

Test Plan

For Interoperability Testing

Of the MAP&ISUP Interface

Between the Nokia Siemens Networks SR14 GSM-R network

and the

Kapsch GSM 20 GSM-R network

(version 1.4)

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1 Scope

This document defines the test suite to be used for Interoperability Test (IOT) between Nokia Siemens Networks NSS SR14 release and KAPSCH GSM NSS 20 at the MAP and ISUP interface to evaluate the integration of a configuration between networks from the two vendors.

The focus of testing in this test plan will be directed towards real-life system functionality testing, which can be executed without the use of simulators.

2 References

2.1 Applicable Documents

- [1] Network Vendors IOT Forum - IOT Methodology
- [2] GSM-R Infra IOT Global agreement

2.2 Standards

- [3] **3GPP TS 22.067** – enhanced Multi-Level Precedence and Pre-emption service (eMLPP); Stage 1
- [4] **3GPP TS 23.067** – enhanced Multi-Level Precedence and Pre-emption Service (EMLPP); Stage 2
- [5] **3GPP TS 42.068** – Voice Group Call Service (VGCS); Stage 1
- [6] **3GPP TS 42.069** – Voice Broadcast Service (VBS); Stage 1
- [7] **3GPP TS 43.068** – Voice Group Call Service (VGCS); Stage 2
- [8] **3GPP TS 43.069** – Voice Broadcast Service (VBS); Stage 2
- [9] **3GPP TS 44.068** – Group Call Control (GCC) Protocol
- [10] **3GPP TS 44.069** – Broadcast Call Control (BCC) Protocol
- [11] **3GPP TS 23.003** – Numbering, addressing and identification
- [12] **3GPP TS 24.008** – Mobile radio interface Layer 3 specification; Core network protocols; Stage 3
- [13] **3GPP TS 48.008** – Mobile Switching Centre - Base Station system (MSC-BSS) Interface Layer 3 Specification
- [14] **“EIRENE - Functional Requirements Specification, PSA167D005”**. Railway Radio Enhanced Network -UIC Project EIRENE.
- [15] **“EIRENE - System Requirements Specification, PSA167D006”**. Railway Radio Enhanced Network - UIC Project EIRENE.
- [16] **“ASCI options for Interoperability, A 01 T 0004 1”**. MORANE Project

3 Abbreviations

BSC	Base Station Controller
BSS	Base Station Sub-system
BTS	Base Transceiver Station
CLIP	Calling Line Identification Presentation
CLIR	Calling Line Identification Restriction
DCH	Dedicated Channel
eMLPP	enhanced Multi-Level Precedence and Pre-emption
EVEA	Enhanced Very Early Assignment
FA	Functional Addressing

FN	Functional Number
GCA	Group Call Area
GCH	Group Cannel
GCR	Group Call Register
GCRef	Group Call Reference
GID	Group Identity
HLR	Home Location Register
IMEI	International Mobile Equipment Identity
IMSI	International Mobile Subscriber Identity
IOT	Interoperability Test
LDA	Location Dependent Addressing
MS	Mobile Station
MSC	Mobile Switching Centre
NSS	Network Sub-system
OTDI	Originator to Dispatcher Information
PEC	Public Emergency Call
REC	Railway Emergency Call
SS	Service Subscriber
TCU	Transcoding Unit
VLR	Visitor Location Register
VBS	Voice Broadcast Service
VGCS	Voice Group Call Service

4 Overview

The purpose of this testing is to verify the correct implementation of the MAP and ISUP interface between the Nokia Siemens Networks SR14 (Release 99) architecture and the Kapsch GSM20 architecture (Release 4).

The following main areas will be covered in testing MAP&ISUP interface:

- VGCS basic handling
- REC basic handling
- eMLPP basic handling
- Functional addressing
- Forced deregistration
- OTDI
- Late Entry
- Class of registration
- Acknowledgement of high priority calls

Figure 1 shows the MAP interface protocol stack.

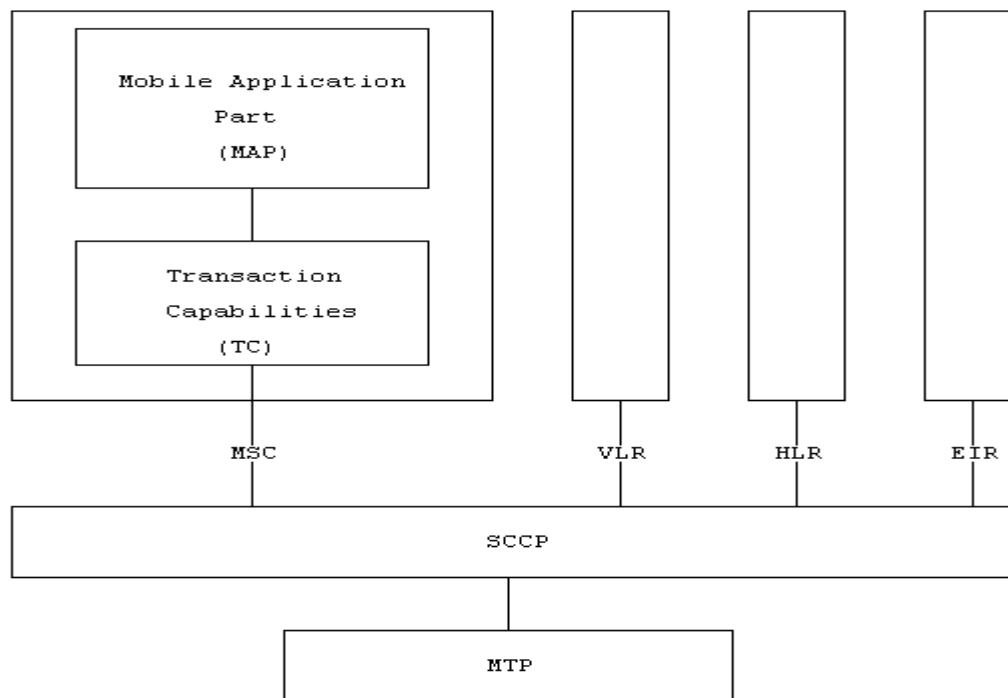


Figure 1: MAP Interface Protocol Stack

The most significant changes with impacts on GSM-R Infrastructure (or track side) in EIRENE FRS version 7 and SRS version 15 compared with previous documents EIRENE FRS version 6 and SRS version 14 are as follows:

Nr	Change EIRENE 6/14 → 7/15	Chapter	FRS ref	SRS ref	Test Phase 9.1
1	Alerting duration	Network Req		2.6.1	
2	Automatic reception of railway emergency calls by mobiles	Network Config	3.5.6		7.2, 7.4
3	Automatic reception of railway emergency calls by cab-radios	Network Config	3.5.7		7.2, 7.4, 7.5
4	Termination of ongoing VGCS/VBS by the network	Network Config		3.7.1	7.1
5	Muting and unmuting for VGCS	Network Config		3.8.1	7.1
				3.8.2	
				3.8.3	
				3.8.4	
				3.8.5 & 8.3.5	
		Controller		8.3.3	
				8.3.4	
6	Access to external networks, usage of specific codes	Numbering Plan		9.10	7.8
7	Revised Function Codes	Numbering Plan		Table 9A-1	7.6, 7.8
8	Organisation of SIM card content, selection of networks in certain order	Subscriber Mgmnt		10.5.1	7.8
9	MS to prefer GSM-R Frequencies	Subscriber Mgmnt		10.5.1i	
10	Operator's removal of functional number relationship	FN and LDA		11.3.8	7.8
11	Forced deregistration followed by registration, sequence of actions	FN and LDA		11.3.9i, ii, iii, iv	7.8
12	Global Title, SCCP msg	FN and LDA		11.6.5	7.8
13	Location info from train based systems	FN and LDA		11.7.6	7.8
14	Extension of the predefined areas for emergency calls	REC	13.1.6		7.2
15	Extension of the configuration types for emergency group call areas	REC		13.2.3	7.2
16	Recommendations concerning Anchor MSCs	REC		13.2.4-5	7.2
17	Compressed OTDI	REC		13.4.6	7.2, 7.3
18	MSC Release bit, Rel 99, immediate set-up 2	REC		13.4.7	7.2
19	EN 301 515			References	2.0, 7.1
20	TR 102 281			References	2.0

These changes require the update of GSM-R infrastructure to a significantly modified and improved software version – this applies equally to both involved suppliers (the Beneficiaries). Furthermore such an update may also whenever that makes sense from supplier and user

perspectives be paired with a concurrent hardware upgrade/modification. The main objective of the test campaign described herein is to validate that already validated interoperability is maintained using software and hardware including all these updates/upgrades. For this purpose the test plan includes a selection of test cases broadly covering the entire functional spectrum of EIRENE to test as many parts of the new software as reasonably possible.

5 Test Session Details

This section details the location of the testing and the period over which the tests were performed, together with the personnel involved in the testing.

- Test Location: Nokia Siemens Networks: NSN-lab
- Test Location: Kapsch: KCC-lab

Personnel	NSN	Kapsch
Manager	Mrs. J. Herzog/ E. Ganga	Mr. Ulrich Geier
Test Engineer	Mr. Mladen Kraljevic	Mr. Erich Seitz
Test Engineer		
Test Engineer		

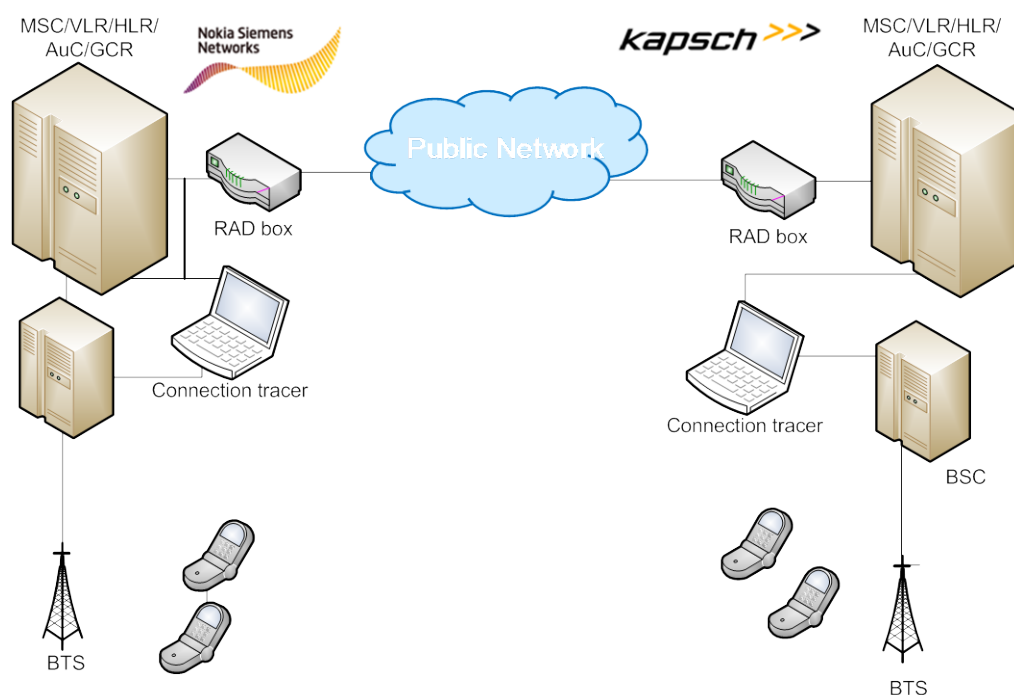
6 Test Configuration

This section details the software versions of the network elements and the network configurations that were used to perform the test cases detailed in this document, together with the system parameters and the test equipment used to verify the results.

6.1 Network Configuration

The diagram below shows the network configuration that was used to perform the tests during this IOT session.

NETWORK CONFIGURATION



Page 1

Figure 2: Network Configuration

6.2 Network Element Software Versions

The following network elements were used to perform the tests in this IOT session:

Network Element	NSN	Kapsch
MSC/VLR/HLR	SR14	NSS20
SCP	Integrated test FNN SR14	SCP4.0
BSS/TRAU	BR10	V18

6.3 System Parameters

This section details the values of various system parameters and database settings that will be used in this IOT session. Please note that the values detailed here are only recorded as a statement of the configuration used during testing. In no way should they be taken as definitive values to be used in live networks.

6.4 Test Equipment

6.4.1 Equipment in Nokia Siemens Networks' location

6.4.1.1 NSN Equipment

- GSM-R NSS core (1 x MSC/VLR/HLR/AC, Integrated test FNN)
- GSM-R RAN (BSC/TRAU, BTS)
- RAD box
- K15xx Protocol Analyzer, running on A interface
- Dispatcher

6.4.2 Equipment in Kapsch's location

6.4.2.1 Kapsch equipment

- GSM-R NSS core (1 x MSC/VLR/HLR/AC, IN-System)
- GSM-R RAN (BSC/TCU, BTS)
- RAD box
- K15xx Protocol Analyzer, running on A interface
- PABX with dispatcher

6.4.3 Terminals

The following terminal test equipment is used to carry out the tests during this IOT session:

	Make	Model
Service subscribers (NSN)	Sagem	OPH940 B02,1R GPH940 BG2,1D
Service subscribers (Kapsch)	Sagem	OPH940 B02,2B GPH940 BG2,1P OPS BS2,2E
Fixed Dispatcher (NSN)	Siemens	Version 3.00.0000
Fixed Dispatcher (Kapsch)	Frequentis	Dicora S
Mobile Dispatcher (NSN)	Siemens	software version = 1.1
Mobile Dispatcher (Kapsch)	Sagem	GPH940 BG2,1P

7 Test Case List

7.1 VGCS basic handling

This test area verifies the VGCS functionality including talker change, killing sequence, roaming scenarios between GSM-R systems from NSN and Kapsch.

Test Id	Description	NSN anchor	KCC anchor	Remarks
PH3_02	Subscriber initiated VGCS (Talker change, normal clear down of call)			
PH3_07	Dispatcher originated VGCS (Talker change, normal clear down of call)			
PH3_12	Subscriber initiated VGCS (Late Entry) (no talker change, normal clear down of call)			
PH3_13	Subscriber initiated VGCS (Abandon call/reject call) (no talker change, normal clear down of call)			

Number of test cases: 4

7.2 Railway Emergency Call (REC)

This test area verifies the REC functionality including the acknowledgement functionality between GSM-R systems from NSN and Kapsch.

Test Id	Description	NSN anchor	KCC anchor	Remarks
Ph3_47_REC_1	Subscriber initiated REC			
Ph3_48_REC_2	Subscriber initiated REC			
Ph3_50_REC_4	MS Dispatcher originates a REC			

Number of test cases: 3

7.3 Originator to Dispatcher Information (OTDI)

This test area verifies the correct functioning of the OTDI feature between GSM-R systems from NSN and Kapsch.

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

Test Id	Description	NSN anchor	KCC anchor	Remarks
PH3_78	Subscriber initiated REC, mobile dispatchers receive the OTDI (Dispatcher clears down call, kill sequence)			
PH3_79	Subscriber initiated REC, mobile dispatchers receive the OTDI (Orig on Anchor, Dispatcher clears down call, kill sequence)			

Number of test cases:2

7.4 Late Entry

This test area verifies the correct functioning of the Late Entry feature between GSM-R systems from NSN and Kapsch.

Test Id	Description	NSN anchor	KCC anchor	Remarks
Ph3+_21	Service subscriber active in a PtP call moves to a cell with an ongoing REC			
IOT4_LE 2	Orig. SS active in a VBS (P4) call move in a cell with ongoing REC call			
Ph3+_22	Orig. SS active in a VGCS (P4) call move in a cell with ongoing REC call			

Number of test cases: 2

7.5 eMLPP and MLPP test cases

This test area verifies the correct functioning of the eMLPP and MLPP functionality between GSM-R systems from NSN and Kapsch.

Test Id	Description	NSN anchor	KCC anchor	Remarks
PH3_54	P2P preempted by VGCS – roamer is P2P originator			
PH3_55	P2P preempted by Railway Emergency Call			
PH3_59	VGCS preempted by Railway Emergency Call (VGCS)			
PH3_65	Correct priority is transmitted in VGCS call			
PH3_67	P2P call pre-empted by group call			

Number of test cases: 5

7.6 Functional addressing test cases

This test area verifies the correct behaviour of the functional addressing functionality between GSM-R systems from NSN and Kapsch.

Test Id	Description	NSN anchor	KCC anchor	Remarks
PH3_68	Verification of Functional Numbers previously registered in HPLMN (CT2/3/4)			

PH3_69	Registration of CT2 number while roaming			
PH3_70	Deregistration of CT2 numbers while roaming			
PH3_71	Mobile subscriber gets CT2 number with connect message			

Number of test cases: 4

7.7 Notification signals for forced deregistration

This test area verifies the correct behaviour of the forced deregistration functionality between GSM-R systems from NSN and Kapsch.

Test Id	Description	NSN anchor	KCC anchor	Remarks
PH3+_14	FM service supervisor in home PLMN executes a forced de-registration of roaming mobile (Both subscribers belong to same H PLMN)			
PH3+_16	FM service supervisor in home PLMN executes forced de-registration of a roaming subscriber FN (The subscribers belong to different H PLMN).			

Number of test cases: 2

7.8 Class of Registration

This test area verifies the correct behaviour of the class of registration functionality between GSM-R systems from NSN and Kapsch.

Test Id	Description	NSN anchor	KCC anchor	Remarks
PH3+_19	Unsuccessful registration with train number (CT2 FC 10) because of wrong CoR (CT2 FC01 works)			
PH3+_20	Unsuccessful registration with Lead driver number (CT2 FC 01) because of wrong CoR (CT2 FC10 works)			

Number of test cases: 2

8 Test Case Descriptions

Test Cases

The tests have to be carried out twice, first using the NSN network as A and the KCC network as B, then using KCC as A and NSN as B

Using the naming conventions and the scenarios below, all combinations with roamers, anchor MSC and dispatchers are covered.

Notations

In all the test cases listed below, the following notation shall be used:

- MSa will indicate own subscribers inside own network
- MSb will indicate roaming network subscribers

Network A	Network B
MS(a1), MS(a2), ... MS(b1), MS(b2), ...	
Dispatcher A	Dispatcher B

Group-ID used for REC during testing will be 399 (instead of recommended 299), in order to avoid the risk of interference with real rail operations. The configuration for 399 is done as it is done for 299.

Ph3_02 Subscriber initiated VGCS (Talker change, normal clear down of call)

Short description

MS A1 initiates a VGCS, MSA2, MSB1, MSB2 and the Dispatcher A join .Talker change A1->A2->B1->B2->A1. MS A1 releases the call.

Setup

Network A (anchor)	Network B (relay)
MS A1, MS A2 MS B1, MS B2	
Dispatcher A	Dispatcher B

Purpose:

Verify correct call setup of VGCS using normal assignment procedures.

MS A1, MS A2 and Dispatcher A of network A are registered in the VLR of network A.

MS B1 and MS B2 of network B are registered in the VLR of network A.

Dispatcher B of network B is registered in the VLR of network B.

MS A1 originates a VGCS call on the home MSC in network A using normal assignment procedures. MS A2, MS B1, MS B2 and Dispatchers A and B join the group call.

Preconditions:

- MS A1, MS A2 and Dispatcher A subscriber, which are subscribers of A network, have to be created in HLR A
- MS B1, MS B2 and Dispatcher B subscriber, which are subscribers of B network, have to be created in HLR B
- MAP interface in service between network A and network B
- Group-ID GID274 is defined in the Group Call Register (GCR) of both MSCs.
- MS A1, MS A2, Dispatcher A and MS B1, MS B2, Dispatcher B are subscribed to all basic and supplementary services listed
- VGCS Group-ID GID274 is defined for MS A1, MS A2, Dispatcher A and MS B1, MS B2, Dispatcher B

Required Terminal Equipment:

- Four GPHs (MS A1, MS A2, MS B1, MS B2)
- One OPH (MS ...)
- One CAB radio

Description:

- 1) Group-ID GID274 is activated for VGCS on MS A1, MS A2, MS B1, MS B2 and Dispatchers A and B
- 2) Group-ID GID274 is dialed on MS A1 and a VGCS call is originated
- 3) MS A2, MS B1, MS B2, Dispatcher A and B join the group call
- 4) MS A1 presses the 'Push to Talk' (PTT) button and talks
- 5) MS A1 releases the PTT button
- 6) MS A1 closes the group call

Pass Condition (Expected result):

- Call is set up
- Authentication and ciphering occurs for MS B1
- Following call setup, MS A1 can talk, and MS A2, MS B1, MS B2, Dispatcher A and B cannot talk
- Uplink connection is released by MS A1
- When MS A2 pushes the PTT button, MS A2 can talk, and MS A1, MS B1, MS B2, Dispatchers A cannot talk
- MS A2 can no longer talk after releasing the PTT button
- VGCS call is released when MS A1 closes the group call

Ph 3_07 Dispatcher originated VGCS (Talker change, normal clear down of call)**Short description**

Dispatcher A initiates a VGCS. MSA1, MSA2, MSB1, MSB2 join. MSA1 requests the UL and is granted it. Talker change A1->A2->B1->B2.

Dispatcher A releases the call.
(MUTING)

Setup

Network A (Anchor)	Network B (relay)
MS A1, MS A2 MS B1, MS B2	
Dispatcher A	Dispatcher B

Purpose:

- Verify correct call setup and take-down of VGCS with originating dispatcher.
- MS A1, MS A2 and Dispatcher A of network A are registered in the VLR of network A.
- MS B1 and MS B2 of network B are registered in the VLR of network A.
- Dispatcher B of network B is registered in the VLR of network B.
- Dispatcher A originates a VGCS call on the home MSC in network A. MS A1, MS A2, MS B1 and MS B2 join the group call.
- The originating dispatcher releases the VGCS.

Preconditions:

- MS A1, MS A2 and Dispatcher A subscriber, which are subscribers of A network, have to be created in HLR A
- MS B1 and MS B2 which are subscribers of B network, have to be created in HLR B
- MAP interface in service between network A and network B
- Group-ID GID273 is defined in the Group Call Register (GCR) of both MSCs
- MS A1, MS A2, Dispatcher A and MS B1, MS B2 are subscribed to all basic and supplementary services listed
- VGCS Group-ID GID273 is defined for MS A1, MS A2, Dispatcher A and MS B1, MS B2, Dispatcher B

Required Terminal Equipment:

- Four GPHs (MS A1, MS A2, MS B1, MS B2)
- One OPH (MS A3)
- One CAB radio

Description:

- 1) Group-ID GID273 is activated for VGCS on MS A1, MS A2, MS B1, MS B2 and Dispatcher A
- 2) Group-ID GID273 is dialed on Dispatcher A and a VGCS call is originated
- 3) MS A1, MS A2, MS B1 and MS B2 join the group call
- 4) Dispatcher A releases the uplink connection
- 5) Dispatcher A closes the group call

Pass Condition (Expected result):

- Call is set up
- One way point to multipoint voice path connection is establish between the Dispatcher A and the mobile subscribers
- VGCS call is released by originating Dispatcher A

Ph3_12 Dispatcher originated VGCS Late Entry (no talker change, normal clear down of call)

Short description

MS A1 initiates a VGCS, MSA2, MSB1 and the Dispatchers A join. MSB2 is detached. MSB2 attaches and is notified about the ongoing call and joins. MSA1 closes the call.

Setup

Network A (anchor)	Network B (relay)
MS A1, MS A2 MS B1, MS B2	
Dispatcher A	Dispatcher B

Purpose:

- Verify correct call setup of VGCS using normal assignment procedures.
- MS A1, MS A2 and Dispatcher A of network A are registered in the VLR of network A.
- MS B1 and MS B2 of network B are registered in the VLR of network A.
- Dispatcher B of network B is registered in the VLR of network B.
- MS A1 originates a VGCS call on the home MSC in network A. MS A1, MS A2, MS B1 and Dispatcher A join the group call.
- MS B2 attaches and joins the group call.

Preconditions:

- MS A1, MS A2 and Dispatcher A subscriber, which are subscribers of A network, have to be created in HLR A
- MS B1, MS B2 and Dispatcher B subscriber which are subscribers of B network, have to be created in HLR B
- MAP interface in service between network A and network B
- Group-ID GID273 is defined in the Group Call Register (GCR) of both MSCs
- MS A1, MS A2, Dispatcher A and MS B1, MS B2, Dispatcher B are subscribed to all basic and supplementary services listed
- VGCS Group-ID GID273 is defined for MS A1, MS A2, Dispatcher A and MS B1, MS B2, Dispatcher B

Required Terminal Equipment:

- Four GPHs (MS A1, MS A2, MS B1, MS B2)
- One OPH (MS A3)
- One CAB radio

Description:

- 1) Group-ID GID273 is activated for VGCS on MS A1, MS A2, MS B1, MS B2 and Dispatcher A
- 2) Group-ID GID273 is dialed on MS A1 and a VGCS call is originated
- 3) MS A2, MS B1 and Dispatcher A join the group call
- 4) MS B2 attaches to the network
- 5) MS A1 closes the group call

Pass Condition (Expected result):

- Call is set up
- One way point to multipoint voice path connection is establish between MS A1, the mobile subscribers and Dispatcher A
- VGCS call is released by MS A1

Ph3_13 Dispatcher originated VGCS Abandon call/reject call (no talker change, normal clear down of call)

Short description

MS A1 initiates a VGCS, MSA2,MSB1 and the Dispatcher A join. MSB2 rejects the call. Normal call clearing of MSA1

Setup

Network A (anchor)	Network B (relay)
MS A1, MS A2 MS B1, MS B2	
Dispatcher A	Dispatcher B

Purpose:

- Verify correct call setup of VGCS using normal assignment procedures.
- MS A1, MS A2 and Dispatcher A of network A are registered in the VLR of network A.
- MS B1 and MS B2 of network B are registered in the VLR of network A.
- Dispatcher B of network B is registered in the VLR of network B.
- MS A1 originates a VGCS call on the home MSC in network A. MS A1, MS A2, MS B1 and Dispatcher A join the group call.
- MS B2 rejects the group call.
- Ms A1 releases the group call.

Preconditions:

- MS A1, MS A2 and Dispatcher A subscriber, which are subscribers of A network, have to be created in HLR A
- MS B1, MS B2 and Dispatcher B subscriber which are subscribers of B network, have to be created in HLR B
- MAP interface in service between network A and network B
- Group-ID GID273 is defined in the Group Call Register (GCR) of both MSCs
- MS A1, MS A2, Dispatcher A and MS B1, MS B2, Dispatcher B are subscribed to all basic and supplementary services listed
- VGCS Group-ID GID273 is defined for MS A1, MS A2, Dispatcher A and MS B1, MS B2, Dispatcher B

Required Terminal Equipment:

- Four GPHs (MS A1, MS A2, MS B1, MS B2)
- One OPH (MS A3)
- One CAB radio

Description:

- 1) Group-ID GID273 is activated for VGCS on MS A1, MS A2, MS B1, MS B2 and Dispatcher A
- 2) Group-ID GID273 is dialed on MS A1 and a VGCS call is originated
- 3) MS A2, MS B1 and Dispatcher A join the group call
- 4) MS B2 rejects the group call
- 5) MS A1 closes the group call

Pass Condition (Expected result):

- Call is set up
 - One way point to multipoint voice path connection is establish between MS A1, the mobile subscribers and Dispatcher A
- VGCS call is released by MS A

Ph3_47_REC_ 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 and Test Verification:

#	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 were send

PH3_48_REC_2 Subscriber initiated REC (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.
Talker change A1->A2->B1->B2->A1.
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 and Test Verification:

#	ACTION	RESULT
1	MSa #1 initiates a REC	Call is offered to all subscribers. They auto connect.
2	The uplink is requested by the following subscribers in the respective order (by pressing the PTT button: MSa #2, MSb #1, MSb #2, MSa #1	The uplink is granted to the different subscribers.
3	MSa #1 releases the call.	The call is cleared down.

PH3_50_REC_4 Dispatcher originated 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. Dispatchers A 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 and Test Verification:

#	ACTION	RESULT
1	Dispatchers A initiates a REC	Call is offered to all subscribers. They auto connect.
2	Dispatchers A releases the call.	The call is cleared down.

IOT4_OTDI 1 SS originates VGCS call, terminating MS dispatcher receives the OTDI

Purpose:

Verify that the terminating dispatcher receives the OTDI from the originating SS

Setup

Network A (Anchor)	Network B (Relay)
MS B1, MS B2	MS A1, MS A2
Dispatcher A	Dispatcher B

Pre-requisites:

- 1 cell (Kapsch BSS)
- 1 SS (Registered to a Functional Number)
- 3 SS part of the VGCS call
- 1 MSC in NSN NSS
- terminating dispatchers of a VGCS call

Test Procedure and Test Verification:

Action	Result
1) SS originates a Prio 1 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

Ph3_78 Subscriber initiated REC, mobile dispatchers receive the OTDI (Dispatcher clears down call, kill sequence)

Short description

MS A1 initiates a REC, MSA2, MSB1, MSB2 and the Dispatchers A and B join. Dispatcher A releases the call.

Test setup

Network A (Anchor)	Network B (Relay)
MS B1, MS B2	MS A1, MS A2
Dispatcher A	Dispatcher B

Purpose:

Verify OTDI info in REC is transmitted to all involved dispatchers.

Preconditions:

- Subscribers MS A1, MS A2 of network A are roaming in network B
- Subscribers MS B1, MS B2 of network A are roaming in network A
- MAP interface in service between network A and network B
- MS A1, MS A2, MS B1, MS B2, are subscribed to all basic and supplementary services listed
- REC Group-ID GID399 is defined for MS A1, MS A2 and MS B1, MS B2, Dispatchers A and B
- For GID273 the MSC of network B is the relay and MSC A anchor
- MS A1 is registered to CT4 (max length) of Network A

Description:

- Group-ID GID399 is activated for REC on MS A1, MS A2, MS B1, MS B2 and Dispatchers A and B
- MS A1 starts the REC call with Group-ID GID399
- MS A2, MS B1, MS B2, Dispatchers A and B join the group call
- Dispatcher A closes the group call

Pass Condition (Expected result):

- Call is set up
- Dispatcher A and B can see FN of MS A1 on terminal
- REC call is released by Dispatcher A

Ph3_79 Subscriber initiated REC, mobile dispatchers receive the OTDI (Orig on Anchor, Dispatcher clears down call, kill sequence)

Short description

MS B1 initiates a REC, MSA2, MSA1, MSB2 and the Dispatchers A and B join. Dispatcher A releases the call.

Test setup

Network A (Anchor) Network B (Relay)

MS B1, MS B2

MS A1, MS A2

Dispatcher A

Dispatcher B

Purpose:

Verify OTDI info in REC is transmitted to all involved dispatchers.

Preconditions:

- Subscribers MS A1, MS A2 of network A are roaming in network B
- Subscribers MS B1, MS B2 of network A are roaming in network A
- MAP interface in service between network A and network B
- MS A1, MS A2, MS B1, MS B2, are subscribed to all basic and supplementary services listed
- REC Group-ID GID399 is defined for MS A1, MS A2 and MS B1, MS B2, Dispatchers A and B
- For GID273 the MSC of network B is the relay and MSC A anchor
- MS B1 is registered to CT4 (max length) of Network A

Description:

- Group-ID GID399 is activated for REC on MS A1, MS A2, MS B1, MS B2 and Dispatchers A and B
- MS B1 starts the REC call with Group-ID GID399
- MS A2, MS A1, MS B2, Dispatchers A and B join the group call
- Dispatcher B closes the group call

Pass Condition (Expected result):

- Call is set up
- Dispatcher A and B can see FN of MS B1 on terminal
- REC call is released by Dispatcher B

IOT4_LE2 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.

Test setup:

PLMN A	PLMN B
Anchor	Relay
MSa #1/2/3	
MSb #1/2/3	

- 2 cell
- 4 Mobiles
- 3 SS

- Emergency Threshold (Signalling Point Object)= Priority 0

Test description:

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.

PH3+_21: Service subscriber active in a PtP call moves to a cell (same PLMN) with ongoing REC call and will receive notification about the ongoing REC

OBJECTIVE

This testcase is to verify that a Service Subscriber MS A#1 active in a PtP call in cell A (PLMN A) moving into cell B (PLMN A) with an ongoing REC call, will receive notification that there is an ongoing REC in the new cell B. It is also verified that the moiles involved in the REC send an acknowledgement message to the MSC.

SETUP

- The test case will be performed with Siemens as PLMN A and Nortel as PLMN B as well as Nortel as PLMN A and Siemens as PLMN B.

PLMN A	PLMN B
Anchor	Relay
MS A#1	
MS A#2	
MS B#1	
MS B#2	

—

- MS A#1 and MS A#2 are in cell A on PLMN A
- MS B #1 and MS B #2 are in cell B on PLMN A
- The REC GCA is defined with cell B from PLMN A only

EXECUTION

#	Action	Result
1	MS A#1 which is member of the REC group makes a PtP call to MS A#2 in cell A on PLMN A which is not part of the REC GCA	PtP call between MS A#1 and MS A#2 is established.
2	In cell B in PLMN A MS B #1 initiates a REC	REC is established in GCA (cell B) and MS B#2 joins the REC.
3	MS A#1 involved in the PtP call moves from cell A to cell B	<ul style="list-style-type: none"> – MS A#1 Handover successful – MS A#1 gets notification of the ongoing REC – The PtP call between MS A#1 and MS A #2 gets preempted. – PtP call is successfully released on MAP-if – MS A#1 is connected to the REC call
4	MS B #1 releases the REC	The REC is properly closed
5	MS B #1, #2 and MS A #1 send acknowledgement messages to the MSC	The acknowledgement messages are received at the MSC

SUCCESS CRITERIA

- Verify that the monitored message sequence is correct
- Verify that all E-interface resources are successfully released on completion of the call

PH3+_22: Service subscriber active in a Prio4 VGCS (talker) moves to a cell (same PLMN) with ongoing REC and will receive notification about the ongoing REC

OBJECTIVE

This testcase is to verify that a Service Subscriber MS A#1 active in a Priority 4 VGCS call in cell A (PLMN A) and moves into cell B (PLMN A) with an ongoing REC, will receive notification about the ongoing Railway Emergency Call in the new cell B.

SETUP

- The test case will be performed with Siemens as PLMN A and Nortel as PLMN B as well as Nortel as PLMN A and Siemens as PLMN B.

PLMN A	PLMN B
Anchor	Relay
MS A #1	
MS A #2	
MS B #1	
MS B #2	

-
- VGCS group 274 is datafilled in table GCR with priority 4
- MS A#1 and MS A#2 in cell A on PLMN A
- MSBMS B #1 and MS B #2 in cell B on PLMN A
- The REC GCA is defined with cell B from PLMN A only

EXECUTION

#	Action	Result
1	MS A#1 which is member of the REC group establishes a Priority 4 VGCS call in cell A in PLMN A, which is not part of the REC GCA	A Priority 4 VGCS call for MS A#1 and MS A#2 is established.
2	In the cell B in PLMN A MS B #1 initiates a REC call	REC is setup in GCA (cell B)
3	MS A#1, which has established a Priority 4 VGCS call and has the uplink (GCH) moves from cell A to cell B	<ul style="list-style-type: none"> – MS A#1 Handover successful – MS A#1 getting notification of the ongoing REC – The Priority 4 VGCS call getting preempted. – VGCS uplink is successfully released on MAP'if between A- and R-MSC – MS A#1 getting the REC call
4	In the new cell B MS A#1 request the uplink of the REC	MS A#1 gets the uplink and has voice path
5	MS B #1 releases the REC	The REC is properly closed

SUCCESS CRITERIA

- Verify that the monitored message sequence is correct
- Verify that all E-interface resources are successfully released on completion of the

Ph3_54 eMLPP Basic Handling (P2P preempted by VGCS – roamer is P2P originator)

Purpose:

The aim of this test is to verify that the MS is able to pre-empt the ongoing P2P call and to indicate the new incoming higher priority call. The MS should react in the proper way.

MS B1 calls MS A1 (MS B1 -> MS A1). MS A2 originates a VGCS call with a higher priority. MS B1 is connected to the call by automatic answering (MS A2 -> MS B1).

Preconditions:

- Map interface is in service between network A and network B
- Group-ID GID02 is defined in the Group Call Register (GCR) of both MSCs
- MS A2, MS B1 and MS A1 are subscribed to all basic and supplementary services listed
- Group-ID GID02 is defined for MS A2 and MS B1
- Automatic answering is defined for GID02

Setup

PLMN A	PLMN B
Anchor	Relay
MS A #1	
MS A #2	
MS B #1	

Required Terminal Equipment:

- ThreeGPHs (MS A1, MS A2 & MS B1)

Test description

- MS B1 calls MS A1 (P2P using the MSISDN)
- MS A1 answers the call
- MS A2 originates VGCS call with higher priority (GID02)
- MS B1 is connected to the VGCS call by automatic answering and the P2P call is released or put on hold.

Pass Conditions (passed in both labs):

- Call is set up
- MS B1 is connected to the VGCS call by automatic answering and the P2P call is released or put on hold.

Ph3_55 eMLPP Basic Handling (P2P preempted by REC)

Purpose:

The aim of this test is to verify that the MS is able to pre-empt the ongoing P2P call and to indicate the new incoming higher priority call. The MS should react in the proper way.

MS A1 originates a P2P call. MS B1 answers the call (MS A1 -> MS B1). MS A2 originates REC (VGCS) call. MS B1 and MS A1 are connected to the call (MS A2 -> MS B1, MS A1).

Preconditions:

- Map interface is in service between network A and network B
- MS A2, MS B1 and MS A1 are subscribed to all basic and supplementary services listed

Setup

PLMN A	PLMN B
Anchor	Relay
MS A #1	
MS A #2	
MS B #1	

Required Terminal Equipment:

- ThreeGPHs (MS A1, MS A2 & MS B1)

Test description:

- MS A1 call MS B1
- MS B1 answers the call
- MS A2 originates REC
- MS B1 and MS A1 are connected to the REC and the P2P call is released or put on hold.

Pass Conditions (passed in both labs):

- Call is set up
- MS B1 and MS A1 are connected to the REC and the P2P call is released or put on hold.

Ph3_59 eMLPP Basic Handling (VGCS preempted by REC)

Purpose:

The aim of this test is to verify that the MS is able to pre-empt the ongoing VGCS call and to indicate the new incoming higher priority call. The MS should react in the proper way.

MS A1 originates a VGCS call. MS B1 joins the call (MS A1 -> MS B1). MS A4 (cab radio) originates REC (VGCS) call. MS B1 and MS A1 are connected to the call (MS A4 -> MS B1, MS A1).

Preconditions:

- Map interface is in service between network A and network B
- Group-IDs GID04 is defined in the Group Call Register (GCR) of both MSCs
- MS A2, MS B1 and MS A1 are subscribed to all basic and supplementary services listed
- Group-ID GID04 is defined for MS A1 and MS B1

Required Terminal Equipment:

- Three GPHs (MS A1 , MS A2 & MS B1)

Test description:

- Group-ID GID04 is activated for VGCS on MS A1 and MS B1
- MS A1 initiates VGCS call
- MS B1 joins the call
- MS A2 originates REC
- MS B1 and MS A1 are connected to the REC and the VGCS call is released by the network (after timer expiry).

Setup

PLMN A	PLMN B
Anchor	Relay
MS A #1	
MS A #2	
MS B #1	

Pass Conditions (passed in both labs)

- Call is set up
- MS B1 and MS A1 are connected to the REC and the VGCS call is released by the network (after timer expiry).

PH3_65_MLPP_2: Correct priority is transmitted in VGCS call

Purpose:

This test case is to verify that correct priority is assigned for VGCS calls.

Test setup:

PLMN A	PLMN B
Anchor	Relay
MSa #1	MSb #1

Test description:

#	Action	Result
1	MSb #1 calls GID with priority 0	Verify that the correct priority is seen on the MAP E interface. The priority is passed down to the mobile over the A-Interface.
2	MSa #1 calls GID with priority 1	Verify that the correct priority is seen on the MAP E interface
3	MSb #1 calls GID with priority 2	Verify that the correct priority is seen on the MAP E interface
4	MSa #1 calls GID with priority 3	Verify that the correct priority is seen on the MAP E interface
5	MSb #1 calls GID with priority 4	Verify that the correct priority is seen on the MAP E interface

Pass Conditions (passed in both labs):

- All results as expected: VGCS call with the requested priority is established.
- No error messages on NSN NSS/Kapsch NSS

PH3_67_MLPP_4: P2P call pre-empted by group call

Purpose:

This test case is to verify that a P2P call can be pre-empted by a group call with a higher priority.

Test setup:

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

There is only one traffic channel available on the ISUP interface.

Test description:

#	Action	Result
1	MSa #1 calls MSb #1 with priority 4	The call is offered to MSb #1.
2	MSb #1 answers the call.	
3	MSb #2 calls GID with priority 2	The P2P is released and the group call is offered to the subscribers

Pass Conditions (passed in both labs):

- All results as expected
- No error messages on NSN NSS/Kapsch NSS

PH3_68_FA_1: Verification of Functionnal Numbers previously registered in HPLMN

Purpose:

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

Test setup:

PLMN A	PLMN B
MSa #1	
MSb #1	←

- MSa #1 and MSb #1 have CT2 – CT4 registered as below table:

	Kapsch	NSN
Train number - CT2	TBD	TBD
Coach number - CT3	TBD	TBD
Car number - CT4	TBD	TBD

Test description:

#	Action	Result
1	MSa #1 calls MSb #1 on all his functional numbers	MSb #2 rings and all calls are possible
2	MSb #1 calls MSa #1 on all his functional numbers	MSa #2 rings and all calls are possible

Pass Conditions (passed in both labs):

- All results as expected
- No error messages on NSN NSS/Kapsch NSS

PH3_69_FA_2: Registration of CT2 number while roaming

Purpose:

This test case is to verify that a mobile roaming in a VPLMN can register successfully with a train number (CT2) of the VPLMN.

Test setup:

PLMN A	PLMN B
MSb #1/2	

- MSb #1/2 have permission to register to CT2 numbers

- MSb #1/2 are registered to HPLMN CT2 numbers

	Kapsch	NSN
Train number - CT2#1	TBD	TBD
Train number - CT2#2		

Test description:

#	Action	Result
1	Using MMI MSb #1 registers with short CT2 number	Mobile is registered to CT number in both networks and gets a confirmation message
2	Using MMI MSb #2 registers with long CT2 number	Mobile is registered to CT number in both networks and gets a confirmation message

Pass Conditions (passed in both labs):

- All results as expected
- No error messages on NSN NSS/Kapsch NSS

PH3_70_FA_3: Deregistration of CT2 numbers while roaming

Purpose:

This test case is to verify that the mobile can deregister the functional numbers when roaming in a VPLMN.

Test setup:

PLMN A	PLMN B
MSb #1	←

- MSb #1 registered to CT2 number 2-xxxxx xx in both networks.

	Kapsch	NSN
Train number - CT2	TBD	TBD

Test description:

#	Action	Result
1	Using mobile MMI deregister the HPLMN CT2 number	SS is de-registered and receives an confirmation message. The SS is still registered for the VPLMN CT2 number

Pass Conditions (passed in both labs)

All results as expected
No error messages on NSN NSS/Kapsch NSS

PH3_71_FA_4: Mobile subscriber gets CT2 number with connect message

Purpose:

This test case is to verify that a roaming subscriber mobile dialling the MSISDN number of another mobile gets the CT2 number with the connect message if the other mobile is registered with this number.

Test setup:

PLMN A	PLMN B
MSa #1	
MSb #1	

- MSa #1 registered to 2-xxxxx xx
- MSa #1 has User-to-User-Signalling service assigned in HLR
- MSb #1 has COLP service assigned in HLR

	Kapsch	NSN
Train number - CT2	TBD	TBD

Test description:

#	Action	Result
1	MSb #1 dials MSISDN number of MSa #1	MSa #1 gets audible ring back and MSb #1 is ringing
2	MSa #1 answers	MSb #1 can see the CT2 in the display and two-way voice path is established.
3	MSb #1 takes call down	All resource return to idle state

Pass Conditions (passed in both labs):

- All results as expected
- No error messages on NSN NSS/Kapsch NSS

PH3+_14: FM service supervisor in home PLMN executes a forced de-registration of roaming mobile (Both subscribers belong to same H PLMN)

OBJECTIVE

This testcase is to verify that FM supervisor MS A#2 in PLMN A can execute forced de-registration to a roaming subscriber MS A#1 in PLMN B (same PLMN subscriber).

SETUP

PLMN A	PLMN B
	MS A#1
MS A#2	

- The test case will be performed with Siemens as PLMN A and Nortel as PLMN B as well as Nortel as PLMN A and Siemens as PLMN B.
- MS A#1 is roaming in PLMN B
- MS A#1 is registered with FN of PLMN A
- MS A#2 is attached in PLMN A
- MS A#2 is FM service supervisor

	Kapsch	Siemens
Train number - CT2#1	kapsch IC + 2 + xxxxx + 01	Siemens IC + 2 + xxxxx + 01

EXECUTION

#	Action	Result
1	MS A#2 in PLMN A initiates forced de-registration of MS A#1 FN of PLMN A roaming in PLMN B	Deregistration of MS A#1 FN of PLMN A is succesfull.
2	MS A#1 receives notification of forced de-registration	MS A#1 returns result.

SUCCESS CRITERIA

- Verify that the monitored message sequence is correct
- Verify that all E-interface resources are successfully released on completion of the call

PH3+_16: FM service supervisor roaming in foreign PLMN executes forced de-registration of a roaming mobile in the foreign PLMN. (Both subscribers belong to same H PLMN)

Purpose:

This test case is to verify that a roaming FM supervisor MS A#2 can execute forced de-registration of a roaming subscriber MS A#1 in PLMN B (same PLMN subscribers).

Test setup:

The test case will be performed with NSN as PLMN A and Kapsch as PLMN B as well as Kapsch as PLMN A and NSN as PLMN B.

PLMN A	PLMN B
	MS A#2
	MS A#1

- Configuration A
- MS A#1 is roaming in PLMN B
- MS A#1 is registered with FN of PLMN A
- MS A#2 is roaming in PLMN B
- MS A#2 is FM service supervisor

	Kapsch	NSN
Train number - CT2#1	TBD	TBD
Train number - CT2#2	TBD	TBD

Test description:

#	Action	Result
1	MS A#2 initiates forced de-registration of MS A#1 FN of PLMN A. Both subscribers are roaming in PLMN B. The test case will be performed with Kapsch as PLMN A and NSN as PLMN B.	Forced de-registration of MS A#1 FN of PLMN A is successful.

Pass Conditions (passed in both labs):

- Verify that the monitored message sequence is correct
- Verify that all E-interface resources are successfully released on completion of the call

PH3+_19: Unsuccessful registration with train number (CT2 FC 10) because of wrong CoR (CT2 FC01 works)

Purpose:

This test case is to verify that a subscriber MS A #1 can be restricted from registration of defined functional numbers.

For this the Class of Registration (CoR) is set accordingly in the HLR/HLRi of PLMN A

Test setup:

The test case will be performed with NSN as PLMN A and Kapsch as PLMN B as well as Kapsch as PLMN A and NSN as PLMN B.

PLMN A	PLMN B
Anchor	Relay
MS A#1	

- MS A#1 is not registered to any CT2 number
- MS A#1 has permission to register to CT2 number with function code 01
- MS A#1 has no permission to register to CT2 number with function code 10

	Kapsch	NSN
Train number - CT2#1	TBD	TBD
Train number - CT2#2	TBD	TBD

Test description:

#	Action	Result
1	MS A#1 tries to register with the functional CT2#2 number (CT2 FC 10) of PLMN B	MS A#1 is not allowed to register to CT2#2 and receives an error message
2	MS A#1 tries to register with the functional CT2#1 number (CT2 FC 01) of PLMN B	MS A#1 is successfully registered to CT2#1

Pass Conditions (passed in both labs):

- Verify that the monitored message sequence is correct
- Verify that all E-interface resources are successfully released on completion of the registration

PH3+_20: Unsuccessful registration with Lead driver number (CT2 FC 01) because of wrong CoR (CT2 FC10 works)

Purpose:

This test case is to verify that a subscriber, MS A#1 can be restricted from registration of defined functional numbers.

For this the Class of Registration (CoR) is set accordingly in the HLR/HLRi of the PLMN A.

Test setup:

The test case will be performed with NSN as PLMN A and Kapsch as PLMN B as well as Kapsch as PLMN A and NSN as PLMN B.

PLMN A	PLMN B
Anchor	Relay
MS A#1	

- MS A#1 is not registered to any CT2 number
- 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

	Kapsch	NSN
Train number - CT2#1	TBD	TBD
Train number - CT2#2	TBD	TBD

Test description:

#	Action	Result
1	MS A#1 tries to register with the functional CT2#1 number (CT2 FC01) of the PLMN (B)	MS A#1 is not allowed to register to CT2#1 and receives an error message
2	MS A#1 tries to register with the functional CT2#2 number (CT2 FC 10) of the PLMN (B)	MS A#1 is successfully registered to CT2#2

Pass Conditions (passed in both labs):

- Verify that the monitored message sequence is correct
- Verify that all E-interface resources are successfully released on completion of the registration

Document Approval

The contents of this document are approved by:

Approved by	
Date/Signature:	
Responsible Person:	, TBD
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