Rethink Possible

Panel on Standards, UE, Evolution & Performance Validation

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April 23, 2012

Standards and Interoperability

- *Standards are important in that they provide a framework for interoperable products*
  - *Without standards, it would be difficult (impossible?) to have true interoperability across global networks in a multi-vendor environment*
- *However, standards by themselves do not **insure** inter-operability*
  - *Why?*
    - *LTE air interface, the Evolved Packet Core, and the IP Multimedia Subsystem supports many options, e.g. for modulation format (QPSK, 16QAM and 64QAM), frequency bands (FDD and TDD), resource allocations, and mobility*
    - *Standards are full of options*
      - *Vendor or carrier specific "features" pushed into the standards*
      - *Regional specific options*
    - *Some standards are vague and left to "interpretation"*
    - *Standards are ultimately "voluntary"*
- *Ultimately it is through carrier requirements and industry implementation guidelines which define the minimum set of standards to support inter-operability across networks*
- *As a carrier, to insure inter-vendor inter-operability, we base our product requirements on standards, and specify to our vendors the minimum set of standards and "options" required*
  - *Then test to insure those requirements are met!*

Experiences with inter-vendor, inter-equipment, inter-operability

- Given standards are full of options, there are cases where vendors may interpret standards differently, or implement different options, or fail to implement specific operator requirements
  - Vendor products may pass all conformance tests because they do meet the minimum performance requirements
  - But, differences in implementation may result in problems during operator testing and/or first office deployments
    - Requires effort to isolate the problem, then determine which implementation is “incorrect” according to standards, operator requirements, etc.
  - And then the challenge is to get a vendor to modify the implementation …
- In the extreme, inter-vendor inter-operability testing failures may require changes or clarifications to standards or development of implementation guidelines

Conformance testing

- *Standard conformance test plans are an important part of supporting the goal of inter-operability – **but not the "end all"***
  - *Ensures that network elements meet a minimum level of performance as defined in the 3GPP specifications*
- *Standard conformance test cases defined by 3GPP available for vendors, carriers, and testing labs:*
  - *3GPP RAN5 develops conformance testing specs for Radio interface and User Equipment (UE) based on the requirements defined by RAN WG4 for the radio test cases, and RAN WG2 and CT WG1 for the signaling and protocols test cases*
  - *Conformance specs include common test environments, radio and transmission reception, protocol conformance, A-GPS/positioning, SIP and SDP protocol conformance, common test environments*
- *PTCRB*
  - *Created by operators to provide an independent evaluation process where GSM / UMTS Type Certification can take place*
  - *Technical evaluation is based on standards as well the needs of the operators, who determine the requirements for the Type Certification Process*
- *It is important to define tests that are most important for market requirements*
  - *RAN5 works closely with the Global Certification Forum, for example*
- *Need to define how/where any unique "public safety" conformance tests will be developed and who defines the "market requirements"*
  - *3GPP RAN5? ATIS? PTCRB?*
- *Testing ultimately is the responsibility of the operator and vendor(s)*
  - *Operator acceptance testing is the final step in the process and includes more carrier-centric tests*

Managing evolution, long term planning horizon. Implementing new standards.

- Standards is an ever-evolving process
  - Not only new features and capabilities, but changes that result from deployment experiences and inter-operability issues
  - Planning for new standards includes market driven business requirements as well as technology enhancements
- Standards cycles – especially global standards - are typically 18-24 months, followed by product development once standards are completed, after which the deployment cycle begins
- Standards evolution needs to account for backwards compatibility
- The proper standards body should be identified, for example:
  - 3GPP and/or ATIS for radio and network
  - OMA (Open Mobile Alliance) for Device Management, SUPL User plane Location, etc.
  - IETF for protocols
- Changes to the standards will come from many different drivers and market requirements
  - As a carrier we work with our vendors to define the network evolution path to provide the services that our business requires
- Our guideline – don't introduce a new feature or capability into the network that has not been fully tested
  - Testing has to be end to end and must include all components – handset, network elements , and OA&M systems - before we release the feature
  - Once lab testing is successful, we enter the FOA and begin field deployments

Key Take-aways

Standards do not insure interoperability, but provide a framework to support interoperability both within the Public Safety network and between the Public Safety and Commercial networks

- *Based on 3GPP specifications with collaborative agreements and requirements for specifics of functions, features and options*

Proprietary implementations of standards can lead to a lack of interoperability

Conformance Testing is important to insure a minimum level of performance, but testing does not stop there

Evolution of standards must insure backwards compatibility while introducing new capabilities and features, as well as changes to address interoperability issues