Test Report

for GSM-R REC and ADIA

Mobile-to-Mobile

set-up time measurements

using

NOKIA Rel4 Core and Flexi BSS Radio

and

Funkwerk Cab radios

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### Modification History

<table>
<thead>
<tr>
<th>Version / Issue</th>
<th>Date</th>
<th>Pages</th>
<th>Description of changes</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>17/04/2015</td>
<td></td>
<td>Initial draft</td>
<td>Ola Bergman</td>
</tr>
<tr>
<td>0.2</td>
<td>21/05/2015</td>
<td>all</td>
<td>Clarifications of issues brought forward by ERA in email dated 12/05/2015</td>
<td>Ola Bergman</td>
</tr>
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1 Executive Summary

Throughout the document NN stands for ‘Nokia Networks’ and FWK stands for ‘Funkwerk’.

The testing is supported by the European Commission by providing funding under the TEN MAP 3rd call, Work Package 10 “GSM-R interoperability/compatibility testing”. The corresponding decision includes two options;

- Subactivity 10.1 “Lab tests may include measurement of the network part of certain call set up times including REC”.
- Subactivity 10.2 “Lab tests may include measurement of the Cab radio/EDOR part of certain call set up times including REC.

This report summarizes the results of the work of NN and FWK to implement these two options. Basis for the work is a new suggested method for call set-up measurements elaborated by GSM-R industry under Work Package 5 of TEN MAP 3rd call and documented in an update to version 0.19 of the document gsmr2875, i.e. in gsmr2875-0.19 [R2]. The work aimed at 1) assessing the feasibility of the measurement method suggested in gsmr2875-019 and 2) measurements of REC and ADIA set-up times using equipment implemented to support ERA GSM-R baseline 0 release 4, i.e. EIRENE FRS version 7.4.0 and SRS version 15.4.0.

The work was carried out in the test lab of NN in December 2014.

The results of the work show that to use acoustic trigger points as suggested in gsmr2875-019 is possible and working well, i.e. the feasibility of the method described in gsmr2875-0.19 was partly validated.

Due to time constraints it was not possible to execute more than 20 REC end-to-end measurements and no ADIA measurements at all. 20 measurements are not considered sufficient for any statistical significance. Therefore no measured end-to-end values are reported.

A 2nd Cab radio as suggested in gsmr2875-0.19 was not available but on the receiving end a GPH radio (without access to the AT-interface) was used. Therefore network only measurements could not be executed.

2 References

2.1 Applicable Documents

[R1] Network Vendors IOT Forum - IOT Methodology
[R2] gsmr2875-019

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
3 Abbreviations

ADIA  All Drivers In the Area
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
GPH   General Purpose Handheld
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
This document is dealing about Phase 4 activity of GSM-R IOT 2014/2015. The objective of the Phase 4 IOT is to
- verify the REC and ADIA set up time measurement methodology suggested in gsmr2875-019
- submit statistically significant lab values for REC and ADIA set up times

4.1 Test Coverage
The following list summarizes the content.
- see gsmr2875-019

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: NN-lab in Budapest
- Test session start date: 9th of December 2014
- Test session end date: 11th of December 2014

<table>
<thead>
<tr>
<th>Personnel</th>
<th>NN</th>
<th>FWK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordination</td>
<td>Mr. Ola Bergman</td>
<td>Mr. Alexander Ende</td>
</tr>
<tr>
<td>Test Engineer</td>
<td>Mr. Daniel Cardoso</td>
<td>Mr. Alexander Ende</td>
</tr>
<tr>
<td>Test Engineer</td>
<td>Mr. Gyula Nagy</td>
<td></td>
</tr>
<tr>
<td>Test Engineer</td>
<td>Mr. Tamas Tenyi</td>
<td></td>
</tr>
</tbody>
</table>

6 Test Configuration
Details about the test configuration are contained in [R2] gsmr2875-019

6.1 Network Configuration
Some details about the network configuration are contained in [R2] gsmr2875-019
6.2 Network Element Software Versions

The following software versions were used:

<table>
<thead>
<tr>
<th>Network Element</th>
<th>NN</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSC/VLR/HLR/AC</td>
<td>Rel 4 ATCA MR 17.0</td>
</tr>
<tr>
<td>BSS/TRAU</td>
<td>Flexi BSS RGR20</td>
</tr>
</tbody>
</table>

6.3 Terminal Software Versions

The following terminal software versions were used:

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handsets</td>
<td>Sagem Tigr155</td>
</tr>
<tr>
<td>FWK Cab Radio MESA 23</td>
<td>CR_SW 04.08.02</td>
</tr>
</tbody>
</table>
7 Test Case Results

Each test case is given one of the following Test Execution Status':

- **Passed (P)**
  All parties agree that the test case has met all the requirements defined in the test case description.

- **Passed with a Comment (P*)**
  All parties agree that the test case has met the requirements defined in the test case description, however a comment is included to clarify the behavior witnessed during the test.

- **Not Performed (NP)**

- **Failed (F)**
  All parties agree that the test case has not met the criteria specified in the test case description.

Errors are classified using the following classes:

- **Blocking Problem (F-B)**
  The continuation of the IOT session for the concerned test area is not possible unless an error classified as 'Blocking' has been fixed. The concerned test area can be the entire test session or one or more sections of the test plan.

- **Service Affecting Problem (F-S)**
  An error classified as 'Service Affecting' describes a discrepancy from the relevant standards that has major impact on the functionality of the system.

- **Non-Service Affecting Problem (F-N)**
  An error classified as 'Non-Service Affecting' describes a discrepancy from the relevant standards and can be evaluated from a protocol specific view only. If there is an impact on the functionality, it only represents a minor problem.

<table>
<thead>
<tr>
<th>Test Id</th>
<th>Description</th>
<th>Result</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Case</td>
<td>Description</td>
<td>Outcome</td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
<td>---------</td>
<td></td>
</tr>
<tr>
<td>REC M2M_ACTr</td>
<td>This test case aims at verifying the method of using acoustic triggering to start and stop set up time measurement for mobile-to-mobile REC as described in [R2] gsmr2875-019. Complete end-to-end REC set-up duration is measured, i.e. includes delay in originating Cab, in the network and in terminating GSM-R terminal.</td>
<td>P</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A standard Windows lap top was configured to sense acoustic signals and to perform time measurements using these signals to start and stop measurement. To start the measurement the noise caused by pressing the REC button on the REC originating Cab radio was used as trigger. To stop the measurement the REC warning tone radiated by the GSM-R terminal (GPH) at the REC receiving end was used as trigger. The method worked very well and the test case Passed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>REC M2M_ATTR</td>
<td>This test case aims at verifying the method of sensing relevant messages on the AT-interface (internal to the Cab) on both REC originating and terminating sides as triggers to start and stop set up time measurement for mobile-to-mobile REC as described in [R2] gsmr2875-019. Measured values will indicate the delay caused by the network plus the (short) delays in the radio modules of the GSM-R terminals on originating and receiving end.</td>
<td>NP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AT-i/f on receiving end not accessible since a 2nd Cab radio with this possibility was not available. Therefore the Test Case was Not Performed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>REC M2M_Value</td>
<td>This test case aims at measuring the mobile-to-mobile REC set up times using both acoustic and relevant AT messages as triggers.</td>
<td>NP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Only 20 measurements and only using acoustic triggering were executed. 20 measurements not sufficient statistically and AT measurement missing completely. Therefore the Test Case was deemed Not Performed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADIA M2M_ACTr</td>
<td>This test case aims at verifying the method of using acoustic triggering to start and stop set up time measurement for mobile-to-mobile ADIA as described in [R2] gsmr2875-019. Complete end-to-end ADIA set-up duration is measured, i.e. includes delay in originating Cab, in the network and in terminating GSM-R terminal.</td>
<td>NP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Due to time constraints this test case was Not Performed. (However based on positive result of REC M2M_ACTr there is confidence this will work just as well).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
This test case aims at verifying the method of sensing relevant messages on the AT-interface (internal to the Cab) on both ADIA originating and terminating side as triggers to start and stop set up time measurement for mobile-to-mobile ADIA as described in [R2] gsmr2875-019. Measured values will indicate the delay caused by the network plus the (short) delays in the radio modules of the GSM-R terminals on originating and receiving end.

NP

Due to time constraints this test case was Not Performed.

| ADIA M2M_ATTtr | This test case aims at measuring the mobile-to-mobile ADIA set up times using both acoustic and relevant AT messages as triggers. | NP | Due to time constraints this test case was Not Performed. |

Number of test cases: 6

8 Conclusion

Acoustic triggering works well.

Further work required to meet all objectives.