Indoor Location – A Broadband Use Case

• Emergency Services IP Network (ESInet)
  – A Broadband Architecture

• 9-1-1 Indoor Location Call Scenarios
  – Indoor Location Technology Choices

• Wi-Fi Location Call Scenarios for Indoor 9-1-1
  – Four key Wi-Fi Location Scenarios

• Wi-Fi Location Technology – a 9-1-1 Call Scenario
  – Broadband required
# ESInet – A Broadband Network of Networks

<table>
<thead>
<tr>
<th>Clients</th>
<th>Access Networks</th>
<th>Origination Networks</th>
<th>Emergency Services IP Network (ESInet) Domains</th>
</tr>
</thead>
<tbody>
<tr>
<td>IM Clients</td>
<td>LIs</td>
<td>CSP Call Server</td>
<td>Public Web Services</td>
</tr>
<tr>
<td>SIP/H.323 clients</td>
<td></td>
<td>E-CSCF (IMS)</td>
<td>DNS</td>
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<tr>
<td>Wireless/IP clients</td>
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<tr>
<td>PSTN client</td>
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<tr>
<td>Wireless/CS Clients</td>
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</tbody>
</table>

Built to deliver voice, video & data from clients to PSAPs

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9-1-1 Indoor Location Call Scenarios

• Outdoor Technologies
  – Satellite/GNSS
  – Metropolitan Beacons
  – Observed Time Difference of Arrival (OTDOA)

• Indoor Technologies
  – Small Cells
  – Femtocells
  – Wi-Fi/Blutooth
Wireless E9-1-1: Consumer Voice-over-WiFi

1: Smartphones with Wi-Fi
2: Consumer purchases-installs Wi-Fi
3: 9-1-1 Calls from Indoor Locations
4: Dispatchable address of Wi-Fi unit

Wireless Carrier

- (202) 555-1212
- 9-1-1
- Wi-Fi

Mobile Switching Center

- a – "Tower" IS enhanced

Selective Router

ALI

LEC

PSAP

911 Communicator

TCS E9-1-1 Center

CRDB – Call Routing Data Base

PDE – Position Determination Entity

MPC – Mobile Positioning Center

ESRK – Emergency Services Routing Key

1: Smartphones with Wi-Fi
2: Consumer purchases-installs Wi-Fi
3: 9-1-1 Calls from Indoor Locations
4: Dispatchable address of Wi-Fi unit
Wireless E9-1-1: Residential Wi-Fi Database

1: Smartphones with Wi-Fi
2: Homes “cutting the cord”
3: 9-1-1 Calls from Indoor Locations
4: Dispatchable address of nearby Wi-Fi unit

- CRDB – Call Routing Data Base
- PDE – Position Determination Entity
- MPC – Mobile Positioning Center
- ESRK – Emergency Services Routing Key

Wireless Carrier

MPC

PDE

ESRK

NEAD

ALI

TCS E9-1-1 Center

Selective Router

Voice

Data

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Wireless E9-1-1: Probe/Crowd-Sourced Wi-Fi

1: Smartphones with Wi-Fi
2: Homes “cutting the cord”
3: 9-1-1 Calls from Indoor Locations
4: Heightened location of nearby Wi-Fi unit

CRDB – Call Routing Data Base
PDE – Position Determination Entity

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Probe/Crowd-Sourced Wi-Fi example

- Wi-Fi hotspots in TCS probe data
- 50m radius
- Baltimore 911 call
Wireless E9-1-1: Enterprise Wi-Fi Access

1: Smarphone with Wi-Fi
2: Enterprise installs Wi-Fi access
3: Person in Enterprise calls 9-1-1
4: E9-1-1 Center prepares query
5: E9-1-1 Center queries Enterprise Wi-Fi

Enterprise

Wireless Carrier

Mobile Switching Center

Selectiv Router

ALI

LEC

PSAP

911 Communicator

Wireless Carrier

9-1-1

Tower

b - Precise

Dispatch to Enterprise Wi-Fi location (dispatchable address)

TCS E9-1-1 Center

ESRK

ELG

IDB

MPC

ALI

Selectiv Router

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Enterprise Wi-Fi Location

Locating Wi-Fi device using Enterprise Access Points

Maps require broadband

Street address

Floor number

Uncertainty radius
9-1-1 Indoor Location Wi-Fi Demonstration - Setup

My Active Sessions
No active sessions assigned to gem user one.

Other Active Sessions
No other active sessions.
9-1-1 Indoor Location Wi-Fi Demonstration – Indoor Map

Unassigned Queue
1-303-766-7777 (1) 47704 min(s)

1-206-661-1896 (1) 32208 min(s)

My Active Sessions
No active sessions assigned to gem user one.

Other Active Sessions
No other active sessions.

indoor location
Campus: Seattle WA 98121
Building: 2401 Elliott Avenue
Floor: Second Floor
Uncertainty Radius: 7.32 meters
Zoom: 7.32 meters

Located At: Oct 14 7:13:37 PDT
Latitude: +47.61259
Longitude: -122.34997
Horizontal Uncertainty: 7 meters
Status: ✓ Location Found

Request Indoor Location

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Questions

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