WHY GIS AND 9-1-1?

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St. Clair County 911/ETSB

GeoComm

General Info

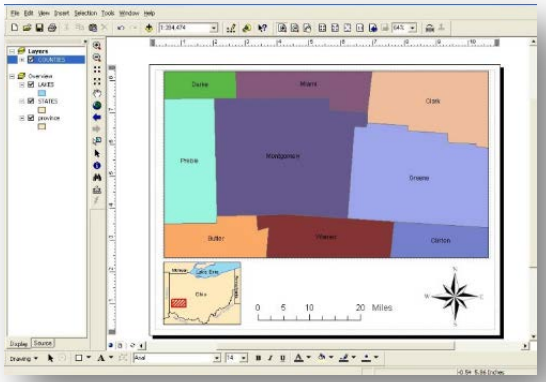
- Time 9:00am – 4:00pm
- Breaks 10:30am, 2:00pm
- Lunch 11:30am – 1:00pm
- Bathrooms (directions)
- Cell phones Silent please
- Questions Open discussion

Agenda

- 9-1-1 and GIS Today
- Where is 9-1-1 going?
- Developing Communication
- NENA GIS model for public safety
- Roadmap for future GIS requirements

Why


CALL
9.1.1
EMERGENCY


Dane
Miami
Clark
Preble
Montgomery
Greene
Butler
Warren
Clinton
0 5 10 20 Miles

GeoComm

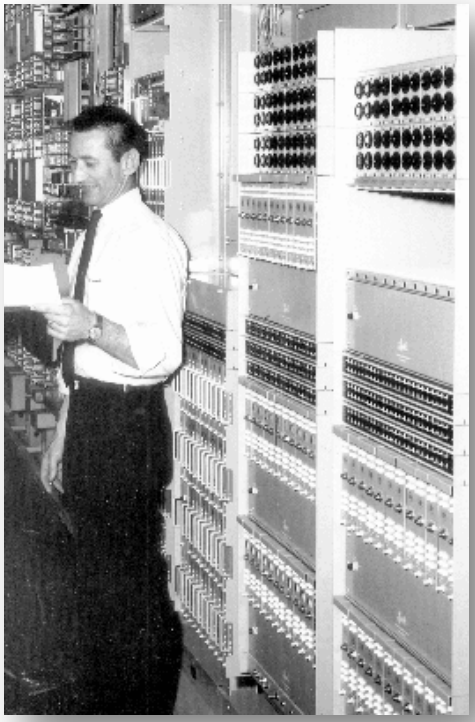
Background

Why 9-1-1?

GeoComm

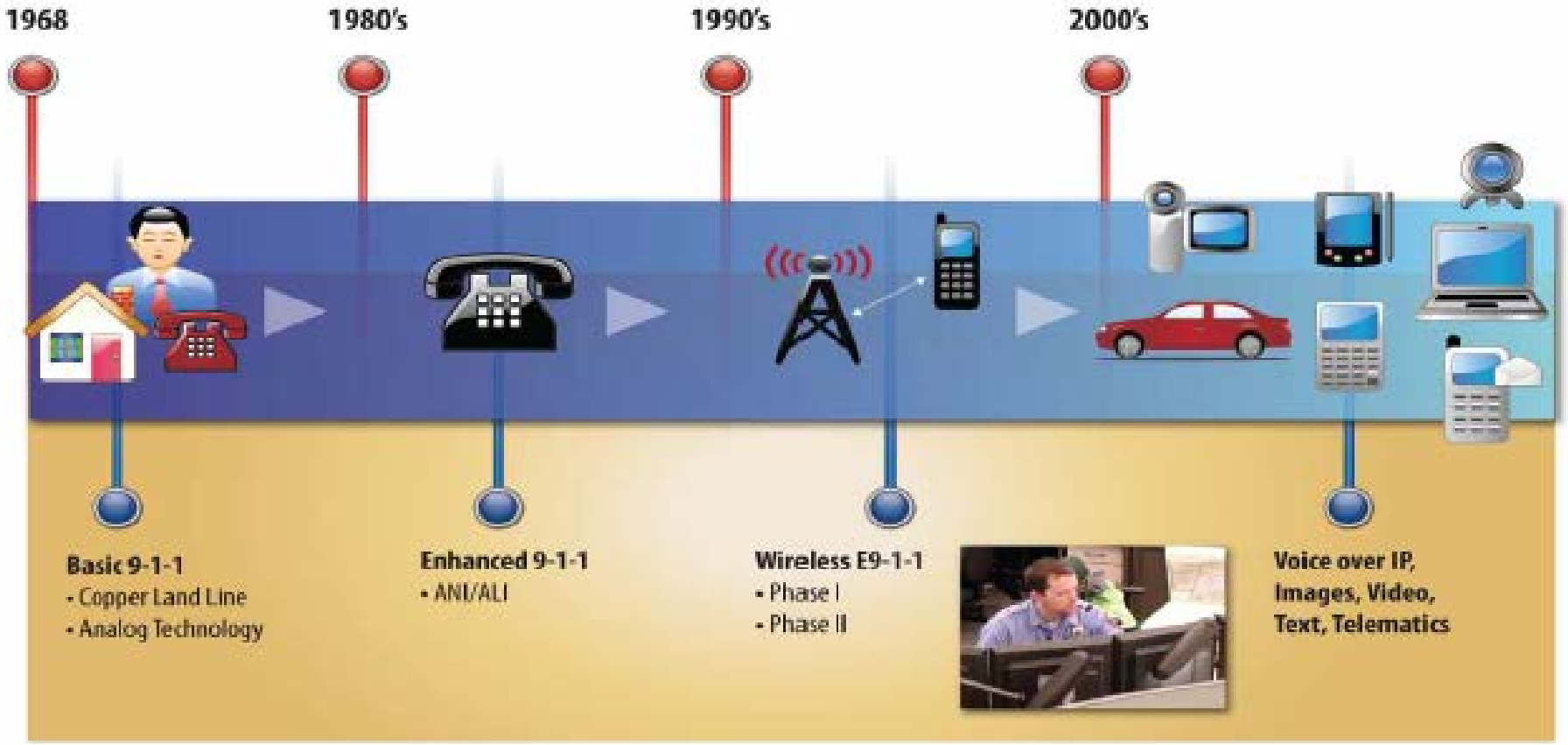
1968 - Haleyville, AL

- 2 p.m. on Friday, Feb. 16, 1968
- first 911 call was placed from the mayor's office in Haleyville (Ala.)



GeoComm

9-1-1 Evolution



GeoComm

What is your emergency?

- At the end of the day, people will judge by three things:
  - Did you save my life?
  - Did you reduce human suffering?
  - Did you protect my property?

Maj Gen Bill Reddel
The Adjutant General (TAG)
New Hampshire National Guard
NSGIC 2013 Midyear Conference

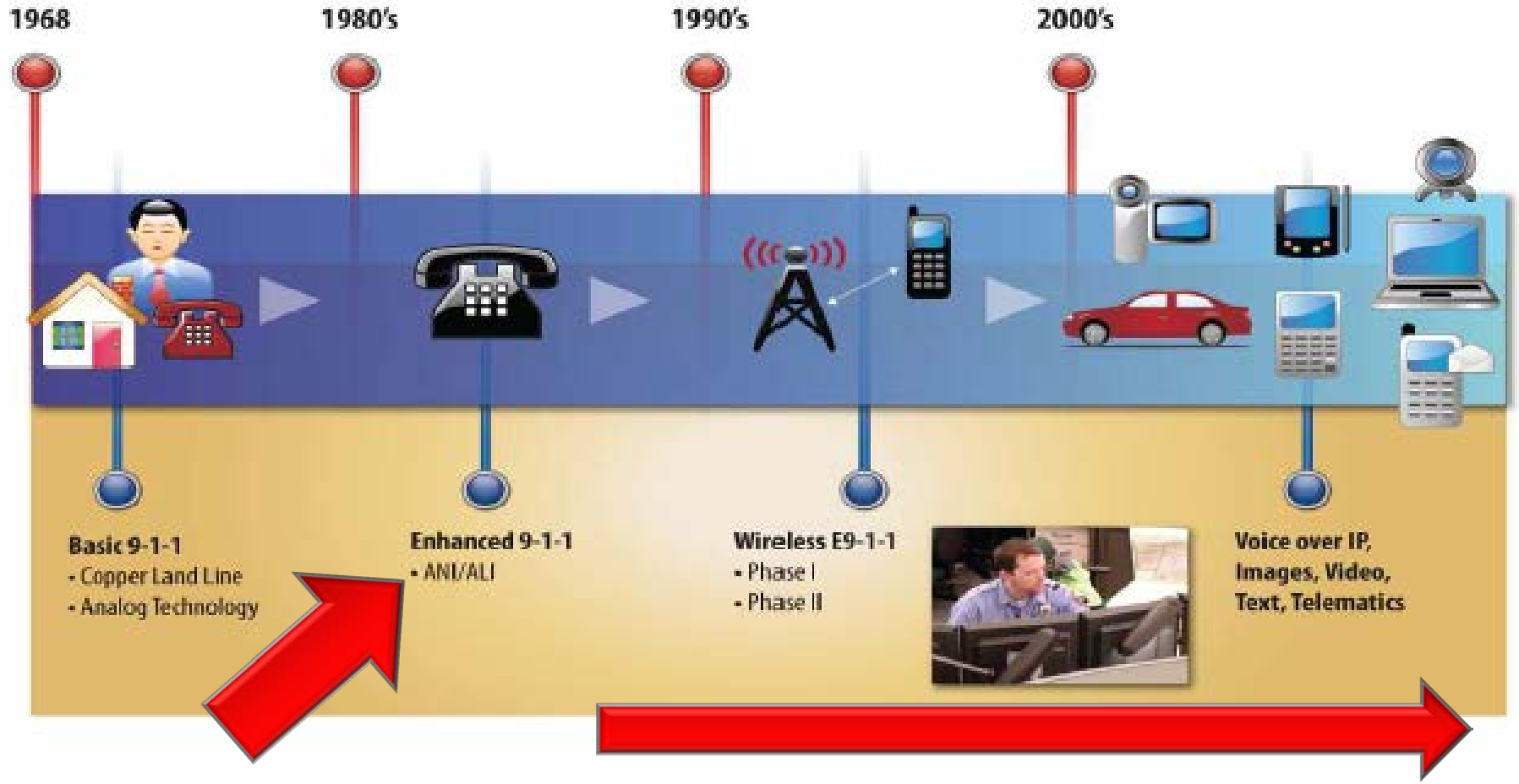
GeoComm

9-1-1 and GIS Today

How does 9-1-1 work

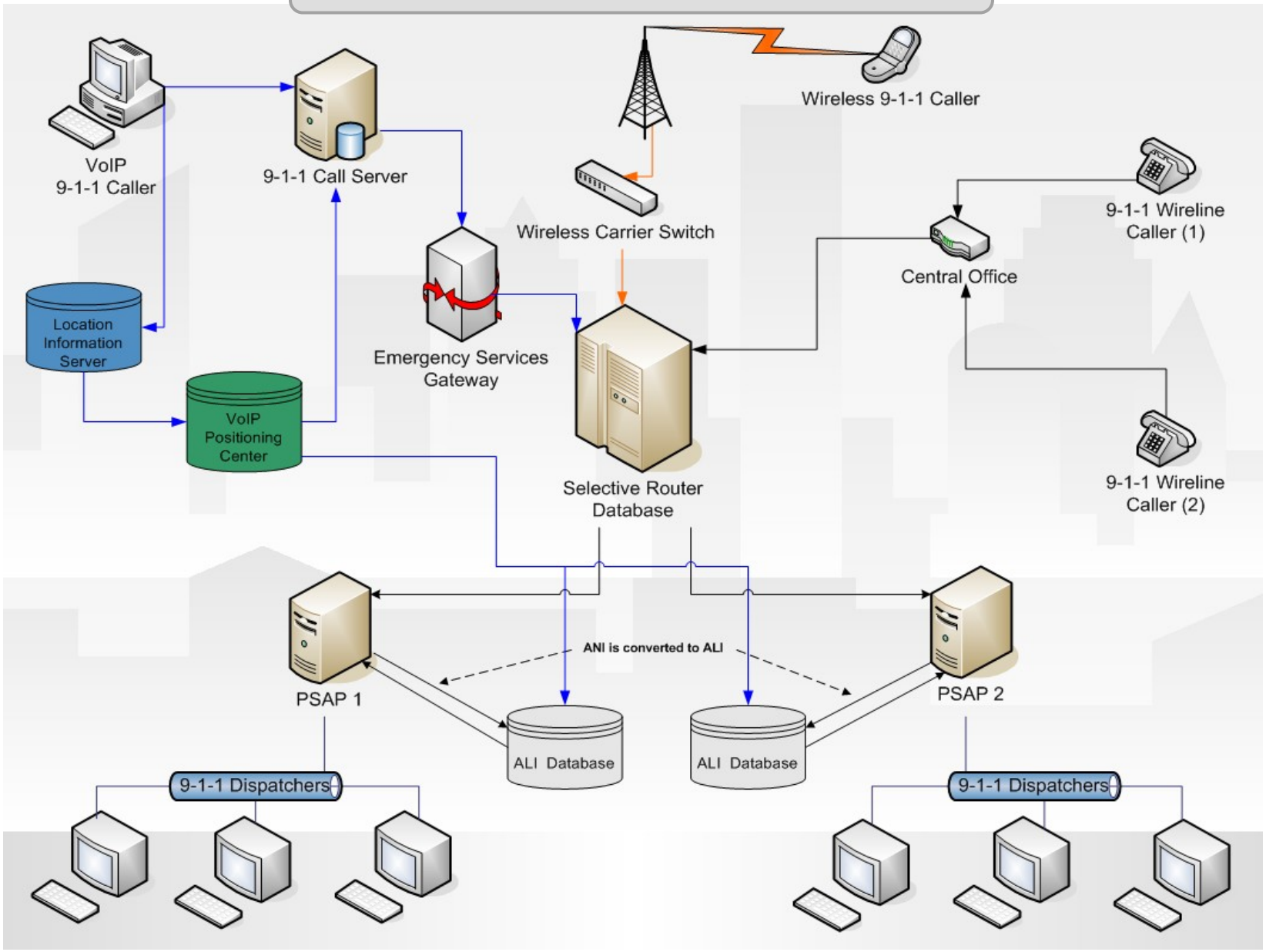
Role of GIS today

9-1-1 Evolution



GeoComm

ENHANCED 9-1-1



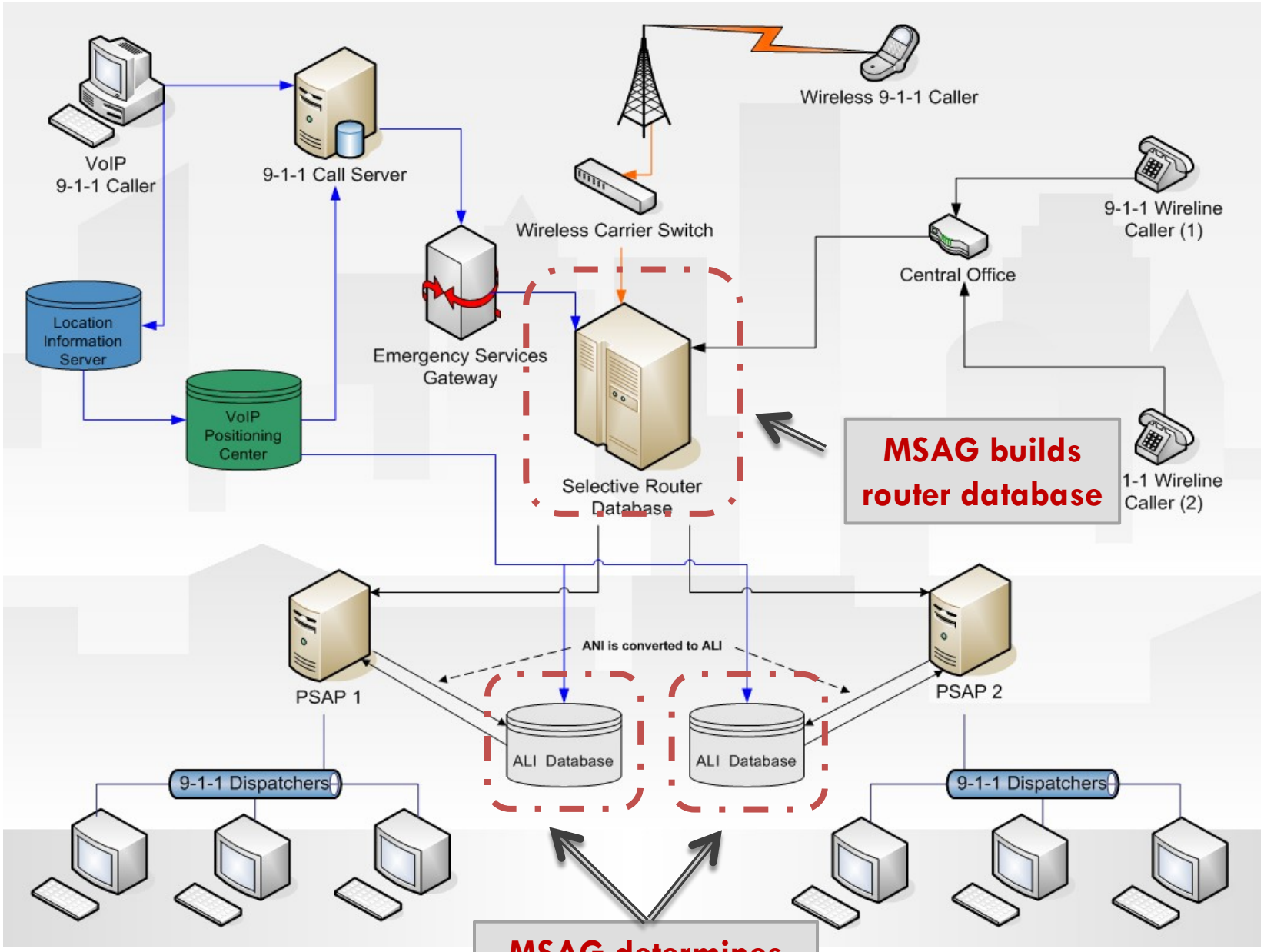
MSAG

(workhorse of 9-1-1)

DI	STREET	LOW	HIGH	COMM	ST	O_E	ESN	ID911	LMODIFY	IDTELCO	RESRVD	EXCH
	1ST AV E	100	499				400	N27	021907	5193		HNDV
	1ST AV W	100	999				400	N27	012506	5193		HNDV
	2ND AV E	100	299				400	N27	020508	5193		HNDV
	2ND AV W	100	299				400	N27	020508	5193		HNDV
	3RD AV E	100	299				400	N27	061810	5193		HNDV
	3RD AV W	100	1251				400	N27	061810	5193		HNDV
	4TH AV E	100	432				400	N27	012506	5193		HNDV
	4TH AV E	433	433				400	N27	012506	5193		ASHE
	4TH AV E	434	599				400	N27	061810	5193		HNDV
	4TH AV W	100	1399				400	N27	062110	5193		HNDV
	4TH AV W	1400	1499				395	N27	062110	5193		HNDV
	5TH AV E	100	651				400	N27	061810	5193		HNDV
	5TH AV W	100	1325				400	N27	061810	5193		HNDV
	5TH AV W	1326	1330			E	400	N27	061810	5193		HNDV
	5TH AV W	1400	1504			E	400	N27	012506	5193		HNDV
	5TH AV W	1401	1699			O	402	N27	020810	5193		HNDV
	5TH AV W	1506	1698			E	395	N27	012506	5193		HNDV
	5TH AV W	1700	1750				401	N27	012506	5193		HNDV
	6TH AV E	100	299				400	N27	082108	5193		HNDV
	6TH AV E	400	475				400	N27	082108	5193		HNDV
	6TH AV W	100	1300				400	N27	012506	5193		HNDV
	7TH AV E	100	1599				400	N27	110509	5193		HNDV
	7TH AV W	100	1133				400	N27	110308	5193		HNDV
	8TH AV E	100	499				400	N27	012506	5193		HNDV
	8TH AV E - NE SECTOR	425	425				400	N27	050908	5193		WRLS
	8TH AV E - NW SECTOR	425	425				400	N27	050908	5193		WRLS
	8TH AV E - SE SECTOR	425	425				400	N27	050908	5193		WRLS
	8TH AV W	100	499				400	N27	061810	5193		HNDV
	9TH AV E	400	577				400	N27	061810	5193		HNDV

ALI database

	A	B	C	D	E	F	G	H	I	J	K	L
1	NPA	[redacted]		OUSE_NUMBE	_NUMBER_	IX_DIRECTI	STREET_NAME	UFFIX_DIRECTIONA	COMMUNITY	COUNTY	EXCHANGE	ESN
2	405	[redacted]		100			CIMARRON TER		CASHION	073	CHN	0008
3	405	[redacted]		707			CEDAR AVE		CASHION	073	CHN	0008
4	405	[redacted]		320		S	2ND ST		CASHION	073	CHN	0008
5	405	[redacted]		721		N	EUCLID AVE		CASHION	073	CHN	0008
6	405	[redacted]		105	1/2	S	JOSEPHINE ST		CASHION	073	CHN	0008
7	405	[redacted]		20		W	COMANCHE		CASHION	073	CHN	0008
8	405	[redacted]		1714			CEDAR TRAIL DR		CASHION	073	CHN	0008
9	405	[redacted]		214		W	BROADWAY AVE		CASHION	073	CHN	0008
10	405	[redacted]		120		E	BROADWAY AVE		CASHION	073	CHN	0008
11	405	[redacted]		407		N	MAIN ST		CASHION	073	CHN	0008
12	405	[redacted]		108		W	BROADWAY AVE		CASHION	073	CHN	0008
13	405	[redacted]		1601		N	EUCLID AVE		CASHION	073	CHN	0008
14	405	[redacted]		303		S	5TH ST		CASHION	073	CHN	0008
15	405	[redacted]		623		W	GRIMES AVE		CASHION	073	CHN	0008
16	405	[redacted]		100		E	BUENA VISTA AVE		CASHION	073	CHN	0008
17	405	[redacted]		100		E	BUENA VISTA AVE		CASHION	073	CHN	0008
18	405	[redacted]		100		E	BUENA VISTA AVE		CASHION	073	CHN	0008
19	405	[redacted]		100		E	BUENA VISTA AVE		CASHION	073	CHN	0008
20	405	[redacted]		309		W	BROADWAY AVE		CASHION	073	CHN	0008
21	405	[redacted]		316		N	5TH ST		CASHION	073	CHN	0008
22	405	[redacted]		620		W	GUTHRIE AVE		CASHION	073	CHN	0008
23	405	[redacted]		310		N	3RD ST		CASHION	073	CHN	0008
24	405	[redacted]		113		E	BROADWAY AVE		CASHION	073	CHN	0008
25	405	[redacted]		219			CHEROKEE DR		CASHION	073	CHN	0008
26	405	[redacted]		1			CEDAR CIR		CASHION	073	CHN	0008
27	405	[redacted]		219			CHISHOLM DR		CASHION	073	CHN	0008
28	405	[redacted]		515		W	LOGAN AVE		CASHION	073	CHN	0008
29	405	[redacted]		610		W	BOULEVARD AVE		CASHION	073	CHN	0008
30	405	[redacted]		120		N	6TH ST		CASHION	073	CHN	0008
31	405	[redacted]		102		S	FRANK ST		CASHION	073	CHN	0008
32	405	[redacted]		603		N	EUCLID AVE		CASHION	073	CHN	0008
33	405	[redacted]		206		N	2ND ST		CASHION	073	CHN	0008
34	405	[redacted]		214			CIMARRON TER		CASHION	073	CHN	0008
35	405	[redacted]		609		N	EUCLID AVE		CASHION	073	CHN	0008
36	405	[redacted]		121		E	BROADWAY AVE		CASHION	073	CHN	0008
37	405	[redacted]		207			CHEROKEE DR		CASHION	073	CHN	0008
38	405	[redacted]		421		W	BROADWAY AVE		CASHION	073	CHN	0008
39	405	[redacted]		802		N	MAIN ST		CASHION	073	CHN	0008
40	405	[redacted]		420		W	BUENA VISTA AVE		CASHION	073	CHN	0008


VoIP
9-1-1 Caller
9-1-1 Call Server
Wireless 9-1-1 Caller
Wireless Carrier Switch
9-1-1 Wireline
Caller (1)
Central Office
Location
Information
Server
Emergency Services
Gateway
VoIP
Positioning
Center
Selective Router
Database
MSAG builds
router database
1-1 Wireline
Caller (2)
ANI is converted to ALI
PSAP 1
PSAP 2
ALI Database
ALI Database
9-1-1 Dispatchers
9-1-1 Dispatchers
MSAG determines
ALI database

MSAG builds ALI database

22 Allen Ave, Oxford

PRED	STREET_NAME	LOW	HIGH	COMM_NAM	ODD_EV	ESN
	ALLEN AVE	1	16	ARUNDEL		3
	ALLEN AVE	1	90	BUXTON		7
	ALLEN AVE	1	20	BRIDGTON		38
	ALLEN AVE	1	752	PORTLAND		59
	ALLEN AVE	6	9	WESTBROOK		73
	ALLEN AVE	8	34	OXFORD		107
	ALLEN AVE	1	190	AUBURN		164
	ALLEN AVE	9	61	LEWISTON		168

ALI Database

20	ALLEN AVE	AUBURN	1
21	ALLEN AVE	AUBURN	1
22	ALLEN AVE	OXFORD	1
24	ALLEN AVE	LEWISTON	1
25	ALLEN AVE	LEWISTON	1
27	ALLEN AVE	OXFORD	1

ALI Discrepancy

- Not MSAG valid address
- NRF (No Record Found)
- Review phone database fallout

GeoComm

ALI

Automatic Location Identification

The automatic display at the PSAP of the caller's telephone number, the address/location of the telephone and supplementary emergency services information of the location from which a call originates.

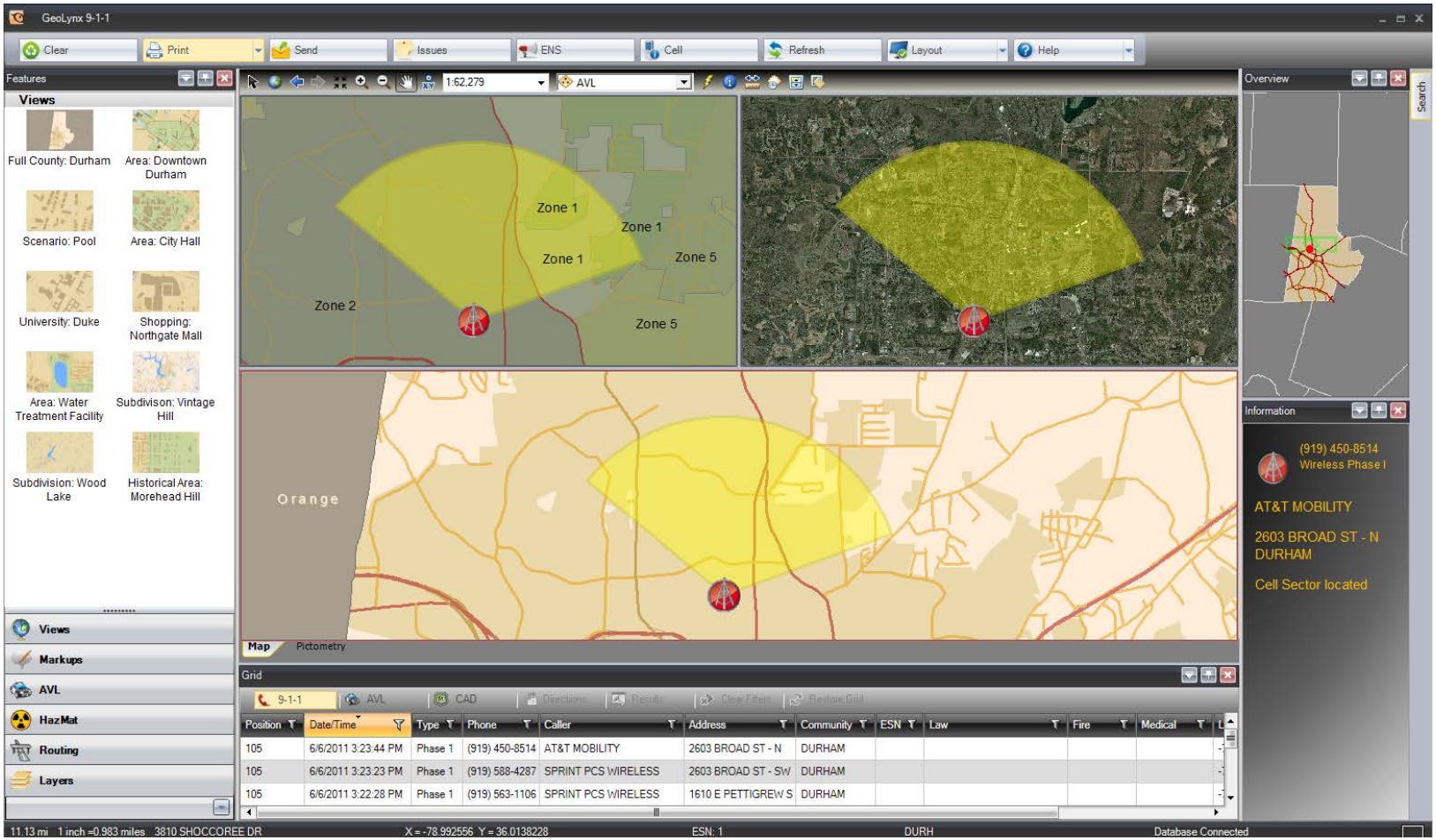
ALI forms the question to the map data

GeoComm

Wireless 9-1-1

- Phase 1
  - Calling back number
  - Tower sector
- Phase 2
  - Call back number
  - Lat/Long
  - Rebid

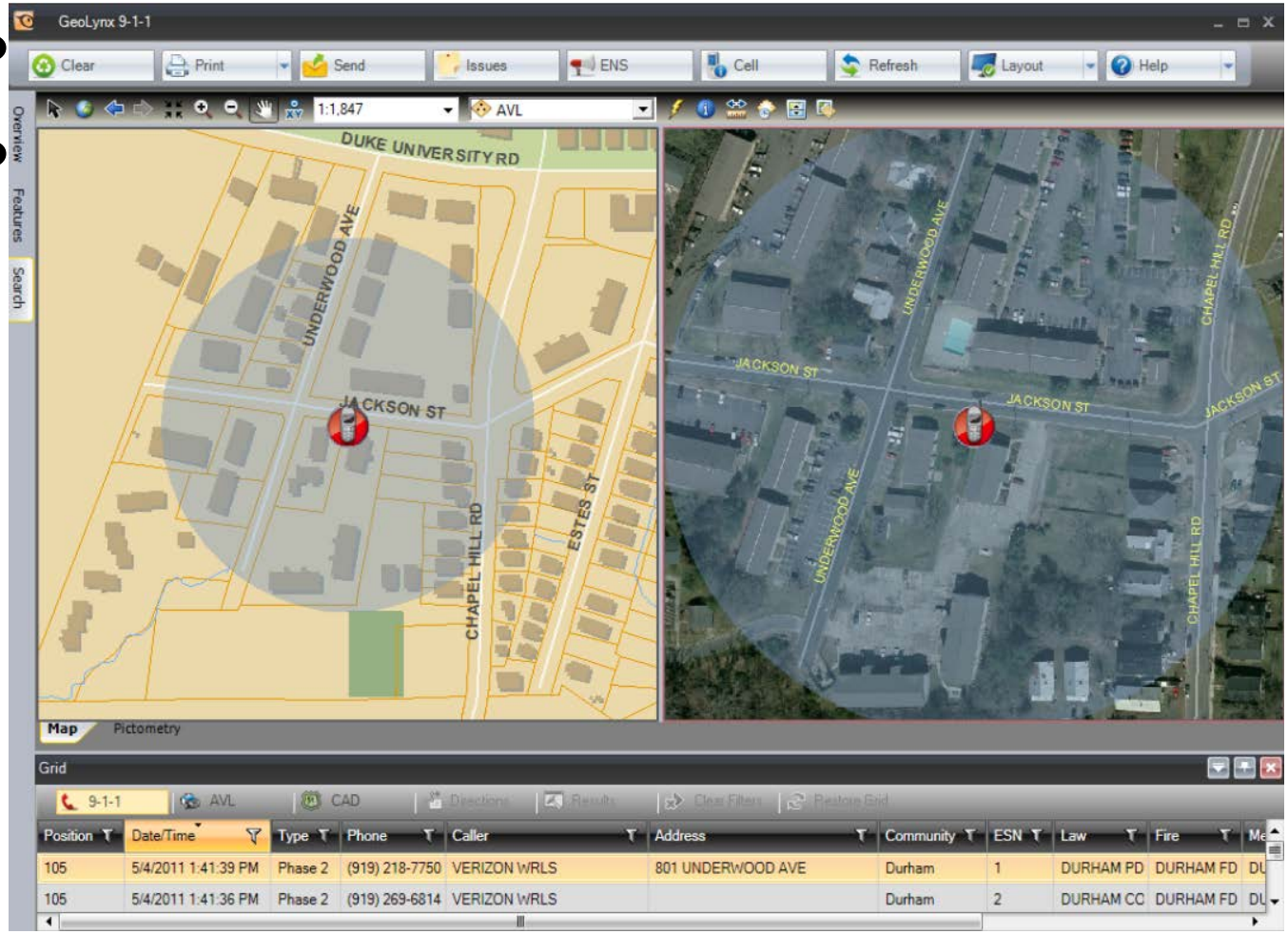
Phase 1 – Tower information



GeoComm

Phase 2 – X,Y of device

- P
- P

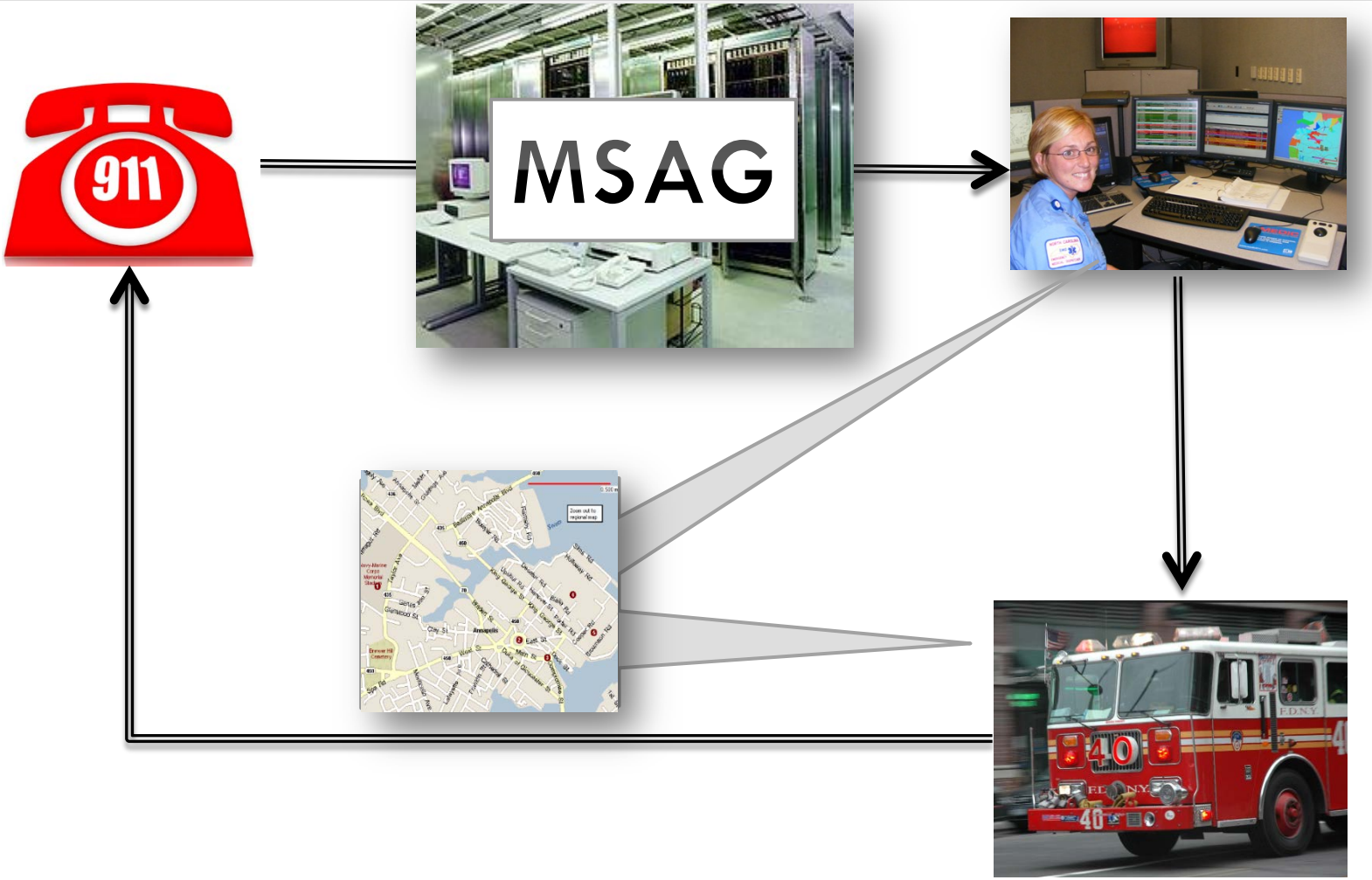


GeoComm

Wireless Routing Today

- Today's environment

9-1-1 Today



GeoComm

GIS 9-1-1 Functions…..

- Find 9-1-1 call location
  - Civic address or coordinates
  - Who to send to call
- Display CAD Incidents
  - Computer Aided Dispatch
- Response vehicles
  - Display and tracking
- Emergency Notification Systems

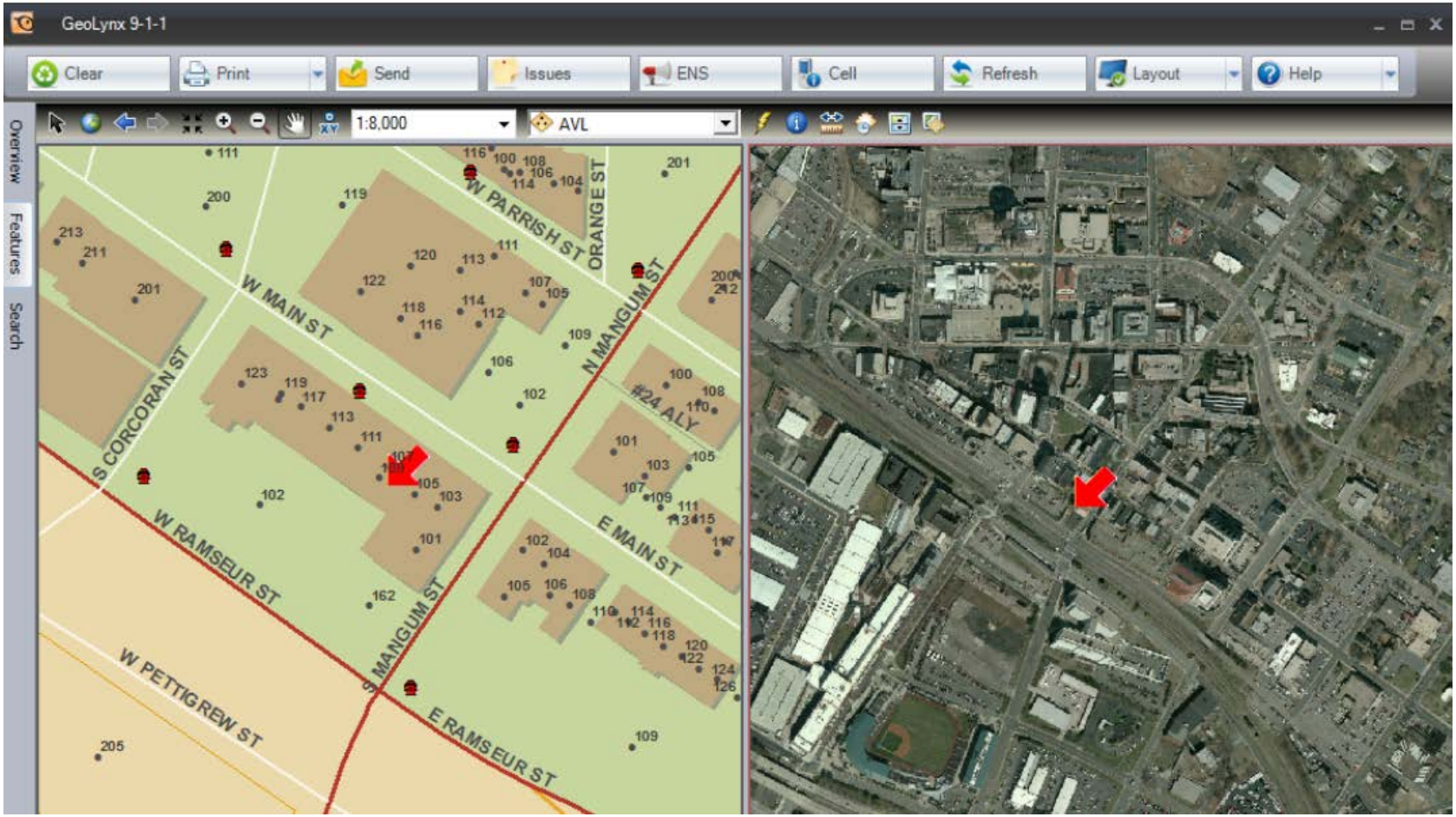
GeoComm

GIS basics for 9-1-1

- Ask a question
- Map data gives the answer

GeoComm

Find107 W Main St?



GeoComm

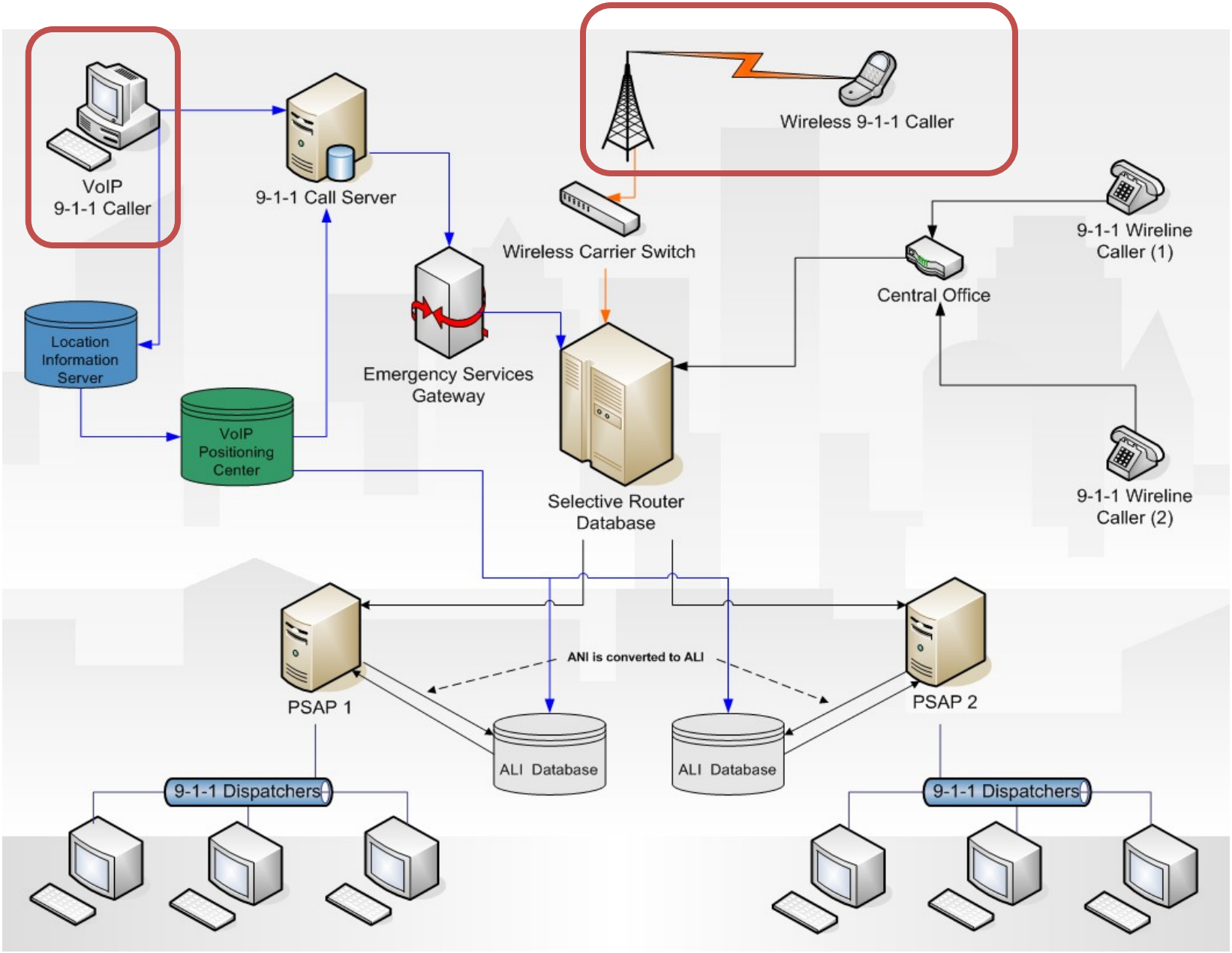
Glossary http://www.nena.org/?page=Glossary

- Handout

Where is 9-1-1 going?

Next Generation 9-1-1

What are the new GIS functions


VoIP
9-1-1 Caller
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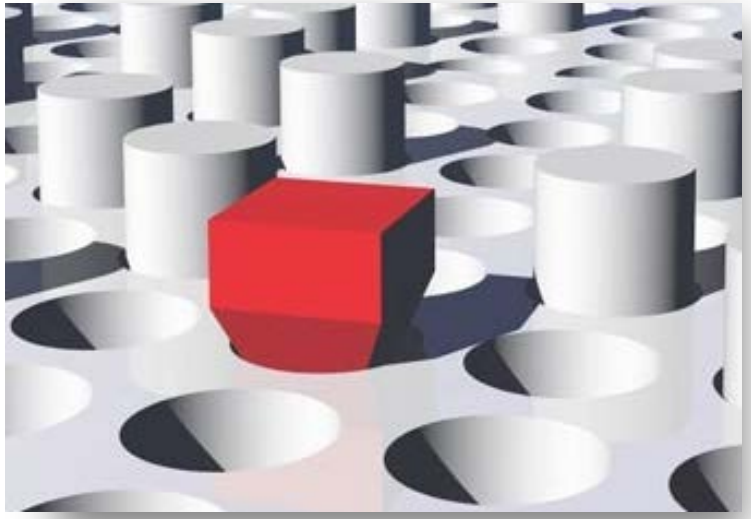
Wireless 9-1-1 Caller
Wireless Carrier Switch
9-1-1 Wireline
Caller (1)
Central Office
Location
Information
Server
Emergency Services
Gateway
VoIP
Positioning
Center
Selective Router
Database
9-1-1 Wireline
Caller (2)
ANI is converted to ALI
PSAP 1
PSAP 2
ALI Database
ALI Database
9-1-1 Dispatchers
9-1-1 Dispatchers

Why



Delivery System

Why NG9-1-1?

- IP based delivery system
- Newer Technologies/Services
- "Mainstream" 9-1-1 Technology
- Survivability
- Network Resilience
- Interoperability

Technology Comparison

E9-1-1	NG9-1-1
• Complex analog trunking and data network	• Engineered, managed IP networks (ESInet)
• Translation based control • Limited to voice calls or TTY via phones	• GIS and database controls • Voice, text, video
• Data limited to 512 charcters • Custom interfaces for each service type	• Data unlimited • Standard IP interface for all service types
• Limited ability to transfer calls	• Transfer calls to anywhere
• Limited Emergency Notification capability	• Location-specific emergency alerts possible
• Limited Interoperability	• Interoperability unlimited

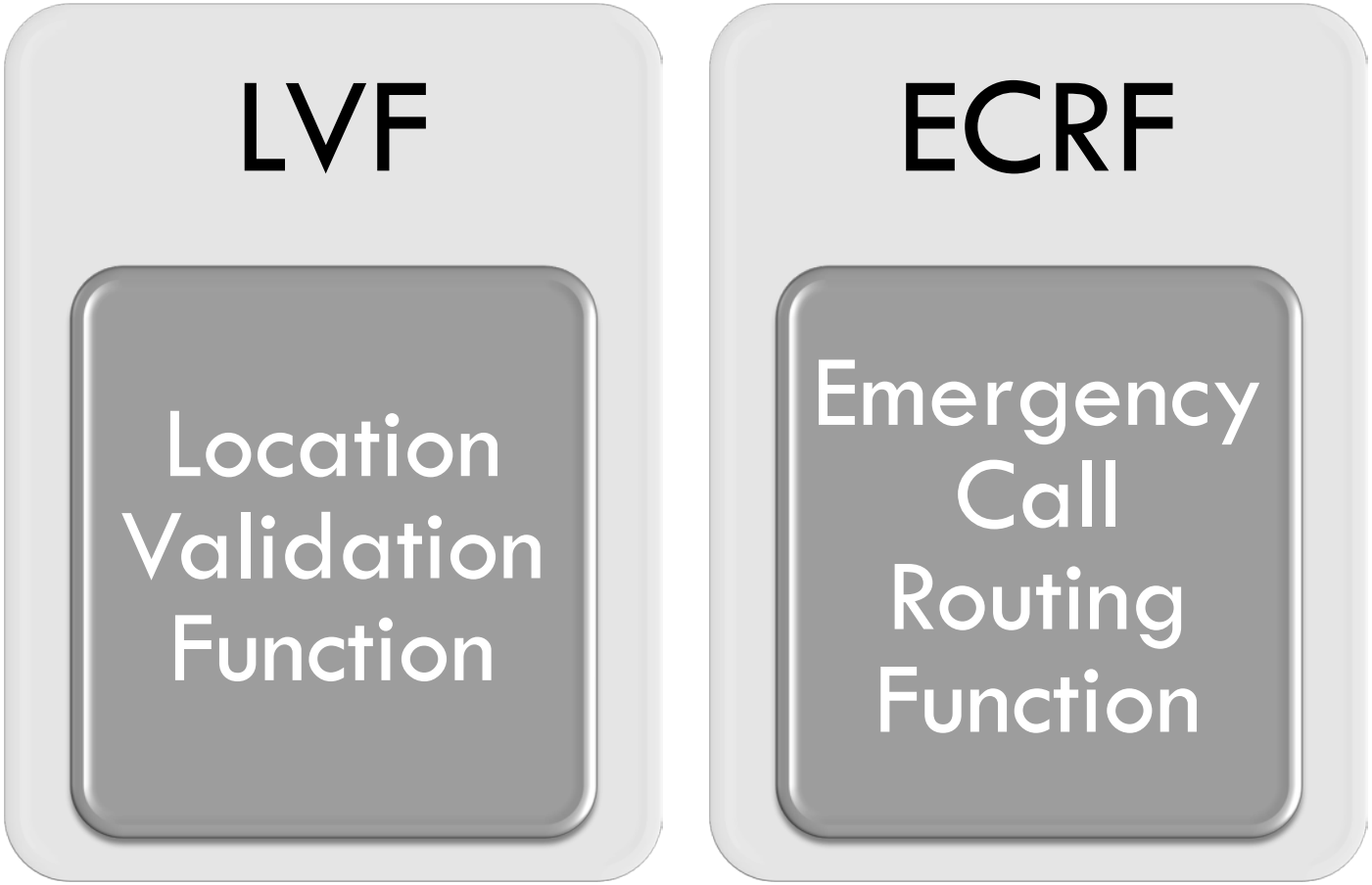
GIS and NG9-1-1

GeoComm

GIS and NG9-1-1

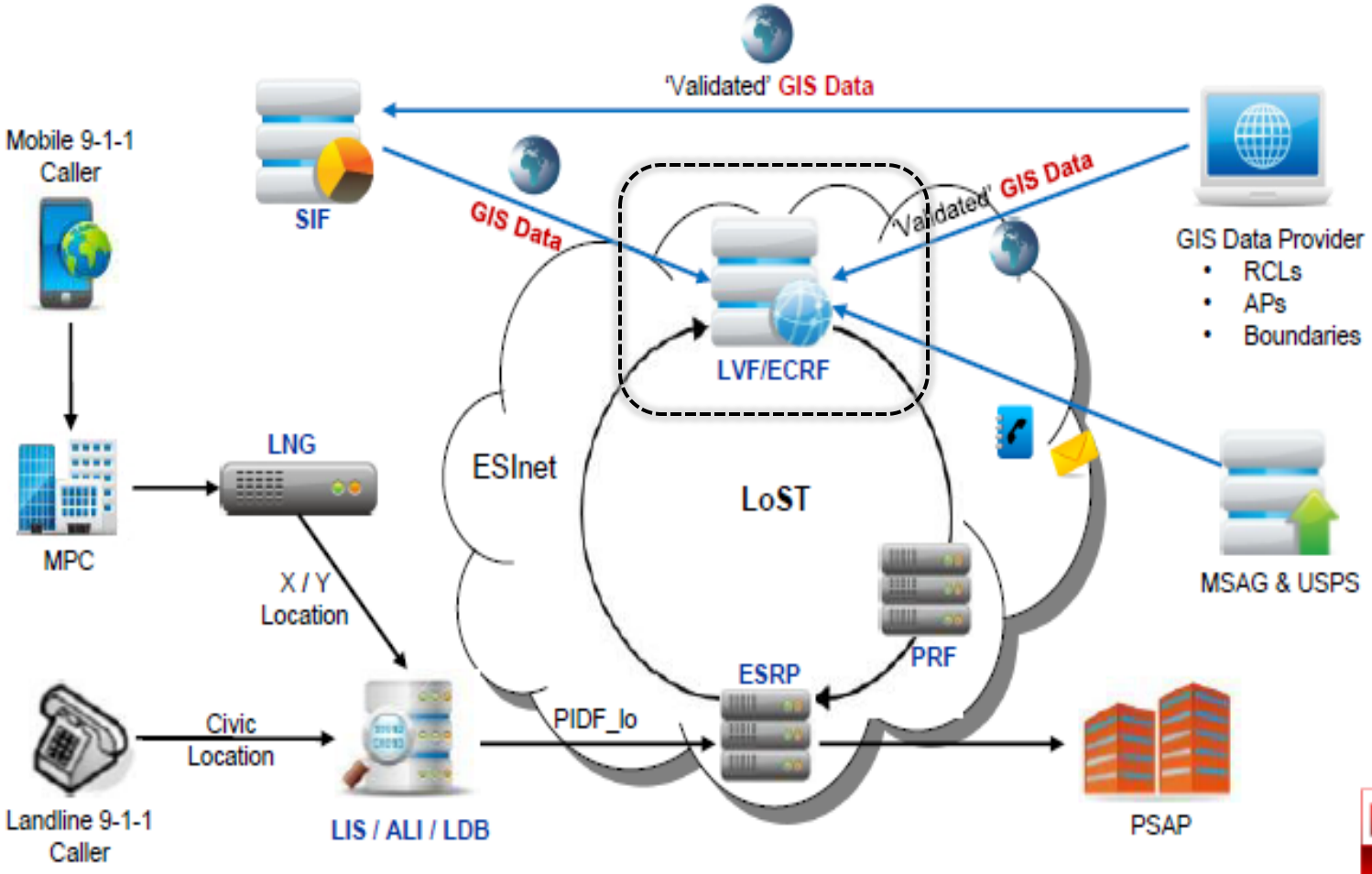
GeoComm

NG9-1-1 and GIS



GeoComm

GIS Data is the Core of i3



NENA THE 9-1-1 ASSOCIATION

GeoComm

PIDF-LO

Presence Information Data Format – Location Object

IP network.
Provides a flexible and versatile means to represent location information in a SIP header using an XML schema.
(see Primacy Public Safety Answering Point)

GeoComm

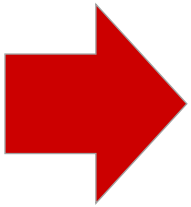
Location Components

<country>	2-letter ISO code, e.g. "US"
<A1>	national sub-division (e.g. state), ex: NY
<A2>	county, parish, ex: King's County
<A3>	
<A4>	
<A5>	
<RD>	
<PRD>	
<POD>	
<STS>	
<HNO>	house number
<HNS>	house number suffix
<LMK>	landmark or vanity address, ex: Columbia University
<LOC>	additional location information, ex: South Wing
<NAM>	name (residence or office occupant), ex: Town Barber Shop
<PC>	postal or ZIP code
<BLD>	building (structure), ex: Law Library
<UNIT>	unit (apartment, suite), ex: Suite A
<FLR>	floor, ex: 2
<ROOM>	room, ex: 450F

```
<civicAddress>
        <A3>New York</A3>
        <RD>Main St</RD>
        <PRD>N</PRD>
        <HNO>101</HNO>
</civicAddress>
```

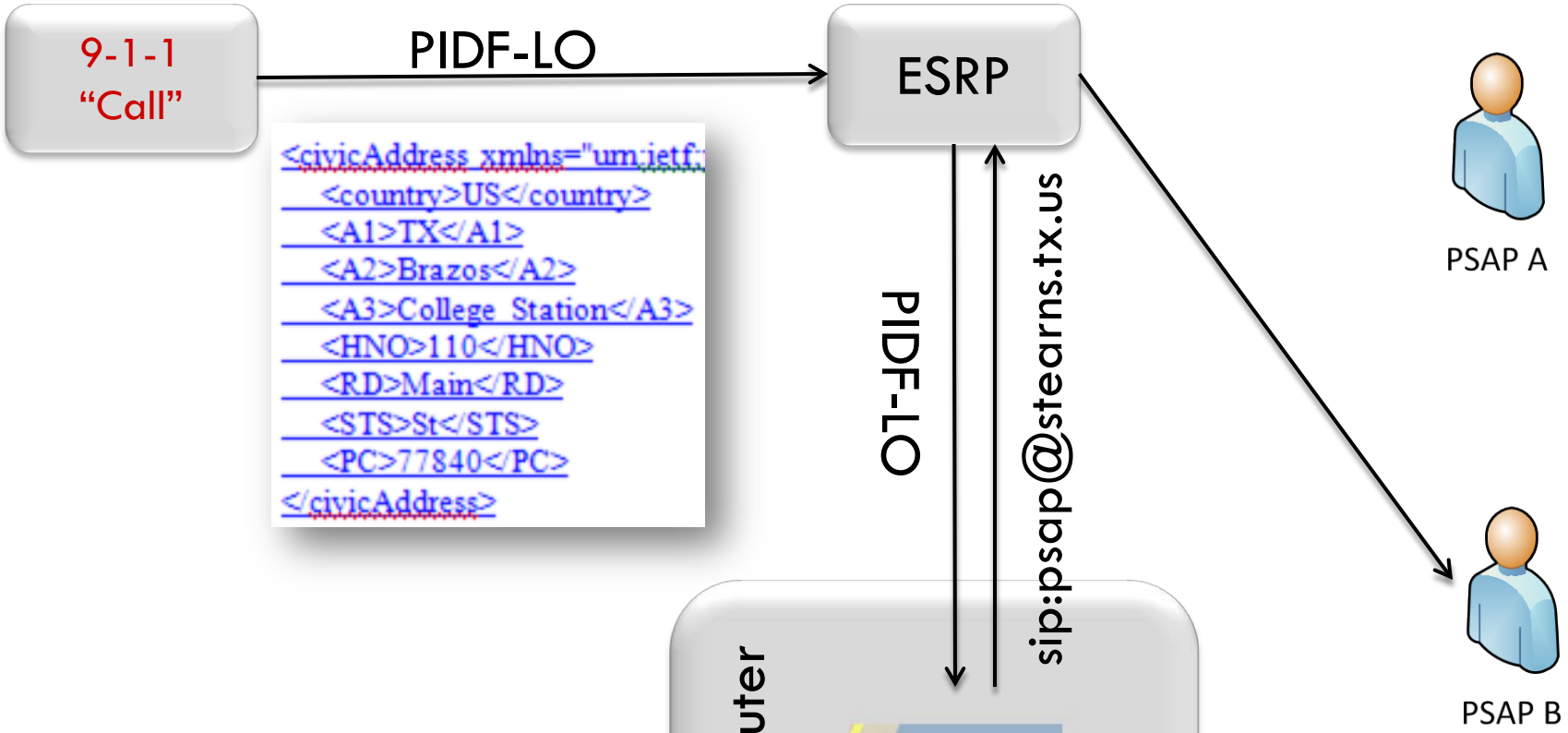
LVF Process

```
<civicAddress xmlns="urn:ietf:
    <country>US</country>
    <A1>TX</A1>
    <A2>Brazos</A2>
    <A3>College Station</A3>
    <HNO>110</HNO>
    <RD>Main</RD>
    <STS>St</STS>
    <PC>77840</PC>
</civicAddress>
```



- Valid
- Invalid
- Unchecked

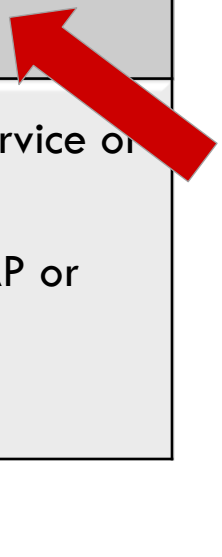
ECRF Process



- Exact match
- Only one option

Service Boundary Draft
(Routing attributes)

AgencyId	AgencyId	M	A	100	A domain name which is used to uniquely identify any agency. Example: psap.columbus.oh.us
Route URI	RouteURI	M	URI	300	URN/URL for Routing. Example: sip:sos.law@city.eoc.tx.us
Service URN	ServiceURN	M	URN	50	The URN/URL for the Emergency Service or other Well-Known Service Example: "urn:service:sos" for a PSAP or "urn:service:sos.ambulance" for an ambulance service.



Responsible for GIS Data?

YOU!

GeoComm

MSAG

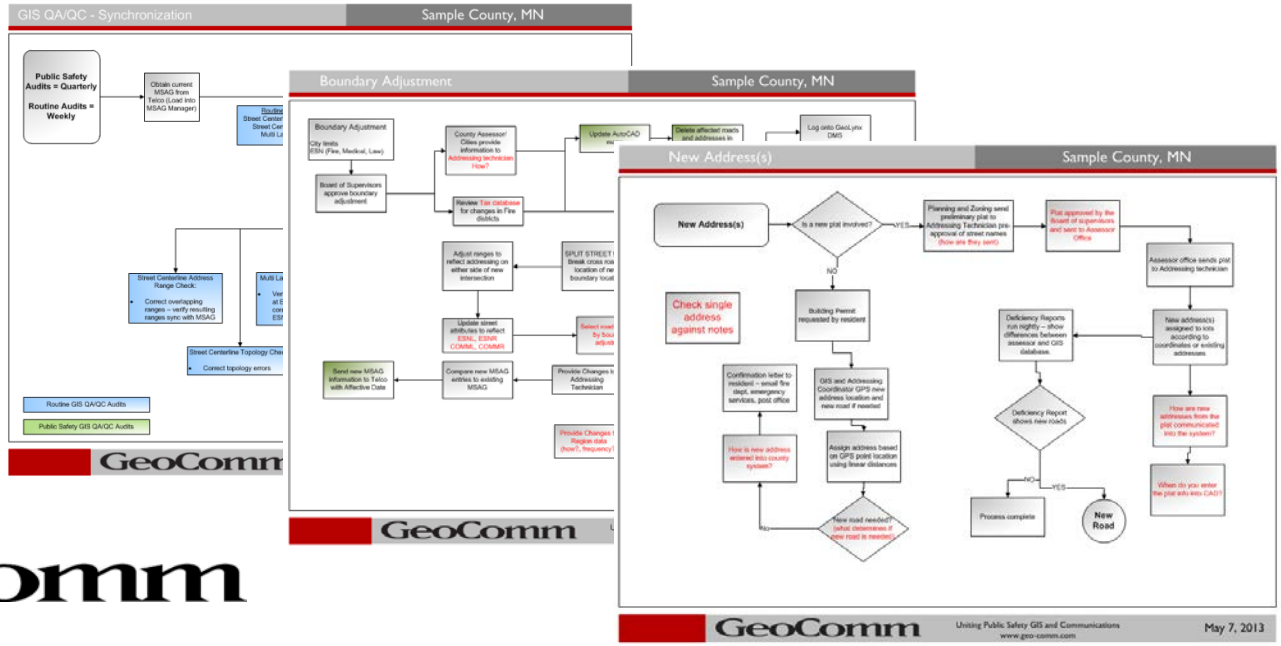
- Maintained by 9-1-1
- What will happen?
- Confidence in "system"?
- Technologies coming together

Goal

GeoComm

Maintenance Plan

- Understanding each departments needs and requirements
- Work together
- Documentation, documentation, documentation



GeoComm

Communication

Developing communication between 9-1-1 and GIS professionals

- Why
- How

GeoComm

Issue Example

St Clair Co, IL

- 9-1-1 Call (processed in CAD)
- ALI - **2421 Antiquity Ln**
- ALI Law responder — County Sheriff
- CAD Law responder — Shiloh PD
- Shiloh PD dispatched to call

- Wrong Law agency dispatched to call

"We think our map data is screwed up"

GeoComm

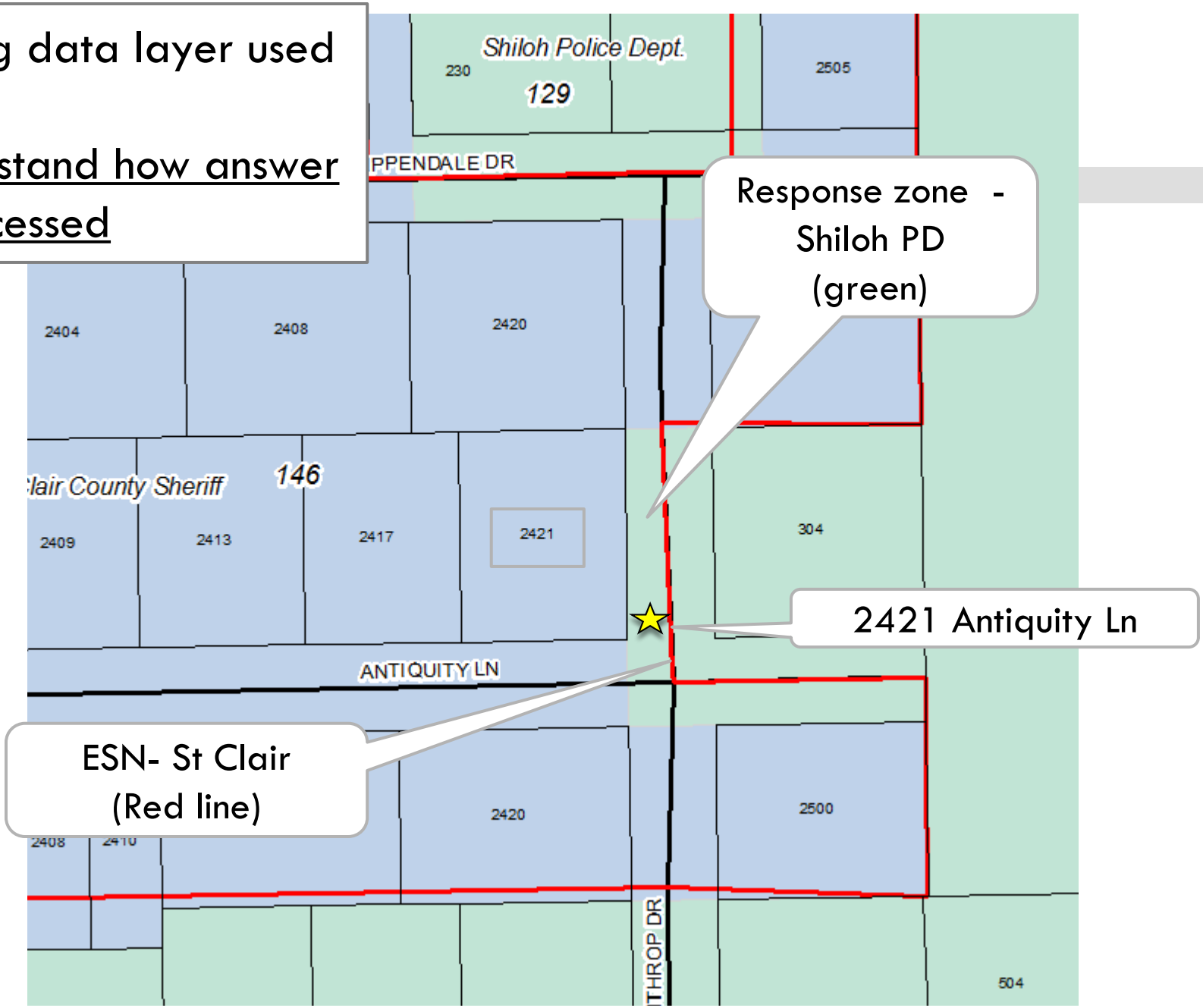
Data Analysis – Study area

- Geocode address to centerline
- Refine by ESN polygon layer
- Simulated CAD process

Analysis	Address found in different ESN	Match Rate
ALI to Roads with ESN layer	29	99.03%
ALI to Roads with Police Response layer	**7506**	**71.50%**

Wrong data layer used

<u>Understand how answer is processed</u>



Response zone - Shiloh PD (green)

2421 Antiquity Ln

ESN- St Clair (Red line)

Issue Example

- County in Georgia
- ENS (Emergency Notification Systems)
- Resident notified by location

Incident Review

- Public Safety did not understand requirements
- GIS data missing or incomplete
  - GIS Road file
    - MSAG Matched
    - No ranges for geocoding
  - Zones
    - Town Boundaries
    - Emergency Response Zones
  - No Address Point File
- Addressing issues
  - Problems in 45% of sample area

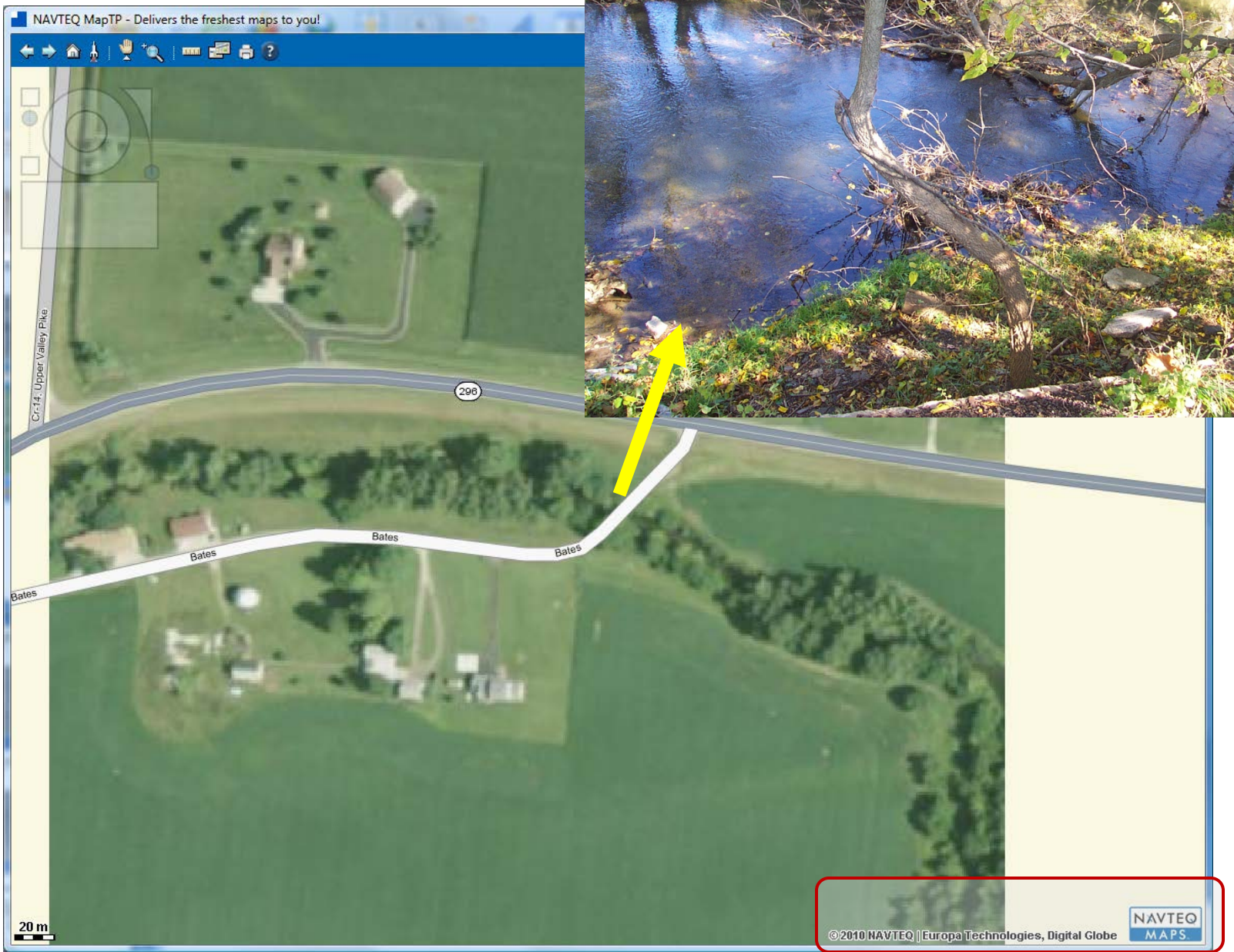
GIS to understand 9-1-1 “needs”

- Public safety functions
  - Terminology such as rebidding
- Accuracy
  - Spatial
  - Attribute
  - Attribute standards
    - Postal
- Time issue – urgency
  - Need to understand “call affecting” (three things)
  - Not OK to wait – done yesterday

911 needs to understand GIS

- Understand the functions
- GIS is more than “map”
- Each function has different GIS requirements
- Understand what you are asking for
- Understand base terminology
- Understand function they are discussing – such as AVL or call plotting, ENS
- Bring GIS personnel into the discussions – not an afterthought
- General GIS functions are not life and death

Importance of Accuracy



Urgency of 9-1-1

GeoComm

Vehicle Routing

- More complex question more complex data
- Functionality related to data and software
- Understand data requirements

I want the most direct route from point A to point B…….
Now take into account:

- Rush hour
- Speed limits
- Construction
- Turning radius for pumper truck

GeoComm

GIS Model for Public Safety

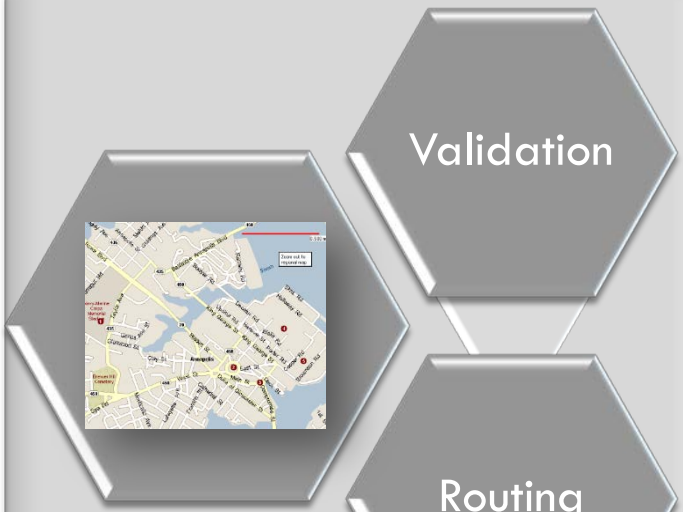
Current data model

NG9-1-1 data model

GeoComm

GIS Responsibility

LVF/ECRF



PSAP

NENA Standards
Vendor Requirements

GeoComm

What is your emergency?

- At the end of the day, people will judge by three things:
  - Did you save my life?
  - Did you reduce human suffering?
  - Did you protect my property?

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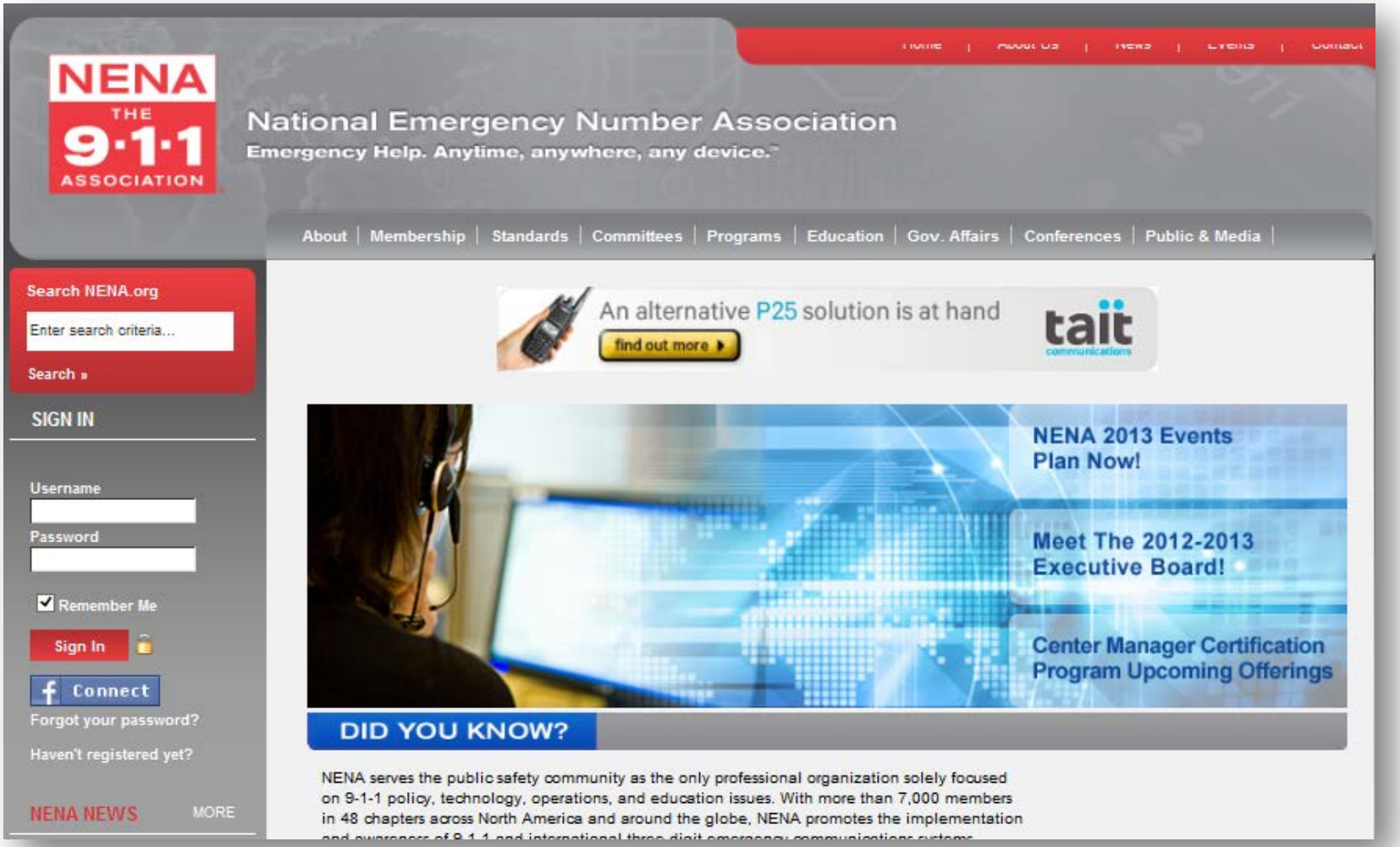
NENA http://www.nena.org



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NENA Documents

- Informational
  - Site Structure Address Points (SSAP)
  - Data synchronization
- Standards
  - Data Management
  - ECRF
- Requirements
  - i3 Technical document

NENA Documents - GIS

- A Public Safety Answering Point Manager's Guide to Geographic Information Technology
  - White Paper, 2002
- 02-014
  - NENA GIS Data Collection and Maintenance Standards
- 71-501
  - Informational document for data synchronization
- 02-010
  - Standard for GIS formats (legacy)
- 57-001
  - Covers wireless call routing (Standard)
- 08-002 version 1 – Standards for NG9-1-1

NENA 02-010 v9

- NENA Standard for Data Formats for ALI, MSAG, and GIS (Exhibit 22 – pg83) - Legacy

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Model Breakdown - Legacy

- ATTRIBUTE NAME – representation
- USE R/O – field required or optional
- TYPE – field format
- DATA DESCRIPTION – what field represents

1.2.1A Centerline Layer (Required)

ATTRIBUTE NAME	USE R/O	TYPE	DATA DESCRIPTION
Low Address Left	R	N	Lowest address on left side of street in ascending order
High	R	N	Highest address on left side of street in ascending order

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Required Layers - Legacy

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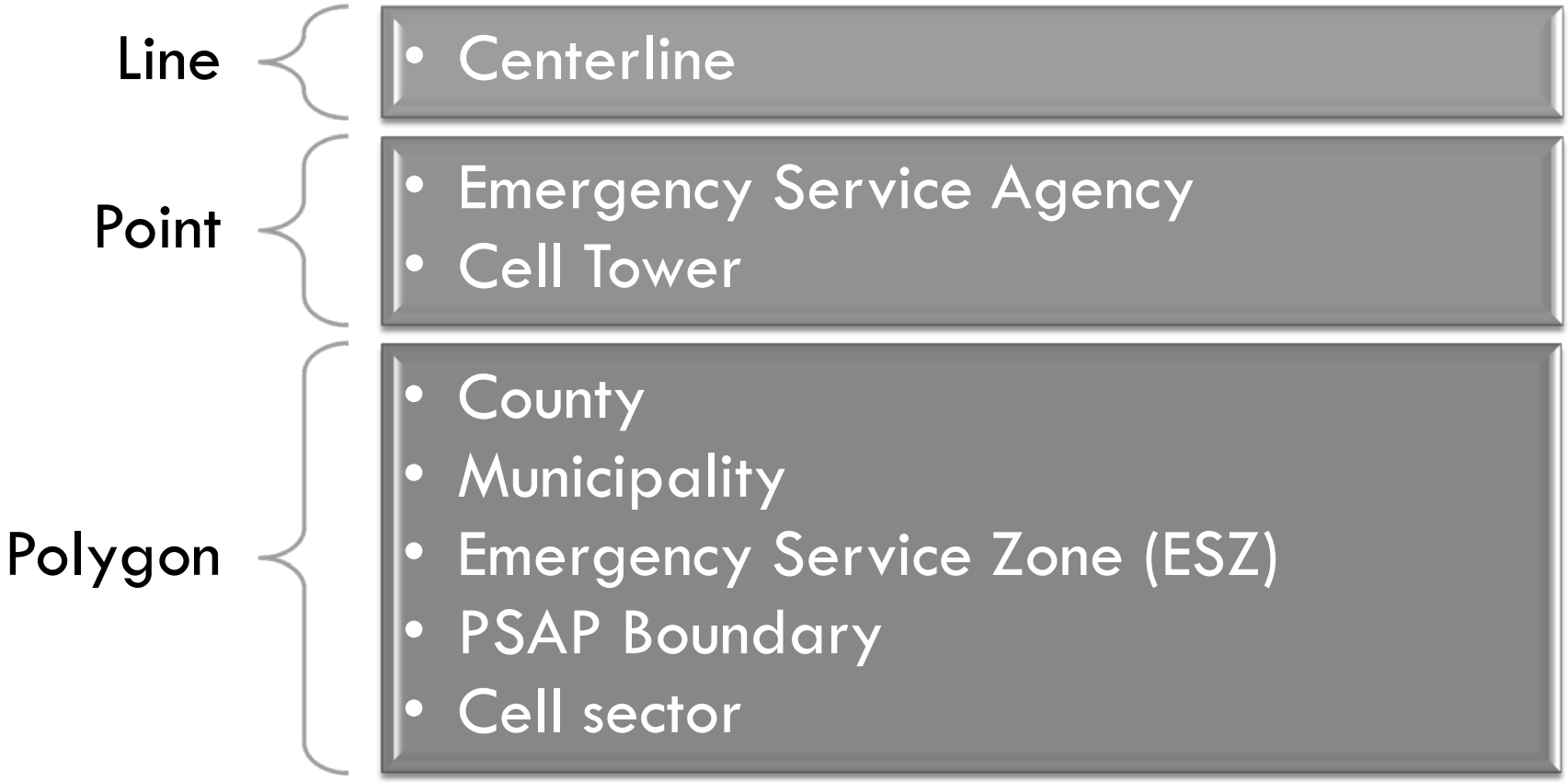

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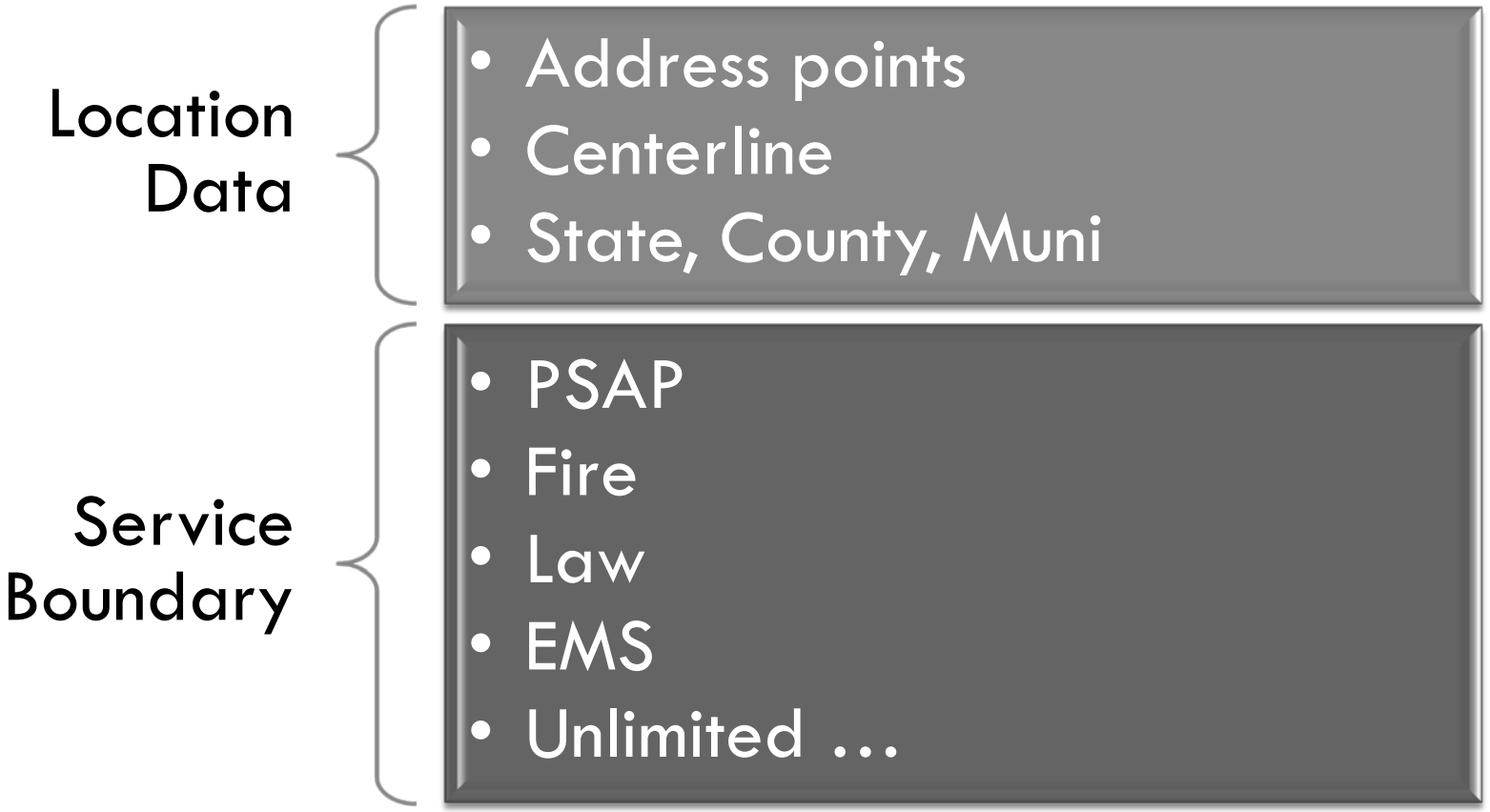
NG9-1-1 Data Model

- Standards document
- Public Review soon
- Attribute information

Data Types – NG9-1-1



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Data Layers NG9-1-1

Required

- Centerline
- Emergency Service Boundary PSAP , law, fire, or medical
- Authoritative boundary

Strongly Recommended

- Site/structure address points
- Municipal/County/State or equivalents
- Cell site and sectors
- Road name alias table

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Attribute Information

Mandatory	implies that an attribute value must exist for the data field
Conditional	implies that if an attribute value exists, it must be included. If no value exists for the attribute, the data field is left blank
Optional	implies an attribute value may or may not be included in the data field

TYPE

A	Alphanumeric (any combination of upper and lower case letters A to Z and/or any number from 0 to 9)
D	Date and time using ISO 8601 compliant formats which are in the format of YYYY-MM-DDThh:mm:ss.sTZD
N	Numeric (consisting of whole numbers only)

Draft NG9-1-1 Data Model

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Road Map for Future GIS Requirements

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Check List for your GIS

- How does my data compare to NENA standards?
- What is my synchronization level?
- Do we have the layers necessary for 9-1-1?
- How does my maintenance program stack up?
- Willing to risk YOUR agency's reputation on it?

Synchronization Factors

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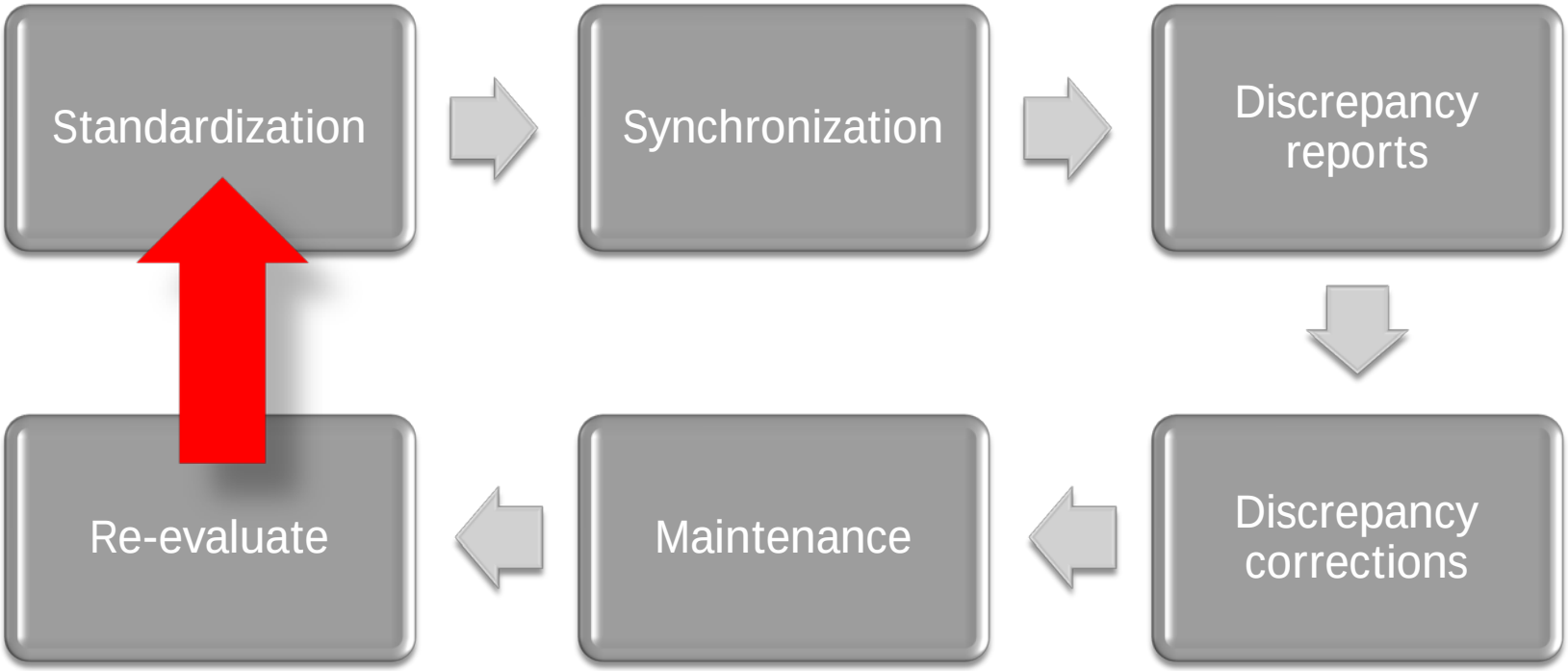
Synchronization

Synchronization Steps



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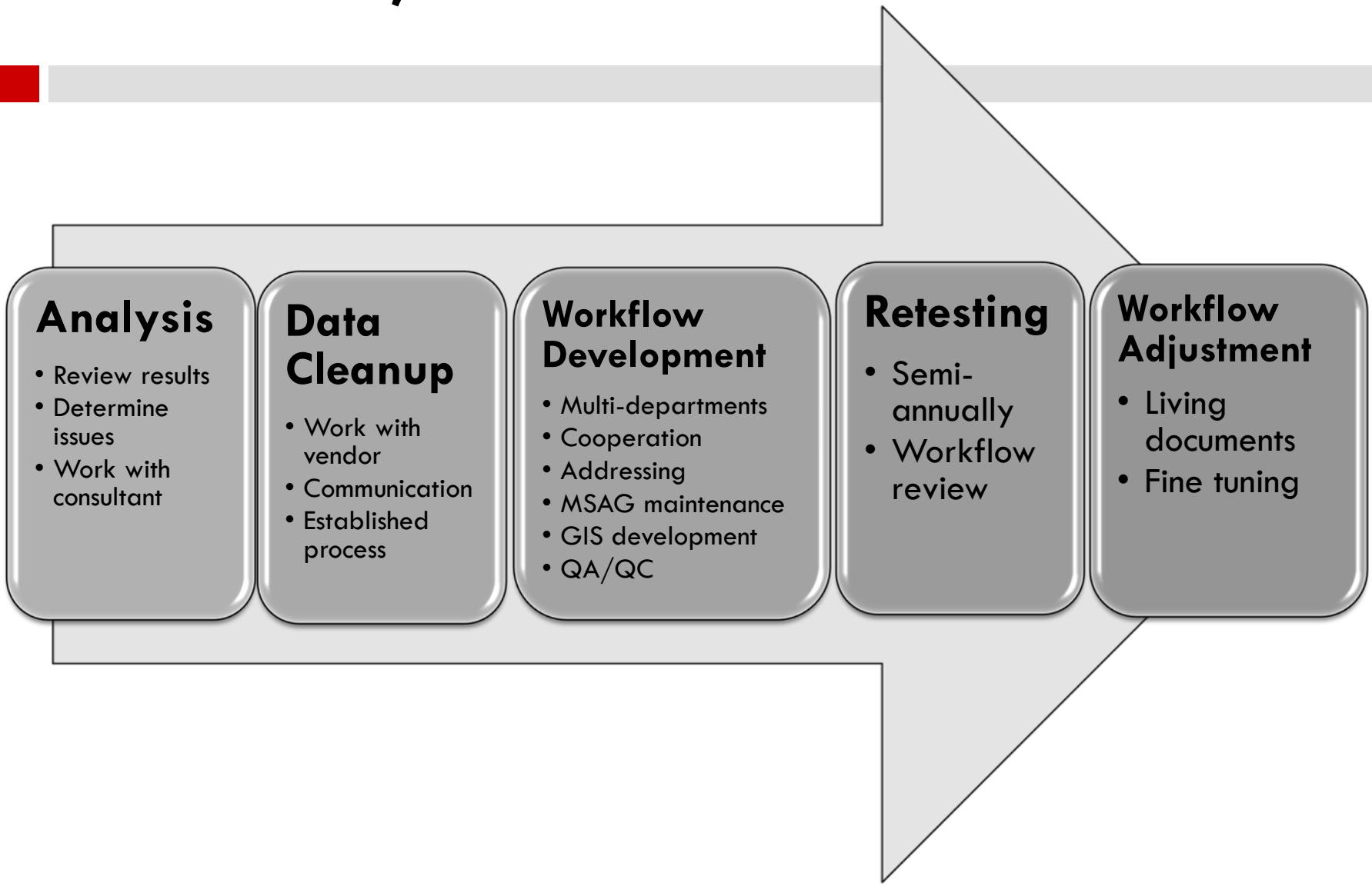
Henderson, NC



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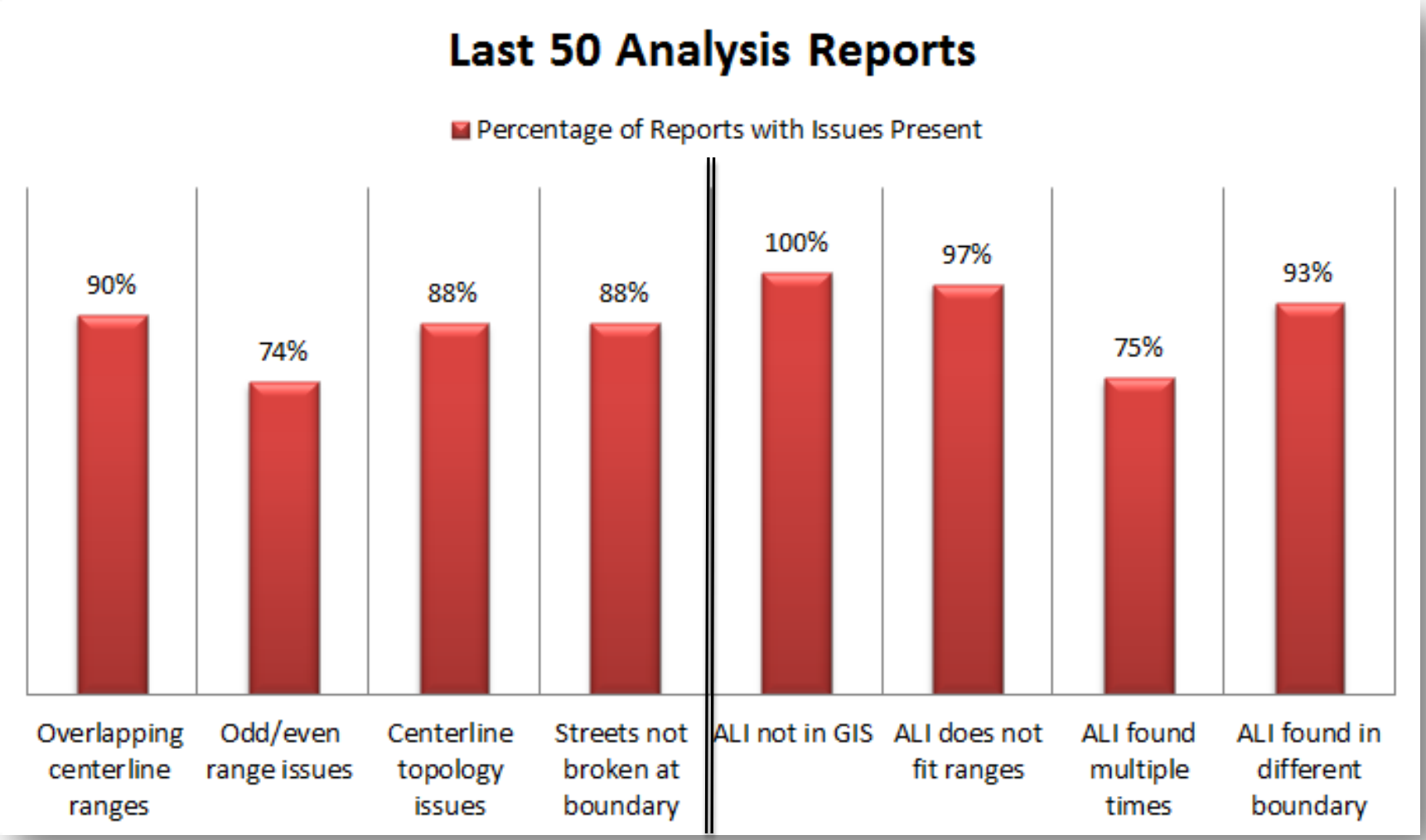
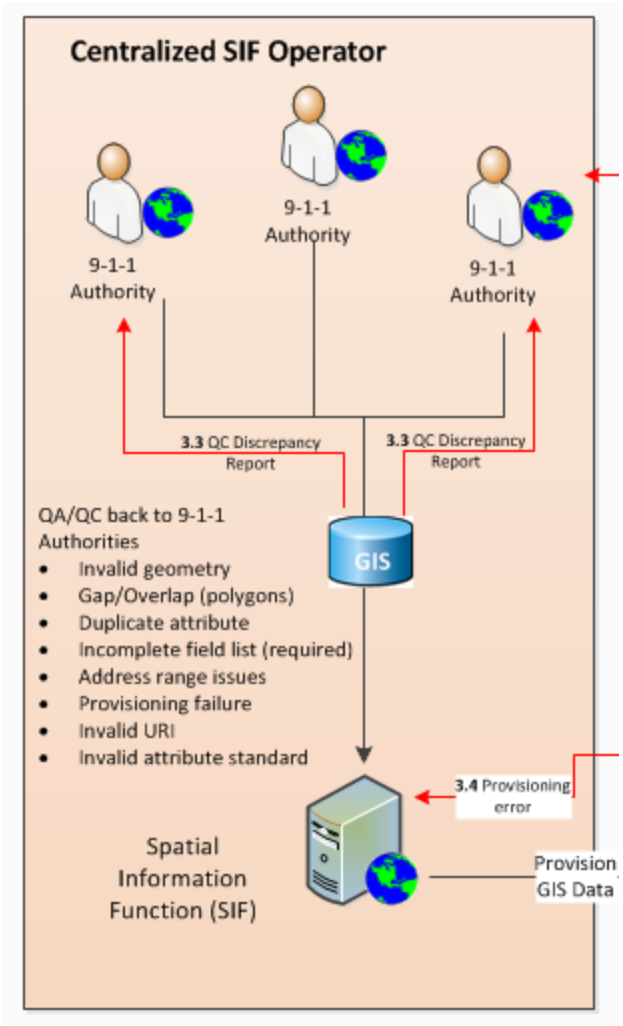
Data Quality

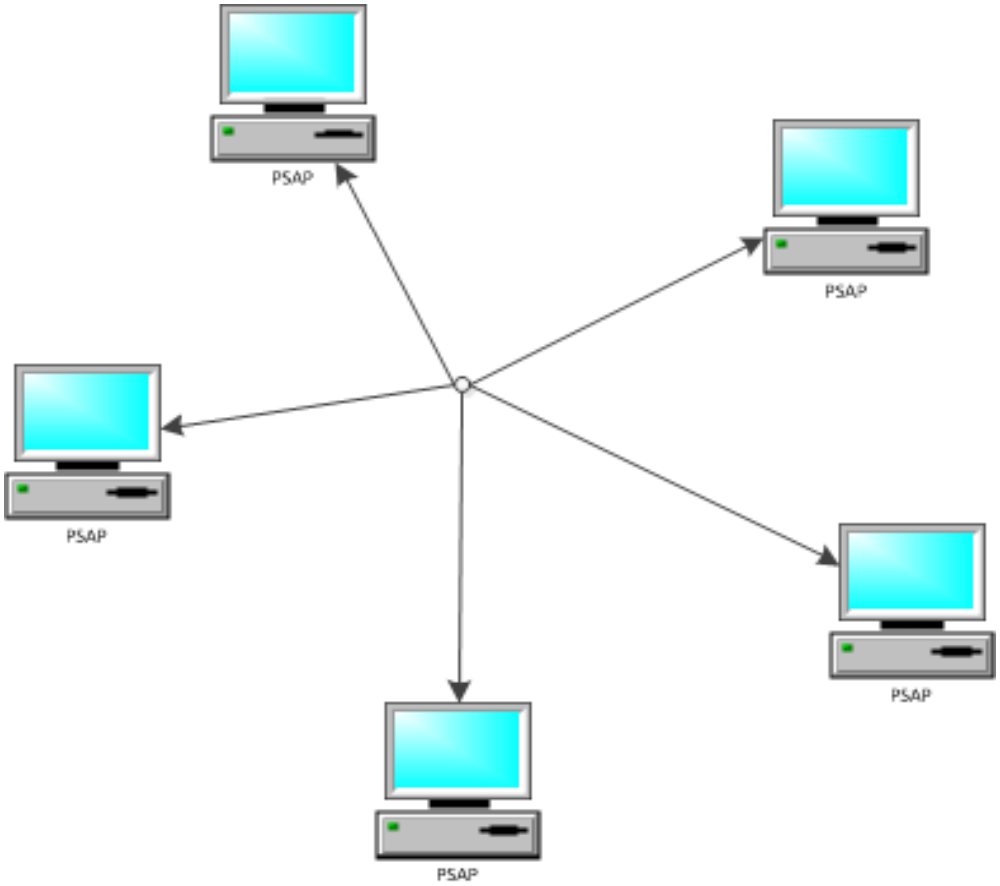


Provisioning Data to Spatial Router (LoST)



- Possible QA/QC back to 9-1-1 Authorities
  - Invalid geometry
  - Gap/Overlap (polygons)
  - Duplicate attribute
  - Incomplete field list (Mandatory)
  - Address range issues
  - Provisioning failure
  - Invalid URI
  - Invalid attribute standard

Data Sharing



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Preparation

Quality	• Synchronization tests • Standards
Data Steward	• Where • How
Sharing	• Provisioning to LVF/ECRF

Communication, Cooperation, Collaboration

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URISA/NENA Joint Conference

November 2-6, 2013 | St. Louis, MO

St. Louis DoubleTree – Union Station

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Remember…

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  - Did you save my life?
  - Did you reduce human suffering?
  - Did you protect my property?

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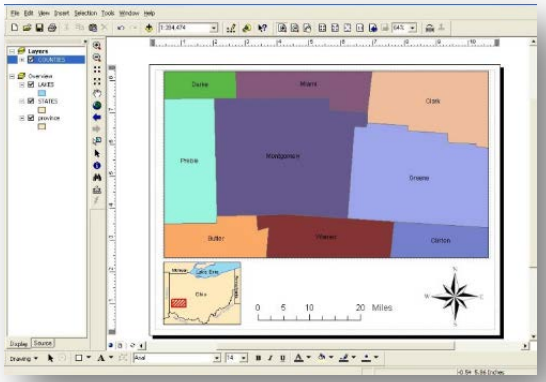
Why


CALL
9.1.1
EMERGENCY


Dane
Miami
Clark
Preble
Montgomery
Greene
Butler
Warren
Clinton
0 5 10 20 Miles

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