Product Introduction

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
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
- Touchscreen
- Camera
- BT
- Multiple Radios
- Power Amplifiers
- Processors
- Sensors
- 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

Optimal User Experience

Operators Specific

UE Manufactures Specific

Industry Challenge

Anritsu Battery Life Test Solution
Battery Life Testing

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

Power Supply/Current Meter

MD8475A

Smart Studio

SmartStudio Manager Automation Software

CONTROL PC

UE controller

UE interface

WLAN AP

GNSS simulator

WLAN
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

1. Configure RAT & Network (Sim Parameters)
2. Configure BTS (Cell Parameters)
3. Start Simulation
4. Wait Until UE’s in Communication

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

- SmartStudio control API & utility functions available for insertion
- Workspace Management: Access to logs and reference tests
- Flow-based test offers easy visualization of test steps and streamlines error handling by connecting desired events to timeout or error nodes
- Free-form comments can be placed in convenient locations to explain code logics
- 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

Variable Monitoring

Real-time Test Flow Overview

Timer Configuration Status

Available User Actions

Message to Test Operator

Instrument Communication History

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

Power Supply data plotted in real-time (currently running as separate applications)

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