INTEROPERABILITY, PERFORMANCE AND CONFORMANCE TESTING

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TOPICS

• Mobile Evolution
• Increasing Complexity
• IOT & Network Simulation
• Conformance Testing
• Best way forward
• Questions ?
THE MOBILE EVOLUTION...

1980s (The Brick)  

Now (The Brain)
DUBAI EVOLUTION...

The main street of Dubai, in 1990

Now
INCREASING COMPLEXITY OF MOBILE DEVICES!

- Smartphones
- Mobile apps
- Multi-band networks
- Tablets
- User Experience
- Multi-tech networks
- Broadband on the go
- SW upgrades
- SIM profiles

Increased need for device testing
INCREASED COMPLEXITY OF NETWORKS AND TECHNOLOGY

Introduction of new technology support such as Carrier Aggregation, MIMO, eICIC, etc. is leading to a higher level of testing complexity.
INCREASED NEED FOR ROAMING, MOBILITY AND HANDOVER SCENARIO TESTING

LTE brought more complexity and fundamentally changed the mobility ecosystem.
BAND SUPPORT AND BAND COMBINATIONS

Supporting LTE multimode activities globally

Support for over 40 RF bands required

North America
- UMTS/CDMA AWS
- UMTS/CDMA1900
- UMTS/CDMA850
- Extended AWS
- LTE-FDD700
- LTE-TDD2600 (B41)
- MSS 1500 (L-Band)
- MSS2100 (S-Band)

Europe
- UMTS2100
- UMTS900
- CDMA450
- LTE-FDD800
- LTE-TDD800
- LTE-TDD2100 (B34)

China
- UMTS/CDMA2100
- CDMA850
- CDMA450
- TD-SCDMA1900
- TD-SCDMA2000
- LTE-TDD2300
- LTE-TDD2600 (B38)
- LTE-FDD2600

South Korea
- UMTS850
- LTE-FDD850
- UMTS2100
- CDMA700
- LTE-FDD1800

India
- CDMA850
- UMTS2100
- UMTS900
- LTE-TDD2300

Australia
- UMTS2100
- UMTS850
- UMTS900
- LTE-FDD1800
- LTE-TDD2300

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SUMMARISING CHALLENGES

Commercial

• Quality + Cost
• Time to market
• User expectations

Technical

• New/evolving technologies
• Technologies’ interworking
• Signalling/data performance

Get it right the first time
IOT: THE NEED FOR NETWORK SIMULATION

Simple-to-use, Adaptable, State-of-the-art mobile device testing solution
IOT - INTER OPERABILITY FOR MOBILE DEVICES

- The capability of two/more – HW/SW – devices or components to work harmoniously together
- Part of device certification testing
- Typically comprises:
  - Field testing/trials (sometimes considered as a separate category)
  - Network simulation (lab) based testing
  - Network equipment vendor or infrastructure (lab) based testing
SAS: SIMPLE-TO-USE MOBILE DEVICE TEST SOLUTION

- All in one platform
- Modular/Flexibility
- Stability
- Ease of use
- Early availability (functionality / test cases)
- Easy upgradability
SAS – IOT NETWORK SIMULATOR ‘USE CASES’ BEYOND CONFORMANCE(1/2)

● Test ‘What if’ scenarios and inferior network settings - not possible in the field

● Perform testing using live network data and not be restricted to a partial spatiotemporal view of the network

● Conduct roaming tests using specific network settings and configurations

● Perform mobility and handover scenario testing

● Procedure rejection and problem scenarios

● Conduct performance data throughput testing (with fading and noise)

The world’s Top 10 device manufacturers and Tier-1 operators use SAS to quickly and cost-effectively launch new devices
Roaming tests
  - using specific network settings and configurations

Combined and parallel procedures
  - CS, PS, SMS etc

Using real data
  - connected to servers or live internet

Mobility and handover scenarios

Procedure rejection and problem scenarios

Applications testing
  - with access to signalling and the ability to disrupt bearers

Performance (with Fading & Noise)
  - data throughput and service set-up times
HOW SAS IS USED FOR GERAN/UTRAN

STEP 1 (optional)

Interactive
Use GUI to set up network configurations and control terminal testing in real time

STEP 2

Play
Execute pre-written scripts or test scenarios created through Interactive use

Diagnostic Mobile Interface: consider real-life cell configurations from recorded data (2G/3G)

Record live network data (e.g. via NEMO)

Import data in SAS via DMI

Automatic population of data in SAS

Use Interactive Mode; create script
CREATING CUSTOMISED SCRIPTS IN SAS
SAS FOR LTE DATA PERFORMANCE

- Leading LTE Operator requirement
- Simulated channel conditions (fading+ noise)
- Internal fading capability of Anite 9000
- Example and operator acceptance scripts
- Supports 3GPP and operator-specific LTE fading profiles
- A cost-effective upgrade for existing SAS customers

GUI-based review of the data performance
DATA PERFORMANCE AND CARRIER AGGREGATION

- Data Performance with Carrier Aggregation is supported in SAS
- CAT 9 and 10 data rates using 4x4 MIMO on PCell and SCell are verified
- Cat 11 and 12 data rates to be verified

Carrier Aggregation in SAS Data performance Analyser
Excel-based reporting includes: Pass/Fail verdict based on the specified criteria; list of sent versus expected messages; graphical representation of messages sent by the device under test; etc.

<table>
<thead>
<tr>
<th>UE:</th>
<th>UE Make</th>
<th>UE Model Ver: UE Build</th>
</tr>
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<tbody>
<tr>
<td>Date:</td>
<td>22/04/2013 17:28</td>
<td></td>
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<tr>
<td>Test Case:</td>
<td>Path</td>
<td>C:\AniteSAS\ResultData\20130422\Run17</td>
</tr>
<tr>
<td>Result:</td>
<td>Pass</td>
<td></td>
</tr>
</tbody>
</table>

We offer operator acceptance scripts for signalling performance tests.
WIDE RANGE OF APPLICATION TEST CASES FROM A SINGLE VENDOR

- Comprehensive support for LTE-IMS test plans (e.g. Wi-Fi Offloading, VoLTE, LTE Video Calling, Voice over Wi-Fi and RCS) mandated by major mobile operators

- Supports multi-carrier and multi-technology Wi-Fi/LTE/3G testing

- Simple upgrade of SAS to extend test coverage

- Includes reliable, intuitive and feature rich software
CONFORMANCE TESTING
WHAT IS GCF?

- The industry’s primary certification scheme
- Global coverage

- Membership structure:
  - Operator members (>100)
    - Includes Vodafone, Verizon, Telefonica, Deutsche Telekom, CMCC
  - Manufacturer members (~50)
    - Chipset vendors
    - Most major device manufacturers
  - Observer members (~70)
    - Test system manufacturers (including Anite)
    - Test laboratories
WHAT IS PTCRB?

• Primarily used by North American operators

• Membership structure:
  – Operator members (~50)
    • Includes AT&T and T-Mobile
  – Observer members
    • Chipset vendors
  – Device manufacturers
    • Test system manufacturers (including Anite)
  – Test laboratories

• Certification process administered by the CTIA
CONFORMANCE TOOLSET – KEY FEATURES

- Unified user interface
- Simplified parameter management
- Comprehensive logging
- TTCN-3 editor
- Real-time trace
- Report generator
- Automation
- Remote control
- Flexible licensing
- Common/modular platform
- Comprehensive test case portfolio
ALL TECHNOLOGIES

Sum of all protocol test case band combinations validated at either GCF or PTCRB

Number of validated combinations

Sources:
GCF DCC v3.59.1 (16th October 2015)
PTCRB NAPRD03 v5.25 (16th October 2015)
ANITE’S LTE PROTOCOL EXPERTISE

Source: RAN5 TTCN Status Report - 2012-08-31
BEST WAY FORWARD

• Fully appreciate the challenges involved

• All players to work together, in a well-defined and mandatory framework

• Have realistic expectations

• Focus on the high-priority areas first

• Start testing early but only if it makes sense (no devices = no tests)

• Consider tests based on network-relevant issues/characteristics
THE ROAD AHEAD CAN BE BUMPY...
BUT WE CAN MAKE END-USERS HAPPY!
THANK YOU ﻣشراء

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WATCH THIS VIDEO ON OUR DATA PERFORMANCE SOLUTION

This video shows how to run a data performance script in Sequencer.

sas_data_throughput.mp4