Mobile Chipset Protocol Test Solutions

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Wireless devices need complex modem software development and many hours of testing. Significant research and development (R&D) investment and specialized expertise are needed. Anritsu's protocol test solutions for chipset R&D address your key challenges of time-to-market and technical complexity.

We offer a range of solutions optimally designed to meet your specific needs. All our protocol test solutions are available with the Rapid Test Designer (RTD) integrated test environment which means they offer the same efficient user interface for test creation, management and execution.

The MD8430A signaling tester for LTE technologies and the MD8480C signaling tester for WCDMA and GERAN are perfect for developing, integrating and regression testing a modem chipset for a smartphone, tablet or M2M device.
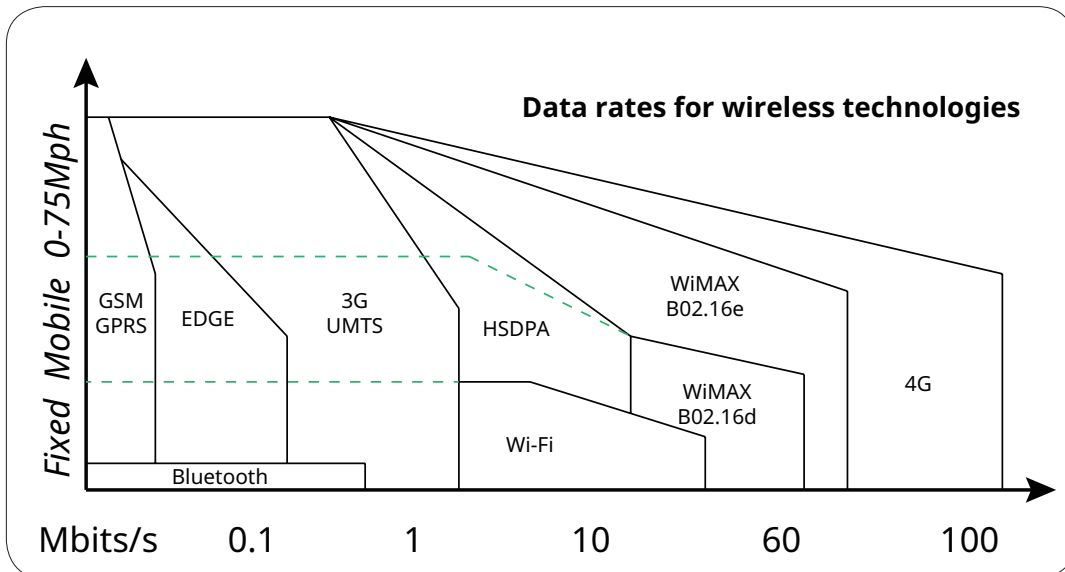
The Challenge

Industry Trends - Ensuring a Quality User Experience

We take for granted the ability to make a voice call from anywhere, to anyone, anywhere. It is easy to forget just how fast this technology has developed.

Alongside voice communications we also expect to check the latest news, receive navigation assistance, find information about our locality, view the activities of our friends and connections on social media, post our own activity updates and blog entries, download or stream music and high definition videos. In fact, many of the tasks we used to perform sitting at a desktop computer, connected to the internet by wire in a static location, we now expect to be able to perform while on the move.

All of these applications and services need an ever-increasing amount of data to be transferred over the air to our devices. Furthermore, it needs to be delivered over an increasingly congested frequency spectrum.

"[2014's] mobile data traffic was nearly 30 times the size of the entire global Internet in 2000. One exabyte of traffic traversed the global Internet in 2000, and in 2014 mobile networks carried nearly 30 exabytes of traffic." - Cisco®

Data rates for wireless technologies

Fixed   Mobile 0-75Mph

GSM GPRS | EDGE | 3G UMTS | HSDPA | WiMAX B02.16e | WiMAX B02.16d | 4G | Wi-Fi | Bluetooth

Mbits/s | 0.1 | 1 | 10 | 60 | 100

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Testing is critical to ensure that devices deliver an exceptional level of performance to the user under all required use cases. This means testing under many different radio conditions and active frequency bands to ensure they perform well and do not impair the performance of the other devices sharing these crowded networks. Problems experienced by consumers in the field can be catastrophic for a brand. Reduction in consumer confidence resulting from field issues can quickly decimate your brand value. This is why identifying and fixing problems early is a business goal for any mobile product development organization.
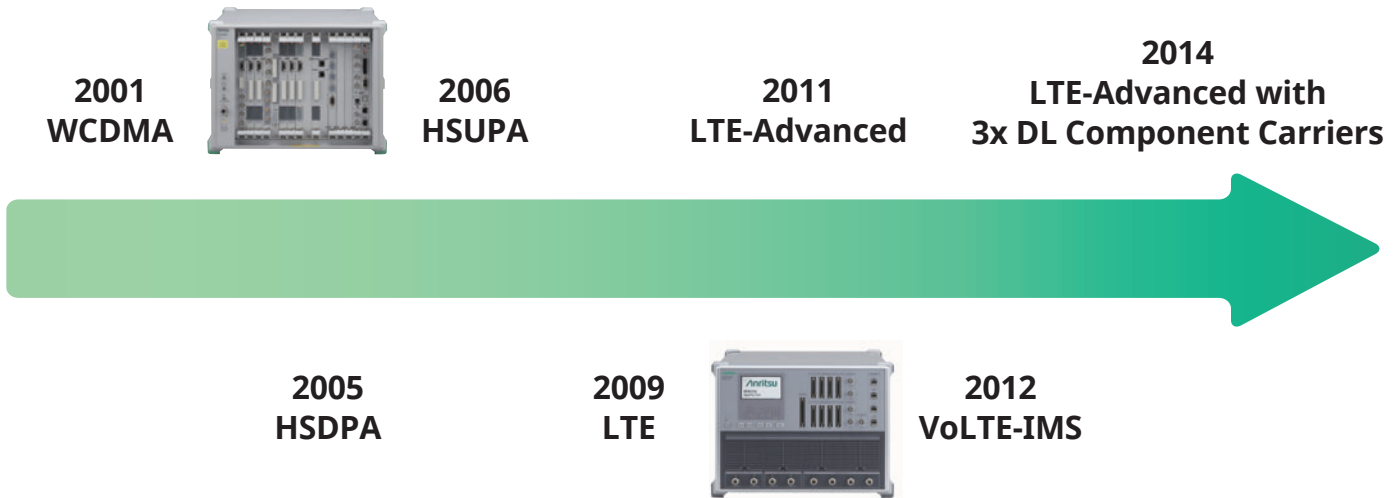
RTD's flowchart-based test scripting makes it the fastest way to create tests with many variants so you can cover any scenario imaginable that might occur in the real world. This gives you reassurance that your brand's reputation is protected.

Device Trends - Increasingly Complex Devices

The latest devices support the latest radio technologies, but they must also support legacy radio standards. Mobile networks around the globe evolve at different rates and we expect our devices to work anywhere. This means our devices must be backwards compatible with earlier standards. They must also support mobility between coverage areas where different radio standards are supported. Today's smartphone therefore has to support 2G, 3G and 4G technologies. It must provide transitions between these technologies that are seamless from a user's perspective. This means that voice calls must not drop, and data transfer must continue without any perceptible interruption during transitions.

Support for multiple frequency bands must be built in to modern products in order to address different markets. The radio spectrum is a scarce resource that is allocated for different uses in different regions of the world. In order for users to experience seamless global roaming most smartphones and similar devices are capable of operating in many different frequency bands.

RTD can work in conjunction with multiple Anritsu signaling testers, covering all the major cellular radio technologies for all globally deployed frequency bands. It fully supports complex interworking scenarios for all commonly deployed combinations.

2001
WCDMA

2006
HSUPA

2011
LTE-Advanced

2014
LTE-Advanced with
3x DL Component Carriers

2005
HSDPA

2009
LTE

2012
VoLTE-IMS

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Product Development Trends

As more wireless technologies are crammed inside devices, and the pressure for global consumer brands to maintain competitive advantage intensifies, wireless developers face the challenges of ensuring a quality user experience and managing complexity with the added pressure of decreasing product launch timescales. The way wireless development teams are organized, and the development methods they employ have changed in order to address these challenges.

RTD's flowchart based test scripting makes it the fastest way to design and implement complex tests. It does not require specialist programming skills and so it can be used by engineers from a broad range of backgrounds – whether they are development engineers, or test specialists.

Agile Development

In order to compress product launch timescales problems must be found and fixed early. Wireless developers are increasingly borrowing the latest techniques from general purpose software development methodologies such as 'Agile'. Tests are defined in parallel with, or even before feature implementation. Where in the past the core development team passed its build to a separate test department in a sequential manner, the trend is for testing to be concurrent with development - there may no longer be a separation between the developers and the testers.

Multiple Remote Teams

We see that development teams are now organized into smaller, specialized sub-teams, often located across multiple geographies so that they are close to the relevant customer and supplier organizations within the ecosystem. For example, the team specialized in the Time Division Duplex (TDD) may be located in China where TDD is the main standard. This team may be working on the same software code base that is worked on by other teams in the US and India. All the teams need to share common design methods and test equipment to ensure consistent results and a high quality end product. They need easy ways to ensure that any changes made to the code base do not break previously verified functionality. The best way to do this is to set up a shared regression test 'farm' of multiple concurrent, fully automated test systems that is capable of running comprehensive suites of tests on daily software builds.

RTD features, such as the ability to connect to a networked server to share a single instance of the software enables efficient use of your investment by multiple remote teams.

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Anritsu's Protocol Test Solutions

Anritsu provides you with a complete set of protocol test solutions to help at every step from early development through to type approval and at every link in the mobile value chain.

Development stage:	Chipset Development, Integration, Regression	Protocol Conformance	Carrier Acceptance
Ideal Solution:	**RTD + MD8430A/MD8480C**	**ME7834 PCT**	**ME7834 CAT MD8475A CAT**

Chipset Development, Integration and Regression

Chipset and device makers develop platforms and reference designs which provide the wireless modem to multiple end products. Protocol testers for core platform development need to support leading edge technology, and features to help with initial feature development such as a digital baseband interface that can be used prior to baseband integration with the RF front end.

All developers need to ensure their implementation continues to work perfectly when code changes are made. Regular builds and frequent regression tests are needed to flag up any unwanted side effects of a new feature implementation at the earliest opportunity. Protocol testers for regression testing need to support fully automated testing of multiple technologies so that broad functional test coverage can be achieved with minimal human intervention. Smartphone and other device makers need to integrate the core wireless platform into their end products. They need a way to easily create a comprehensive set of reference tests that can easily be extended as new platform features are integrated. RTD coupled with the Anritsu MD8430A and MD8480C signalling testers is perfectly suited to these tasks.

Protocol Conformance

Gaining certification from a recognized industry body such as the Global Certification Forum (GCF), will increase your customer's confidence and open up new possibilities for your device on the global market. Anritsu's Protocol Conformance Toolkit application, running on the ME7834 Mobile Device Test Platform provides industry leading test coverage for certification to device makers and commercial test houses.

Carrier Acceptance

The world's leading mobile network operators/carriers need to guarantee that a device used with their network and/or sold in their retail outlets will delight customers and reduce subscriber churn. This is why many have defined their own carrier-specific testing regimes. Anritsu's Carrier Acceptance Test (CAT) application running on the ME7834 and MD8475A Mobile Device Test Platforms, provide support for the highest number of carrier-specific acceptance programmes in the industry.

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RTD – simplifying your testing

RTD software runs on a standard PC. Tests are created using a simple flowchart based editor within a fully integrated test design and execution environment. During test execution, RTD controls one or more Anritsu signaling testers to accurately simulate a number of cellular base stations and provide runtime monitoring information. After the test is complete, protocol analysis features allow rapid troubleshooting of any issues found with the implementation under test.
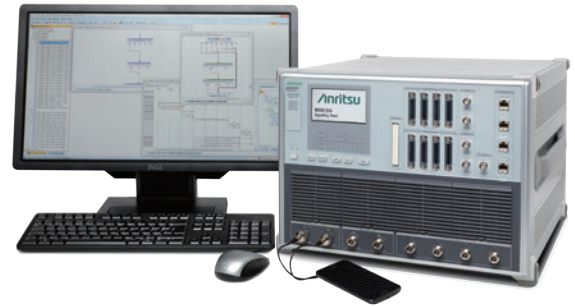
Test Editor
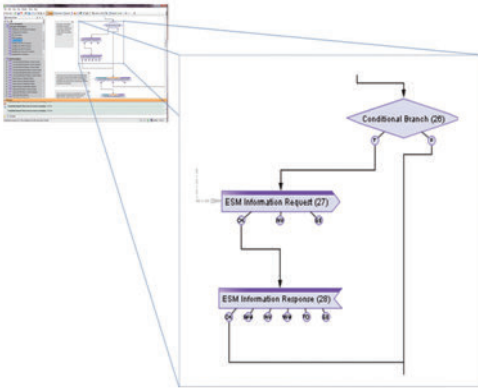
The flowchart based test design environment allows engineers at all levels of expertise to create tests quickly by dragging and connecting signaling blocks to define the test flow. Test parameters default to typical sensible values and can easily be adjusted using intuitive parameter dialog boxes.

Example tests are supplied as standard to provide a solid reference base from which you can freely adapt to create bespoke tests.

RTD gives you the ultimate trade-off between ease-of-use and control. Testing of a complete stack should not require the user to understand the parameterization of the lower layers but testing a partial stack implementation (e.g. physical layer only) will need full control over the low layer protocols. RTD achieves this by offering 2 levels of protocol procedures. 'Layer 3 procedures' enable fast and error-free test creation through automatic configuration of layers 1 and 2. 'Low level' procedures deliver fine-grained control of layers 1 and 2. Time and money is saved - not only through rapid test creation, but also because RTD is the correct tool for each job.

Automated Test Execution

RTD provides all the features you would expect for efficiently running a single test, and for running your extensive, automated regression campaigns. You can rely on RTD to keep going without the need for manual intervention and to provide rock-solid, repeatable results.

It's remote control interface makes it easy to integrate with your existing automated testing environment and it supports standard 'AT commands' as well as tailor-made interfaces for controlling the device under test.

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Protocol Analysis

The latest technologies support high data rates, and also a large amount of control signaling. All this information is stored during test execution, and somewhere, buried within this information will be the clue that points you to the cause of any issues.

RTD's protocol analyzer has been designed by protocol engineers, for protocol engineers to deliver the best possible tool for pinpointing issues.

Its message sequence format provides clear distinction between data, and control messages. This makes it easy to establish the test flow.

User Support

RTD is much more than just a software application. User help and documentation are delivered with the product, and the support service provides you with direct access to expert engineers. Regular software updates allow you to access the latest features and ensure that your testing complies with the latest protocol standards. Anritsu can also provide you with onsite support and bespoke user training courses.

Everything is in place to maximize your testing productivity!

Supported Signaling Testers and Radio Technologies

Core Platform Development

MD8430A - LTE-Advanced

The MD8430A is trusted by hundreds of leading LTE and LTE-Advanced development engineers as the unsurpassed signaling tester for simulating LTE networks in the development lab. It continues to evolve with the rapidly changing LTE standards. It simulates 2 full cells (uplink and downlink) and 4 downlink only neighbor cells for the recreation of complex, real world scenarios.

MD8480C - WCDMA and GSM/(E)GPRS

The MD8480C was the world's first ever – and most widely adopted - WCDMA signaling tester. Now supporting HSPA Evolution features up to 3GPP Release 9, it can simulate up to 4 WCDMA plus 2 TDMA cells.

Integration and Regression

MD8475A - Multiple Technologies in a Compact Unit

The MD8475A Signalling Tester is a simple bench-top solution to help engineers test and evaluate worldwide mobile systems. It can simulate up to 2 cells and supports LTE, WCDMA, GSM/(E)GPRS and TD-SCDMA. The MD8475A can be added to an RTD-based solution for TD-SCDMA support.

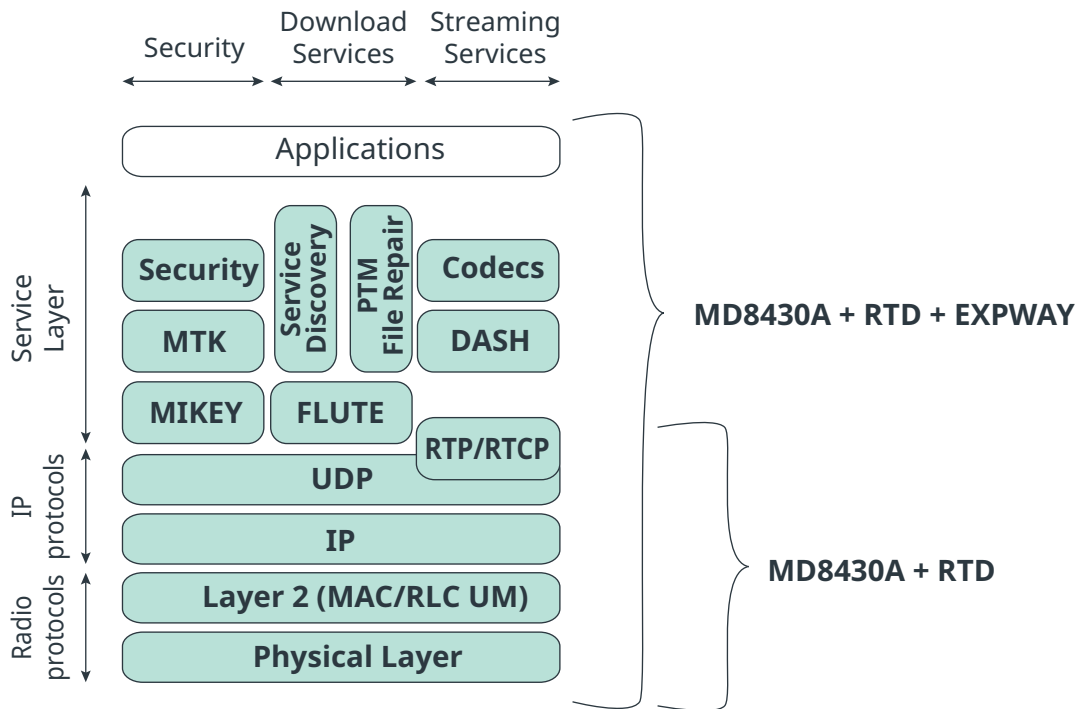# Mobile Chipset Protocol Test Solutions MX786201A

RTD for eMBMS Testing

The evolved Multimedia Multicast Broadcast Service (eMBMS) enables the efficient delivery of media content simultaneously to a high number of subscribers. Operators are upgrading their networks to utilize eMBMS technology in order to keep up with the demand for services such as mobile TV.

Devices not only have to implement support for additional radio channels and protocols, but also need to implement a service layer to communicate with additional core network elements for eMBMS. The most important of these is the Broadcast Multicast Service Center (BM-SC).

Anritsu partners with Expway – the leading supplier of BM-SC technology components, top deliver a complete end-to-end eMBMS test solution consisting of the MD8430A Signaling Tester, RTD software and a BM-SC adapted for test purposes. This provides a complete lab simulation to test not only LTE Layer 1 and Layer 2 operation, but also the eMBMS service layer and interactions between the radio modem and the eMBMS middleware.

"Mobile Video Will Generate More Than 69 Percent of Mobile Data Traffic by 2019" – Cisco®.

The Business Case for RTD

It is difficult to quantify the benefits of early problem fixes and faster time to market in hard cash terms, but one may safely assume that it is a high value measured in millions of dollars. This is why world-class organisations are performing as much testing as possible using signaling testers in their laboratories. Significant benefits will be gained by adopting a purpose-built signaling tester as the heart of a successful UE development and testing strategy.

RTD enables more testing of leading technologies, faster than anything else.

RTD will save you time and money because it maximizes all the business benefits arising from the use of a signaling tester.

We have developed a model, based on a typical UE development process, which allows you to calculate the time to market advantage and operational cost savings that RTD can deliver relative to an alternative solution.

> *RTD tests are interpreted – not compiled, this means a modified test is ready to run straight away. During early development this saves many hours of precious time.*
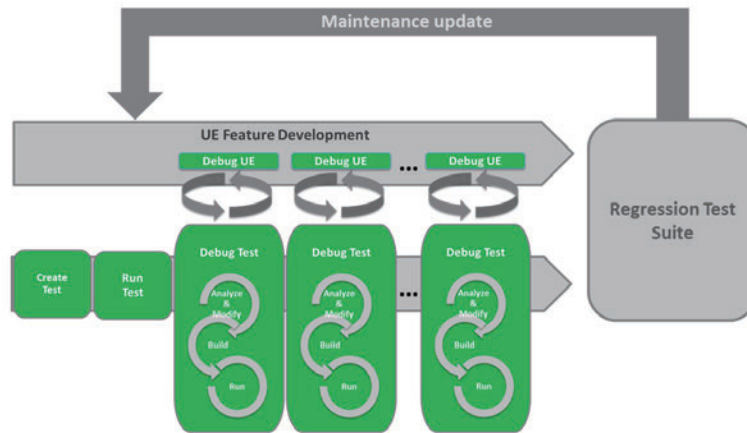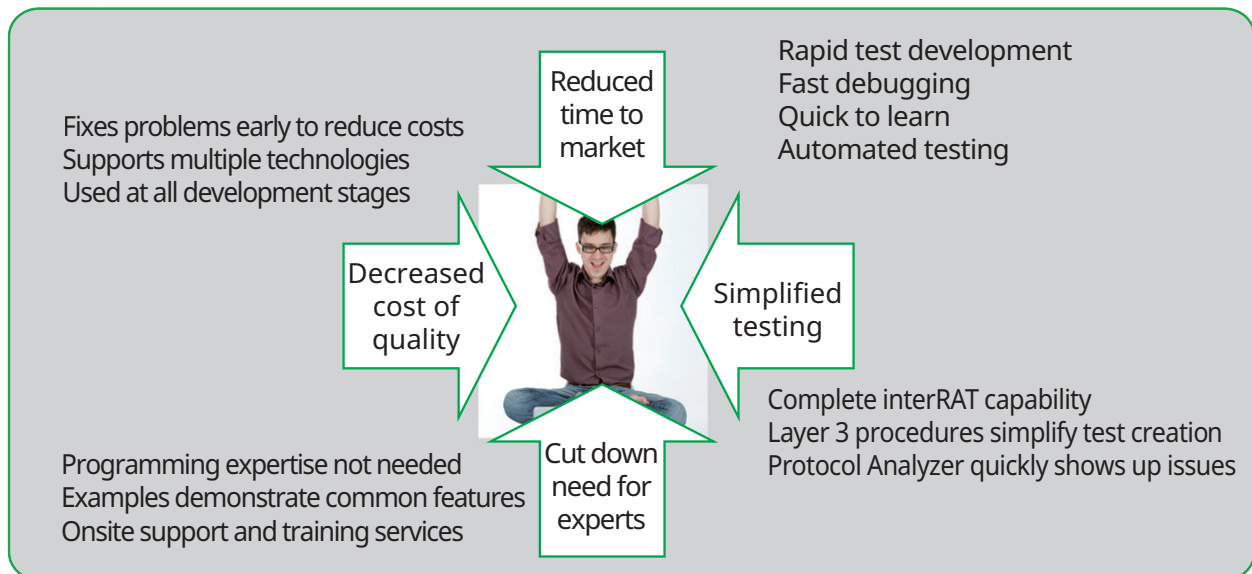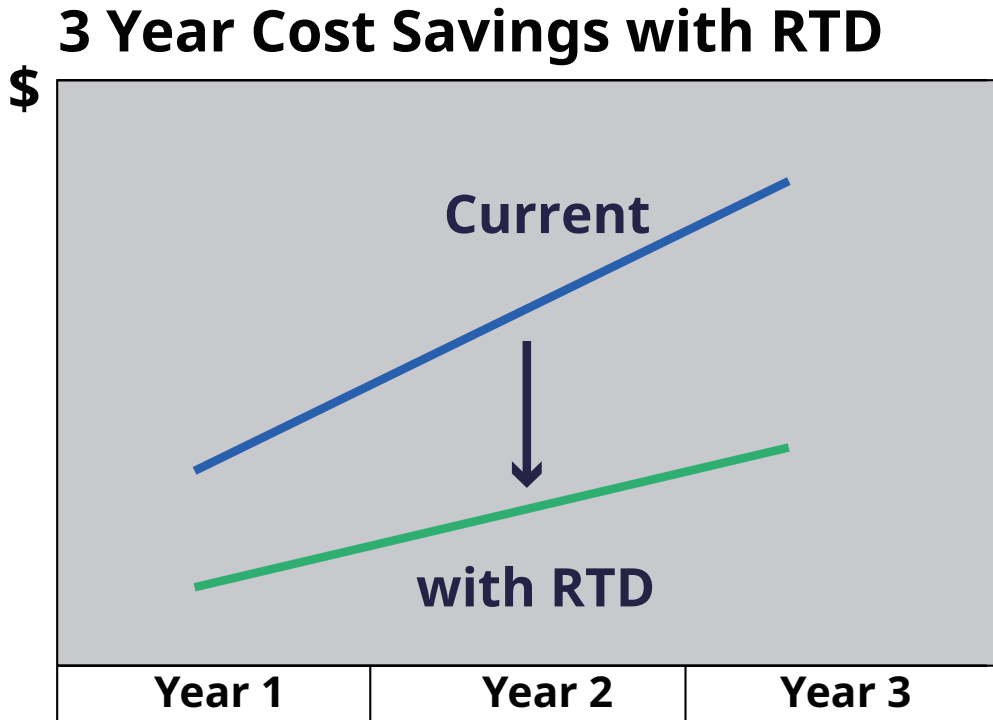

Our model assumes a typical UE development process where a test for a protocol feature is defined and created before the feature is implemented. The test is run against the initial implementation, the results are analyzed and any required changes are made to the UE code and/or the test script. The process of test execution, analysis and modification is repeated until the feature implementation and the test script have been verified. Once verified, the test script is added into an automated regression suite that is used to verify that further UE changes have not broken existing functionality. Every so often the UE software will be updated to conform to the latest release of the 3GPP standard. To ensure that the tests in the regression suite remain valid they will need to undergo a 'maintenance update'.

Reliability for repeatable tests

Accuracy for confidence

Adaptability easily create test variants

Technology lead test new technology early

Speed fast test creation and automation

Focus on core activities

Scalability replicate for consistent result

For our illustrative example project, RTD gave a time to market advantage in the region of 3 to 4 months with cost savings of over $500k. When we also consider the other benefits such as reduced personnel and training costs, time saved by self-documenting tests, time saved updating test suites to newer standards, easier system setup and configuration and improved test automation, then these significant operational savings only represent a proportion of the total time and money that RTD can save your organization. It is easy to understand why RTD has been adopted by the world's leading mobile protocol developers.

3 Year Cost Savings with RTD

$

Current

with RTD

| Year 1 | Year 2 | Year 3 |

Fixes problems early to reduce costs
Supports multiple technologies
Used at all development stages

Reduced time to market

Rapid test development
Fast debugging
Quick to learn
Automated testing

Decreased cost of quality

Simplified testing

Programming expertise not needed
Examples demonstrate common features
Onsite support and training services

Cut down need for experts

Complete interRAT capability
Layer 3 procedures simplify test creation
Protocol Analyzer quickly shows up issues

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Ordering Information

Please specify the model/order number, name and quantity when ordering.
The names listed in the chart below are Order Names. The actual name of the item may differ from the Order Name.

Model/Order No.	Name
	Main Frame
MX786201A	Rapid Test Designer (RTD)
Z1591A	USB Dongle (Protocol)
	Options
MX786201A-025	eMBMS BM-SC Procedure Library
MX786201A-027	RTD IMS Signalling Library
MX786201A-028	Layer 1/Layer 2 Statistics Monitor (LTE)
MX786201A-031	RTD Layer 3 Procedure Library (LTE)
MX786201A-038	Low-level Configuration Library for RTD (LTE)
MX786201A-40	Ciphering
MX786201A-041	RTD Layer 3 Procedure Library (UTRAN/GERAN)
MX786201A-45	RTD Test Creation and Editing Tools
MX786201A-46	RTD Run Time Engine
MX786201A-048	Low-level Configuration Library (UTRAN/GERAN)
MX786201A-052	Dual Cell Capability (Run-time Option)
MX786201A-056	Dual-cell to Multi-cell Upgrade (Run Time Option)
	Tools Options
MX787401A	Set of Signalling Application Support Tools
MX787401A-011	Protocol Analyzer (RTD)
MX787401A-012	Remote Control Interface
MX787401A-013	Signalling Application Tool for Terminal Automation
MX787401A-014	Signalling Application Tool for Test Sequencing
MX787401A-017	IMS Audio calls on RTD PC (AMR codec)
MX787401A-018	IMS over 3G
MX787401A-019	IMS over WiFi
MX787401A-020	IMS RCS
MX787401A-033	Protocol Analyzer 3- Real Time Log Capture Tool
MX787401A-062	Interface Driver for MF6900A (Fading Simulator)
MX787401A-065	RTD Fading Library
MX787401A-066	RTD Fading Library (Higher Order MIMO)
MX787401A-070	RTD Fading Library (UTRAN)
MX787401A-076	RTD Fading Library (SCME)
	Framework Options
MX787201A	Multi-RAT Framework for Signalling Testing Applications
MX787201A-012	Enabler for Multiple Signalling Testers
MX787201A-013	LTE UL 2×2 MIMO FRAMEWORK
MX787201A-021	GERAN Framework for Signalling Testing Applications
MX787201A-023	Framework UTRAN Core (Incl. HSPA)
MX787201A-026	Framework HSPA Evo (Rel-8)
MX787201A-027	LTE Core FRAMEWORK for Signalling Testing Applications
MX787201A-028	LTE FDD Framework for Signalling Testing Applications
MX787201A-029	Framework LTE TDD Option
MX787201A-030	LTE Advanced Carrier Aggregation Framework
MX787201A-031	Framework C2K Core (Can be ordered only for ME7834L CAT)
MX787201A-032	UTRAN LCR TDD Framework Core (Incl. HSPA)
MX787201A-035	LTE Framework Technology MD8430 ETM Driver
MX787201A-036	LTE-A 3 Carrier Aggregation Framework
MX787201A-037	UTRAN Framework MC-HSDPA (REL-10)
MX787201A-038	LTE DL 4×4 MIMO Framework
MX787201A-039	LTE CoMP Framework
MX787201A-041	LTE-A 4 Carrier Aggregation Framework
MX787201A-042	LTE DL 8×4 MIMO FRAMEWORK
MX787201A-043	LTE Dual Connectivity Framework
MX787201A-045	LTE-A 5 Carrier Aggregation Framework
MX787201A-047	LTE Unlicensed 6 GHz Framework
MX787201A-048	Extended DL Frequency Bandwidth Framework
MX787201A-050	LTE Licensed Assisted Access (LAA) Framework
MX787201A-051	Floating (Server based) License
MX787201A-053	LTE Enhanced MTC Framework
MX787201A-054	Narrow band IoT Framework
MX787201A-056	LTE-A 6 Carrier Aggregation Framework
MX787201A-057	LTE-A UL 3 Carrier Aggregation Framework

Model/Order No.	Name
	Options for eMBMS
MX787460A	eMBMS BM-SC Server
MX787460A-SS120	MX787460A 1 Year Support Service
MX787460A-SS020	MX787460A 1 Month Support Service
Z1896A	Additional PC for RTD eMBMS (With Monitor)
Z1897A	eMBMS USB Dongle
	Update & Maintenance
MX786201A-20	Software Update and Maintenance Contract
MX787201A-SS100	Maintenance for Technology Framework
MX787401A-SS100	Maintenance for Software Tools
	Additional Accessories
Z1320D	Standard PC for RTD (with monitor)
P0055D6	RTD Standard UICC Pack -4FF
P0055D7	RTD Standard UICC Pack -3FF