

MX847503A

SmartStudio Manager

MD8475A
Signalling Tester

Test Solutions for Smartphone

- MX847503A SmartStudio Manager Product Introduction -

v1.07

January 2014

Anritsu Corporation

Anritsu's new Automation Framework: SmartStudio Manager

Product Description; MX847503A SmartStudio Manager

- **Product Attributes**

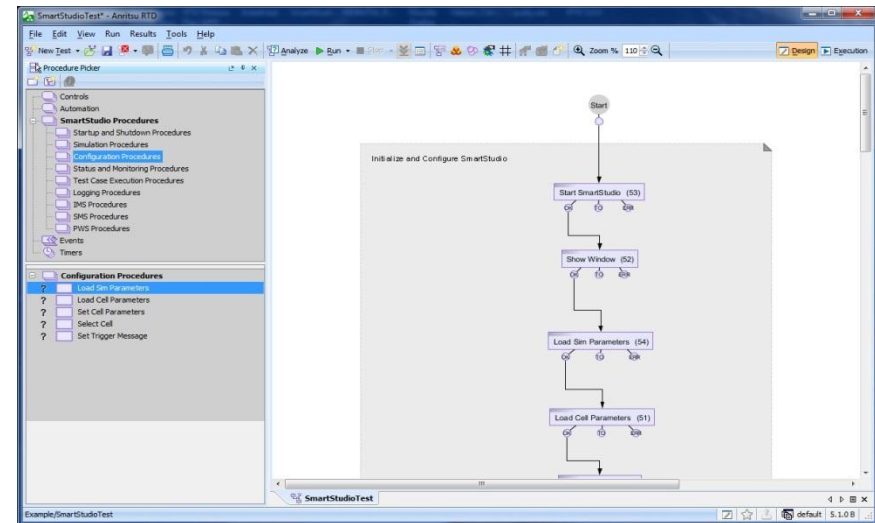
- **Ease of use, without requiring in depth knowledge of 3GPP protocols**
 - Intuitive graphical user interface to expedite creation and execution of test sequences
- **Evaluates application behavior under different network conditions**
 - Simulate different QoS, data throughput and mobility scenarios
- **Captures logs and reports results to application developer**
 - Provides protocol log of message sequence for analysis



Functional Testing

Test Application Examples

- Software Regression Test
 - Mobility Test
 - Stress Test
- Battery Consumption Test
- Device Thermal Test
- Data Throughput Test



Battery Life Test

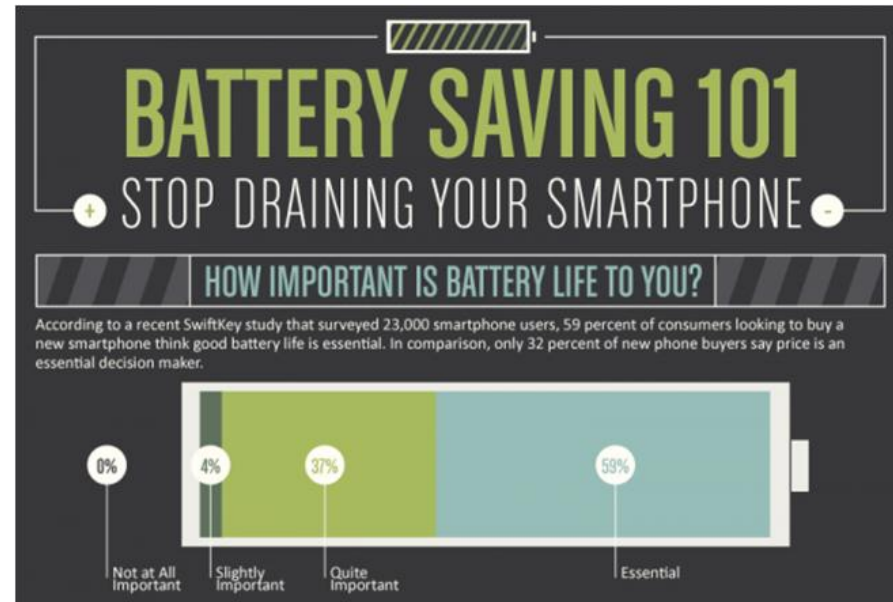
Smartphone Battery Life

- Why is smartphone battery performance so important?

In a recent survey, 59% of users looking to buy a new smartphone stated good battery life was essential, while only 32% said price was essential decision point.

Key product selection point

- To increase their subscriber base and reduce churn, Operators want to offer devices with optimal user experiences...including battery life
- To improve their brand value and increase market share, UE manufactures want to keep improving their battery performance.



What Causes Short UE Battery Life?

Display/Backlight

Multiple Radios

Power Amplifiers

Touchscreen

Processors

Camera

Sensors

BT

WLAN

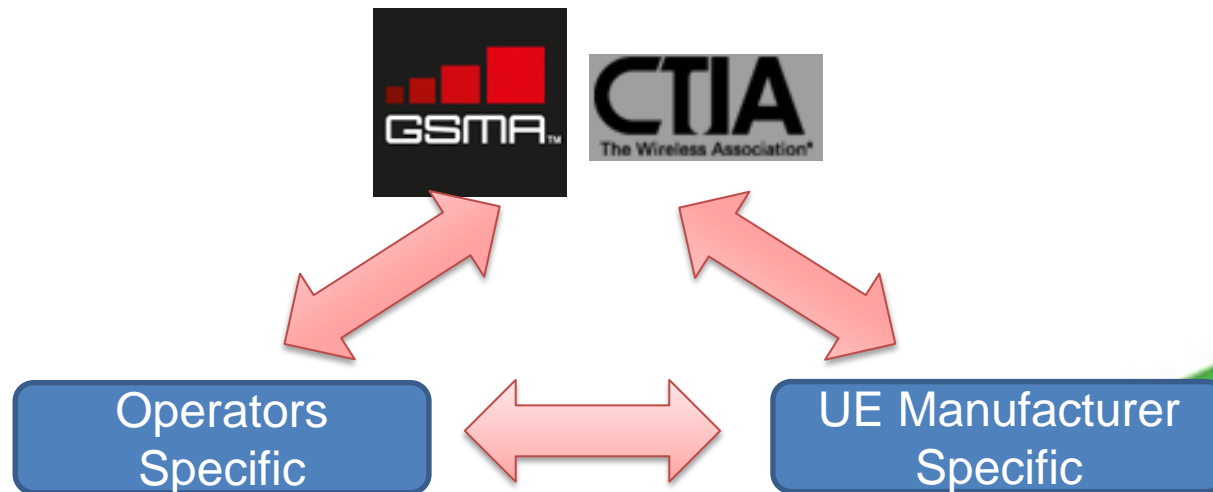
GPS



Battery Life Testing

- Developer's Challenge -

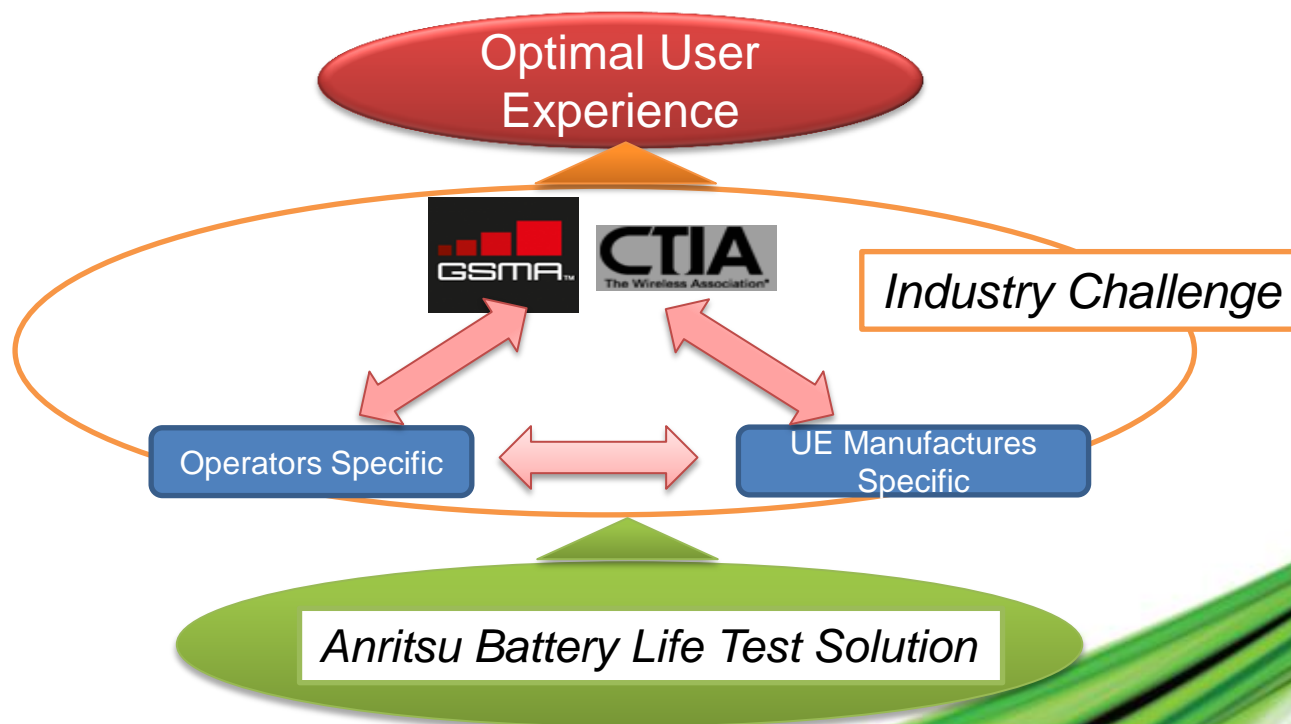
- To accurately measure current drain on the battery in a tightly controlled, reliable, reproducible environment
 - Benchmark different devices under the same test conditions
- Numerous Industry Specifications for Battery Life Testing
 - GSMA TS09 Battery Measurement Technique Reference Guide
 - CTIA Battery Certification Program
 - Operator Specific Battery Life Test (Carrier Acceptance Test)
 - UE Manufacturer Specific Battery Life Test



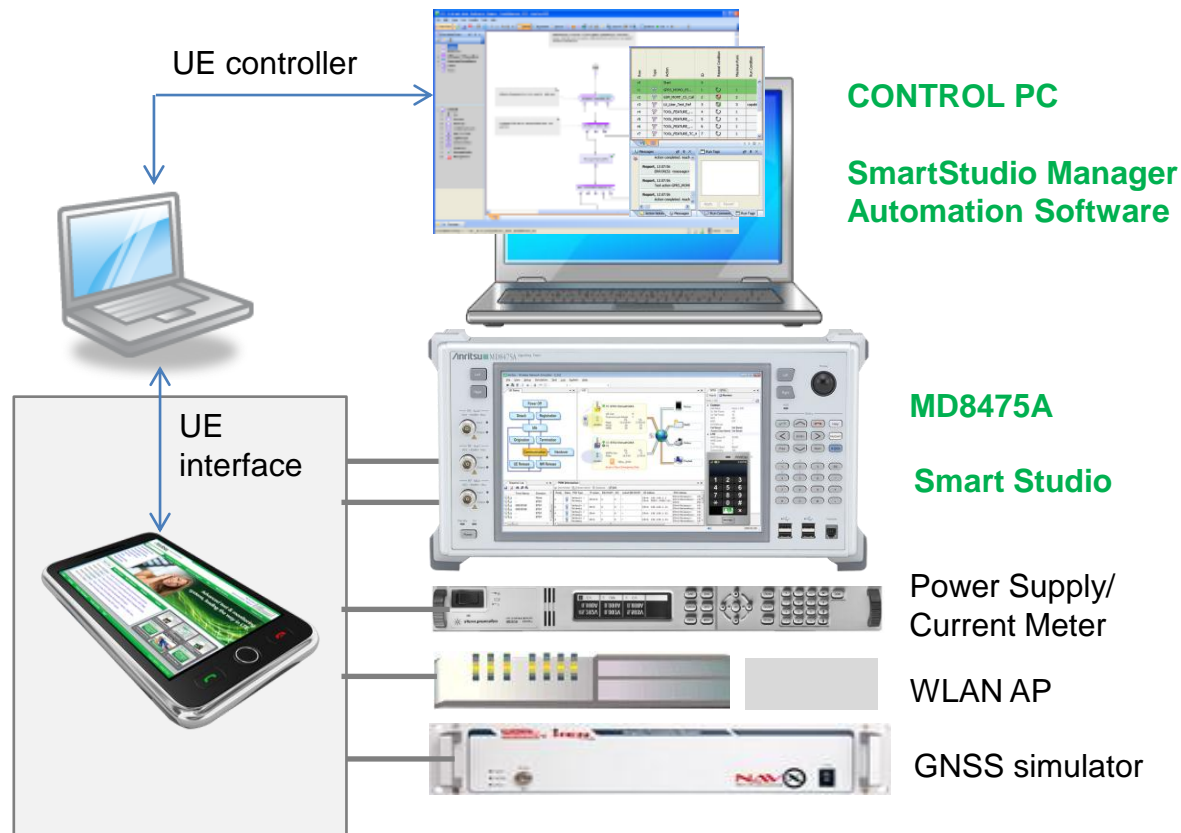
Battery Life Testing

- Anritsu Solution

- Battery life test solution based on industry specification with flexibility to customize to operators' and manufacturers' specific needs
- MD8475A with new automation framework as a turnkey Multi-RAT test environment



Battery Life Testing



Measure current during

- Call Processing
- Messaging
- Mobility
- File transfer
- Web Browsing
- Video Streaming
- VoLTE/RCS/IMS
- WLAN Offload
- Positioning
- Camera

Battery Life Testing – Available test Sequences

- Step.1 (Available Now)
 - MX847503A SmartStudio Manager
 - SmartStudio Procedure Library
 - UE/AT Procedure Library
 - Power Supply Control Function (Temporary version)
 - Current Drain Viewer (Temporary version)
 - GSMA TS.09 Test sequences
 - Stand- By time test; 2 Test Sequences for L/W
 - Talk Time Test; 2 Test Sequences for W MOMR/ MTNR
 - PS Transfer Test; 1 Test Sequence for L
- Step.2 (Jan. 2014)
 - GSMA TS.09 Test sequences Update
 - Stand- By time test; 5 Test Sequences for W/G
 - Talk Time Test; 2 Test Sequences for GSM
- Step.3 (Mar. 2014)
 - GSMA TS.09 Test sequences Update
 - PS Transfer Test; 11 Test Sequence for L/W/G
 - WLAN AP Procedure Library (Temporary version)
- Step.4 (H1. 2014)
 - MX847503A SmartStudio Manager (Update)
 - Current Drain Viewer (Enhancement)
 - External GPS Signal Generator Control
 - CTIA Sample Test sequence

Regression Testing

Regression Testing

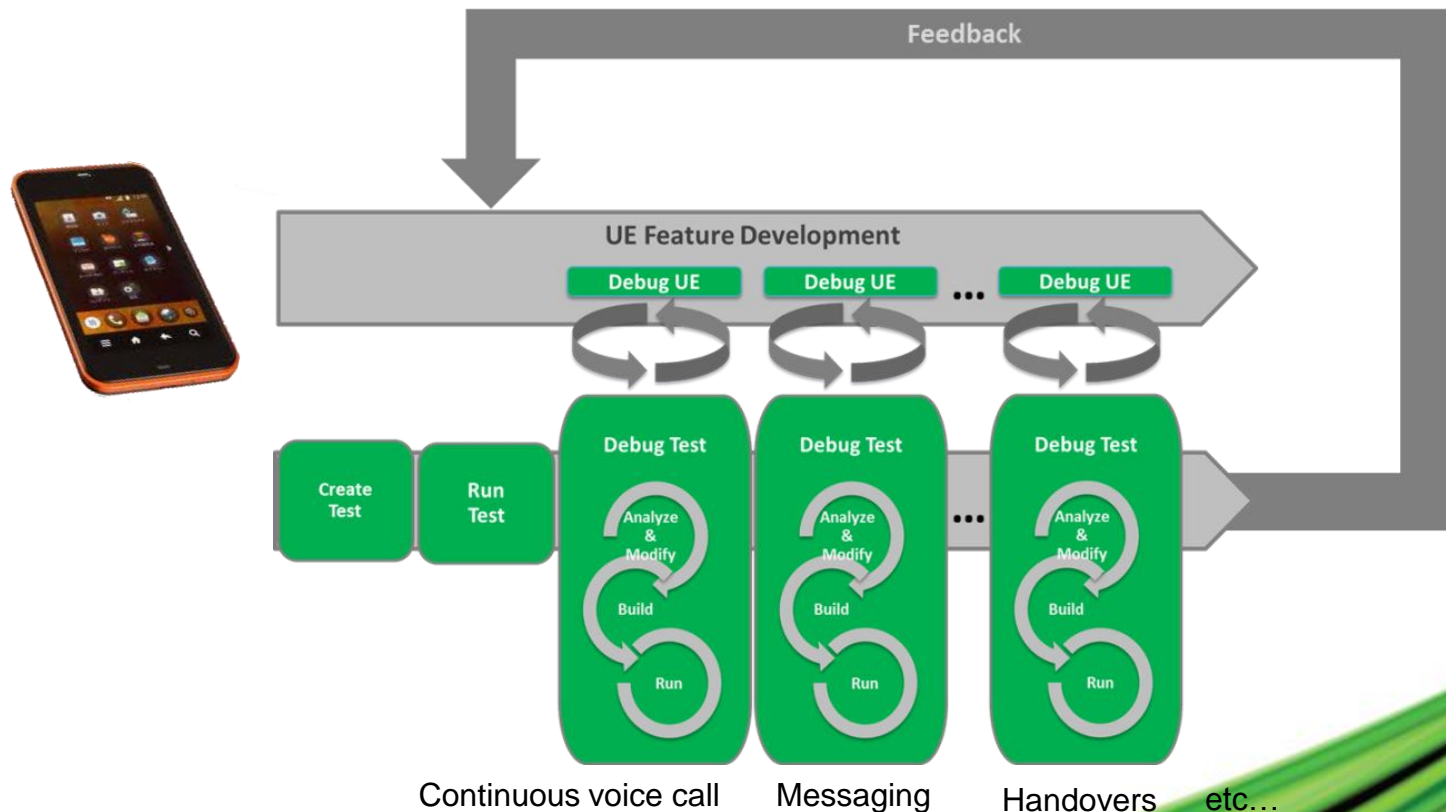
- Smartphone firmware is updated frequently
 - Smartphone firmware is updated when new features, functions and services are implemented
 - With each new release, existing functions must continue to operate normally in addition to the new functions
 - If problems occur in existing functions, it impacts user experience, creates churn, and degrades brand image
- Challenges
 - New UE software updates are released every few weeks
 - For OS and applications
 - Smartphones have many functions that need to be tested for each new release
 - Time consuming and costly to perform tests manually
 - User Applications also have big impact on performance
 - Battery, memory, latency/response time
 - Interaction between OS and the applications is complex



Regression Testing

- Developer's Challenge -

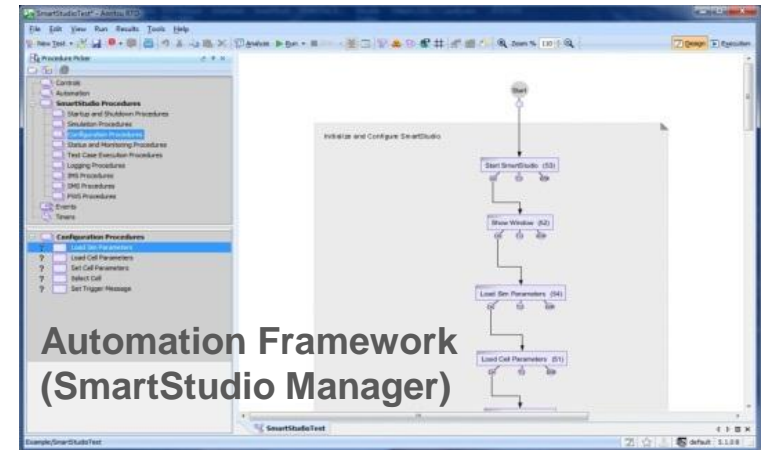
- Cost effective automated testing that is easy-to-learn and easy-to-use
- Ability to continually expand test sequence library to increase test coverage



Regression Testing

- Anritsu solution: MD8475A + SmartStudio Manager

- Regression test platform that can cover wide variety of test scenarios
 - Latest 3GPP/3GPP2 features
 - Thousands of adjustable parameters
- Test environment that is flexible, yet tightly controlled to give consistent, reliable, reproducible results



Sample Test sequences (available now)

- LTE Attach
- LTE Out Of Service
- LTE to LTE Inter-Freq Handover
- LTE to LTE Intra-Freq Handover
- LTE to W-CDMA Handover
- LTE to W-CDMA Redirection Handover



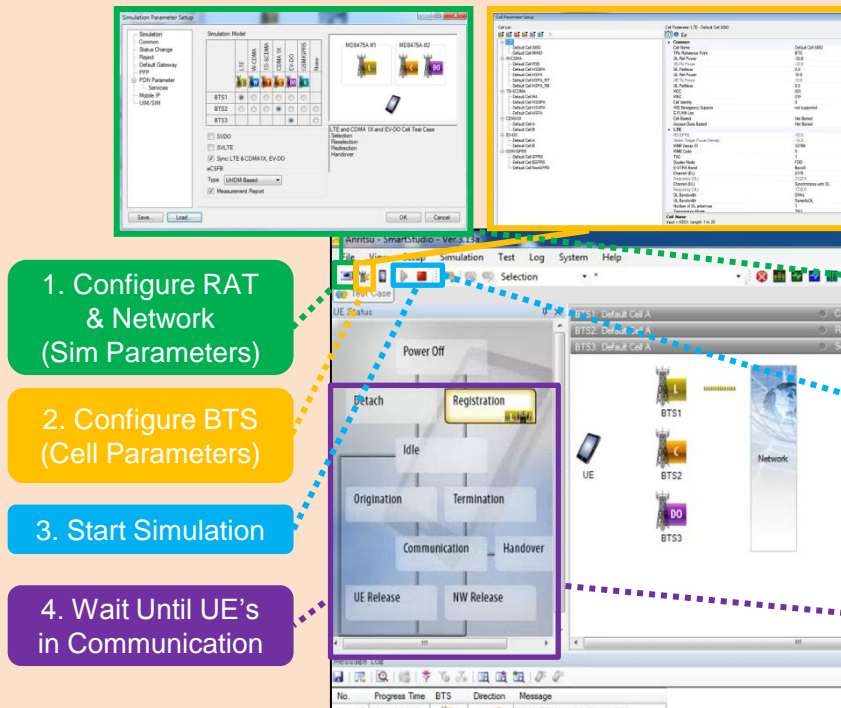
Software Regression Test – Available test sequences

- Step.1 (Available now)
 - Basic
 - LTE Attach
 - LTE Out Of Service
 - Mobility
 - LTE to LTE InterFreq Handover
 - LTE to LTE IntraFreq Handover
 - LTE to W-CDMA Handover
 - LTE to W-CDMA Redirection Handover
- Step.2 (Jan. 2014)
 - Service (4 Test Sequences)
 - MOMR CSFB (L-W/L-G)
 - MTNR CSFB (L-W/L-G)
 - Mobility (9 Test Sequences)
 - Cell Selection/Reselection(L-L/L-W/L-G)
 - Redirection(L-L/L-W/L-G)
 - Handover(L-L/L-W/L-G)
 - SMS (LTE, 2 Test Sequences)
 - SMS over SGS (MO/MT)
- Step.3 (Mar. 2014)
 - Basic (4 Test Sequences)
 - Attach(W/G)
 - Out of Service(W/G)
 - Service (6 Test Sequences)
 - Voice (W/G)
 - Packet (W/G)
 - L-W SRVCC (MOMOR/MTNR)
 - Mobility (3 Test Sequences)
 - TAU (For LTE)
 - RAY/LAU (For WCDMA/GSM)
 - SMS (WCDMA, GSM 4 Test Sequences)
 - SMS over SGS (MO/MT)
 - IMS (2 Test Sequences)
 - MO/MT SMS over IMS

Appendix

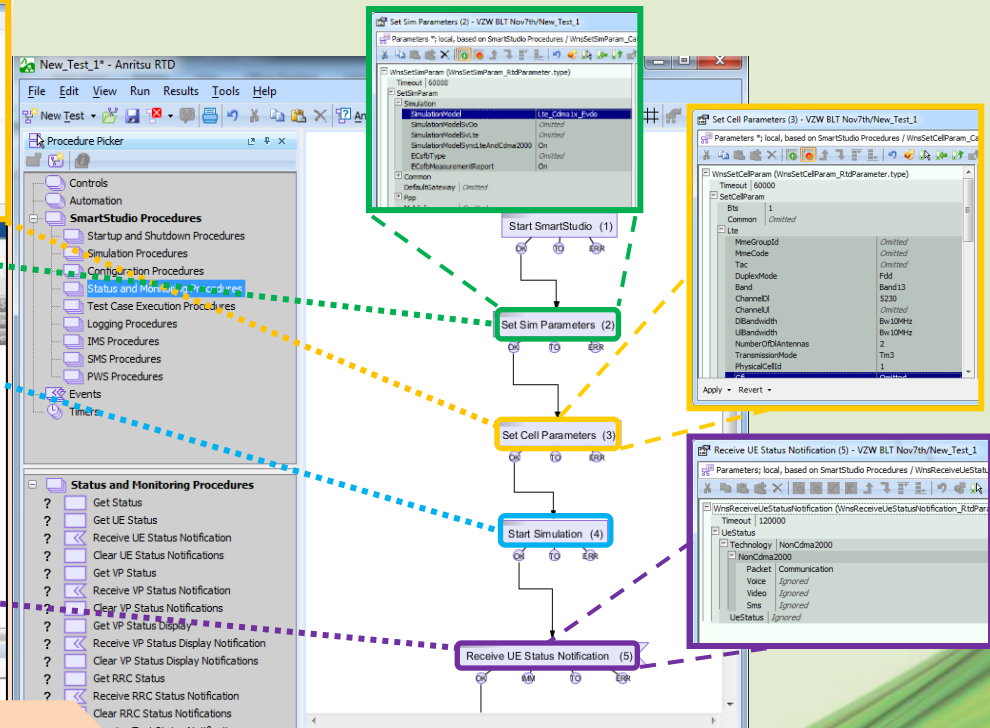
Introducing SmartStudio Manager: SmartStudio Procedures in an Integrated Test Environment

SmartStudio's Manual Operation



SmartStudio's simple, parameter-based manual operation translates to compact, linearly designed SSM tests

Scripted SmartStudio Manager Automation



SSM include suites of ready-to-use Test Executive Tools

SmartStudio Manager Development Environment:

Visual-centric design approach yields simple-to-follow tests

The screenshot displays the SmartStudio Manager Development Environment interface. On the left, a 'Procedure Picker' pane lists various test procedures under categories like 'Controls', 'Automation', 'SmartStudio Procedures', 'Simulation Procedures', 'Configuration Procedures', 'Status and Monitoring Procedures', 'Test Case Execution Procedures', 'Logging Procedures', 'IMS Procedures', 'SMS Procedures', 'PWS Procedures', 'Events', and 'Timers'. A 'Configuration Procedures' list is also visible, including options like 'Load Sim Parameters', 'Set Sim Parameters', 'Set PDN Parameters', 'Load Cell Parameters', 'Set Cell Parameters', 'Select Cell', 'Set Trigger Message', 'Configure Virtual Phone', 'Set Service Parameters', and 'Configure Status Change'. The main workspace shows a flow-based test design for 'V-REQ-300-24-Idle_Current-4G* - Anritsu RTD'. The flowchart includes steps like 'Set SIM and Cell parameters in SmartStudio if a simulation is not running already', 'Conditional Branch (164)', 'MessageDisplay (416)', 'Wait For Event (415)', 'Continue_Previous_Session (417)', and 'Restart_Simulation (418)'. A 'Messages' pane at the bottom shows log entries such as 'Action completed, reached OK@VZW BLT Nov7th/VZW-REQ-300-24-Idle_Current-4G.Clear Message Log(459), 17:38:30' and an error: 'RTD Error, 17:51:11 VZW BLT Nov7th/VZW-REQ-300-24-Idle_Current-4G, SmartStudioSetParameters (348); [Broken archive link] - Archive "TestCases_475A" is not found. Compound procedure "SmartStudioSetParameters" opened.' The bottom right corner shows a watermark and version control information: 'default 5.1.0 C'.

Idle (Standby mode) – 3G/4GLTE <VZW-REQS-300-24>
This use case simulates the device being idle in either 3G or 4G LTE coverage area with no background account synchronization (No Exchange or Consumer email or social networking accounts setup).

Free-form comments can be placed in convenient locations to explain code logics

SmartStudio control API & utility functions available for insertion

Flow-based test offers easy visualization of test steps and streamlines error handling by connecting desired events to timeout or error nodes

Workspace Management: Access to logs and reference tests

Watermark & version control

SmartStudio Manager Integrated Environment:

Unique approach to modularize tests & increase script utilities

Variable declarations are centrally managed; scopes and default values can be adjusted

Useful groups of procedures can be stored as “compound procedures”. Users can import and export CPs between tests

Verdicts are set based on flow of nodes, instead of runtime values, enabling ex-post facto re-evaluation

SmartStudio Manager Execution Environment:

Range of information presented to operators during execution

SmartStudio Manager's Execution Mode

Campaign Manager

Variables

Local_Variables (InteractiveVariableList.Type)

- Variable
Name: AvgMeasCurr
Value: Omitted
Description: Omitted
- Variable
Name: HwConfig
Value: OneBox
Description: Omitted
- Variable
Name: MeasCompletion
Value: false
Description: Omitted
- Variable
Name: RET
Value: Omitted
Description: Omitted

Variable Monitoring

Timers

Timers

Timer	Value
registration	120000ms
sigregistration	60000ms
measTimer	3600000ms
oneMin	60000ms
pollwait	100ms
preMeasWait	900000ms

Timer Configuration Status

Events

SmartStudio_Setting

- Continue_Previous_Session
- Restart_Simulation

user_confirm

- confirmDUTConfig

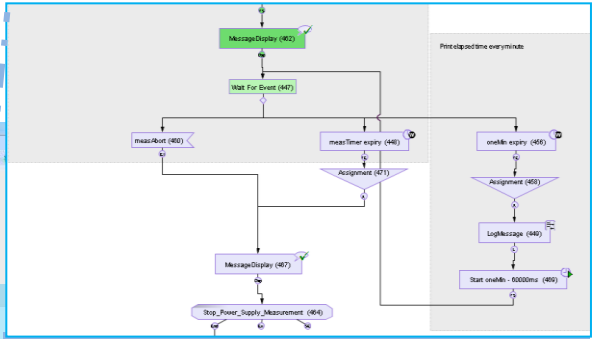
user_abort

- measAbort
- premeasWaitAbort

Available User Actions

Measurement is being captured....

Message to Test Operator



Message Sequence Chart

Messages

Time	Action	Message
00:04:04.415	Action	VMS_Event ChangeToPacketStatus
00:04:07.765	Action	VMS_Event VspStatus
00:04:07.765	Action	VMS_Event VspStatus
00:04:08.138	Action	VMS_Event ChangeToPacketStatus
00:04:08.138	Action	VMS_Event VspStatus
00:04:13.227	Action	VMS_Event ChangeToPacketStatus
00:04:13.227	Action	VMS_Event VspStatus
00:04:13.444	Action	VMS_Event ChangeToPacketStatus
00:04:13.444	Action	VMS_Event VspStatus
00:04:20.727	Action	VMS_Event ChangeToPacketStatus
00:04:20.727	Action	VMS_Event VspStatus
00:04:20.986	Action	VMS_Event ChangeToPacketStatus
00:04:20.986	Action	VMS_Event VspStatus
00:04:24.040	Action	VMS_Event ChangeToPacketStatus
00:04:24.040	Action	VMS_Event VspStatus
00:04:28.119	Action	VMS_Event ChangeToPacketStatus
00:04:28.119	Action	VMS_Event VspStatus
00:04:28.120	Action	VMS_Event ChangeToPacketStatus
00:04:28.120	Action	VMS_Event VspStatus
00:04:28.121	Action	VMS_Event ChangeToPacketStatus
00:04:28.121	Action	VMS_Event VspStatus
00:04:28.297	Action	VMS_Event ChangeToPacketStatus
00:04:28.297	Action	VMS_Event VspStatus
00:04:28.329	Action	VMS_Event ChangeToPacketStatus
00:04:28.329	Action	VMS_Event VspStatus
00:04:28.340	Action	VMS_Event ChangeToPacketStatus
00:04:28.340	Action	VMS_Event VspStatus
00:04:28.354	Action	VMS_Event ChangeToPacketStatus
00:04:28.354	Action	VMS_Event VspStatus

Instrument Communication History

Campaign Manager

Procedure Picker

Run	Type	Action	Repeat Condition	Max Run	Max Wait	Max Wait
1	Start			0	1	0
2	VZW REQ-300-24-Side_Current-4G			2	1	0
3	VZW REQ-300-24-Side_Browsing-4G			3	1	0
4	VZW REQ-300-24-Side_Gaming-4G			4	1	0
5	VZW REQ-300-24-Side_Video-4G			5	1	0

Insert test sequences into campaign sequences with optional setup scripts and custom procedures

SmartStudio Manager & Battery Life Test

BLT Test Flow

Configure SmartStudio
Network (optional)

Verify Cellular Connectivity

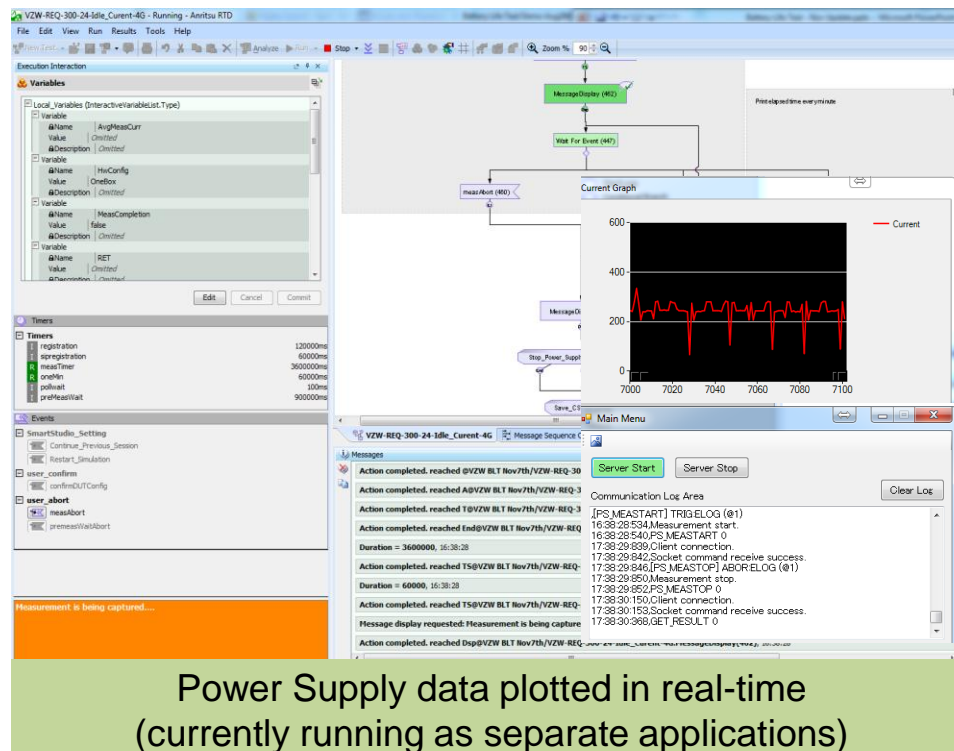
Prompt User to Confirm DUT
OS and Apps Settings

Prompt User to Perform Test
sequence Specific Actions

Wait for Test Specified Time
Period to Elapse

Begin Power Supply Data
Collection

Terminate Test sequence



A	B	C	D	E
13	VZW-REQ-300-34-Browsing-4G	11/20/2013 12:25:05.267	439.5287824	FALSE
14	VZW-REQ-300-34-Browsing-4G	11/20/2013 12:31:09.586	413.9021903	FALSE
15	VZW-REQ-300-34-Browsing-4G	11/20/2013 12:31:56.534	332.3442515	FALSE
16	VZW-REQ-300-34-Browsing-4G	11/20/2013 12:38:46.666	295.9909026	TRUE
17	VZW-REQ-300-34-Idle_Current-4G	11/20/2013 22:51:50.949	3.781819999	FALSE
18	VZW-REQ-300-24-Idle_Current-4G	11/21/2013 00:00:49.587	8.908866261	TRUE
19	VZW-REQ-300-38-Video_Streaming-4G	11/21/2013 00:13:20.292	162.4979877	FALSE
20	VZW-REQ-300-78-Device_Off_Current	11/21/2013 01:05:56.163	0.273908311	TRUE
21	VZW-REQ-300-78-Flight_Mode_Current	11/21/2013 01:18:32.042	358.0598707	TRUE
22	VZW-REQ-300-78-End_Flight_Mode_Current	11/21/2013 01:23:09.376	6.891649676	TRUE

Test summary appended to "TestReport.csv"; raw measurement data for each test sequence is saved as a CSV file (unformatted)

Battery Consumption

- Overview of GSMA TS.09 Battery Life Measurement and Current Consumption Technique
 - Chapter 3: Standby Time test
 - 3.3 GSM Standby
 - 3.4 GSM/GPRS Standby
 - 3.3 WCDMA Standby
 - 3.7 LTE FDD/TDD Standby
 - Chapter 4: Talk Time Test
 - 4.1 GSM call
 - 4.2 WCDMA call
 - Chapter 5: Packet Switched Transfer Test
 - 5.1 GPRS
 - 5.2 WCDMA
 - 5.3 LTE File Download
 - 5.4 LTE File Upload
 - 5.5 LTE FDD Parallel File Download & Upload

● United States

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.

Praça Amadeu Amaral, 27 - 1 Andar
01327-010 - Bela Vista - São Paulo - SP - 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

● United Kingdom

Anritsu EMEA Ltd.

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

● France

Anritsu S.A.

12 avenue du Québec, Bâtiment Iris 1- Silic 612,
91140 VILLEBON SUR YVETTE, 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.r.l.

Via Elio Vittorini 129, 00144 Roma, Italy
Phone: +39-6-509-9711
Fax: +39-6-502-2425

● Sweden

Anritsu AB

Kistagången 20B, 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 (Service Assurance)

Anritsu AB (Test & Measurement)
Kay Fiskers Plads 9, 2300 Copenhagen S, Denmark
Phone: +45-7211-2200
Fax: +45-7211-2210

● 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

● India

Anritsu India Private Limited

2nd & 3rd Floor, #837/1, Binnamangla 1st Stage,
Indiranagar, 100ft Road, Bangalore - 560038, India
Phone: +91-80-4058-1300
Fax: +91-80-4058-1301

● Singapore

Anritsu Pte. Ltd.

11 Chang Charn Road, #04-01, Shriro House
Singapore 159640
Phone: +65-6282-2400
Fax: +65-6282-2533

● P.R. China (Shanghai)

Anritsu (China) Co., Ltd.

Room 2701-2705, Tower A,
New Caohejing International Business Center
No. 391 Gui Ping Road Shanghai, 200233, P.R. China
Phone: +86-21-6237-0898
Fax: +86-21-6237-0899

● P.R. China (Hong Kong)

Anritsu Company Ltd.

Unit 1006-7, 10/F., Greenfield Tower, Concordia Plaza,
No. 1 Science Museum Road, Tsim Sha Tsui East,
Kowloon, Hong Kong, P.R. China
Phone: +852-2301-4980
Fax: +852-2301-3545

● Japan

Anritsu Corporation

8-5, Tamura-cho, Atsugi-shi, Kanagawa, 243-0016 Japan
Phone: +81-46-296-1221
Fax: +81-46-296-1238

● Korea

Anritsu Corporation, Ltd.

5FL, 235 Pangyoyeok-ro, Bundang-gu, Seongnam-si,
Gyeonggi-do, 463-400 Korea
Phone: +82-31-696-7750
Fax: +82-31-696-7751

● 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: