Public Safety 700MHz Broadband Demonstration Network

IWCE 2012

PSCR

Public Safety Communications Research

Agenda

- What is 4G?
- Who is PSCR?
- What are we doing to help public safety?

PSCR

Public Safety Communications Research Program

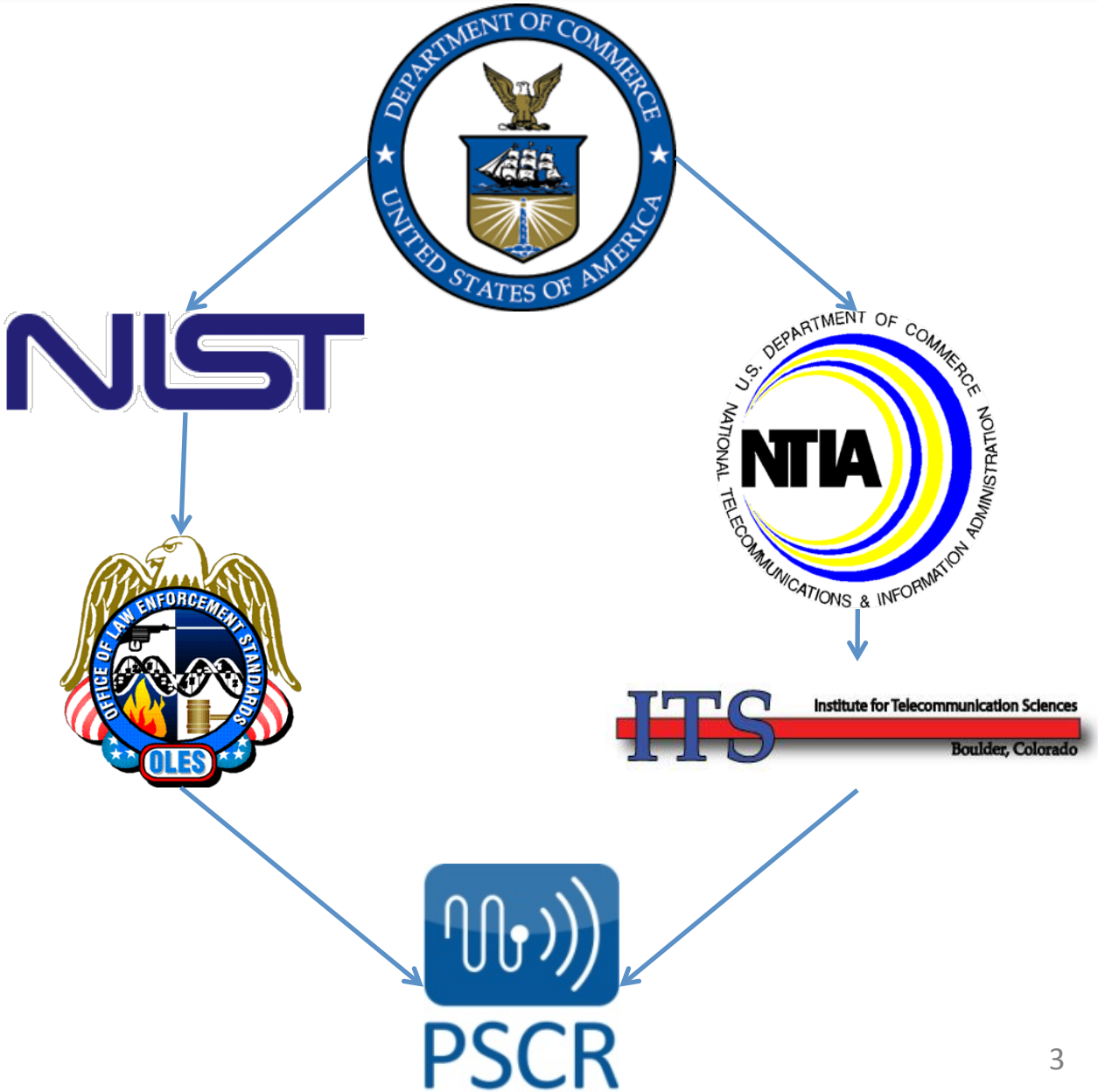
Located at the Department of Commerce Boulder Labs in Colorado

The PSCR Program is a joint effort between:

NIST's Office of Law Enforcement Standards (OLES)

and

NTIA's Institute for Telecommunication Sciences (ITS)



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Genesis of PSCR Demo Network

- **Spring 2010 PSCR kicks off 700 MHz LTE Demonstration Network**
  - The only government or independent lab facility located in the United States to test and demonstrate public safety 700 MHz broadband networks and applications, the Demonstration Network provides:
    - A vendor-neutral place for manufacturers and carriers to deploy their systems to test them in a multi-vendor environment. This provides integration opportunities.
    - A place for public safety to see how these systems will function, specific to their unique needs. Interested agencies can visit the network and get hands-on experience with these systems, as well as run public safety specific test cases that relate directly to their operational environments.
    - A place where early builders can ensure that the systems they might procure will in fact work in the eventual nationwide network, assisting agencies in their procurement process.

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Demonstration Network Overview

- R&D nationwide interoperability through a unified approach to network design and implementation
  - Testing (conformance, performance and evaluation)
  - Multi-site/vendor Over-The-Air network – allows consistent testing between vendors
    - All eNodeBs co-located and share common antenna system
    - EPCs local and remote
    - Dedicated RF & Interoperability test labs
  - Develop guidelines/Industry Requirements for network architecture, RF, IP, PLMN, IMSI, eNUM, Security, Application… etc
  - Advanced feature testing – QCI, ARP, eMBMS, FFR, Channel Bonding, IPX/Roaming

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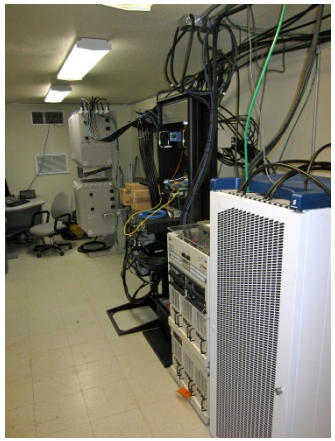
Field Sites

OTA Testing

- Two fixed sites – Table Mtn & Green Mtn
- Two mobile sites (COW)
- Each eNodeB co-located at each site
- Utilize same RF transmission & backhaul facilities
- Test in variety of RF conditions (rural & suburban), antennas
- Test microwave and fiber backhaul



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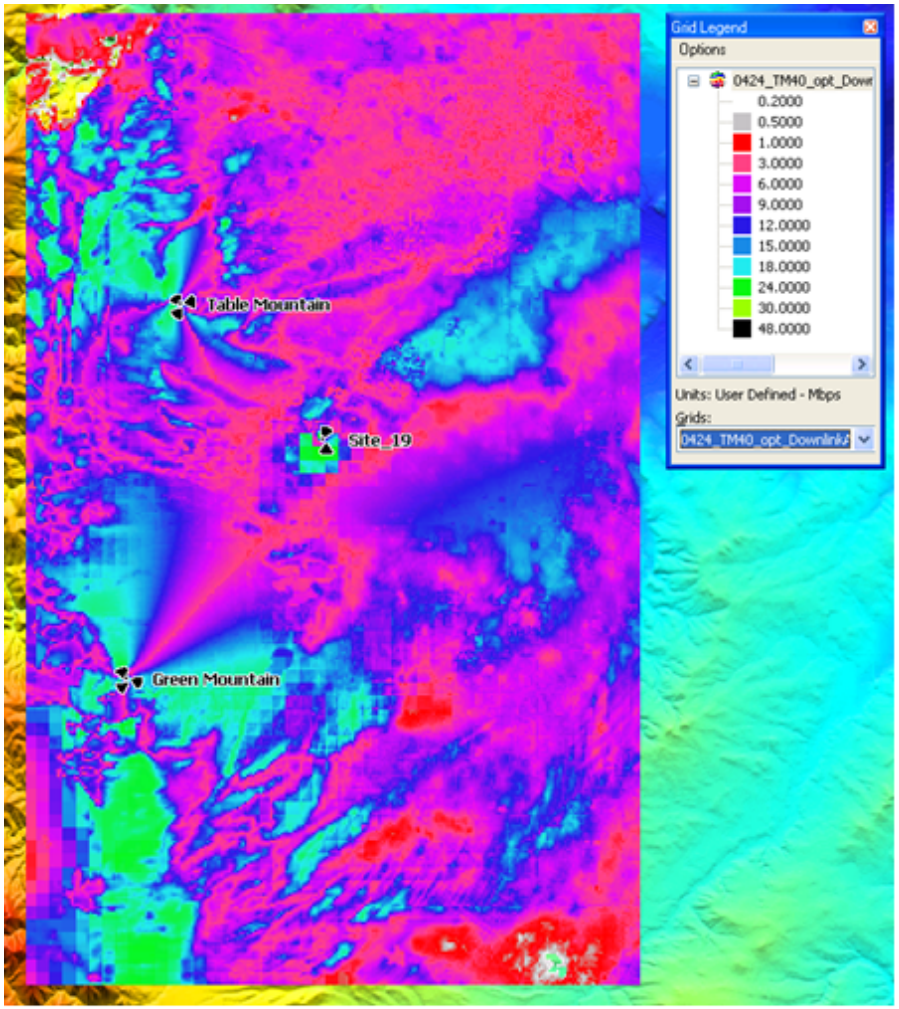
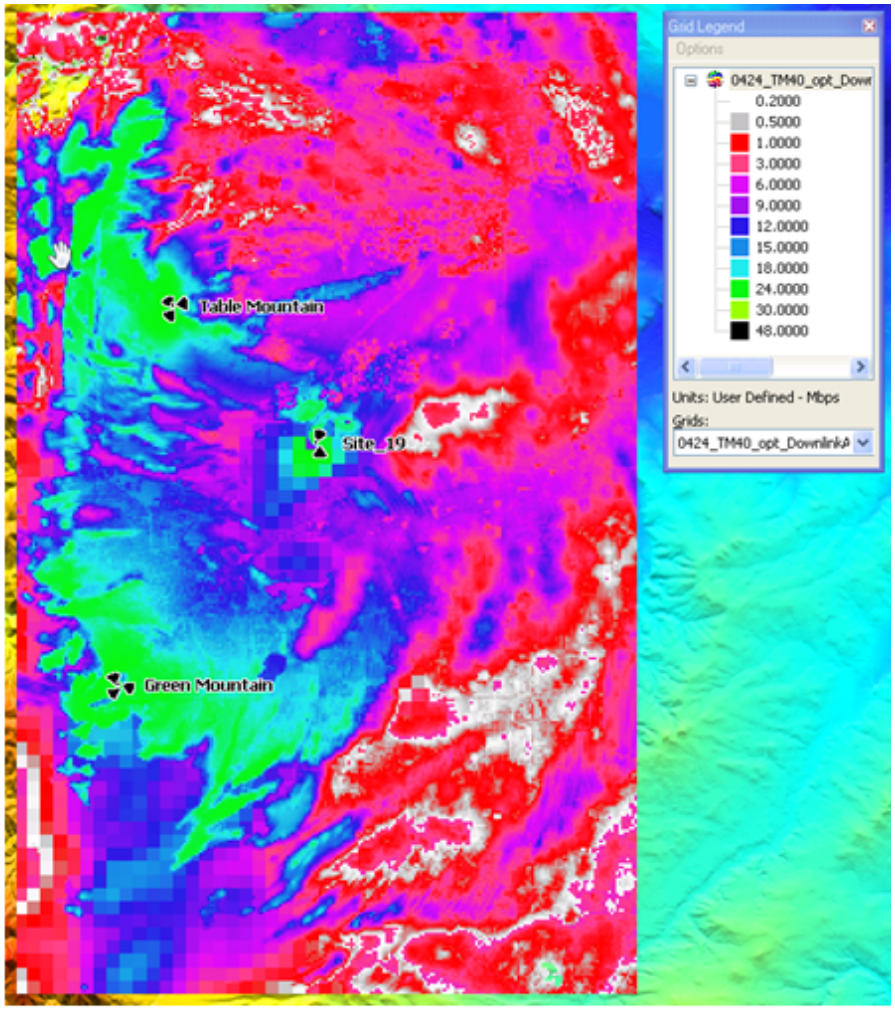
Simulations



Area DL > 768 kbps: 98.0%



Area UL > 256 kbps: 91.7%

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PSCR Standards & Testing

- Generate interest from broadband vendors to develop a 700 MHz broadband equipment ecosystem
  - **Band Class 14 (D Block & Public Safety Block), Long Term Evolution (LTE)**
  - **Stimulate early development for public safety systems (e.g. Waiver Orders)**
  - **Support & participate in the commercial standards and testing process with public safety requirements e.g.**
  - **Publish test results (non-attributable) to inform stakeholders**

Study Item Groups

- PSCR has defined specific Study Items for the Broadband Demonstration Network. These Study Items are areas of technical need identified within the PSCR Demonstration Network project that require input from our stakeholders.
- The following Study Items will be led by the PSCR Project Team:
  - UE Testing
  - **Network Identifiers – Published PSCR 700 MHz Demonstration Network Identifier Guidelines – *a.k.a. PLMN IDs***
  - Roaming & Clearing
  - UICC
- To join the groups go to www.pscr.gov and sign up for the groups and for sharepoint/web portal access

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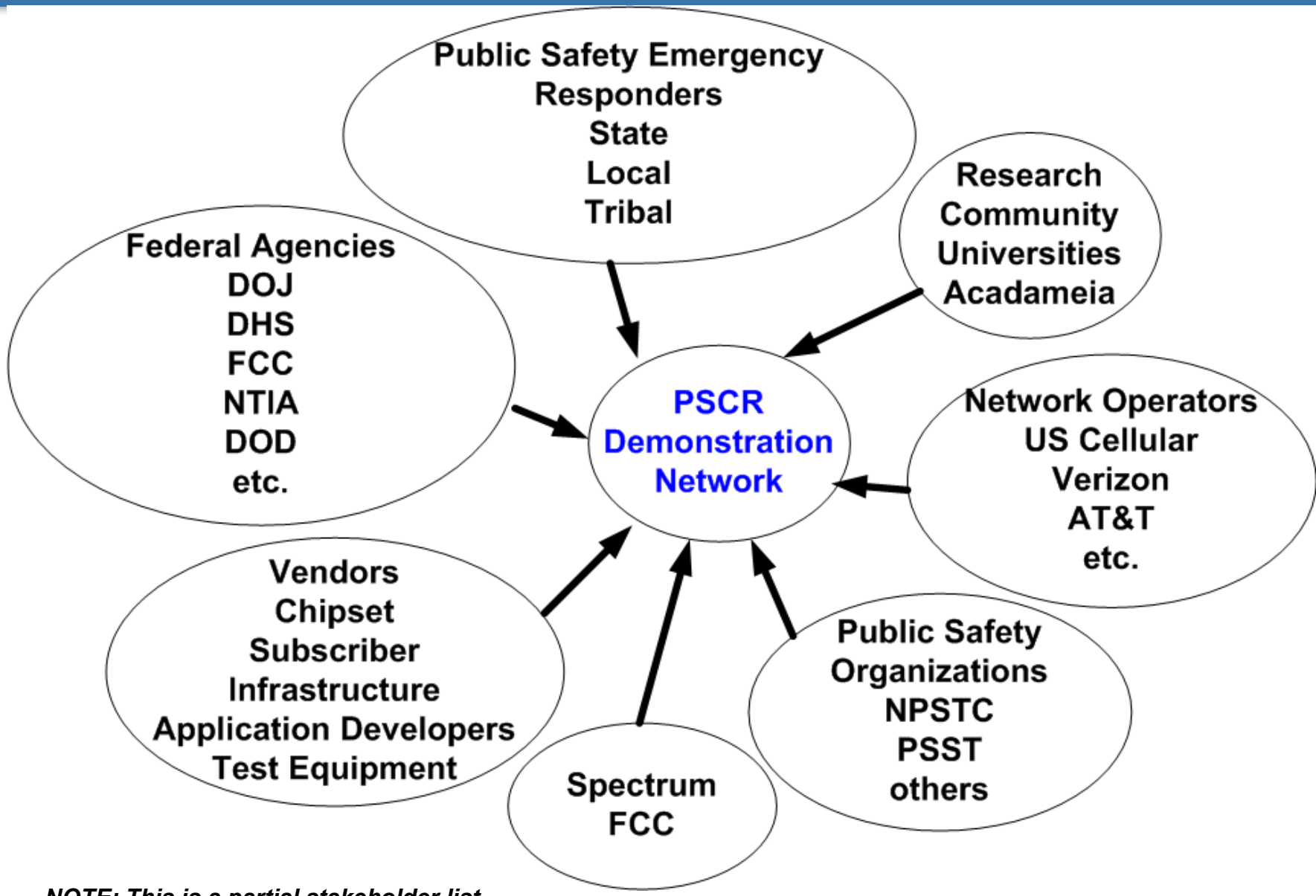
Demo Project Stakeholders



NOTE: This is a partial stakeholder list

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CRADA

- CRADA – Cooperative Research And Development Agreement
  - CRADAs are partnering tools allowing federal laboratories to work with US industries, academia and other organizations on cooperative R&D projects. CRADAs provide flexibility in structuring project contributions, intellectual property rights, and in protecting proprietary information and CRADA research results.
  - 40 submissions executed – 11 more in process
    - Project Phased Approach relates to phased CRADA execution
    - Judgment of NIST on whether or not to execute CRADA based on project needs

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Executed CRADAs

COMMSCOPE®
ANDREW®
INMOTION TECHNOLOGY
IXIA
ROHDE&SCHWARZ
ascom
IPWireless
verizon wireless
TAIT radio communications
Alcatel·Lucent
TALLEY
Anritsu Discover What's Possible™
HARRIS®
traffix systems
at&t
Sprint
MOTOROLA SOLUTIONS
U.S. Cellular
Powerwave technologies
7 layers
AIRCOM INTERNATIONAL
Wavesat
CASSIDIAN AN EADS COMPANY
CISCO
LG
JDSU
CAVIUM NETWORKS
EDX WIRELESS
CETECOM™
ERICSSON
Nokia Siemens Networks
AEROFLEX
ISCO INTERNATIONAL
Raytheon JPS Communications
TWISTEDPAIR Rethink Critical Communications
AT4 WIRELESS
Agilent Technologies
PSCR
T·Mobile·
NORTHROP GRUMMAN
Syniverse

Project & Testing

Updates

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Testing Phases

Phase 1

- Basic functionality testing
  - Physical layer tests to ensure that the submitted equipment will not interfere with other existing 700 MHz LMR, PSCR demonstration systems
  - Messaging/protocol tests
  - Public safety application tests
  - Basic drive test single user performance tests

Phase 2

- Phase 2.1
  - Physical Layer Tests: Examine several characteristics of the eNB that will indicate how this equipment will operate in PS scenarios.
  - Throughput Performance Tests
    - Tests examine throughput in bidirectional, downlink and uplink configurations.
- Phase 2.2
  - Performance Tests
  - Messaging/Protocol Tests
  - Network O&M - Alarm/ Fault Reporting
  - Application/"Status Info Homepage" evaluation

Phase 3

- Network architecture type testing, including evaluation of various PLMN, eNUM and IP implementations
- Interoperability testing that includes testing the EPC and inter-connecting multiple EPCs
  - Basic RAN IOT – UE and eNB based both
- Mobility, Handover & Roaming testing and evaluation (pending UE availability)
  - LTE-to-LTE (public safety-to-public safety)
  - LTE-to-LTE (PS to commercial)
- Stress, performance, messaging/protocol, application tests

Testing Status

- Phase 1 tests published & available on www.pscr.gov
  - Test plan stable at v1.22
  - Completed Phase 1 testing with Alcatel-Lucent, MSI and NSN
  - Started testing with MSI and NSN
- Phase 2.1 testing complete with Alcatel-Lucent
- Phase 2.2 scheduled to start Q2
- Phase 3 TBD start date
- Initial Phase 1 results to be presented at PSCR conference

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UE Testing

- PSCR looking to move most UE testing to PTCRB certified labs
- Working with PTCRB on PVG submittal for Band 14 validation
  - CRADAs signed with 7Layers,Cetecom & AT4 Wireless
  - One test platform has already tested on one UE chipset but did not meet 2 chipset criteria

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Face-to-Face

- Annual PSCR Face-to-Face meetings to be held March 6-7 – Broomfield, CO
  - Send email to 700MHz@its.bldrdoc.gov to get added to distribution list
  - Or sign up and register at www.pscr.gov website

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For Additional Information:
http://www.pscr.gov

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