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Canadian IP Telephony and 9-1-1

2003 CISCO TECHNICAL SYMPOSIUM

Jeff Seifert, jseifert@cisco.com

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
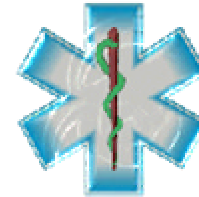
Terminology:

- **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 you 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**

Agenda

911 Overview and Terminology

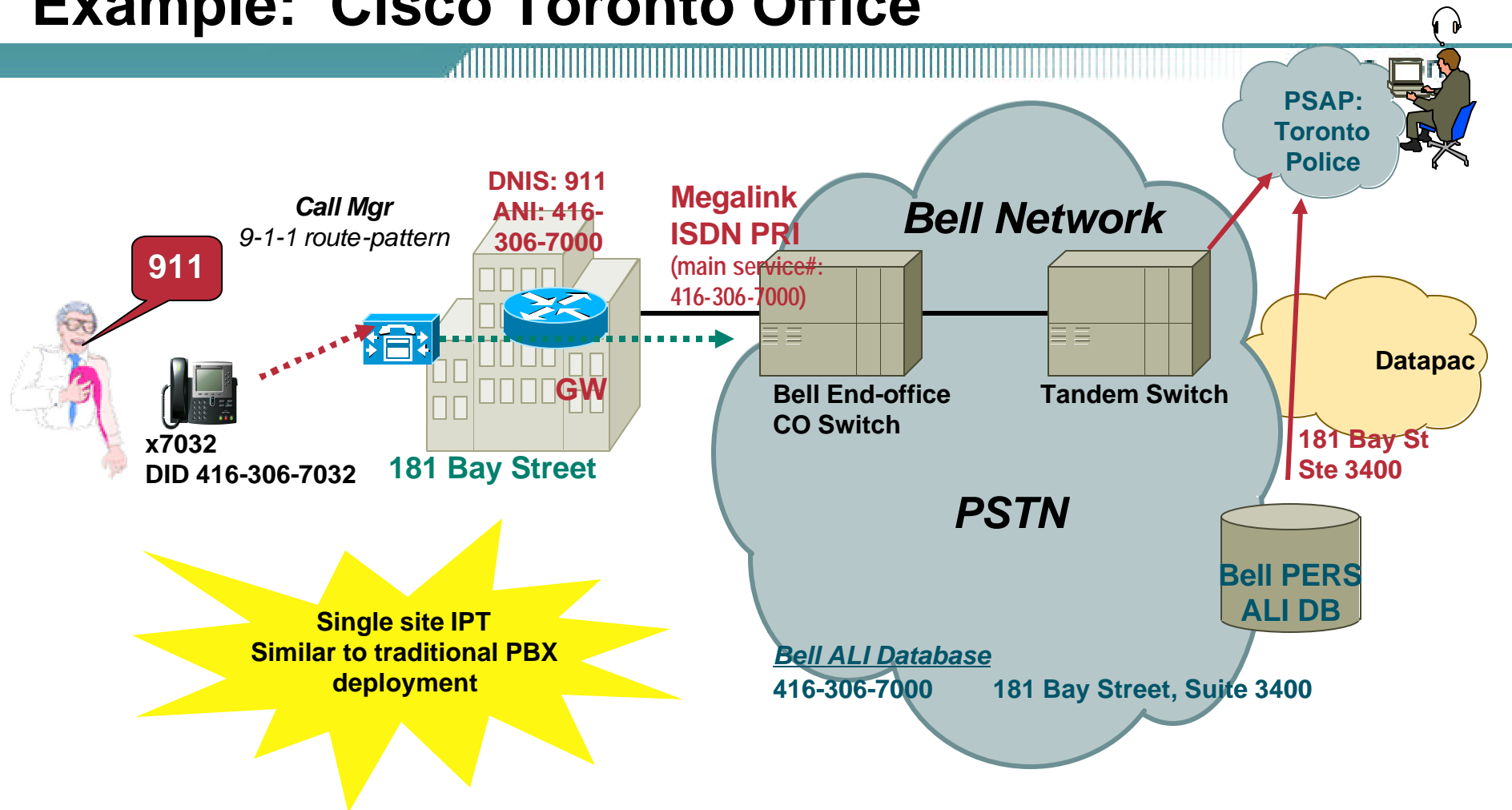**Canadian 9-1-1 Specifics**

Cisco IP Telephony 9-1-1 Configuration Examples

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Testing 9-1-1 Dial Plans

Single Site Cisco IP Telephony & 9-1-1 Example: Cisco Toronto Office

911

x7032
DID 416-306-7032

Call Mgr
9-1-1 route-pattern

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

GW

181 Bay Street

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

Bell Network

**Bell End-office
CO Switch**

Tandem Switch

PSTN

**PSAP:
Toronto
Police**

Datapac

**181 Bay St
Ste 3400**

**Bell PERS
ALI DB**

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

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

9-1-1 PSAP Callback to 416-306-7000 – to Cisco Reception

File   Edit   View   Favorites   Tools   Help

⇦ Back ▾   ⇨ ▾   ⊗   ↻   ⌂   🔍 Search   ✳ Favorites   🕘 History   📧 ▾   🖨

Address http://cm31m20/CCMAdmin/routepatternconfig.asp   ⤳ Go   Links

Route Pattern Configuration

Add a New Route Pattern
Back to Find/List Route Patterns

Route Pattern: New

Status: Ready
Note: Any update to this route pattern automatically resets the associated gateway/route list

[Insert]   [Cancel Changes]

Pattern Definition

Route Pattern*	9.911
Partition	< None >
Numbering Plan*	North American Numbering Pl
Route Filter	< None >
Gateway/Route List*	RL_PSTN
Route Option	⦿ Route this pattern ○ Block this pattern
☑ Provide Outside Dial Tone	☐ Urgent Priority

Important to understand based on specific local carrier requirements

Calling Party Transformations

☐   Use Calling Party's External Phone Number Mask

Calling Party Transform Mask   4163067000

Prefix Digits (Outgoing Calls)

Called Party Transformations

Discard Digits	PreDot
Called Party Transform Mask	
Prefix Digits (Outgoing Calls)	

Done   Local intranet

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

Elementary School

Elementary School

Elementary School

IP MAN

PSTN

Megalink ISDN PRI (main service#: 514-483-7200)

GW

School Board office

Bell End Office CO Switch
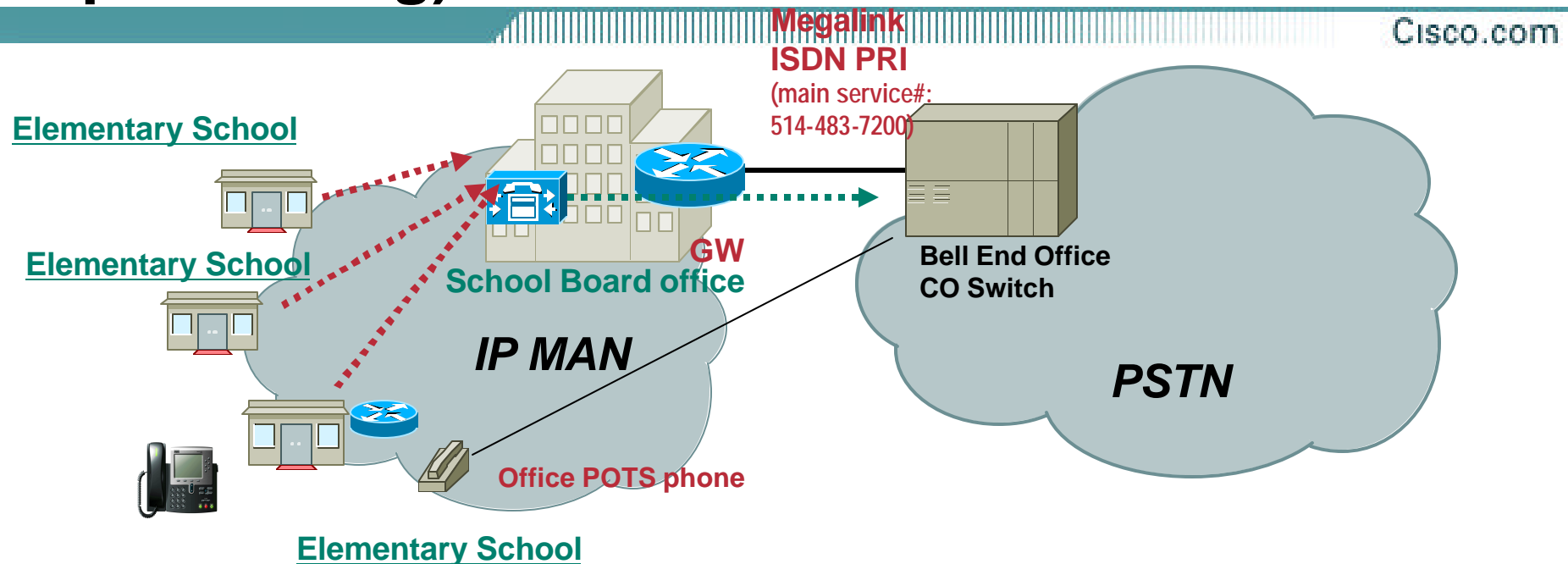
Office POTS phone

- 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

911

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

DNIS: 911
ANI: 514-733-7990

Megalink ISDN PRI
(main service#: 514-483-7200)

School Board office

GW

Bell Network

PSAP: Montreal Police

Bell End Office CO Switch

Tandem Switch

Datapac

4810 Van Horne

PSTN

Elementary School

1FL : 514-733-7990

X 5000 non-DID
(Coronation Calling Search Space)

Bell PERS ALI DB

Bell ALI Database
514-483-7200   6000 Fielding Ave.
514-733-7990   4810 Van Horne

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
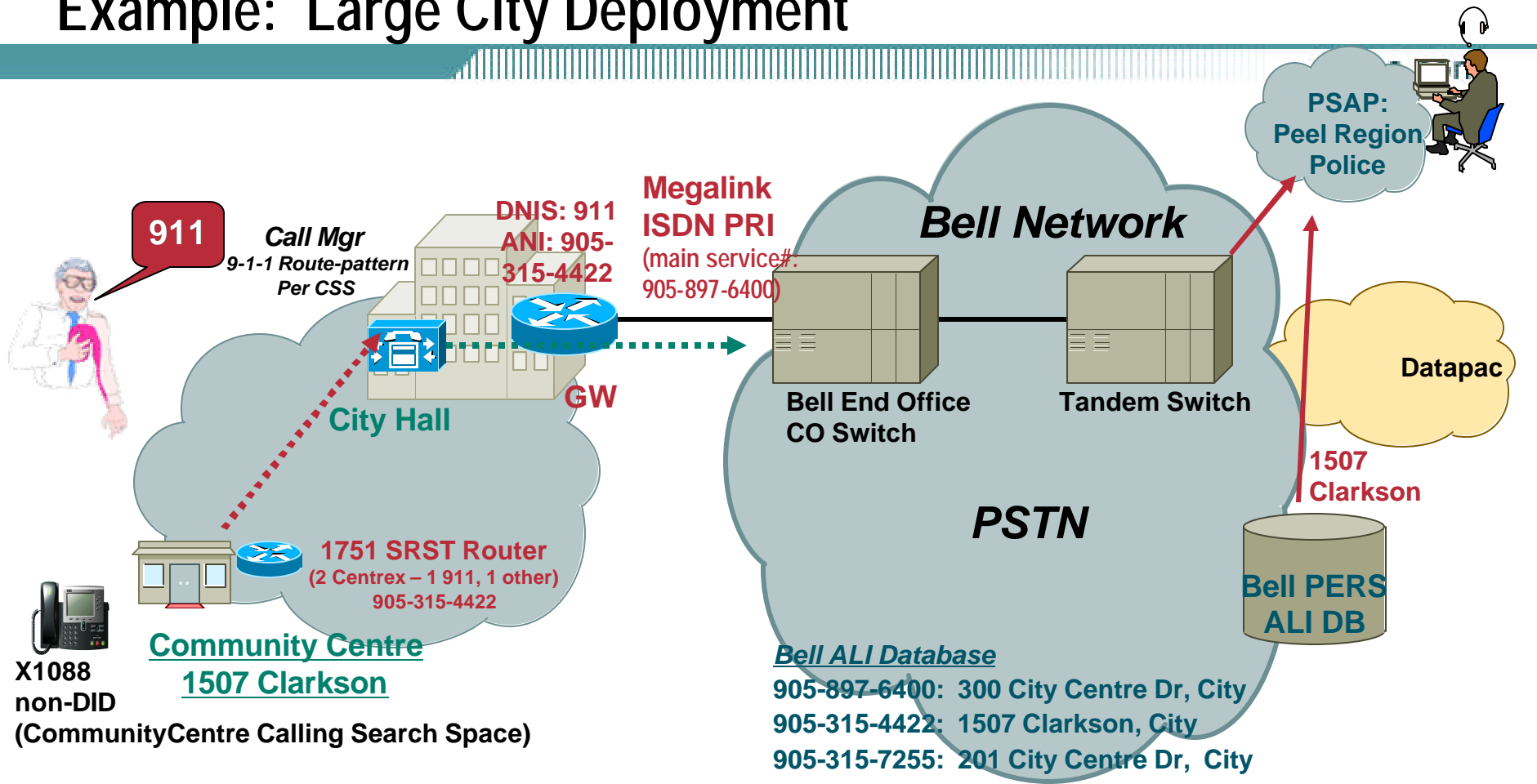
Extension Mobility and Multi-site CSS 911 Design

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)
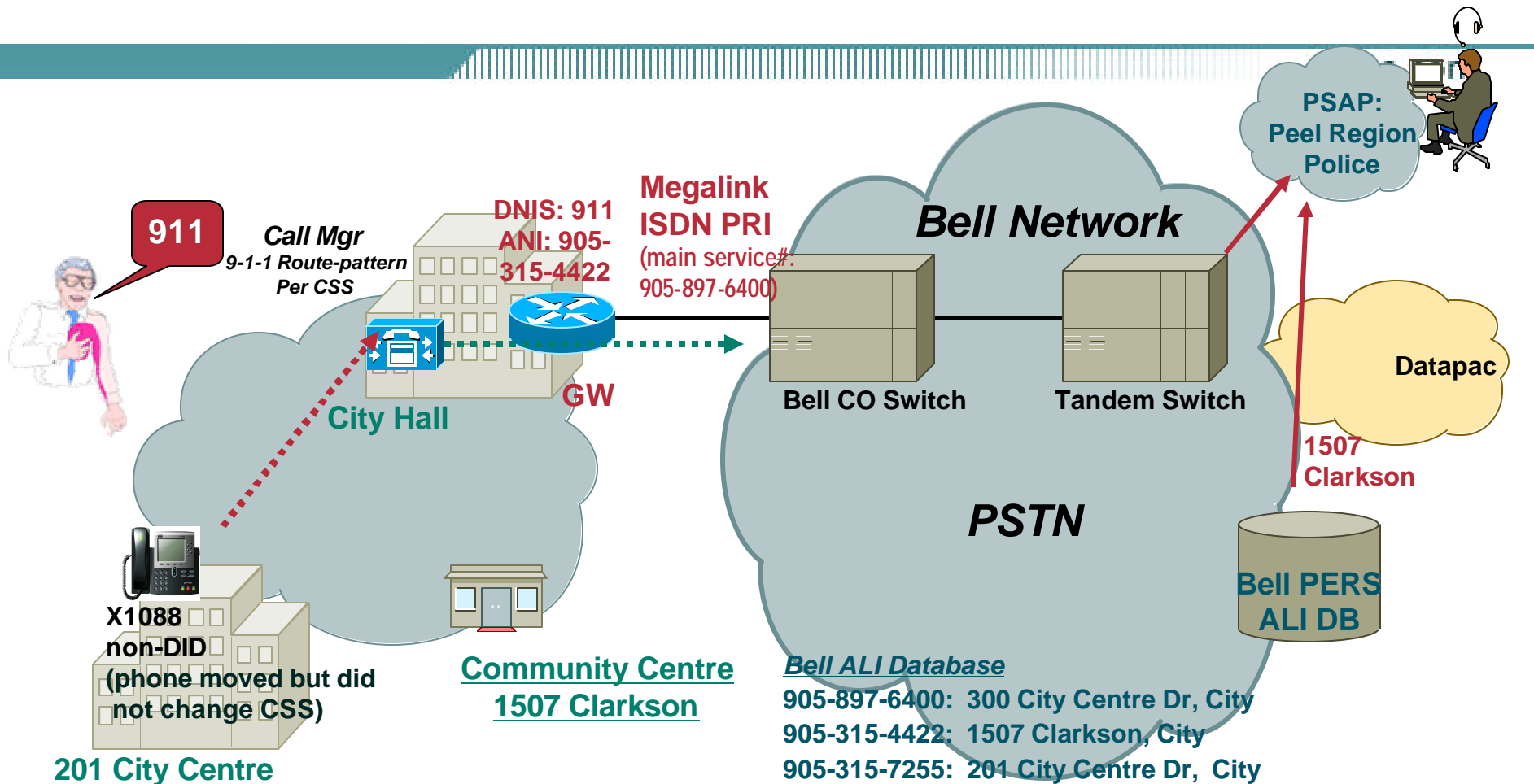
Multi-site 9-1-1 Deployment with SRST & no CER
Example: Large City Deployment

911

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

DNIS: 911
ANI: 905-315-4422

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

Bell Network

PSAP: Peel Region Police

GW

City Hall

Bell End Office
CO Switch

Tandem Switch

Datapac

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

PSTN

1507 Clarkson

X1088 non-DID
(CommunityCentre Calling Search Space)

Community Centre
1507 Clarkson

Bell PERS ALI DB

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

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
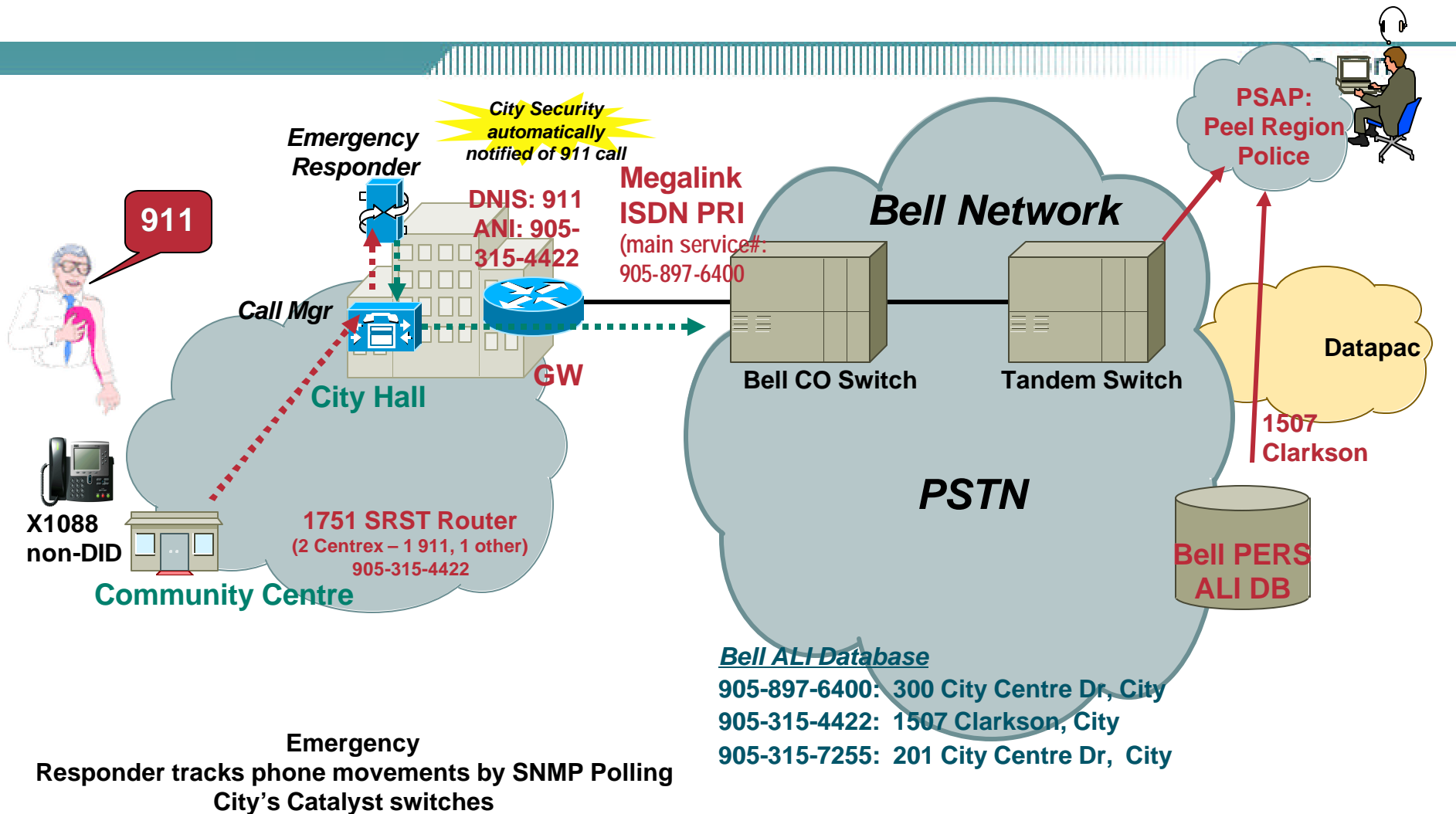
9-1-1 Mobility Issue when only using CSS

911

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

City Hall

DNIS: 911
ANI: 905-315-4422

GW

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

Bell Network

Bell CO Switch

Tandem Switch

PSTN

**PSAP:
Peel Region
Police**

Datapac

1507
Clarkson

**Bell PERS
ALI DB**

**X1088
non-DID
(phone moved but did
not change CSS)**

201 City Centre

**Community Centre
1507 Clarkson**

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

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

911

Emergency Responder

City Security automatically notified of 911 call

DNIS: 911
ANI: 905-315-4422

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

Bell Network

PSAP: Peel Region Police

Call Mgr

City Hall

GW

Bell CO Switch

Tandem Switch

Datapac

X1088 non-DID

Community Centre

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

PSTN

1507 Clarkson

Bell PERS ALI DB

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

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

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

CISCO SYSTEMS
EMPOWERING THE INTERNET GENERATION

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 formating tool

  – match Bell Canada PERS format

- **Special assembly filed and approved with CRTC**

- **Cisco developed ALI formating 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
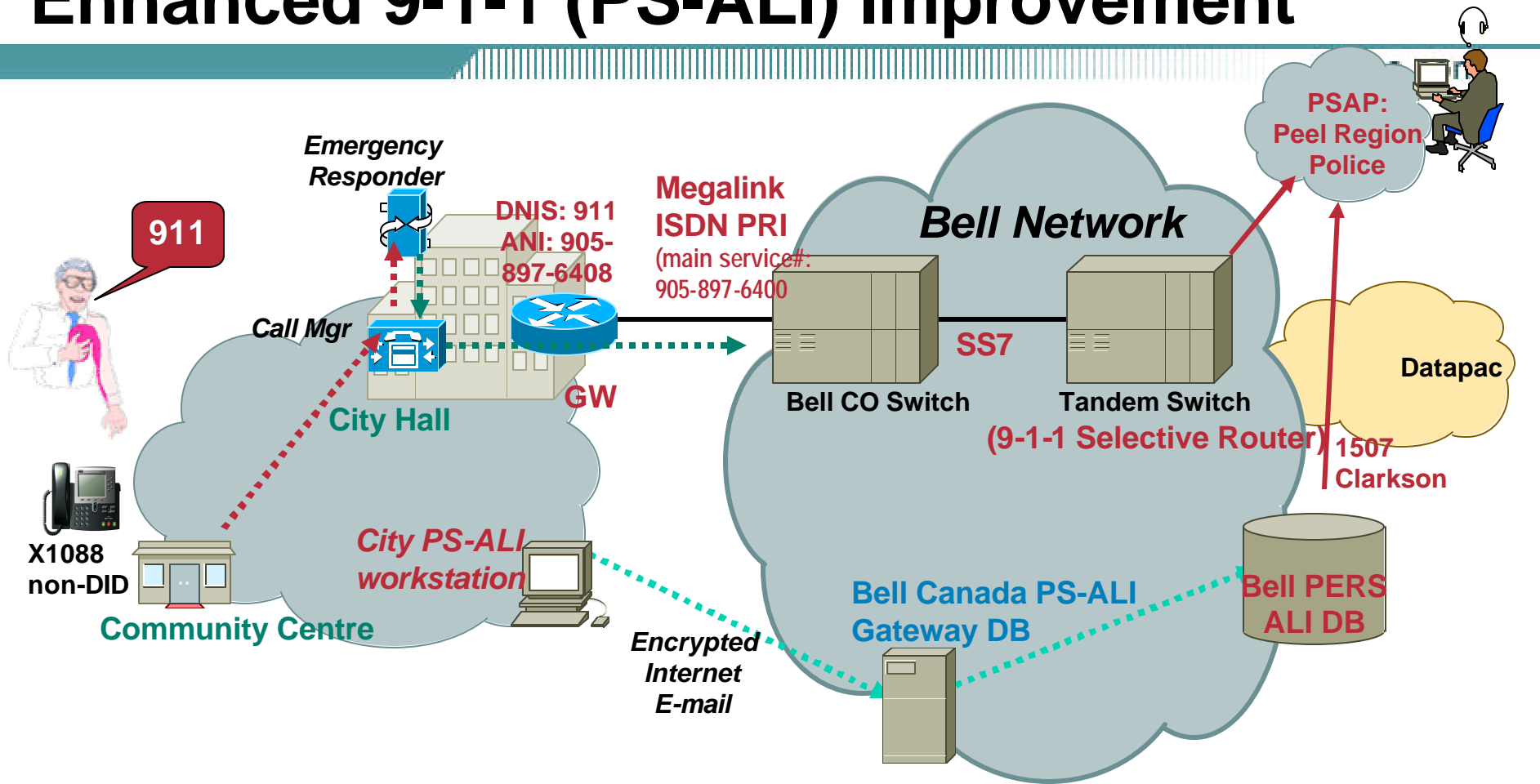
BELL ALI file created from Cisco ER – AFT conversion tool

905-897-6402: 300 City Centre Dr, Ground Floor Misssissauga

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
❓ Help for this screen

Fill all prevalidated fields from validation file by selecting a tag. **Select a tag** `—Not Selected—`

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**

House Number *	`300`	House Number Suffix ``
Street Name *	`City Centre`	Prefix Directional ``
Street Suffix	`DR` `—Select one—▾`	Post Directional ``
Community Name *	`Mississauga`	State * `ON`
Main NPA	`905`	Main Telephone No `8976411`
Class Of Service *	`Business PBX ▾`	Type of Service * `Non-Pub`
Exchange	`BELL`	Customer Name * `CTY MISSISSAUG`
Order Number	``	Extract Date `112202`
County ID	``	Company ID * `MSAUG`
Zip Code	`L5B`	Zip Code Extension `3C1`
Customer Code *	`111`	Comments ``
Longitude	``	Latitude ``
Elevation	``	TAR Code ``
Location	`Floor 3 Tower`	Reserved (for Service Provider use) ``

[Update ALI Info]   [Cancel Changes]   [Close]

Address http://localhost/cersysadmin/servlet/CERAdminServlet?formname=zoneconfigframe

AFT- Bell Canada

File   Edit   Tools   Help

☐ ☑ ELINs (1 ALI Records)
　☐ ☑ 905
　　☐ ☑ 897
　　　☑ 6411

ALI Record | Header Record | Trailer Record

Record Number 1, ELIN :9058976411

<u>Transaction Code</u>　Subscriber Account ID　Street Name　　　　　　Street Suffix　Street Direction

A ▼　　　　111　　　　　CITY CENTRE　　　　　DR

Extended Municipality Name　　Province Pilot NPA Pilot Telephone No　LSP ID　Data LSP ID

MISSISSAUGA　　　　　　ON　905　　8976411　　　BELL　MSAUG

Subscriber Name　　　　　Postal Code　Municipality Code　Civic Number　Civic Number Suffix

CTY MISSISSAUGA　　　　L5B　　　3C1　　　　300

Additional Information

FLOOR 3 TOWER

Bell Canada Specific fields

<u>Service Class</u>　　Class of Service　　<u>Service Municipality</u>　Location Type　　Location Number

CPB　　　　　　　　　　　　　　MISSISSAUGA

<u>Underlined fields are required fields</u>

Ready

9 Record(s) Exported to file
C:\Program Files\Cisco Systems\CiscoER\export\CoM NENA
export3.txt

Local intranet

tart | ☐ ⚫ ⬤ ⬤ | **AFT- Bell Canada** | Cisco Emergency Respon... | Cisco Emergency Respon...　5:06

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**