Canadian IP Telephony and 9-1-1

2003 CISCO TECHNICAL SYMPOSIUM

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Agenda

911 Overview and Terminology
Canadian 9-1-1 Specifics
Cisco IP Telephony 9-1-1 Configuration Examples
  – Single site
  – Multi-site (centralized call processing) without CER or SRST
  – Multi-site (centralized call processing) with SRST without CER
  – Cisco Emergency Responder overview
  – Multi-site (centralized) with CER
  – Multi-site with CER and with Bell PS-ALI

Testing 9-1-1 Dial Plans
Why is it important?

• Two important Goals:
  - First: Get call to the correct Emergency Response Team
  - Second: Get as much info to the Emergency Response Team about the caller’s location as possible

• IP telephony breaks down traditional telephony boundaries
  - Ability for user to unplug a phone and move it to another office or location
  - Regional and National networks springing up where more than one office are served by same IP Telephony network but Emergency Services are still local requirement
  - Extension Mobility allows users to temporarily sign onto phones in alternate cities or offices
  - Phones can be run at great distances from Local Call Manager and gateways (customers already running phones remote to Latin America, India, Europe, Caribbean, Northern Canada via Satellite)
Overview: 9-1-1

- 9-1-1 is a single number to call for medical/fire/police emergencies
- Calls to 9-1-1 are routed to a Public Safety Answering Point (PSAP)
  - First-tier *triage* call center for emergency calls
  - PSAP operators dispatch or conference medical/fire/police resources as necessary
- **Automatic Location Information Database (ALI-DB)** maps the caller’s ANI (calling number) to a street address and location description
Overview: E9-1-1
Terms and Acronyms

• **ANI**—“automatic number identification”; used interchangeably with *calling party number* (CPN)
• **ERL**—“emergency response location”; a specific physical area within which a 911 caller can be located by response personnel in a timely fashion
• **ELIN**—“emergency line identification number”; also called “pseudo-ANI”; the PSTN-routable number sent as the CPN for all 911 calls from an ERL
• **ESZ**—“emergency service zone”; denotes a geographic zone in a municipality with a unique set of police, fire, and medical jurisdictions

* Details and more terms in speaker notes
Canadian 9-1-1 Specifics

- **Primary Public Safety Answer Point (PSAP)** typically Police in Ontario, Quebec – typically Fire in Western Canada
- **Primary PSAP qualify and transfer to secondary dispatch**
- Carrier End Office switch hard-wired to one or more 911 Tandem switches
- **ANI (calling number)** critical to PSAP understanding location
- Incumbent (ILEC) Phone Company (Bell in Ont/Que, TELUS in BC/Alta) holds 911 ALI (automatic location identification) database
- Competitive Local Carriers (CLEC) End Office switches also hardwired to PSAP Tandem
- When ILEC delivers call to PSAP the ILEC pushes the ALI to the PSAPs 911 system – eg. Not high tech: X.25 Datapac 3201/3000
- **PSAP** is actually a specialized call centre with queing, display boards, etc
Canadian 9-1-1 Specifics

Terminology:

• Called Party Supervision: possible for 911 calls that originate from copper circuits (eg. Residential, 1FL, Centrex) - PSAP via Tandem switch controls when call is released

• Ringback – on copper circuits PSAP can instruct the Tandem to callback the 911 caller – automated function not dialed

• Callback – where Ringback is not available the PSAP can redial the caller based on the ANI

• Howler – PSAP has ability on copper circuits to send ringing voltage and loud tones even if phone is on-hook
9-1-1 Differences among Canadian Telco Providers

- **Bell in Ontario/Quebec:**
  - 9-1-1 system called PERS
  - Only upload one ALI Civic Address per trunk group for Main Service Number (do not confuse with BTN) – result no address for each DID
  - System based on 7 digit DNs – multi NPA situations require attention (647/416, 289/905)

- **CLECs in Ontario/Quebec**
  - Upload their ALIs to Bell PERS 911 Database automatically
  - CLEC decision/responsibility on what to upload (eg. TELUS upload ALI for all DIDs in Ont/Que

- **TELUS in Alta/BC**
  - Three separate 911 databases (pre-merger) – working on new system
  - Upload ALI for each DID

**In Summary:** Talk to your Service Provider about what to send!
Customer Responsibility

- Send 9-1-1 calls to correct trunk and Central Office for PSAP location (especially important with centralized dial plans) – (e.g. don’t send 9-1-1 calls for Richmond Hill to downtown Toronto gateway)
- ISDN PRI allows you to send ANI so it is important to send valid ANI (Calling ID) – talk to your carrier
- Analog lines, Centex lines, DEA (T1 CAS) do not allow customer to send ANI so the ANI is data-filled for ALI lookup to PSAP
- CAMA trunks not available in Canada
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Testing 9-1-1 Dial Plans
Single Site Cisco IP Telephony & 9-1-1

Example: Cisco Toronto Office

**Call Mgr**
9-1-1 route-pattern

**DNIS**: 911
**ANI**: 416-306-7000

**Megalink**
ISDN PRI
(main service#: 416-306-7000)

**Bell Network**

- Bell End-office CO Switch
- Tandem Switch

**PSTN**

**Bell ALI Database**
416-306-7000
181 Bay Street, Suite 3400

**PSAP**: Toronto Police

181 Bay St
Ste 3400

**Datapac**

194

**Bell PERS ALI DB**

**Single site IPT**
Similar to traditional PBX deployment

**9-1-1 PSAP Callback to 416-306-7000 – to Cisco Reception**
Important to understand based on specific local carrier requirements
Common Mistakes

- 911 and 9.911 route patterns: customer forgets to set calling party transform mask (ie calling line sent with 4 digit DN)

- Recognize difference between carriers
  TELUS send actual DID as ANI
  Bell send the main service number
Multi-site or Campus (centralized call processing) without CER or SRST

- Centralized call managers in board offices
- Megalink ISDN PRI trunking at central sites
- Only phones at school (no primary trunking, no call managers)
- Backup analog POTs phone line in each school connected to 1FL
- Schools in same region (i.e. single PSAP)
- Normal 9-1-1 calls via central Megalink using ANI of 1FL
- If WAN down 9-1-1 calls via emergency POTs phone
Multi-site 9-1-1 Deployment with **no** SRST & **no** CER

Example: School Board

**Call Mgr**
9-1-1 Route-pattern Per CSS

**School Board office**

9-1-1 PSAP Callback to 514-733-7990 - Coronation E.S. POTs phone in office

**Caveat:** If WAN is down then IP phones down, 9-1-1 call made from office POTs phone
Important to only have 911 and 9.911 patterns on phone calling search space and not line calling search space

- **Problem:** If Toronto user logs onto Montreal phone Toronto user’s device profile over-rides line CSS. This would result in 911 calls from Montreal phone going to Toronto police. – Bad!

- **Solution:** Create Montreal911CSS and put on phone, Apply MontrealLocalCalling or MontrealLongDistanceCalling CSS on the phone line (ensure the local and LD CSS do not have 911 or 9.911 route patterns)
Multi-site 9-1-1 Deployment with SRST & no CER
Example: Large City Deployment

9-1-1 PSAP Callback to 905-315-4422 - Auto-ringdown incoming calls on the 1751 to Site Reception

Note: IP network is down then SRST allows 9-1-1 calls out from IP phone to local 1FLs
9-1-1 Mobility Issue when only using CSS

OOPS!!! User moved phone without telling IT/Telecom - Wrong address at PSAP
Cisco Emergency Responder (CER): How Does It Help?

- **Automatically tracks the location of users** within minutes of moves/adds/changes
  - Eliminates manual ALI updates following moves/adds/changes
  - Circumvents traditional limitation of one move per user per day

- Routes 9-1-1 calls to the **correct gateway** based on the current location of the caller

- Provides **correct and current location information** about the 9-1-1 caller to the emergency operator (PSAP)

- **Alerts on-site emergency response personnel** (e.g. a security desk) about details of a 9-1-1 call in progress
  - Real-time notification via: e-mail, pager, telephone, web page

- Creates an **audit log** for E9-1-1 configuration changes, and records a **commented history log of all 9-1-1 calls**
Solution: Introduce Cisco Emergency Responder

Bell Network

1751 SRST Router
(2 Centrex – 1 911, 1 other)
905-315-4422

Megalink ISDN PRI
(main service#:
905-897-6400)

City Hall

Emergency Responder

City Security
automatically notified of 911 call

Call Mgr

DNIS: 911
ANI: 905-315-4422

GW

PSTN

Bell CO Switch

Tandem Switch

PSAP: Peel Region Police

Datapac

1507 Clarkson

Community Centre

9-1-1 PSAP Callback to 905-315-4422 – consults Emergency Responder – routes call to x1088

Bell ALI Database

905-897-6400: 300 City Centre Dr, City
905-315-4422: 1507 Clarkson, City
905-315-7255: 201 City Centre Dr, City

Emergency Responder tracks phone movements by SNMP Polling
City’s Catalyst switches

Bell PERS ALI DB

City’s Catalyst switches

905-897-6400

Community Centre

1507 Clarkson

City Security
automatically notified of 911 call

City Security
automatically notified of 911 call

911

X1088 non-DID

905-315-4422

PSAP: Peel Region Police

Datapac

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9-1-1 PSAP Callback to 905-315-4422 – consults Emergency Responder – routes call to x1088

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Emergency Responder tracks phone movements by SNMP Polling
City’s Catalyst switches
Summary of Cisco Emergency Responder Benefits:

- Automatically tracks phone moves – accurate ANI/ALI for 911 calls
- On-site emergency staff notification – phone call, web alerts, e-mails
- Call-back to DID and non-DID phones
- 9-1-1 Call History Log
Bringing True Enhanced 9-1-1 to Canada

- PS-ALI (ability to upload more specific info to phone company 9-1-1 ALI database)
- PS-ALI technical trials with City of Mississauga, Peel Police/Fire & Bell in Fall 2002
  
  Cisco Developed Bell ALI formatting tool
  
  – match Bell Canada PERS format
- Special assembly filed and approved with CRTC
- Cisco developed ALI formatting tool posed to CCO
  
  http://www.cisco.com/cgi-bin/tablebuild.pl/aft
- TELUS has also filed special assembly request with CRTC for PS-ALI for BC customer
Enhanced 9-1-1 (PS-ALI) Improvement

**Bell Network**

- **Bell Network**
- **Bell CO Switch**
- **Tandem Switch** (9-1-1 Selective Router)
- **Megalink ISDN PRI**
- **Gateway DB**
- **SS7**
- **Bell Canada PS-ALI Gateway DB**
- **City PS-ALI workstation**
- **City Hall**
- **Community Centre**
- **Emergency Responder**
- **Call Mgr**
- **DNIS: 911**
- **ANI: 905-897-6408**
- **Encrypted Internet E-mail**

**PSAP:** Peel Region Police

- **PSAP: Peel Region Police**
- **Datapac**
- **1507 Clarkson**

**Bell ALI file created from Cisco ER – AFT conversion tool**

- **905-897-6402:** 300 City Centre Dr, Ground Floor Mississauga
- **905-897-6403:** 300 City Centre Dr, Ground Floor, City
- **905-897-6405:** 300 City Centre Dr, B1, City
- **905-897-6407:** 201 City Centre Dr, Floor 2, City
- **905-897-6408:** 1507 Clarkson, City
Sample PSAP Screen with PS-ALI

897-6404 (905) CTY City MSAUG CPB MIS 02/11/27 09:15:13 #:01622
CBN#:--------(---) Data LSP ID TN#: - ( )
CTY City
300 CITY CENTRE DR FLOOR BASEMENT LEVEL 1 – SHIPPING&RECEIVING ENTRANCE

City City L5B 3C1 ON

ESN#: 00234 PEELREGPOL 905 453 3311
PEELFIR 905 279 2311
CityMB905 905 844 4242
### ALI Information for Civic Centre Floor 3 Tower

* indicates required item

Fill all prevalidated fields from validation file by selecting a tag.

**Save your validation file as:** C:\Program Files\Cisco Systems\CiscoER\nena_msag_records\validate.txt on CMIS2000-54

For sample validation file refer C:\Program Files\Cisco Systems\CiscoER\nena_msag_records\samplevalidate.txt on CMIS

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<th>Value</th>
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<tr>
<td>Street Name *</td>
<td>City Centre</td>
</tr>
<tr>
<td>Street Suffix</td>
<td>DR -Selectone-</td>
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<tr>
<td>Community Name *</td>
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<tr>
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**Select a tag**

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**Not Selected**

**Update ALI Info**

**Cancel Changes**

**Close**
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<td>Extended Municipality Name</td>
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<td></td>
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<td>Data LSP ID</td>
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**Additional Information: FLOOR 3 TOWER**

**Bell Canada Specific fields:**

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<th>Location Type</th>
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<td>MISSISSAUGA</td>
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</tbody>
</table>

*Underlined fields are required fields*
911 Testing

Approaches:

- Configure correct 9-1-1 before first IP phone is activated.
- Set up test pattern eg. 111 to test Calling Search Space, gateway, and ANI (CLID) manipulation with final remapping 111 to test phone (eg. Cell phone)
- Co-ordinate true 9-1-1 test with Carrier and/or local PSAP (eg call police or fire PSAP supervisor to pre-arrange)

Cautions:

- PSAPs are very busy and get quite upset over unscheduled test calls – often queued real calls
- Even if dialed 9-1-1 by mistake NEVER hang up on a 911 call without first talking to the 911 agent. If they can’t call back they have to dispatch
Summary

• Remember Two important Goals:
  ➢ First: Get call to the correct Emergency Response Team
  ➢ Second: Get as much info to the Emergency Response Team about the caller’s location as possible

• Actions:
  ➢ Deal with 9-1-1 Configuration design Early even before equipment is ordered
  ➢ Work with your carrier and/or PSAP
  ➢ Know your approach and dial plan tools
  ➢ Don’t be afraid to ask others for help – Remember what is at stake
Cisco Systems

Empowering the Internet Generation