:

Subscriber A is not registered to any functional number Subscriber A is allowed to use Functional Addressing (provisioning) Subscriber A can register/deregister COR A, B and C numbers.

Test Procedure:

ACTION	RESULT
1) Subscriber A initiates a deregistration.	1) The request fails and Subscriber A is notified of the failed deregistration.
2) Verify OMs Verify ERs Verify the system for possible error logs and alarms.	2) The correct OMs, ERs have been generated. No error logs have been generated.

RINF_FA_5 Interrogation of an FA Number

Purpose:

Verify the interrogation of an FN

Initial conditions:

FN is registered and is assigned to the MSISDN of Subscriber A.

Subscriber A and Subscriber B are provisioned to the FA service.

Subscriber A can register/deregister COR A, B and C numbers.

Test Procedure:

ACTION	RESULT
1) Subscriber A initiates an interrogation.	1) The network response for a successful interrogation. The FN is still activated and displayed on the mobile.
2) Query FNN for the FN.	2) The MSISDN of Subscriber A is registered to the FN and the FN is still in the registered state.
3) Subscriber B initiates an interrogation.	3) The network response for a successful interrogation. The FN is still activated and displayed on the mobile.
4) Query FNN for the FN.	4) The MSISDN of Subscriber A is registered to the FN and the FN is still in the registered state.
5) Verify OMs Verify ERs Verify the system for possible error logs and alarms.	5) The correct OMs, ERs have been generated. No error logs have been generated.

RINF_FA_6 Interrogation of a FN fails

Purpose:

Verify a failed scenario of an interrogation of an FN

Initial conditions:

The FA service is not allowed to use this functional number (this specific FN is not provisioned in the system)
Subscriber A is provisioned to the FA service.

Subscriber A can register/deregister COR A, B and C numbers.

Test Procedure:

ACTION	RESULT
1) Subscriber A initiates an interrogation for the non-existing functional number.	1) The network response for a failed interrogation.
2) Query FNN for the FN.	2) The FN is still not provisioned in the system.
3) Verify OMs Verify ERs Verify the system for possible error logs and alarms.	3) The correct OMs, ERs have been generated. No error logs have been generated.

RINF_FA_7 FA Call - Successful Call

Purpose:

Verify a successful basic FA scenario

Initial conditions:

Subscriber A is registered to FN_A

Subscriber B is registered to FN_B

Test Procedure:

ACTION	RESULT
1) Subscriber A dials FN_B.	1) The call is established between Subscriber A and Subscriber B.
2) Check the number, which is displayed at Subscriber A.	2) FN_B is displayed in the display of Subscriber A.
3) Check the number, which is displayed at Subscriber B.	3) FN_A is displayed in the display of Subscriber B.
4) Verify OMs Verify ERs Verify the system for possible error logs and alarms.	4) The correct OMs, ERs have been generated. No error logs have been generated.

RINF_FA_8 FA Call – Call is not completed

Purpose:

Verify that a call to an inactive FN is released.

Initial conditions:

Subscriber A is provisioned to the FA service.

Subscriber A is registered to FN_A

Test Procedure:

ACTION	RESULT
1) Subscriber A dials an FN that does not exist.	1) No call will be established. Subscriber A returns to idle.
2) Verify OMs Verify ERs Verify the system for possible error logs and alarms.	2) The correct OMs, ERs have been generated. No error logs have been generated.

RINF_FA_9 Verification of Functional Numbers previously registered in HPLMN

Purpose:

This test case is to verify that the functional numbers previously registered in the HPLMN can be used in the VPLMN to receive calls.

Initial conditions:
- MS_A #1 being a subscriber of PLMN A has registrations to CT2, CT3 in PLMN A
- *MS_B#1 being a subscriber of PLMN B has registrations to CT2, CT3 in PLMN B*

	PLMN A	PLMN B
Train number - CT2	TBD	TBD
Engine number - CT3	TBD	TBD

- MS_A#1 is located in its Home PLMN A, MS_B#1 is roaming in PLMN A

PLMN A	PLMN B
MSa #1	
MSb #1 ←	

Test Procedure:

#	Action	Result
1	MS_A #1 calls MS_B #1 on all his functional numbers.	MS_B #1 receives all calls correctly Correct Presentation of the FN to be checked.
2	MS_B #1 calls MS_A #1 on all its functional numbers.	MS_A #1 receives all calls correctly Correct Presentation of the FN to be checked.

RINF_FA_10   Deregistration of CT2 numbers while roaming

Purpose:

Verify that the Mobile Station can deregister the functional numbers when roaming in a VPLMN.

Initial Conditions:

PLMN A	PLMN B
MSb #1 ←	

- MSb #1 is roaming into the visited PLMN A from its home PLMN B
- MSb #1 registered to CT2 number 2-xxxxx xx in both networks.

Test Procedure:

#	Action	Result
1	Using the DMI MSb#1 deregisters from the CT2 number registered in the HPLMN.	MSb#1 is de-registered and receives a confirmation message. MSb #1 is still registered for the VPLMN CT2 number.

RINF_FA_11 Forced Deregistration

Purpose:

Verify that a MS can perform a forded deregistration procedure and the network informs the mobile which has been deregistered.

Initial conditions:

Subscriber A is provisioned to the FA service.

Subscriber A is registered to FN_A

Subscriber B is not registered to a Functional Number

Test Procedure:

ACTION	RESULT
1) Subscriber B initiates a forced deregistration notification procedure.	1) Procedure completes successfully and Mobile of Subscriber B is registered to the FN previously held by Subscriber A.
2) Mobile Station of Subscriber A is notified of the forced deregistration and performs an interrogation procedure.	2) After the interrogation procedure the MS informs the user that the status of the FN has changed (i.e. starts to let the FN blink on the screen).

RINF_FA_12 Class of Registration (CoR) for CT2 FC01 not allowed, CT2 FC10 allowed

Purpose:

Verify that a subscriber, MS A#1 can be restricted from registration of defined functional numbers.

Initial Conditions:

Class of Registration (CoR) is set with CT2 FC01 not allowed, CT2 FC10 allowed for MS A#1 in the HLR of PLMN, i.e.

* MS A#1 has no permission to register to CT2 number with function code 01
* MS A#1 has permission to register to CT2 number with function code 10

MS A#1 is not registered to any CT2 number
MS A#1 is located in its Home PLMN A

Test Procedure:

ACTION	RESULT
1) MS A#1tries to register with a functional CT2number with FC=01 (CT2 FC01) in PLMN B.	1) MS A#1 is not allowed to register to CT2 FC01 and receives an error message.
2) MS A#1 tries to register with a functional CT2 number with FC=10 (CT2 FC 10) in PLMN B.	2) MS A#1 is successfully registered to CT2 FC10 and receives a confirmation message.

RINF_FA_13 Register 3 functional numbers to one user (non-roaming case)

Purpose:

Verify the registration of 3 Functional Numbers (FN) to one and the same user.

Initial Conditions:

Subscriber MS_A#1 is located in its Home PLMN A. MS_A#1 is not registered to any FN. All FN to register are unregistered.

Test procedure

ACTION	RESULT
1) MS_A1 registers a FN_1, CT3, FC01 by sending an USSD string "**214*<IC_A+FN_1>***#".	1) The USSD outcome code "01" which means "FollowMe activated" is displayed on MS A1. Alternatively MS converts the outcome code in an appropriate text message.
2) MS_A1 registers a FN_2, CT2, FC01 by sending an USSD string "**214*<IC_A+FN_2>***#".	2) The USSD outcome code "01" which means "Follow Me activated" is displayed on MS_A1. Alternatively MS converts the outcome code in an appropriate text message.
3) MS_A1 registers a FN_3, CT2, FC08 by sending an USSD string "**214*<IC_A+FN_3>***#".	3) The USSD outcome code "01" which means "Follow Me activated" is displayed on MS_A1. Alternatively MS converts the outcome code in an appropriate text message. 4) MS_A#1 is registered to 3 FN.

RINF_FA_14   Registration of an FN fails - remote party already registered

Purpose:

Verify that a MS cannot register to a FN which is already registered.

Initial conditions:

Subscriber A is provisioned to the FA service.

Subscriber B is registered to FN_A

Subscriber A is not registered to a Functional Number

Test Procedure:

ACTION	RESULT
1) Subscriber A initiates a registration to FN_A.	1) The request fails and the FN is neither activated nor displayed on the mobile.
2) Verify OMs Verify ERs Verify the system for possible error logs.	2) The correct OMs, ERs have been generated. No error logs have been generated.

RINF_FA_15 FA Call - Successful Call

Purpose:

Verify a successful basic FA scenario

Initial conditions:

Select any FN_A and FN_B available in the Network

Network restrictions are set to allow calls between FN_A and FN_B (e.g. Access Matrix)

Subscriber A is registered to FN_A

Subscriber B is registered to FN_B

Test Procedure:

Action	Result
1) Subscriber A dials FN_B.	1) The call is established between Subscriber A and Subscriber B.
2) Check the number, which is displayed at Subscriber A.	2) FN_B is displayed in the display of Subscriber A.
3) Check the number, which is displayed at Subscriber B.	3) FN_A is displayed in the display of Subscriber B.
4) Verify OMs Verify ERs Verify the system for possible error logs and alarms. Verify subaddressing information.	4) The correct OMs, ERs have been generated. No error logs have been generated. Subaddressing information is correct.

7.4 Location Dependent Addressing (LDA)

RINF_LDA_1 Successful LDA Call - Verify the cell format is correct

Purpose:

Verify Short Code call is setup correctly and the format of the COO is transferred correctly.

Initial conditions:

Subscriber A is located in cell #1.

The MSISDN of Subscriber B is assigned to Short Code 1200 for calls originated in cell #1

The MSISDN of Subscriber C is assigned to Short Code 1300 for calls originated in cell #1

Test Procedure:

ACTION	RESULT
1) Subscriber A dials the 'Short Code' 1200 and 1300.	1) The call with short code 1200 is connected to Subscriber B. The call with short code 1300 is connected to Subscriber C.
2) Verify OMs Verify ERs Verify the cell format is correct.	2) The correct OMs, ERs have been generated. No error logs have been generated.

RINF_LDA_2 Unsuccessful LDA Call-Call to invalid Short Code

Purpose:

Verify Short Code call with unknown Short Code is released.

Initial conditions:

Subscriber A is located in cell #1.

1299 is a not valid SC number.

Test Procedure:

ACTION	RESULT
1) Subscriber A dials the 'Short Code' 1299.	1) The call is released.
2) Verify OMs Verify ERs Verify the system for possible error logs and alarms.	2) The correct OMs, ERs have been generated. No error logs have been generated.

7.5 Enhanced Multi-Level Precedence and Pre-emption Service (eMLPP)

RINF_eMLPP_1 MS in VGCS call on DCH, pre-emption on Air IF by higher prio PtP call

Test Purpose:

Verify preemption of the Air-Interface channel of MS in VGCS call on DCH by higher prio PtP call

Pre-requisites:
- 1 NSS Provider's MSC/HLR, 2 BSS Provider's for BTS (BTS1 and BTS2)

- 5 GSM-R mobiles (MS-A, MS-B, MS-C, MS-D, MS-E) with standard features. MS-A, MS-B and MS-E have the GID activated.
- MS-A, MS-B, MS-C and MS-D are in BTS1-Cell
- MS-E is on BTS-2 Cell

- All but 2 TCH are locked on BTS1
- All cells are in same GCA

Test Procedure:

ACTION	RESULT
1) Serv. Subs. MS-A establishes a prio 3 VGCS in cell A. MS-B and MS-E joins the VGCS call. MS-A keeps the Uplink on dedicated channel.	1) A prio 3 VGCS call is established and MS A has the Uplink of the DCH.
2) From the same Cell A originate prio 2 PtP call between (MS-C <-> MS-D).	2) The origination of the prio 2 PtP call causes Air-Interface pre-emption upon the resource being used by VGCS call in cell A. -The DCH and GCH are released. - A prio 2 PtP call (MS-C<-> MS-D) is established. - Verify correct prio 2 is seen in the CALL PROCEEDING message from the BSS. - Group call is still on air in Cell B.

RINF_eMLPP_2   MS in VBS call as listener, pre-emption on Air IF by higher prio VBS call

Test Purpose:

Serv. Subs. in a VBS call as a listener can be preempted from the VBS call on Air IF by a higher prio VBS call. However, the VBS call stays up.

Pre-requisites:
- 4 GSM-R mobiles with standard features.
- 2 cell (Cell-A and Cell-B)
- 1 BSS Provider's BSC
- 1 MSC
- 2 mobiles MS-A, MS –B in BSC1/BTS1/Cell-A
- 2 mobiles MS-C, MS-D in BSC1/BTS2/Cell-B
- All but 2 TCH on the Air IF to Cell-B are locked
- All Cells are in same GCA
- MS-A, MS-B, MS-C subscribe to GID1, but not GID2
- MS-D subscribe to GID2 and not to GID1

Test Procedure:

ACTION	RESULT
1) MS-A originates a prio 4 VBS call (Cell A and B). MS-B, MS-C join the VBS call.	1) VBS call is established.
2) MS-D originates a prio 2 VBS (Cell B only).	2) MS-C is pre-empted of the prio 4 VBS call. But MS-A and MS-B remain on call.
3) MS-D closes the prio 2 VBS call.	3) VBS call is released properly.
4) MS-A closes the prio 4 VBS call.	4) VBS call is released properly.

RINF_eMLPP_3   MS in VGCS call having the UL of the GCH, pre-emption on Air IF by higher prio VBS call.

Test Purpose:

Verify preemption of MS in VGCS call in (Group Mode) by higher prio VBS call

Pre-requisites:
- 1 NSS Provider's MSC/HLR, 1 BSS Provider's BSC, 1 BSS Provider's BTS
- 5 GSM-R mobiles (MS-A, MS-B, MS-C, MS-D, MS-E) with standard features. MS-A and MS-B have the Broadcast GID activated. MS-E is in a different cell than the other MSs.
- All but 2 TCHs are blocked in the Air IF
- 2 BSS Provider's BTS (BTS1, BTS2)
- All but 2 TCH are locked on BTS1
- MS-A, MS-B, MS-C, MS-D are in BTS1-Cell
- MS-E is on BTS2-Cell
- all Cells are in the same GCA
- GID1 (VGCS) is only activated on MS-A, MS-B, MS-E
- GID2 (VBS) is only activated on MS-C, MS-D

Test Procedure:

ACTION	RESULT
1) Serv. Subs. MS-A establishes a prio 3 VGCS MS-B and MS-E join the VGCS call. MS-A takes the Uplink on group channel.	1) A prio 3 VGCS call is established and MS A has the Uplink of the Group Call Channel.
2) From the same Cell originate prio 2 VBS call from MS-C.	2) MS-A and MS-B are pre-empted. A prio 2 VBS call is established. - Verify correct prio 2 is seen in the CALL PROCEEDING message from the BSS.
3) MS-E grabs the GCH UL.	3) MS-E is granted the UL.
4) MS C ends the prio 2 VBS call.	4) VBS call is ended and all resource are freed.

RINF_eMLPP_4 MS in PtP call, pre-emption on A IF by higher prio VGCS call (REC)

Test Purpose:

Verify preemption of an A-Interface SCCP connection with a PtP call due to activation of a REC group call channel.

Pre-requisites:
- 1 MSC/HLR, 2 BSC, 2 BTS, 2 Cells
- The 2 BSC/BTS/Cells will be labeled BSC/BTS/Cell-A and BSC/BTS/Cell-B.
- 4 GSM-R mobiles (MS-A, MS-C, MS-D, MS-E) with standard features.
- MS-A and MS-B are on BSC/BTS/Cell-A.
- MS-C and MS-D are on BSC/BTS/Cell-B.
- All but 2 TCH on the A IF to Cell-A are locked
- All Cells are in same GCA
- All MS subscribe to REC

Test Procedure:

ACTION	RESULT
1) MS-A calls (p4 – PTP) MS-D.	1) A prio 4 PtP call (MS-A <-> MS-D) is established. Correct prio 4 is seen in the outgoing CALL PROCEEDING message from the BSS.
2) MS-B establishes a REC.	2) MS-A and MS-C are automatically pre-empted. The REC is established and MS-A, MS-C and MS-D join.
3) MS-B closes the REC.	3) REC call is released correctly.

RINF_eMLPP_5   MS in VBS call as originator, pre-emption on Air IF by higher prio VGCS call (REC)

Test Purpose:

Verify preemption on the Air-Interface of MS in VBS call as originator due to a

VGCS (REC) call setup.

Pre-requisites:
- 1 MSC/HLR, 1 BSC, 2 BTS
- The 2 BTS will be labelled BTS-A and BTS-B.
- 4 GSM-R mobiles (MS-A, MS-B, MS-C, MS-D) with standard features.
- MS-A, MS-B, and MS-C are on BTS-A.
- MS-D is on BTS-B.
- MS-A and MS-D are subscribed to the VBS call
- All but 2 Air IF timeslots to Cell-A and Cell-B are locked
- Cells are Cell-A and Cell-B

All Cells are in same GCA

Test Procedure:

ACTION	RESULT
1) MS-A establishes a prio 2 VBS call.	1) A prio 2 VBS call (MS-D <-> MS-A) is established. MS-D joins as listener. - Verify correct prio 2 is seen in the NOTIFICATION message from the BSS.
2) MS-B establishes a REC.	2) MS-A and MS-D are automatically pre-empted. The VBS call is released. The REC is established and MS-A, MS-C and MS-D join.
3) MS-B closes the REC.	3) REC call is released correctly.

RINF_eMLPP_6   MS in VGCS call having the UL of the GCH, pre-emption on MS by higher prio VGCS call (REC)

Test Purpose:

Verify preemption of a VGCS call with subsequent talker due to another higher priority VGCS call (REC)

Pre-requisites:

· 1 MSC/HLR, 1 BSC, 1 BTS

· 3 GSM-R mobiles (MS-A, MS-B, MS-C) with standard features.

· MS-A, MS-B − are subscribed to the VGCS call. MS −A is not subscribed to REC call

Test Procedure:

ACTION	RESULT
1) Serv. Subs. MS-A establishes a prio 4 VGCS call on GID-1. MS-B accepts the call.	1) A prio 4 VGCS call (MS-A <-> MS-B) is established. - Verify correct prio 4 is seen in the NOTIFICATION message from the BSS.
2) MS-B grabs the GCH UL.	2) The GCH UL is granted to MS-B.
3) Serv. Subs. MS-C establishes a VGCS call (REC).	3) MS-B is leaving the VGCS call and join the REC call.
4) MS A grabs the uplink.	4) Uplink is granted.
5) MS A releases uplink.	5) Uplink is released.
6) MS-C closes the REC.	6) The REC is taken down. MS-B is re-notified of the VGCS call.
7) MS B takes the UL.	7) The GCH UL is granted to MS-B.
8) MS B releases uplink.	8) Uplink is released.
9) MS-A takes down the VGCS call.	9) The VGCS call is released and all resources are freed.

RINF_eMLPP_7 MS in data call, pre-emption on Air IF by higher prio VGCS call (REC)

Test Purpose:

Verify that a PTP- Data Call (scenario 1: Protocol = transparent, Speed = 9600, scenario 2: Protocol = transparent, Speed = 2400) preempted on Air interface by high Priority VGCS call (REC)

Pre-requisites:
- 2 GSM-R mobiles (MS-A, MS-B,) with standard features, 2 mobiles for data call (MS-C, MS–D)
- 1 cell
- 1 BSC
- 1 MSC
- Lock all but 2 Air IF timeslots

Test Procedure:

ACTION	RESULT
1) MS-C establishes a prio 3 - Data Call to MS-D.	1) A prio 3 DataCall (MS-C <-> MS-D) is established. - Verify correct prio 3 in the PAGING message, transparent service and Data Rate 9.6 Kbits/s are seen in the Assignment Request Message from the BSS.
2) MS-A establishes a REC call.	2) The origination of the REC causes Air Interface preemption upon the resources being used by the prio 3 -Data Call. - Data call is released.
3) MS-A closes the REC.	3) REC is ends and all resource are free.

RINF_eMLPP_8   MS in PtP call, pre-emption on Air IF by higher prio data call (4800 baud, transparent)

Test Purpose:

Verify pre-emption MS in PtP call on Air IF by higher prio data call (4800 baud, transparent)

Pre-requisites:
- 4 GSM-R mobiles (MS-A, MS-B, MS-C, MS–D) with standard features.
- MS-A and MS B for PtP call
- MS-C and MS-D for data call (4800 baud, transparent)
- 1 cell
- 1 BSC
- 1 MSC
- Lock all but 2 Air IF timeslots

Test Procedure:

ACTION	RESULT
1) MS A establishes a priority 2 PtP call to MS –B.	1) MS B answers the call.
2) MS C makes prio 0 data call to MS D.	2) The origination of the prio 0 data call causes Air Interface preemption upon the resources being used by the prio 2 PTP - PtP voice call is released.
3) MS C releases the data call.	3) The call is released properly.

RINF_eMLPP_9 eMLPP prio is preserved during CFU (Call Forwarding Unconditional)

Test Purpose:

When an eMLPP subscriber with CFU feature receives a call, verify the priority is preserved when the call is forwarded unconditionally.

Pre-requisites:
- 1 MSC/HLR, 1 BSC, 1 BTS
- 3 GSM-R Terminals (MS-A, MS-B, MS-C) with standard features
- MS-B has CFU feature with the call being forwarded to MS-C

Test Procedure:

ACTION	RESULT
1) MS-A calls (p2 – PTP) MS-B.	1) - MS-B remains idle since the call is forwarded to MS-C. - MS-C is alerting.
2) MS-C answers the call.	2) - A prio 2 PtP call (MS-A <-> MS-C) is established. - Verify the correct prio 2 is seen in the outgoing CALL PROCEEDING message from the BSS to MS-C.
3) MS-A drops the prio 2 PtP call.	3) The PtP call call ends. The CDR contains the correct eMLPP information.

RINF_eMLPP_10 eMLPP prio is preserved during CFB (Call Forwarding Busy)

Test Purpose:

When an eMLPP subscriber with CFB feature is in a call and receives another call, verify the priority is preserved when the call is forwarded.

Pre-requisites:
- 1 MSC/HLR, 1 BSC, 1 BTS
- 3 GSM-R Terminals (MS-A, MS-B, MS-C, MS-D) with standard features
- MS-B has no CW, CFB is provisioned with calls being forwarded to MS-C

Test Procedure:

ACTION	RESULT
1) MS-D calls (p4 – PTP) to MS-B.	1) - PtP call (MS-D <-> MS-B) is established.
2) MS-A calls (prio 3 – PtP) MS-B.	2) MS-B being busy and forwards the call to MS-C MS-C is alerting. A prio 3 PtP call (MS-A <-> MS-C) is established. - The call between MS-D and MS-B remains connected. - Verify the correct prio 3 is seen in the outgoing. PAGING message from the BSS to MS-C.
3) MS-C answers the call.	3) The PtP call is established.
4) MS-A drops the PtP call.	4) The PtP call between MS-A and MS-C ends. The CDR contains the correct eMLPP information.
5) MS-D closes the PtP call with MS-B.	5) The PtP call between MS-D and MS-B ends.

7.6   Voice Group Call Service (VGCS)

RINF_VGCS_1 SS originates VGCS Call

Test Purpose:

Verify that a Service Subscriber is able to originate a VGCS call.

Pre-requisites:

- 2 GSM-R subscribers (MS A, MS B) with standard options, data fill and routing
- MS-A and MS-B are SS of the VGCS, they are located in the GCA in 2 different cells.
- 2 cells on BSS Provider's BSS on 1 BSC
- 1 MSC in   NSS Provider's NSS

Test Procedure:

ACTION	RESULT
1) MS A originates a VGCS call as a service subscriber.	1) - Origination is successful, DCH and GCH allocated in cell of originator, GCH allocated in cell of terminator. - MS B is notified of the VGCS call. - MS A has two way voice path until the dedicated channel is released.
2) MS B joins the VGCS call.	2) - MS B is able to join the VGCS call. - MS B is in listening mode all the time.
3) MS A closes the call.	3) The VGCS call is released properly and all resources are deallocated correctly.

RINF_VGCS_2   MS Dispatcher originates VGCS call and takes it down with the Kill Sequence

Test Purpose:

Verify that MS dispatcher can originate the VGCS call and end the call by pressing the kill Sequence.

Pre-requisites:
- 2 GSM-R subscribers (MS A, MS B) with standard options, data fill and routing
- MS-A is a dispatcher that is allowed to originate the VGCS call. MS-B is SS of the VGCS call, MS-B is located in the GCA.
- 2 cells in BSS Provider's BSS on 1 BSC
- 1 MSC in NSS Provider's NSS

Test Procedure:

ACTION	RESULT
1) MS A originates Voice Group call as a dispatcher by dialing 50 + < GCA > + <GID>.	1) - Origination is successful, DCH allocated in cell of originator, GCH allocated in cell of terminator. The DCH of the MS Dispatcher stays allocated for the duration of the call. - MS A has two way voice path during the whole duration of the call. - MS B is notified of the VGCS call.
2) MS B joins the VGCS call.	2) - MS B is able to join the VGCS call. - MS B is in listening mode.
3) MS B takes the Uplink.	3) MS B has two-way voice path.
4) MS A closes the call by entering the killing sequence.	4) The VGCS call is released properly and all resources are deallocated correctly.

RINF_VGCS_3 SS originates VGCS call, leaves, rejoins and ends it.

Test Purpose:

Verify SS can originate VGCS call, later leave the group call and rejoin.

Pre-requisites:
- 2 GSM-R subscribers (MS A, MS B) with standard options, data fill and routing
- MS A and MS B are SS of the VGCS, they are located in the GCA in 2 different cells.
- 2 cells on BSS Provider's BSS on 1BSC
- 1 MSC in NSS Provider's NSS

Test Procedure:

ACTION	RESULT
1) MS A originates VGCS call as a service subscriber.	1) • Origination is successful, DCH and GCH allocated in cell of originator, GCH allocated in cell of terminator. • MS B is notified of the VGCS call. • MS A has two way voice path until the dedicated channel is released.
2) MS B joins the VGCS call.	2) MS B is able to join and is in listening mode all the time.
3) MS A leaves the group call.	3) The VGCS call stays up.
4) MS A rejoins the group call.	4) MS A is in listening mode in the VGCS call.
5) MS A takes the Uplink.	5) MS A has two way voice path after obtaining the GCH UL.
6) MS A closes the group call.	6) The VGCS call is released properly and all resources are de-allocated correctly.

RINF_VGCS_4 SS enters into VGCS broadcast area with ongoing VGCS call and is notified of it

Test Purpose:

Verify Mobiles which enter the group call area after the call has been established shall get notification.

Pre-requisites:
- 2 GSM-R subscribers (MS A, MS B) with standard options, data fill and routing
- MS-A is a dispatcher that is allowed to originate the VGCS, MS-A is located outside of the GCA. MS-B is SS of the VGCS, MS-B is located outside the GCA.
- 2 cells on BSS Provider's BSS, one on each of 2 BSCs 1 MSC in NSS Provider's NSS

Test Procedure:

ACTION	RESULT
1) Establish voice group call from MS A as Dispatcher by dialing 5+0+<SA>+<GID>.	1) - Origination is successful, DCH allocated in cell of originator, GCH allocated in cell of terminator. The DCH of the MS Dispatcher stays allocated for the duration of the call. - MS B is so far not notified of the VGCS call - MS A has two way voice path during the whole duration of the call.
2) MS B moves into the GCA, where the VGCS call is ongoing.	2) MS B is notified of the ongoing VGCS call.
3) MS B joins the VGCS call.	3) - MS B is able to join the VGCS call. - MS B is in listening mode.
4) MS B takes the Uplink.	4) MS B has two-way voice path.
5) MS A closes the VGCS call by dialing the killing sequence.	5) The VGCS call is released properly and all resources are deallocated correctly.

RINF_VGCS_5 MS Dispatcher joins ongoing VGCS call

Test Purpose:

Verify MS dispatcher is able to join ongoing VGCS (only) when he is entitled to.

Pre-requisites:
- 1 MS dispatcher MS A that is entitled to originate and to kill the VGCS call, located outside the GCA
- 1 MS dispatcher MS B that is not entitled to originate the VGCS call, located outside the GCA
- 1service subscribers: MS C, located in the GCA
- 2 cells in BSS Provider's BSS on 1 BSC
- 1 MSC in NSS Provider's NSS
- MS A is configured as an originating dispatcher and is allowed to terminate (kill-sequence) the VGCS.
- MS B is configured as an terminating dispatcher only

Test Procedure:

ACTION	RESULT
1) Establish voice group call from MS C as SS.	1) Origination is successful, DCH allocated in cell of originator, GCH allocated in cell of terminator. MS C is in listening mode after losing the UL on the DCH.
2) MS A joins the VGCS call by dialing 5+0+<SA>+<GID>.	2) MS A is able to join VGCS call and has two way voice path during the whole duration of the call.
3) MS B tries to join the VGCS call by dialing 5+0+<SA>+<GID>.	3) VGCS origination/joining of MS B is rejected by the NSS.
4) MS A closes the call by dialing the killing sequence.	4) VGCS calls get released properly. All resources are free.

RINF_VGCS_6 Parallel group calls are possible to the same cell

Test Purpose:

Verify whether it is possible to have parallel VGCS calls in the same cell.

Pre-requisites:
- 2 service subscribers with GID A: MS A, MS B
- 2 service subscribers with GID B: MS D, MS E
- 1 BSS Provider's cell
- 1 BSC
- 1 MSC

Test Procedure:

ACTION	RESULT
1) MS A originates VGCS call to GID A. MS B takes call.	1) VGCS call is established between MS A and MS B.VGCS call up.
2) MS A request the DCH UL.	2) MS A has two way voice path, MS B is in listening mode.
3) MS D originates VGCS call to GID B. MS E takes call.	3) VGCS call is established between MS D and MS E.VGCS call up.
4) MS E request the GCH UL.	4) MS E has two way voice path, MS D is in listening mode.
5) MS A releases UL and MS B requests the GCH UL.	5) MS B have speech path to MS A.
6) MS A and MS D close the VGCS calls.	6) Both VGCS calls get released properly. All resources are idle.

RINF_VGCS_7   GID delivered correctly to terminating SS in SS originated VGCS call

Test Purpose:

Verify correct GID is shown on the display of the terminating SS.

Pre-requisites:
- 2 service subscribers: MS A, MS B activated for GID<xxx> with standard options, datafill and routing
- 1 cell
- 1 BSC
- 1 MSC

Test Procedure:

ACTION	RESULT
1) MS A originates VGCS call with GIDxxx as a service subscriber.	1) MS B is paged for the call and on its display GID<xxx> is displayed correctly.
2) MS B answers the call.	2)
3) MS A closes the call.	3) VGCS calls is released and all resources are deallocated.

7.7 Voice Broadcast Service (VBS)

RINF_VBS_1 Service Subscriber originates Voice Broadcast (VBS) Call

Test Purpose:

Verify SS can originates Voice Broadcast (VBS) Call

Pre-requisites:
- 2 GSM-R mobiles with standard options, datafill and routing , (MS A present in BSS Provider's BSS and MS B present in NSS Provider's BSS)
- 2 cell (Cell-A present in BSS Provider's BSS and Cell-B present in NSS Provider's BSS)
- 2 BSC (BSC-A present in BSS Provider's BSS and BSC- B present in NSS Provider's BSS)
- 1 MSC in NSS Provider's NSS

Test Procedure:

ACTION	RESULT
1) MS A originates prio 2 Voice broadcast call as a service subscriber.	1) • Origination is successful, DCH and GCH allocated in cell of originator, GCH allocated in cell of terminator. • The DCH UL stays allocated during the duration of the VBS call. • MS B is notified of the VBS call.
2) MS B joins the call.	2) MS A has two way voice path while MS B is in listening mode.
3) MS A closes the call.	3) VBS calls is released and all resources are deallocated.

RINF_VBS_2 SS originates prio0 VBS call

Test Purpose:

Verify SS can originates prio0 Voice Broadcast (VBS) Call

Pre-requisites:
- 2 GSM-R mobiles with standard options, datafill and routing , (MS-A present in Cell-A and MS-B in Cell-B)
- 2 cell (Cell-A and Cell-B present in BSS Provider's BSS)
- 1 BSC (BSS Provider's BSC)
- 1 MSC in NSS Provider's NSS

Test Procedure:

ACTION	RESULT
1) MS A originates prio 0 Voice broadcast call as a service subscriber	1) - Origination is successful, DCH and GCH allocated in cell of originator, GCH allocated in cell of terminator. - MS B is notified of the VBS call
2) MS B joins the call	2) MS A has two way voice path while MS B is in listening mode
3) MS A closes the call	3) VBS calls is released and all resources are deallocated

RINF_VBS_3 MS Dispatcher originates VBS call and takes down the call by disconnecting

Test Purpose:

Mobile Subscriber as dispatcher can Originates VBS call and terminate the call by disconnecting from the call.

Pre-requisites:
- 2 GSM-R mobiles (MS A present in BSS Provider's BSS and MS B present in NSS Provider's BSS) with standard options, datafill and routing
- 2 cell (Cell-A present in BSS Provider's BSS and Cell-B present in NSS Provider's BSS)
- 2 BSC (BSC-A present in BSS Provider's BSS and BSC B present in NSS Provider's BSS)
- 1 MSC in NSS Provider's NSS

Test Procedure:

ACTION	RESULT
1) MS A originates voice broadcast call as a dispatcher (<51>+<GCA>+<GID>)	1) - Origination is successful, DCH allocated in cell of originator, GCH allocated in cell of terminator. - MS B is notified of the VBS call
2) MS B joins the call	2) MS A has two way voice path while MS B is in listening mode
3) MS A closes the call	3) VBS calls is released and all resources are deallocated

RINF_VBS_4 MS Dispatcher originates VBS call and takes down call with the kill sequence

Test Purpose:

Mobile Subscriber as dispatcher can Originates VBS call and terminate the call with the killing Sequence

Pre-requisites:
- 2 GSM-R mobiles (MS A present in BSS Provider's BSS and MS B present in NSS Provider's BSS) with standard options, datafill and routing
- 2 cell (Cell-A present in BSS Provider's BSS and Cell-B present in NSS Provider's BSS)
- 2 BSC (BSC-A present in BSS Provider's BSS and BSC B present in NSS Provider's BSS)
- 1 MSC in NSS Provider's NSS

Test Procedure:

ACTION	RESULT
1) MS A originates voice broadcast call as a dispatcher	1) • Origination is successful, DCH allocated in cell of originator, GCH allocated in cell of terminator. • MS B is notified of the VBS call
2) MS B joins the call	2) MS A has two way voice path while MS B is in listening mode
3) MS A closes the call by sending the kill sequence	3) VBS call is released and all resources are deallocated.

RINF_VBS_5 MS Dispatcher joins ongoing VBS call

Test Purpose:

Verify VBS MS Dispatcher can join the ongoing VBS call.

Pre-requisites:
- 2 GSM-R mobiles with standard options, datafill and routing , (MS'A present in BSS Provider's BSS and MS B present in NSS Provider's BSS)
- 1 mobile dispatcher: DISP C (present in BSS Provider's BSS)
- **Mobile Dispatcher is configured as an originating dispatcher for the VBS**
- 2 cell (Cell-A present in BSS Provider's BSS and Cell-B present in NSS Provider's BSS)
- 2 BSC (BSC-A present in BSS Provider's BSS and BSC B present in NSS Provider's BSS)
- 1 MSC in NSS Provider's NSS

Test Procedure:

ACTION	RESULT
1) MS A originates Voice broadcast call as a service subscriber	1) • Origination is successful, DCH and GCH allocated in cell of originator, GCH allocated in cell of terminator. • MS B is notified of the VBS call
2) MS B joins the call	2) MS A has two way voice path while MS B is in listening mode
3) MS DISP C joins ongoing VBS call by dialing 51+<GCA>+<GID>	3) MS DISP C joins ongoing VBS and is in the listening mode
4) MS A closes the call	4) VBS calls is released and all resources are deallocated

RINF_VBS_6   **SS enters into VBS broadcast area with ongoing VBS call
and is notified of it, SS joins the VBS call**

Test Purpose:

Verify Mobile Subscriber is paged/notified about the ongoing VBS call when enters in to the broadcast call area.

Pre-requisites:
- 3 GSM-R mobiles (MS A and MS C present in BSS Provider's BSS and MS B present in NSS Provider's BSS) with standard options, datafill and routing
- 2 cell (Cell-A present in BSS Provider's BSS and Cell-B present in NSS Provider's BSS)
- 2 BSC (BSC A present in BSS Provider's BSS and BSC B present in NSS Provider's BSS)
- 1 MSC in NSS Provider's NSS

Test Procedure:

ACTION	RESULT
1) MS A originates Voice broadcast call as a service subscriber	1) • Origination is successful, DCH and GCH allocated in cell of originator, GCH allocated in cell of terminator. • MS B is notified of the VBS call
2) Turn on MS C. MS C join ongoing VBS call.	2) MS C perform LOCATION_UPDATE and receive notifications on ongoing VBS calls. VBS call up, MS A is able to talk, MS B and MS C are in listening mode.
3) MS A close the call	3) The call gets released properly. VBS resources are free.

7.8 Railway Emergency Call (REC)

RINF_REC_1 SS originates a REC

Test Purpose:

Verify SS can originate Railway Emergency Call.

Pre-requisites:
- 1 cell (BSS Provider's BSS)
- 1 BSC (BSS Provider's BSS)
- 1 MSC in NSS Provider's NSS
- 3 GSM-R mobiles (MS A, MS B and MS C) with standard options, datafill and routing

Test Procedure:

ACTION	RESULT
1) MS A originates emergency call as service subscriber and releases the UL on the DCH	1) • Origination is successful, DCH and GCH allocated in cell of originator, GCH allocated in cell of terminator. • MS B and MS C is notified of the REC call • MS B and MS C join the call automatically. • MS A has two way voice path until the dedicated channel is released
2) MS A request the uplink on GCH	2) MS A has speech path, MS B and MS C are in listening mode.
3) MS A release the call	3) The call gets released properly.
4) Check the signaling msg's.	4) Immediate SETUP is used by MS A (configured on the SIM) ISETUP (= Immediate Setup (BCC/GCC) is used by MS A

RINF_REC_2   Subscriber initiated REC (no talker change, normal clear down of call)

Purpose

MSa #1 initiates a REC, MSa #2, MSb #1, MSb #2 and the Dispatchers A and B join. MSa #1 releases the call.

Setup

PLMN A	PLMN B
Anchor	Relay
Dispatcher A	Dispatcher B
MSa #1/2	
MSb #1/2	

−   All subscribers are members of the REC group and are in the correct area.

Test Procedure:

#	ACTION	RESULT
1	MSa #1 initiates a REC	Call is offered to all subscribers. They auto connect.
2	MSa #1 releases the call.	The call is cleared down.
3	Verify that acknowledgements are send and received.	Records are sent from the Mobiles

RINF_REC_3 SS accepts an incoming REC

Test Purpose:

Verify SS can accept an incoming REC

Pre-requisites:
- 3 GSM-R subscribers (MS A, MS B and MS C) with standard options, data fill and routing
- MS A ,MS B and MS C are SS of the REC call, they are located in the GCA in 2 different cells(MS A in Cell A and MS B ,MS C in Cell-B)
- 2 cells on BSS Provider's BSS, one on each of 2 BSCs Voice Inactivity timer is set long enough in order to execute steps 1-4 before the timer expires.

Test Procedure:

ACTION	RESULT
1) MS A originates emergency call as service subscriber	1) • Origination is successful, DCH and GCH allocated in cell of originator, GCH allocated in cell of terminator. • MS B is notified of the REC call • MS B join the call automatically. • MS A has two way voice path until the dedicated channel is released
2) MS C moves into the GCA, where the REC call is ongoing	2) MS C is notified of the ongoing REC call
3) MS C joins the REC call	3) • MS C is able to join the VGCS call. • MS C is in listening mode
4) MS C takes the Uplink	4) MS C has two-way voice path
5) MS C releases the uplink	5) Uplink is released
6) MS A closes the REC call	6) The REC call is released properly and all resources are deallocated correctly

RINF_REC_4 MS Dispatcher originates a REC

Test Purpose:

Verify that MS dispatcher can originate the **Railway Emergency Call** and end the call by pressing the kill Sequence.

Pre-requisites:
- 2 GSM-R subscribers (MS A, MS B) with standard options, data fill and routing
- MS A is a dispatcher that is allowed to originate the VGCS call, MS A is located outside of the GCA. MS B is SS of the VGCS call, MS B is located in the GCA.
- 2 cells on BSS Provider's BSS, one on each of 2 BSCs 1 MSC in NSS Provider's NSS

Test Procedure:

ACTION	RESULT
1) MS A originates Voice Group call as a dispatcher by dialing 50 + < GCA > + <GID>	1) - Origination is successful, DCH allocated in cell of originator, GCH allocated in cell of terminator. The DCH of the MS Dispatcher stays allocated for the duration of the call. - MS A has two way voice path during the whole duration of the call - MS B is notified of the Railway Emergency call
2) MS B joins the Railway Emergency Call	2) - MS B is able to join the call - MS B is in listening mode
3) MS B takes the Uplink	3) MS B has two-way voice path
4) MS A closes the call by entering the killing sequence.	4) The REC is released properly and all resources are deallocated correctly

RINF_REC_5 SS originates Acknowledgement Call

Test Purpose:

This test case is to verify if the Acknowledgement Call setup and the release complete message is generated after an emergency call and that the content is correct.

Pre-requisites:
- 1 cell (BSS Supplier)
- 1 BSC (BSS Supplier)
- 1 MSC in NSS (NSS Supplier)
- 3 service subscribers: MS A, MS B, MS C
- A and A-bis monitoring links set up

Test Procedure:

ACTION	RESULT
1) MS A originates emergency call as service subscriber	1) • Origination is successful, DCH and GCH allocated in cell of originator, GCH allocated in cell of terminator. • MS B and MS C is notified of the REC call • MS B and MS C join the call automatically. • MS A has two way voice path until the dedicated channel is released
2) MS A request the uplink on GCH	2) MS A has speech path, MS B and MS C are in listening mode.
3) MS A releases the Uplink. MS A release the call	3) MS A isn't able to talk. The call gets released properly.
4) Acknowledgement calls are automatically initiated by all mobiles	4) Acknowledgement calls are successful
5) Verify the content of the USS1 information element of the RELEASE COMPLETE message.	5) Verify User to User info: Protocol discriminator = 00000000; originator tag; listener tag; T_DUR; T_REL; priority level 0 =01, termination cause = 000; GCRef.

RINF_REC_6 REC in a GCA with a locked cell

Test Purpose:

Verify that a Railway Emergency Call can be established, even if not all cells in the GCA are active. The call should be established after the Timer Txx has expired.

→In case of a dispatcher originated Railway Emergency Call, the call is successful if it was established in any cell.

→ In case of a service subscriber originated REC, the call is successful, if it was established at least in the Cell Of Origin

Pre-requisites:
- 2 NSS Provider's cell
- GCA with all available cells
- 2 SS MSA , MS B and mobile dispatcher DISP A at least in COO
- Second cell locked
- 1 MSC in Provider's NSS

Test Procedure:

ACTION	RESULT
1) Lock a cell	1) One of the cells inside of GCA is locked.
2)DISP A dials 50+<GCAREA>+<Emergency GID>

The call is accepted by the participants

DISP A release the call by sending the disconnect sequence "***" | 2) Call is established to all cells in service

DISP A has two-way voice path. The remaining participants are in listening mode.

The REC call gets terminated. All resources are idle.. |
| 3) MS A originates a REC call.

The call is accepted by the participants

MS A release the VGCS call. | 3) Call is established to all cells in service

The REC call gets terminated. All resources are idle..

REC establishment is possible, when one or more of the cells belonging to the GCA are locked. |

7.9 Originator to Dispatcher Information (OTDI)

RINF_OTDI_1 SS originates VGCS call, terminating MS dispatcher receives the OTDI

Test Purpose:
Verify that the terminating dispatcher receives the OTDI from the originating SS

Pre-requisites:
- 1 cell (BSS Provider's BSS)
- 1 SS (Registered to a Functional Number)
- 1 MSC in NSS Provider's NSS
- 5 terminating dispatchers of a VGCS call

Test Procedure:

ACTION	RESULT
1) SS originates a prio 2 VGCS call and sends the OTDI IE	1) VGCS getting established -> dispatcher included in VGCS -> GCC/BCC_SETUP contains OTDI IE
2) Verify that the terminating dispatcher got OTDI from originating SS	2.) Dispatcher receives the uncompressed OTDI in UUS IE of the call setup message
3.) Originator takes the VGCS call down	3.) VGCS call is taken down, all resources are released properly

**RINF_OTDI_2   SS originates VGCS Immediate Setup 2 call, MSC
uncompresses the OTDI info and terminating MS dispatcher receives the
uncompressed OTDI**

Test Purpose:

Verify that the VGCS Immediate Setup 2 message contains the compressed OTDI info and
that the terminating dispatcher receives the uncompressed OTDI

Pre-requisites:

- 1 cell (BSS Provider's BSS)
- 1 SS (Registered to Functional Number)
- 1 MSC in NSS Provider's NSS
- 5 terminating dispatchers of a VGCS call

Test Procedure:

ACTION	RESULT
1) SS originates a prio 0 VGCS call	1) VGCS getting established -> dispatcher included in GC -> GCC/BCC_IMMEDIATE_SETUP 2 contains compressed OTDI IE
2) Verify that the terminating dispatcher got OTDI from originating SS	2.) Dispatcher receives the uncompressed OTDI in UUS IE of the call setup message
3.) Originator takes the VGCS call down	3.) VGCS call is taken down, all resources are released properly

7.10 Late Entry

RINF_LE_1 SS active in a PtP call move in a cell with ongoing REC call

Purpose:

Verify that a SS which is active in a PtP call and move in a cell with an ongoing REC call,, getting a notification, that there is an ongoing Railway Emergency call.

Initial conditions:

2 cell at least

4 Mobiles

3 SS at least

Emergency Threshold (Signalling Point Object)= Priority 0

Test Procedure:

ACTION	RESULT
1) A Mobile SS which is member of the REC group establishing a PtP call to another Mobile/fixed call in a cell A what is not part of the REC group call area.	1) PtP call getting established -> has voice path
2) In the second cell B a SS establishing a REC.	2.) REC call getting established -> has voice path
3.) Mobile SS which has established PtP call moves from cell A -> B ->Verify on the Abis Interface that the Mobile SS getting notified with a GCCH Notification Request message	3.) ->Handover successful ->Mobile getting Notification of the ongoing REC ->PtP (ends) call getting preempted and SS getting the REC call
4.) In the new cell B the SS request the uplink of the REC call.	4.) SS get the uplink and has voice path
5.) originating SS takes down the call	5.) The REC call getting properly closed.

RINF_LE_2 Orig. SS active in a VBS call move in a cell with ongoing REC call

Purpose:

Verify that a SS which is active in a VBS call and move in a cell with an ongoing REC call, getting a notification, that there is an ongoing Railway Emergency call.

Initial conditions:

2 cell at least

4 Mobiles

3 SS at least

Emergency Threshold (Signalling Point Object)= Priority 0

Test Procedure:

ACTION	RESULT
1) A Mobile SS which is member of the REC group establishing a VBS (P4) call in a cell A what is not part of the REC group call area.	1) VBS (P4) call getting established -> has voice path
2) In the second cell B a SS establishing a REC.	2.) REC call getting established -> has voice path
3.) Mobile SS which has established VBS call moves from cell A -> B ->Verify on the Abis Interface that the Mobile SS getting notified with a GCCH Notification Request message	3.) ->Handover successful ->Mobile getting Notification of the ongoing REC ->VBS (ends) call getting preempted and SS getting the REC call
4.) In the new cell B the SS request the uplink of the REC call.	4.) SS get the uplink and has voice path
5.) originating SS takes down the call	5.) The REC call getting properly closed.

RINF_LE_3 SS active in a VGCS (GCH) call move in a cell with ongoing REC call

Purpose:

Verify that a SS which is active in a VGCS call (GCH) and move in a cell with an ongoing REC call, getting a notification, that there is an ongoing Railway Emergency call.

Initial conditions:

2 cell at least

4 Mobiles

3 SS at least

Emergency Threshold (Signalling Point Object)= Priority 0

Test Procedure:

ACTION	RESULT
1) A Mobile SS which is member of the REC group establishing a VGCS call (p4) in a cell A what is not part of the REC group call area and going on a GCH	1) VGCS call (P4) getting established -> has voice path
2) In the second cell B a SS establishing a REC.	2.) REC call getting established -> has voice path
3.) Mobile SS with pressed Uplink in the VGCS call moves from cell A -> B ->Verify on the Abis Interface that the Mobile SS getting notified with a GCCH Notification Request message	3.) ->Handover successful ->Mobile getting Notification of the ongoing REC -> Ongoing VGCS call is left and SS going to the REC call
4.) In the new cell B the SS request the uplink of the REC call.	4.) SS get the uplink and has voice path
5.) originating SS takes down the call	5.) The REC call getting properly closed.

7.11 Access Matrix

RINF_AM_1 National call - AM allows call

Purpose

Verify the Access matrix configuration works.

Initial conditions:

Access Matrix AM configured to allow for following:

Case 1: CT2 / FC 01 calls CT7 /FC01.

Case 2: CT2 / FC 02 calls CT7 /FC02.

Case 3: CT2 / FC 01 calls CT2 /FC10.

Case 4: CT2 /FC10 calls CT2 /FC01.

Functional numbers have been registered in PLMN A as follows:

MS_A1 reg with FN_1

MS_A2 reg with FN_5

MS_A3 reg with FN_7

TCT_A1 (FN_11)

TCT_A2 (FN_13)

(TCT=Train Controller Terminal, also sometimes called Dispatcher Terminal))MS_A3 has the Follow Me subscription ABCD.

Test Procedure:

Case 1: CT2 / FC 01 calls CT7 /FC01.

ACTION	RESULT
1) MS_A1 calls FN_11.	1) AM allows the call, the incoming call is displayed on TCT_A1..
2) MS_A1 accepts the call	2.) The PtP call between TCT_A1 and MS_A1 is successfully established
3.) Verify PFN and check the number displayed on both calling- and called party.	3.) TCT_A1 displays the function of the connected MS_A1 and MS_A1 displays the function of TCT_A1.
4.) One of the calling- and called party closes the call..	4.) Call is released

Case **2**: **CT2 / FC 02 calls CT7 /FC02.**

ACTION	RESULT
1) MS_A2 calls FN_13.	1) AM allows the call, the incoming call is displayed on TCT_A2.
2) CT_A2 accepts the call.	2.) The PtP call between TCT_A2 and MS_A2 is successfully established
3Verify PFN and check the number displayed on both calling- and called party.	3.) TCT_A2 displays the function of the connected MS_A2 and MS_A2 displays the function of TCT_A2.
4.) One of the calling- and called party closes the call..	4.) Call is released

Case **3: CT2 / FC 01 calls CT2 /FC10.**

ACTION	RESULT
1) MS_A1 calls FN_7.	1) AM allows the call, the incoming call is displayed on MS_A3.
2) MS_A3 accepts the call.	2.) The PtP call between MS_A3 and MS_A1 is successfully established
3Verify PFN and check the number displayed on both calling- and called party.	3.) MS_A3 displays the function of the connected MS_A1 and MS_A1 displays the function of MS_A3..
4.) One of the calling- and called party closes the call..	4.) Call is released

Case **4: CT2 /FC10 calls CT2 /FC01.**

ACTION	RESULT
1) MS_A3 calls FN_1.	1) AM allows the call, the incoming call is displayed on MS_A1.
2) MS_A1 accepts the call.	2.) The PtP call between MS_A3 and MS_A1 is successfully established
3Verify PFN and check the number displayed on both calling- and called party.	3.) MS_A3 displays the function of the connected MS_A1 and MS_A1 displays the function of MS_A3.
4.) One of the calling- and called party closes the call..	4.) Call is released

RINF_AM_2 National call - AM denies call

Purpose

Verify the Access matrix check on call processing.

Initial conditions

This test case has been divided into the following subcases:

Case 1: CT7 /FC 01 calls CT2 /FC02.

Case 2: CT7 /FC02 calls CT2 /FC10.

Case 3: CT7 /FC02 calls CT2 /FC08.

Case 4: CT2 /FC10 calls CT7 /FC02.

Access Matrix is enabled and configured with

the cells marked with "Open" in EIRENE set to "No".

Functional numbers have been registered in PLMN A as follows:

MS_A1 reg with FN_1

MS_A2 reg with FN_5

MS_A3 reg with FN_7

TCT_A1 (FN_11)

TCT_A2 (FN_13)

(TCT=Train Controller Terminal, also sometimes called Dispatcher Terminal)

MS_A3 has the Follow Me subscription ABCD.

Test procedure

Case **1: CT7 /FC 01 calls CT2 /FC02.**

ACTION	RESULT
1) TCT_A1 calls FN_5	1) AM does not allow the call. Release cause indicating a disallowed call by AM to be checked.
2) Change the according entry of AM to allow the call ("yes") temporarily.	2) The affected call is configured to be allowed.
3) TCT_A1 calls FN_5.	3) AM now allows the call, the incoming call is displayed on MS_A2.
4)	4) The PtP call between MS_A2 and TCT_A1 is successfully established
5) Verify PFN and check the number displayed on both calling- and called party	5) MS_A2 displays the function of the connected TCT_A1 and TCT_A1 displays the function of MS_A2.
6) One of the calling- and called party closes the call.	6) Call is released.
7) Undo the above temporary change	7) The affected cell of AM is configured to "No".

Case **2: CT7 /FC02 calls CT2 /FC10.**

ACTION	RESULT
1) TCT_A2 calls FN_7.	1) AM does not allow the call. Check release cause indicating a disallowed call by AM.
2) Change the according entry of AM to allow the call ("yes") temporarily.	2) The affected call is configured to be allowed.
3) TCT_A2 calls FN_7.	3) AM now allows the call, the incoming call is displayed on MS_A3.
4)	4) The PtP call between MS_A3 and TCT_A2 is successfully established
5) Verify PFN and check the number displayed on both calling- and called party.	5) MS_A3 displays the function of the connected TCT_A2 and TCT_A2 displays the function of MS_A3.
6) One of the calling- and called party closes the call.	6) Call is released.
7) Undo the above temporary change	7) The affected cell of AM is configured to "No".

Case **3: CT7 /FC02 calls CT2 /FC08.**

ACTION	RESULT
1) MS_A2 registers to IC_A, FN_6.	1) The USSD outcome code "01" or corresponding message which means "Follow Me activated" is displayed on MS_A2.
2) TCT_A2 calls FN_6.	2) AM does not allow the call. Check release cause indicating a disallowed call by AM
3) Change the according entry of AM to allow the call ("yes") temporarily.	3) The affected call is configured to be allowed.
4) TCT_A2 calls FN_6.	4) AM now allows the call, the incoming call is displayed on MS_A2.
5)	5) The PtP call between MS_A2 and TCT_A2 is successfully established
6) Verify PFN and check the number displayed on both calling- and called party.	6) MS_A2 displays the function of the connected TCT_A2 and TCT_A2 displays the function of MS_A2.
7) One of the calling- and called party closes the call.	7) Call is released.
8) Undo the above temporary change.	8) The affected cell of AM is configured to "No".

Case **4: CT2 /FC10 calls CT7 /FC02.**

ACTION	RESULT
1) MS_A3 calls FN_13.	1) AM does not allow the call. Check release cause indicating a disallowed call by AM.
2) Change the according entry of AM to allow the call ("yes") temporarily.	2) The affected call is configured to be allowed.
3) MS_A3 calls FN_13.	3) AM now allows the call, the incoming call is displayed on TCT_A2.
4) TCT_A2 accepts the call.	4) The PtP call between MS_A3 and TCT_A2 is successfully established.
5) Verify PFN and check the number displayed on both calling- and called party.	5) MS_A3 displays the function of the connected TCT_A2 and TCT_A2 displays the function of MS_A3.
6) One of the calling- and called party closes the call.	6) Call is released.
7) Undo the above temporary change.	7) The affected cell of AM is configured to "No".
8) Undo the subscription change for MS_A3.	8) MS_A3 has no more Follow Me subscription.

7.12 GPRS

RINF_GPRS_1 GPRS Connection Setup

This test case will create and test 3 GPRS service connections:

1. Set-up a GPRS session for an ETCS user.
2. Set-up a GPRS session for a KMS user (except for countries where included in ETCS)
3. Set-up a GPRS session for "other traffic (office, internet, etc…)
4. Optional : ATO

Test Purpose:

- test GPRS connection (and indirectly test the APN naming conventions)

- test data connection

- test IPV4 for ETCS

- test that no cross connections (ETCS mobile cannot access other traffic and vice versa)

Pre-requisites:
- 1 cell (BSS Provider's BSS)
- 1 PCU (BSS Provider's BSS)
- 1 packet core SGSN-GGSN (NSS Provider's NSS)
- 2-3 servers (servers in fixed IP network)
- 2-3 GSM-R mobiles (PC + module, supporting GPRS).

Test Procedure:

ACTION	RESULT
1. Create APN's for each service ETCS, KMS and background traffic. Country specific: ETCS and KMS might use same APN.	APN for different service should lead to correct server in dedicated IP network with own address space: at least ETCS server (IPV4 network) and Background server (IPV4 allowed).

2. Setup data connection and send data over each connection
    a. ETCS mobile to ETCS server
    b. KMS mobile to KMS(ETCS) server
    c. Background mobile to background server
	Successful data path for each APN

3. Send data from background traffic mobile to ETCS APN	Background traffic should not have access to data or server of the other services (ETCS, ATO and KMS) and vice versa.

It shall be understood, that APN separation may be implemented in different points in the overall network topology.

RINF_GPRS_2 Contact an RBC in the ETCS domain

Test Purpose:

Contact an RBC using the DNS service (conversion of RBC number into IP address).

Pre-requisites:
- 1 cell (BSS Provider's BSS)
- 1 BSC (BSS Provider's BSS)
- 1 packet core SGSN-GGSN (NSS Provider's NSS)
- 1 RBC, 1 DNS (servers in fixed IP network) (access/connectivity available to those servers)
- 1 GSM-R mobiles (PC + module, supporting GPRS).

Test Procedure:

ACTION	RESULT
0. use ETCS APN of RINF_GPRS_1	
1. on DNS server, create Domain name(s) for at least one RBC	Domain name should be linked to valid ip address

2.   Set up data path to an RBC
    a.   Look up IP address using full text domain name of RBC
    b.   Start data transfer to RBC
	Successful request of IP address ,
	 a data transfer can be started

RINF_GPRS_3 QOS and priority test between ETCS and Background traffic

Purpose:

Verify that an ETCS user (using the ETCS APN with QOS) can setup session with sufficient bandwidth if other service is running (Background traffic, fully loaded Cell (GPRS timeslots) on radio interface)

Pre-requisites:

Same as RINF_GPRS_2

Traffic generation for the Background traffic APN: for example a typical handset can generate traffic for 2 UL 2DL timeslots with a (massive) file upload and download.

ACTION	RESULT
1. start GPRS session with back ground traffic	GPRS timeslots should be loaded with traffic
2. Set up GPRS session (with ETCS APN) and transmit data	Session should establish without noticeable delay and receive the minimum of 4kbps (corresponding QOS profile).

8 Test Cases Description for O (Optional) features (testing MI Requirements for O features)

8.1 Uplink reply/Notification Response

RINF_URNR_1 SS active in a VGCS call moves in empty cell

Purpose:

Verify that GCH is allocated in an previously empty cell when a SS which was active in a VGCS call moves in that cell.

Initial conditions:

2 cells (cell_A, cell_B)

Both cells in the same group call area and have handover relationship to each other

Activate the uplink reply timer/notification response on on both cells

3 mobiles (MS_1, MS_2, MS_3)

VGCS GID is defined

MS_1 (cell_A, VGCS GID active)

MS_2 (cell_A, VGCS GID active)

MS_3 (cell_B, VGCS GID not active)

In cell_B, no other mobile with activated VGCS GID

Test Procedure:

General: Status of the TCH should be checked by an O&M System

ACTION	RESULT
1) MS_1 initiates VGCS call.	1) Call established. MS_2 is listener MS_3 in cell_B is not notified
2) MS_1 takes the GCH for a period greater than uplink timer value configured in BSS	2.) Due to lack of uplink reply (on air interface "Uplink access burst - absence of MS with the activated VGCS GID) in cell_B the GCH get de-allocated
3.) MS_2 moves from cell_A to cell_B	3.) The GCH in cell_B gets re-allocated because of the new presence of MS_2 having the VGCS GID activated. Re-allocation is based on notication response
4.) MS_1 takes down the call.	4.) The call is properly released

RINF_URNR_2 SS active in a VBS call moves in empty cell

Purpose:

Verify that GCH is allocated in an previously empty cell when a SS which was active in a VBS call moves in that cell.

Initial conditions:

2 cells (cell_A, cell_B)

Both cells in the same group call area and have handover relationship to each other

Both cells: uplinkReplyTimer >= 6s

3 mobiles (MS_1, MS_2, MS_3)

VGCS GID is defined

MS_1 (cell_A, VBS GID active)

MS_2 (cell_A, VBS GID active)

MS_3 (cell_B, VBS GID not active)

In cell_B, no other mobile with activated VBS GID

Test Procedure:

General: Status of the TCH should be checked by an O&M System

ACTION	RESULT
1) MS_1 initiates VGCS call.	1) Call established. MS_2 is listener MS_3 in cell_B is not notified Due to lack of uplink reply (on air interface "Uplink access burst - absence of MS with the activated VBS GID) in Cell_B the GCH get de-allocated
2) MS_2 moves from cell_A to cell_B	2.) MS_2 makes location update and gets notified of the VBS call as the GCH gets re-allocated because of the new presence of MS_2 having the VBS GID activated
3.) MS_1 takes down the call	3.) The call is properly released

RINF_URNR_3 SS active in a REC call moves in empty cell

Purpose:

Verify that TCH is allocated in a cell, no matter if the cell.is empty or not

Initial conditions:

2 cells (cell_A, cell_B)

Both cells in the same group call area and have handover relationship to each other

Both cells: uplinkReplyTimer >= 6s

2 mobiles (MS_1, MS_2)

MS_1 (cell_A)

MS_2 (cell_A)

No mobile in cell_B

REC GID is active on all mobiles

Test Procedure:

General: Status of the TCH should be checked by an O&M System

ACTION	RESULT
1) MS_1 initiates REC call.	1) Call established. MS_2 is listener A GCH is allocated in cell_B despite the absence of subscribers
2) MS_1 takes the uplink for a period greater than uplink timer value configured in BSS	A GCH is still allocated in cell_B despite the absence of subscribers
3.) As listener MS_2 moves from cell_A to cell_B	3.) MS_A2 makes a location update and gets notified of the REC call
4.) MS_1 takes down the call.	4.) The call is properly released

8.2   Enhanced Railway Emergency Call (eREC)

RINF_eREC_1   eREC call with correct SID – eREC MS with same SID are joining, eREC MS with different SID will not be alerted

Purpose:

Verify eREC terminals are joining an eREC call if the SID is same and eREC terminals are not joining an eREC call if the registered SID is different.

Initial conditions:

eREC is activated in the network

At least 4 eREC devices

LAC_1 and CID_1 for which eREC is used are defined in the network

LAC_2 and CID_2 for which eREC is used are defined in the network

2 sectors (SID_1, SID_2) are defined

eREC GIDs are defined: 299

A dispatcher

Test Procedure:

ACTION	RESULT
1) Using 2 eREC devices, perform a registration on the concerned defined LAC and CID with SID_1	1) Registration is performed, no error is returned to the eREC device
2) Using 2 other eREC devices, perform a registration on the concerned defined LAC and CID with SID_2	2) Registration is performed, no error is returned to the eREC device
3) Perform an eREC call with an existing SID defined	3) All eREC terminals with same SID are alerted and join the eREC call. The terminal registered with a different SID will not be alerted
4) Verify the correct dispatcher is alerted	4) Dispatcher number is according to the one defined for this SID.

RINF_eREC_2   eREC call which involve with eREC capable and non eREC capable terminals

Purpose:

Verify eREC call and REC call are both joined by eREC capable (and registered) and non eREC capable terminals

Initial conditions:

eREC is activated in the network

 1 terminal capable and supporting eREC is available (registered to eREC): MS_1

1 non capable eREC terminal: MS_2

LAC and CID for which eREC is used are defined in the network

eREC GIDs are defined: 299

Sector ID (SID_1) is defined

A Dispatcher

Test Procedure:

ACTION	RESULT
1) Perform a 299 REC call	1) Call is generated all concerned terminals and dispatcher are alerted The eREC terminals are joining
2) Use a eREC terminal which is registered to eREC.	2) Registration is performed
3) Perform a 299 eREC call with SID_1	3) eREC call is established. The eREC terminal are joining. The non eREC capable terminal is joining
4) Perform a 299 REC call	4) Call is generated all concerned terminals and dispatcher are alerted The eREC terminals and the non eREC capable terminals are joining

8.3 ER-GSM

RINF_ER-GSM Establishment of a PtP call in an ER-GSM network

Purpose:

Verify basic GSM functionality when the network utilizes the ER-GSM frequency band. Both types of UE with and without ER-GSM capability should be capable to accede to the network.

Initial conditions:

A cell with more than one TRX, the BCCH TRX must belong to the UIC GSM-R Band (without the E-Band) and the second TRX to the ER-GSM band.

Subscriber A has a UE in ER-GSM band. Subscriber B has an UE in the GSM-R band.

Test Procedure:

ACTION	RESULT
1) Subscriber B calls Subscriber A	2) The system allocates TCH in the TRX configured with ER-GSM frequency for Subscriber A. 3) The system allocates TCH in the TRX configured with UIC GSM-R frequency for Subscriber B 4) The call is setup correctly