



Geo based 9-1-1 call routing

Michigan Tech Forum 2017

Agenda

Introduction

GIS data usage today

The problem with 911 accuracy

A transitional improvement to 911

Next Steps

Introduction

People to see after the presentation

Tim McKee - PFN

Kent Claussen - INdigital

April Heinze - INdigital

Eric Hartman - INdigital

Mark Holmes - Michigan GIS

GIS usage today

GIS routing is used today

MI GIS data is used for the Geo-routing of **text-to-911** calls

Worked with the MI GIS dept to create the boundary data

Extended the GIS data to include waterways

Text sessions:

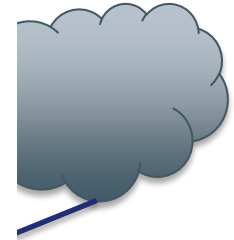
2016 - 1,524 (PFN network)

2017 - 454 (year to date Q1)

Wireless provider



Text Control Center



TCC



PFN queries C data/ECRF and routes the call on location

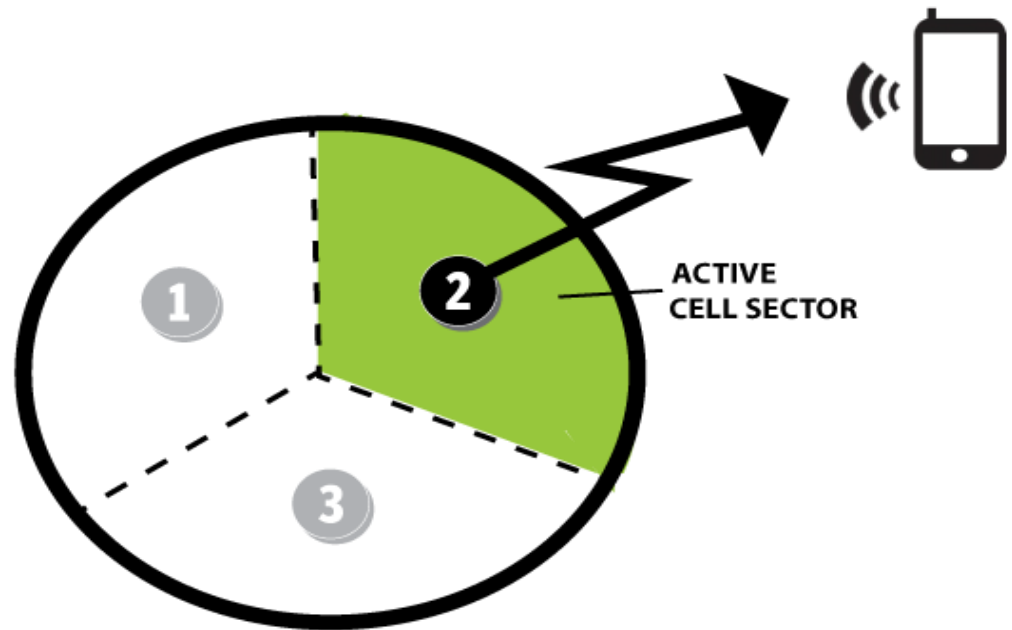
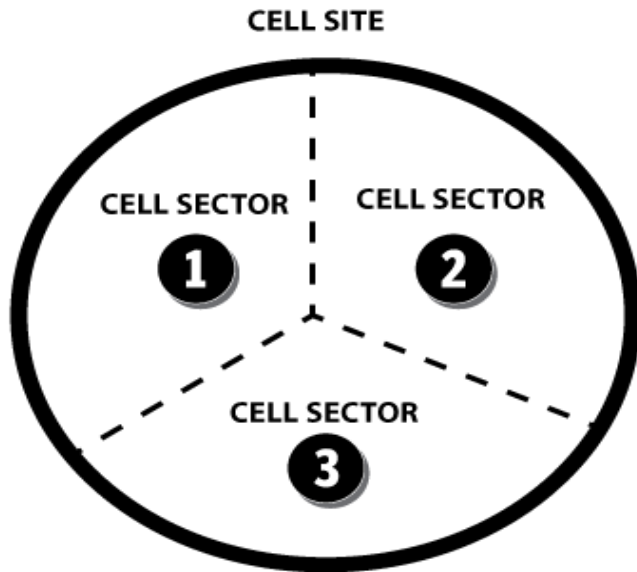


Centroid - what is that?

The full tower coverage area



This is cell service?



- Accessible on Android and Blackberry devices



$$A = \pi R^2$$



The accuracy problem

911 accuracy

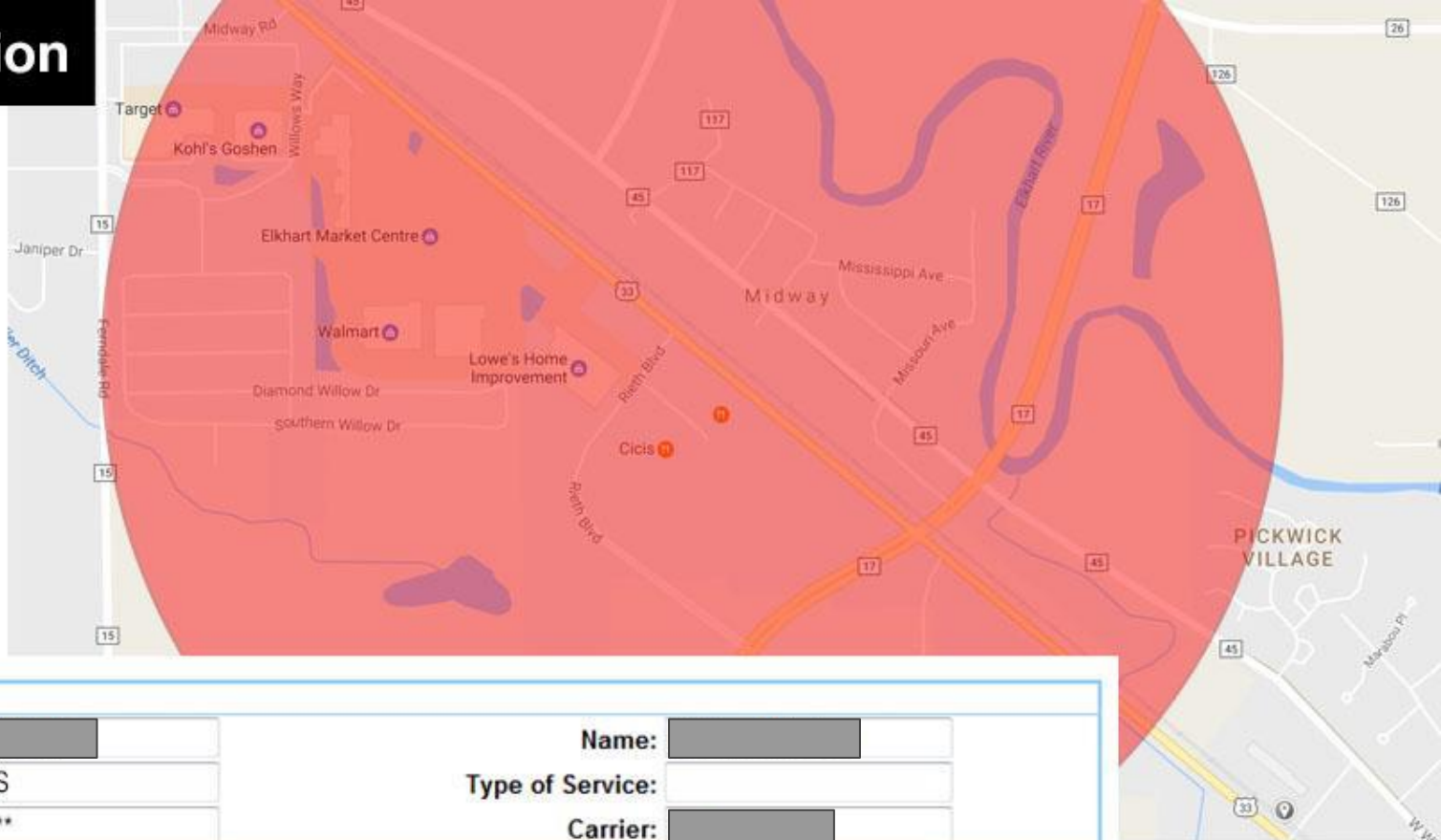
The PSAP isn't getting good location information (all the time)

911 providers don't have location information to make routing decisions

911 routing is database driven

The Public doesn't know their location

WRLS - Location



Call Information

Phone:

Class of Service: WRLS

Callback #: *****

Name:

Type of Service:

Carrier:

Street Address

Address: 2410 Peddlers Village Rd

Unit Type: NW Sector

City: Goshen

Zip:

Unit Number:

State: IN

County:

Geographic Information

Longitude (X): -85.878026

Latitude (Y): 41.609143

Geo Result:

Uncertainty:

Transfer Information

ESN:

Police:

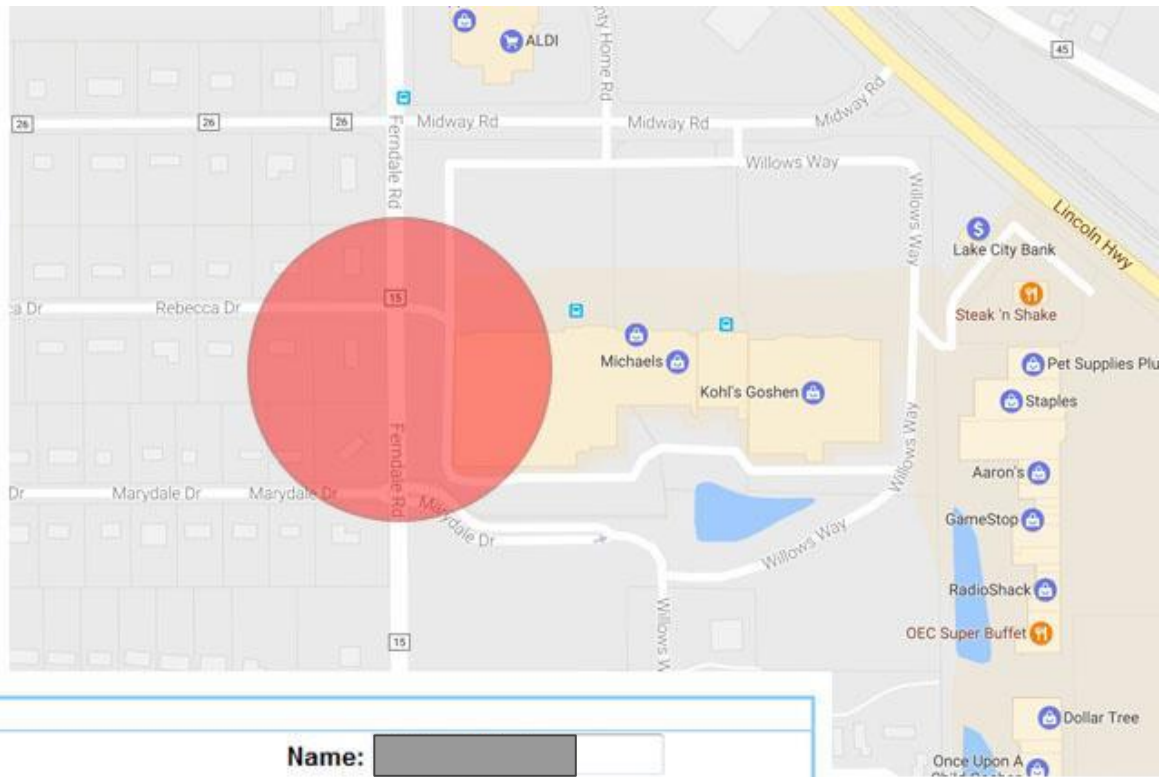
EMS:

Fire:

OTHER:

Call Taker Notes

WPH2 - Location



Call Information

Phone:

Name:

Class of Service: WPH2

Type of Service:

Callback #: *****

Carrier:

Street Address

Address: 23000 Rebecca Dr

Unit Type: NW Sector

Unit Number:

City:

State:

Zip:

County:

Geographic Information

Longitude (X): -85.907418

Latitude (Y): 41.621886

Geo Result:

Uncertainty:

Transfer Information

ESN:

Police:

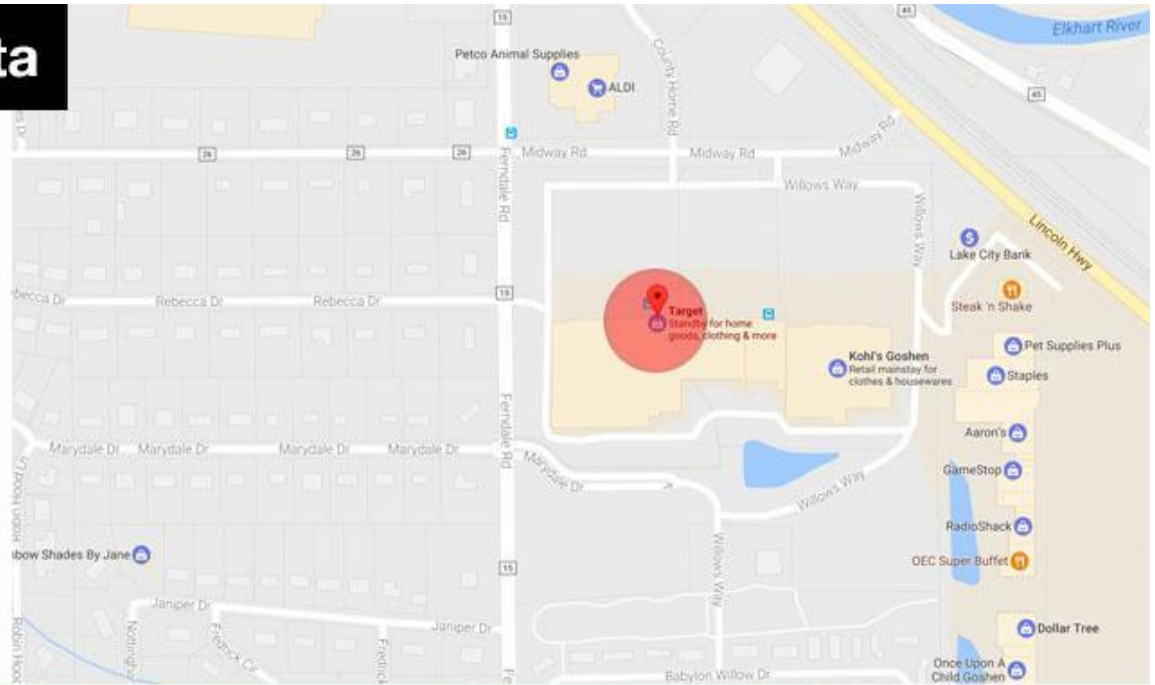
Fire:

EMS:

OTHER:

Call Taker Notes

RSOS - Supplemental Data



Call Information

Phone:

Class of Service: RSOS

Callback #: *****

Name:

Type of Service:

Carrier:

Street Address

Address:

Unit Type: Unit Number:

City: State:

Zip: County:

Geographic Information

Longitude (X): -85.905336 Latitude (Y): 41.621589

Geo Result: Uncertainty:

Transfer Information

ESN:

Police: Fire:

EMS: OTHER:

Call Taker Notes

Another transition

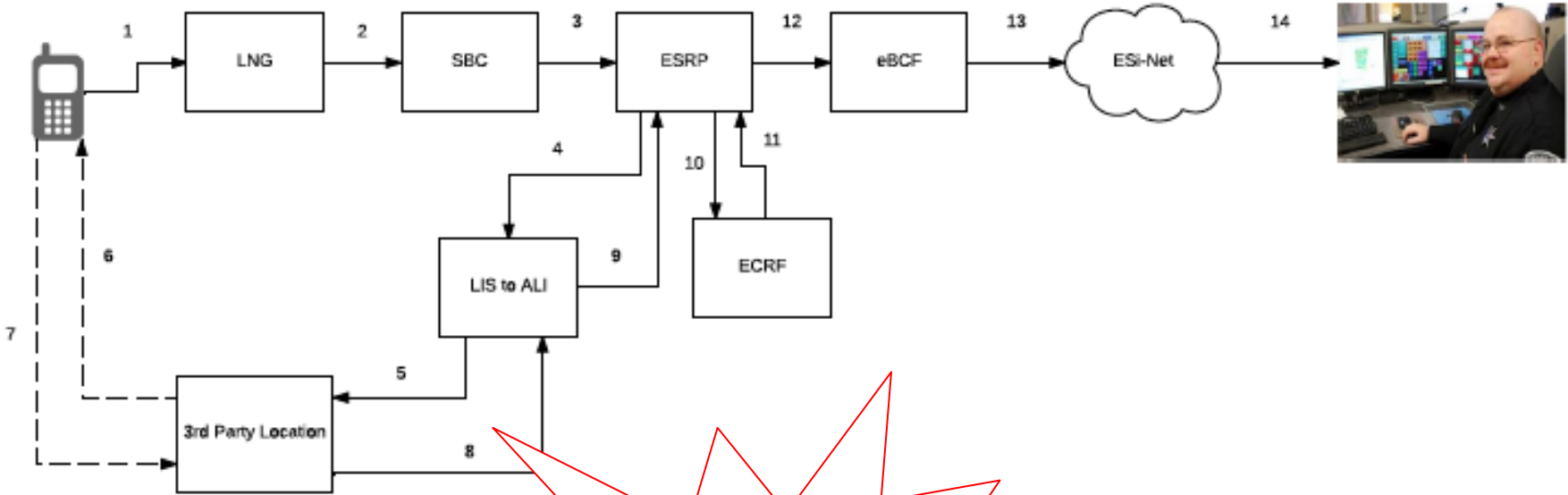
Legacy to LIS transition

Originating service providers - are not providing location information within the call setup

How to make progress and continue to move forward:

- What if we query the location providers as the call comes into the 911 network?
- How long does the query take to get location information?
- How many calls would benefit from this routing technique?
- What safeguards are needed?

Legacy to LIS testing



On average took 2.75 seconds to gather phase 2 location for routing

It works, at least during the test!

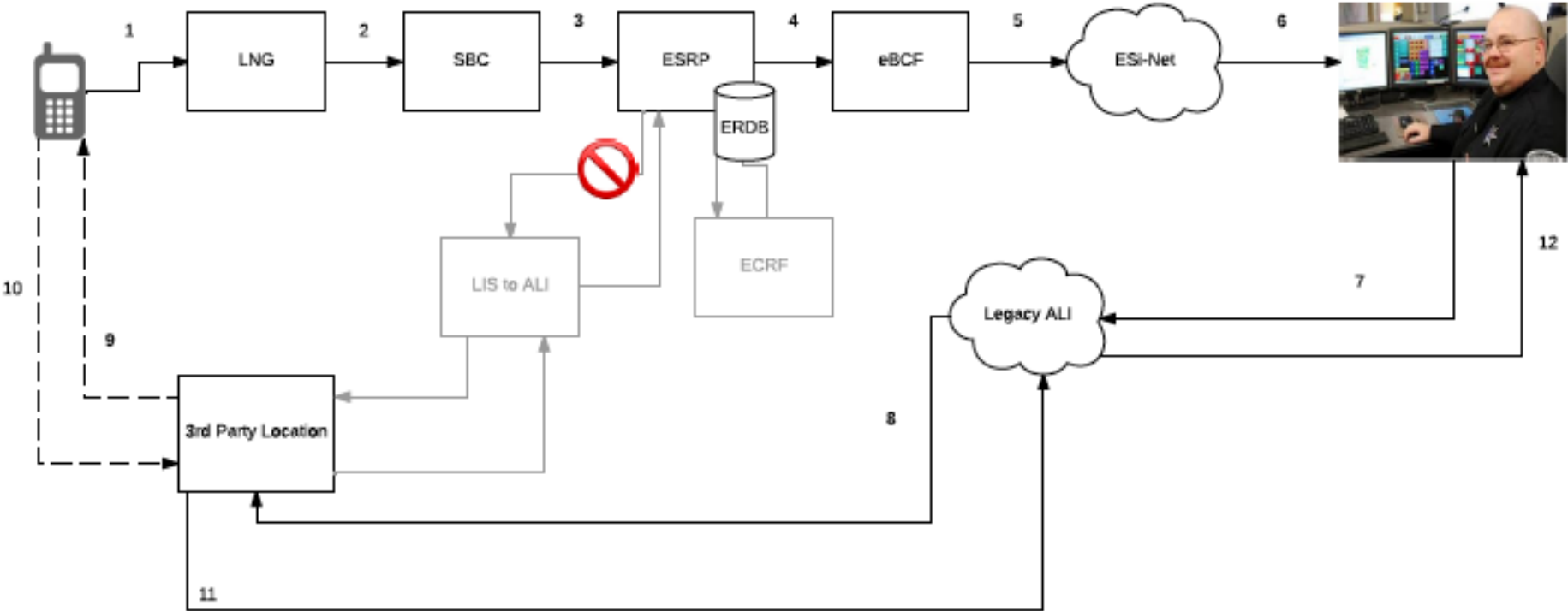
Position</GPST><FTME>18:26:33.0Z</FTME><LTD>VZW VZN
WRLS</LTD><QuerySrcName>Baraga
ALI</QuerySrcName><GDAY>03/24/2017</GDAY><QuerySrcIP>10.200.252.19:57312</QuerySrcIP><F
COF>211.14</FCOF><GLTY>Handset
AFLT</GLTY><CBN>9062504490</CBN><HNO>321</HNO><POS>1</POS><inESN>9521</inESN><C
OS>WPH2</COS><MCN>Negaunee Twp</MCN><HAN>12941</HAN><FCOP>90%</FCOP><LAT>
46.526338</LAT><FELV> 409+/-0.00 meters</FELV><FDAY>2017-03-
24</FDAY><ALIsrvr>NGDTL.MCCR</ALIsrvr><STN>US Hwy 41 East - SW
Sector</STN><CPSLoc>Miami</CPSLoc><NAM>Verizon Wireless</NAM></RSP>

Lon = -87.548697 Lat = 46.526338

It works, at least during the test!

```
<?xml version="1.0" encoding="UTF-8"?>
<findServiceResponse xmlns="urn:ietf:params:xml:ns:lost1">
  <mapping expires="NO-CACHE" lastUpdated="2014-08-12T19:53:34Z"
source="inecrf.lost.indigital.net" sourceId="0e884d48-109e-11e7-bb09-000c29f89460">
    <displayName xml:lang="en">Marquette County</displayName>
    <service>urn:service:sos</service>
    <serviceBoundaryReference key="{78032B7C-904D-4820-8D9D-
45A49FB3AEE9}" source="inecrf.lost.indigital.net"/>
    <uri>sip:1261030001@in911.net</uri>
    <serviceNumber>911</serviceNumber>
  </mapping>
  <path>
    <via source="inecrf.lost.indigital.net"/>
  </path>
  <locationUsed id="rdSkST5ry3"/>
</findServiceResponse>
```

Failure scenario



Next Steps

Next Steps

More testing & more data

Does the 2.75 seconds hold true for hundreds of thousands of queries?

Can we perform geo-routing 90%, 95%, or 99% of the time?

More coordination

What are the cost elements?

How many ECRF's are needed?

Do we all have the tools to manage GIS data?

Questions?