E-911

Adapted from Material Created by Phil Campbell

Definitions from the Master Glossary maintained by NENA
(National Emergency Number Association)
at [http://www.nena.org/standards/technical/master-glossary](http://www.nena.org/standards/technical/master-glossary)
Traditional E911 from Landline Phone

1. End Office
2. Tandem Office
3. PSAP
4. ALI db

ALI: Automatic Location Identification
ESN: Emergency Service Number
ANI: Automatic Number Identification
PSAP: Public Safety Answering Point
The E911 Sequence

1. Resident calls E-911
2. Class 5 CO passes call to Tandem Office
   • Adds ANI data
3. Tandem office connects call to PSAP
   • TN/ESN table determines which PSAP
   • ESN: Emergency Service Number
   • Passes ANI data to PSAP (only ANI!)
4. PSAP consults ALI database
   • ANI info sent to ALI
   • Returns address, ESN
Before the Call: MSAG

• Master Street Address Guide
• Maintained by government authorities
  – typically counties
• Maps street addresses into ESNs
Before the Call: OSS

- When a customer arranges phone service:
  - Customer tells telco his/her service address.
  - Telco assigns TN.

- The ILEC’s OSS:
  1. Queries the MSAG to determine the customer’s ESN, based on address.
  2. Adds the TN, ESN to table in tandem switch.
  3. Adds TN, ESN, & address to ALI db.
Works Very Well, If…

- Single Telco playing with the Data.
- Phone number uniquely determines location.
- Location is unchanging.
- PSAP doesn’t need to be relocated in large-scale emergency.
Cellular Issues

• Obvious, yes?
• Call-back number no longer describes the physical location of the phone.
• But…
  – Service provider must know which cell caller is located in.
Cellular Solution – Phase 0

• Requires:
  – Cellular caller to reach PSAP.
  – Somewhere, anywhere.
  – No ANI or call back required.

• More-or-less universal.
Cellular Solution – Phase 1

• Requires:
  – Cellular caller to reach PSAP.
  – PSAP to know which cell caller is in.
  – PSAP able to call back.

• Let's note:
  – Analog ANI is 10 digits, exactly.
  – SS7/ISDN can do more.
  – Many, many PSAPs have analog trunking.
Cellular Solution – Phase 1

- Telco sets up a series of pseudo-ANIs.
  - 740-xxx-xxxx means “cellular 911 caller”
- Telco sets up corresponding pseudo-ALIs.
  - “cell served by tower at 18 S Court St NE antenna; callback number 613-5552345”
- When call is made, the telco:
  - Sends pANI to PSAP,
  - Modifies pALI in real time to include call back number.
- PSAP gets real callback number from ALI db.
E911 from Cell Phone – Phase 1

1. Call placed from cell phone
2. Signal received by Tandem Office
3. ANI transmitted to PSAP
4. Information processed by PSAP

TN/ESN
ALI db
Phase 1 Problems

• Cells can include multiple ESNs.
  – Sometimes even multiple states.

• Not useless, but…
  – Depends on caller for detailed location info.
Cellular Solution – Phase 2

• Calls for:
  – Cellular caller to reach PSAP.
  – PSAP to know precise location of caller:
    » Within 50 m for 67% of calls
    » Within 150 m for 95% of calls
  – PSAP able to call back.
Location Methods

• Choice left to service providers.
• Related to GSM/TDMA/CDMA choice.
• Equipment vendors jockey for one choice or another.
Current Status In US

- Here’s the FCC summary:
  - [www.fcc.gov/cgb/consumerfacts/wireless911srvc.html](http://www.fcc.gov/cgb/consumerfacts/wireless911srvc.html)
- Cell companies now mostly adhere to somewhat looser Phase II.
- PSAPs still old, old, old technology.
Current Status In Ohio

• Ohio according to NENA
  – All counties have E911
  – 10 counties do not have wireless Phase I deployed
  – 6 counties are at Phase I

• Since Fall 2005
  – Wireless per line surcharge for E911
  – Currently $0.28 per line
VoIP Issues

• Variation on the theme, but different.
  – IP addresses are not geographic
  – SOHO locations that reach PSTN through HQ could be on different continent!

• Facilities based VoIP providers know who they handed an IP address to

• Mobile and nomadic providers do not!
  – Sometimes called “over the top” providers
  – Use someone else’s network
In case you were wondering (I was)...

The Vonage vPhone aka “phone on a stick”