QoS and Session Control NG9-1-1 to FirstNet

Panel Members,

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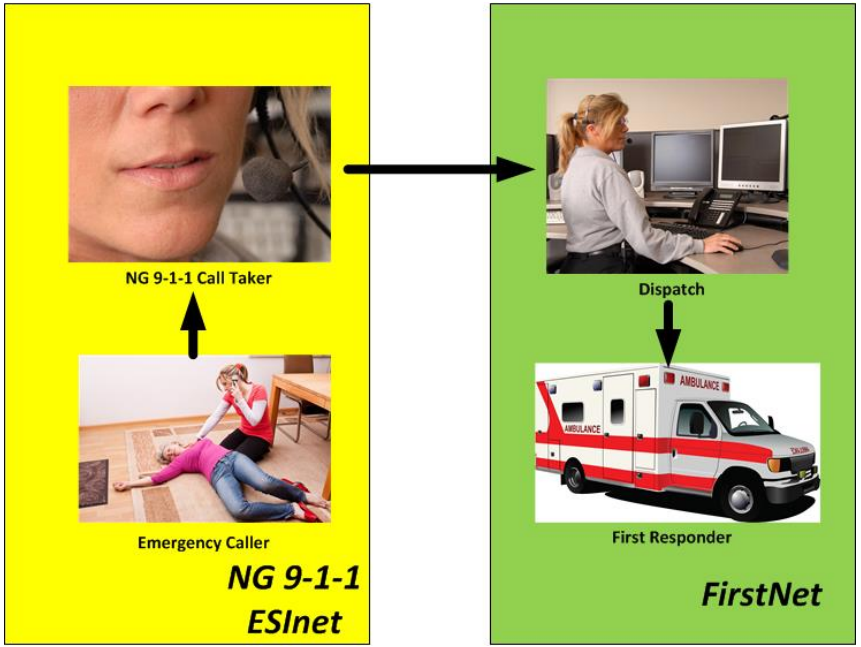
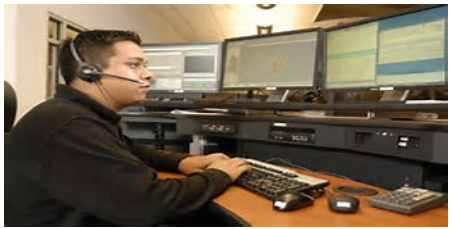
Stephen Ashurkoff, General Dynamics
Brian Knueppel, Oracle
Susan Seet, State of Texas CSEC

The Vision


NG 9-1-1 Call Taker
Emergency Caller
NG 9-1-1
ESInet
Dispatch
AMBULANCE
First Responder
FirstNet

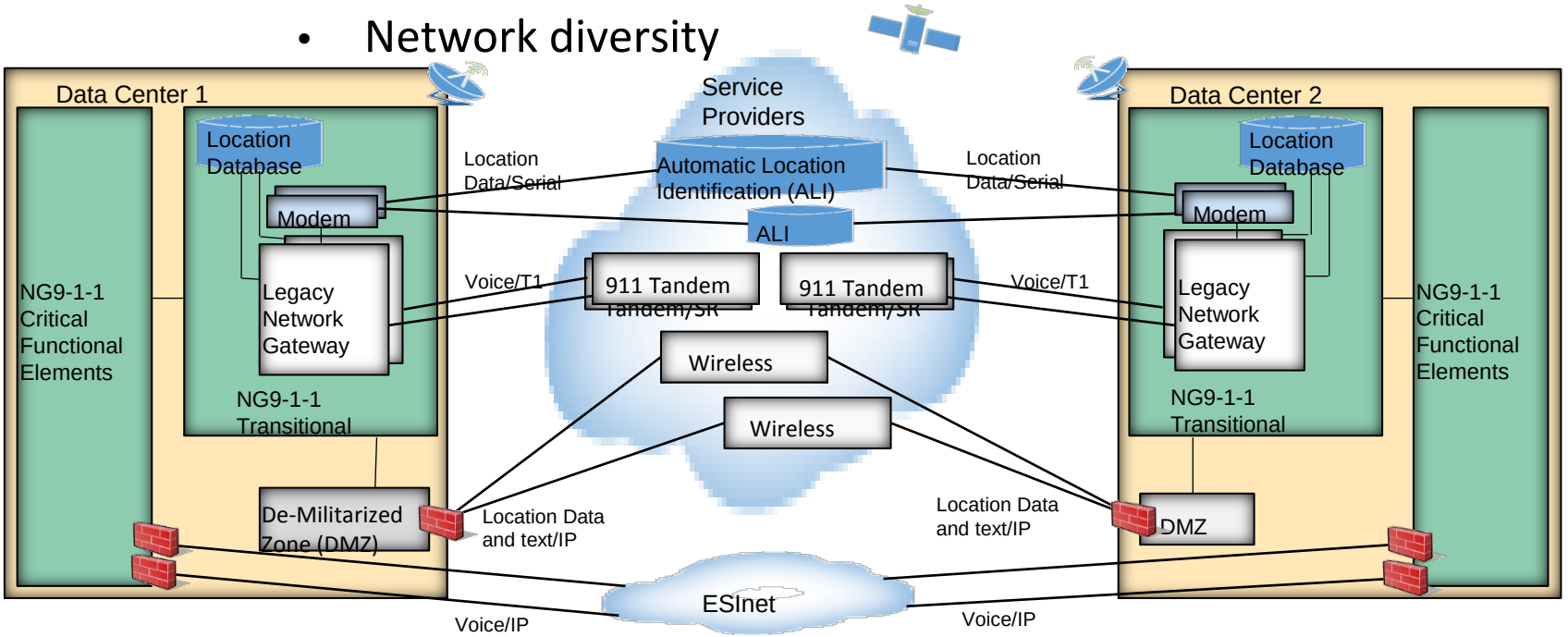
Reliability Matters for NG9-1-1 Solutions

- Lives and property are at stake
- When a call to 9-1-1 is placed, how does a NG9-1-1 solution provide reliability for this communication path?

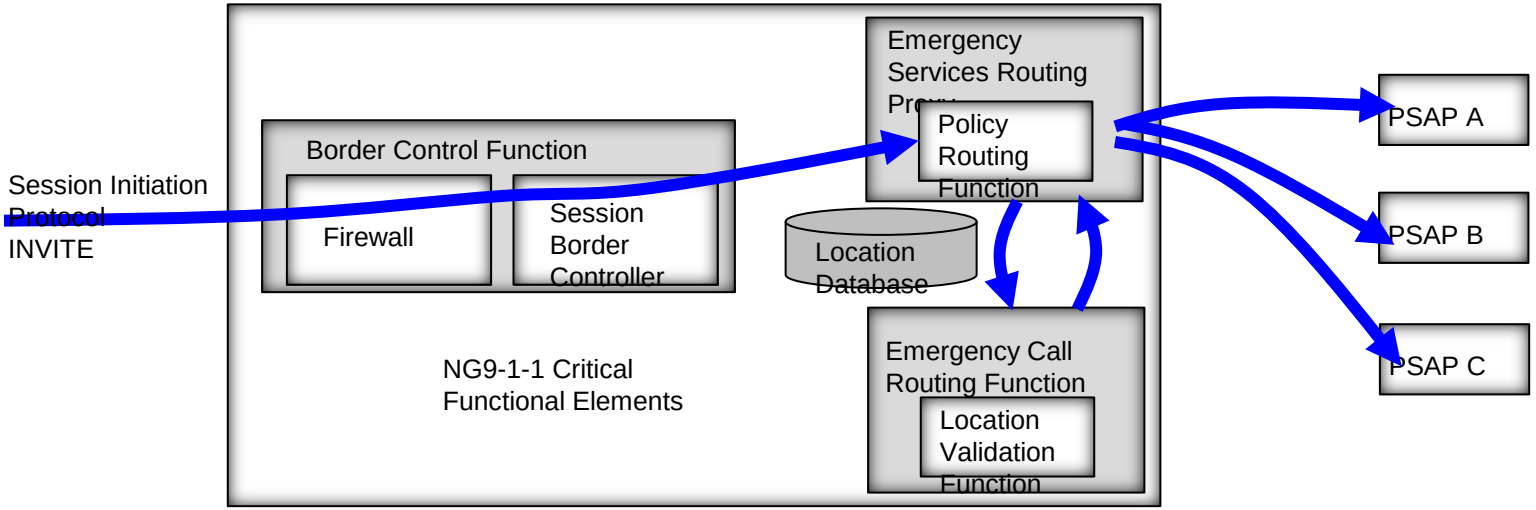


Resilient connections to External Networks

- No single point of failure
- **Geographic diversity**
- Network diversity



Routing Policies Play Key Role in Reliability



- **Alternate routing**
- **Default routing**
- **Agreements with service providers**
- **Agreements with other PSAPs**

Intro

- Brian Knueppel: Oracle Architecture/Solutions
- State, Local, Public Safety
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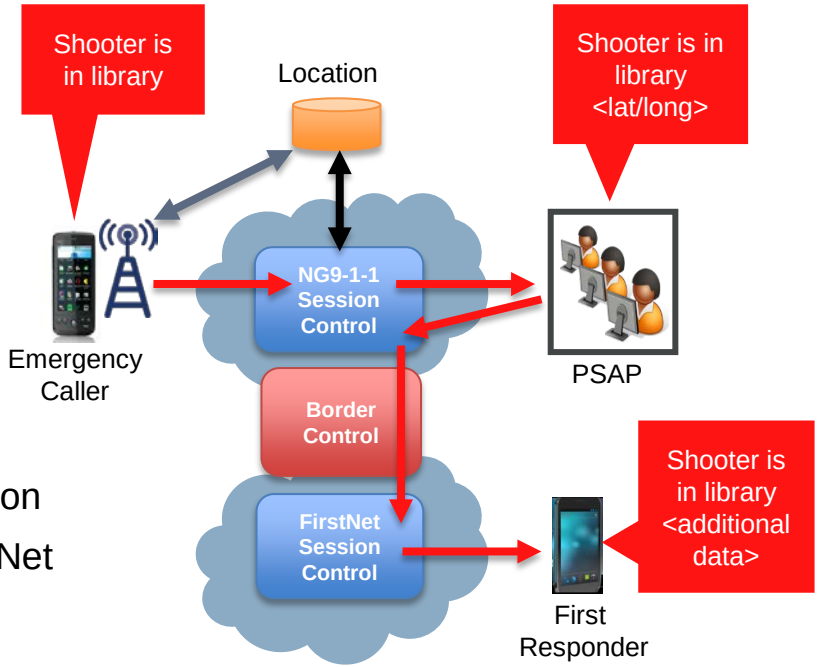
NG9-1-1 and FirstNet Overview

- NG9-1-1 characteristics:
- An IP-based replacement for E9-1-1 features and functions
  - Operating on managed, reliable IP network
  - Based on Open Standards for true interoperability
  - Multimedia
  - Advanced data sharing
  - Application layer
  - Policy for Routing and call handling
  - For 9-1-1 and other emergency entities

- FirstNet characteristics:
- An IP-based replacement for wireless service (LTE) dedicated to First Responders
  - Operating on managed, reliable IP network
  - Based on Open Standards for true interoperability
  - Multimedia
  - Advanced data sharing
  - Application layer
  - Policy for Routing and Roaming
  - For emergency entities, public utilities, agencies

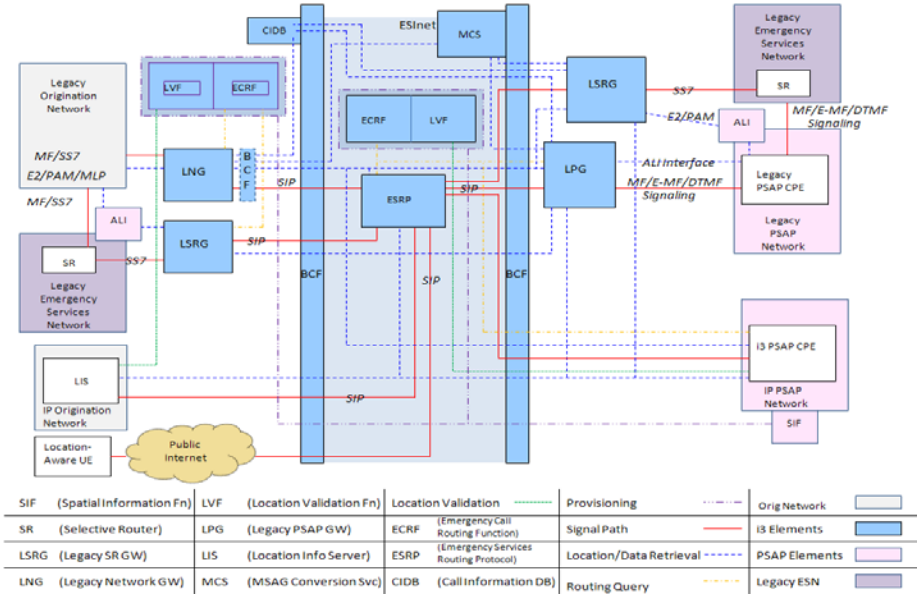
NG9-1-1 to FirstNet Use Case

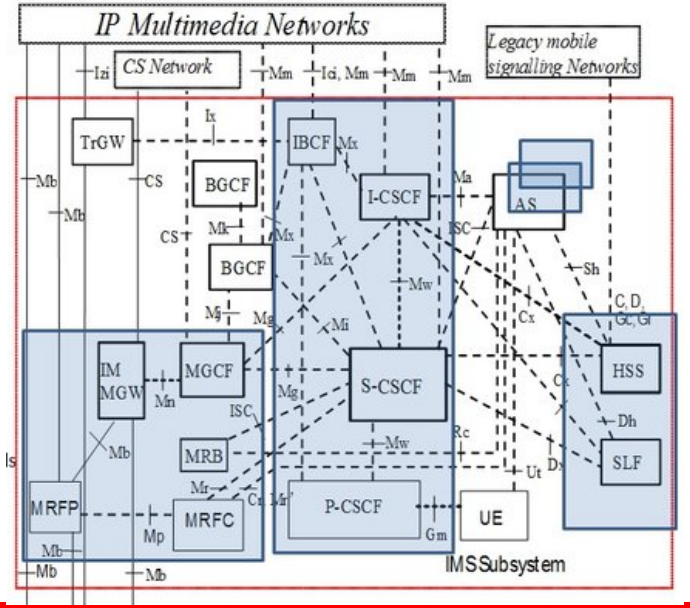
- The Public has first hand view of emergencies
  - Shooter, fire, illness, natural event etc
- The Public uses multimedia and expects to use it for 9-1-1
  - Pictures, video, text
- The Public should be able to send information to 9-1-1
  - 9-1-1 call center is known as Public Safety Answer Point (PSAP)
  - NG9-1-1 will provide multimedia to PSAPs
- PSAPs cannot make use of most incoming information
- First Responders can make the best use of the Public information
- PSAP's need to conference multimedia to Responders on FirstNet

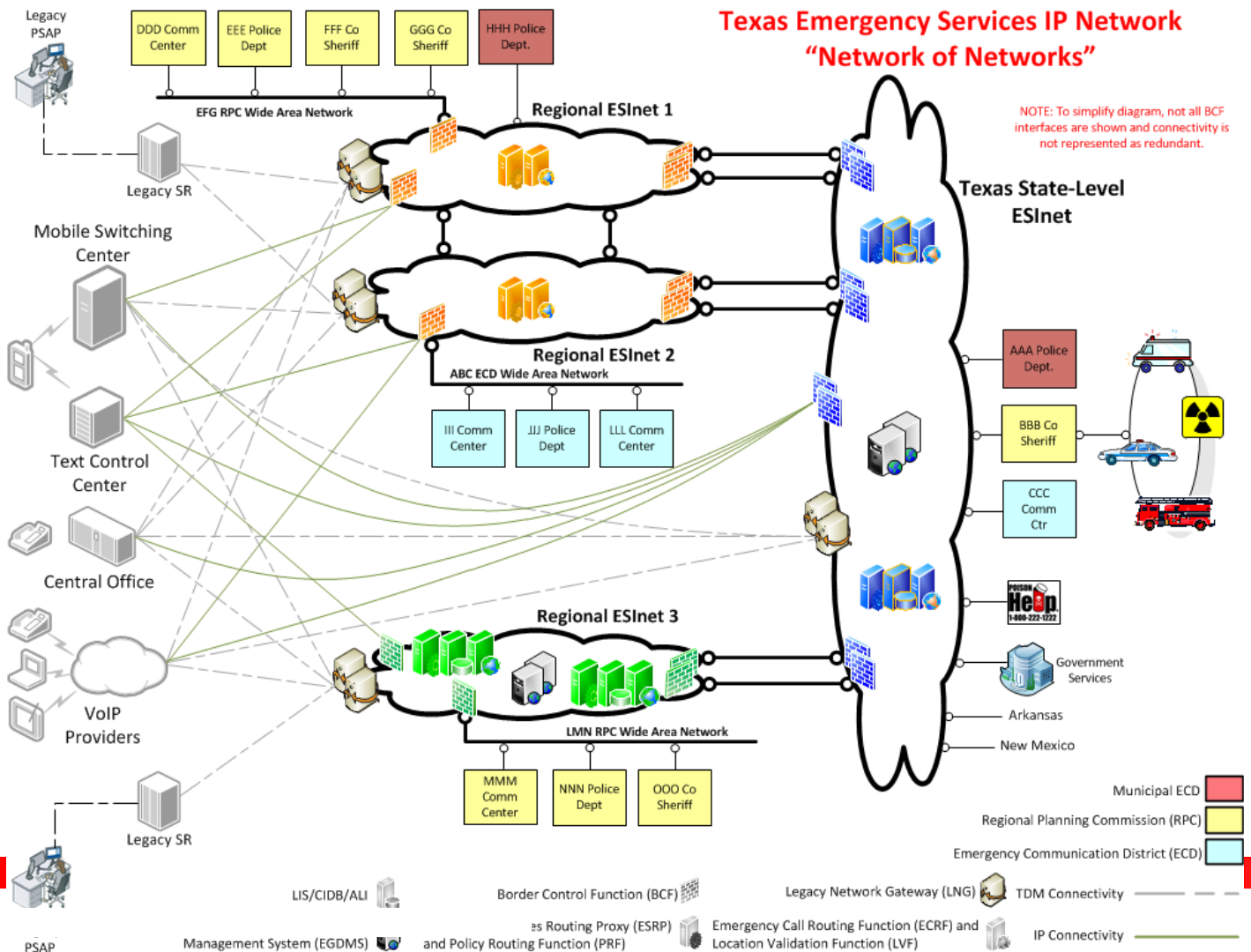


NG9-1-1 and FirstNet Architectures

- NENA's i3 and FirstNet's IMS diagrams below
- Both are architectural framework for delivering IP multimedia services
- Both are well defined and standardized set of interfaces and services
- The missing pieces are the defined interface, interaction and QoS between the two

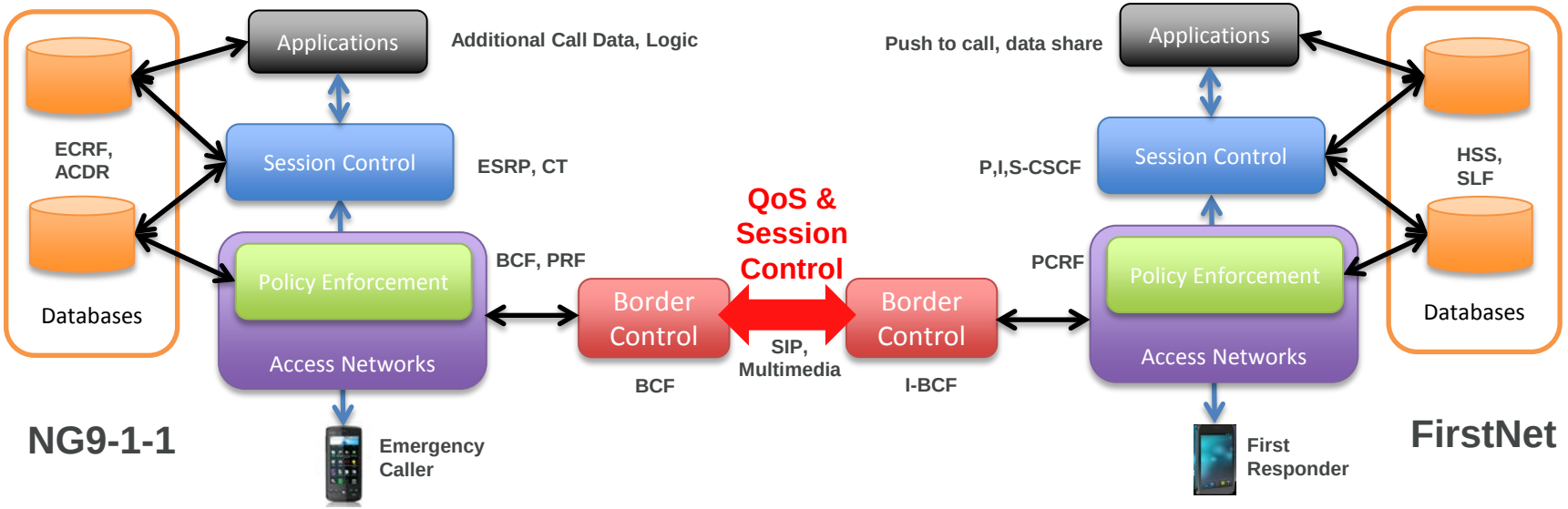





Texas Emergency Services IP Network
"Network of Networks"
NOTE: To simplify diagram, not all BCF interfaces are shown and connectivity is not represented as redundant.
Legacy PSAP
DDD Comm Center
EEE Police Dept
FFF Co Sheriff
GGG Co Sheriff
HHH Police Dept.
EFG RPC Wide Area Network
Regional ESInet 1
Legacy SR
Mobile Switching Center
Text Control Center
Central Office
VoIP Providers
Regional ESInet 2
ABC ECD Wide Area Network
III Comm Center
JJJ Police Dept
LLL Comm Center
Regional ESInet 3
LMN RPC Wide Area Network
MMM Comm Center
NNN Police Dept
OOO Co Sheriff
Legacy SR
PSAP
Texas State-Level ESInet
AAA Police Dept.
BBB Co Sheriff
CCC Comm Ctr
Government Services
Arkansas
New Mexico
Municipal ECD
Regional Planning Commission (RPC)
Emergency Communication District (ECD)
LIS/CIDB/ALI
Border Control Function (BCF)
Legacy Network Gateway (LNG)
TDM Connectivity
Management System (EGDMS)
and Policy Routing Function (PRF)
Emergency Call Routing Function (ECRF) and Location Validation Function (LVF)
IP Connectivity

Interface Between NG9-1-1 and FirstNet

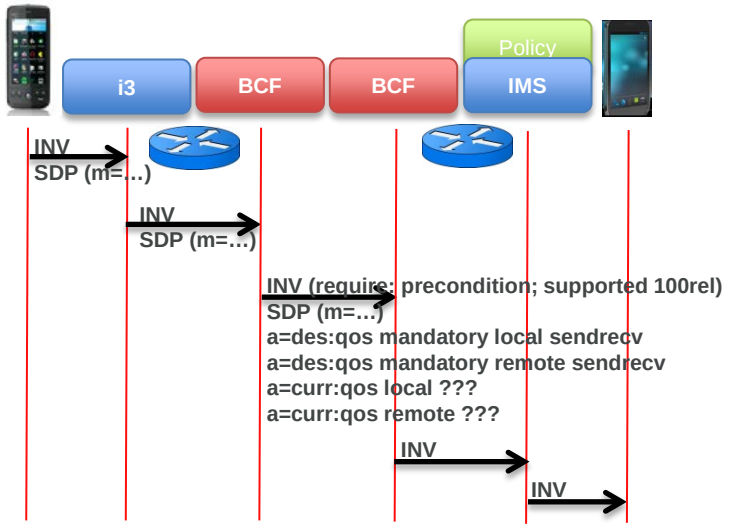
- Architecture and Border Control Similarities
- Define interconnection/handoff
- Set QoS and Session Control



QoS – IP and SIP/SDP

- Can we ensure QoS end to end?
- Will preconditions be used end to end in FirstNet?
- What is the QoS transitional plan from start to 2022?
- How to handle QoS when roaming on commercial?
- Do we need 3GPP QoS mechanisms on the NG911 side?
- IP layer QoS mechanisms similar (DSCP) but code maps?
- SIP/SDP QoS mechanism in FirstNet based on 3GPP
  - NG911 does not use preconditions for QoS in SIP/SDP
- FirstNet QoS established for pipes, devices, and flows
  - Dedicated GBR, default non-GBR
- Interworking at the border is required
  - Request priority via DSCP
  - Non 3GPP UE to 3GPP UE SIP
    - Preconditions, 100rel

Type/Code	NG911	FirstNet
911 Sig	5-AF12	14-QCI5?
911 Txt	9-AF12	14-QCI1?
911 Aud	13-EF	14-QCI1?
911 Vid	17-AF11	14-QCI2?
911 m2m	21-AF21	14-QCI1?



The Challenges of Next Generation 9-1-1 Geospatial Data

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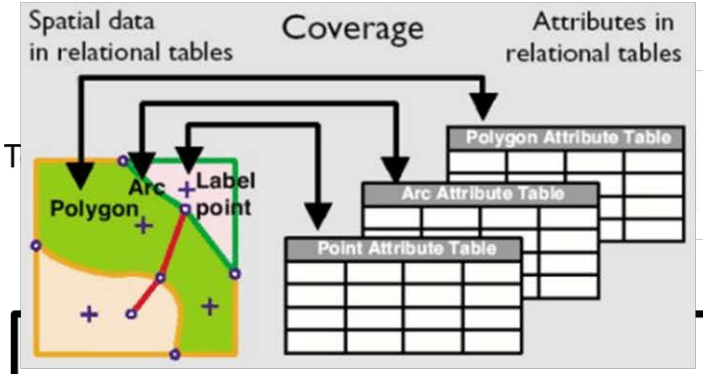
E9-1-1/NG 9-1-1 Data & Call Routing



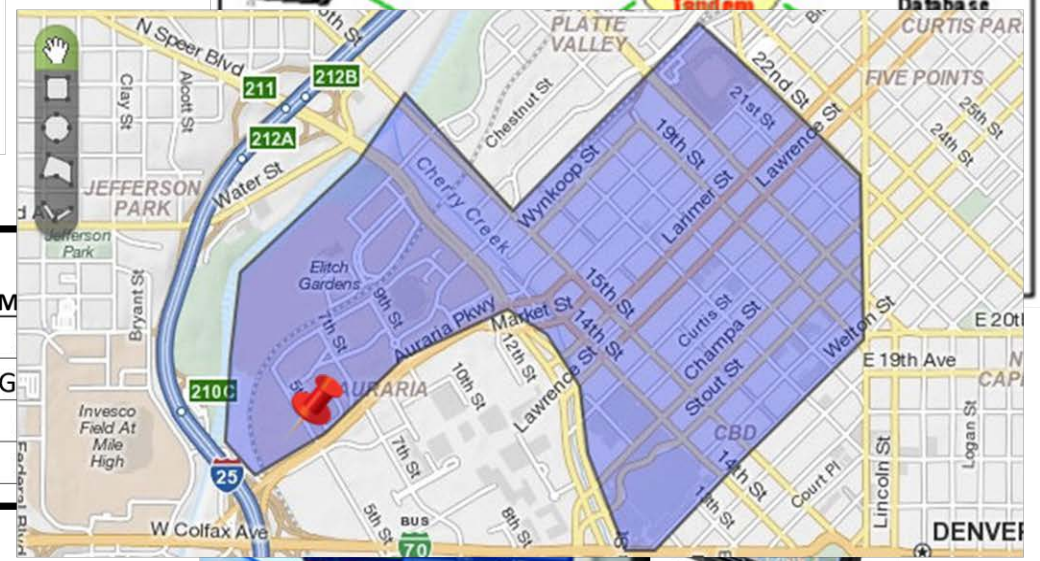
PD	STREET	ST_TYPE	LOW	HIGH	COM
[illegible]	[illegible]	[illegible]	10100	10199	
[illegible]	[illegible]	LN	4300	4399	G
[illegible]	[illegible]	[illegible]	4300	4399	
[illegible]	[illegible]	LN	4400	4499	

NG 9-1-1 Geospatial Data

- Road Center Lines
- Site Structure Address Points
- PSAP Service Polygon
- Fire Response Agency Polygon
- Law Response Agency Polygon
- EMS Response Agency Polygon

Location to Service Translation (LoST) Protocol used to obtain route

Concept: Point in Polygon



Challenges to Quality NG9-1-1 Geospatial Data

Quality Criteria

(spatial data & attributes)

1. Accuracy & Precision
2. Completeness
3. Currency

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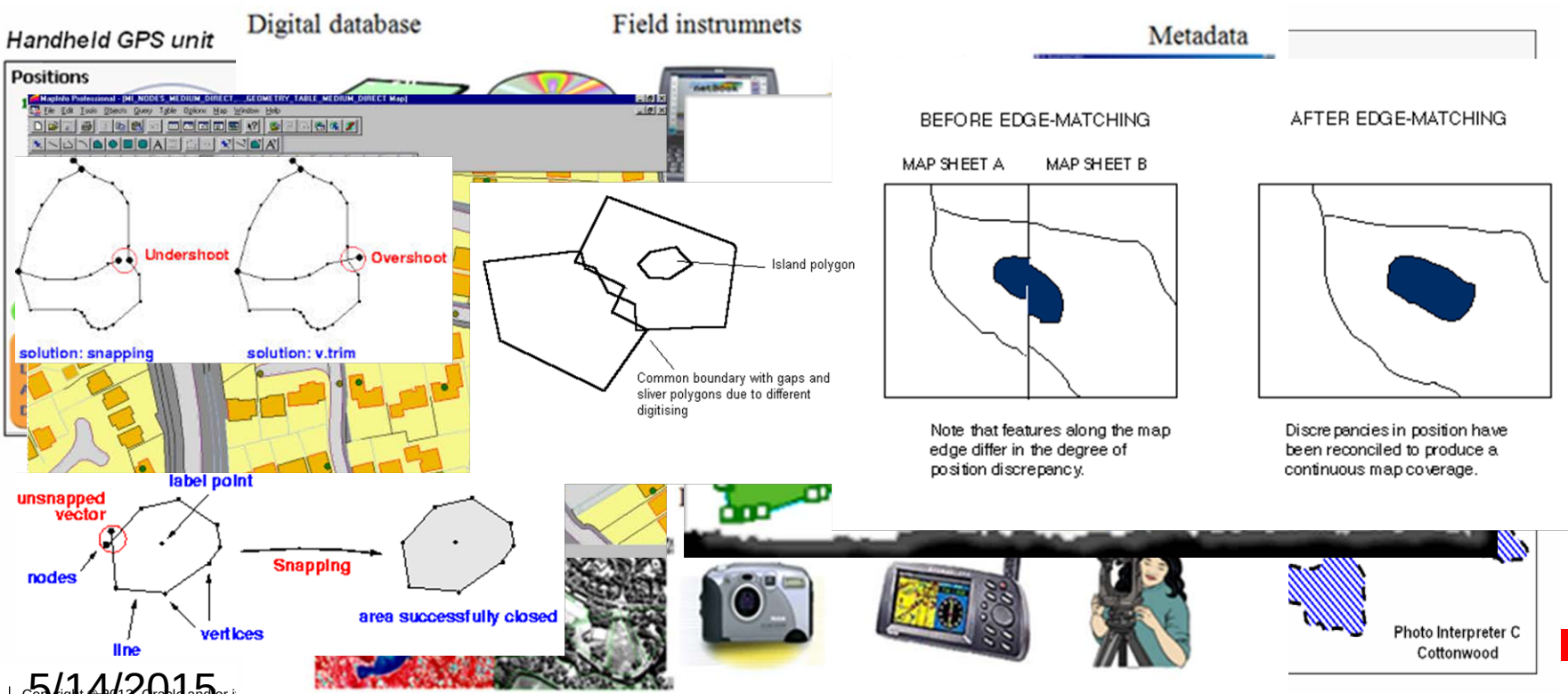
Challenges to Quality NG9-1-1 Geospatial Data

Spatial Accuracy & Topology Precision



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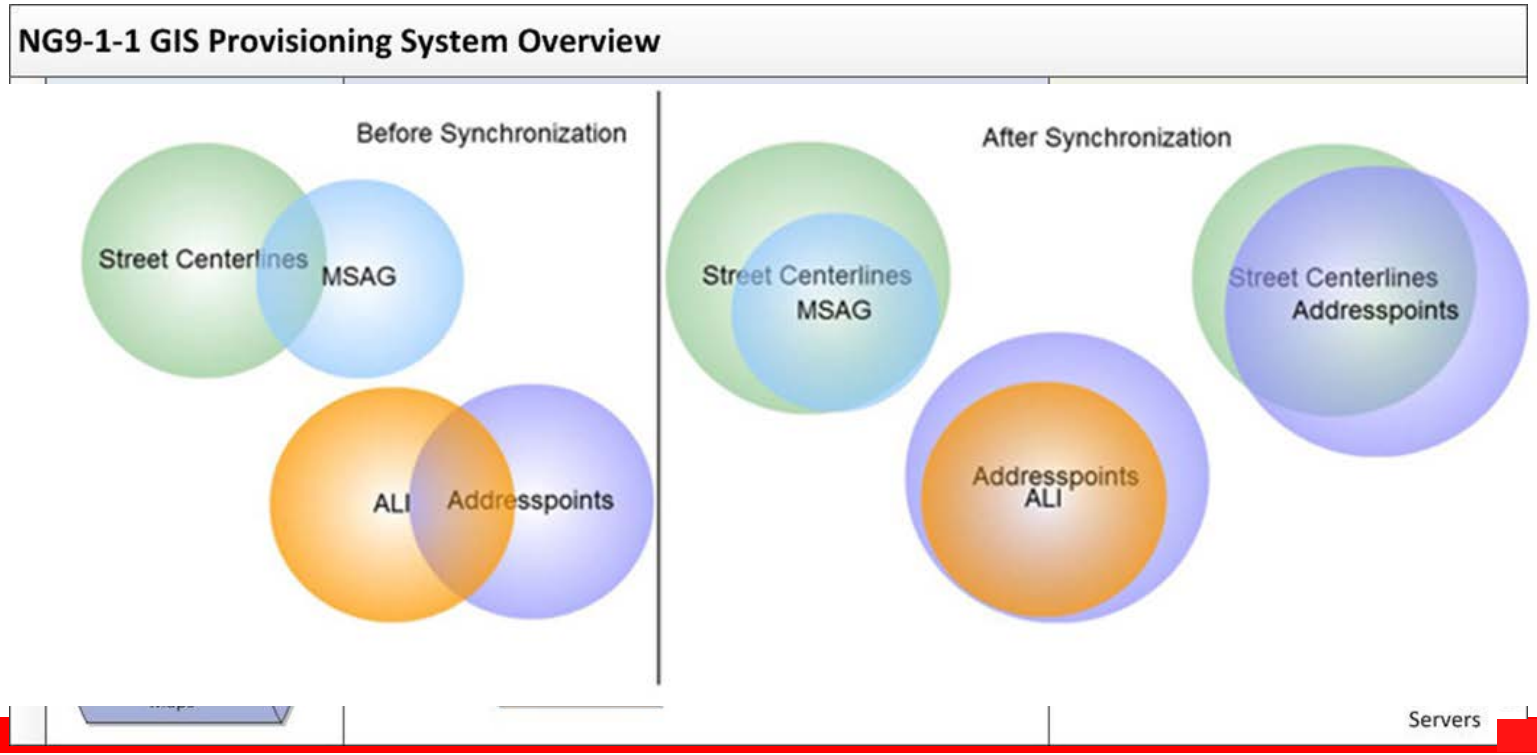
State-level geospatial data management processes



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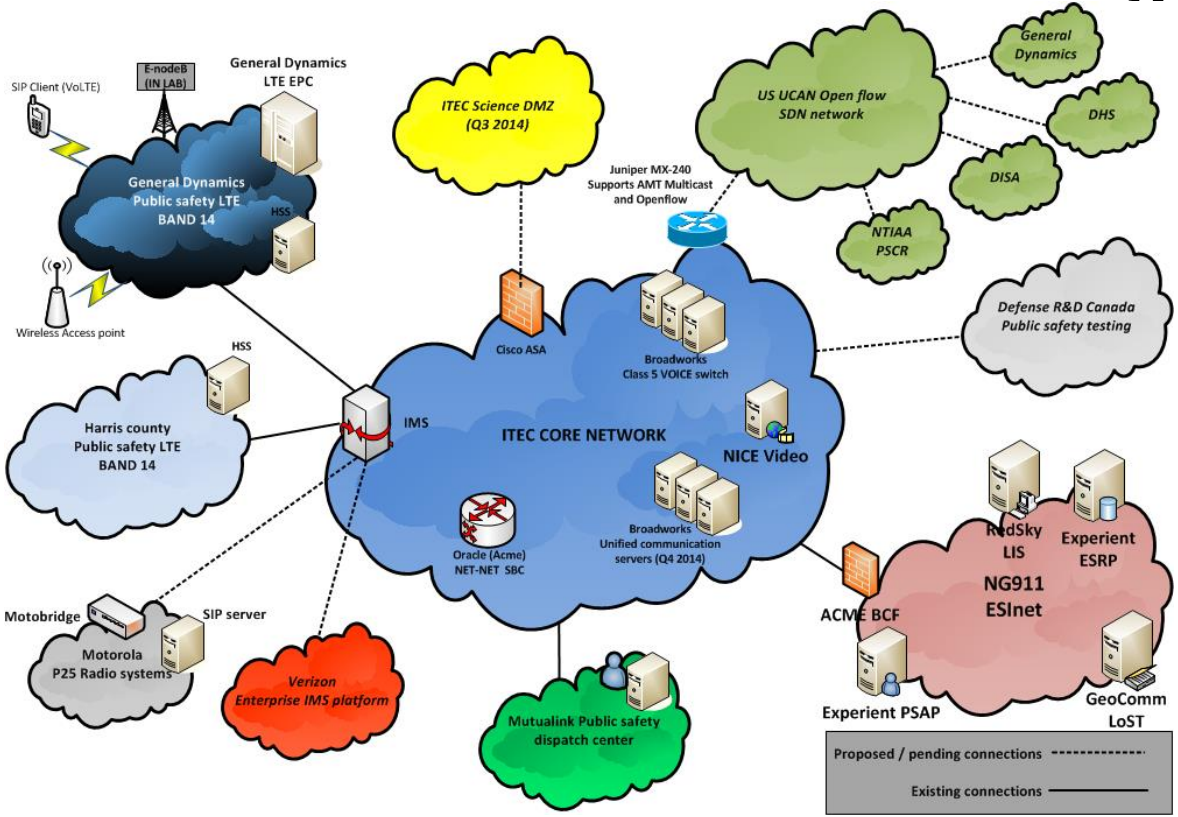
TAMU ITEC - Where it all comes together



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