700MHz Public Safety Broadband Demonstration Network

Inaugural Stakeholder Meeting

April 20-21 2010

Boulder, Colorado

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Executive Summary

The inaugural stakeholder meeting for the Public Safety Communications Research (PSCR) program's Broadband Demonstration Network brought together over 130 representatives from the public safety community and the broadband industry. These representatives met at the National Institute of Standards and Technology's (NIST) facilities in Boulder, CO over two days to have a series of sessions about the new Demonstration Network. The sessions included discussions and briefings on:

- Project expectations & issues from public safety and industry
- Draft test plan and test planning process
- Demonstration and technology evaluation tests
- Public safety voice and security requirements
- Network planning and design
- A process for collecting public safety LTE requirements
- Network architecture, link budget, & roaming
- Public safety roaming, priority access, pre-emption, and quality of service requirements
- Standards work and standards development organization participation
- Device and band class 14 requirements
- Cooperative Research and Development Agreements (CRADA)
- Project schedule

These discussions will inform how PSCR moves forward in developing the Demonstration Network. The key outcomes of this meeting were:

- Beginning of a dialogue between the public safety community and industry on expectations, concerns, and requirements for broadband networks.
- Education of the key stakeholders on the scope and goals of the Demonstration Network.
- Gathering input on the Test Plan and Network Design from which the working groups can build.
- Development of a group of interested representatives from public safety and industry to participate in working groups and inform the Network as it evolves.

Based on the discussions, the PSCR has determined several steps for moving the project forward. These are:

- Establishment of working groups for Network Architecture, Application Demonstrations, and Evaluation Testing (June 2010)
- Development of the Demonstration Network Test Plan (August 2010)
- Continued outreach to the public safety and industry community (Ongoing)
- Delivery of equipment (4Q 2010)

- First call on the Network (4Q 2010)
- First Demonstration Day (4Q 2010)

Introduction

Thank you for your interest in the Inaugural Stakeholders Meeting for the 700MHz Public Safety Broadband Demonstration Network in Boulder, CO on April 20-21 2010. The meeting was facilitated by the Public Safety Communications Research (PSCR) program, with sponsorship from the Department of Homeland Security's Office of Emergency Communications (DHS OEC), and brought together representatives of the public safety community, federal agencies, and industry to discuss how the Demonstration Network could forward the goals of creating a nationwide public safety broadband network in the 700 MHz public safety band.

The goal of this project is to provide public safety and industry a vendor neutral environment in which to test and observe how equipment in this band operates. Broadband technologies have the potential to revolutionize the way public safety performs its mission. Access to high-speed data for geographic information systems (GIS), video, and many other applications can help public safety personnel communicate and share information more effectively. These new capabilities will in turn help public safety personnel better perform their mission to protect lives and property. Additionally, these networks will supplement and potentially one day converge with the traditional land mobile radio (LMR) networks that handle mission critical voice communications. This Demonstration Network has been designed to contribute to the understanding of how broadband capabilities can support public safety in the near-term and the possibilities for it to converge with LMR in the long-term.

As envisioned by the PSCR, this Network will operate under a special license from the Federal Communications Commission (FCC)[1] with deployments on Table Mountain in Boulder, CO and in Washington, DC. These locations provide both urban and rural environments for testing. At the inauguration of this project, PSCR has established a set of principles to guide the Network. The Network will:

- Be designed for demonstration purposes only, and will not serve as an operational network for Boulder, CO or Washington, DC.
- Be made up of equipment donated by industry.
- Not duplicate testing performed by other bodies such as Third Generation Partnership Project (3GPP) or the Global Certification Forum (GCF).
- Provide learnings and information that will be open to all of public safety.
- Deploy equipment based on the Long-Term Evolution (LTE) standard.

Based on these principles, the 130 participants in the stakeholder meeting engaged in discussion about their expectations, requirements, and concerns over a two-day period. These discussions also offered public safety personnel the opportunity to interact directly

[1] "Special Temporary Authority" (http://www.fcc.gov/pshs/services/sta.html)

with the vendor community, and begin to build partnerships that will aide in achieving the goal of a nationwide public safety broadband network.

Thanks to these discussions, we have developed a path forward for the development of the Demonstration Network in partnership with public safety, Federal agencies, and industry. In this report you will find a compilation of all the discussion results as well as a meeting agenda, attendee list, stakeholder map, and project schedule. Thank you again for your dedication to this project; we look forward to your continued participation in improving public safety communications.

Dereck Orr
Program Manager

Emil Olbrich
Project Leader

About PSCR

The NIST Office of Law Enforcement Standards (OLES) and the National Telecommunications Information Administration's (NTIA) Institute for Telecommunication Sciences (ITS) Information Technology and Telecommunications Planning Division (P Division) have been working in partnership to develop standards and perform testing and evaluation work relating to public safety communication for more than 20 years. This partnership, along with expertise leveraged from two other NIST laboratories, is known as the Public Safety Communications Research (PSCR) program.

Today, PSCR provides objective technical support—research, development, testing, and evaluation—in order to foster nationwide communications interoperability. Drawing on existing standards as well as critical requirements provided by public safety practitioners, the team provides insight and direction to IT and wireless standards committees that are developing standards for voice, data, image, and video communications. To meet the short-term needs of public safety agencies until such standards are in place, the program also evaluates commercial devices that can provide for interim voice or data communications interoperability.

Vision

The response community nationwide can exchange voice and data seamlessly to effectively respond to any incident or emergency. Seamless voice and data exchange refers to the ability of the response community to interoperate with each other on demand, in real time, when needed, and when authorized.

Mission

To fulfill this vision, PSCR will act as an objective technical advisor and laboratory to public safety to accelerate the adoption and implementation of only the most critical public safety communication standards and technologies.

Vision for 700MHz Public Safety Broadband Demonstration Network

There are currently no government or independent laboratories in the United States that can test and demonstrate LTE equipment for the public safety community. To address this gap, PSCR has designed the Demonstration Network as a tool for both industry and public safety to learn about the key technical challenges and opportunities involved in deploying broadband networks in the public safety band. In keeping with that goal, the PSCR has developed the following vision for this project.

The Public Safety Demonstration Network will provide unbiased technical information to support public safety, in partnership with industry, in the creation of a nationwide broadband network that will help our Nation's responders perform their mission more effectively.

To do this the Demonstration Network will:

- *Provide information to public safety to help agencies plan for potential purchases.*
- *Provide manufacturers with a site for early deployment of their systems.*
- *Provide public safety and industry an opportunity to evaluate these systems in a multi-vendor environment.*
- *Create integration opportunities for commercial service providers.*
- *Gather public safety specific information to influence the LTE standards process.*

Key Outcomes and Accomplishments

Over the course of the two days, industry and public safety engaged in a series of conversations about their expectations and concerns, timelines and key steps, test planning, requirements, and other associated topics. For many of the participants, this meeting represents the first time potential broadband vendors have interacted directly with the public safety community. As broadband becomes an essential part of public safety's communications architecture, these relationships will become more valuable.

Throughout the discussion it became clear that industry requires an extensive dialogue with public safety to understand its concerns and unique requirements and that public safety is seeking to educate itself on broadband and the opportunities and challenges it represents. The Demonstration Network project is specific to testing LTE equipment in the public safety 700 MHz band. Since this meeting was the first time many in the public safety community and broadband industry came together in one forum, many of the discussions touched on topics beyond the scope of this project. Moving forward, the PSCR sees its role as providing the technical information that can inform these discussions, and it will partner with other organizations helping to implement the public safety network.

The key outcomes of this meeting were:

- Beginning a dialogue between the public safety community and industry on expectations, concerns, and requirements for broadband networks.
- Education of the key stakeholders on the scope and goals of the Demonstration Network.
- Gathering input on the Test Plan and Network Design for the working groups to build off of.
- Development of a group of interested representatives from public safety and industry to participate in working groups and inform the Network as it evolves.

Expectations—Public Safety Perspective

Background:

This 45-minute meeting included discussion in breakout groups and with all public safety representatives together on the industry expectations of both the 700MHz Public Safety Broadband Network and the PSCR Demonstration Network project. Questions and concerns were also discussed. After the Public Safety-specific discussion, all meeting participants (industry and public safety) gathered to hear a short recap of each other's discussions.

Objectives:

- Articulate public safety expectations of both the national 700MHz public safety network and PSCR's demonstration network.
- Develop a list of public safety's questions and concerns surrounding the national network and PSCR's demonstration network.

700MHz Public Safety Broadband Network

Expectations	Concerns
• A national build-out plan • Rural issues are addressed • Education and training are provided • The network is built from the start to public safety requirements • Consideration is given to the *700MHz Statement of Requirements* and the Broadband Task Force reports • Though a data network initially, it will ultimately support public safety voice • Priority access for public safety • Interoperability across entire network • Bandwidth can be ramped up when needed • Easily adaptable so new technologies can be added and supported • Equipment is financially viable • Understood that there is a parallel path that recognizes the eventual convergence of traditional LMR and broadband • A national standard for public safety quality of service	• How will the public-private partnership work? • How will the shared network be controlled, managed, and governed? • Rural vs. urban build-outs • Must be coverage-based and not population-based • Timing: Technologies must exist, be in demand, be affordable, and spectrum must be available • What could corporate changes and/or mergers mean for the network? • How do municipalities train people to manage the network? • False expectations of broadband vs. LMR • Grant money could be diverted from LMR to broadband • Is public safety given adequate spectrum?

PSCR DEMONSTRATION NETWORK

Expectations	Concerns
The Demonstration Network: • Will emulate large disaster scenarios with a large number of users • Will emulate the LMR to broadband migration • Could "verify" the need for additional spectrum • Will consider applications as well as operational components • Will be a live network • Will include all morphologies • Involves on-the-ground public safety practitioners • Contains realistic use-cases • Helps public safety independently validate claims	• How will the public-private partnership work? • How will the shared network be controlled, managed, and governed? • Rural vs. urban build-outs • Must be coverage-based and not population-based • Timing: Technologies must exist, be in demand, be affordable, and spectrum must be available • What could corporate changed and/or merges mean for the network? • How do municipalities train people to manage the network? • False expectations of broadband vs. LMR • Grant money could be diverted from LMR to broadband • Is public safety given adequate spectrum?

Next Steps:

Public safety practitioners are invited to participate in the Application Demonstration Working Group established by PSCR to provide continuing guidance during the project planning and execution.

Expectations– Industry Perspective

Background:

This 45-minute meeting included discussion, in breakout groups and with all public safety representatives together, on the industry expectations of both the 700MHz Public Safety Broadband Network and the PSCR Demonstration Network project. Questions and concerns were also discussed. After the industry-specific discussion, all meeting participants (industry and public safety) gathered to hear a short recap each other's discussions.

Objective:

- Articulate industry expectations of both the national 700MHz public safety network and PSCR's demonstration network.
- Develop a list of industry's questions and concerns surrounding the national network and PSCR's demonstration network.

700MHz Public Safety Broadband Network

Expectations	Concerns
• Public safety will have reasonable expectations of what the network can provide • This will require change in business model to serve public safety • New business model will stress quality-based business vs. volume-based business • The network will perform as well or better than LMR	•Does public safety have reasonable expectations? • What will User Equipment (UE) look like? • Who's going to pay for 95-98% coverage (for 700MHz network in general)? • Can we get coverage equivalent to what Pubic Safety is used to with LMR?

PSCR Demonstration Network

Expectations	Concerns
• Basics, Basics, Basics: Demonstrate voice, data, and a core network • Need to understand roaming and coverage • Will incorporate edge use cases • There will be a reasonable expectation of test cases • Use cases should assume private networks then look at roaming in and out	• What's the business case for public safety? • What is the scope of roll out? • What is an average use case we're trying to demo? • Not all that can be tested in a Demo Network may not be applicable to a real-world network • Pre-emption of services • Demo Network test must stay standards-based • Need to understand and better quantify public safety requirements • Priority access: What does it mean? How will it impact commercial community? • Overlap testing between GCF and PSCR testing? • Is the Demo Network going to use LTE as it is today?

Next Steps:

Industry working groups will be established by PSCR to provide continuing guidance through the project planning and execution. Industry working groups include test and use case selection, network architecture and design, among others.

Demonstration Tests

Background:

To foster discussion, this meeting was broken out into two groups, both of which included industry and public safety representatives. After a short overview of PSCR's draft test plan and an explanation of demonstration and evaluation tests, each group was asked to discuss: *1) Comments & Concerns; 2) Adding or Deleting Features to PSCR's Draft List of Demonstration Tests; 3) Feasibility of Performing these Tests; and 4) What the Demonstration Days Should Look Like.* The comments of both groups were then shared with the entire group. The notes below represent the combined discussion of both groups.

Objectives:

- Obtain input from the public safety community on what kind of demonstration tests they would like to see.
- Present PSCR's current list of application categories for demonstration tests to public safety and assess gaps.
- Develop an idea of what PSCR's Demonstration Days should look like.

Comments:

- The test standards are not all developed. Are we testing what's going to be the standard?
    - Make sure the tests are derived from the standards
- Demo Network needs to employ a phased approach. Consider "enhanced" LTE (for those features/functionalities not yet included in standard).
    - 3-Phase Approach: 1) technological component testing; 2) applications testing and stressing system with multiple applications; 3) operational context testing
- Ensure reproducibility of these tests
- Instead of broad categories, try scenario-driven (pre-emption, priority) testing in order to make these tests more interesting for public safety
- Will terrain and distance be a part of the demonstration testing?
- How do we plan for the LTE standards roadmap in this Demonstration Network?
- Need to define baseline/performance benchmarks
    - Requirements are the baseline and the Demonstration Network should prove these and identify gaps
- Are we testing the platform or the applications?
- Who will be doing the testing? Public safety should be included

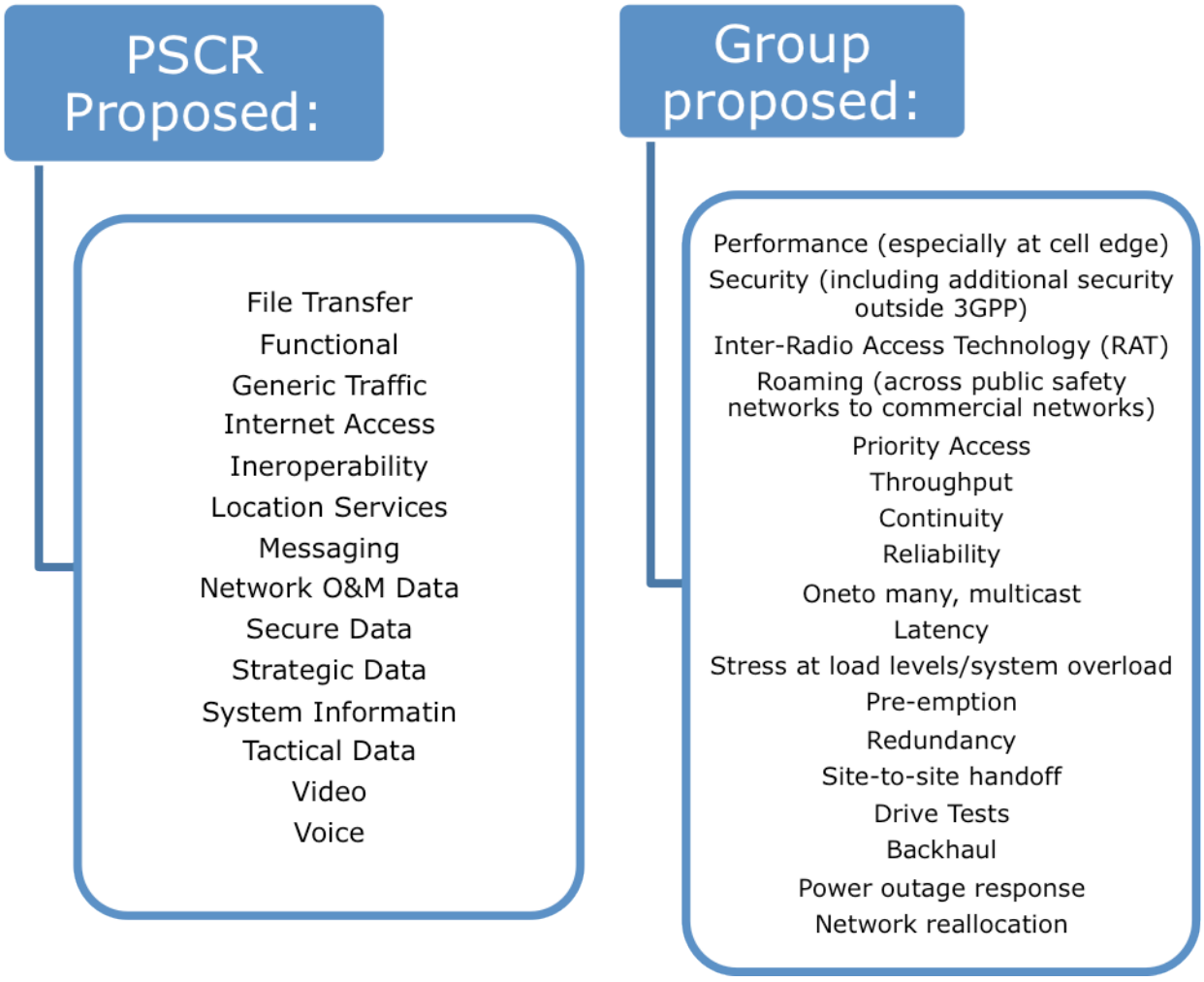
Demonstration Day Expectations:

- Focused on user experience
- Scenario-type demos
- Give an operational perspective
- Includes concept devices
- Objective measures as results
- Twice a year or quarterly
- Multiple days with small groups
- Include waiver cities
- Hands-on for public safety
- Funding for public safety agencies to participate
- Same demonstrations in Boulder and DC
- Mission focused, not technology focused

- Are we testing along with other technologies (e.g., Internet)?
- Are vendors providing subscriber units?
- Vendors are already doing testing and demonstrations. Can these be leveraged?

Demonstration Test Application Categories:

The following tables show the application categories for demonstration tests that were proposed by PSCR and the features and functionalities that the group proposed to be added.



Next Steps:

An Application Demonstration Working Group will be formed by PSCR, and both industry and public safety are invited to participate.

Evaluation Tests

Background:

This session, which was geared towards industry participants, included a briefing from PSCR on what it is currently thinking in regards to evaluation testing on the Demonstration Network. PSCR has identified 150 tests that appear to be important to public safety. A draft evaluation test plan was circulated one week prior to this meeting, and participants were asked to provide comments.

Evaluation tests examine the system's ability to meet particular engineering criteria. These tests may involve specialized software of instrumentation and are typically quantitative rather than qualitative in nature.

Objectives:

Begin to get buy-in from industry on the types of evaluation tests to be conducted on the Demonstration Network.

Comments:

- We need to focus on what's unique to public safety test needs and make those tests the priority. Otherwise, it's a duplication of effort performing testes that have already been done.
- PSCR proposes testing the Air Interface first and testing the core late. We suggest a phased approach.
- Ue Test Plan
    - Ue Channel state information requires chip set interface access, which must be vendor-provided.
    - Ue testing might be too broad. Maybe not all tests are necessary. It's important to have a fallback to old technology. The list is not required. It depends on who the roaming partner is. Test for that partner's technology—EVDO or HSPDA, GSM or CDMA.
- SMS presents problems for automation testing because certain things don't pass through. SMS testing needs to be manual.
- How should movement at 250 MPH be tested?
- PSCR is hoping to perform test-case automation cases.
- An ITU standard for resting against a reference signal is available.
- Carriers might be able to offer test cases and procedures, but not results.
- Would like to see that evaluation testing is going back to what is important to public safety.
- Want to see a mapping between demonstration tests and evaluation tests.

Concerns:

- Duplication with the Global Certification Forum (GCF)
    - If the GCF has run tests, PSCR does not propose rerunning them.
    - To get access to GCF test results, it's necessary to be a GCF member, which is quite expensive.

    - Is there any effort to verify the difference between GCF tests and any extra tests needed for public safety?
- How to test MIMO (multiple input, multiple output)?
    - Motorola has detailed MIMO test cases.

Next Steps:

A working group will be formed to address demonstration and evaluation tests.
PSCR will give working group members a month to digest the evaluation test plan, and then discuss it in a phone call.

Public Safety Applications and Services

Background:

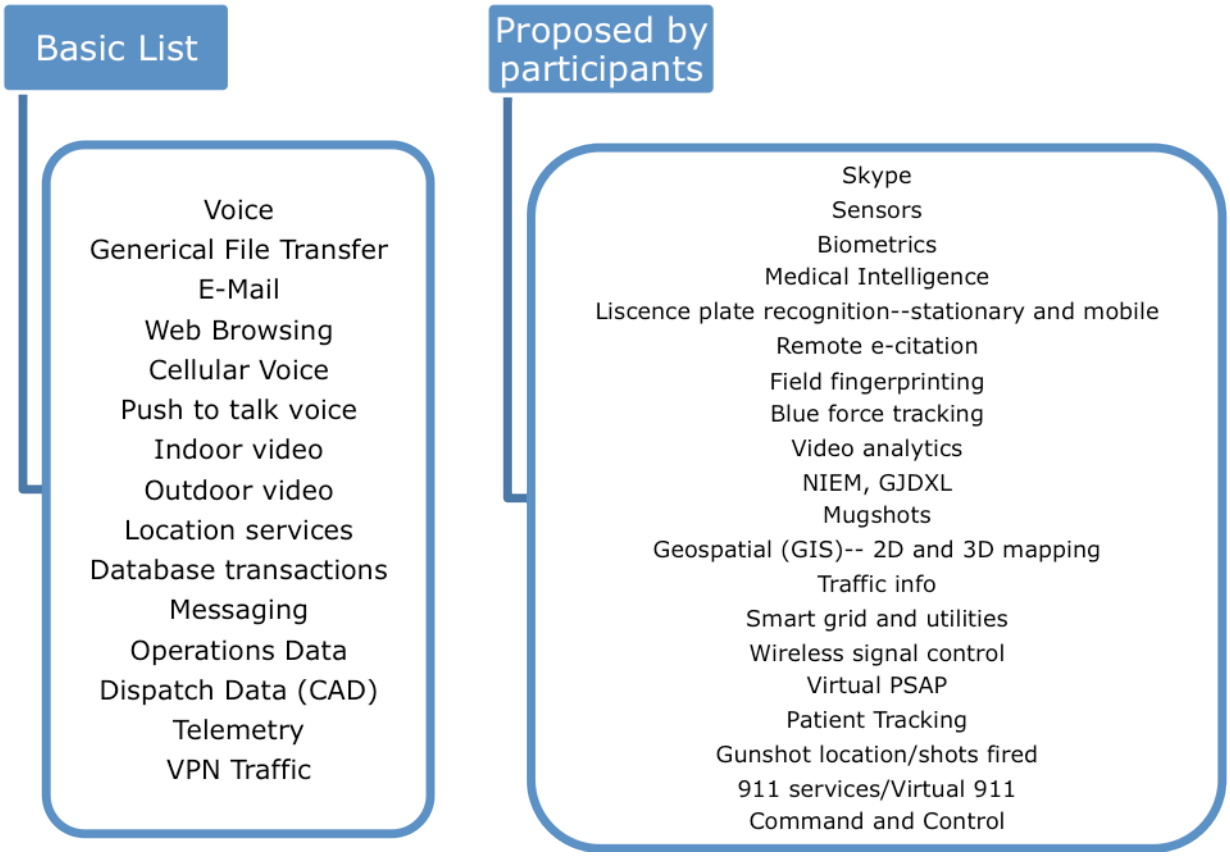
Two sessions focused on public safety's requirements for the new 700MHz broadband network. Discussion centered on voice, security, roaming, priority, pre-emption, and multi-cast/broadcast. PSCR staff provided an overview of where 3GPP standards are currently and when some of these features and functionalities would be incorporated in the standard.

Objective:

The goals of these sessions included the drafting of a basic list of applications and services and a discussion of requirements for these services.

Applications and Services:

The following is a basic list of applications and services public safety may require in the 700MHz broadband network and a list of proposed additions from participants. It was decided to group these applications and services: text based, video, and real-time vs. non-real-time.



Public Safety Requirements:

Voice

What is mission critical voice for broadband?
• The difference between LMR and broadband is that you have to have the ability to talk to someone when the LMR system is down. LTE does not allow for this.
• Need unit-to-unit talk with the network is not available or doesn't work.
• LMR was built to public safety grade. Broadband will have to be built to the same requirements.
• Effort should be top-down

Security

What are the requirements for Authorization, Authentication, and Encryption?
• Need to look at roaming over networks and what kind of security those networks are using. Going from one carrier to another is significant.
• Many vendors turn off or reduce security – so we need to remember this when roaming.
• Public Safety should define what their security requirements are.
• Will there be national authorization and encryption mechanisms?

Roaming

What are your expectations when roaming?
• Two different types of roaming:
o Casual – one person going anywhere in the U.S. and wants to access a different network
o Incident based – a large number of people go from one area to another and need to talk to one another.
• How does someone in a roaming situation get validated on someone else's system?
• How do we get PS info in to these databases for validation?
• We need to be careful to make roaming unique to public safety. We don't want to have to reconfigure everywhere we go.
• Service providers will tell us what's possible based on what they are building out.
• Different issues if we have roaming across all carriers vs. if we have one carrier managing our roaming. Roaming between different carriers is a whole different ballgame.
• Each user needs a profile (that rises above all the regional systems) that states what you can and can't do. This is something that should be done at the national level.

Priority

In what circumstance is a priority capability required? What are your expectations?
• Voice and data will require different answers, and priority services will be needed all the time.
• May be acceptable to have something like a GETS card to activate priority access.
• Because we are event driven, priority access needs to on an individual level, be user friendly, at our fingertips, and easy to train on.
• Emergency call button should activate priority service and make it the top priority
• If we're roaming on someone else's network we should be able to join a priority network if needed. We need to be able to roam on each other's systems.
• Ruthless Pre-emption: Priority all of the time but only activated when needed. (ruthless preemption)
o Precedent is set with GETS.

Public Safety Requirements (Continued):

Pre-Emption

Pre-emption was a requirement for public safety on a shared network. Is this still a requirement given the current situation?

- No, pre-emption is not a shared network assumption.
- Public safety needs preemption. We're not asking for anything we don't already have today.
- Public safety recognizes that we need to have further discussion regarding PS to PS network versus PS to commercial network

Multi-Cast/Broadcast

What it is and what it isn't

- Should this network be strictly data or also voice? We discussed this but no real answer.
- Could be used in the following applications: distributing data to multiple ground units, distributing a photo (e.g., mugshot) to many, a conference call (audio or video) where you're looking to join several members who may be in different areas, situational awareness (e.g., GIS map)
- We need to be able to pass this traffic between networks.

Network Architecture

Background:

This session included a briefing from PSCR and Washington DC's Office of the Chief Technology Officer (OCTO) regarding current thinking for designing the Demonstration Network. Meeting participants were asked to provide feedback on the current plan and to comment on anything missing.

Objective:

The objective of this session was for PSCR and Washington DC OCTO to answer participant questions in regards to network design.

Q&A:

Will there be a connection between Table Mountain and Green Mountain?

Yes, a 4.9GHz backhaul.

Is this shared with LMR?

No.

Could one eNodeB transmit on D-Block and one on Public Safety block?

Could be considered.

Do you have backup power at the site?

Not currently.

How can you co-locate different vendors at the same site on the same spectrum?

They're not on at the same time.

Have you done propagation predictive RF maps yet?

Yes, in earlier 700MHz projects, but not specifically for LTE in 700MHz yet.

What is the impact of TV stations operating near the 700MHz bands?

There is probably no issue, but this requires follow up.

As the project progresses with voice being a lower priority, isn't that a problem for getting public safety on board?

For many agencies, voice over LTE is not a priority. Existing LMR systems are adequate for mission-critical voice.

Priority, Pre-Emption, and Quality of Service

A session was also held to garner industry feedback on priority, pre-emption, and quality of service issues. The following were the questions posed by industry representatives.

When you talk about pre-emption are you talking about lowering someone in the queue or kicking them off?

It will drop them down in the queue.

Is it PSCR's role to establish profiles to help mitigate this (region to region, etc.)?

Yes, the technical aspects are PSCR's role. Policy issues will fall to the ERIC.

From an FCC/commercial network perspective, is preemption legal (from a roaming standpoint)?

We are talking about the public safety network, which does not have to meet commercial standards/regulations. This is essentially a private network and public safety has full ability to do preemption.

Public safety defines parameters as they see fit, but in a model where users need to roam to a commercial provider's network, doesn't there have to be compatibility between those various settings?

For seamless roaming, yes.

Next Steps:

PSCR will set up a Network Planning working group.

Public Safety Requirements Gathering & PSCR Participation in Standards Development Organizations

Background:

PSCR led a session to discuss gathering public safety's requirements for the 700MHz broadband network. A second session was held to discuss PSCR's involvement in 3GPP and other standards development organizations, with a focus on how to ensure these requirements are brought to the SDOs.

Objective:

A goal of these sessions was for public safety to come to consensus regarding who gathers and provides requirements, which will allow PSCR to take an agreed-upon set of requirements to 3GPP and other SDOs.

Requirements Gathering:

- How do we pay for practitioners to develop requirements? (Time, facilitation, travel, documentation, etc.)
- The PSST and ERIC need requirements they can consume.
- Public Safety needs to state, "these are our requirements" and point to a product or a process as the ***only*** public safety requirements.
- We may want to segment the requirements work. Focus on the network first and then the more long-term requirements.
- Legal people need to understand these issues because they end up in contracts. A recommendation is to include lawyers in any stakeholder group dealing with this issue.
- Need to determine who owns the requirements document?
- The Federal government won't "house" the requirements but they can participate (and do things like helping to fund travel).
- A successful requirements document will not be produced by the Feds. It must be driven by the locals.

ATIS & 3GPP:

- PSCR is a member of ATIS, which allows for participation in 3GPP. PSCR hopes public safety uses the program as its conduit.
    - The mechanism for the community to feed PSCR the information is still not defined.
- Carrier's priorities will drive 3GPP.
    - The companies that are members of 3GPP need to be supporting what we want or we will not succeed.
    - As public safety moves forward we need to consider the politics of the process or we will not get what we want.
    - Public Safety cannot be heavy handed in 3GPP.
    - Anything in 3GPP must have a legitimate business case.
    - One strategy is to look at Release 9 to see what is on it and what public safety needs. Public Safety can then push for what they want that is not on the list.

- There is concern about the cost of public safety representation in 3GPP because it's so expensive. 3GPP is also daunting: often 2,000 people with 24 sessions going on at the same time.
- One of the key reasons for the Demonstration Network is to help get support from 3GPP private sector firms.
- PSCR needs to "represent" public safety in 3GPP, but who can designate PSCR as the public safety rep?
    - According to Harlin McEwen, PSST, this is a problem because there's nobody who can designate this right now.

Next Steps:

- PSCR will identify what is needed from a requirements gathering perspective.
- Additional action items:
    - Develop a roles and responsibilities matrix/chart for this environment.
    - Develop an outreach document specific for lawyers/contracting officers to highlight the issues, best practices, etc.

Next Steps

Based on the results of the meeting, PSCR is moving forward to implement the Demonstration Network in partnership with industry and public safety. Given how new LTE technology is the timelines and steps contained in this report may have to be modified as circumstances change. The one essential element to the future of the Network will be continued coordination between public safety and industry to make the project successful. PSCR sees the next steps as:

- Establishment of working groups for Application Demonstrations, Evaluation Tests, and Network Planning (June 2010)
- Development of the Demonstration Network Test Plan (August 2010)
- Continued outreach to the public safety and industry community (Ongoing)
- Delivery of equipment (Fall 2010)
- First call on the Network (4Q 2010)
- First Demonstration Day (4Q 2010)

Beyond these steps, PSCR will engage in an ongoing dialogue with the public safety community and industry to determine the future course of the Network and whether its continued operation is warranted.

Appendix

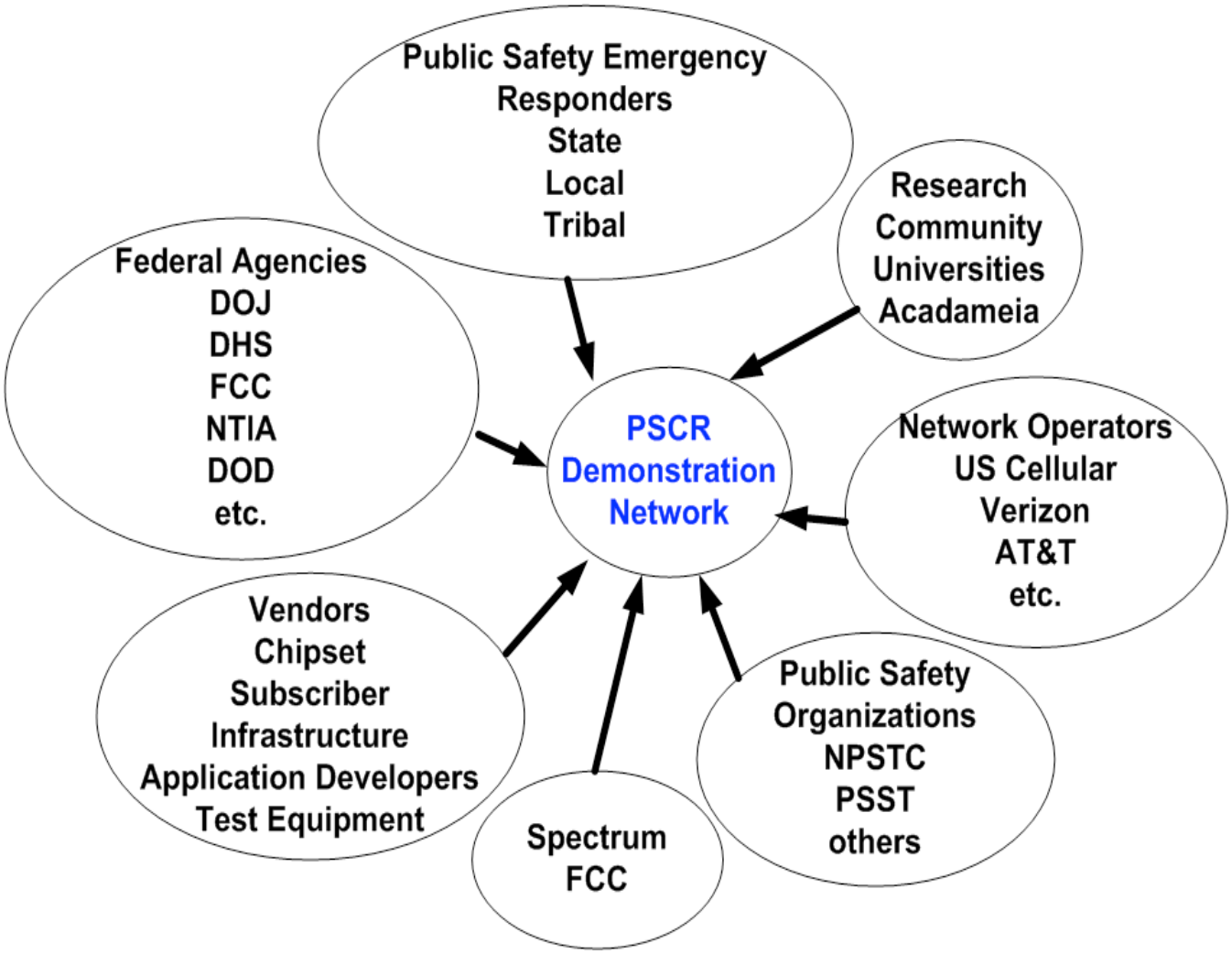
Meeting Agenda

Conference Bridge # / Pin

Day 1 | Tuesday, April 20	9:00 AM	9:30 AM	**Registration & Check-In** *Lobby*	
	9:30 AM	9:45 AM	**Opening Remarks** *Auditorium*	*1-866-654-0742 / 9864043*
	9:45 AM	10:00 AM	**Overview of PSCR** *Auditorium*	*1-866-654-0742 / 9864043*
	10:00 AM	10:30 AM	**Project Agenda, Overview, & Meeting Logistics** *Auditorium*	*1-866-654-0742 / 9864043*
	10:30 AM	10:45 AM	**Break**	
	10:45 AM	11:30 AM	Track 1 **Project Expectations & Issues – Public Safety Perspective** *Room 1103/1105* *1-877-491-0547 / 1373200*	Track 2 **Project Expectations & Issues – Industry Perspective** *Room 1107* *1-888-834-9071 / 3867142*
	11:30 AM	12:00 PM	**Project Expectations & Issues – Discussion** *Auditorium*	*1-866-654-0742 / 9864043*
	12:00 PM	1:00 PM	**Lunch**	
	1:00 PM	1:15 PM	**Test Plan Overview – BBTF Recommendations & Demonstration Versus Evaluation Tests** *Auditorium*	*1-866-654-0742 / 9864043*
	1:15 PM	3:00 PM	**Demonstration Tests** *Auditorium*	*1-866-654-0742 / 9864043*
	3:00 PM	3:15 PM	**Break**	
	3:15 PM	5:00 PM	Track 1 **Public Safety Voice & Security Requirements** *Room 1103/1105* *1-877-491-0547 / 1373200*	Track 2 **Technology Evaluation Tests** *Room 1107* *1-888-834-9071 / 3867142*

Day 2 | Wednesday, April 21	8:45 AM	9:00 AM	**Registration & Check-In** *Lobby*	
	9:00 AM	9:15 AM	**Welcome & Recap Day 1** *Auditorium*	*1-866-654-0742 / 9864043*
	9:15 AM	9:45 AM	**Network Planning & Design Overview – Boulder & Washington DC** *Auditorium*	*1-866-654-0742 / 9864043*
	9:45 AM	10:45 AM	Track 1 **Public Safety Requirements** *Room 1103/1105* *1-877-491-0547 / 1373200*	Track 2 **Network Architecture, Link Budget, & Roaming** *Room 1107* *1-888-834-9071 / 3867142*
	10:45 AM	11:00 AM	**Break**	
	11:00 AM	12:00 PM	Track 1 **Public Safety Roaming, Priority, & Pre-emption Requirements** *Room 1103/1105* *1-877-491-0547 / 1373200*	Track 2 **Priority, Pre-emption, & QoS** *Room 1107* *1-888-834-9071 / 3867142*
	12:00 PM	1:00 PM	**Lunch**	
	1:00 PM	2:00 PM	Track 1 **Standards Work Overview & SDO Participation (ATIS & 3GPP)** *Room 1103/1105* *1-877-491-0547 / 1373200*	Track 2 **Device Requirements & BC14 Requirements** *Room 1107* *1-888-834-9071 / 3867142*
	2:00 PM	2:45 PM	Track 1 **Cooperative Research and Development Agreement (CRADA) Overview** *Auditorium* *1-866-654-0742 / 9864043*	Track 2 **PSCR Lab Tour** *Lobby*
	2:45 PM	3:00 PM	**Break**	
	3:00 PM	4:00 PM	**Schedule – Equipment Deliveries, Working Groups, Demo Days** *Auditorium*	*1-866-654-0742 / 9864043*
	4:00 PM	4:30 PM	**Closing Remarks** *Auditorium*	*1-866-654-0742 / 9864043*

Stakeholder Map



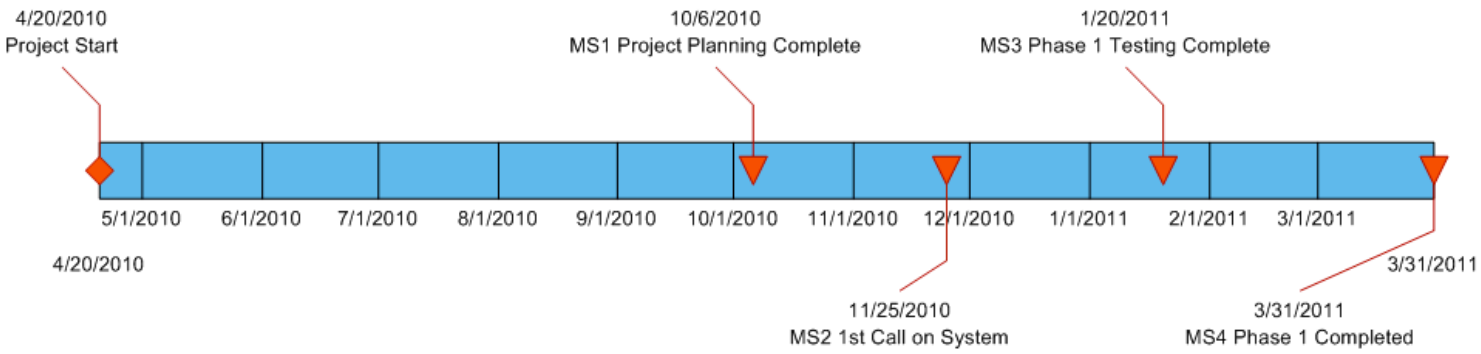
Attendee List

Last Name	First Name	Affiliation
Abdelmonem	Amr	ISCO International
Adams	Mark	Northrop Grumman
Amodio	Pat	FCC
Anderson	Jeff	Motorola
Baig	Ahsan	City of Oakland/Dept. of IT
Baker	Ken	University of Colorado
Barden	Rob	Aeroflex
Barot	Anil	Wavesat
Barton	Bruce	Rescue International Inc
Betts	Terry	SF Bay Area UASI
Blau	Jeff	Bay Area UASI
Boettcher	Travis	Motorola
Bolden	Anthony	L.R Kimball
Boley	Kenneth	District of Columbia, Office of CTO
Bratcher	Jeff	PSCR
Brouwer	Wim	Alcatel-Lucent
Caldwell	Alan	International Association of Fire Chiefs
chang	yoon	fcc
Chopra	Rajeev	Alcatel Lucent
Cioe	Peter	Nokia Siemens Networks
CLEEK	JD	Aeroflex
Cohen	Jeffrey	FCC PSHS Bureau
Combs	Mark	Nokia Siemens Networks
Contestabile	John	Johns Hopkins University/Applied Physics Lab
Cressman	Keith	ATT
Croom	Norris	Castle Rock Fire and Rescue
Curley	Jon	Epitiro Group
Dalton Koravos	JoAnne	Harris Corp
Daly	Brian	AT&T
De Gruy	Darryl	U.S. Cellular
Dean	Richard	Qualcomm
DeMark	Dominic	Verizon Wireless
Denning	Donald	City of Boston
Eagler	John	Willdan Homeland Solutions
Eierman	David	Motorola
Engelbrecht	Matthew	State of Colorado OIT
Engelman	Richard	Sprint Nextel
Fennelly	Robert	Nokia Siemens Networks
Fischer	Ted	Norwich+University+Applied+Research+Institutes
Fishel	Oleg	Aeroflex
Forristall	Jeff	Agilent Technologies
Garcia	Victoria	State of New Mexico Dept of Info Technology
Geiger	Renitta	Verizon Wireless
Goetzelman	Bradley	Agilent Technologies/JDSU
Golmie	Nada	NIST
Goni	Usman	NGC
Hall	Douglas	Cisco Systems Inc.
Hall	Terry	APCO International
Hanbury	Trey	Sprint Nextel Corporation
Hanley	Joseph	Telephone and Data Systems, Inc.
Hanna	Joe	Directions

Hassett	James	NYC Police Dept
Herlehy	Bill	Alcatel-Lucent
Hixson	Roger	NENA
Hollowell	Ben	Los Angeles County Sheriff's Department
Horden	Neil	Federal Engineering Inc.
Jensen	Ryan	T-Mobile USA
kaczmarska	margaret	cisco
Kahn	Ken	Agilent Technologies
Kaiser	Patrick	Huawei
Kalantar	Claudia	AT&T
Kalvels	Dennis	State of Colorado
Kavaleri	Teddy	DC OCTO
Kim	Sang	LG Electronics
Kusluski	Gary	Agilent Technologies
Kyung	Chanho	LG Electronics Inc.
Lane	Scott	Adcom911
LEE	JAEYONG	SAMSUNG
LeGrande	Robert	LEGTSS, LLC
Leon	Greg	EDX Wireless
Leslie	Walter	ADCOM911
Lopez, PE	Robert	RCC Consultants, Inc.
Luu	Cuong	DHS
Mark	Michael	Rivada Networks
Mayer	Marc	Agilent Technologies
McEwen	Harlin	Public Safety Spectrum Trust
McGeary	Kevin	L R Kimball
McLaurin	Jason	Cisco
Meister	John	Agilent Technologies
Mendel	David	King County
Meyer	Dean	Motorola
Miller	Trent	Motorola
Moir	Kirk	In Motion Technology Inc.
Musgrove	Peter	AT&T
Naylor	Dan	Motorola
Needham	Robin	Rivada Networks
Ng	Clement	Bay Area UASI
Nixon	Jim	T-Mobile USA
NYberg	Lawrence	Motorola Inc.
Onhaizer	Doug	SEARCH
Overby	Stu	Motorola
Packendorff	Magnus	Ericsson
Paetsch	Siegmund	Agilent
Palamara	Maria	Alcatel-Lucent
Pavlak	Bob	District of Columbia - OCTO
Perez	Jose R.	Broward Sheriff's Office
Perry	Byron	US Marine Corps
Perschau	Stephen	DHS/NPPD/CS&C/NCS
Phillips	Laura	Bay Area UASI Program
Pottenger	Warren	Samsung Telecom America
Proctor	Steve	UCAN
Pungaliya	Prem	Arsha Consultant LLC
Ray	Karen	Department of Homeland Security S&T
REISH	ROBERT	OREGON DEPT OF TRANSPORTATION
Riddle	Gregory	APCO International
Roark	Dennis	Rivada Networks
Ross	Joe	Televate
SAN GASPAR	CHRIS	D.C. OFFICE OF THE CHIEF TECHNOLOGY OFFICER

Sarazen	Russell	T-Moble USA
Schedlbauer	Rick	SAI Technology
Schuhler	Phil	Motorola
Schulz	Mark	Signals Research Group
Scribano	Gino	Motorola
Sennett	DeWayne	AT&T
Shah	Aneesh	Motorola
Shepherd	Brian	ADCOM 911
Shively	David	AT&T
Sinclair	Keith	IPWireless
Sorley	Tom	City of Houston
Sorley	Tom	City of Houston
Stansbury	Karen	ATT
Stevenson	Tom	Montrose County Sheriff's Office/West
Subramanian	Vijayarangam	National and Homeland Security Directorate, Idaho National Laboratory
Tang	Richard	Huawei
Troup	David	Boston
Trujillo	Marne	Rohde & Schwarz
Unruh	Lincoln	Willdan Group
Unruh	Lincoln	RavnTech Corp
Urrutia	Jaime	Los+Angeles+County+Fire
Vea	Edmond+	NLECTC Communications Technology Center of Excellence
Vincent	Brent	Motorola Enterprise
Walsh	David	Verizon+Wireless
Wendelken	Sandra	MissionCritical Communications
Wu	Stanley	City of Seattle
Yi	Byung K.	LGE
Zhuang	Xiangyang (Jeff)	Motorola

Project Schedule



This schedule is a conservative estimate based on equipment deliveries and predicated by vendor participation. This schedule ***will change*** as PSCR gets more input from stakeholders.

The PSCR team will work to accommodate earlier deployments.