Public Safety Communications Research (PSCR)

Department of Commerce – Boulder Labs

ANSI-HSSP Plenary Session on Preparedness and Crisis Management

PSCR and Public Safety Broadband

Dereck Orr
Program Manager, NIST
Public Safety Communications Research

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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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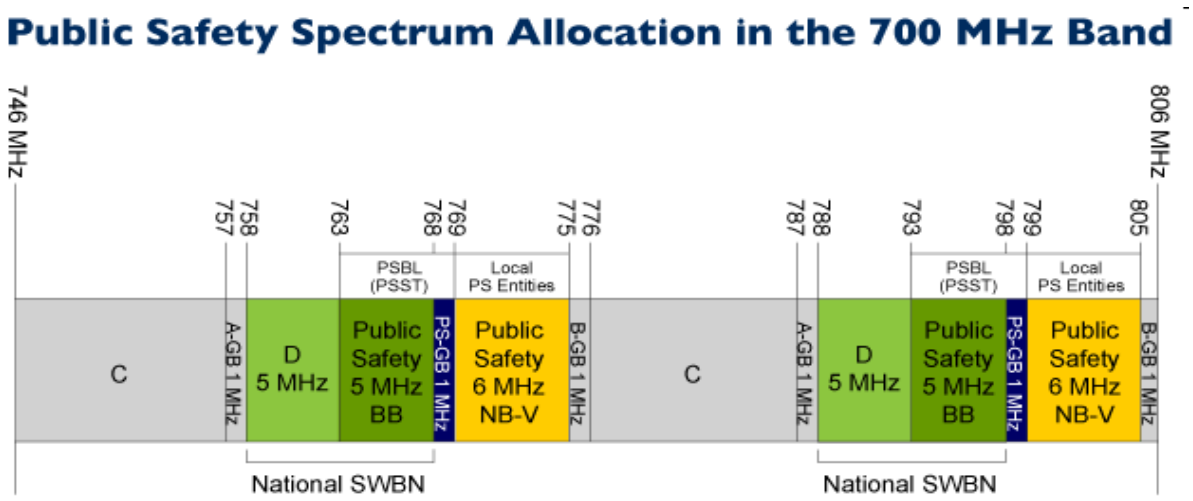
Spectrum Allocation



Public Safety 700 MHz Allocations		
Total Allocation	(12 x 12)	24 MHz
Broadband Portion	(5 x 5)	10 MHz
Narrowband Portion	(6 x 6)	12 MHz
Guardband Portion	(1 x 1)	2 MHZ

Legend

PSBL = Public Safety Broadband Licensee
PSST = Public Safety Spectrum Trust
PS Entities = Public Safety Narrowband Licensees
SWBN = Shared Wireless Broadband Network
BB = Broadband
NB-V = Narrowband Voice (e.g., P25 systems)
PS-GB = Public Safety Guardband

FCC allocated spectrum to public safety for broadband data services

Commercial D block, to be combined with public safety broadband allocation

- These combined blocks will be called the Shared Wireless Broadband Network (SWBN)
- Public Safety will have highest priority use of and the only pre-emption authorities on the SWBN
- The combined 10 x 10 MHz block will allow public safety to use advanced broadband data services

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Courtesy PSST

Technology Choice

- NPSTC, NENA, MCC, PSST and APCO have chosen LTE as their broadband technology of choice
- LTE – Long Term Evolution a.k.a 3rd Generation Partnership Project (3GPP) Release 8 and beyond

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LTE At a Glance

- **Goals for LTE:**
  - **Reduced cost per bit**
  - **Lower cost services with better user experience**
  - **Flexible use of new and existing frequency bands**
    - **1.4 – 20 MHz flexible channel bandwidth**
  - **Mobility**
  - **Advanced antenna and modulation techniques**
    - ***MIMO***
    - ***OFDMA***

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Dynamic Policies

- **LTE offers a new and better way to allocate resources (bandwidth) to users dynamically based upon their applications, needs, and user profile.**
  - **ARP – Allocation and Retention Priority:** ***key to public safety in determining whether a user request gets accepted or rejected based on system resource limitations*****.**
    - **Priority Level** – ensures the bearer (application/user) with the highest priority is preferred (15 levels)
    - **Pre-emption capability** – Determines whether the bearer can be dropped to free resources
    - **Pre-emption vulnerability** – Determines whether the bearer is applicable for dropping
  - Cell Barring – prevent Ue from accessing the cell
  - Cell Access – suspends traffic in overload condition

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LTE and 3GPP Status

- **LTE is currently in Release 8 and beyond**
  - **Release 8 was approved March 2009**
  - **Release 9 was frozen in December 2009**
  - **Release 10 is scheduled for freeze in March 2011**
- **Release 9 contains features for essential for public safety:**
  - **Emergency Call (e911)**
  - **Location-based positioning**
  - **Broadcast capabilities**

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Public Safety Requirements

- PSCR has been involved for several years working with public safety on their requirements for Broadband
  - 700 MHz Broadband Questionnaire
  - Public Safety 700MHz Broadband Statement of Requirements (SoR)
- Led the Technology Working Group of the 700MHz NPSTC Broadband Task Force (BBTF)
  - Overwhelming support from public safety, press, PSST, emergency responder organizations and vendors
- All documents available on http://www.pscr.gov/projects/broadband/700mhz/700mhz.php

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PSCR Standards Efforts

- PSCR uniquely positioned to represent public safety requirements to Standards Development Organizations (SDO) such as:
  - Alliance for Telecommunication Industry Solutions (ATIS)
  - 3rd Generation Partnership Project (3GPP)
- ATIS is the North American Organizational Partner
- Department of Commerce is member of ATIS
  - **PSCR is a now a member of 3GPP**

PSCR will be directly involved in commercial standards representing public safety requirements.

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PSCR Demonstration System

- Concept: The PSCR Broadband Demonstration Project (PBDP) is a *collaborative effort of public safety and industry* being led by the Public Safety Communications Research (PSCR) group in Boulder, CO.
  - The primary goal of this project is to accelerate the ecosystem for public safety 700 MHz broadband technologies and provide vendor neutral evaluation environments.

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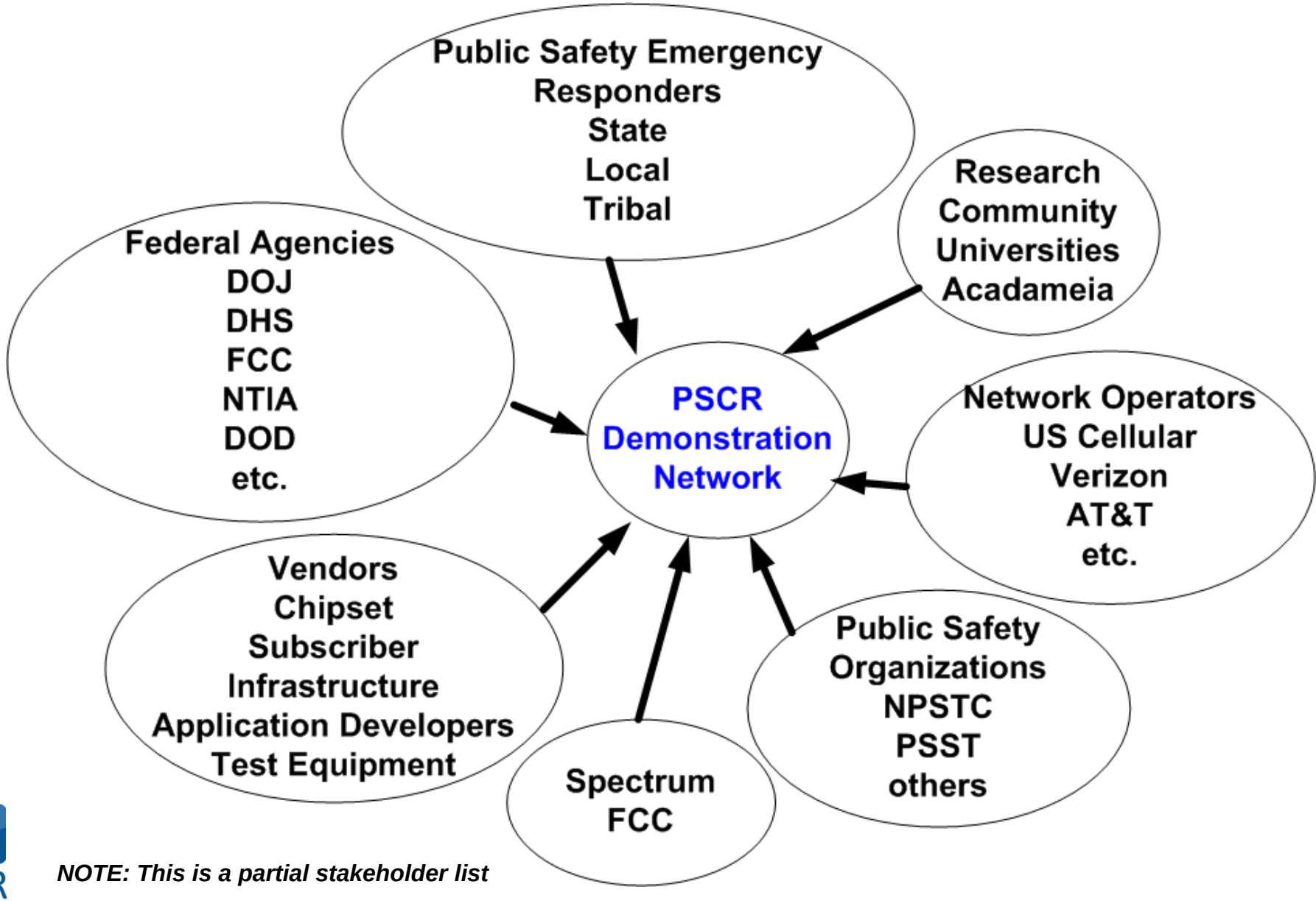
Stakeholders



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NOTE: This is a partial stakeholder list

PSCR Demo Network Project Plan

- **Obtain, Procure and generate interest from broadband vendors to develop a 700 MHz broadband equipment ecosystem - including Band Class 14 (D Block & Public Safety Block), Long Term Evolution (LTE)**
  - **Stimulate early development for public safety systems**
  - **Support the commercial 3GPP standards process with public safety requirements**
- **Demonstrate broadband air-interface and core network capabilities**
  - **Proof of concept, Improve quality for future systems, Create new technology and requirement benchmarks**
  - **Evaluate broadcast capabilities for wide area, simultaneous data delivery**
- **Interoperability with existing cellular, broadband and LMR technology**
  - **Roaming functionality with LTE and non-LTE systems**
  - **How QoS, billing, priority, pre-emption and applications work when roaming**
- **Validation of key public safety functionalities and requirements**

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Holistic Approach

- **Stakeholders will be able to come and deploy their equipment in a neutral host network**
  - **Allows vendors to inter-operate with each other**
  - **Allows us to obtain equipment for little to no cost**
  - **Allows smaller vendors and service providers to evaluate the technology**
  - **Public safety emergency responders will be able to participate actively in all aspects of the project, so they do not have to potentially waste capital expenditures for evaluating a network technology**
  - **Difficult design issues can be tested and evaluated**
    - **MIMO issues (Multiple Input Multiple Output)**
    - **Inter-cell interference (ICI)**
    - **Inter & Intra network roaming**
    - **Voice & SMS (Short Message Service)**
    - **QoS, ARP (Quality of Service, Allocation Retention Priority)**
  - **Common testing and evaluation procedures used for repeatability**
  - **Evaluation results will be available publically so results can be used to enhance the system**

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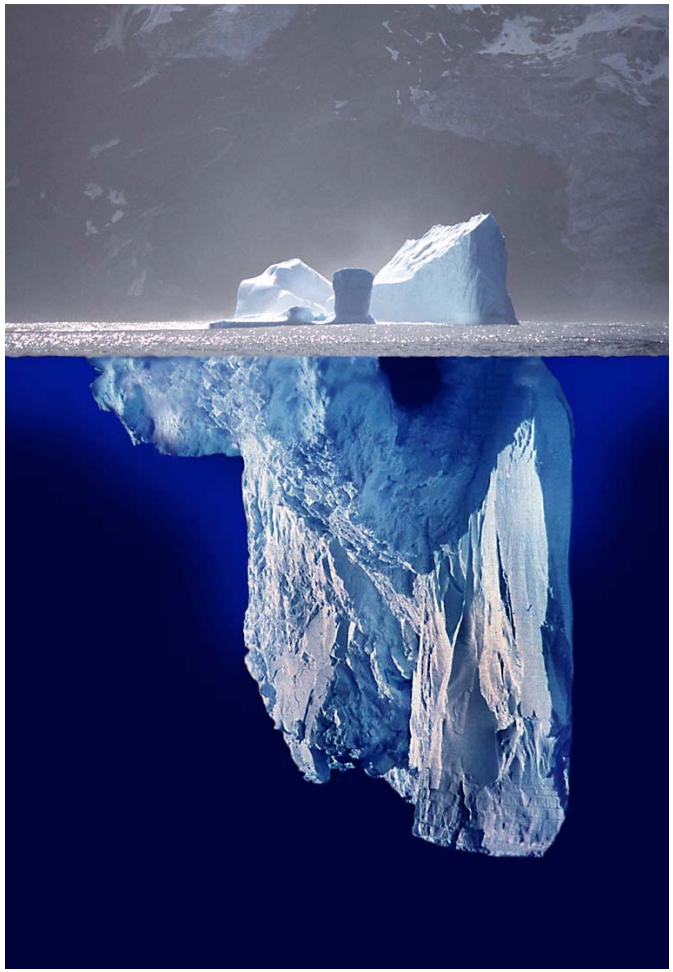
Final Thoughts

- We have only scratched the surface on what we understand about LTE & 700 MHz broadband
- The technology is advancing quickly and dynamically – PSCR is well placed to evaluate the best solutions to public safely.



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