

T-Mobile USA UMTS Protocol Test Packages (for RTD)

[MX786201A-200](#) (Includes MX786201A-201, MX786201A-202, MX786201A-203, MX786201A-204, MX786201A-205, MX786201A-206) [Release 1.8.0_B](#)

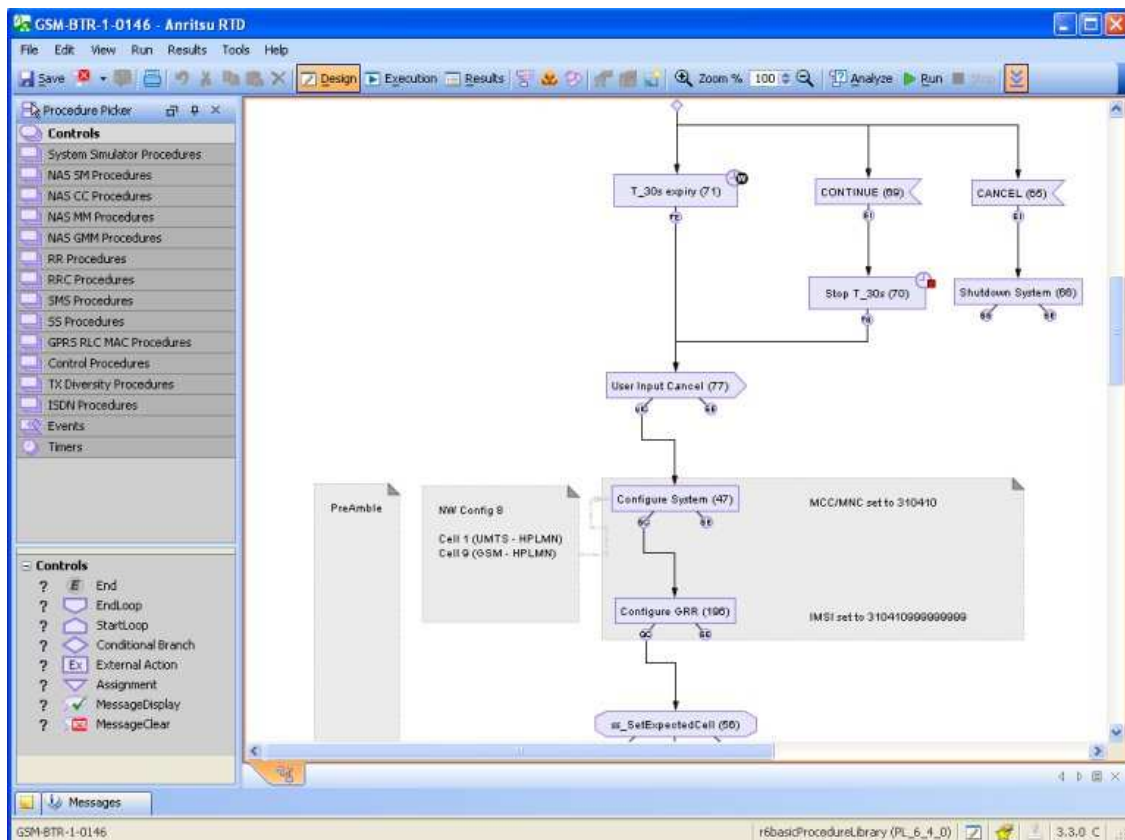
Introduction

The T-Mobile USA Protocol Libraries consist of a selection of tests that are taken from the T-MOBILE USA UE acceptance documents and may be mapped to the tests required in these documents. The libraries are created for the RTD with an Anritsu multi-cell network model based on T-MOBILE USA's Network description. It is used to ensure that UEs proposed for T-MOBILE USA will meet their requirements before deployment on the live network.

The tests can also be modified to provide a fast and highly efficient method for debugging of Band IV UEs for the T-Mobile USA Network. This network model provides a quick entry point for test modification but should not be seen as a way to create similar libraries as the compound procedures and network model is restricted to use with the tests in each package.

Detailed test annotation and test flow

The graphical layout of each test makes it straightforward to visualize the test flow and hence verify and debug the UE's behavior. All the tests are annotated, enabling easy identification of logical and functional blocks so that they may be re-used by saving as a new test and then modifying. Test flow is available when manually investigating failures or when checking for specific conditions. Note that modified tests carry the licensing requirements of the original test.



Typical Test Layout

Library support and documentation

The documentation provided with the Libraries includes all the information needed to understand the test method, its purpose and criteria applied to prove a pass or failure. This is documented in a way that will be familiar to users that have studied the 3GPP processes. The document references blocks and areas annotated within the test window.

See example below for a test “Cell Reselection from Connected Mode, Candidate Cells of Different LAC, same URA”.

The Test Purpose is to Verify that the UE can transit from cell DCH state to Cell PCH state and reselect to a different cell when the reselection criteria are met..

MX786201A-35 T-Mobile USA UMTS Protocol Test Library

Test Method

Initial Environment Conditions
The UE is in automatic PLMN selection mode.

Cell	Cell ID	CPICH_Ec [dBm/3.84 MHz] (FDD)	PLMN	Radio Access Technology
Cell1	2	-60	HPLMN	UTRAN
Cell2	4	N/A	HPLMN	UTRAN
Cell2	14	N/A	HPLMN	UTRAN

Test Preamble

- The SS activates Cells1, 2 and 3, and then monitors the cells for random access requests from the UE.
- The UE is switched on.
- The UE registers on Cell1.
- The UE requests a PS session on cell1 (PS registration is performed if not PS attached).
- The PS session is established and the RTD radio bearer used is defined as 64k UL and 64k DL.

Test Procedure

The following table describes the test environment:

Environment Condition	T1
Cell1 (dBm)	-70
Cell2 (dBm)	-75
Cell3 (dBm)	-60

The test procedure is as follows:
The SS transmits a physical channel reconfiguration message requiring the UE to change from RRC cell DCH to cell PCH state (step1).
The UE transmits a physical channel reconfiguration complete message enters RRC cell PCH state (step2). A timer is used to ensure that the UE remains in RRC cell PCH state (step3).

5-720 13000-00200 Rev A.1.0.0

Shows cells used from network model

See example below showing Test Procedure with expected messages and behavior and also the criteria for pass and failure

MX786201A-35 T-Mobile USA UMTS Protocol Test Library

The environment conditions are set to "T1" (step4).
In order to reselect the UE enters the RRC cell FACH state and a cell update message is received by the SS (step5).
A cell update confirm message is transmitted by the SS with the RRC cell DCH state required (step6). The UE transmits a physical channel reconfiguration complete message in RRC cell DCH state (step7).
The user may now validate the bi-directional bearer by transferring data across the air interface in both directions (step8).

Step	Direction		Message/Behaviour	Comment
	UE	SS		
1		←	PHYSICAL CHANNEL RECONFIGURATION	The target RRC cell state is URA PCH
2		→	PHYSICAL CHANNEL RECONFIGURATION COMPLETE	Start Timer1 (5s)
3				Timer1 expires
4				Environment Condition "T1"
5		→	CELL UPDATE	The RRC cell state is Cell FACH
6		←	CELL UPDATE CONFIRM	The target RRC cell state is Cell DCH
7		→	PHYSICAL CHANNEL RECONFIGURATION COMPLETE	The RRC cell state is cell_DCH
8		<optional>		User data tests

Test Postamble

- PS session Termination.
- RRC Connection Release.
- Deconfigure the system resources.

Test Requirement
Identified success criteria are defined as follows:



13000-00200 Rev A.1.0.0 5-721

Shows expected behavior

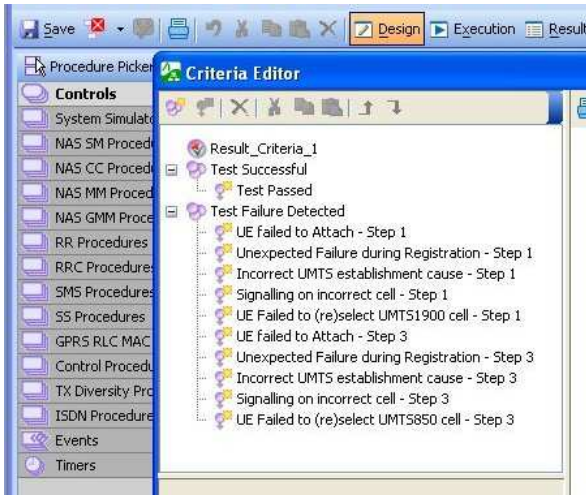
The library has been proven with Anritsu equipment against UEs made available by T-MOBILE USA.

Many of the tests can be run from a single key press and if AT commands are supported by the UE; a fully automatic test campaign is possible. This makes regression testing simple and by using the Criteria editor within the RTD tool, all results are given a preliminary judgment, avoiding the need to study the test logs. The criteria may be changed at any stage to allow very fast result management and report generation without having to re-run the tests. Using the Result criteria to quickly focus in on specific failure causes can lead to greater efficiency.

Criteria Editor

A judgment of the test is made using the criteria set within each test. At a high level: this is shown by a simple pass  or fail . Further investigation reveals the cause of failure or abnormality.

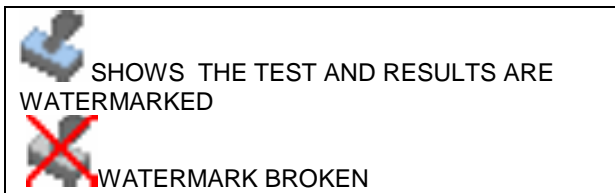
The screen below shows the criteria applied to the example test. These criteria have been approved by T-MOBILE USA and may determine incorrect behavior that can be traced back to the protocol messages in the resultant log. The test criteria may be modified by the user to prove specific functionality and applied to new and existing tests. For existing tests it has the added benefit that tests do not need to be re-run to analyze results against new criteria.



Criteria applied to test

Watermarking of tests and results

We encourage users to make copies of the tests and make changes for debug and other purpose, so all tests in the Library have a watermark that is broken if the test is modified. This provides confidence to the user and T-MOBILE USA that the tests and results from original tests have not been modified.



Test and Library Development in the future

Tests that are suited to the RTD Test System will be created and supported by Anritsu with cooperation from T-MOBILE USA. The intention is to release more tests every 3 months to align with the T-MOBILE USA processes.

365 RTD test cases

The library currently includes 365 RTD tests that cover a range of needs. The intention is to populate the libraries with all the tests relevant to T-MOBILE USA's requirements over the next year and maintain them on a quarterly basis.

Test sections covered today include:	
Idle mode	Registration Cell Selection/Reselection Roaming Inter-Band, Inter-RAT Measurements
Connected CS	MO voice calls RAB Tests MT calls MO Emergency Call Operation
Connected PS	UMTS PS Call Operations RAB Tests
Handovers and Reselections	Soft/Softer Handovers Inter-RAT (UMTS – GSM) Inter-RAT (GSM – UMTS) Inter-RAT (Subsequent handovers) Interband and other handovers Cell Reselections (Connected mode)
Miscellaneous	Miscellaneous Miscellaneous Failure Conditions Miscellaneous Failure Conditions – Reject codes
HSDPA	Basic Tests State transitions RAB Tests RAB Reconfigurations Handovers/Reselections Inter-RAT Handovers/Reselections (UMTS-GSM) Inter-RAT Handovers/Reselections (GSM-UMTS) Intra-Frequency and Inter-Frequency Handovers Soft handovers Measurements
HSUPA	Basic tests State transitions RAB tests RAB Reconfigurations Inter-RAT Handovers/Reselections (UMTS-GSM) Inter-RAT Handovers/Reselections (GSM-UMTS) Intra-Frequency and Inter-Frequency Handovers Soft handovers
Utility	Utility Tests are used to set up initialized conditions for registration, forbidden PLMNs and cable losses in the test jigs.
Total	528

USIM / SIM Compatibility

The UMTS Protocol Test Library is designed to work against the T-Mobile USA UMTS Protocol Test Library USIM 'UPL 3G r1' (Anritsu Part Number MX786201A-227) and SIM 'UPL 2G r2' (Anritsu Part Number MX786201A-226). A sample of these is provided and details of how they may be created are described in the manual.

Automating tests

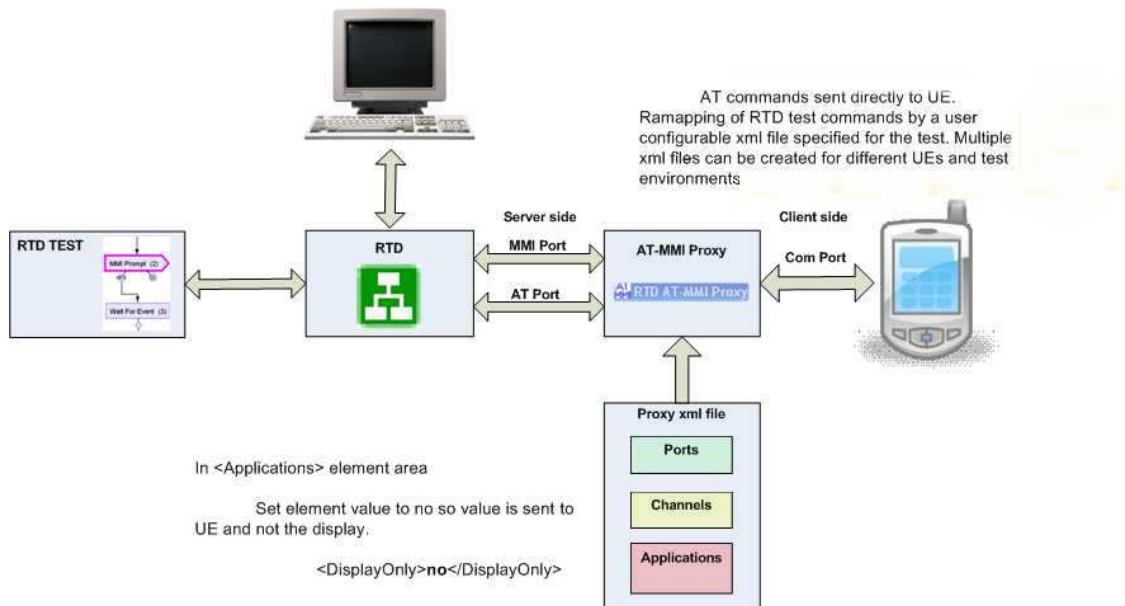
Running the Test Cases Using the AT-MMI Proxy to Automation

The RTD provides proxy control of the AT command set to the UE through the RTD Test Cases. It enables automated testing to be achieved through a serial port on the control PC. In order to use the AT commands provided within the test cases, the RTD ATMMI command interface must be set to use the appropriate serial port connection and an appropriate proxy.xml file is applied to map the AT/MMI commands to match those supported by the UE. Prompts on the screen can be suppressed when automation is used.

Some points to note:

- In general automated testing can be carried out via the use of the AT command set [3GPP TS27.007]
- Full control of a UE is only possible if the UE vendor has made provision for an automated testing interface
- The combined AT/MMI proxy was developed as a flexible interface which can adapt to many different types of UEs through the use of a configuration file 'proxy.xml'
- Where the vendor has not implemented a given AT command, for instance AT+CFUN which is used to turn off the UE between tests, it may be possible to use the Keypad Control command (AT+CKPD) which simulates the pressing of the UE key pad via the AT command interface.

RTD with AT-MMI proxy enabled



Running the RTD within a test system

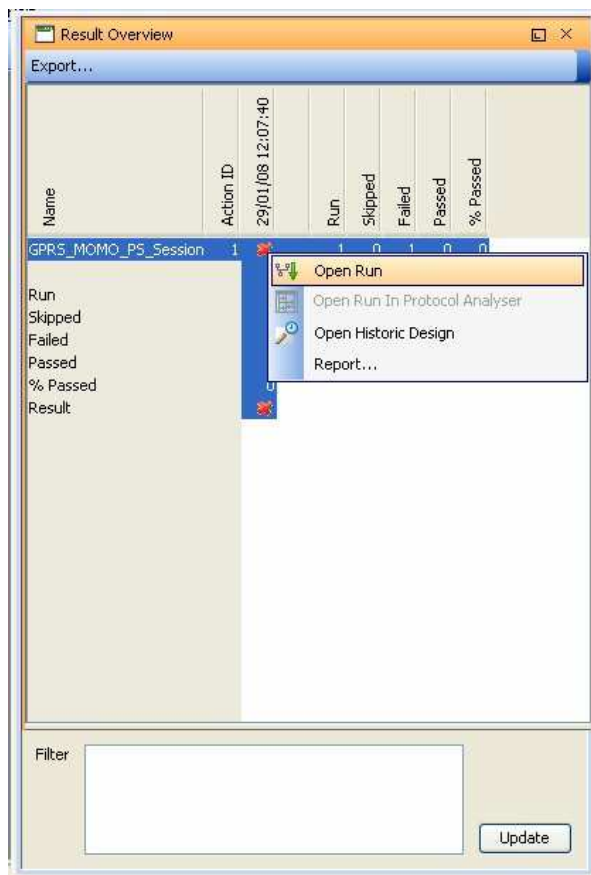
The RTD may also be controlled using remote commands and integrated into a total test system. The RTD is compatible with a number of remote commands that allow Tests to be RUN, ANALYZED, etc.

Campaign management within the tool

The RTD now includes campaign management. This provides the user with the ability to create test runs that can be run remotely.

Tests can be repeated depending on rules set by the user. Results are generated in a tabular form and can be exported to form part of a formal report.

A campaign may be used to run an entire suite of conformance tests, or inter-operability tests, or any other large grouping of tests.



Test Results

Test results may be summarized for reports and exported to external formats (such as XML or CSV).

Library Support

Support and maintenance of the library includes upgrading and re-validating existing test cases to new platform versions of RTD. Every time the RTD platform is upgraded to enable new features or improve stability and/or usability, the test cases are re-validated. Each current test case needs to be upgraded and tested for 2 consecutive passes against a selection of Reference UEs.

Changes to the test specifications will require maintenance of test cases based on T-Mobile's new requirements. An important maintenance activity for this is moving all our test cases over from SIM to USIM authentication. This development effort resulted in new compound procedures to facilitate changing PLMNs, MCCs, MNCs, and other related USIM parameters. Maintenance of test cases based on T-Mobile's new requirements occurs every 3 months.

We are also looking at ways to better integrate the RTD into users automation systems.

We have support staff in place at both the UK and US facilities that provide frequent support to customers on issues they are seeing with their devices using T-Mobile test cases.

Ordering information

RTD users now have the ability to purchase the Libraries outright or subscribe to them on an annual basis to suit their fiscal needs.

1. Purchasing the tests requires the customer to order each individual Library package. Further packages will be released throughout the year. Details are in the Roadmap which can be supplied by your local Anritsu representative.

Part Number	Library Package
MX786201A-201	T-Mobile USA UMTS Protocol Test Library Package 1 (For RTD)
MX786201A-202	T-Mobile USA UMTS Protocol Test Library Package 2 (For RTD)
MX786201A-203	T-Mobile USA UMTS Protocol Test Library Package 3 (For RTD)
MX786201A-204	T-Mobile USA UMTS Protocol Test Library Package 4 (For RTD)
MX786201A-205	T-Mobile USA UMTS Protocol Test Library Package 5 (For RTD)
MX786201A-206	T-Mobile USA UMTS Protocol Test Library Package 6 (For RTD)
MX786201A-207	T-Mobile USA UMTS Protocol Test Library Package 7(For RTD)
	<i>Future packages are described in the Roadmap</i>
	<i>Note that 3 Utility Tests are included in all packages</i>

2. Purchasing an annual subscription provides access to all available tests for the period of subscription.

Part Number	Library Package
MX786201A-200	T-Mobile USA UMTS Protocol Test Library Annual Subscription and support
	<i>Note that 3 Utility Tests are included</i>

3. Subscribers to the libraries may convert to purchasing the libraries. There is a reduced price for those libraries already supplied.

Part Number	Library Package
MX786201A-251	T-Mobile USA UMTS Protocol Library Package 1 (for RTD), upgrade from subscription
MX786201A-252	T-Mobile USA UMTS Protocol Library Package 2 (for RTD), upgrade from subscription
MX786201A-253	T-Mobile USA UMTS Protocol Library Package 3 (for RTD), upgrade from subscription
MX786201A-254	T-Mobile USA UMTS Protocol Library Package 4 (for RTD), upgrade

Technical Datasheet

	from subscription
MX786201A-255	T-Mobile USA UMTS Protocol Library Package 5 (for RTD), upgrade from subscription
MX786201A-256	T-Mobile USA UMTS Protocol Library Package 6 (for RTD), upgrade from subscription
MX786201A-257	T-Mobile USA UMTS Protocol Library Package 7 (for RTD), upgrade from subscription
	<i>Future packages are described in the Roadmap</i>
	<i>Note that 3 Utility Tests are included in all packages</i>

- **NOTE:**
- Option 200 provides a license to use all released T-MOBILE USA tests for one year. This option should be ordered on its own and includes the support and maintenance of the tests for a year from date of purchase.
- We expect to release 2 library options per year in 4 packages (updates every 3 months). Please ask your Anritsu Representative for the latest roadmap
- These tests are under continuous maintenance with T-MOBILE USA and may change to meet their future requirements.

Part Number	Optional Accessories
MX786201A-226 (supersedes 66996)	T-Mobile USA UMTS Protocol Test Library SIM 'UPL 2G r2'
MX786201A-227 (supersedes 66997)	T-Mobile USA UMTS Protocol Test Library USIM 'UPL 3G r1'

- **NOTE:**
- One set of the SIM / UICCs is provided with the library when purchased or when a subscription is renewed.

Recommended MD8480C Configuration		
Part Number	Product Description	Quantity
MD8480C	W-CDMA SIGNALLING TESTER	1
MU848060C	TDMA2	1
MU848060C-01	EGPRS(R99)	1
MU848072C1	BTS UNIT	2
MU848072C-01	HSDPA	3
MU848072C-02	HSUPA	3
MD8480C-03	ADDITIONAL RF UNIT2	1
MX848001A-01	W-CDMA SIGNALLING TESTER TX DIVERSITY	1
MX848001A-02	W-CDMA SIGNALLING TESTER COMPRESSED MODE	1
MX848001A-05	W-CDMA SIGNALLING TESTER GSM FREQUENCY HOPPING	1
MX848001C-11	HSDPA TX DIVERSITY	
MX848041C	FIRMWARE FOR CIPHERING	1
MX848041A-01	TX DIVERSITY FOR CIPHERING	1
MX848041A-02	COMPRESSED MODE FOR CIPHERING	1
MX848041A-05	GSM FREQUENCY HOPPING FOR CIPHERING	1
MX848041A-10	HSDPA CIPHERING	1
MX848041A-11	HSDPA TX DIVERSITY FOR CIPHERING	1
MX848045C	GSM/GPRS2 CIPHERING	1
MC0011A	WEB ACCESS KEY	
MD8480C-SS150	1 YEAR SUPPORT SERVICE (W/G/HSPA)	1
MD8480C-SS151	1 YEAR SUPPORT SERVICE CIPHERING (W/G/HSPA)	1
Z1218A	MD8480C SOFTWARE WITH CIPHERING CD-ROM	1

- **NOTE: The configuration above is recommended to allow all tests in the libraries to be run. Tests are validated using this configuration only.**



Specifications are subject to change without notice.

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