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NG9-1-1 Primer and National Activity

April 2011

ARCHITECTURE • ENGINEERING • COMMUNICATIONS TECHNOLOGY

AVIATION | CIVIL | CONSTRUCTION SERVICES | DATA SYSTEMS | ENVIRONMENTAL
FACILITIES ENGINEERING | GEOSPATIAL | NETWORKS | PUBLIC SAFETY | TRANSPORTATION

Background

- How did we get here?
- What is NG 9-1-1?
- What is an ESInet?
- How do we get there?
- National activity

Today's 9-1-1 System – Timeline

1968:

Basic 9-1-1:

- Copper Land Line
- Analog Technology

1980s–90s:

Enhanced 9-1-1:

- ANI / ALI

1990s – 2000s:

Wireless E9-1-1:

- Phase I
- Phase II

Today:

Voice over IP, Images, Video, Text, Telematics

Background / 9-1-1 Today

9-1-1 is not broken

- Initially designed to do one thing – complete emergency **calls**
  - 3 digit dialing from fixed locations (landline) to reach emergency response
- CAMA trunks added ANI
- E9-1-1 adds in ALI w/ANI

New technologies caused a patchwork of modifications

- **Wireless** added through considerable system modification and effort (patches)
- **VoIP** added but still has limitations (more patches)

- Legacy 9-1-1 Platform is not extensible to support newer technologies

9-1-1 Today	NG9-1-1
Primarily voice calls via telephone handsets	Voice, text, or video information available from many different types of communication devices
Minimal data available	Advanced data sharing is available -telematics -sensors
Access to services are locally provided, backup is local, usually not enhanced	Enhanced capabilities; physical location of PSAP becomes less important
Routing based on phone number / MSAG	Ability to route “calls” more accurately

Hatfield Report

- *". . . one over-arching issue that immediately emerged in my inquiry is that the existing wire line E9-1-1 infrastructure, while generally reliable, is seriously antiquated. Indeed, it turns out that the existing wire line E9-1-1 infrastructure is built upon not only an outdated technology, but also one that was originally designed for an entirely different purpose. It is an analog technology in an overwhelmingly digital world. Yet it is a critical building block in the implementation of wireless E9-1-1."*

Next Generation 9-1-1

What is NG 9-1-1?

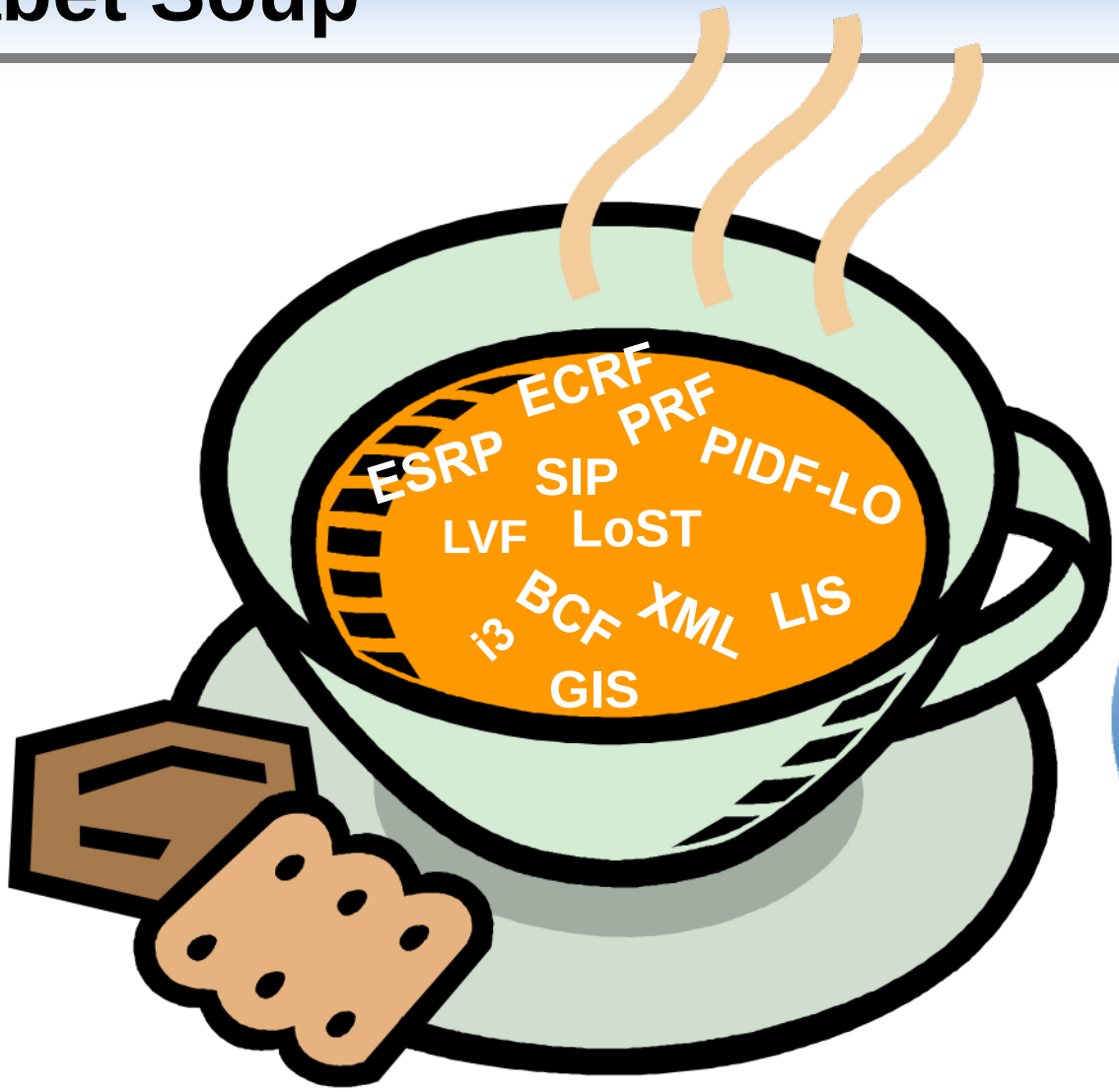
What is NG9-1-1?

- NG9-1-1 is best described as an open-standard-based, robust system of systems, that allows the public to use **any device** to request help or send information to the appropriate public safety agency
- NG9-1-1 is often considered a network, but it doesn't stop there – it is the culmination of converging many applications into a common platform.

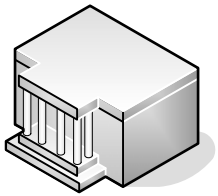
What is NG9-1-1?

- It contains the functions of the legacy 9-1-1 system while allowing for greater interoperability, convergence and better utilization of financial and human resources, in a secure environment
- NG9-1-1 does not have a “chosen” or preferred entry point
- NG9-1-1 comprises operational and technical objectives into a strategic roadmap for the future

Alphabet Soup



So why is NG 9-1-1 necessary?



PSAPs have a problem

Limited bandwidth to support applications

- E9-1-1 architecture can be overwhelmed with new converged communications
- Multiple connections can be costly
- Constantly upgrading to support new applications

PSAPs cycle through upgrades to stay ahead of their customers

End users have a problem

Rising demand for bandwidth

- Public quickly moving to VoIP, security, video, and wireless applications are driving demand
- Residential multimedia trends - broadband access, gaming, VoIP, IPTV driving demand

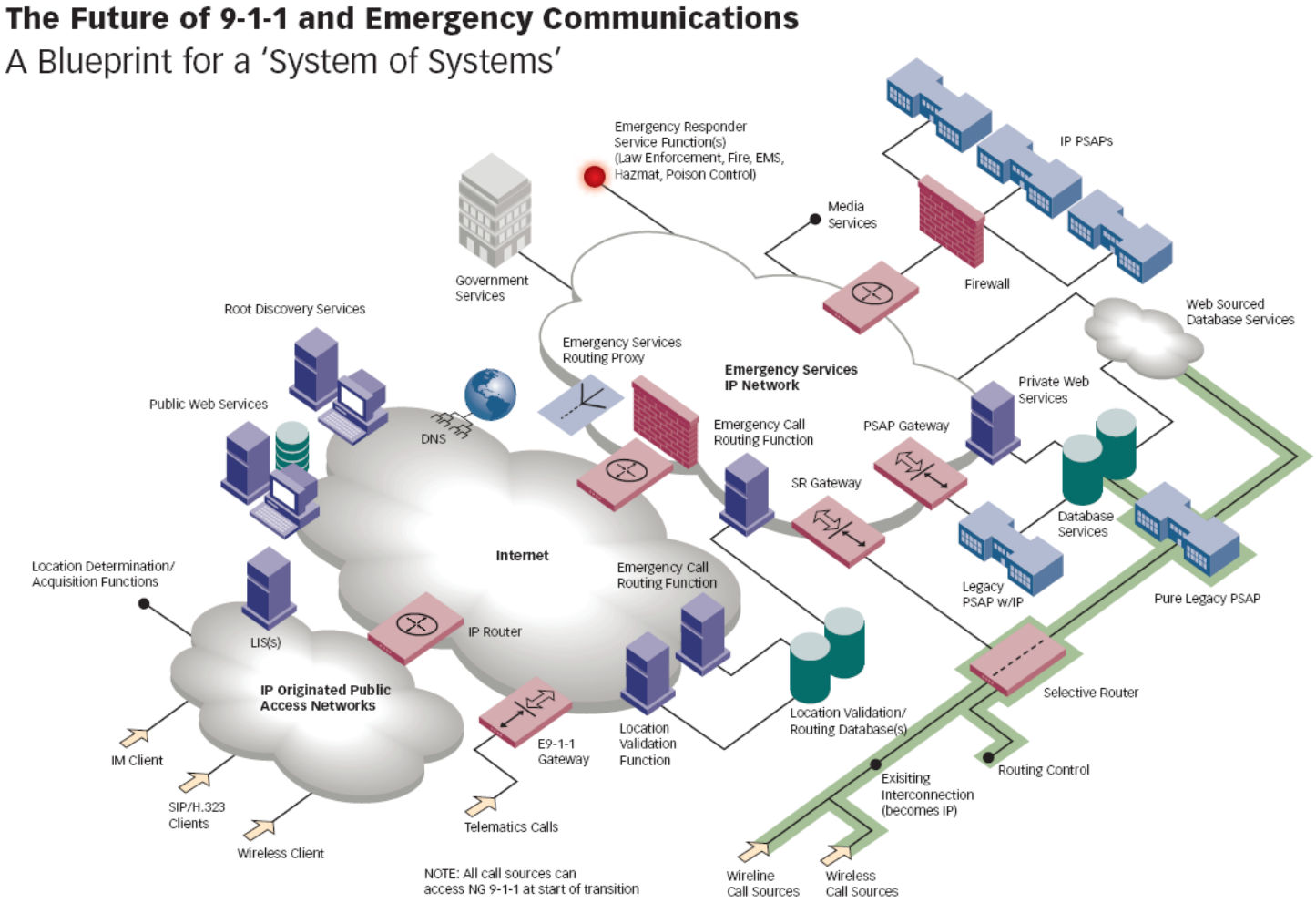
Bandwidth Limitations

- CAMA trunking
  - Limited bandwidth cannot easily support broadband capable devices
- Functionality must be augmented to support all current devices
  - Wireless and Cellular
  - Unregistered nomadic VoIP caller
  - Mobile VoIP caller
- Unified communications limitations
  - Text messaging (critical for hard of hearing)
  - Images
- Local limitations
  - Does not support call taking by geographically dispersed PSAPs

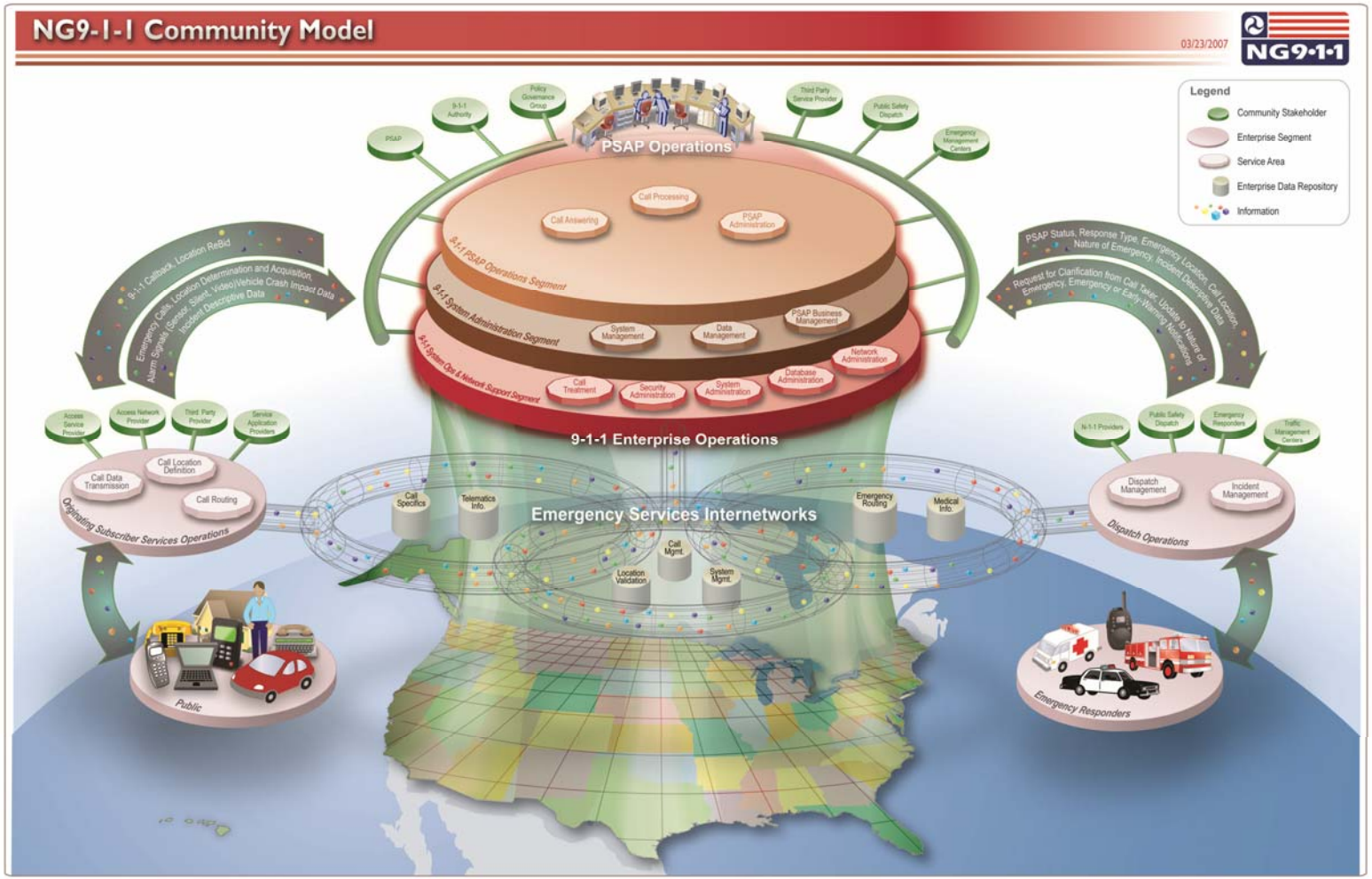
Functional Limitations

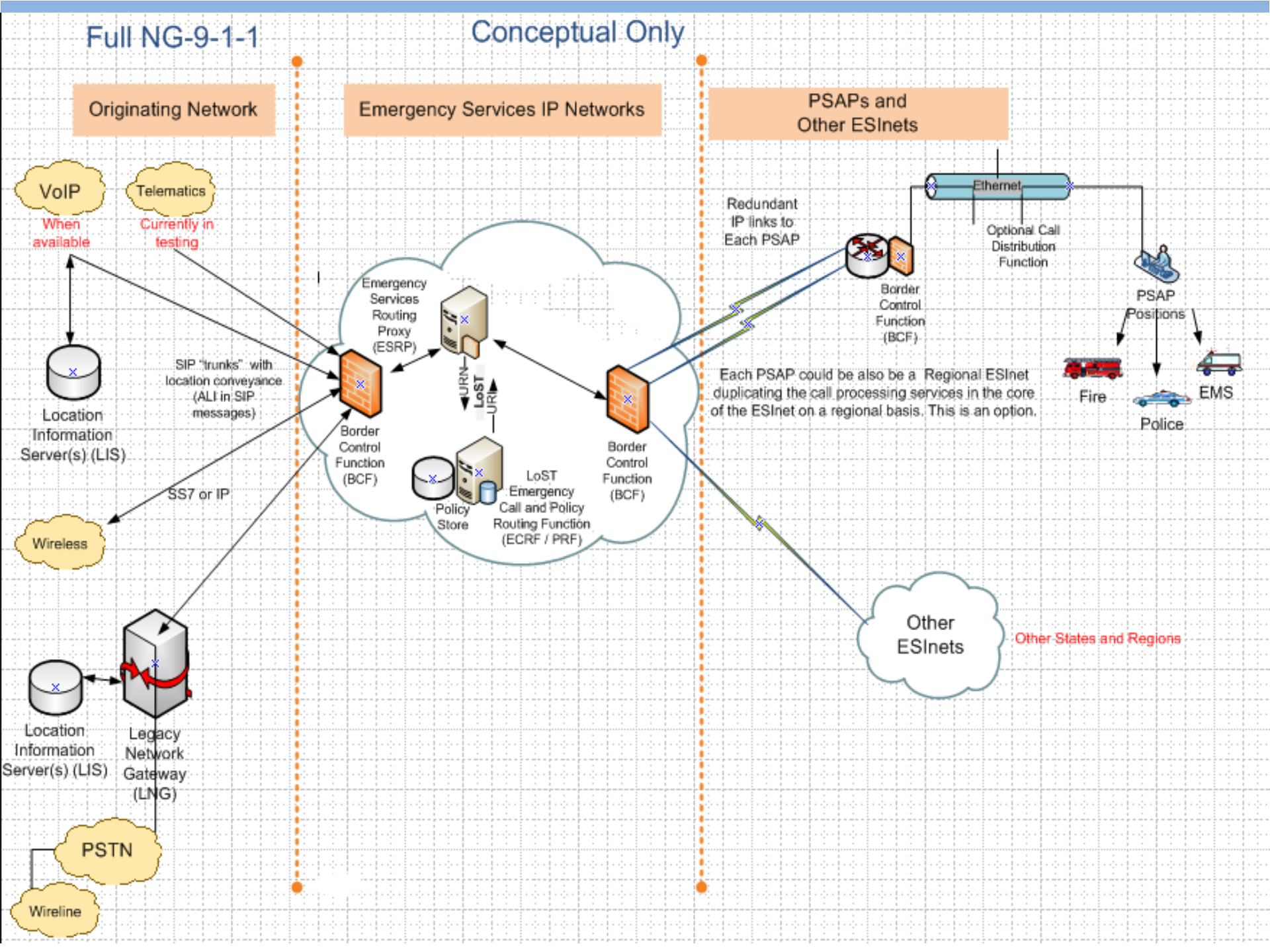
- Interoperability is limited
  - Emergency responders
  - Other emergency services
- Limited access to supplemental, available information
  - Advanced telematics
  - Building plans
- Society rapidly accepting new technology
  - Smartphones, Mobility, Web based communications
  - Need to integrate more rapidly

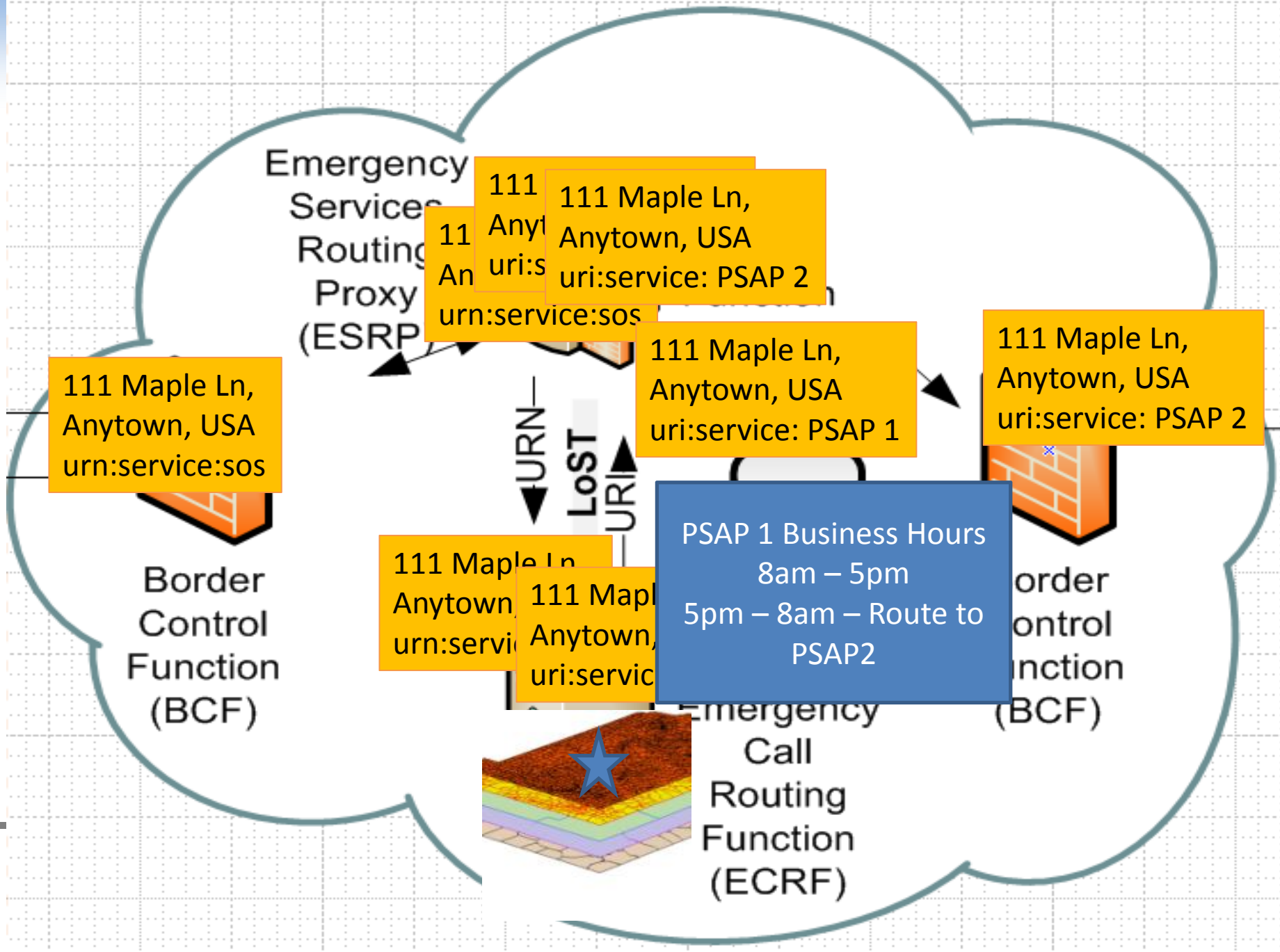
NG 9-1-1 as shown by NENA



NG 9-1-1 model US DoT




Full NG-9-1-1
Conceptual Only
Originating Network
Emergency Services IP Networks
PSAPs and Other ESInets
VoIP
When available
Telematics
Currently in testing
Location Information Server(s) (LIS)
SIP "trunks" with location conveyance (ALI in SIP messages)
SS7 or IP
Wireless
Location Information Server(s) (LIS)
Legacy Network Gateway (LNG)
PSTN
Wireline
Emergency Services Routing Proxy (ESRP)
URN
LoST
URI
Border Control Function (BCF)
Policy Store
LoST Emergency Call and Policy Routing Function (ECRF / PRF)
Border Control Function (BCF)
Redundant IP links to Each PSAP
Ethernet
Optional Call Distribution Function
Border Control Function (BCF)
PSAP Positions
Fire
Police
EMS
Each PSAP could be also be a Regional ESInet duplicating the call processing services in the core of the ESInet on a regional basis. This is an option.
Other ESInets
Other States and Regions


Emergency Services Routing Proxy (ESRP)
111 Maple Ln, Anytown, USA urn:service:sos
111 Maple Ln, Anytown, USA uri:service: PSAP 2
111 Maple Ln, Anytown, USA urn:service:sos
111 Maple Ln, Anytown, USA uri:service: PSAP 1
111 Maple Ln, Anytown, USA uri:service: PSAP 2
URN
LoST
URI
PSAP 1 Business Hours
8am – 5pm
5pm – 8am – Route to PSAP2
Border Control Function (BCF)
Emergency Call Routing Function (ECRF)
(BCF)

NG 9-1-1: What it isn't

- NG 9-1-1 is not going to put local PSAPs out of business
- Is not going to work without local participation, collaboration and teamwork
- It is not going to use the public internet for emergency communications
- Going to keep patching the current system to accommodate new technology
- A fad, the public is demanding it by adopting new technologies, services and applications

Next Generation 9-1-1 (NENA definition)

- NG9-1-1 is best described as a robust system of systems that will allow the public to use any device to request help or send information to the appropriate public safety agency
  - Makes use of open standards
  - Must have access to shared data

NENA Future Path Plan

- Began to look at the impact of new technology on 9-1-1
  - Development of NENA i3 documentation
  - Technical functions
    - Network configurations to support broadband
  - Operational functions
    - Ability to share information, move from local to regional and larger system
  - Legislative functions
    - Funding the development of new converged networks
- Scalability for future technologies

Road to NG9-1-1

- Many entities are currently planning NG9-1-1 deployment, migrations, etc
  - Some are deploying networks and other NG9-1-1 foundational elements
- The systems that are being bought today through effective planning will be migrated to NG9-1-1 as opposed to fork lifted
- Entities need to start the planning process now
  - New Costs, new Operations, new Processes, new Technology
  - Functional requirements
  - Increase role of GIS – data accuracy is critical for call routing
  - Security must be built into NG9-1-1 from the outset, not bolted on later

National Activity

NG9-1-1 Across the Nation

Federal Activity

- US Department of Transportation (USDOT)
  - NG 9-1-1 proof of concept
  - Technical Assistance Center
- US Federal Communications Commission (FCC)
  - Network Reliability and Interoperability Council (NRIC)
  - Communications, Security, Reliability and Interoperability Council (CSRIC)
  - National Broadband Plan
  - NOI on NG 9-1-1
- US Army's Armament Research, Development and Engineering Center (ARDEC)
  - Regional Fusion center integration
  - Homeland Security interoperability
  - Hospital Emergency Planning Initiative (HEPI)
  - Regional Integrated Command Center (RICC)

USDOT NG 9-1-1 Project

Background:

This project is a research and development project, funded by the USDOT's Intelligent Transportation Systems (ITS) Joint Program Office (JPO), that will define a NG9-1-1 system architecture and develop a transition plan that considers responsibilities, costs, schedule and benefits for deploying Internet Protocol (IP)-based emergency communications across the nation.

Long Term Goal:

To enable the general public to make a 9-1-1 "call" (any real-time communication – voice, text, or video) from any wired, wireless, or IP-based device, and allow the emergency services community to take advantage of advanced call delivery and other functions through new internetworking technologies based on open standards.

National 9-1-1 Program

- Facilitate coordination among public and private stakeholders at local, State and Federal/national levels
- Serve as an information clearinghouse
- Provide a Federal focus for 9-1-1
- Promote and support 9-1-1 services
- National 9-1-1 Guidelines Work Group (NAGWG)

9-1-1 Resource Center

- One of the major goals of the National 9-1-1 Program is to develop, collect, and disseminate information concerning practices, procedures, and technology used in the implementation of 9-1-1 services.
- The 9-1-1 Resource Center was developed to provide outreach and assistance to the 9-1-1 community.
- The Resource Center works in partnership with the national 9-1-1 program and 911.gov.

Developed Under Cooperative Agreement DTNH22-08-H-00224 with NHTSA

9-1-1 Resource Center

www.911.gov

www.911resourcecenter.org

Developed Under Cooperative Agreement DTNH22-08-H-00224 with NHTSA

Technical Assistance: Categories

- Regulation / Legislation
- Operational Policy and Procedures
- Radio System
- PSAP Telephone system
- CAD Systems
- GIS Systems and Data
- Other PSAP Equipment
- IP Networks
- Next Generation 9-1-1
- ALI and MSAG
- Funding
- Enhanced 9-1-1
- Wireless E9-1-1
- VoIP E9-1-1 and SIP
- Interagency Agreements
- Education and Training
- Cyber Security
- Consolidation
- Other/Unknown

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Texas example

- Statewide Master Plan for CSEC
  - Define the functional requirements of NG9-1-1 and the configuration of ESInets within Texas
- Regional ESInets
  - ESInets to support individual Council of Governments
  - Strategically aligned with the State Master Plan to ensure that interconnectivity can be achieved
  - Growing from the ground up to support the Statewide initiative
  - Areas of consideration
    - Governance
    - Policy
    - Technical and functional requirements – GIS, Security

State of Montana Example

- Defined an NG9-1-1 roadmap (strategy)
  - Assessment of current Telephony, Policy, Legislation and Funding
  - Development of a long-term strategy
    - Developed Functional requirements for NG9-1-1 for the State of Montana
- Completed Competitive Procurement of CPE and Network
  - Evaluation of proposals
  - Contract negotiation support
- Implemented an IP-enabled network (ESInet) with IP-capable CPE solution Statewide
  - Project Management of installation (vendor management)
  - Acceptance testing / verification and validation
  - Areas of consideration
    - Policy
    - Technical and functional requirements
    - Procurement
    - Project Management

Additional Statewide NG9-1-1 efforts

- State of Montana
  - IP enabled network and CPE solution to connect all PSAP's in the state
- State of Minnesota
  - IP enabled network
- State of Tennessee
  - Integrating with the State Information Resources network to include functional requirements for 9-1-1 and IP enabled services – recently hired IP network provider and network manager
- State of Massachusetts
  - Currently beginning the process
- State of Maryland
  - Completed a similar report as Michigan working towards a Statewide IP enabled network

Questions?

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