Proposal of a Minimal Requirement on an Automatic Test Equipment for Roaming

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1 Scope

This document describes specifications concerning the minimal test equipment for automatic Roaming Retesting and test cases, that rely on the infrastructure as described in IR.28.

Due to high number of GSM operators in the world it is more and more difficult to perform efficient periodic retesting on time as required in the roaming agreements.

To perform more than one single test for each operator with a small operation staff, an automatic test equipment is useful for

- Performing the tests several times, in order to guarantee the network quality
- Performing several type of tests (data, SMS, CF.. CB .. MO, MT)
- Performing tests at any time, for instance during heavy traffic hours or off peak hours
- Performing test calls for periodical billing data tests.

The minimal requirement on the infrastructure of a PLMN to be tested is defined in the document IR.28.

Only some common tests scenarios are described here. Every operator is free to define more detailed tests.

2 Abbreviations

Abbreviations according to the GSM specification ETR 100:1993 (GSM 01.04 Version 4.0.2).

Term	Description
SMS	Short Message Service
SMSC	Short Message Service Center
CF	Call Forwarding
CB	Call Busy
CFNR	Call Forwarding Non Reacheble
BAIC	Barring All Incoming Calls
TS	Automatic Roaming Test System
MS/SIMa	Mobil Test Equipment with SIM from PLMN a
MS/SIMb	Mobil Test Equipment with SIM from PLMN b
PSE	PSTN Subscriber Emulator
AAC	Automatic Answering Circuit
DAAC	Data Automatic Answering Circuit
CU	Central Unit

3 Test Configuration

TS: Automatic Roaming Test System

CU: Control Unit

MS/SIMa: Mobil Test Equipment with SIM from PLMN a

MS/SIMb: Mobil Test Equipment with SIM from PLMN b

PSE: PSTN Subscriber Emulator

AAC: Automatic Answering Circuit (Voice)

DAAC: Data Automatic Answering Circuit (incl. Fax Gr. 3)

4 Test Method

The shown test configuration allows to perform the roaming test fully automatically. The roaming test is carried out by establishing test calls from:

- MS to MS
- MS to AAC
- MS to PSE
- MS to DAAC

and vice versa.

The test scenarios can be created by the CU. For each roaming feature to be tested a dedicated scenario has to be created. The test scenarios can be stored on the CU. On request by the operator the scenarios will be downloaded to the involved MS or/and PSE. The number of repetition can be predetermined. The start time of a test can be programmed, as well.

The ARTS consists of:

- CU
- MS
- PSE
- AAC
- DAAC

CU The CU is the central unit of the test system. The main functions are:

- Generate Test Suites
- Store Test Suites
- Load test suites to TE
- Control the Test run
- Get and store results
- Present results

- **MS** The MS is/simulates a mobil station which is controlled remotely by the CU. The MS is able to handle outgoing and incoming calls.

MS/SIMa

MS/SIMa is/simulates a roaming mobil station from HPLMNa.

MS/SIMb

MS/SIMb is/simulates a mobil station of the VPLMNb.

PSE

PSE emulates either an analogue subscriber or an ISDN subscriber for incoming and outgoing calls.

5 Test scenarios

This document specifies 5 test cases for international roaming test. As location update can be tested with each call, it will not be tested by a specific test case.

5.1 Basic Service Test Cases

5.1.1 Location update by MS/SIMa1 and MS/SIMa2 in VPLMN and MS/SIMa1 calls MS/SIMa2

Preconditions:

- MS/SIMa1 and MS/SIMa2 are roaming in the VPLMN.
- The registration of MS/SIMa1 and MS/SIMa2 must be deleted in the VLR before.
- HLR record contains basic and supplementary service information.
- Authentication and encryption are enabled in VMSC.

Actions:

- Location update for MS/SIMa1.
- Location update for MS/SIMa2.
- The time needed for location update is measured and compared against a set time specified in the test Case.
- MS/SIMa1 calls MS/SIMa2
- MS/SIMa1 measures the time for call establishing and compares it against a set time specified in the test case.
- MS/SIMa2 answers the call
- MS/SIMa1 and MS/SIMa2 check the speech path during a programmable time for stability.
- MS/SIMa1 releases the call.

Results:

Call OK:

- The location update could be done within the set time.
- The call could be established within the set time.
- The call remains without call cut off and call drop during the set time.

Call faulty:

- Location could not be done within the set time.
- The call could not be established within the set time.
- The call was not stable during call hold time.

5.2 Supplementary Service Test Cases

5.2.1 Barring of Outgoing International Calls

Preconditions:

- Location update request for MS/SIMa1

Actions:

- MS/SIMa1 activates BAIC
- MS/SIMa1 calls to AAC of HPLMN(a)
- MS/SIMa1 checks for busy tone or the non-detection of the DTMF signal of the AAC.
- MS/SIMa1 releases the call.
- MS/SIMa1 deactivates BAIC

Results:

Call OK:

DTMF signal was not recognized or busy tone was detected.

Call faulty:

The call could be established to AAC (DTMF was recogized)

5.2.2 Call Forwarding on not reachable

Preconditions:

- Location update request for MS/SIM a1

Actions:

- MS/SIM a1 activates CFNRc to AAC of HPLMN (a)
- MS/SIM a1 is switched off
- MS/SIM a2 calls to MS/SIM a1
- MS/SIM a2 checks the answer (detection of DTMF signal)
- MS/SIM a1 is switched on
- MS/SIM a1 deactivates CFNRc

Results:

Call ok:

DTMF signal was recognized

Call faulty:

The call could be established to the MS/SIM a2

The DTMF signal was not recognized

5.3 Data transmission services

5.3.1 Data transmission indication

- A file of maximum 2 Kbytes is sent (uploaded) with the name of the originating operator; after that, the same file is read back (downloaded) and the operator compares the contents of the two files.
- The quality of the transmission is highly dependent of the PSTN line and of the modem equipment used; therefore it is foreseen to do only a functionality and not a quality test. For this reason any file transfer protocol can be used to send the files.

5.3.2 Data transmission, Bearer Service 26

MS/SIMa1 roamed in VPLMN(b) calls the DAAC in HPLMN(a) with a speed of 9600 bits/s in asynchronous mode.

Preconditions:

Bearer service 26 is provisioned in HLR subscription. MS/SIMa1 is registered in VPLMN(b).

Actions:

- MS/SIMa1 establishes a call to the auto-answer modem station in PLMN(a) with the configuration 9600 bits/s, 8 bits, No parity, 1 stop bit and transparent or not transparent.

If call is successfully established, then upload (send) a file, using the Z-modem file transfer protocol (overwrite-mode in both ends).

If the file is successfully sent, then download (receive) the same file, using the Z-modem file transfer protocol (overwrite-mode in both ends).

If the file is successfully received, then check whether the two files are identical.

Results:

Successful:

- if the two transmissions are successful, and if the sent and received files are identical.

Comments:

This test case confirms the support of this data service by the VPLMN(b). The test is done with a file transfer protocol because this is a functionality and not a quality test.

5.4 Short Message Service

5.4.1 SMS Mobile Originating - Mobile terminating

Preconditions:

- MS/SIMa1 and MS/SIMa2 both roaming in VPLMN (b).
- MS/SIMa2 is detached or switched off (if SMSC supports the waiting state).

Actions:

- MS/SIMa1 sends a MO SM with 40-160 characters towards MS/SIMa2 via the SMSC (a).
- After 1 minute MS/SIMa2 is switched on or attached again and receives the SM.

Results:

Successful:

The SM received by the MS/SIMa2 matches the SM sent by MS/SIMa1.

Comments:

This test confirms the availability of the routing of SM's from the HPLMN-SMSC to and from the VPLMN.

5.5 Telefax services

5.5.1 MS/SIMa1 calls Telefax in HPLMN(a) (Mobile Originating Fax)

Preconditions:

Location update request for MS/SIMa1

Actions:

- MS/SIMa1 calls the telefax.
- Call is answered by the telefax.
- ARTS sends a telefax (one page).
- MS/SIMa1 releases the liaison.

Results:

Successful:

The call is answered and the acknowledgement of end of transmission (protocol T30) has been received.

Comments:

The quality of service is not controlled because this quality is depended on the telefax equipment or telefax software.

Annex A Document Management

A.1 Document History

Version	Date	Brief Description of Change	Approval Authority	Editor / Company
3.0.0	10 October 2005	specifications concerning the minimal test equipment for automatic Roaming Retesting and test cases	Networks group	Javier Sendin GSMA

A.2 Other Information

Type	Description
Document Owner	Networks Group - SIGNAL
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