Discover What's Possible™

RTD (Rapid Test Designer)

LTE Protocol Development Application

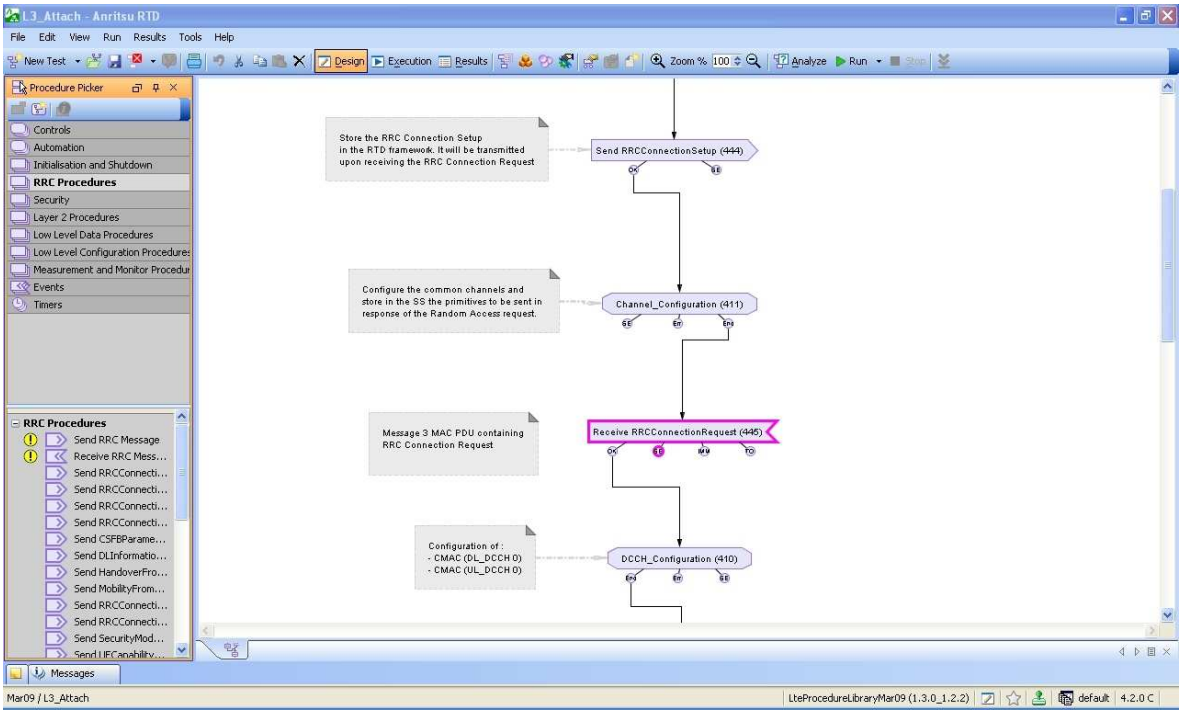
MX786201A

Introduction

The RTD is a unique environment for creating test scenarios to prove the protocol & behavior of modern wireless terminals. The Graphical Flow Chart brings many benefits to test creators as well as those executing the tests and provides fast flexible methods for test iteration, as well as creation and maintenance.
The RTD comes with a suite of multi-RAT (GERAN/UTRAN/LTE) signaling testing libraries for creating and executing tests on the industry standard MD8480C (GERAN/UTRAN) and MD8430A (LTE) signalling tester platforms. Together they provide terminal development organizations with the tools needed to support their development cycle, through integration and onto inter-operability, regression and acceptance. Additionally the MD8470A provides a system for LTE/CDMA 2000 inter-working development.

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 terminal's behavior. Tests can be annotated, enabling easy identification of logical and functional blocks so that they may be re-used by "cutting and pasting" into a new test if required. Test flow is available when manually investigating failures or when checking for specific conditions.



- **Fast test creation and execution –** tests can be easily created and modified for fast debug and analysis
- **Built in pass/fail judgment -** preliminary judgment of the tests results using criteria simplifies analysis
- **Automation of tests** – built in intelligent test sequencer and control of device under test means campaigns can be run unattended
- **Real time displays** – Many parameters are shown during test execution for performance analysis
- **Proven hardware reliability** – existing MD8480C users will know the benefits from the most stable platform – MD8430A extends that reliability

Virtual Front panel

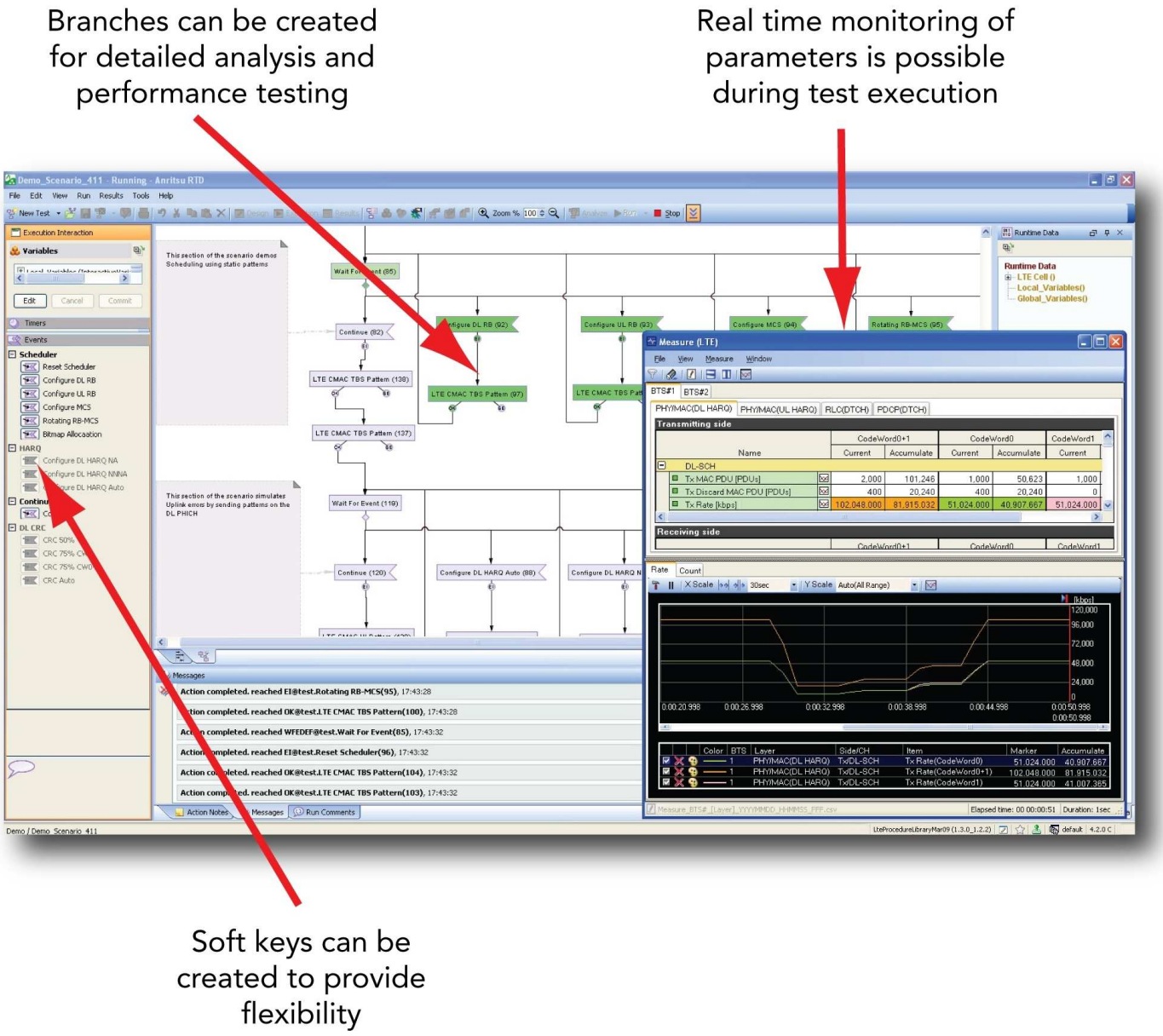
The RTD allows terminal development teams to create test scenarios with virtual front panel control. This provides a fast development, debug and proving environment without the need to recompile between iterations. In some cases it is possible to make changes to the parameterization while tests are running for examination of performance

Automating the scenarios is also possible, so a single test can be used to check over a range of values without any human intervention.

A real time measurement and monitoring application is available to see the effect of different loading and scheduling.

Virtual Buttons

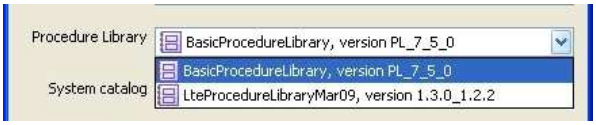
Tests can include “soft-buttons” that allow a variety of functions and features for manual investigation of terminal performance. E.g. control of power levels during tests to be modified without re-running the tests.



Example of virtual front panel with soft keys

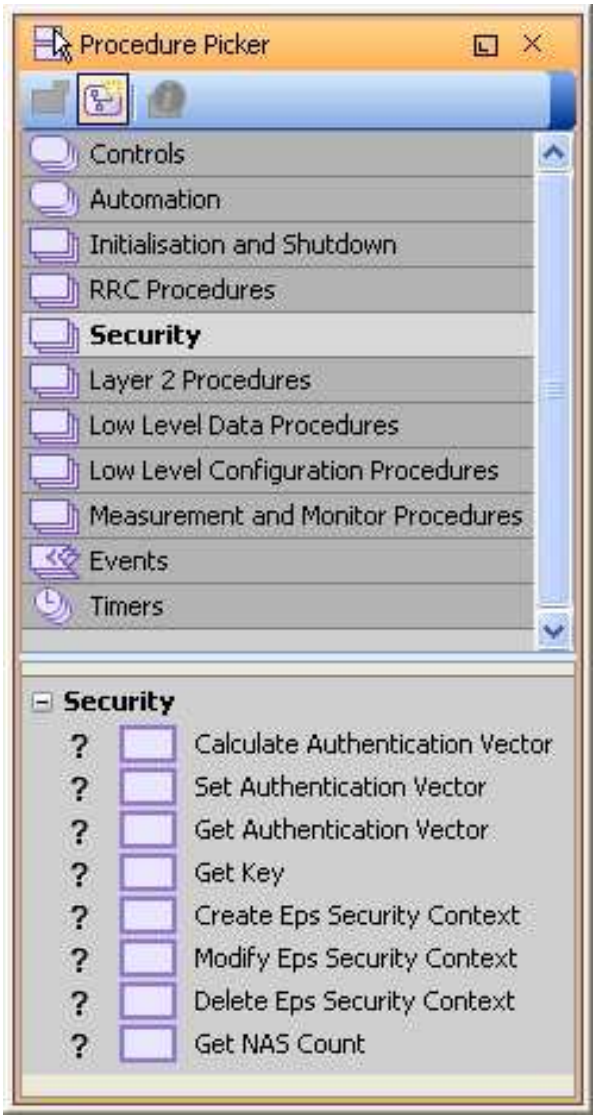
Procedure Library support

There are two RTD Procedure Libraries available. LTE Low-level Configuration Library (Mar09) and a UTRAN/GERAN Layer 3 Procedure Library.



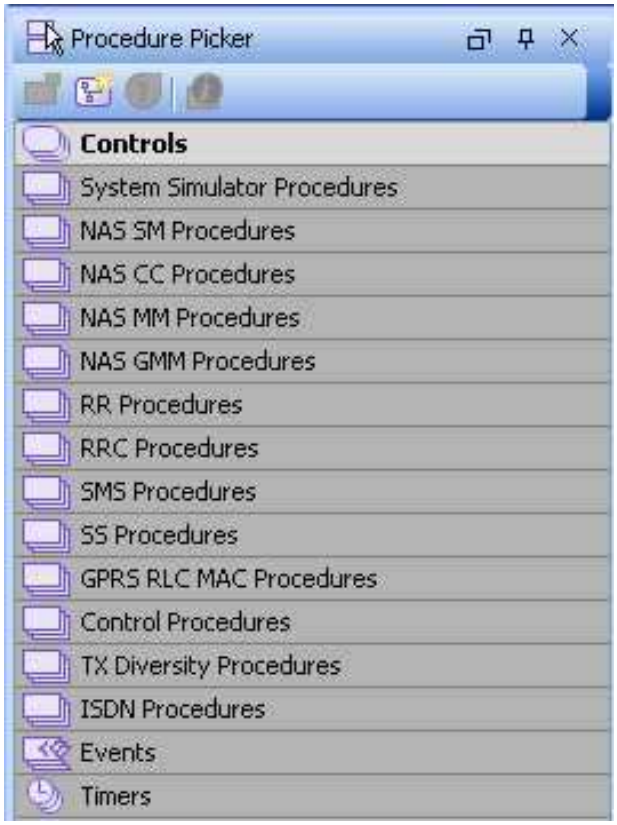
These libraries are maintained with the 3GPP protocol specifications to provide a system that not only stays up to date with latest changes in the 3GPP process but also allows the user to upgrade existing test scenarios with a single command.

LTE Procedure Libraries



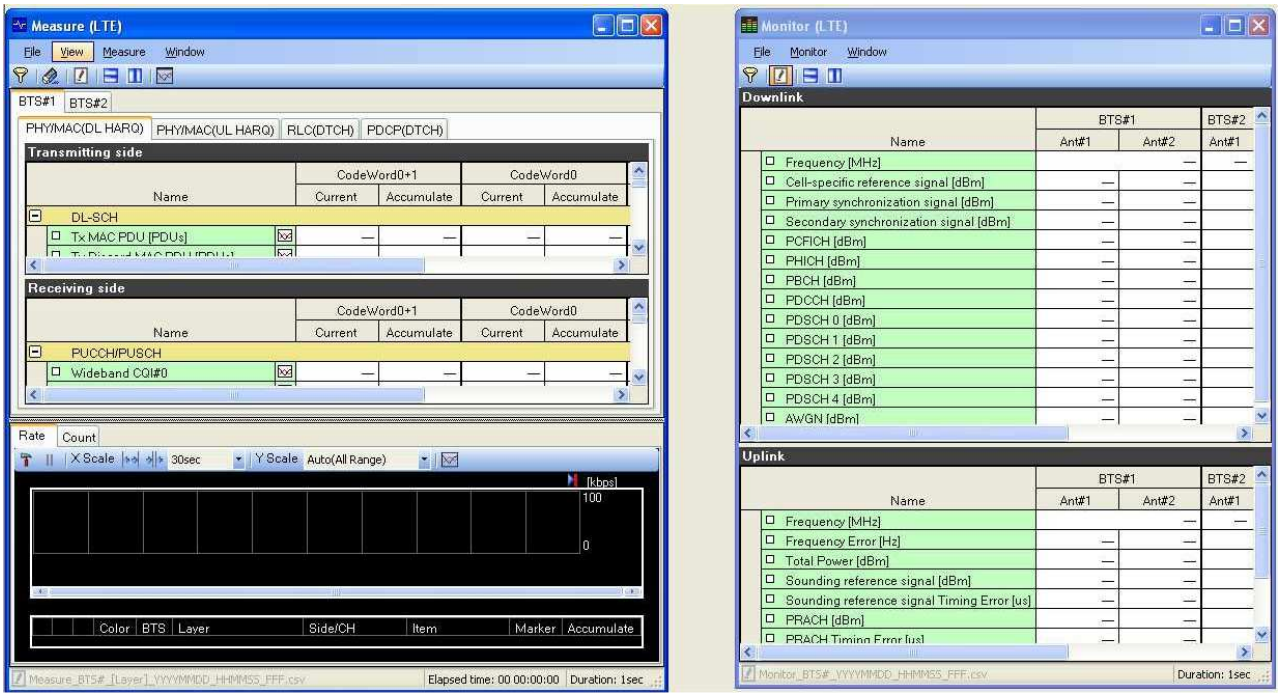
As LTE matures, the number of procedural blocks will increase and with updates occurring every 3 months, users can expect to keep up with 3GPP developments.

UTRAN/GERAN Procedure Libraries



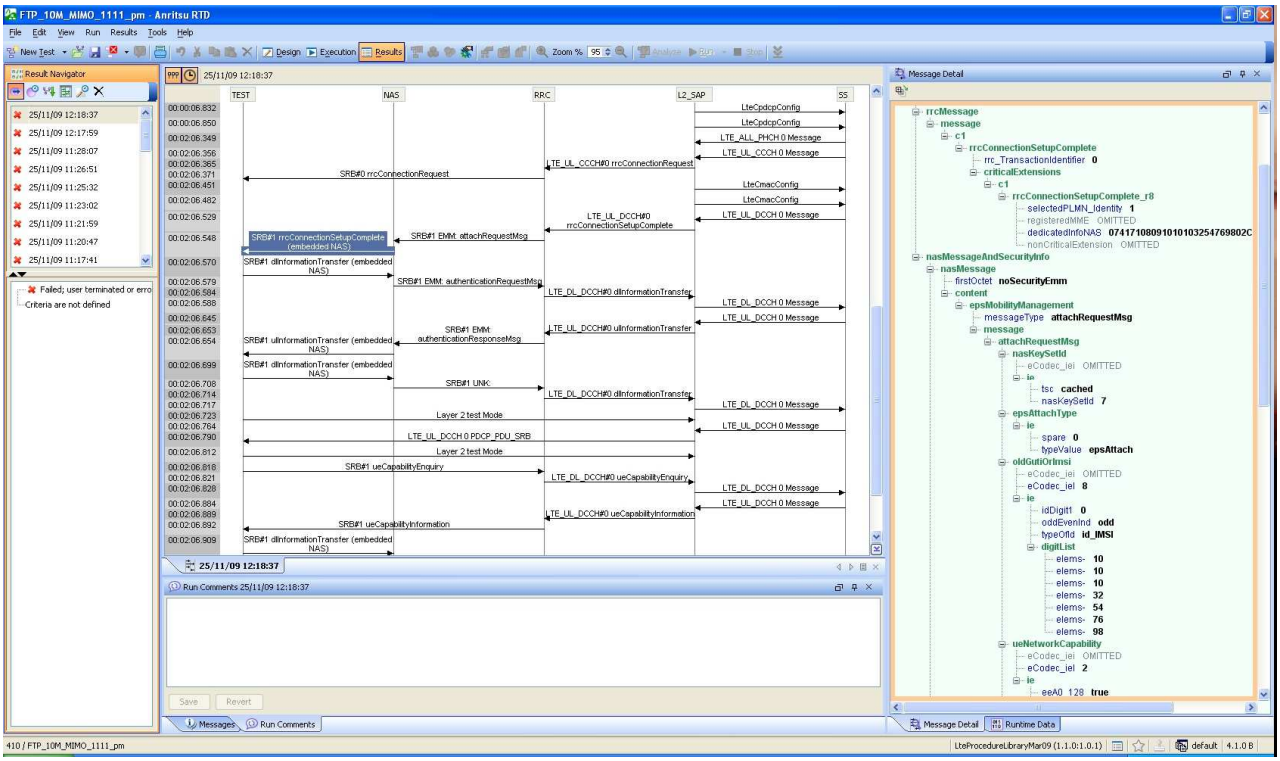
3GPP progression
A very important feature of the RTD is the ability to update tests to the latest 3GPP Release. Entire archives of test scenarios can be updated automatically and for regression, backups of the original are saved.

The Measurement and Monitor Application



Runtime information is available to the user in a number of ways. As well as protocol messages, the RTD provides an application that is used to measure throughput under a number of scenarios. Conditions can be changed while displaying the throughput of data in the graphical window.

The Dynamic MSC provides a message sequence chart as the test progresses. This information is dynamically updated during runtime. The user can switch between Diagram and MSC view while the test is running without interrupting the logging of trace information. The trace is cleared when the test is rerun, but all the information from the test run will be stored in a Test Log Results file ready to view with the Protocol Analyzer.



Test Results Analysis

The RTD provides several ways to observe test results. A complete log of the messages is captured for viewing with the in-built protocol analyzer or may be exported to HTML for viewing on a web browser.

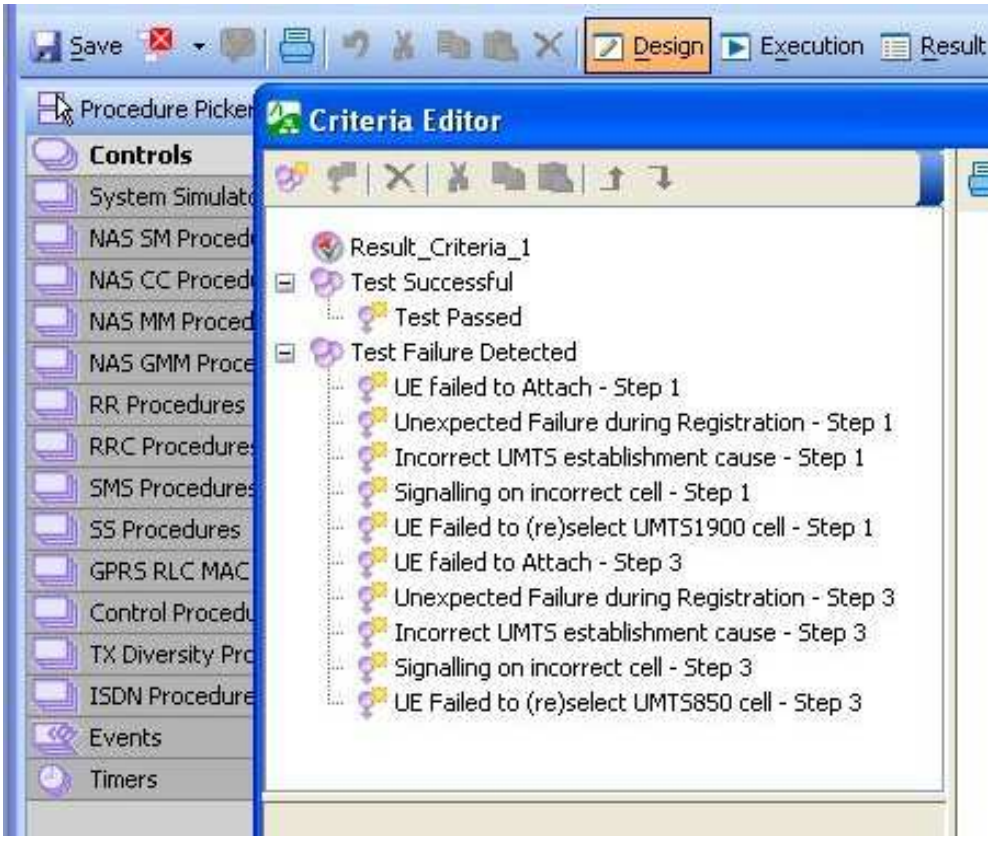
Criteria Editor
The RTD is able to provide a preliminary judgment of the tests results using criteria that can be set by the test creator or modified later for custom judgment of the results. The criteria are determined by the flow of the tests with multiple loops possible to ensure that behavior is accurately recorded. 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 to 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.

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 Anritsu test packages have a watermark that is broken if the test is modified. This provides confidence to the user that the tests and results from original tests have not been modified.

SHOWS THE TEST AND RESULTS ARE WATERMARKED

WATERMARK BROKEN

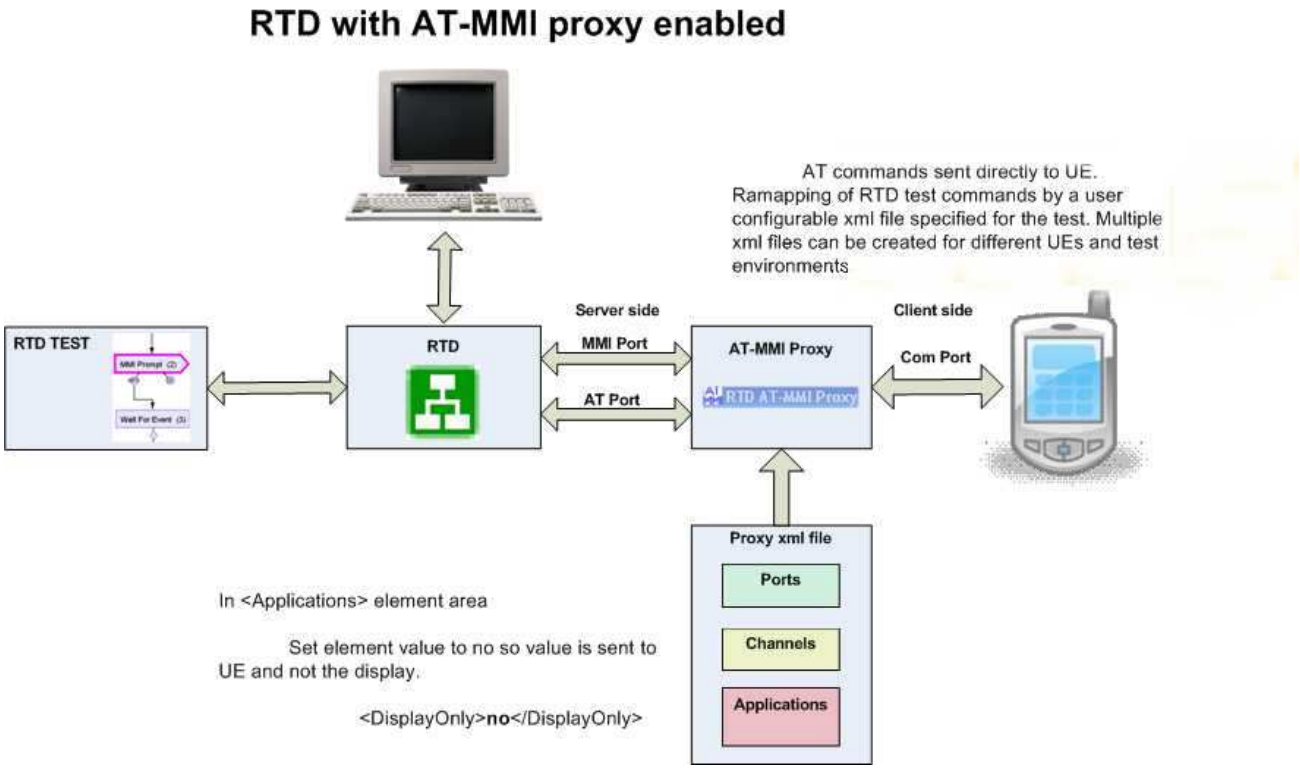


Automating tests

Running the Test Cases Using the AT/MMI Proxy for Automation

The RTD provides proxy control of the AT command set to the terminal 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 AT/MMI 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 terminal.
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 terminal is only possible if the terminal 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 terminals 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 power cycle the terminal between tests, it may be possible to use the Keypad Control command (AT+CKPD) which simulates the pressing of the terminal key pad via the AT command interface.



Running the RTD within a test system

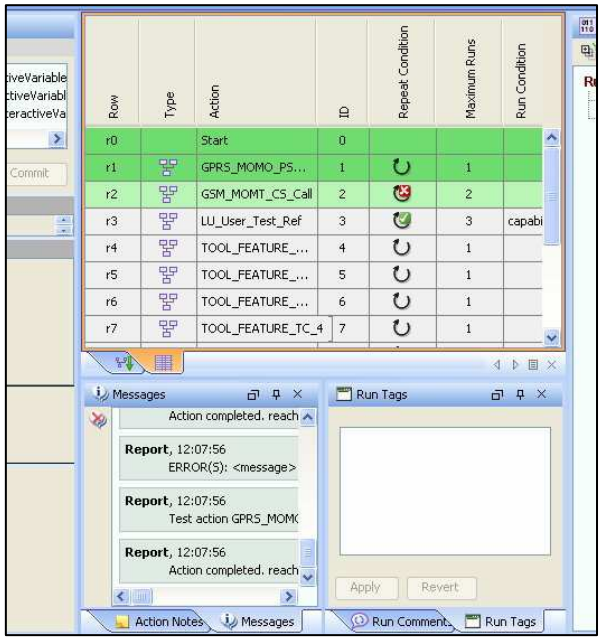
The RTD may also be controlled using remote commands and integrated into a total test system. The RTD is compatible with a number of remote commands that allow Tests to be RUN, ANALYZED, etc.

Campaign management within the tool

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

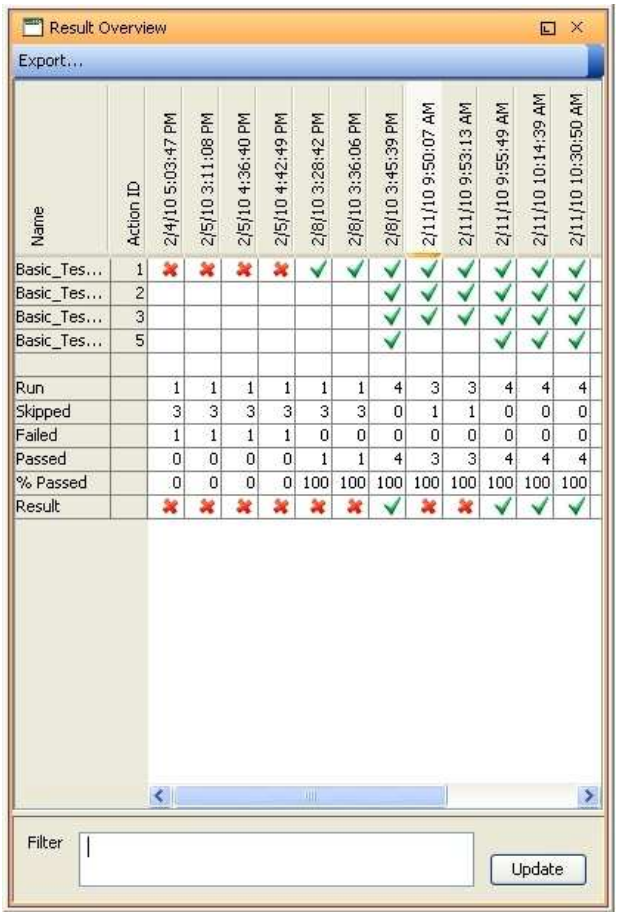
Tests can be repeated depending on rules set by the user. Results are generated in a tabular form and can be exported to form part of a formal report.

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

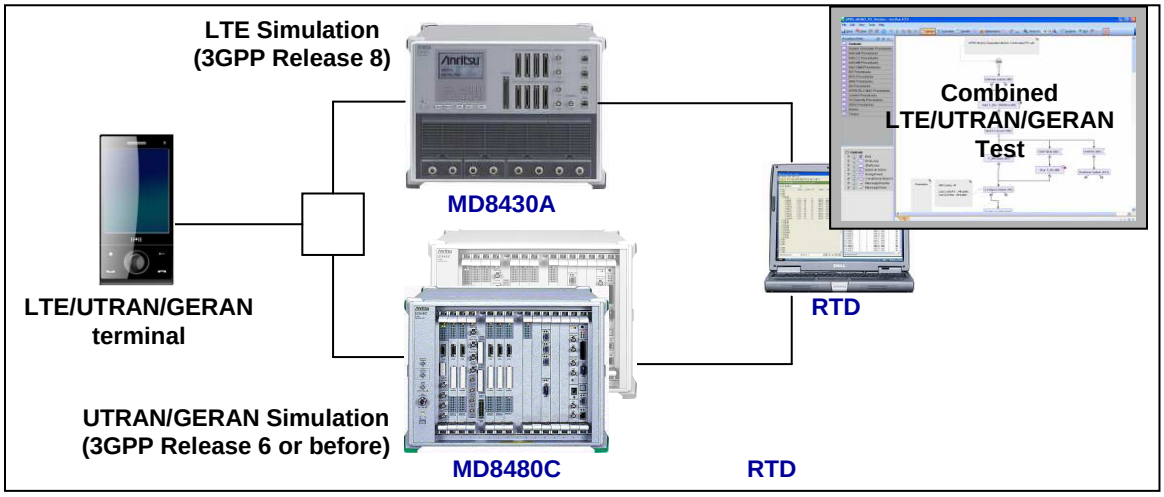
Test results may be summarized for reports and exported to external formats (such as XML or CSV). The Results Overview created within the tool may be used for regression purposes.



LTE / UTRAN / GERAN Inter-working

The RTD is able to control the MD8430A and MD8480C to simulate network behavior in LTE / UTRAN / GERAN Inter-working processes. This provides a compelling way for existing RTD users to upgrade using their existing tests and experience to develop even greater test coverage.

LTE, UTRAN, and GERAN procedures can be used in a single test to create a combined LTE/UTRAN/GERAN test.



- **MD8480C specifications**
- Up to 4 W-CDMA* cells and 2 TDMA** cells
- Up to 2 physical RF channels
- HSDPA up to 14.4MB: HSUPA up to 5.7MB
- Enhancement to HSPA Evo
- Part of RTD, PTS and PCT systems

- **MD8430A specifications**
- LTE for FDD and TDD covering 350 to 3000 MHz frequency band
- 100 MB (DL): 50 MB (UL)
- 4 RF supports 2x2MIMO handover
- Up to 6 Cells (2 communication, 4 neighbor)
- Future proof – Cat 4 today

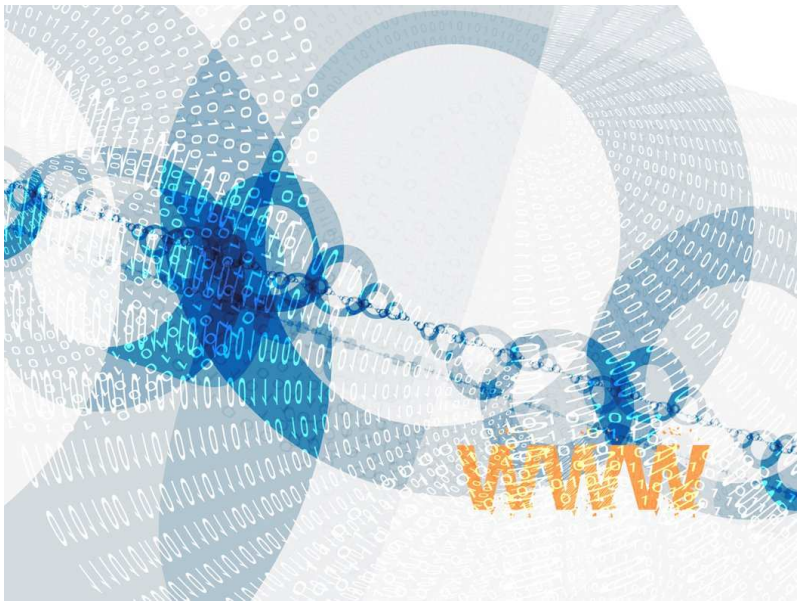
RTD Test Packages

In order to provide the fastest route to market, RTD has an LTE Integration library available as an option for LTE development teams. The tests provide developers and integrators with 29 tests that will be available through 2010 and 2011.

- Each test case is specified with a test case title, a brief description of the aim of the test case and the SS feature that they intend to demonstrate
- The test cases are chosen to cover the majority of the LTE/SAE protocol areas
- The test cases are designed to be usable as full-stack building blocks for customers to use to build system tests

Support and maintenance of the test packages includes upgrading and re-validating existing test cases to new platform versions of RTD as well as later 3GPP releases.

We have support staff in the USA, UK and Japan to provide support to customers on issues they may have with their devices using tests in the test packages.



Reference Test packages

RTD is delivered with reference test packages that provide a natural way to discover the features and benefits of the RTD. Coupled with the operation manuals and the on-line help, these tests are part of the overall training program.

Acceptance Test packages

There are a number of acceptance test packages available for RTD including *The AT&T IOT Library Packages and T-Mobile USA UMTS Protocol Test Library Packages*
RTD users now have the ability to purchase the Libraries outright or subscribe to them on an annual basis to suit their fiscal needs.
Other 3rd party library packages may be available through partnerships with network operators.

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 that the tests and results from original tests have not been modified.


SHOWS THE TEST AND RESULTS ARE WATERMARKED


WATERMARK BROKEN

Ordering information

RTD is configured to be very flexible and to allow existing Anritsu products to be updated and upgraded while still protecting investment in tests and equipment. Two examples of typical systems is shown below.

LTE Protocol development system

Configured for LTE R&D, Integration and regression with multi-cell capability L1/L2 and L3 Libraries & LTE Integration Test Package – uses MD8430A – STM hardware.

Applications
This configuration provides L1 / L2 and a L3 capability to allow LTE multi-cell test creation, editing and executing of the tests

MX786201A – Rapid Test Designer (RTD) chassis
MX786201A-028 – Layer 1 / 2 Statistics monitor
MX786201A-038 - Low-level Configuration Library (LTE)
MX786201A-039 - Layer 3 Procedure Library (LTE)
MX786201A-040 – RTD Ciphering
MX786201A-045 - RTD test creation and editing capability
MX786201A-052 – RTD dual-cell capability (run-time option)
MX786201A-020 – Annual software support and maintenance

Technology
This configuration is for LTE FDD

MX787201A - Framework chassis
MX787201A-027 - Framework LTE core
MX787201A-028 - Framework LTE FDD option
'MX787201A-SS100 – Annual support and maintenance

Tools
This configuration has full automation of tests and control of the DUT.

MX787401A - Signaling application tools chassis
MX787401A-011 - Protocol Analyzer(RTD)
MX787401A-012 - Remote control
MX787401A-013 - Terminal control
MX787401A-014 - Signaling Application Tool for Test Sequencing
MX787401A-SS100 – Annual support and maintenance

Services
Support and maintenance for RTD is on an annual basis.

MX786201A-024 RTD Advanced Training Course (5 days)

Test Packages
There are test packages for a number of different applications and technologies. This configuration provides an LTE package

MX786201A-911 – LTE Integration Test Package for RTD

NOTE: Blue text denotes optional

Other options to consider:

MX786201A-026 - Framework HSPA Evo (R8)
MX786201A-029 - Framework LTE TDD
MX786201A-031 - Framework CDMA 2000 (C2k)
MX786201A-041 - Layer 3 Procedure Library (UTRAN/GERAN)
MX786201A-047 - 3 x RTD creation and editing licences
MX787201A-012 - Multiple h/w platform support RTD (MD8480/8430/8470)
MX787201A-021 - Framework GERAN core
MX787201A-023 - Framework UTRAN core (Rel-99 to Rel-7 inclusive)
MX787201A-046 - RTD Multi cell capability (run-time option) [alternative to MX787201A-052]
MX787201A-051 - Floating (server based) license
MX787401A-061 - Interface driver for MD1230A/B (data analyzer)
MX787401A-062 - Interface driver for MF6900A (fading simulator)

LTE / UTRAN / GERAN Protocol development system

Configured for LTE / UTRAN / GERAN R&D, Integration and regression with multi-cell capability L1/L2 and L3 Libraries & LTE Integration Test Package – uses MD8430A – STM and MD8480C hardware.

Applications
This configuration provides L1 / L2 and a L3 capability to allow LTE multi-cell test creation, editing and executing of the tests

MX786201A – Rapid Test Designer (RTD) chassis
MX786201A-028 – Layer 1 / 2 Statistics monitor
MX786201A-038 - Low-level Configuration Library (LTE)
MX786201A-039 - Layer 3 Procedure Library (LTE)
MX786201A-040 – RTD Ciphering
MX786201A-045 - RTD test creation and editing capability
MX786201A-046 - Multi-cell capability (run-time option)
MX786201A-020 – Annual software support and maintenance

Technology
This configuration is for LTE FDD

MX787201A - Framework chassis
MX787201A-012 - Multiple h/w platform support RTD (MD8480/8430/8470)
MX787201A-021 - Framework GERAN core
MX787201A-023 - Framework UTRAN core (Rel-99 to Rel-7 inclusive)
MX786201A-026 - Framework HSPA Evo (R8)
MX787201A-027 - Framework LTE core
MX787201A-028 - Framework LTE FDD option
MX786201A-041 - Layer 3 Procedure Library (UTRAN/GERAN)
'MX787201A-SS100 – Annual support and maintenance

Tools
This configuration has full automation of tests and control of the DUT.

MX787401A - Signaling application tools chassis
MX787401A-011 - Protocol Analyzer
MX787401A-012 - Remote control
MX787401A-013 - Terminal control
MX787401A-014 - Signaling Application Tool for Test Sequencing
MX787401A-SS100 – Annual support and maintenance

Services
Support and maintenance for RTD is on an annual basis.

MX786201A-024 RTD Advanced Training Course (5 days)

Test Packages
There are test packages for a number of different applications and technologies. This configuration provides an LTE package

MX786201A-911 – LTE Integration Test Package for RTD

NOTE: Blue text denotes optional

Other options to consider:

MX786201A-029 - Framework LTE TDD
MX786201A-031 - Framework CDMA 2000 (C2k)
MX786201A-047 - 3 x RTD creation and editing licences
MX787201A-051 - Floating (server based) license
MX787401A-061 - Interface driver for MD1230A/B (data analyzer)
MX787401A-062 - Interface driver for MF6900A (fading simulator)

RTD is also available for terminal acceptance and interoperability. Please see the appropriate data sheet for a full description and list of Options and Support details.

Anritsu

Specifications are subject to change without notice.

Anritsu Corporation
5-1-1 Onna, Atsugi-shi, Kanagawa, 243-8555 Japan
Phone: +81-46-223-1111
Fax: +81-46-296-1264

• **U.S.A.**
Anritsu Company
1155 East Collins Blvd., Suite 100, Richardson,
TX 75081, U.S.A.
Toll Free: 1-800-267-4878
Phone: +1-972-644-1777
Fax: +1-972-671-1877

• **Canada**
Anritsu Electronics Ltd.
700 Silver Seven Road, Suite 120, Kanata,
Ontario K2V 1C3, Canada
Phone: +1-613-591-2003
Fax: +1-613-591-1006

• **Brazil**
Anritsu Eletrônica Ltda.
Praca Amadeu Amaral, 27 - 1 Andar
01327-010-Paraiso-São Paulo-Brazil
Phone: +55-11-3283-2511
Fax: +55-11-3288-6940

• **Mexico**
Anritsu Company, S.A. de C.V.
Av. Ejército Nacional No. 579 Piso 9, Col. Granada
11520 México, D.F., México
Phone: +52-55-1101-2370
Fax: +52-55-5254-3147

• **U.K.**
Anritsu EMEA Ltd.
200 Capability Green, Luton, Bedfordshire, LU1 3LU, U.K.
Phone: +44-1582-433200
Fax: +44-1582-731303

• **France**
Anritsu S.A.
16/18 avenue du Québec-SILIC 720
91961 COURTABOEUF CEDEX, France
Phone: +33-1-60-92-15-50
Fax: +33-1-64-46-10-65

• **Germany**
Anritsu GmbH
Nemetschek Haus, Konrad-Zuse-Platz 1
81829 München, Germany
Phone: +49-89-442308-0
Fax: +49-89-442308-55

• **Italy**
Anritsu S.p.A.
Via Elio Vittorini 129, 00144 Roma, Italy
Phone: +39-6-509-9711
Fax: +39-6-502-2425

• **Sweden**
Anritsu AB
Borgafjordsgatan 13, 164 40 KISTA, Sweden
Phone: +46-8-534-707-00
Fax: +46-8-534-707-30

• **Finland**
Anritsu AB
Teknobulevardi 3-5, FI-01530 VANTAA, Finland
Phone: +358-20-741-8100
Fax: +358-20-741-8111

• **Denmark**
Anritsu A/S
Kirkebjerg Allé 90, DK-2605 Brøndby, Denmark
Phone: +45-72112200
Fax: +45-72112210

• **Spain**
Anritsu EMEA Ltd.
Oficina de Representación en España
Edificio Veganova
Avda de la Vega, n° 1 (edf 8, pl 1, of 8)
28108 ALCOBENDAS - Madrid, Spain
Phone: +34-914905761
Fax: +34-914905762

• **Russia**
Anritsu EMEA Ltd.
Representation Office in Russia
Tverskaya str. 16/2, bld. 1, 7th floor.
Russia, 125009, Moscow
Phone: +7-495-363-1694
Fax: +7-495-935-8962

• **United Arab Emirates**
Anritsu EMEA Ltd.
Dubai Liaison Office
P O Box 500413 - Dubai Internet City
Al Thuraya Building, Tower 1, Suit 701, 7th Floor
Dubai, United Arab Emirates
Phone: +971-4-3670352
Fax: +971-4-3688460

• **Singapore**
Anritsu Pte. Ltd.
60 Alexandra Terrace, #02-08, The Comtech (Lobby A)
Singapore 118502
Phone: +65-6282-2400
Fax: +65-6282-2533

• **India**
Anritsu Pte. Ltd.
India Branch Office
Unit No. S-3, Second Floor, Esteem Red Cross Bhavan,
No. 26, Race Course Road, Bangalore 560 001, India
Phone: +91-80-32944707
Fax: +91-80-22356648

• **P.R. China (Hong Kong)**
Anritsu Company Ltd.
Units 4 & 5, 28th Floor, Greenfield Tower, Concordia Plaza,
No. 1 Science Museum Road, Tsim Sha Tsui East,
Kowloon, Hong Kong
Phone: +852-2301-4980
Fax: +852-2301-3545

• **P.R. China (Beijing)**
Anritsu Company Ltd.
Beijing Representative Office
Room 1515, Beijing Fortune Building,
No. 5, Dong-San-Huan Bei Road,
Chao-Yang District, Beijing 10004, P.R. China
Phone: +86-10-6590-9230
Fax: +86-10-6590-9235

• **Korea**
Anritsu Corporation, Ltd.
8F Hyunjuk Building, 832-41, Yeoksam Dong,
Kangnam-ku, Seoul, 135-080, Korea
Phone: +82-2-553-6603
Fax: +82-2-553-6604

• **Australia**
Anritsu Pty. Ltd.
Unit 21/270 Ferntree Gully Road, Notting Hill,
Victoria 3168, Australia
Phone: +61-3-9558-8177
Fax: +61-3-9558-8255

• **Taiwan**
Anritsu Company Inc.
7F, No. 316, Sec. 1, Neihu Rd., Taipei 114, Taiwan
Phone: +886-2-8751-1816
Fax: +886-2-8751-1817

Please Contact: