Enterprise E911
A Primer

MERIT 2009 Spring Conference
Why Worry About E911?
Why Worry?

- Increased capabilities of IP Telephony:
  - Enhanced networking capabilities
  - Quick & Easy phone MAC’s
  - Share Trunk Groups
- Single Virtual telephone environments
  - Easy to create
Why Worry?

Litmus Test:

- When a user dials “911” – will their call go to the correct dispatch center?
- When a user dials “911” – will the dispatch center get the proper information for the call?
- If emergency responders are dispatched – is it reasonable they will be able to find the caller if no one is there to guide them to the caller?
Why Worry?

- State Regulation
  - Some States have 911 regulations affecting telephone system requirements

- Reasonable Prudence
  - Lack of regulation may not waive liability
Why Worry?

Enterprise E911 Applications & Services

- Designed to deliver:
  - Customized & Detailed location information
  - Via: CPE solutions/Hosted solutions
  - Via: PS-ALI (carrier) solutions
Key 911 Terms
### Key 911 Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>PSAP</strong></td>
<td>Public Safety Answering Point (Dispatch Center)</td>
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<tr>
<td><strong>ANI</strong></td>
<td>Automatic Number Identification</td>
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<tr>
<td><strong>ALI</strong></td>
<td>Automatic Location Identification</td>
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<tr>
<td><strong>Wireline Enhanced 911</strong></td>
<td>Calls route to PSAP with ANI and ALI</td>
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# Key 911 Terms

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<tr>
<td>Emergency Service Number (ESN)</td>
<td>A code that identifies the geographic zone the caller is from and matches it to the PSAP responsible to take the call.</td>
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<tr>
<td>Master Street Address Guide (MSAG)</td>
<td>A database maintained by the municipality/county to identify all valid addresses within their community and associates these with an ESNumber/ESZone.</td>
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What is E911 Capability?
Purpose: To allow an enterprise telephone system to provide detailed ALI information (building/floor/office) beyond the ALI assigned to the trunk being used to call 911.
PS-ALI Service / E911 Capability

- Telephone system application - E911 Capability
  - Standard capability
  - Optional capability
  - Separate software package
PS-ALI Service / E911 Capability

- PS-ALI service
  - Your “private” ALI information must be interfaced to the “public” 911 network
  - ILEC PS-ALI Service (e.g., AT&T 911 Locator ID) serves as the interface to the public 911 network
Without E911 Capability - Campus Network

ANI: Main # or DID #
ALI: BLDG 2 Address
PS-ALI Service / E911 Capability

With E911 Capability - Building and Floor

ANI: Main # for 3rd Floor or DID #
ALI: BLDG 1 and 3rd Floor
PS-ALI Records: 10

BLDG 1

BLDG 2

PSTN

BLDG 3
PS-ALI Service / E911 Capability

With E911 Capability - Building, Floor, Office

ANI: DID #
ALI: BLDG 1 and Office 306
PS-ALI Records: 100
911 Call Processing
The E911 Network

Enterprise Phone
123 Corporate Blvd
555-123-4567

Central Office Switch
Forwards 911 call to selective router

Tandem Switch / 911 Selective Router
Performs lookup in ALI DB to determine which PSAP to send the call

PSAP #1
Call delivered to PSAP simultaneously while ALI DB queries for location information

CAMA or SS7

CAMA or PRI delivers ANI
555-123-4567

Database Lookup
123 Corporate Blvd
ESN 201
(Master Street Address Guide)

Verifies address and returns ESN information

Contains location information

ILEC/Carrier

plante moran
Potentially OK:

- Trunks seized by caller dialing “911” are associated with their building
  - PSAP receives ANI/ALI associated with the caller’s location
911 Call Processing

- Potentially Not OK:
  - A single building environment that is:
    - Very large / Very complex
    - Multiple floors
    - PSAP receives ANI/ALI associated with the caller’s location – but may not be able to find the caller upon arrival
  - Campus environment with multiple buildings but only one DEMARC
    - PSAP receives ANI/ALI associated with the campus
  - Networked environment that serves multiple buildings (MAN/WAN)
    - Some/All buildings have access to only hub trunks
911 Call Processing

- Typical PSAP Protocol
  - Confirm ALI with Caller
  - Hang Ups / Dropped Calls
    - Call back using ANI to confirm emergency
    - RNA? Dispatch a responder to the ALI location
911 Call Processing

- **Use of Analog Trunks to ID Multi-Site 911 calls**
  - Two trunks per site
  - Assumes:
    - DEMARC exists at each building
    - Each site equipped with system/gateway that supports CO/FXO connection
    - Each system/gateway supports routing its site’s users to the “911” trunk group
    - Each system/gateway can support ringing appearance of a call on either “911” line if Dispatch calls back
State Law governs 911 regulations

Sixteen states (including Alaska) have legislation with potential to affect enterprise telephone system design

www.nena.org/

State Status of MLTS/PBX Legislation
Customizing 911 - The Tools
ANI drives the 911 call process

- ANI passes through network
  - Determines which PSAP gets the call
  - Determines which address record is looked up & presented to PSAP
Customizing 911 - The Tools

- **Enterprise E911**
  - Telephone system application
  - Allows the ANI on a 911 call to be “customized”
    - Assign Pseudo-ANI
    - Group proximate users – share a single Pseudo-ANI
    - Minimize number of PS-ALI records
    - Simplifies Administration
Customizing 911 - The Tools

- PS-ALI Service
  - Carrier application
  - Allows you to “customize” the ALI associated with an ANI
    - Private customer has interface to carrier’s ALI DB
    - Private customer can script ALI information
    - Price is typically related to number of records
Understanding the E911 Application
Without E911 application...

- 100% use of PS-ALI service
- Each user = Separate record
  - Unique DID/ANI
  - Unique ALI

Expensive

Burdensome to administer

- MAC updates
Understanding the E911 Application

With E911 application...

- PS-DID users are grouped into “Zones”
  - Emergency Response Location (ERL)
- DID users share a custom DID for their “Zone” when calling 911
  - Emergency Location Identification Number (ELIN)
  - Customer Emergency Service ID (CESID)
Understanding the E911 Application

- With E911 application... (cont.)
  - Reduces number of PS-ALI records required
  - Easier System Administration (MAC’s)
Understanding the E911 Application

Potential drawbacks...

- Pseudo-ANI is typically delivered to PSAP – not “true” DID number
- Pseudo-ANI should ring to a manned station (call backs)
- Where a separate server provides the E911 applications – a server failure may result in default trunk information
  - Redundant server to mitigate risk
Additional Benefits...

- Real time notification a 911 call was placed
  - Notify up to several users
    - Alert/Email/Phone Call
    - Who made the call
    - Bridge the in-progress call

- Automatic administration of IP telephony MAC’s
  - Subnet assignment or Layer 2 information = ELIN assignment
Understanding the E911 Application

- **Cisco Unified Communications Manager**
  - Cisco Emergency Responder (CER)
  - Server approach (redundancy available)
    - Loss of server = 911 calls process using default trunk information
  - Real time notification of 911 calls
  - Automatic management of IP telephony MAC’s
Understanding the E911 Application

Avaya Communications Manager 5.0

- Enhanced 911 is embedded in the generic SW
  - Standard feature
- No separate server
- Real time notification of 911 calls ("Crisis Alert")
  - Capable of monitoring and recording crisis calls
- When using "zones" – will present PSAP with pseudo or true ANI
- Automatic management of IP telephony MAC’s
Understanding the E911 Application

Nortel CS1000

- Emergency Services Access (ESA) is embedded in the generic SW
  - Standard functionality: define by subnets
  - Optional functionality: define by switch or port
    - Requires third party: eTelemetry Locate911
    - Linux appliance to map data network and track IP phones
- May require an appliance – but No Point of Failure
- Real time notification of 911 calls (one license at no cost)
- When using “zones” – can tie back to true ANI
- Automatic management of IP telephony MAC’s
Understanding the E911 Application

- **Mitel 3300 ICP**
  - Basic E911 functionality in generic SW
  - Enhanced functionality: Emergency Response Advisor
    - Separate server
    - Maps data network and tracks IP phones
  - May require a separate server
  - Real time notification of 911 calls
  - Automatic management of IP telephony MAC’s
Understanding the E911 Application

**NEC SV 8300 / SV 8500**

- Basic E911 functionality in generic SW
  - Enhanced functionality: Amcom Enterprise Alert
    - Separate server (up to 100 LAN switches per server)
    - Maps data network and tracks IP phones
- May require a separate server
  - Loss of server = 911 calls process using default trunk information
  - Redundant server option available
- Real time notification of 911 calls
- Automatic management of IP telephony MAC’s
Understanding the E911 Application

 Siemens Openscape Voice Application (HiPath 8000)

- Enhanced 911 is embedded in the generic SW
  - Standard feature: “E911 Tables”
  - Tracking of “Zones” by Subnet
  - Tracking by LAN switch or port requires Third Party Application
- No separate server
- No Real time notification of 911 calls
- Automatic management of IP telephony MAC’s
Understanding the E911 Application

**Shoretel Unified Communications Solution**

- Basic E911 functionality in generic SW
- Enhanced E911 functionality
  - Third Party Provider: ConneXon Telecom’s 911 Enable Emergency Routing Service
    - Offers CPE and Hosted approach
- Third Party CPE: Requires separate server
- Third Party Hosted: Trunk connection to 911 Enable’s NOC
- Automatic management of IP telephony MAC’s
Understanding the E911 Application

- **3Com VCX (Connect 100/200, V7000 Enterprise, Unified Communications on IBM System)**
  - Third Party: ConneXon Telecom’s 911 Enable
  - Requires separate server
  - Automatic management of IP telephony MAC’s
Understanding the E911 Application

Aastra Clearspan

- Third Party: ConneXon Telecom’s 911 Enable
- Requires redundant Location Information Servers
- “Zones” are defined by Subnet
  - Definitions to LAN switch or port are planned for future release
- Real time notification of 911 calls
- Automatic management of IP telephony MAC’s
Understanding the E911 Application

- Third Party Providers
  - CPE and Hosted Solutions
    - 911 Enable
    - 911 ETC
    - Amcom
    - eTelemetry
    - Red Sky
Understanding PS-ALI Service
Understanding PS-ALI Service

- PS-ALI = Access to the “real” 911 ALI database
  - Typically: ILEC’s/CLEC’s offer this service
    - AT&T, Verizon, Qwest, Cincinnati Bell, etc.

- Connection between premise telephone system and carrier ALI database
  - CAMA trunks
  - ISDN-PRI (preferred choice)
Understanding PS-ALI Service

- Pricing: PS-ALI service
  - One Time Set Up Cost
    - Ex: $2,000/50 records to $8,000/2,000 records
  - Monthly Recurring Cost
    - Ex: $30/50 records to $150+/2,000 records

- More records = More Cost
Understanding PS-ALI Service

- AT&T (Legacy SBC region)
  - 911 Locator ID
    - Direct interface to update DB
    - Scales to thousands of records
  - 911 Locator ID Lite
    - Less than 25 records – static DB
Understanding PS-ALI Service

- AT&T (Legacy Bell South region)
  - 911 Pinpoint
- AT&T (Legacy PAC Bell / Southwestern Bell region)
  - PS-ALI service
Understanding PS-ALI Service

- Verizon
  - PS-ALI

- $2500 set up fee
- No recurring fees
Understanding PS-ALI Service

- Qwest
  - PS-ALI
- Embarq (legacy Sprint)
  - PS-ALI
- Intrado
  - Primarily serves carriers but will work with large enterprises on a case-by-case basis
Understanding PS-ALI Service

**SIP Trunks**

- IP-based trunks may require services from a VoIP Positioning Center (VPC)
  - 911 Enable
  - Intrado
  - Red Sky
  - TeleCommunication Systems
  - Vixxi

- SIP trunks allow for even more record detail than conventional trunks
Enterprise E911 Design Considerations
E911 Design Considerations

- Key Decision: Define “Zones” (Emergency Response Locations) to be used
- More Zones = More Work/Cost
- Identify level of “granularity” desired

Considerations

- Station/User density
- Ease of access
- Ability to visually ascertain the area
E911 Design Considerations

- Tools
  - Building Floor Plans
  - Site walk-throughs
  - Fire alarm zones

- Local Police or Fire may have insight
E911 Design Considerations

Question to ask:

Knowing the ALI - Could I quickly find the caller?

- Large spaces
- Many cubicles
E911 Design Considerations

- Determining the number of “zones”
  - Defines the number of PS-ALI records needed
E911 Design Considerations

- Problem children...
  - Soft Phones
    - Inside the enterprise vs outside the enterprise
  - Networked sites
    - Crossing PSAP boundaries could mean you will be sending calls to various PSAPs
      - Define which sites are served by what PSAPs
    - Crossing boundaries could mean you will be served out of multiple carrier ALI databases
      - Define which carrier’s databases are serving each PSAP you are sending calls to
Problem children...(cont.)

- SIP Phones
  - SIP phones – as opposed to the manufacturer’s IP phones – may limit full E911 functionality
Resources

- www.nena.org (MLTS Model Legislation)
- http://www.nojitter.com/showArticle.jhtml?articleID=213402585
- www.911dispatch.com
Thank You

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